Grenfell Tower
Inquiry

GRENFELL TOWER INQUIRY: PHASE 2 REPORT

REPORT of the PUBLIC INQUIRY into the FIRE at GRENFELL TOWER on 14 JUNE 2017

The Panel:
Chairman: The Rt Hon Sir Martin Moore-Bick
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Volume 4
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This report contains content which some may find distressing.

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Part 6

The refurbishment of Grenfell Tower

Chapter 47
Introduction to Part 6

47.1 The refurbishment of Grenfell Tower between 2012 and 2016 lies at the heart of our investigations. We have therefore examined in some detail the course of the project from its original inception to completion. In order to provide the context in which the important decisions were made we begin with a description of the regulations and guidance relating to the construction of external walls of high-rise buildings which ought to have been uppermost in the minds of those making decisions about the nature of the work to be undertaken and the choice of materials.

47.2 That is followed by a brief description of the people and organisations involved in the work, which we have included to give the reader an overall understanding of the way in which individuals and organisations that appear frequently in the following chapters fit into the overall picture.

47.3 The story of how the refurbishment was planned and the important roles filled is of interest and importance, not only because decisions were made at that stage that affected the subsequent course of the work, but also because it sheds light on the way in which the TMO, as the client for the refurbishment, went about managing its own responsibilities.

47.4 Expert advice on fire safety was sought in the form of a fire safety strategy for the building, both in its existing form and following its intended refurbishment, but for reasons we describe, the latter was never completed, leaving a significant gap in the advice that should have been received by the TMO and the design team. A failure to understand the characteristics of the materials proposed for use in the refurbishment turned out to have disastrous consequences.

47.5 There follow several chapters in which we describe how the various materials and products used in the work came to be selected. It is a subject that calls for detailed examination because it was the decision to use aluminium composite panels with unmodified polyethylene cores in what was known as “cassette” form as the rainscreen that was primarily responsible for the rapid spread of the fire. Other products made a contribution, however, in particular the Celotex and Kingspan insulation boards, neither of which complied with the guidance on the use of combustible materials on high-rise buildings.

47.6 The requirement to obtain building control approval for the refurbishment should have ensured that any errors in design or the choice of materials were identified and put right before the work started. Regrettably, however, that did not happen. Given the importance of building control for the protection of the public, we have examined in some depth the reasons why the system failed to achieve the purpose for which it was designed.

47.7 Our investigations have disclosed that errors were made by many of those involved in the refurbishment and at many points during its course. As a result, we have found it convenient to collect our criticisms of each of the organisations principally responsible for the work in a number of individual chapters at the end of this Part.

Chapter 48
The legislative background

48.1 Chapter 5 of the Phase 1 report contains a brief summary of the main legislative provisions and associated guidance that applied to the refurbishment of Grenfell Tower. However, in order to give a true picture of the context in which important decisions were taken in connection with the work, it is necessary at this stage to describe those provisions more fully and in greater detail. Given the important role played by the cladding system in the fire at Grenfell Tower, we concentrate on the statutory framework, including the statutory guidance relating to the construction of external walls, applicable during the period in which the refurbishment was carried out. In this chapter we also examine briefly the regulatory framework governing building control and the duties applicable under the CDM Regulations.

The Building Act 1984

48.2 The Building Act 1984 ("the Act")[1] is the principal primary legislation governing building and buildings and related matters. Section 1(1) of the Act gives the Secretary of State the power to make regulations with respect (among other things) to the design and construction of buildings for a number of purposes, including securing the health, safety and welfare of persons in or about buildings. Regulations made under section 1(1) of the Act are known as "building regulations" and were made by way of statutory instrument. The regulations in force at the time of the refurbishment were the Building Regulations 2010 ("the Regulations").[2]

48.3 Section 6 of the Act provides that the Secretary of State, or a designated body, may approve and issue documents for the purpose of providing practical guidance with respect to the requirements of any provision of the Regulations. At the time of the refurbishment that practical guidance was contained in a series of Approved Documents. The provisions of the Approved Documents are not mandatory; their purpose is merely to describe one or more ways in which the requirements of the Regulations can be met. Failure to comply with an Approved Document does not in itself render a person liable to any civil or criminal proceedings, but it may be relied upon in any proceedings as "tending to establish liability". Likewise, compliance with the provisions of an Approved Document, although not proof of compliance with the Regulations, may be relied on in any proceedings as "tending to negative liability".[3] It is important to note, however, that compliance with the Approved Documents does not ensure compliance with the Regulations.

48.4 Schedule 1 of the Act sets out further matters which building regulations may provide for. Paragraph 7 of Schedule 1 provides that they may make provision for (among other things) fire precautions.[4]

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1 The Building Act 1984 {HOM00035068}.
2 The Building Regulations 2010 {INQ00015098}.
3 See Section 7 of the Building Act 1984 {HOM00035068/13}.
4 Paragraph 7(iv) of Schedule 1 of the Building Act 1984 {HOM00035068/109} states "Fire precautions including (a) structural measures to resist the outbreak and spread of fire and to mitigate its effects, (b) services, fittings and equipment designed to mitigate the effects of fire or to facilitate fire-fighting, and (c) means of escape in case of fire and means for securing that such means of escape can be safely and effectively used at all material times."

48.5 Part 3 of the Regulations contains requirements for local authorities to be notified of building work. In particular, regulation 12(3) obliges a person intending to carry out building work in relation to a building to which the Regulatory Reform (Fire Safety) Order 2005 (the Fire Safety Order) applies to deposit full plans with the local authority in accordance with regulation 14. (The refurbishment of Grenfell Tower involved work on a building to which the Fire Safety Order applied and a deposit of full plans was therefore required.) By virtue of regulation 14, full plans are to consist of a description of the proposed work together with plans describing the work and demonstrating that it would comply with the Regulations.

48.6 The Act itself provides for the local authority's response to the deposit of full plans. Section 16 provides that, where plans for proposed work are deposited with a local authority, it is their duty to pass the plans unless a provision elsewhere in the Act requires them to be refused, or the plans are defective, or they show that the proposed work would contravene any of the Regulations. If the plans are defective or show that the work would contravene the Regulations, the local authority may reject them or (with the consent of the person by whom they were deposited) pass them subject to conditions. Within 5 weeks from the deposit of plans the local authority must give notice to the depositor stating whether they have been passed or rejected.[5]

48.7 Failure to comply with the Regulations is punishable by a fine (section 35), but in addition local authorities have the power to require the owner of the building to pull down or remove any work that contravenes the Regulations or make such alterations to it as are necessary to make it comply with them (section 36).

The Building Regulations 2010

48.8 The Regulations prescribe the standards that building work must meet and impose on the person proposing to carry it out a requirement to obtain approval from a local authority or approved inspector. The requirements for building work are set out in regulation 4, which provides that building work shall be carried out so that it complies with the requirements contained in Schedule 1. The Regulations apply to building work as defined in regulation 3, which includes, among other things, the material alteration of an existing building. An alteration is material for these purposes if the work, or any part of it, would at any stage result in the building's ceasing to comply with any one of a number of listed requirements of the Regulations or (if it did not comply with such a requirement before the work commenced) becoming more unsatisfactory than it previously had been, but there is no requirement when work is done to an existing building to bring it up to current standards. This is sometimes known as the "non-worsening principle". The listed requirements include functional requirements B1, B3, B4 and B5 relating to fire safety.[6] It is not disputed that the cladding work to Grenfell Tower, including the addition of insulation, and the renovation of the smoke control system constituted material alterations and that the Regulations therefore applied to them.

48.9 Paragraph 8(1)(e) of Schedule 1 to the Act gives the Secretary of State power to make building regulations with respect to buildings that are subject to a material change of use. A material change of use is defined in regulation 5. It occurs when, among other things, a building which contains dwellings is altered to contain a greater or lesser number of

[5] Section 16(4) of the Building Act 1984 {HOM00035068/20}. The five-week limit is subject to any agreed extensions up to a maximum of two months (section 16(12) {HOM00035068/22-23}.
[6] Section 3(3) of the Building Regulations 2010 {INQ00015098/7}.

dwellings than it did previously. In the case of Grenfell Tower refurbishment, the addition of new flats in those parts of the building that had previously been put to other uses constituted a material change of use.

48.10 The prescribed standards for building work are expressed in schedule 1 to the Regulations in terms of functional requirements. Although the refurbishment was required to comply with all the requirements, for the purposes of this report we concentrate on Part B.

48.11 Part B is concerned with fire safety and is divided into five sections:

B1 Means of warning and escape.

B2 Internal fire spread (linings).

B3 Internal fire spread (structure).

B4 External fire spread.

B5 Access and facilities for the fire service.

48.12 Requirements B1, B3(4) and B4 are of particular relevance to the fire at Grenfell Tower and deserve to be quoted in full:

Means of warning and escape

B1. The building shall be designed and constructed so that there are appropriate provisions for the early warning of fire, and appropriate means of escape in case of fire from the building to a place of safety outside the building capable of being safely and effectively used at all material times.

Internal fire spread (structure)

B3. (4) The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.

External fire spread

B4. (1) The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building.

(2) The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building.

48.13 The Regulations also contain certain energy efficiency requirements. In particular, regulation 23 provides that where renovation of a thermal element (which would include an external wall) constitutes a major renovation or amounts to the renovation of more than 50% of the element's surface area, the renovation must be carried out so as to comply with paragraph L1(a) of schedule 1 in so far as that is technically, functionally and economically feasible. Requirement L of schedule 1 is headed "Conservation of Fuel and Power" and paragraph L1(a) provides that reasonable provision shall be made for the conservation of fuel and power in buildings by limiting heat gains and losses through thermal elements and other parts of the building fabric.

48.14 The supervision of the proposed work by the local authority is intended to culminate in the issue of a completion certificate evidencing compliance with certain requirements of the Regulations. Those requirements include the applicable requirements of regulation 38

(discussed below) and schedule 1 of the Regulations. Once issued, a certificate is evidence (but not conclusive evidence) that the requirements specified in the certificate have been complied with.

48.15 Regulation 38 is concerned with the provision of fire safety information. It applies where building work consists of or includes the erection or extension of a relevant building or is carried out in connection with a relevant change of use and when Part B of Schedule 1 imposes a requirement in relation to the work. In those circumstances the regulation obliges the person carrying out the work to give the responsible person under the Fire Safety Order not later than the date of completion of the work or the date of occupation of the building or extension, whichever is the earlier, information relating to the design and construction of the building and the services, fittings and equipment provided in or in connection with it that will assist that person to operate and maintain the building with reasonable safety.

48.16 The Fire Safety Order is considered in greater detail in Part 2 of this report. For the purposes of the Regulations, however, it is important to note that article 45 requires a local authority in receipt of a full plans application in relation to a building to which the order applies to consult the enforcing authority (in this case the London Fire and Emergency Planning Authority ("LFEPA") before passing the plans.[7]

The Construction (Design and Management) Regulations 2007 and 2015

48.17 The Construction (Design and Management) Regulations were made by the Secretary of State under powers in the Health and Safety at Work Act 1974. They seek to protect persons against risks to health and safety arising from construction work through the establishment of a systematic framework for the assessment and management of those risks. The definition of construction work includes the construction, alteration, conversion, fitting out, commissioning, renovation, repair, upkeep, redecoration or other maintenance of any building.[8] The first regulations were made in 1994 and came into force in March 1995. They were replaced in 2007 and again 2015. The 2007 Regulations remained in force until 5 April 2015 when the 2015 Regulations came into force.

48.18 The CDM Regulations 1994 and 2007 were each supported by guidance in the form of Approved Codes of Practice (ACOPs) published by the Health and Safety Executive, which provided practical guidance on how to comply with the law.[9]

48.19 When the CDM Regulations 2007 were superseded by the CDM Regulations 2015, a transition period from 6 April to 6 October 2015 was introduced to enable all those affected to put in place alternative arrangements.

48.20 The CDM Regulations 2007 are relevant to our investigation of the refurbishment because they imposed various duties on clients, designers (defined as including anyone preparing or modifying a design or instructing others to do so)[10] and contractors relating to health and

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7 For more detailed consideration of this provision see Menzies Module 1 Report {BMER0000004/139-140}. In practice, save for the highest risk or most complex projects, the consultation expected by building control and the LFEPA related to the B1 (means of escape) and B5 (access and facilities for the fire service) functional requirements only.

8 See regulations 2 and 3 of the Construction (Design and Management) Regulations 2007 {INQ00011315/1-4}.

9 See the 2007 Code "*Managing health and safety in construction*" at {INQ00013936}. The CDM Regulations 2015 {INQ00011316} were not supported by an ACOP. Instead, the HSE published guidance in the form of a document entitled "*Managing health and safety in construction*" {HSE00000003}.

10 See Regulation 2 of the 2007 Regulations {INQ00011315/2}.

safety or reinforced existing duties under health and safety legislation. We refer to these in more detail where relevant in the following chapters describing the refurbishment work at Grenfell Tower. The 2015 Regulations also imposed an obligation on the principal designer to prepare a health and safety file, keep it under review and deliver it to the client at the end of the project.[11]

Statutory guidance: Approved Documents

48.21 As we have set out above, section 6 of the Building Act 1984 Act provides for the publication by the Secretary of State of documents providing practical guidance with respect to the requirements of the Building Regulations. At the time of the refurbishment that practical guidance was contained in a series of Approved Documents, which themselves referred to British Standards and other guidance. Approved Document B dealt with fire safety. Before the Grenfell Tower fire, it was divided into two volumes: volume 1 dealt with dwelling houses; volume 2 dealt with all other buildings, including blocks of flats and buildings containing flats.

Approved Document B

48.22 As we have set out in Chapters 4 and 6, Approved Document B was first published in 1985 and was amended on numerous occasions thereafter. In this section of the report we have referred to the 2006 version incorporating the 2007, 2010 and 2013 amendments.[12]

48.23 Section 12 of Approved Document B provided guidance on the construction of external walls.[13] Our attention has focused most closely on paragraphs 12.5–12.8 of that guidance, which are worth setting out in full:

> "12.5 The external envelope of a building should not provide a medium for fire spread if it is likely to be a risk to health or safety. The use of combustible materials in the cladding system and extensive cavities may present such a risk in tall buildings.
>
> External walls should **either** meet the guidance given in paragraphs 12.6 to 12.9 or meet the performance criteria given in the BRE Report *Fire performance of external thermal insulation for walls of multi storey buildings* (BR 135) for cladding systems using full scale test data from BS 8414-1:2002 or BS 8414-2:2005.
>
> 12.6 The external surfaces of walls should meet the provisions in Diagram 40…
>
> 12.7 In a building with a storey 18m or more above ground level any insulation product, filler material (not including gaskets, sealants and similar) etc. used in the external wall construction should be of limited combustibility (see Appendix A). This restriction does not apply to masonry cavity wall construction which complies with Diagram 34 in Section 9.[14]
>
> 12.8 Cavity barriers should be provided in accordance with Section 9."

48.24 Paragraph 12.5 thus provided two potential routes to compliance with the Regulations: following the guidance in paragraphs 12.6 to 12.9 (sometimes referred to as the "linear route") or meeting the performance criteria in BR 135 following testing in accordance with BS 84[14]. However, Approved Document B provided no more than guidance and in addition to the two routes it set out, there could be other ways of demonstrating compliance with

[11] Regulations 12(5) and 12(10) of the 2015 Regulations {INQ00011316/12}.
[12] {CLG00000224}.
[13] {CLG00000224/95}.
[14] {CLG00000224/95-96}.

the functional requirements of the Regulations to which we refer below. We note in passing that the majority of witnesses who gave evidence about the design of the Grenfell Tower refurbishment either thought that the "linear route" had been adopted or were not aware which route had been adopted.[15]

48.25 Paragraph 12.6 of Approved Document B provided that the external surfaces of walls should meet the provisions in Diagram 40.[16]

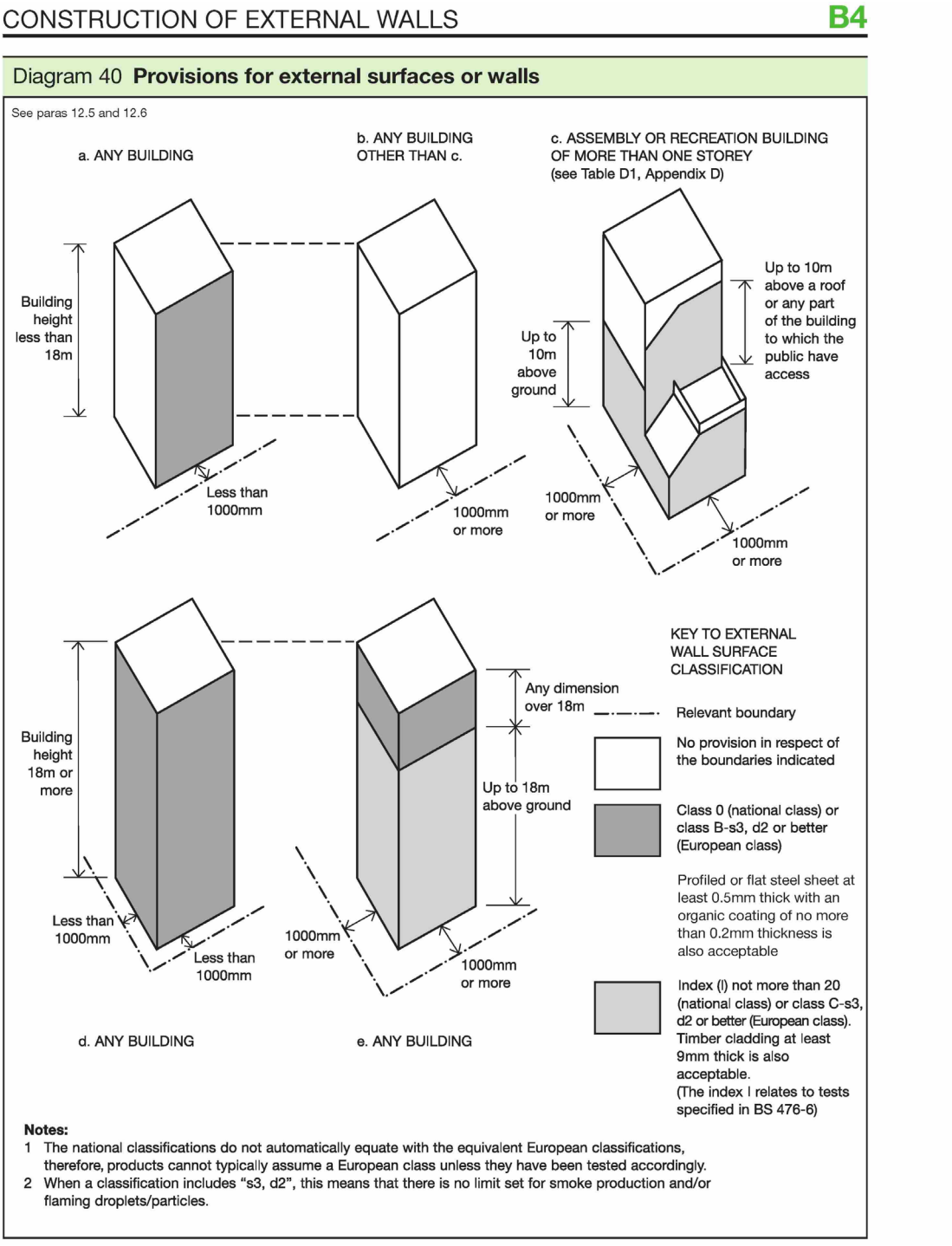

Figure 48.1 – Diagram 40

[15] Sounes {Day7/138:2-16}; Crawford {Day9/177:3}-{Day179:23}; Ashton {Day17/138:2-3}; Lawrence {Day22/77:1-16}; Bailey {Day33/27:10-24}; Anketell-Jones {Day35/170:21}-{Day172:25}; Anketell-Jones {Day35/173:15-19}; Lamb {Day37/141:19}-{Day37/142:14}; Hoban {Day45/37:21}-{Day45/40:16}; Allen {Day47/25:22-25} {Day47/116:22-25}.

[16] {CLG00000224/95-97}.

48.26 The heading of Diagram 40 (in particular the use of the words "or walls") might suggest that a distinction is being drawn between "external surfaces" and "walls" but the label in the key to Diagram 40 is concerned solely with "external wall surface classification". We think it is clear that it was intended to apply to the wall's external surface and thus to the material or product that makes up the outer surface of the wall.[17] That is certainly consistent with the language of paragraph 12.6 of the guidance which introduces Diagram 40 and which refers to the "external surfaces of walls".

48.27 Diagram 40e applied to Grenfell Tower and required that above 18 metres from the ground the external surface of the walls had to satisfy national class 0 or European class B-s3, d2 or better. We have described in Chapter 5 the tests which supported those classifications.

48.28 In our view the wording of paragraph 12.6 suggests that it applies to the external surface of a wall and does not include any product, such as insulation, that may have been fitted behind it. Similarly, when considering a composite product, such as an ACM panel, the paragraph naturally refers to its surface rather than to its core.

48.29 Paragraph 12.7 is headed "Insulation Materials/Products". It provided that in a building with a storey 18 metres or more above ground level any insulation used in the external wall construction should be of limited combustibility.[18] Limited combustibility is defined in Appendix A of Approved Document B (see Chapter 6).[19]

48.30 It has been argued that paragraph 12.7 should be understood as applying to the core of ACM cladding panels of the kind installed at Grenfell Tower.[20] The argument was put in two ways. The first relied on the use of the word "filler" in paragraph 12.7, which was said to be apt to refer to the core of a composite cladding panel. We do not agree with that. The word "filler" forms part of the expression "insulation product, filler material (not including gaskets, sealants and similar) etc. used in the external wall construction". In that context the word "filler" naturally means a material, such as compressible fibre or expanding foam, used to fill gaps of an unplanned or occasional kind rather than small apertures that are intended to be closed off by gaskets or sealants. It is not apt to refer to the core of a composite cladding panel which is an integral part of the finished product. We derive further support for our conclusion from the fact that we have not seen any evidence that the core of a composite panel was described as "filler" by anyone in the building industry before the Grenfell Tower fire.

48.31 The second argument was that the provisions relating to external surfaces in paragraph 12.6 and Diagram 40 were additional to the basic requirement that the external walls of a building over 18 metres in height should be composed only of materials of limited combustibility in the facade and do not override the functional requirement that they adequately resist the spread of fire.[21] That interpretation was supported by Beryl Menzies[22] and support can also be found for it in industry guidance published by the Building Control Alliance in its Technical Guidance Note 18, which we discuss in Chapter 49.[23] However, in neither case was any reason given for adopting that interpretation, beyond saying that it would give effect to functional requirement B4(1).

17 Hyett {PHYR0000029/34} section 4.2.42.
18 Throughout the external wall, not just at heights above 18 metres.
19 {CLG00000224/132}.
20 Team 1 Module 1 Opening Statement {BSR00000061/30} paragraph 13.16(2).
21 BSR Team 1 Module 1 Opening Submissions {BSR00000061/30} paragraph 13.16 (2).
22 Menzies {BMER0000004/126} paragraph 417.
23 BCA Technical Guidance Note 18, Issue 0 {CEP00057294}.

48.32 We do not agree that paragraph 12.7 of Approved Document B can be read in that way. Functional requirement B4(1) sets out the standard with which external walls must comply. The purpose of Approved Document B was to provide guidance on ways in which that standard might be met, which it did by identifying certain elements of the wall and suggesting the kinds of materials that were likely to ensure compliance. There is nothing in the language of paragraphs 12.5–12.9 (including paragraph 12.7) to support the conclusion that all elements of the external wall, including the core of any composite panel, should be of limited combustibility. The only reference to "limited combustibility" is found in paragraph 12.7 which referred only to insulation products. That would naturally have been understood as referring to materials and products used for the purposes of insulation, not as referring to materials chosen for other purposes but which happen to have insulating properties.

48.33 Section 9 of Approved Document B provided guidance on the provision of cavity barriers to inhibit the spread of smoke and flame through concealed spaces or cavities in the construction of a building as required by functional requirement B3.[24] Paragraph 9.1 draws attention to the risks of fire spread within cavities and warns that "as any spread is concealed, it presents a greater danger than would a more obvious weakness in the fabric of the building."[25] Paragraph 9.3 makes it clear that cavity barriers should be provided to close the edges of cavities, "including around openings". Diagram 33 (reproduced below) shows where cavity barriers are required in external walls, namely, at the lines of compartment floors and compartment walls, at the top of any cavities in the walls and around openings such as those provided for doors and windows.

[24] {CLG00000224/82}.
[25] {CLG00000224/82}.

B3

Section 9: Concealed spaces (cavities)

Introduction

9.1 Concealed spaces or cavities in the construction of a building provide a ready route for smoke and flame spread. This is particularly so in the case of voids in, above and below the construction of a building, e.g. walls, floors, ceilings and roofs. As any spread is concealed, it presents a greater danger than would a more obvious weakness in the fabric of the building.

Provision of cavity barriers

9.2 Provisions for cavity barriers are given below for specified locations. The provisions necessary to restrict the spread of smoke and flames through cavities are broadly for the purpose of sub-dividing:

a. cavities, which could otherwise form a pathway around a fire-separating element and closing the edges of cavities; therefore reducing the potential for unseen fire spread; and

Note: These should not be confused with fire-stopping details, see Section 10 and Diagram 33 (see also paragraphs 9.3 to 9.7).

b. extensive cavities (see paragraphs 9.8 to 9.12).

Consideration should also be given to the construction and fixing of cavity barriers provided for these purposes and the extent to which openings in them should be protected. For guidance on these issues, see paragraphs 9.13 to 9.16 respectively.

Diagram 33 **Provisions for cavity barriers**

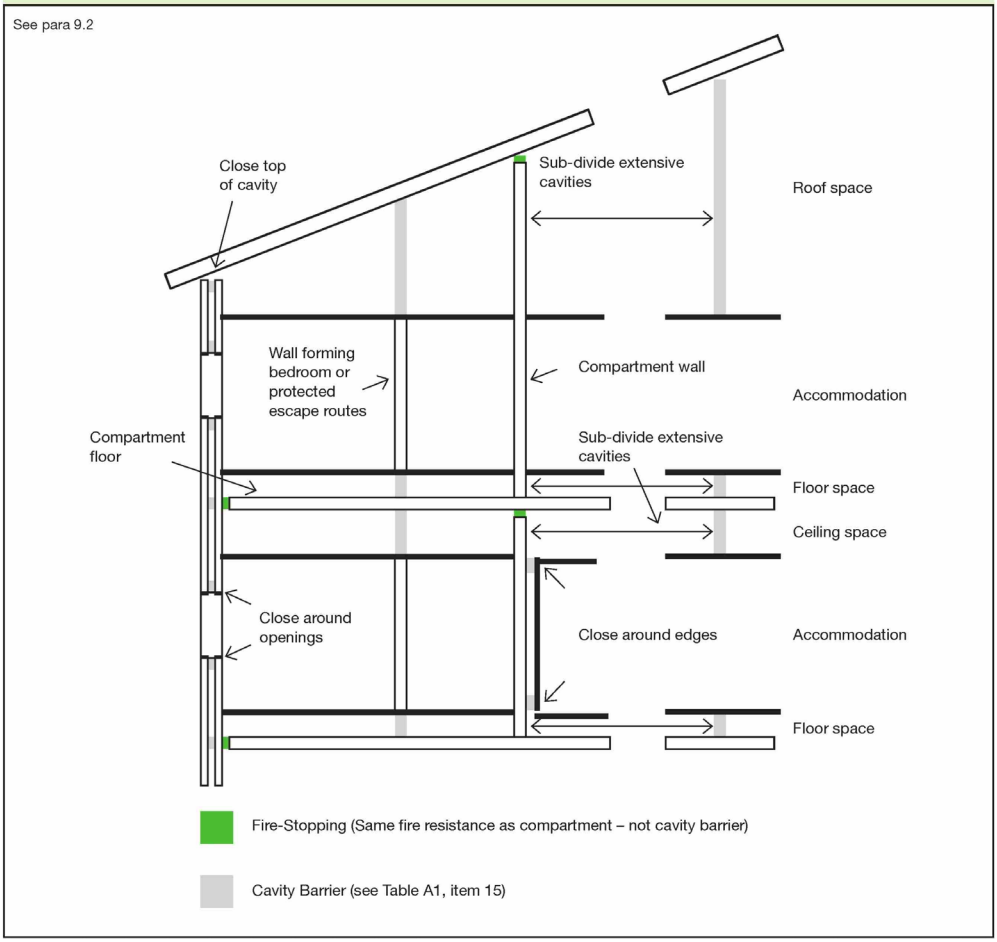

Figure 48.2 – Diagram 33

48.34 Paragraph 9.13 gives guidance on the construction and fitting of cavity barriers and states that they should provide at least 30 minutes' fire resistance.[26] Cavity barriers should be distinguished from fire stopping, which is a seal provided to close an imperfection of fit or design tolerance between elements or components, to restrict the passage of fire and smoke.[27]

[26] {CLG00000224/86}.
[27] Approved Document B, Appendix E, definition of "Fire stop" {CLG00000224/144}.

Comments on Approved Document B

48.35 Our investigations have revealed two particular problems relating to Approved Document B to which we think we should draw attention. The first relates to the guidance itself. Paragraph 2.3c on the means of escape from flats assumes that compliance with functional requirement B3 will provide a high degree of compartmentation and a low probability of fire spreading beyond the flat of origin, so that simultaneous evacuation of the building is unlikely to be necessary. In other words, it assumes that there would be no need for a partial or total evacuation of the building in the unlikely event that the fire spread beyond the compartment of origin and that a stay put strategy is therefore appropriate. That assumption holds good, however, only as long as the external wall of the building does not itself support the spread of fire.

48.36 Some uncertainty has arisen from the fact that functional requirement B4(1), which section 12 of Approved Document B was intended to support, requires only that the external walls should "adequately" resist the spread of fire, having regard to the height, use and position of the building. However, we assume that the word "adequately" was chosen to accommodate the full range of buildings to which the functional requirement applies. What is adequate will vary from case to case having regard to a number of matters, including the characteristics of the building.

48.37 It has been known for a long time that, even in the case of a fully compartmented residential building constructed entirely of non-combustible materials such as concrete (as Grenfell Tower was before the refurbishment), a fire in one compartment may spread to the compartment above as a result of the "coanda" effect. A limited degree of fire spread of that kind is not considered to undermine a stay put strategy because the extent of the evacuation required is very limited. Thus a limited degree of fire spread is acceptable, even where the building has a stay put strategy, because the ability of the external walls to resist the spread of fire is adequate.

48.38 However, the assumption underlying the guidance ceased to hold good when it became the practice to overclad high-rise residential buildings using materials that would support the spread of fire and to construct new buildings with steel frames with external walls composed in whole or in part of materials that would support the spread of fire. Unless all the materials used in the external wall are non-combustible, the effect in either case is to destroy the isolation of individual compartments by installing a continuous layer of combustible material on the outside of the building that would support the spread of fire across the outside of many compartments.

48.39 The failure to appreciate the effect of those developments introduced a fundamental flaw into the statutory guidance, which was not amended to draw the attention of designers to the need to consider the nature of the materials proposed to be used and other factors, such as access for the fire and rescue service, the nature of the occupants, the measures provided for alerting them to a fire and the means of escape if that should that become necessary, all of which have a bearing on whether the ability of the external wall to resist the spread of fire is adequate. If the external walls of a high-rise residential building support the spread of fire to any significant degree they are unlikely adequately to resist the spread of fire unless arrangements have been made to enable all those occupants who may be threatened by the fire to escape quickly and safely; but in any event it is not possible to operate a stay put strategy safely in relation to such a building.

48.40 The effect of the introduction of new materials and methods of construction does not appear to have been recognised by any of the witnesses (other than the experts), including those from DCLG or BRE.[28] There appears to have been a widely held view in the construction industry that if the surface of an external wall panel was classified Class 0, it was safe to use it on a building of any kind. There was also a widespread but erroneous understanding that if, following a test in accordance with BS 8414, an external wall system satisfied the criteria in BR 135, the building when completed would inevitably satisfy functional requirement B4(1) of the Building Regulations. Moreover, many in the industry failed to appreciate that the BS 8414 test applies only to a wall system as a whole and tells one nothing about its individual components. It is a matter of concern that no one appears to have considered whether the extent of flame spread that could occur while still satisfying the performance criteria in BR 135 was consistent with the adoption of a stay put strategy. We return to this matter in the context of our recommendations.

48.41 The second problem relates to the relationship between the regulations and the statutory guidance and the way in which Approved Document B is understood and applied by many in the construction industry. One striking feature of the evidence was the extent to which many construction professionals have routinely regarded the statutory guidance as containing a definitive statement of the requirements of the Building Regulations. In the absence of a clear statement to the contrary, we think that is an inevitable consequence of couching the guidance in prescriptive terms. Many construction professionals appear to be uncomfortable with the broad language of functional requirements B1 to B4 and want to be told what is expected of them and in any event many are not competent to translate the general language of the functional requirements into decisions about the choice of materials or methods of construction. That presents a particular problem for those who frame the statutory guidance, but while the functional requirements continue to set the standard which the law requires, it must be made clear in the guidance that following its provisions will not necessarily result in compliance with the regulations.

48.42 For reasons given elsewhere, Class 0 was never an appropriate standard for rainscreen panels, particularly panels with highly combustible polyethylene cores. In our view the guidance should explicitly have drawn the attention of those responsible for designing the cladding to the fact that Class 0 panels might not satisfy the requirements of functional requirement B4(1).

48.43 More generally, we think that Approved Document B requires a complete overhaul. It is out of date in many respects, not helpfully worded and does not contain the guidance that designers need. In a constantly changing environment it needs to be kept under review and revised annually or more often if circumstances demand. It should be drafted conservatively, so that those who follow the guidance can have a high degree of confidence that, if it is followed, the functional requirements will be met. Again, we return to this matter in the context of our recommendations.

[28] See the examination of Dr Colwell at {Day231/175:11-24}; Debbie Smith {Day236/114:4}-{Day236/115:4}; Martin {Day251/96:19}-{Day251/98:19}; Burd {Day238/214:10}-{Day238/215:6}.

Chapter 49
Industry guidance on the construction of external walls

49.1 In this chapter we describe the industry guidance relevant to the refurbishment of the external wall of Grenfell Tower that was publicly available from reputable sources at and around the time of the refurbishment. In addition to the guidance contained in Approved Document B, certain bodies within the construction industry published guidance on the various aspects of the construction of external walls, particularly the walls of high-rise buildings. There were important developments in that guidance, particularly between 2012 and 2017, as more became known about the performance of certain products and materials in response to fire. In some respects the guidance contained in Approved Document B was overtaken by guidance published by the industry which suggested more rigorous requirements for the fire performance of each element of any external wall. According to Dr Lane[29] and Mr Sakula,[30] knowledge of the dangers posed by the use of combustible materials was developing rapidly during that time, partly as the result of a series of fires in high-rise buildings in various countries whose external walls contained insulation made from organic materials and aluminium composite material rainscreen panels with a polyethylene core ("ACM PE panels"). Those fires and the information readily available about them are discussed in more detail in Chapter 11 of this report.

Building Research Establishment: BR 135

49.2 In 1988 the Building Research Establishment (BRE) published guidance entitled *Fire performance of external thermal insulation for walls of multi-storey buildings*.[31] It is generally known as "BR 135". The document was revised in 1999 and a second edition was published in 2003 following the fire at Garnock Court, Irvine in 1999.[32] A third edition was published in 2013.[33] The second and third editions are relevant to the refurbishment of Grenfell Tower. BR 135 is expressly referred to in paragraph 12.5 of Approved Document B, which adopts its performance criteria using full scale test data derived from a BS 8414 test as providing one way of demonstrating compliance with functional requirement B4(1) of the Building Regulations.[34] The history of BR 135 and the test methods contained in BS 8414-1 (2002) and 2 (2005) are described in Chapter 5 of this report.

49.3 The second edition of BR 135 (2003) contained a series of important warnings about the risks posed by combustible external cladding systems. For example, Figure 2 illustrated the way in which fire may spread rapidly up through the building envelope itself to create secondary fires in compartments at many levels.[35]

29 Lane {Day61/195:1}-{Day61/197:19}.}.
30 Jonathan Sakula, Report of Facade Expert {JOS00000001/34} paragraphs 8.1.1-8.1.2; {JOS00000001/35-37} paragraphs 9.2-9.4; {JOS00000001/60-61} paragraphs 17.6-17.12, Sakula {Day125/29:13-20}; {Day125/94:15}-{Day125/96:12}; {Day125/101:25}-{Day125/102:22}; {Day125/108:1-5}.
31 See introduction to BR 135, 3rd Edition {CEL00003364/4}.
32 {BRE00005554/7}.
33 {CEL00003364/4}.
34 {CLG00000224/95}.
35 {BRE00005554/9}.

49.4 The guidance contained further warnings about the risks posed by external cladding systems, in particular, the risk that the existence of cavities may cause flames to become elongated and drawn up the building, possibly unseen,[36] to affect several stories simultaneously and how fire can spread unseen through cavities,[37] thus making firefighting more difficult.[38] The guidance also referred to the fact that non-combustible materials were typically used in such systems as it was difficult to prevent fire entering the cavity and spreading through the insulating material.[39] It also warned that, if exposed directly to the sustained flame envelope, metal panels, such as aluminium, might melt, generating molten debris.[40]

49.5 The third edition of BR 135 (2013) repeated the warnings given in the second edition[41] and contained further warnings about external fire spread and the use of certain materials in cladding systems. In particular, it drew attention to the rapid development of the market for cladding systems, driven by the need to construct more energy-efficient and sustainable buildings, which had resulted in increased volumes of potentially combustible materials being used in external cladding applications.[42] There were further important warnings about the proper use of cavity barriers and fire-stopping. The warnings about insulation and cladding panels were also more detailed. In particular, on the subject of cladding panels it said:

> "These products generally have good surface spread of flame characteristics to prevent rapid fire spread across the surface of the system, but once the panels become involved in the fire, they have the potential to generate falling debris, add to the overall fire load, and provide a route for fire to propagate up the outside of the building"[43]

Building Control Alliance

49.6 The Building Control Alliance ('BCA') was formed in 2008 to represent the interests of those involved in carrying out building control functions, both local authorities and approved inspectors, and to promote consistency in the interpretation of the Building Regulations and statutory guidance. From time to time its Technical Group published guidance notes intended to assist building control officers in carrying out their functions.

49.7 In June 2014 BCA produced version 0 of its Technical Guidance Note 18 entitled *Use of Combustible Cladding Materials on Residential Buildings* (TGN 18).[44] The introduction to TGN 18 stated that the note outlined the procedures referred to in paragraph 12.5 of Approved Document B for demonstrating compliance with functional requirement B4(1) and set out to address common misconceptions relating to combustibility and surface spread of flame ratings.[45]

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36 {BRE00005554/10}.
37 {BRE00005554/17}.
38 {BRE00005554/10}.
39 {BRE00005554/17}.
40 {BRE00005554/17-18}.
41 {CEL00003364} see e.g. paragraphs 3.3.2 and 3.5.
42 {CEL00003364/11} paragraph 2.1.
43 {CEL00003364/22} paragraph 6.4.1.
44 {CEP00057294} The purpose of the note is described as follows: "BCA technical guidance notes are for the benefits of its members and the construction industry, to provide information, promote good practice and encourage consistency of interpretation for the benefit of our clients. They are advisory in nature, and in all cases the responsibility for determining compliance with the Building Regulations remains with the building control body concerned."
45 {CEP00057294/1}.

49.8 Under the heading "Key Issues", TGN 18 stated that the spread of fire by way of the external wall is exacerbated by the use of combustible materials and extensive cavities. It warned that within the confines of a cavity, flames can elongate up to ten times in search of oxygen, meaning that there is a need for robust cavity barriers, restricted combustibility of key components and the use of materials with a low spread of flame rating.[46]

49.9 Importantly, TGN18 made it clear that a surface spread of flame classification does not indicate that the material is not combustible. It went on to state that:

> "Thermosetting insulants (rigid polyurethane foam boards) do not meet the limited combustibility requirements of AD B2 Table A7 and so should not be accepted as meeting AD B2 paragraph 12.7. However, if they are included as part of a cladding system being tested to BR135 & BS8414, the complete assembly may ultimately prove to be acceptable.
>
> The BR135 / BS8414 tests deal solely with the spread of fire once it has entered the cavity. Hence, the requirements for cavity barriers in accordance with Section 9 of AD B2 are required in all cases including around openings in the façade."[47]

49.10 TGN 18 went on to recommend three options for demonstrating compliance with paragraph 12.7 of Approved Document B.[48] Option 1 was the use of materials of limited combustibility for *all* elements of the cladding system both above and below 18 metres. Option 2 was to demonstrate that the entire system met the performance criteria in BR 135 when tested in accordance with BS 8414. Option 3 was to submit a desktop study report from "a suitable independent UKAS accredited testing body" based on test data already in its possession stating whether, in its opinion, the proposed system would meet the criteria in BR 135. As far as we are aware, that was the first occasion on which it had been formally suggested that a desktop study could provide a means of demonstrating compliance with functional requirement B4(1). It was not referred to in Approved Document B and was not the method adopted in connection with the refurbishment of Grenfell Tower.

49.11 A further edition of TGN 18 (version 1) published in July 2015 contained similar warnings about external fire spread.[49] This revised guidance made it clear that a wider group of thermosetting insulants did not meet the limited combustibility requirements of Approved Document B Table A7, including polyisocyanurate and polystyrene foam boards. When dealing with desktop study reports the guidance now said that a report from a "suitably qualified fire specialist" based on test data from a suitable independent UKAS accredited testing body was acceptable, without indicating what qualifications might be required for the purpose. The effect of that change was to increase the number of persons who might be considered suitable to carry out such a study. This version also introduced a fourth option in the form of a "holistic fire-engineered approach" taking into account "the building geometry, ignition risk and factors restricting fire spread etc."[50] That method was not adopted in connection with the refurbishment of Grenfell Tower.

46 {CEP00057294/1}.
47 {CEP00057294/1}.
48 {CEP00057294/2}.
49 {CEL00002347}.
50 {CEL00002347/2}.

Centre for Windows and Cladding Technology

49.12 The Centre for Windows and Cladding Technology (CWCT) is an industry body comprising a broad spectrum of clients, architects, consultants, contractors, manufacturers and researchers which exists to assist its members in the construction of building envelopes and glazing.[51] From time to time it publishes recommended standards and guidance for the benefit of its members and hosts meetings to discuss matters of interest to the industry. In the period 1996 to 2018, CWCT produced five documents of relevance to the Inquiry's investigations: *Guide to Good Practice for Facades*, 1996;[52] *Standard for Walls with Ventilated Rainscreens*, 1998;[53] *Standard for Systematised Building Envelopes*, 2008 ("the CWCT Standard");[54] Technical Note 73, *Fire performance of curtain walls and rainscreens*, March 2011;[55] and Technical Note 98, *Fire performance of facades – Guide to the requirements of UK Building Regulations*, 2017.[56]

49.13 The CWCT's *Guide to Good Practice for Facades* (1996) stated that thermal insulation should be inert and drew attention to the fire performance of some insulating materials.[57] The *Standard for Walls with Ventilated Rainscreens* (1998) made clear that any cavity behind rainscreens should not include materials which could significantly promote flame spread within the unseen cavity and therefore recommended non-combustible insulation.[58] It warned that the use of any combustible material for the cladding framework and insulation needed to be carefully considered as the height of the building increased.[59] Both of those CWCT standards were referred to in the structural performance specification for Grenfell Tower.[60]

49.14 The CWCT Standard (2008) gave guidance on a range of aspects of the construction of the external envelopes of buildings[61], with part 6 focusing on fire performance.[62] Within part 6 the standard provided that the building envelope should not be composed of materials which readily support combustion, add significantly to the fire load, or give off toxic fumes.[63] It emphasised the importance of test evidence supporting fire performance requirements, as follows:

> "In all cases, products or elements of construction requiring a fire resistance or spread of flame performance should have the appropriate evidence of performance test based on test information. The final installation should follow the applicable test evidence in all respects."[64]

51 https://www.cwct.co.uk/pages/about-us.
52 {CWCT0000055}.
53 {CWCT0000053}.
54 {CWCT0000046}.
55 {CWCT0000019}.
56 {CWCT0000024}.
57 {CWCT0000055/13} paragraph 4.10.1.
58 {CWCT0000053/45} paragraph 2.20.4; {CWCT0000053/46} paragraph 2.20.8.
59 {CWCT0000053/45} in the notes to the right of paragraph 2.20.4.
60 Curtins Consulting, the structural engineer appointed by the TMO, wrote a specification entitled 'Structural Performance Specification for the Design, Supply and Application of Overcladding Systems to Grenfell Tower' dated March 2013 {CCL00002347}, in which section 7.0 addressed 'Overcladding' and included reference to these standards.
61 {CWCT0000046/10}. Including, but not limited to, rainscreen cladding.
62 {CWCT0000046/10-16}.
63 {CWCT0000046/11} section 6.2.
64 {CWCT0000046/11} section 6.2. It also stated in blue italic text: "The suitability of materials should be judged in relation to their conditions of use. For example, combustible insulation may give acceptable performance when used with a metal facing…" The black text in the CWCT Standard was prescriptive, while the blue italic text gave background information or guidance on interpretation of the clause which it followed, see {CWCT0000046/6}.

49.15 The CWCT Standard stated that aluminium envelope systems do not normally have significant resistance to fire and that most unmodified aluminium building envelopes would provide only 10–20 minutes stability and integrity resistance.[65] Under the heading "Insulation materials" it contained the same guidance as in paragraph 12.7 of Approved Document B, namely, that insulation in walls of buildings with a storey more than 18 metres above ground level should be of limited combustibility.[66] It also made clear that cavity barriers needed to be provided to close any cavity around penetrations through the rainscreen for windows.[67] The standard also expressly addressed "Composite components", providing:

> "When one of the cladding elements is a composite of two or more materials (mechanically jointed, bonded or fused together) the elements as a whole must demonstrate the appropriate fire performance. Similarly it must be demonstrated that the composite will remain reasonably whole and not become prematurely separated from the building or framework."[68]

49.16 The CWCT Standard (2008) was expressly referred to in the NBS specification for the refurbishment works at Grenfell Tower (see Chapter 56).[69]

49.17 Technical Note 73, *Fire performance of curtain walls and rainscreens*, was published by CWCT in March 2011.[70] It contained warnings about fire and smoke spread within cavities and out of the top of cavities and highlighted the importance of cavity barriers to close the edges of cavities, including around window openings.[71] Under the heading "Use of combustible material" it made it clear that "the only commonly used insulation material that will satisfy the definition of limited combustibility is mineral wool".[72] It also emphasised that where testing was carried out in accordance with BS 8414, the test applied to the complete cladding system including insulation, rainscreen and cavity barriers[73] and that changing any of those components might affect the ability of the walls to resist the spread of fire.[74]

49.18 Technical Note 98 *Fire performance of facades – Guide to the requirements of UK Building Regulations* was published in April 2017. Although it was published too late to be taken into account in the design and construction of the refurbishment of Grenfell Tower, it provides a useful picture of the state of knowledge in the industry in the months before the fire. In particular, in the introductory section the note warns:

> "Strict compliance with ADB does not necessarily guarantee adequate performance of a given façade in a fire. It is incumbent on the building designer to ensure that the guidance given in ADB is relevant to their building and what additional measures (if any) are required to ensure the façade achieves the required performance standard."[75]

65 {CWCT0000046/11} section 6.3.
66 {CWCT0000046/15} section 6.6.2.
67 {CWCT0000046/14} section 6.4.4.2 (ii) under the heading "Cavities in rainscreen walls".
68 {CWCT0000046/16} section 6.6.3.
69 NBS Specification prepared by Studio E {SEA00000169/68-69} NBS Specification clauses 220/310.
70 {CWCT0000019}.
71 {CWCT0000019/4-5}.
72 {CWCT0000019/6}.
73 {CWCT0000019/6} under the heading "Alternative approaches".
74 {CWCT0000019/6}.
75 {CWCT0000024/1}.

49.19 Technical Note 98 also stated that combustible materials may have non-combustible facings which restrict the spread of flame over the surface. It warned that combustible materials with non-combustible facings rely on the facings remaining intact and that the materials should be checked for damage.[76] Appendix C of Technical Note 98 dealt with the combustibility of materials and paragraph 12.7 of Approved Document B. It stated:

> "Clause 12.7 specifically refers to insulation materials and filler materials but is now being interpreted more generally (see BCA Guidance note 18). Therefore, where a building has a storey 18m or more above ground level **all significant materials** should be of limited combustibility (Class A2 in accordance with EN 13501). This includes but is not limited to:
>
> Rainscreen panels
>
> - Standard ACM panels do not meet these requirements. Limited combustibility ACM panels are available.
>
> Insulation materials
>
> - The only commonly used insulation material that will satisfy the definition of limited combustibility is mineral wool.
>
> …"[77]

Booth Muirie Technical Guidance Note 1

49.20 Booth Muirie Ltd is a company which provides specialist architectural cladding services, including design, manufacturing and distribution. In March 2016 it published a guide to designing multi-layered walls using ACM rainscreen panels.[78] Like the BCA Technical Guidance Notes it set out various options for complying with the fire safety requirements for external walls of buildings over 18 metres in height. Option 1, which was described as "the most straightforward" was to restrict all the significant elements of each layer to non-combustible materials or materials of limited combustibility. Options 2, 3 and 4 were the same as those contained in Issue 1 of the BCA's TGN 18. Reynobond ACM with a polyethylene core, Celotex RS5000 and Kingspan K15 were all identified as being neither non-combustible nor of limited combustibility.

[76] {CWCT0000024/3}.
[77] {CWCT0000024/13}.
[78] {ARC00000559}.

Chapter 50
Organisations involved in the refurbishment

50.1 In this chapter we describe the organisations principally involved in the refurbishment of Grenfell Tower and the people who acted on their behalf. The purpose of doing so is to provide a brief introduction to those engaged on the project and the nature of their involvement. A number of other organisations, not referred to here, played minor and uncontroversial roles of a kind that do not call for discussion at this stage. Their involvement will be described in later chapters as we come to discuss particular aspects of the work.

50.2 The refurbishment of a major building is a complex undertaking which requires the co-operation of many different bodies, some with specialised skills and experience. In addition to the client, who ultimately controls the budget and determines the scope of the work, they usually include (and in this case did include) an architect, quantity surveyor, the principal building contractor and several sub-contractors. In this case other consultants were employed at different times and for different purposes. They included a mechanical and electrical services ("M & E") consultant, a fire engineering consultant, an employer's agent and a CDM co-ordinator. Others, such as the local authority building control office, were also directly involved in the project, although in a different way. Building control, in particular, had a responsibility to the public to ensure that those involved in the project complied with the requirements of the Building Regulations.

The client: Kensington and Chelsea Tenant Management Organisation

50.3 Although Grenfell Tower was owned by the Royal Borough of Kensington and Chelsea (RBKC), it was managed by the Kensington and Chelsea Tenant Management Organisation (TMO) under a modular management agreement. Although the decision to refurbish the tower was taken by RBKC, which provided the funds required for that purpose, the TMO acted as the client and in that capacity procured the services needed to carry out the project and oversaw its execution. The circumstances in which the TMO procured the services of the architect and the main contractor are discussed in Chapters 51, 52 and 53.

50.4 As client the TMO also incurred certain obligations under the CDM Regulations 2007 and 2015. They included ensuring that all designers were competent and adequately resourced.[79]

[79] CDM Regulations 2007{INQ00011315/4-5}Regulations 4 and 9; Approved Code of Practice to Construction (Design and Management) Regulations 2007, Managing Health and Safety in Construction (HSE) {INQ00013936/15-17} paragraphs 43 and 49-52; CDM Regulations 2015{INQ00011316/5-6} Regulation 4; Approved Code of Practice to Construction (Design and Management) Regulations 2015 {HSE00000003/16-18} paragraphs 29-36.

50.5 The people principally involved in negotiating the contracts for the refurbishment on behalf of the TMO and overseeing the project were:

Mark Anderson

Peter Maddison

Paul Dunkerton

David Gibson

Claire Williams.

50.6 **Mark Anderson** was an architect by profession with experience of private practice before he became involved with social housing.[80] He was appointed by the TMO as interim Director of Asset Investment and Engineering in March 2011 and following a redesignation of his role served as interim Director of Assets and Regeneration from April 2012 until January 2013.[81] He was responsible for the early stages of the refurbishment project which he later handed over to Peter Maddison when the latter was appointed to succeed him.

50.7 **Peter Maddison** was appointed by the TMO to the post of Director of Assets and Regeneration from January 2013.[82] In that role he took over primary responsibility for organising the refurbishment project at a strategic level for the TMO, including overseeing the engagement of consultants and the selection of the main contractor.

50.8 **Paul Dunkerton** was a freelance project manager for the TMO between late 2010 and early July 2013.[83] He initially reported to Mark Anderson and later to Peter Maddison, taking on a more active role when he had no senior manager to whom to report.[84]

50.9 **David Gibson** was Head of Capital Investment at the TMO from February 2013 until the end of June 2016, reporting to Peter Maddison.[85] As such he was responsible for assisting Mr Maddison in the development and delivery of the refurbishment project. Mr Gibson had been a registered architect between 1987 and 1991 and had had some previous experience of regeneration projects in the social housing sector.[86]

50.10 **Claire Williams** joined the TMO in September 2013 as project manager for the Grenfell Tower refurbishment. Once the work began, she became the primary point of contact with the main contractor. One of her tasks was to communicate with the residents of Grenfell Tower,[87] having been appointed for her particular skill and experience in resident relations.[88] She considered herself to be the TMO's project manager for the refurbishment,[89] although there was some confusion about who, if anyone, was formally acting in that capacity.

80 Anderson {TMO10048968/1} page 1, paragraph 6.
81 Anderson {TMO10048968/1} page 1, paragraph 5. Mr Anderson was not employed as an architect by the TMO.
82 Maddison {TMO00000892/1} page 1, paragraph 2.
83 Dunkerton {TMO00000885/1} page 1, paragraph 5.
84 Dunkerton {Day51/11:4-15}.
85 Gibson {TMO00000887/1-2} pages 1-2, paragraphs 2 and 8.
86 Gibson {Day53/11:15-23}; Gibson {TMO00000887/1-2} pages 1-2, paragraphs 5-7; Gibson {TMO00879742/1} page 1, paragraph 3.
87 Williams {TMO00840364/4} page 4, paragraphs 18-19.
88 Williams {TMO00840364/2} page 2, paragraph 11; Williams {Day54/87:12}-{Day54/88:1}.
89 Williams {Day54/80:23}-{Day54/81:9}; {Day54/101:7-12}.

The architect: Studio E

50.11 The architectural practice known as "Studio E" was appointed by the TMO for the Grenfell Tower refurbishment and provided professional services in respect of the project from about February 2012 to July 2016.[90] In Chapter 52 we describe the circumstances in which it came to be appointed, but for present purposes it is necessary to refer in a little more detail to the origin and structure of the practice.

50.12 Studio E Architects Limited ("SEAL") was founded in 1994 by Andrzej Kuszell and two others. A separate body in the form of a limited partnership, Studio E LLP ("SELLP"), was established by Mr Kuszell and his partners in 2007 but did not start trading until 2011.[91] Thereafter, between 2011 and 2014, SEAL was effectively dormant[92] but it was revived in 2014 when SELLP became insolvent and ceased trading. Throughout this report we refer to the practice simply as "Studio E", except when it is necessary to identify the particular legal entity involved.

50.13 After the principal contractor had been appointed Studio E's services were transferred to it under a separate agreement between them. We discuss the circumstances under which that occurred and the terms of the resulting contractual arrangements in Chapter 63.

50.14 Studio E was represented in relation to its work on the Grenfell Tower refurbishment principally by the following persons:[93]

Andrzej Kuszell

Bruce Sounes

Neil Crawford

Tomas Rek.

50.15 **Andrzej Kuszell** is a registered architect and a founding director of SEAL.[94] During his career he worked in various sectors, including defence, commercial development and education work with an emphasis on education, sports and leisure centres.[95] Mr Kuszell did not have day-to-day involvement with the Grenfell Tower project,[96] although he oversaw the provision of resources and took part in design reviews. He did not have any personal experience of overcladding an occupied residential building and no personal experience of refurbishing a high-rise building.[97]

50.16 **Bruce Sounes** studied architecture at the University of Natal at Durban in South Africa between 1989 and 1994. He completed the RIBA Part 3 examination and became a registered architect in 2000.[98] Before 2000, his experience had been predominantly in education, sports, and leisure projects.[99] He joined Studio E in the role of architect in 2000 and was promoted to the role of associate in 2005.[100] Mr Kuszell said that it was not

90 Kuszell {SEA00014271/9-10} page 9-10, paragraph 35; Sounes {SEA00014273/30} page 30, paragraph 58; Studio E {SEA00014232/2} page 2, paragraph 3.1.
91 Kuszell {Day6/16:7-16}.
92 Kuszell {Day6/18:15-18}.
93 Others at Studio E were also involved in the Grenfell Tower refurbishment from time to time.
94 Kuszell {Day6/10:17} – {Day6/11:2}; Kuszell {SEA00014271/2} page 2, paragraph 3.
95 Kuszell {Day6/11:3-18}.
96 Kuszell {SEA00014271/2} page 2, paragraph 4.
97 Sounes {Day6/173:14-16}; {Day6/11:19-22}.
98 Sounes {Day6/169:2-3}; He commenced work in the UK as an Architectural Assistant in 1998 at KSR Architects: Sounes {Day6/167:17}-{Day6/169:1}.
99 Sounes {Day6/166:13-23}.
100 Sounes {Day6/170:3-19}; Kuszell (Day6/104:21-24}.

unusual for an associate to lead a project and that for a commission with a construction value of £1 million or more either a partner or an associate would do so.[101] From July 2014, Neil Crawford took over day-to-day responsibility for the project from Mr Sounes, although Mr Sounes remained responsible for it and for supervising Mr Crawford's work.[102] Mr Sounes did not have any experience of overcladding an occupied residential building, although he had gained some experience of an overcladding project when working on the Watford Woodside Leisure Centre.[103]

50.17 **Neil Crawford** had a degree and a post-graduate diploma in architecture[104] but was not a registered architect because he had not completed the Royal Institute of British Architects Part 3 examination.[105] Between 1997 and 2009 he had worked at Foster + Partners, initially as a Part 2 graduate and later as an associate.[106] He joined Studio E in 2009 and soon became an associate.[107] From July 2014, he took over day-to-day responsibility for the project from Mr Sounes, although Mr Sounes continued to lead it.[108]

50.18 Mr Crawford worked on the Grenfell Tower refurbishment on a day-to-day basis.[109] By October 2015, he had been made the project architect.[110] He had some limited experience of commercial projects involving cladding and curtain walling but had not previously been involved in the overcladding of a high-rise residential building.[111]

50.19 **Tomas Rek** was a registered architect who was employed by Studio E between December 2011 and December 2013.[112] Before joining Studio E he had worked mainly in the education sector.[113] He started work on the Grenfell Tower refurbishment project on 18 September 2013.[114] Under the supervision of Mr Sounes, he developed the National Building Specification (NBS) specification for the project and the architectural drawings intended to form part of the tender documents.[115] (The NBS is a computerised system designed to assist architects and other building professionals in describing the materials, standards and workmanship required on a construction project.) Studio E drafted three versions of the NBS Specification dated 21 November 2013[116], 29 November 2013[117] and 30 January 2014.[118] The second and third of those were sent to tenderers.

The quantity surveyor, employer's agent and CDM co-ordinator: Artelia

50.20 Appleyards Ltd had been appointed by the TMO as a consultant on the KALC project and as a result the TMO appointed it as quantity surveyor, employer's agent and CDM co-ordinator for the Grenfell Tower project. In March 2012, Artelia Ltd bought Appleyards

101 Kuszell {Day6/105:5}-{Day6/107:13}.
102 {SEA00014276}; Kuszell {Day6/124:5-10}; Crawford {Day9/22:15-20}.
103 Sounes {Day6/174:21-25}.
104 Crawford {Day9/4:9-15}. Neil Crawford studied at the Mackintosh School of Architecture between 1991 and 1997.
105 He had studied towards the RIBA Part 3 examination in London in 2007 but had not completed it: Crawford {Day9/5:19-22}.
106 Crawford {Day9/10:2-11}.
107 Crawford {Day9/21:19-22}.
108 {SEA00014276/7}; Kuszell {Day6/124:5-10}; Crawford {Day9/22:15-20}.
109 Crawford {Day9/23:25}-{Day9/24:8}. }
110 {SEA00013508}.
111 Crawford {SEA00014275/9} page 9, paragraph 21; Crawford {Day9/19:20}-{Day9/20:5}.
112 Rek {Day12/5:5-9}.
113 Rek {Day12/8:18-20}.
114 Rek {SEA00014278/4} page 4, paragraph 9.
115 Rek {SEA00014278/5} page 5, paragraph 14; Rek {Day12/11:17-20}.
116 {SEA00000152}.
117 {RYD00001712}.
118 {SEA00000169}.

and thereafter Appleyards traded in the name of Artelia until 30 June 2015, when its business was formally transferred to Artelia.[119] In this report we refer to both entities as Artelia, unless the context requires otherwise.

50.21 A quantity surveyor is a surveyor trained in the particular skill of calculating the quantity and cost of materials required to carry out, or that have been used in carrying out, the whole or a particular part of a construction project. They may be used to estimate the cost of work, help manage costs during the course of the work and participate in agreeing the final account.[120] Artelia agreed to provide quantity surveying services, including preparing an initial budget to test feasibility, preparing regular monthly cost reports as the project progressed and advising the TMO of any decisions required.[121] **Simon Cash** was its project director and had overall responsibility for the whole of Artelia's involvement in the refurbishment.[122] He was a trained quantity surveyor and a Fellow of the Royal Institution of Chartered Surveyors.[123]

50.22 The function of an employer's agent is to perform on behalf of the client various administrative tasks that have to be undertaken by it in relation to a project.[124] **Philip Booth** acted as employer's agent from about April 2013 until June 2015.[125] He left Artelia in April 2016.[126] Neil Reed succeeded Philip Booth as employer's agent in March 2015.[127] In July 2015, Neil Reed left Artelia to start his own business, Re Sol Group Limited (Re Sol), but continued to provide the services of employer's agent under a subcontract with Artelia.[128]

50.23 CDM co-ordinator (CDM-C) is a statutory role under the Construction (Design and Management) Regulations 2007 ("CDM Regulations 2007").[129] The regulations required the TMO to appoint a CDM co-ordinator (CDM-C) for the Grenfell Tower project because of its size.[130] The CDM-C is required to assist and advise the client on the appointment of competent contractors, ensure that health and safety matters are properly co-ordinated during the design process, help communication and co-operation between project team members and prepare the health and safety file.[131] **Keith Bushell** of Artelia was appointed to that role. Following the introduction of the Construction (Design and Management) Regulations 2015 (CDM Regulations 2015), Artelia's appointment as CDM-C terminated on 6 October 2015. On 8 October 2015, Simon Cash wrote to Peter Maddison to confirm that Artelia's appointment as CDM-C had terminated.[132]

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119 Artelia {ART00005764/2} page 2, paragraph 4.
120 Cash {Day48/2:9-13}.
121 Artelia Agreement 2014 {ART00005742/55-58}.
122 Save for a brief period at the end of 2015 to early 2016; Cash {ART00006544/2} page 2, paragraph 4.
123 Cash {ART00006544/2} page 2, paragraph 5.
124 The Building Contract between Rydon and the TMO envisaged that an employer's agent would be appointed {RYD00094235/22} Articles (conformed copy).
125 Booth {ART00008527/3} page 3, paragraph 12; Booth {ART00008527/5} page 5, paragraph 22.
126 Booth {Day49/113:7-8}.
127 Reed {ART00006663/2} page 2, paragraph 8.
128 Reed {ART00006663/2} page 2, paragraph 6; On 10 July 20215, Neil Reed for Re Sol proposed to perform the services of employer's agent, as set out in the 2015 Agreement {ART00007552}. On 28 July 2015, Artelia appointed Re Sol on the basis of that proposal to start from 1 August 2015 and continue to the issue of the certificate of Practical Completion {ART00006674}. In effect, Neil Reed left his employment at Artelia but continued working the same capacity on the refurbishment through his own consultancy business.
129 {INQ00011315}.
130 CDM Regulations 2007, Regulation 2(3) {INQ00011315/4}; CDM Regulations 2007, Regulation 14(1) {INQ00011315/8}.
131 Approved Code of Practice to the CDM Regulations 2007{INQ00013936/24} paragraph 84; CDM Regulations 2007 {INQ00011315/10} Regulation 20(1)(a); reflected in 2014 Agreement: {ART00005742/61} clause 3; CDM Regulations 2007{INQ00011315/11} Regulation 20(2)(e); reflected in 2014 Agreement: {ART00005742/62} clause 11.
132 {ART00006244}.

M & E consultant: Max Fordham

50.24 The TMO appointed Max Fordham LLP as building services engineers with effect from the summer of 2012. **Andrew McQuatt** was the lead project engineer.[133] **Matt Cross Smith** was a building services engineer who worked on the Grenfell Tower project as a graduate engineer.[134]

Structural engineer: Curtins Consulting Ltd

50.25 Curtins Consulting Limited (Curtins) was the consultant structural engineer for the Grenfell Tower project. Its contract was novated to Rydon by an agreement dated 25 April 2016 following that company's appointment as principal contractor.[135]

Fire engineer: Exova (UK) Ltd

50.26 Exova (UK) Ltd, trading as Exova Warringtonfire (Exova), is a company specialising in fire safety, fire engineering and related matters. It had been employed as a consultant by Studio E in connection with the KALC project,[136] and as a result, it was approached by the TMO to advise on the Grenfell Tower refurbishment.[137] Although it was retained by the TMO, it continued to send reports to Studio E.[138] There was no fresh tender or procurement exercise for fire engineering services for the Grenfell Tower project. Exova was used because it was known and trusted as a result of its work on the KALC project.

50.27 The TMO appointed Exova to produce a fire safety strategy for Grenfell Tower in its existing state (the "Existing Fire Safety Strategy")[139] and a fire safety strategy for the building in its refurbished condition (the "Outline Fire Safety Strategy").[140] Its appointment was not novated to Rydon after that company had been appointed as principal contractor and it therefore continued as a consultant to the TMO.[141] However, as discussed in Chapter 54, there was a confusion in some people's minds about Exova's position following Rydon's appointment that was never properly clarified.

50.28 In relation to its work on the Grenfell Tower refurbishment Exova was represented principally by the following persons:

James Lee

Cate Cooney

Dr Clare Barker

Terence Ashton

Dr Tony Pearson.

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133 McQuatt {MAX00017292} page 5, paragraph 19.
134 Cross Smith {MAX00017304} pages 1-2, paragraph 4.
135 {TMO10013954}.
136 Sounes {SEA00014273/36} page 36, paragraph 73.
137 TMO's procurement of Exova's services in respect of the Grenfell Tower refurbishment is explored in Chapter 54.
138 Ashton {Day17/20:1-13}.
139 See fee proposal dated 11 June 2012 {TMO10003884}.
140 See fee proposal dated 9 May 2012 {ART00000026}.
141 {ART00002255/4}; Ashton {EXO00001621/14} page 14, paragraphs 5.9 – 5.10; Ashton {Day16/117:2-10}; {Day17/185:2-3}; {Day16/117:2-10}; {Day17/187:7-10}.

50.29 For a brief period, **James Lee** was involved with the project until he left the company in late July 2012. He attended a design team meeting on 19 April 2012[142] and visited the tower briefly on 29 May 2012.[143] He provided Studio E with a series of marked-up drawings and comments in respect of the proposed refurbishment works[144] and prepared a fee proposal for Studio E for the production of the Existing Fire Safety Strategy.[145]

50.30 At the time Exova was appointed **Dr Clare Barker** was a principal fire engineer in Exova's Warrington office and a member of the Institute of Fire Engineers.[146] She attended a project meeting on 26 July 2012,[147] shortly before Exova was instructed to provide the Existing Fire Safety Strategy. She asked another employee, Cate Cooney, to prepare a first draft,[148] which she later reviewed.[149]

50.31 **Cate Cooney** had joined Exova in 2011 after spending eight years working in building control. By 2012 she had reached the position of senior consultant. At the request of Dr Barker, she prepared the first draft of the Existing Fire Safety Strategy. She also provided some advice to Bruce Sounes of Studio E in relation to the refurbishment proposals.[150]

50.32 **Terence Ashton** had joined Exova in 1989 as a principal consultant after 25 years in building control. He was based at Exova's London office, where he was an associate in the fire engineering department[151] and acted as office manager.[152] He had no formal qualifications in fire engineering. He had worked on high-rise residential buildings but had no experience of overcladding projects.[153] He did not have the expertise to carry out highly technical fire engineering analyses, such as determining how particular materials are likely to behave in a fire, and would have called on his colleagues in Warrington for assistance if had he been asked to do one.[154] He saw his primary role as being to ensure compliance with the Building Regulations.[155] Following James Lee's departure from the company in July 2012, Terence Ashton assumed overall responsibility for Exova's work on the Grenfell Tower refurbishment.

50.33 In 2013, Mr Ashton was aware that Approved Document B contained an express warning that the use of combustible materials in cladding systems and the existence of extensive cavities might present a risk to health and safety in tall buildings.[156] Although he was aware of the existence of BR 135, he had not read it from cover to cover and it did not occur to him to read it before starting work on the Grenfell Tower project.[157] Mr Ashton was aware that serious fires had occurred both in the UK and overseas as a result of the use of inappropriate materials (although he was not aware of the fire at the Lacrosse Building in Melbourne) and was therefore aware that combustible cladding should not be used on

142 {TMO10001143}; {EXO00001740/2} page 2, paragraph 3.3.
143 Lee {EXO00001740/3} page 3, paragraph 3.6; {EXO00000802}.
144 Lee {EXO00001740/3}; page 3, paragraph 3.7; {EXO00001750}.
145 Lee {EXO00001740/3}; page 3, paragraph 3.10; {TMO10037721}.
146 Barker {Day15/7:1-5}.
147 Barker {EXO00001603/2} page 2, paragraph 3.4; {EXO00000242}; {EXO00001620}
148 {EXO00001620/4}; Barker {EXO00001603/3} page 3, paragraph 3.10; Cooney {EXO00001590/2} page 2, paragraph 3.3; Cooney {Day14/27:15-21}; Barker {Day15/9:20-24}; {Day15/41:20-25}.
149 Barker {EXO00001603/3} page 3, paragraphs 3.13-3.14; Cooney {EXO00001590/3} page 3, paragraph 3.9.
150 {EXO00000655}.
151 Ashton {Day16/23:23-25}; {Day16/24:1-2}; {Day16/24:6-8}; Ashton {EXO00001621/2} page 2, paragraph 2.3.
152 Pearson {Day19/4:5-10}.
153 Ashton {Day16/29:1-8}.
154 Ashton {EXO00001621/3} page 3, paragraph 3.4; Ashton {Day17/94:7-20}. He said he would also have called on his testing colleagues within Exova if he needed further advice, for example, on a new type of insulation coming on to the market.
155 Ashton {Day16/64:7-13}.
156 Ashton {Day17/87:3-8}; {CLG00000224/95} page 95, paragraph 12.5.
157 Ashton {Day17/77:14-19}.

high-rise buildings.[158] He had not encountered the use of composite metal panels, apart from one particular composite panel with a polyethylene core.[159] However, he did not envisage that material of that kind would be used on high-rise buildings. He knew that polyethylene was a highly combustible substance and was aware, at least subconsciously, that panels containing polyethylene could exacerbate the spread of fire over the exterior wall of a building.[160]

50.34 **Dr Tony Pearson** joined Exova in 2008 as a graduate. In 2013 he was promoted to senior consultant[161] and remained in that role until he left the company in January 2016.[162] Before he started working on the Grenfell Tower project Dr Pearson had had no experience of refurbishing high-rise residential buildings and very little experience of overcladding projects.[163]

Clerk of works: John Rowan & Partners

50.35 The TMO engaged John Rowan & Partners to provide a limited range of clerk of works services during the refurbishment. John Rowan is a construction consultancy offering a variety of services to the construction industry, including site monitoring and supervision or clerk of works services.[164] Those principally involved were Gurpal Virdee, the managing partner since August 2016,[165] and Jonathan ("Jon") White, who was an experienced clerk of works.

50.36 The functions that John Rowan were required to perform were more limited than those that would be performed by a traditional clerk of works.[166] In effect, they were employed to act as site inspectors or site monitors[167] and were expected to focus a lot of attention on the residents.[168]

The principal contractor: Rydon

50.37 The TMO appointed Rydon Maintenance Ltd ("Rydon") as principal contractor under a contract on the JCT Design and Build Contract form 2011 with amendments.[169] As principal contractor, Rydon was responsible for all aspects of the refurbishment project, including its design, compliance with the Building Regulations and other statutory requirements. The refurbishment division of Rydon, led by its Refurbishment Director, **Stephen Blake**, was responsible for the project. We describe the circumstances in which Rydon came to be appointed in Chapter 53.

158 Ashton {Day18/82:1-10}.
159 Ashton {Day17/88:1-7}.
160 Ashton {Day17/89:2-7}.
161 Pearson {Day19/3:2-5}; Pearson {EXO00001753/2} page 2, paragraph 2.2.
162 Pearson {EXO00001753/2} page 2, paragraph 2.2.
163 Pearson {Day19/7:17-25}.
164 Virdee {JRP00000333/2} page 2, paragraphs 7-8; Virdee {Day43/4:14-21}.
165 Virdee {Day43/3:2-8}.
166 Virdee {JRP00000333/2} page 2, paragraphs 11-12; Virdee {JRP00000333/3} page 3, paragraph 17; Virdee {JRP00000333/5} page 5, paragraph 24; Virdee {JRP00000333/7} page 7, paragraph 28; Virdee {JRP00000333/8} page 8, paragraph 32; Virdee {JRP00000333/12-13} pages 12-13, paragraph 51; White {JRP00000330/2-3} pages 2-3, paragraphs 13-17; White {JRP00000330/5} page 5, paragraph 43. See also oral evidence, Virdee {Day43/19:7}-{Day43/20:1}; with which Claire Williams agreed, Williams {Day55/202:5-22}.
167 White {JRP00000330/2} page 2, paragraph 13.
168 White {Day42/173:7-10}; Williams {Day56/35:9}-{Day56/37:14}; {Day56/45:16}-{Day56/47:9}.
169 {RYD00094235} (conformed copy).

50.38 Those principally involved in the refurbishment on behalf of Rydon were:

Stephen Blake, the Refurbishment Director

Simon Lawrence, one of the contract managers

Simon O'Connor, a project manager

David Hughes, a site manager

Gary Martin, a site manager

Daniel Osgood, a site manager

Zak Maynard, the commercial manager.

50.39 **Stephen Blake** was Refurbishment Director throughout the project.[170] He assumed the role of contract manager in October 2015 following the departure of Simon Lawrence to see the project through to completion and was the most senior Rydon employee to be directly involved in the Grenfell Tower refurbishment.[171]

50.40 **Simon Lawrence** was the contracts manager responsible for the refurbishment from its inception until October 2015. As such he was the most senior Rydon employee with day-to-day involvement in and responsibility for the project.[172] When he left Rydon in 2015 Stephen Blake took over his role.

50.41 **Simon O'Connor** was project manager for the refurbishment until September 2015.[173] He had worked for Rydon since September 2002, progressing from foreman to site manager and then to project manager.[174] The Grenfell Tower refurbishment was the first project for which he had taken on the role of project manager.[175] It was his task to manage the day-to-day running of the project on site.[176]

50.42 **David Hughes** was employed by Rydon as a site manager for the Grenfell Tower project from October 2015 until its completion.[177] He had worked for Rydon since November 2001, after graduating with a degree in civil engineering from Plymouth University.[178]

50.43 **Gary Martin** was employed by Rydon as a site manager on the Grenfell Tower project from May 2014 until its completion. Before joining Rydon he had worked for another company as a site manager on residential refurbishment projects.[179]

50.44 **Daniel Osgood** had joined Rydon in March 2014, starting in the role of temporary site manager.[180] He was employed by Rydon as a site manager on the Grenfell Tower refurbishment from April 2015 until July 2015, when he was moved to work on a different project.[181] At the time of the Grenfell Tower project, he had worked as a site manager for over 10 years.[182]

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170 Blake {Day28/4:10-11}.
171 Blake {RYD00094225/7} page 7, paragraph 4.8.
172 Lawrence {Day22/16:3-9}.
173 O'Connor {RYD00094221/1-2} pages 1-2, paragraph 3.
174 O'Connor {Day26/3:19}
175 Blake {Day28/29:19-22}.
176 O'Connor {RYD00094221/1-2} pages 1-2, paragraph 3.
177 Hughes {RYD00094213/5} page 5, paragraph 22.
178 Hughes {Day27/3:19-22}.
179 Martin {Day30/4:4}.
180 Osgood {RYD00094212/1} page 1, paragraph 3.
181 Osgood {RYD00094212/1} page 1, paragraph 3; Osgood {Day30/100:3-5}.
182 Osgood {Day30/94:14-16}.

50.45 **Zak Maynard** was Rydon's commercial manager, responsible for all financial aspects of the project,[183] including the management of a team of several surveyors, the allocation of work packages to subcontractors, controlling budgets, assessing the financial implications of changes to the works and liaison with the employer's agent.[184]

50.46 Although it took responsibility for all aspects of the design and execution of the works, Rydon did not employ within its organisation people with all the skills and expertise required to discharge its contractual obligations. As is common in the construction industry, it preferred to delegate the discharge of its responsibilities to a host of subcontractors, regarding itself as little more than the conductor of a large and varied orchestra of players. Later in the report we shall refer to the following subcontractors who were employed by Rydon on the refurbishment:

Harley Curtain Wall and Harley Facades

J S Wright & Co Ltd

S D Plastering Ltd

S D Carpentry Ltd.

The facade sub-contractor: Harley

50.47 Harley Curtain Wall ("Harley CW") was established in 1996 by Ray Bailey to carry on the business of designing and installing facades of buildings under construction. By 2013, Harley employed about 16 people,[185] but none of them had any formal qualifications in facade engineering.[186] Mr Bailey had been involved in several projects on high-rise residential buildings which had used ACM rainscreen panels before Harley undertook the work on Grenfell Tower.[187] It was Harley's practice to subcontract much of the work it undertook, including design, manufacture and the installation of the facade itself.[188]

50.48 Harley Facades was established in 2000, also by Ray Bailey. He had originally intended to use the two Harley companies on separate projects,[189] but in the event Harley Facades remained dormant until 2015 when Harley CW went into administration. At that point it took over the work on the Grenfell Tower project.[190] In Chapter 65 we describe how Harley came to be appointed and the key terms of its contract with Rydon. For present purposes it is sufficient to say that Harley was contractually responsible to Rydon for all aspects of the design and construction of the facade of Grenfell Tower, including the cladding, insulation, window frames, window infill panels, glazing and cavity barriers.

50.49 The people principally involved in the project on behalf of Harley were:

Ray Bailey

Mark Harris

Mike Albiston

183 Maynard {Day31/7:9-14}.
184 Maynard {RYD00094346/1} page 1, paragraphs 4-6; Maynard {Day31/7:7}-{Day31/18:11}.
185 Ray Bailey {HAR00010184/3} page 3, paragraph 9.
186 Ray Bailey {Day32/11:16-20}.
187 Ray Bailey {HAR00010184/3} page 3, paragraph 10 and Ray Bailey {Day32/13:20}-{Day32/14:12}. Premier House, Castlemaine Tower, Clements Court, Ferrier Point, Chalcots Estate and Little Venice.
188 Ray Bailey {Day32/12:11}-{Day32/13:5}.
189 Ray Bailey {HAR00010184/2} page 2, paragraph 7.
190 Ray Bailey {HAR00010184/2} page 2, paragraph 7.

Daniel Anketell-Jones

Ben Bailey.

50.50 **Ray Bailey** was the founder of the Harley companies and was in overall control of the business. Mr Bailey graduated with a degree in civil engineering from Salford University in 1981 following which he worked for a number of companies in which he gained experience of all aspects of building envelopes, including design, manufacturing and installation.[191] He had no formal qualifications in facade engineering.[192]

50.51 **Mark Harris** was a self-employed consultant in the field of commercial glazing and cladding appointed by Harley to assist with the Grenfell Tower project.[193] He had been working exclusively for Harley since about 2011 and his experience lay mainly in the field of sales and developing business connections.[194] By the time he became involved in the refurbishment of Grenfell Tower Mark Harris had been involved in several projects on which ACM panels had been used.[195]

50.52 **Mike Albiston** was Harley's senior estimator for the Grenfell Tower project. His main contribution was assisting in the production of Harley's tender for the work of designing and constructing the facade, which began in December 2013.[196]

50.53 **Daniel Anketell-Jones** had been engaged by Harley as a project engineer in November 2006[197] and had been promoted to the role of design manager by the time Harley began work on the Grenfell Tower project.[198] His main duties were to appoint a designer and monitor the progress of the design work until a project manager had been appointed. Between 2014 and 2017, while employed by Harley, he obtained an MSc in structural engineering and began studying for an MSc in facade engineering,[199] but he had not received any instruction in the fire performance of facades until after he had left Harley and his involvement in the Grenfell project had come to an end.[200] During his time at Harley Daniel Anketell-Jones had been involved in a design capacity in two previous high-rise overcladding projects.[201] While working on the Grenfell Tower refurbishment he also worked on two other Harley projects.[202]

50.54 **Ben Bailey** is the son of Ray Bailey. He was employed by Harley as project manager for the Grenfell Tower refurbishment but had not been involved in that capacity on any previous project.[203] He had worked for Harley from time to time while at school and university and had been taken on as a site manager following his graduation in 2013.[204] Until about May 2017, Ben Bailey continued to be involved intermittently in the Grenfell Tower project

191 Ray Bailey {HAR00010184/1-2} pages 1-2, paragraph 4.
192 Ray Bailey {HAR00010184/2} page 2, paragraph 5.
193 Harris {HAR00010159/2} page 2, paragraph 7.
194 Harris {Day43/9:16-20}; Harris {HAR00010159/2} page 2, paragraph 8.
195 Harris {HAR00010159/2} page 2, paragraph 9; Harris {Day34/34:23}-{Day34/35:19}. Mr Harris told Bruce Sounes at Studio E in an email: "Over-cladding tower blocks is very much what we do…". He attached project information sheets for Castlemaine Tower, Chalcots Estate and Clements Court {SEA00007603} dated 25 April 2013.
196 Albiston {HAR00010151/3} page 3, paragraph 9.
197 Anketell-Jones {Day35/114:4-11}.
198 Anketell-Jones {Day35/114:4-11}.
199 Anketell-Jones {HAR00010149/2} page 2, paragraph 7.
200 Anketell-Jones {Day35/116:6-18}.
201 Anketell-Jones {Day35/143:16}-{Day35/144:3} Ferrier Point and Little Venice.
202 Anketell-Jones {Day35/125:12-14}; Anketell-Jones {HAR00010149/2} page 2, paragraph 9. Trinity Square and Compass House.
203 Ben Bailey {HAR00010060/3} page 3, paragraph 9.
204 Ben Bailey {Day39/3:25}-{Day39/4:6}.

when maintenance requests or problems with snagging required attention.[205] When he started work on the Grenfell Tower project Ben Bailey had no previous experience of managing the refurbishment of a high-rise residential building.[206]

Harley's subcontractors

50.55 Harley engaged the following as sub-contractors:

Kevin Lamb, to produce designs and construction drawings

CEP Architectural Facades Ltd, to fabricate and supply ACM rainscreen cassette panels

Osborne Berry Installations Ltd, to install the cladding.

50.56 **Kevin Lamb** was a self-employed designer of curtain walling and cladding, including glazing and rainscreen systems. He was engaged by Harley for the Grenfell Tower project in August 2014,[207] having previously worked for it on one other project as a freelance draftsman.[208] Mr Lamb had previously produced preliminary schematic drawings for the Chalcots Estate refurbishment undertaken by Harley.[209]

50.57 **CEP Architectural Facades Ltd** (CEP) was appointed by Harley as a subcontractor to fabricate and supply the rainscreen panels and glazing units for the Grenfell Tower refurbishment. **Geof Blades** was a director from 2004 until 2013, when CEP was sold.[210] After that, he remained with the company as national glazing manager until 2016, when he became commercial projects manager. He retired in 2018.

50.58 CEP entered into six contracts with Harley between October 2014 and November 2015 for the fabrication and supply of rainscreen cladding panels and window units for Grenfell Tower.[211] In addition, after Harley Curtain Wall had gone into administration, in September 2015 CEP entered into a contract with Rydon for the supply of Reynobond PE 55 panels.[212]

50.59 **Osborne Berry Installations Ltd** was established by **Mark Osborne** and **Grahame Berry** in 2002 as a corporate vehicle for their business of installing windows and cladding on buildings under construction or in the course of refurbishment.[213] Osborne Berry had worked for Harley on many previous occasions and was engaged by Harley to install the facade, including the windows, cavity barriers, cavity wall insulation and the rainscreen panels.[214] The company engaged self-employed fitters to carry out the work.

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205 Ben Bailey {HAR00010060/3} page 3, paragraph 8.
206 Ben Bailey {Day39/12:4-9}.
207 Lamb {HAR00010419/3} page 3, paragraphs 12-15.
208 Lamb {HAR00010419/3} page 3, paragraph 12.
209 Lamb {Day37/67:6-14}; Lamb {HAR00010419/3} page 3, paragraph 12.
210 Blades {Day41/5:12}.
211 {CEP000000447}; {CEP000000469}; attaching {CEP000000470}; {CEP000000471}; {CEP000000472}; {CEP000000492}; {CEP000000512}; attaching {CEP000000513}; {CEP000000527}; {CEP000000528}; attaching {CEP000000529}; {CEP00053848}; {CEP000005833}; {RYD00040435}; {CEP000000616}; {CEP000000617}; {CEP000007550}; {CEP000001124}; {CEP000001168}.
212 {CEP000000693}.
213 Berry {OSB000000084/1} page 1, paragraph 1.
214 Berry {OSB000000084/1} page 1, paragraph 3; Ray Bailey {HAR00010184/24} page 24, paragraph 97; Berry {OSB000000084/2} page 2, paragraph 9; Berry {OSB000000084/3} page 3, paragraph 12; Berry {OSB00000091/9} page 9, paragraph 15; Osborne {OSB00000090/8} page 8, paragraph 15. Osborne Berry's package of work did not include refurbishment of the internal window reveals/internal window trimming. That work was undertaken by SD Plastering. Osborne Berry was also instructed by Harley to undertake some measurements of Grenfell Tower – see Osborne {Day43/88:14-21}; Osborne {Day43/89:1}-{Day43/90:3}; Osborne {Day43/92:11}-{Day43/93:1}; Berry {MET00019985/1-2}; Osborne {OSB00000090/4} page 4, paragraph 7.

50.60 There was no written contract between Harley and Osborne Berry[215] and no document exists which sets out the terms on which Osborne Berry was engaged to carry out the work, the scope and content of that work, the standard to be applied or any programme for the works. Grahame Berry said that there may have been some conversations with Ray Bailey about a programme of works, but not about the quality or the standard of workmanship.[216] Ray Bailey said that it was not uncommon for Harley to appoint subcontractors without any written contract.[217]

Other sub-contractors of Rydon

50.61 **SD Plastering Limited** (SDP) was incorporated in 2002. It was a company that mainly provided dry-lining services.[218] Rydon sub-contracted a package of work to SDP, most of which comprised dry-lining, plastering, remodelling and ceiling works to the lower floors of the tower.[219] In about February 2015, Rydon asked SDP to assist in designing the internal window linings and to carry out the work on the refurbishment of the internal window reveals.[220] Rydon subsequently sub-contracted the work on the internal window reveals of the newly refurbished windows to SDP.[221]

50.62 Rydon employed **J S Wright & Co Ltd** to carry out the mechanical and electrical works which included the design and supply of a new smoke control and ventilation system for Grenfell Tower. J S Wright employed **PSB UK Limited** to design and install the smoke control and ventilation system.

Building Control

50.63 Building control functions were carried out by RBKC's building control department. **John Allen** had joined RBKC as an assistant district surveyor in 1996. By the time he became involved in the refurbishment in 2012, he was Head of Special Projects and was subsequently promoted to Building Control Manager in September 2013.[222] He was directly involved in giving advice on the refurbishment in 2012 and 2013 before any application had been submitted. John Hoban took over responsibility for Grenfell Tower in about December 2013.[223] Between 2014 and 2016 as Mr Hoban's manager Mr Allen continued to be involved in the refurbishment and in due course the completion certificate for the refurbishment was issued in his name as Head of Building Control.[224]

50.64 **John Hoban** was a senior surveyor in RBKC's building control department between 1986 and March 2017, when he retired.[225] He holds BTEC ordinary and higher certificates in building studies. He worked as a junior technical officer in the Building Regulations division and from 1979 to 1986 as a technical assistant in the District Surveyor's office

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215 Berry {OSB000000084/3} page 3, paragraph 12; Ray Bailey {Day33/178:22-25}. Osborne Berry had never had any standard terms in the past that ever formed the basis of Osborne Berry's contracts with Harley, Berry {Day44/15:6-13}.
216 Berry {Day44/13:4-19}; {Day 44/14:1-3}.
217 Ray Bailey {Day33/179:2-4}.
218 Dixon {SDP00000196/2} page 2, paragraphs 6-7; Dixon {Day44/94:14-18}; Dixon {Day44/129:3-11}.
219 Dixon {MET00056695}; Dixon {Day44/100:10-14}.
220 {RYD00032519}.
221 Dixon {SDP00000196/4-5} pages 4-5, paragraphs 19-20; Dixon {SDP00000196/5}; {SDP00000189}; Cole {SDP00000220/3} page 3, paragraphs 15-16.
222 Allen {RBK00033930/1} page 1, paragraphs 2-3; He took voluntary redundancy in early June 2017 but was asked to carry on his role after the fire before leaving RBKC 2018, Allen {Day47/4:24}-{Day47/5:13}.
223 {SEA00010232}.
224 Completion Certificate {RBK00018811}; Allen {Day47/187:10}-{Day47/188:2}.
225 {RBK00050415}.

of the Greater London Council.[226] At the time of the refurbishment he was an associate member of the Chartered Association of Building Engineers.[227] The refurbishment was the first project on which he had to deal with the overcladding of an occupied high-rise residential building.[228]

50.65 **Paul Hanson** was a senior building control surveyor (Fire Regulations) who acted as a consultant to the building control surveyors.

50.66 **Jose Anon** joined the building control department as a surveyor in 1989.[229] In 2013 he was promoted to Deputy Building Control Manager.[230] He was not involved in the refurbishment, save for one site visit on 17 April 2015.[231]

[226] {RBK00050415}; Hoban {Day45/10:7-24}.
[227] Hoban {Day45/12/24}-{Day45/13:9}.
[228] Hoban {Day45/91/3-7}.
[229] Anon {RBK00029897/2} page 2, paragraph 6.
[230] Anon {RBK00029897/2} page 2, paragraph 6.
[231] Anon {RBK00029897/8-9} pages 8-9, paragraphs 37-44.

Chapter 51
The origins of the Grenfell Tower Project

Introduction

51.1 In this chapter we describe the background to the Grenfell Tower refurbishment project, including its origins and reasons, the establishment of the project team and the appointment of Studio E as architect.

The Kensington Aldridge Academy and Kensington Leisure Centre ("KALC") project

51.2 In 2009, the Royal Borough of Kensington and Chelsea (RBKC) instructed a design and planning consultant, Urban Initiatives Limited, to produce a report into options for the transformation of Notting Barns in North Kensington.[232] The report proposed the demolition of Grenfell Tower due to the appearance of the building and the blight on its surroundings resulting from the way in which it met the ground and affected the area east of Latimer Road Station.[233] The report envisaged a new academy for the area and a new leisure centre.[234]

51.3 The report was presented to an RBKC cabinet working group in September 2009.[235] Rock Feilding-Mellen was then a backbench councillor who sat on the Public Realm Scrutiny Committee and was familiar with that report.[236] Later, in 2012, when he held the portfolio for Civil Society,[237] he became aware through a conversation with Cllr Timothy Coleridge of the proposal to refurbish Grenfell Tower and was concerned to know whether it would hinder or obstruct any future potential regeneration of the Lancaster West estate.[238] Cllr Feilding-Mellen attended a meeting on 25 April 2012[239] with Cllr Coleridge and Laura Johnson, RBKC's director of housing, during which the refurbishment of Grenfell Tower and the effect of wider regeneration were discussed. Ms Johnson told Cllr Feilding-Mellen that there was an immediate need to decide whether to invest in Grenfell Tower and reassured him that such investment would not preclude the possibility of regenerating the wider estate in the future.[240]

51.4 In 2010 RBKC began work on the Kensington Aldridge Academy and Kensington Leisure Centre.[241] The borough needed a new secondary school, for which RBKC had received a government grant. The school was to be located on the site of an existing leisure centre

[232] Notting Barns South, Draft Final Masterplan Report, {IWS00002090/5}.
[233] {IWS00002090/19}.
[234] {IWS00002090/17}.
[235] {RBK00057224}.
[236] Feilding-Mellen {RBK00033403/5} page 5, paragraph 18.
[237] Feilding-Mellen {RBK00033403/5} page 5, paragraph 20.
[238] Feilding-Mellen {RBK00054433/2} page 2, paragraph 5.
[239] {RBK00028392}.
[240] Feilding-Mellen {Day131/138:15}-{Day131/139:16}.
[241] Laura Johnson {RBK00034943/10} page 10, paragraph 44.

that was to be demolished and rebuilt as part of the same project. Together the work was known as the "KALC" project.[242] A certificate of practical completion was issued on 13 November 2014.[243]

51.5 Laura Johnson was the senior responsible officer for the project and oversaw the project managers in RBKC's property services team who managed it on a day-to-day basis.[244]

51.6 In September 2011, Studio E won the commission advertised by RBKC in the Official Journal of the European Union ("OJEU") for the design of the KALC project.[245] Studio E retained the services of specialist fire engineers Exova as sub-consultant.[246]

The reasons for the refurbishment of Grenfell Tower

51.7 RBKC recognised that the KALC project would be disruptive to residents of Grenfell Tower and consequently a KALC Residents Forum was set up, chaired by the RBKC Cabinet Member for Housing and Property, Cllr Timothy Coleridge. It first met on 18 July 2011[247] and was usually attended by Cllr Coleridge, Laura Johnson, local residents and, on occasions, the KALC architects or contractors.[248] The local residents who attended included some living in Grenfell Tower who were unhappy that KALC was being built while Grenfell Tower and the wider Lancaster West Estate was in need of refurbishment.[249]

51.8 In December 2011 Cllr Coleridge was invited to visit the flat of a resident of the tower, Edward Daffarn.[250] He saw that the windows were very poor and single-glazed. Mr Daffarn told him that because the hot water was on all the time the flat was very hot in the summer but that it was very cold in the winter due to the lack of good insulation. Cllr Coleridge felt that something should be done for the residents of the tower and hoped that the rest of the Lancaster West estate could be refurbished in the long term.[251] Grenfell Tower had seen no significant investment for 30 years.[252]

51.9 At about the time the KALC project was being undertaken, RBKC developed and sold basement space at Elm Park Gardens in Chelsea. The sale resulted in surplus capital receipts initially to the value of about £6 million.[253] In late 2011, when RBKC knew that that money would become available, Cllr Coleridge raised with Laura Johnson the possibility that the funds might be used to improve Grenfell Tower.[254]

51.10 A meeting took place on 1 November 2011 between Jane Trethewey, RBKC's Housing Strategy and Regeneration Manager, and representatives of the TMO, including Mark Anderson, the TMO's Interim Director of Asset Investment and Engineering. At that meeting the effect of the KALC project on Grenfell Tower and the Lancaster West estate was discussed. In an email sent by Jane Trethewey of RBKC to Laura Johnson the following day, Ms Trethewey said that the TMO was keen to investigate the opportunity to overclad Grenfell Tower and replace its windows, which would have the advantage of improving one of its worst properties and preventing it looking like a poor cousin to the new facility

242 Coleridge {RBK00033737/4} page 4, paragraph 21.
243 {RBK00068791}.
244 Laura Johnson {RBK00034943/10} page 10, paragraph 44.
245 Kuszell {Day6/31:10-23}. This was a competitive procurement exercise.
246 Kuszell {Day6/36:3-16}.
247 Coleridge {RBK00064251/2} page 2, paragraph 5.
248 Coleridge {RBK00033737/4} page 4, paragraph 22.
249 Coleridge {RBK00033737/4-5} pages 4-5, paragraph 22.
250 Coleridge {RBK00064251/2} page 2, paragraph 4.
251 Coleridge {RBK00033737/5} page 5, paragraph 23.
252 Coleridge {RBK00064251/3} page 3, paragraph 7.
253 Coleridge {RBK00033737/4} page 4, paragraph 20.
254 Coleridge {RBK00064251/3} page 3, paragraph 8.

being developed next door.[255] It was also suggested that a cladding design might be chosen which corresponded to the design of KALC, thereby improving the overall visual appearance of the area.[256]

51.11 That is the first record we have found of any discussion of the possibility of cladding Grenfell Tower. In his evidence Mark Anderson said that the thermal efficiency of the building had been discussed at that time but not cladding as such,[257] but the emails recording the discussion[258] and Laura Johnson's evidence suggest otherwise. She said that the primary motivation at that time for considering cladding had been the building's appearance[259] and accepted that RBKC had no reason to think that the thermal efficiency of the tower was poor enough to justify the cost of cladding.[260] Laura Johnson said that she was probably the person who first mentioned the idea of cladding Grenfell Tower to the KALC project architects, Studio E.[261]

51.12 On 12 December 2011 Mr Anderson sent Ms Johnson an email containing indicative costings for cladding the tower.[262] The costings came from Hunters & Partners Ltd, a firm of architects, quantity surveyors and building consultants who had been recommended to the TMO by RBKC, and were intended by Mr Anderson to give an indicative budget for the overall cost of the project.[263] The assumptions behind the costings included using a rainscreen cladding incorporating an insulated panel. According to Mr Anderson, that assumption originated from Hunters.[264]

51.13 Mr Anderson prepared a report[265] for the meeting of the TMO's Operations Committee on 31 January 2012,[266] the purpose of which was to advise the committee that RBKC might make funding available for significant regeneration. In that report Mr Anderson advised the committee that cladding Grenfell Tower and providing it with new windows would address the TMO's need for investment in the building; he also told it that the KALC and Grenfell Tower projects would be procured jointly.[267]

51.14 On 9 February 2012 a housing digest meeting took place between RBKC and TMO. The purpose of such meetings was to provide an opportunity for the member of the RBKC cabinet holding the housing portfolio, at that time Cllr Coleridge, to meet the TMO and discuss important aspects of its delivery of the council's housing strategy and investment.[268] At that meeting there was detailed discussion about the proposed work to Grenfell Tower and it was noted that any new windows and cladding should reflect or complement KALC. Officers were planning to appoint Studio E to draw up a detailed design plan which was intended to provide the benefit of economies of scale and ensure that the two projects complemented each other.[269]

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255 See the email from Jane Trethewey to Laura Johnson on 2 November 2011, containing a summary of the discussion – {TMO10000965/3-4}.
256 As above.
257 Anderson {Day52/44:22}-{Day52/45:2}.
258 {TMO10000965/3}.
259 Johnson {Day128/34:23}-{Day128/35:1}.
260 Johnson {Day128/35:3-8}.
261 Johnson {Day128/47:15-18}.
262 {RBK00002335}.
263 Anderson {Day52/46:21}-{Day52 47:7}.
264 Anderson {Day52/48:1-6}.
265 {TMO10001001/110-112}.
266 {TMO10001001}.
267 {TMO10001001/112}.
268 Anderson {Day52/49:5-14}.
269 {RBK00033739}.

51.15 Mark Anderson said that by that stage a decision had been made that cladding Grenfell Tower was also the route to achieving greater thermal efficiency. He said that the repeated use of the words "reflect" and "complement" in relation to the KALC project indicated a genuine desire on the part of RBKC not only to improve the Lancaster West estate in general and Grenfell Tower in particular, but also to ensure there was synergy between the two projects.[270] He said that there had been a desire to give a good feeling about the Grenfell Tower refurbishment project and convey a message that North Kensington was receiving some very serious investment.[271] Mr Coleridge also said that it had been clear that any insulation for the building would require a rainscreen of some sort, which would change the look of the building and could only improve its general appearance. It had been his view that, if it were decided that Grenfell Tower needed to be insulated, a fresh look at the exterior would be welcome.[272] He had thought it a reasonable assumption that metal sheeting would be used as a rainscreen, which would result in a clean and contemporary look.[273]

51.16 In the light of that evidence, we are satisfied that the initial motive for cladding Grenfell Tower was to improve its visual appearance and to prevent its looking like a poor relation to the KALC development next door. RBKC in particular wished to ensure that the significant investment involved in the refurbishment resulted in a visible legacy. The desire to improve the thermal efficiency of the building was a later consideration, driven in part by Cllr Coleridge's meeting with Mr Daffarn in late 2011. As Laura Johnson admitted, other than residents' complaints about the windows, RBKC did not have any independent evidence that the thermal efficiency of Grenfell Tower was so poor that it needed overcladding.[274]

Funding the Grenfell project

51.17 Mr Anderson prepared a further report on the tower for a meeting of the TMO board on 29 March 2012.[275] In it he recommended that the board approve the submission of a Housing Revenue Account (HRA)[276] Regeneration Bid for Grenfell Tower in the sum of £6 million (excluding VAT) together with the appointment of the members of the existing KALC design team to undertake the detailed development of the project.[277] He informed the board that RBKC had already appointed professionals for the KALC project and proposed that, subject to due diligence and legal compliance, they also be appointed to undertake the work on the Grenfell Tower project, subject to a dispensation from the full TMO Contract Regulations.[278] His recommendation was accepted by the TMO board,

[270] Anderson {Day52/50:21}-{Day52/51:4}.
[271] Coleridge {RBK00064251/10} page 10, paragraph 27.
[272] Coleridge {RBK00064251/10} page 10, paragraph 27.
[273] Coleridge {RBK00064251/6} page 6, paragraph 17.
[274] Johnson {Day128/32:15} – {Day128/33:6}.
[275] {TMO10001095}.
[276] The Housing Revenue Account (HRA) was used by RBKC and the TMO to account for housing income and expenditure. It was used for day-to-day repairs, planned and major works and all other costs relating to RBKC properties managed by the TMO. See, for example, Johnson {RBK00034943/3} page 3, paragraph 10 and Matthews {TMO00873380/10} page 10, paragraph 36.
[277] {TMO10001095/4}.
[278] See paragraphs 5.2 and 5.3 {TMO10001095/3}. The Royal Borough of Kensington and Chelsea Tenant Management Organisation Ltd Contract Regulations were approved by the TMO board on 26 May 2011 {RBK00000762}. Those Regulations provided the framework for the procurement by the TMO of goods, works and services. They were intended to ensure propriety, compliance with statutory and other regulatory frameworks, and the proper use of financial resources. They required a competitive tendering process in accordance with the regulations for any contract with a value in excess of £25,000, see {RBK00000762/7} paragraph 6.04.

which unanimously agreed to the submission of the bid and the appointment of the KALC consultant team for the project. The board also agreed to dispense with the TMO Contract Regulations guidelines for that appointment.[279]

51.18 Following that approval, the RBKC cabinet met on 2 May 2012 to consider a report prepared by Laura Johnson on the use of the funds derived from the sale of basements at Elm Park Gardens.[280] The report recommended that they be set aside for investment in renovation, regeneration and conversion works to Grenfell Tower.[281] The cabinet accepted that recommendation.[282] Consequently, RBKC funded the Grenfell Tower project and had oversight of how it was undertaken.[283]

[279] {TMO00847333}.
[280] {RBK00029027}.
[281] {RBK00029027/8} paragraph 6.3.3.
[282] {RBK00047482}.
[283] Laura Johnson {Day128/9:5-12}.

Chapter 52
The appointment of Studio E

52.1 Although the TMO appointed other professionals engaged on the KALC project to act on the Grenfell Tower project (Artelia, Curtins, Max Fordham and Exova), at this stage we concentrate on Studio E's appointment because it provides some context in which to judge its performance. It also illustrates the TMO's general approach to the appointment of its professional team, which was to prioritise saving cost over other considerations.

52.2 Peter Wright[284] met Andrzej Kuszell, one of the founding directors of Studio E and lead partner on the KALC project, on 9 December 2011 at RBKC Town Hall to discuss the Grenfell Tower refurbishment.[285] The agenda for that meeting included a review of the scope of the works to be carried out,[286] although Mr Kuszell told us that it was not certain that the works to the tower would be commissioned and that he had understood it to be merely an exploratory meeting.[287]

52.3 Mark Anderson's recollection was that the TMO had formally engaged Studio E in February 2012.[288] He said that RBKC had expressed a strong desire for the TMO to make use of the original KALC professional team, which included Studio E and Artelia.[289] He said that the drive to use the KALC team had come from the portfolio holder, who at that time was Cllr Coleridge, and also from all the RBKC officers with whom he had had dealings.[290] Mr Anderson said that he had not been told that the TMO was required to use that team, but there had been a very strong message that that was RBKC's earnest wish.[291] Mr Anderson said that he thought the TMO would have been challenged by RBKC if it had not instructed them.[292]

52.4 Laura Johnson said that she was aware that such a wish might have been expressed by RBKC[293] and that the dominant reason for using the same professional team had been to harmonise the appearance of the two projects and co-ordinate them so that there was an understanding of how they were to work together.[294] Like Mr Anderson, she accepted that the TMO would have been challenged by RBKC if it had decided not to use the KALC team.[295]

52.5 Grenfell Tower was Studio E's first residential high-rise cladding project and yet Mr Anderson told us that no steps had been taken before it was appointed to find out whether it had any experience of a project of that kind.[296] He accepted that that was an obvious question and could not explain why no one had asked it.[297]

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284 Project Manager for Capital Projects in RBKC's Corporate Property Department.
285 Kuszell {SEA00014271/9} page 9, paragraph 34; {TMO10000965/4}.
286 {SEA00003557} at Item 2.
287 Kuszell {Day6/43:18-25}.
288 Anderson {Day52/59:16-19}.
289 Anderson {Day52/60:2-7} Artelia was previously known as Appleyards.
290 Anderson {Day52/60:17-22}.
291 Anderson {Day52/61:16-22}.
292 Anderson {Day52/61:1-4}.
293 Johnson {Day128/59:2-14}.
294 Johnson {Day128/60:6-14}.
295 Johnson {Day128/63:10-14}
296 Anderson {Day52/64:5-9}; Kuszell {Day6/63:16-20}.
297 Anderson {Day52/64:10-11}.

52.6 The first formal communication from the TMO to Studio E, which set out the TMO's requirements for Grenfell Tower, was sent by Mark Anderson to Andrzej Kuszell on 29 February 2012.[298] Mr Anderson identified the principal objectives of the project and stated that the work would be separate from, but complementary to, the KALC project. He also said that it must not in any way compromise the KALC project, by which he meant that RBKC did not want the Grenfell project to impede the KALC project.[299]

52.7 Mr Anderson went on to state that all commissions on the project would be paid by the TMO and were subject to OJEU limits. He accepted that his intention in saying that was to direct Studio E to produce a fee estimate that would fall below the financial threshold for services contracts[300] in order to avoid a public procurement process.[301] Mr Anderson said that no discussion had taken place at that time with Studio E regarding the OJEU limit or the effect it would have on Studio E's fees.[302] He recalled a discussion about OJEU limits with Bruce Sounes on 6 March 2012 and agreed that they effectively capped Studio E's fees, but he also said that there had been no indication from Studio E or from any other members of the professional team that they saw it as a cap or that their fees were likely to approach it.[303]

52.8 The Studio E witnesses, on the other hand, told us that they had been concerned about the capping of their fees at the OJEU limit.[304] Mr Anderson sent his email of 29 February 2012 to Bruce Sounes[305] as well as Andrzej Kuszell, which prompted a discussion within Studio E about the challenge which the limit on the level of fees would present for the project. Mr Sounes replied directly to Mr Kuszell that evening saying that he was concerned about the emphasis of working at risk (i.e. pending a formal agreement) while also being subject to OJEU limits.[306] On 7 March 2012 Mr Sounes mentioned to Mr Kuszell that he (mistakenly) thought the OJEU limit was £99,000, which Mr Kuszell said in his reply would be "problematic".[307] Mr Kuszell told the Inquiry that he had thought that even a limit of £174,000 would result in Studio E doing more work than the fee would cover.[308] Mr Sounes also thought the overall fee to deliver the project would be more than £174,000,[309] but there is no evidence that either he or Mr Kuszell raised their concerns with the TMO.[310]

52.9 On 12 June 2012 Bruce Sounes sent Mr Anderson a fee proposal and draft letter of appointment.[311] The proposal was for Studio E to provide architectural services under the Standard Conditions of Appointment for a Consultant (2010) published by the Royal Institute of British Architects (RIBA). (We refer to these as the RIBA Standard Terms.) However, no agreement was signed at that stage and in the event discussions about the terms on which Studio E was to be appointed continued until November 2013.[312]

298 {SEA00000007/1-2}.
299 Anderson {Day52/91:20-25}.
300 See Regulation 8 of the Public Contracts Regulations 2006 (as amended).
301 Anderson {Day52/92:20}-{Day 52/93:4}.
302 Anderson {Day52/93:21}-{Day 52/94:8}.
303 Anderson {Day52/96:1-8}.
304 Kuszell {Day6/71:4-24}; {SEA00003567}.
305 {SEA00000007}.
306 {SEA00003567}.
307 Kuszell {SEA00014271/12} page 12, paragraph 44; {SEA00014272/2}.
308 Kuszell {Day6/87:13-19}.
309 Sounes {SEA00014273/32} page 32, paragraph 63.
310 Sounes {Day7/38:23}-{Day7/39:7}.
311 {SEA00004561}; Bruce Sounes chose to put forward the RIBA standard form contract terms. Sounes {Day7/56:7}-{Day7/57:4}; The covering letter {SEA00004562} attached: The RIBA Standard Conditions of Appointment for a Consultant (2010) {SEA00004571}, The Standard Conditions of Appointment for an Architect Amendment 1 (1 October 2011) {SEA00004564}, A Memorandum of Agreement {SEA00004570} and appendices A-E {SEA00004565}, {SEA00004566}, {SEA00004563}, {SEA00004567}, {SEA00004568}, {SEA00009827}.
312 Sounes {Day7/57:8-25}; {SEA00009820}.

Both parties contemplated that the refurbishment would be carried out under a design and build contract and that if Studio E were appointed by the TMO as architect its services would in due course be transferred to the principal contractor by what is known as a "novation".

52.10 The proposal was for a fee of £323,000 for all stages of the work (including work to be done after the novation) but only £161,000 for the work to be done before the novation that the TMO had said should be subject to OJEU limits.[313] Although Mr Sounes attempted to persuade us that it was a fairly typical breakdown of fees[314], Artelia advised the TMO in a meeting on 18 July 2012, attended by Mr Sounes, that working to OJEU limits would probably involve deferring some of Studio E's fees to the period after novation, when the contractor would become liable for them.[315]

52.11 In the event, that is exactly what happened. Studio E produced a further fee proposal on 27 July 2012 which showed the fees for the pre-novation design work as £190,000.[316] However, in his covering email to the TMO Mr Sounes proposed deferring 50% of all Stage D fees to keep the total Stage D fee below £174,000.[317]

52.12 The TMO board met on 15 November 2012. In advance of that meeting Mr Anderson prepared a report on the Grenfell Tower project,[318] in which he advised the board that the design team had been engaged by the TMO under its own contract regulations. He also told the board that the fees had been capped at the EU procurement threshold of £174,000 because the procurement process for the design team on KALC did not cover the Grenfell Tower Regeneration project.[319] That represented a change from the position he had reported to the board in March 2012.[320] The report went on to state that the novation of the Grenfell Tower design team to Leadbitter (the principal contractor for KALC and at that time the proposed principal contractor for the Grenfell Tower project) after the planning stage would be compliant with EU procurement rules because the Grenfell Tower project had been included in the OJEU notice relating to the KALC project.[321] However, that statement was wrong, as no mention of the Grenfell Tower project had been made in the OJEU Notice relating to the KALC project.[322]

52.13 By December 2012, Studio E had already issued invoices totalling £174,000 and had stopped invoicing the TMO because it had, in Bruce Sounes' words, "reached the OJEU threshold".[323] It follows that Studio E's fees were always going to exceed the OJEU limit and the capping of its fees by the TMO was a way of avoiding a competitive procurement exercise for design services on the project.

52.14 The appointment of Studio E as architect for the project involved no element of competitive procurement whatsoever.[324] No member of the firm was interviewed as part of a competitive procurement and there was no design competition.[325] Mr Anderson said he had thought that, because the OJEU notice published for the KALC project had included

313 {ART00000148}.
314 Sounes {Day7/42:7}-{Day7/43:17}.
315 {ART00000168}; Sounes {Day7/44:14-18}.
316 {SEA00007386} under the Studio E tab of the spreadsheet.
317 {ART00000981}.
318 {TMO10001766/90}.
319 {TMO10001766/91} paragraph 5.2.
320 {TMO10001095/3} paragraph 5.2.
321 {TMO10001766/91} paragraph 5.3.
322 {TMO10005215}; {RBK00068762}.
323 Sounes {SEA00014273/78} page 78, paragraph 162.
324 Anderson {Day52/73:22-25}; Kuszell {Day6/64:22-25}.
325 Kuszell {Day6/65:1-6}.

the term "housing regeneration", the TMO could rely on the outcome of that exercise to appoint Studio E for the Grenfell Tower project, even though that project had not been mentioned in the notice.[326] He also told us that he had asked the council's legal department and those responsible for procurement whether he could rely on the procurement process for the KALC project to appoint the same professional team for the Grenfell Tower project and was told that he could.[327] However, he did not receive confirmation of that advice in writing and in due course it changed.[328] It is hard to see how Mr Anderson could possibly have thought that it was permissible for the TMO to rely on the procurement process undertaken by RBKC for the KALC project to justify its appointment of Studio E on the Grenfell Tower refurbishment, but if he did, he was obviously mistaken.

52.15 On 11 November 2013, Bruce Sounes sent Peter Maddison by email a revised set of contractual documents.[329] The RIBA Standard Terms were not included in the attachments, but Mr Sounes confirmed that they were the terms on which he was proposing that Studio E be engaged and we are satisfied that that is how the proposal was understood by Mr Maddison.

52.16 By 20 November 2013 the terms of Studio E's appointment appear to have been agreed in principle[330] but Mr Sounes could not recall whether a letter of appointment had ever been signed and Studio E was unable to find a copy of an agreement.[331] Given the inability of either party to produce a signed copy of the terms of appointment, we think it very unlikely that a formal written agreement between Studio E and the TMO was ever signed. That does not matter for present purposes, because both parties accept that a contract came into existence between them incorporating the RIBA Standard Terms.[332] However, it demonstrates a casual approach to the establishment of contractual relations which we have found to exist in relation to other aspects of the refurbishment and which appears to be widespread in the construction industry. In our view a more rigorous and careful approach at all levels would significantly reduce the risks of disagreement about where responsibility for important matters lies.

52.17 In the Schedule of Services in Appendix B to the contract documents, Studio E was designated as lead consultant and lead designer for RIBA Stages A to L of the project,[333] a position that was confirmed by Mr Sounes in a letter to the TMO in November 2013.[334] In the light of the documents and Mr Sounes' evidence, it is clear to us that Studio E was appointed as lead consultant. As such, it had a duty to advise on the need for, and the scope of services to be provided by, consultants, specialists, sub-contractors or suppliers and to monitor the work of other consultants.[335]

326 Anderson {Day52/70:15-23}.
327 Anderson {Day52/78:25}-{Day 52/79:9}.
328 Anderson {Day52/79:10-16}.
329 {SEA00009820}; The family of updated contract documents are {SEA00009821}; {SEA00009822}; {SEA00009823}; {SEA00009824}; {SEA00009825}; {SEA00009826}; {SEA00009827}; {SEA00009828}; {SEA00009829}; {SEA00009830}; and {SEA00009831}.
330 {SEA00009993}; Sounes {Day7/58:3-12}.
331 Sounes {Day7/58:3}-{Day7/59:4}; {Day7/60:18-21}; Sounes {SEA00014273/11} page 11, paragraph 26.
332 Sounes {Day7/61:16}-{Day7/62:19}; {Day7/79:2}-{Day7/80:5}; {Day7/80:9-19}.
333 {SEA00009824/2}.
334 See letter {SEA00009821} and attached contract documents {SEA00009822} and {SEA00009824/2}.
335 See Appendix B: Schedule of Services {SEA00009824/5} sent by Bruce Sounes to Peter Maddison on 11 November 2013. The version sent to Mark Anderson on 12 June 2012 also says the same thing {SEA00004566/5}. Bruce Sounes agreed that these services were part of Studio E's role as Lead Consultant. Sounes {Day7/80:9-19}.

52.18 The RIBA Standard Conditions obliged Studio E to exercise reasonable skill, care and diligence in accordance with the normal standards of the architectural profession when performing its services.[336]

52.19 Studio E did not have any previous experience of providing architectural services in respect of the refurbishment and cladding of an existing residential high-rise building.[337] The process of appointing Studio E as architect for the Grenfell Tower project did not require it to demonstrate that it had the relevant skills, knowledge or experience for such a project.[338] Mr Sounes said that Studio E had not held itself out as having any such experience,[339] but neither Mr Kuszell nor Mr Sounes could remember ever having informed the TMO or Artelia that it did not have experience of high-rise projects or cladding. Thus, by failing for purely financial reasons to follow the proper procurement process, the TMO deprived itself of the opportunity to appoint a firm of architects with relevant skills, knowledge and experience.

52.20 In his email to Mr Kuszell dated 29 February 2012 Mr Sounes described Studio E as a "little green on process and technicality". He therefore suggested "some rapid CPD" (i.e. continuing professional development).[340] Mr Sounes said that by "green on process" he had meant to refer to the logistics of undertaking work on an occupied building.[341] He had noted that overcladding the building formed part of the work, which had struck him as a challenge. He said the challenge lay in the fact that the building was to remain occupied during the work, rather than in the cladding work itself.[342] By "rapid CPD", Mr Sounes said that he had meant nothing more than a consultation to understand the feasibility of how the work could be done, which he said he had undertaken with an employee of Max Fordham, the mechanical and electrical engineers engaged on KALC.[343] Mr Sounes said that his initial concerns about taking on the project had been allayed[344] and that despite his initial uncertainty he had been satisfied that Studio E had the experience and expertise necessary to take on the work being discussed at that stage.[345] He agreed that he had decided that it was possible for him to learn on the job as the project proceeded.[346]

52.21 Mr Kuszell accepted that it was necessary for Studio E to carry out some continuing professional development and to conduct research to identify the various challenges the project might throw up,[347] but he said he had had no reason to believe that the firm was not competent and adequately resourced to do that.[348] He said that Studio E had experience of undertaking complex projects for the first time and that he had no reason to doubt that it would do the research necessary to do the project properly.[349]

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336 {SEA00004571/4}. See Condition 2.1 under the subheading 'Duty of Care'. Bruce Sounes confirmed that this condition was consistent with the standard of service required by Studio E's professional indemnity insurance. Sounes {Day7/61:16} – {Day7/62:7}; {Day7/79:24}-{Day7/80:5}; {Day7/80:9-19}.
337 Kuszell {MET00019989/3} page 3; Kuszell {SEA00014271/4-5} pages 4-5, paragraph 17; Sounes {SEA00014273/32} page 32, paragraph 64; Kuszell {Day6/80:5-15}.
338 Kuszell {Day6/64:14-21}.
339 Sounes {Day6/194:6-20}.
340 {SEA00003567/1}; Sounes {SEA00014273/32} page 32, paragraph 64.
341 Sounes {Day6/185:24}-{Day6/186:4-5}.
342 Sounes {Day6/186:22-25}; {Day6/187:1-7}; {Day6/192:12-14}.
343 Sounes {Day6/188:5-8}; {Day6/189:10-12}; {Day6/190:2}-{Day6/191:9}; {Day6/192:18-25}; Sounes {SEA00014273/32} page 32, paragraph 64.
344 Sounes {Day6/192:15-16}.
345 Sounes {SEA00014273/32} at paragraph 64.
346 Sounes {Day6/194:3-5}.
347 Kuszell {Day6/74:15-17}; {Day6/77:21-23}.
348 Kuszell {Day6/76:17-23}.
349 Kuszell {Day6.75:15-21}; {Day6/76:2-6}; {Day6/80:21-24}.

52.22 Both Mr Kuszell and Mr Sounes accepted that, given Studio E's lack of relevant experience, if a competitive procurement process for architectural services had been undertaken in relation to the Grenfell Tower project, it was unlikely that Studio E would have qualified for appointment.[350]

[350] Kuszell {Day6/70:10-16}; Sounes {SEA00014273/32} page 32 paragraph 63; Sounes {Day6/196:13}-{Day6:197:23}.

Chapter 53
Planning the refurbishment

Initial design team meeting: April 2012

53.1 The Grenfell Tower refurbishment began life as an independent project on 19 April 2012 with an initial design team meeting attended by Studio E, Max Fordham and Leadbitter.[351] Artelia was also present as a potential consultant for the TMO, having acted as employer's agent and quantity surveyor for the KALC project.[352] Simon Cash was designated project director for the refurbishment, the most senior position with overall responsibility for the delivery of Artelia's services.[353] The purpose of the meeting was to introduce the project, to set out in broad terms its scope and objectives and to discuss costs and funding. The TMO indicated that it would request a budget of £6m from RBKC for the full cost of the works.[354]

53.2 On 2 May 2012 Simon Cash wrote to Mark Anderson of the TMO offering to perform quantity surveying, employer's agent and CDM co-ordinator (CDM-C) services for the refurbishment.[355] The letter appended RICS standard forms of contract for employer's agent and quantity surveying services[356] and a list of CDM-C services.[357]

53.3 On 21 August 2012 Mark Anderson confirmed that the TMO wished to appoint Artelia to carry out those functions on the terms outlined in its proposal of 2 May 2012 under the standard RICS standard terms. Although the parties did not sign a contract at that time,[358] both appear to have acted on the basis that they were contractually bound on the terms set out in Artelia's proposal. Eventually, on 23 June 2014, Artelia and the TMO executed a formal deed of appointment incorporating the RICS standard terms.[359] The Schedule of Services stated that Artelia would perform the roles of quantity surveyor, employer's agent and CDM co-ordinator.[360]

Artelia's cost budget estimates in 2012

53.4 A second design team meeting was held on 24 May 2012.[361] At that meeting Chweechen Lim, a quantity surveyor employed by Artelia, was instructed to prepare a cost budget estimate for the project.

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351 {ART00000013}.
352 Cash {ART00006544/5-6} pages 5-6, paragraph 16.
353 Cash {Day47/210:21-23}.
354 {ART00000013/4} item 5.0.
355 {ART00000301}. This letter attached documents including: the RICS standard form of Quantity Surveyor Services; the RICS standard from of Employer's Agent Services and a printed list of services stated to be a summary of the duties of a CDM-C under the CDM Regulations 2007.
356 {ART00000301/7}; {ART00000301/17}. These documents listed specific functions which Artelia selected by marking tick boxes.
357 {ART00000301/24} stated to be a summary of the statutory duties of CDM-C.
358 Cash {Day47/213:24}-{Day47/214:2}.
359 {ART00005742}.
360 {ART00005742/23}.
361 {ART00000038}.

53.5 Between June and December 2012 Chweechen Lim prepared several cost budgets for the TMO under the supervision of Simon Cash.[362] The estimates were based on information provided by the primary designers of the project, Studio E, Curtins Consulting and Max Fordham[363] and ranged from £7,803,000 to £9,645,000.

53.6 The first estimate in 2012, which costed the project at £7,803,000, was presented at the third design team meeting on 7 June 2012.[364] At that meeting Mark Anderson, then interim Director of Asset Investment and Engineering at the TMO, indicated that he was content with the projected cost. He confirmed that RBKC's funding was £6 million, but that he expected further funds to be made available from the TMO's capital programme.[365]

53.7 During 2012 the estimated total cost of the project changed several times, increasing by December 2012 to £9,645,000. The changes were attributable to a number of factors, including changes to the scope of the works and corrections of errors in measurements.

53.8 After June 2012, none of Artelia's estimates were within the budget available to the TMO, a fact not lost on those involved in the project. In mid-September 2012, after Ms Lim had costed the project at £9,280,000,[366] both Artelia and Studio E told the TMO that either the budget must increase, or savings must be achieved, whether by reducing the scope of the project or through "value engineering".[367] In theory, "value engineering" involves making changes to the design or specification that reduce cost without sacrificing performance,[368] but in our view it is in practice little more than a euphemism for reducing cost, because substituting a cheaper product for a more expensive one or altering the design or scope of the work in a way that reduces cost almost invariably involves a compromise of some kind, whether in content, performance or appearance. Certainly, in the present case the expression was being used by the parties simply to mean changes that would lead to a reduction in cost.

Leadbitter's proposed appointment

53.9 At the outset of the Grenfell refurbishment project, and throughout 2012, the TMO had planned to engage Leadbitter Group ("Leadbitter"), the principal contractor for the KALC project, using the IESE ("Improvement and Efficiency in the South East") framework agreement, which was a legitimate alternative to a full procurement exercise.[369] Accordingly, representatives of Leadbitter were present at most of the Grenfell project meetings in 2012 and were on the distribution list for the minutes. Leadbitter became involved in some activities, including preparing a programme of works[370] and conducting site inspections.[371] However, retaining Leadbitter was not uncontroversial within the TMO and the minutes of a meeting of the TMO board on 24 May 2012 record that it needed to be persuaded that using Leadbitter was in the TMO's best interests.[372] Efforts by Mark Anderson to persuade the TMO board to appoint Leadbitter continued until at least

362 Lim {ART00005817/5} page 5, paragraph 15; Cash {Day48/2:5-6}.
363 Cash {Day48/130:24}-{Day48/131:1}.
364 {ART00000079}.
365 {ART00000079/1} The TMO Capital Programme was an RBKC-funded investment programme for works to improve residences.
366 In Estimate 3 Rev 1 {ART00005913}.
367 {ART00005879}; {ART00005783}; {ART00006081}.
368 Hyett, Specialist Report {PHYR0000028/13} section 3.3.21 quoting the definition of value engineering in the RIBA Stage Guide 2015.
369 Anderson {Day52/73:13-21}; Anderson {TMO00847334/2} page 2, paragraph 8.
370 Minutes of meeting 5 {ART00000169}, item: "Programme".
371 Minutes of meeting 10 {ART00000489}, item: "Contractor".
372 {ART00000038/1} item 1.00.

November 2012,[373] but although it authorised the TMO to enter into a pre-construction agreement with Leadbitter,[374] the TMO failed to do so, probably because RBKC and Leadbitter had been unable to agree a final cost for the KALC project, as explained below.

53.10 At the beginning of 2013, RBKC and Leadbitter were negotiating the final account for the KALC project, but they were finding it difficult to reach agreement.[375] On 3 January 2013, Laura Johnson sent an email to Cliff Thomas of Leadbitter telling him that in view of the continuing failure to agree the final account for KALC, RBKC would no longer be recommending that the TMO appoint Leadbitter on the Grenfell Tower project and would advise it to invite tenders from a list of contractors that did not include Leadbitter.[376]

53.11 Although Ms Johnson was the senior responsible officer for the KALC project, she was not the senior responsible officer for the Grenfell Tower refurbishment. Nor was anyone else at RBKC, because the refurbishment was a TMO project and RBKC had no power to decide which contractors the TMO should appoint to deliver its projects.[377] Nevertheless, that did not stop her trying to use Leadbitter's interest in the Grenfell Tower project as a means of putting pressure on it to agree the final account for the KALC project.[378] Ms Johnson took the precaution of sending a copy of her email to Mark Anderson of the TMO so that he would see that RBKC, as the TMO's funder, was seeking to apply pressure to Leadbitter in that way. Although Artelia had also received a copy of Ms Johnson's email to Leadbitter, it nonetheless continued to hold discussions with Leadbitter about the cost of the refurbishment because the TMO was Artelia's client and the TMO wanted Artelia to carry on negotiating with Leadbitter.[379]

53.12 Despite the advice from Artelia and Studio E to increase the budget or achieve savings, the estimated cost of the project continued to rise. The TMO had wanted to enter into a contract with a principal contractor for the refurbishment works by 8 January 2013[380] and therefore by December 2012 there was a pressing need to agree a fixed sum for the project with Leadbitter, which at that time was still expected to be the principal contractor.[381]

Discussions between Leadbitter and Artelia: January–April 2013

53.13 The IESE framework provided for a two-stage mini-tender procurement process for use by public bodies in the south-east of London. The first stage of the process was the selection of a contractor from eight on the framework list; the second was negotiating with that contractor to agree a price.[382] As Leadbitter had already been selected at the outset of the Grenfell Tower project, the IESE process effectively began with negotiating the contract price.

53.14 However, even before discussions had started, Leadbitter indicated that it considered Artelia's cost estimate for the project to be £2 million too low.[383] In January 2013, one of its quantity surveyors, Mohit Kotecha, estimated the cost at £12.6m.[384] Between January and April 2013, Ms Lim and Mr Kotecha exchanged assessments of the cost of the project,

373 TMO Board meeting minutes, 15 November 2012, {TMO10001766/90-93}.
374 TMO Board meeting minutes, 15 November 2012 Part B {TMO00883922/2-3} item 2.
375 Laura Johnson {Day128/116:3-16}.
376 {ART00000637}.
377 Anderson {Day52/28:11-22}.
378 Laura Johnson {Day128/118:25}-{Day128/119:1-2}.
379 Cash {Day48/152:9-19}.
380 As recorded in the minutes of the 22 November 2012 meeting {ART00006750} item 2.2.
381 {ART00000633/4}.
382 Lim {ART00009428/10} page 10, paragraph 27.
383 {ART00008469} item 3.
384 Kotecha {LBI00003938/3} page 3, paragraph 9.

commenting on each other's calculations in detail. They also met in person several times.[385] Both Artelia and Leadbitter adjusted their assessments as a result, having taken into account a number of factors, including some value engineering options.[386]

53.15 Artelia attempted to test its cost assessments by approaching various contractors who had procurement framework agreements with RBKC.[387] At the suggestion of Peter Maddison, Director of Assets and Regeneration at the TMO,[388] in April 2013 Artelia also approached Rydon, even though it was not included in any available framework agreements.[389] Although it was not unusual for potential competitors to be asked to provide information for the purpose of checking costs,[390] none of the contractors approached for that purpose did so.

53.16 Leadbitter's costings drew attention once again to the main difficulty facing the TMO, namely, the inadequacy of its budget. Both Ms Lim and Mr Kotecha, the professional quantity surveyors in the best position to assess the costs, agreed that they exceeded the funds available by a significant margin.[391] Although they worked to understand the differences between their analyses, others in the design team and the TMO tried to find ways to bring the project within budget.[392]

53.17 The cladding was a focal point of the discussions about savings, being described by Bruce Sounes as an obvious target.[393] The TMO also asked for information on the savings that could be made, including specifically on cladding.[394] By April 2013, the cladding, together with the crown and the construction of the new windows, was assumed by all involved in the project to be a prime area in which costs could be reduced and it featured prominently in budget discussions from that point onwards.

A new procurement process considered: February 2013–April 2013

53.18 Peter Maddison joined the TMO in January 2013 as Director of Assets and Regeneration. Like his predecessors, he was attuned to the relationship between RBKC and the TMO and regarded RBKC effectively as TMO's client.[395] He and Laura Johnson had several meetings about the Grenfell Tower refurbishment in the first quarter of 2013.[396] Ms Johnson accepted that in early 2013 she had discussed the relationship between RBKC and Leadbitter with Mr Maddison and had mentioned the difficulties she was having with Leadbitter on the KALC project.[397]

53.19 By late February 2013, Peter Maddison and Paul Dunkerton, who was working as a freelance project manager for the TMO, had become frustrated with what they perceived to be the slow progress of the negotiations with Leadbitter on the Grenfell Tower project. On 27 February 2013, Mr Dunkerton asked Alun Dawson of Artelia to produce a

385 For example: 17 January 2013 {ART00006072/2}; Lim {ART00005817/14} page 14, paragraph 52; and 25 March 2013 {ART00006018}; {ART00006074}.
386 {ART00006072}.
387 {ART00001005}; {ART00009101/18}.
388 Maddison {Day58/178:19}-{Day58/179:1-4}; {RYD00001115}.
389 {ART00008995}; {ART00008434}; {ART00009105}.
390 Lim {ART00009428/17} page 17, paragraph 49.
391 Cloke {MET00070907/5} page 5.
392 {ART00006129/2}; {ART00005911}.
393 {ART00005911/1-2}.
394 On 27 February 2013 {ART00005807}; 22 March 2013 {ART00006017}.
395 Maddison {Day57/80:19-25}-{Day57/81: 12}.
396 See Maddison's notebook for January – May 2013 {TMO00879771} for example, at page 26 (for 13 February 2013).
397 Laura Johnson {Day128/119:21-24}.

programme based on running a fresh procurement process for a principal contractor[398] and from about that time work on a new procurement exercise ran in tandem with the attempt to agree a price with Leadbitter for the refurbishment. The TMO Programme Board discussed running a new procurement exercise at a meeting on 25 March 2013.[399] At that meeting Peter Maddison recommended that it should do so but noted that it might be difficult to explain that change of heart to the TMO board, which had been persuaded to use Leadbitter in the interests of efficiency.[400]

53.20 As incoming employer's agent from March 2013, Robert Powell took over the task of considering a fresh procurement exercise.[401] On 10 April 2013 he proposed that Artelia produce a full report, without which he considered that the TMO could find itself in a worse situation.[402] On 19 April 2013, Mr Dunkerton confirmed the TMO's instruction to Artelia to provide formal advice on how to proceed with the Grenfell Tower project.[403] That was exactly a year after the first project team meeting.

Artelia's Status Report: April 2013

53.21 Artelia produced a Status Report dated 23 April 2013,[404] the executive summary of which identified a number of factors which had contributed to the slow progress and excessive cost of the scheme. Artelia did not consider re-procurement a viable option and recommended that the TMO should retain Leadbitter as principal contractor.[405] It warned the TMO that if the project were not stopped and the scope, programme and cost fundamentally reviewed, it would fail.[406] It therefore recommended that the scheme in its existing guise be stopped immediately, pending a design team review.[407]

53.22 The trenchant terms in which Artelia couched its opinion was matched by the strength of feeling of those working on the project. Philip Booth, who became involved in it in April 2013,[408] recalled that the project had been in a state of distress at that time.[409]

53.23 Simon Cash repeated Artelia's advice to the TMO in a meeting on 26 April 2013.[410] On the same day, Peter Maddison confirmed that a budget of £8.5m for construction costs would be available for the project.[411]

53.24 On 2 May 2013, perhaps in a bid to save a project in trouble, Robert Powell sent Paul Dunkerton a Draft Revised Project Brief,[412] in which he proposed that Artelia should take on the roles of project manager and employer's agent in addition to its responsibilities

398 {ART00008989/4}; see also 15 March 2013 {ART00006556/2}.
399 {TMO10038870}.
400 {TMO10038870/2}.
401 Powell {ART00008984/11} page 11, paragraph 43.
402 {ART00001083}.
403 {ART00001116}.
404 {ART00009101}.
405 {ART00009101/18-19}.
406 {ART00009101/25}.
407 {ART00009101/25}.
408 Booth {ART00008527/3} page 3, paragraph 12. Philip Booth assumed the role of EA in July 2013 when Robert Powell left Artelia.
409 Booth {Day49/128:24}-{Day49/129:15}; {Day50/113:19-21}.
410 {TMO00830537/2} Section "Procurement" Item 8.
411 {ART00009081} item 3. Confirmed in Powell's Draft project Brief of May 2013 {ART00006475} under header "Budget".
412 {ART00006475}; {ART00006383}; Powell{ART00008984/25} page 25, paragraph 77.

as quantity surveyor. He also suggested that Artelia should become the lead consultant.[413] In the event, however, when a formal contract was eventually signed in July 2014 Artelia was engaged to act only as employer's agent, quantity surveyor and CDM co-ordinator.

A change of priorities: value for money rather than maintaining programme

53.25 On 21 May 2013, Robert Powell sent an email to Philip Booth and Simon Cash describing a meeting he had attended with RBKC and the TMO earlier that day. He told them that Peter Maddison had been overruled by Laura Johnson, that Mr Maddison was no longer keen to appoint Leadbitter as principal contractor and that value for money was more important to RBKC and the TMO than preserving the programme. He said that it was likely, therefore, that the TMO would decide to hold a new procurement process in accordance with EU regulations.[414]

53.26 From that moment, the TMO's attention was increasingly directed towards a new procurement exercise, either by inviting tenders through the Official Journal of the European Union (OJEU) or by making use of an existing framework agreement. Neither Laura Johnson nor Peter Maddison accepted there had been any overruling,[415] but, even allowing for some flamboyance in Robert Powell's turn of phrase among colleagues,[416] it is clear to us that Laura Johnson had exercised a decisive influence in favour of re-procurement.[417] Mr Maddison told us that he had changed his mind as a result of what he had been told by Laura Johnson about problems which RBKC had encountered with Leadbitter on the KALC project, although that is not supported by any of the documents we have seen.[418] Ms Johnson, for her part, accepted that her view of Leadbitter had influenced the TMO's decision to put the contract for the Grenfell Tower refurbishment out to tender again.[419] We think that when they gave evidence both Ms Johnson and Mr Maddison independently sought to downplay her influence over the direction of the Grenfell Tower project in order to preserve an appearance of independence from RBKC on the part of the TMO not wholly borne out by the contemporaneous evidence.

53.27 In his email Robert Powell said that the emphasis of the TMO's approach had changed from "programme" to "value for money". Even though the scope of works was still evolving,[420] the project was constrained by an inadequate budget. In the context of the developments that had by then taken place, it is clear to us that the email was recording the change of emphasis on the part of the TMO from one of maintaining the original programme to one of saving cost, and that what the TMO really meant by achieving value for money was finding a contractor who would do the work at a cost lower than that suggested by Leadbitter.

413 {ART00006475/2} under "Contract and Procurement".
414 {ART00006252}.
415 Maddison {Day58/100:20}-{Day58/101:13}; Laura Johnson {Day128/145:2-11}.
416 Booth {Day50/16:8-11}.
417 Powell {ART00008984/27-28} pages 27-28, paragraph 85; Cash {Day48/164:10-16}.
418 Maddison {Day58/103:2-19}.
419 Laura Johnson {Day128/120:6}-{Day128/121:1}.
420 As can be seen by Laura Johnson's email on not progressing kitchens / bathrooms {ART00006252}; Booth {Day50/11:2-25}; {Day50/12:5-8}.

Artelia reports: May–June 2013

53.28 On 24 May 2013, Artelia produced an Addendum to its Status Report.[421] That short document stated that the TMO had made it clear that value for money was to be regarded as the key driver for the project and that it remained to be convinced that the existing arrangements with Leadbitter could provide that. It therefore believed that a new procurement process would provide best value. In the light of those observations Artelia recognised that it was necessary to reconsider its original recommendation and accept that value for money might be enhanced by seeking a principal contractor through a new procurement process.[422]

53.29 When Robert Powell sent the Addendum to Peter Maddison, he commented that he hoped it gave him the support he had been looking for to proceed with a new procurement exercise for a principal contractor, in contrast with the earlier recommendation which had been based on information that had become obsolete.[423] At the time, Robert Powell described the Addendum to Simon Cash as "political lubrication" to give the TMO justification for going against its original recommendation to keep Leadbitter involved in the project.[424] It is apparent that the TMO had decided to start the project again from scratch, which required it to climb down from its position that there was a benefit to using the contractor it had employed on the KALC project. The TMO needed a professional opinion to support its change of position and Artelia, under pressure from its client, duly obliged. In our view, Artelia, as a professional consultant, should not have allowed itself to be influenced to that degree by its client.

53.30 That change of approach was reflected in a revised version of Robert Powell's Project Brief[425] that was circulated by Philip Booth on 3 June 2013.[426] According to that version, the primary driver was "Cost (Value for money)". The Project Brief was presented at a meeting on 6 June 2013 and was approved by the TMO, with some adjustments.[427]

53.31 In a meeting on 6 June 2013 Peter Maddison asked Artelia to change the Addendum to demonstrate that a fresh procurement exercise would deliver better value for money,[428] and in a further meeting on 11 June 2013, he asked Artelia to reword it.[429] Accordingly, Simon Cash sent Mr Maddison a revised status report dated 18 June 2013,[430] the contents of which had been materially altered. Simon Cash noted in his covering email that he had reworded sections to "read in a better light".[431] Having already changed its original advice in favour of support for a new procurement process, in this latest version of the addendum Artelia, having analysed the options, now more firmly recommended that using the EU procedure, rather than a framework agreement, would be more likely to give value for money.[432] In addition, criticisms of the TMO were largely removed or watered down and replaced with criticisms of Leadbitter.[433]

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421 {ART00006232}.
422 {ART00006232/6}.
423 {ART00009020/2}.
424 {ART00006418}.
425 {ART00009032}.
426 Booth {ART00008527/13} page 13, paragraph 55; {ART00008529}.
427 {TMO00833043} item 1.1.; Philip Booth made the amendments and reissued on 10 June 2013: {ART00008641}; {ART00008825}.
428 {TMO00833043} item 2.1.
429 {ART00006473}.
430 {TMO10048492}; {ART00001241}.
431 {ART00001241}.
432 {TMO10048492/28}; Booth {Day50/19:9-18}.
433 Cash {Day48/191:5}-{Day48/194:7}.

53.32 Simon Cash was reluctant to amend the criticisms of the TMO because they did not reflect Artelia's assessment of what had happened on the project,[434] but he was put under pressure to do so by Peter Maddison in the course of what he described as a "particularly strong"[435] conversation. Mr Maddison did not accept that description of the conversation, but he did accept that a "frank" conversation[436] had taken place between them. Later, in an email sent on 17 September 2013 to Claire Williams, the project manager in the TMO Assets and Regeneration Department, David Gibson, TMO's Head of Capital Investment, said that the TMO had had to "twist [Artelia's] arms quite hard" to obtain the revised report.[437] Mr Gibson's evidence was that he meant that the report had not been in the clear form he had wanted,[438] nor had it been as positive and forward-looking as he had expected,[439] but the clear meaning of the words used in that email is that Mr Gibson was aware that Artelia had been reluctant to amend its earlier report and had required some considerable persuasion to do so. In our view the evidence shows that the TMO put significant pressure on Artelia to make changes which it would not otherwise have made.

53.33 Peter Maddison relied on the advice expressed by Artelia in the Addendum to support his presentation to the TMO board on 20 June 2013.[440] The board agreed to hold a new procurement process, noting the then estimated cost of £9,780,000 for the project.[441] In her Budget Monitoring Report for the first quarter of 2013/2014, prepared for RBKC's Management Board, Leaders Group and Cabinet, Laura Johnson reported that the estimated cost of the Grenfell Tower refurbishment was around £9,700,000, but that that was to be confirmed after the procurement process had been completed.[442] She recommended that the cabinet increase the total budget accordingly.[443] That increase was approved by RBKC's Cabinet on 18 July 2013.[444]

The OJEU procurement

53.34 One effect of the decision to hold a new procurement process for the selection of a principal contractor under the OJEU process was to force the TMO to decide the scope of the project and the materials to be used. The details were set out in the NBS Specification, which was included in the tender packs.

53.35 The tender process was led by Jenny Jackson, a procurement specialist engaged directly by the TMO, with the assistance of Artelia. The TMO published a notice of its intention to award the contract on 20 August 2013.[445] Despite the notice receiving 22 expressions of interest, only five potential bidders returned responses to the Pre-Qualification Questionnaire by the deadline of 20 September 2012.[446] All five, namely, Mulalley & Co Limited, Keepmoat Regeneration Limited, Durkan Limited, Rydon Maintenance Limited and Wates Construction Limited, passed the

434 Cash {Day48/194:18-20}.
435 Cash {Day 48/194:15-16}.
436 Maddison {Day58/143:3-8}.
437 {TMO10048490}.
438 Gibson {Day53/139:7-19}.
439 Gibson {Day53/140:1-5}.
440 Maddison {Day58/143:16-22}; {Day58/148:13-24}; {TMO10002849}.
441 {TMO10049945} item 1.
442 {RBK00013783/6} paragraph 3.15.
443 {RBK00013783/7} paragraph 4.1; Laura Johnson {RBK00034943/14} page 14, paragraph 58.
444 {RBK00059321/2} paragraph A5(iv).
445 {ART00008871}.
446 {ART00008876}.

Pre-Qualification Questionnaire evaluation, which was scored by Artelia and the TMO,[447] and were invited to tender.[448] Although Leadbitter had been informed about the process in July 2013,[449] it did not tender for the project.

53.36 In the end, only three of the five companies which had satisfied the Pre-Qualification Questionnaire eventually submitted tenders, Wates having pulled out on 18 December 2013[450] and Keepmoat on 15 January 2014.[451] The tenders were opened on 14 February 2014 and it was immediately apparent that Rydon's was significantly lower than those of the other two companies, Durkan and Mulalley.[452]

Manipulation of the procurement process

53.37 Following their formal evaluation, Rydon's bid was confirmed as being the lowest price; it also achieved the highest score on quality.[453] All the prices for the external facade were substantially higher than Artelia's estimate. The basis of evaluating tenders was 40% for price, and 60% for quality, of which 55% was attributed to written submissions and 5% to interview. Weighting the scoring in that way meant that the tender process slightly favoured the bidder with the highest quality rather than the lowest price. After the scores for the written submissions had been collated, Rydon's bid was identified as the most competitive.[454]

53.38 Residents had some limited participation in the process.[455] At the stage of the Pre-Qualification Questionnaire in October 2013, and at the stage of the Invitation to Tender in February 2014, they contributed their assessments of the quality of the tenderers' communication and liaison with residents.[456] They were not invited to contribute questions about programming or quality, even though those were matters which affected them and on which they might have had valuable insights.[457] On 21 February 2014, Cllr Judith Blakeman suggested to Peter Maddison that some residents should attend the interviews with those who had submitted tenders.[458] That required Claire Williams to find a leaseholder and a tenant at short notice.[459] We do not know which residents attended the interviews or what contributions they made, although Ms Williams thought that Pily Burton and Fahed Barakat had been involved when no one else had come forward.[460] On any view, only very few residents were involved in the process. They marked a limited range of questions, their scores were averaged with those of the professionals and the TMO,[461] which diluted their contribution, and, when it came to the interviews, their attendance

447 {ART00008544}.
448 {ART00001972}; {ART00008841}; {ART00008584}.
449 {ART00008603}.
450 {ART00008690}; {ART00008642}.
451 {ART00008949}.
452 {ART00005886}; {ART00008976}.
453 {ART00002167/23}.
454 {ART00002167/23}.
455 Williams {TMO00840364/8} page 8, paragraph 39; {TMO00840364/27} page 27, paragraph 149; Booth {ART00008527/23} page 23, paragraph 89.
456 Booth {ART00008527/23} page 23, paragraph 89; {ART00008693}; {ART00008909/3} question 10.3 only; {TMO00847721} question 7.1 only.
457 Williams {Day54/176:12}-{Day54/177:22}.
458 {TMO10005313/4}.
459 {TMO10005313/3}; Residents apparently attended {ART00008870}; {ART00008969}.
460 Williams {TMO00840364/8} page 8, paragraph 39.
461 Booth {ART00008527/23} page 23, paragraph 89; Booth {Day50/43:14}-{Day50/44:14}.

appeared to be an afterthought. Despite the TMO's saying that it had every intention of involving residents in the process,[462] we think that their involvement was largely symbolic, having been hastily arranged and entirely undocumented.

53.39 In its final tender report, dated 12 March 2014, Artelia confirmed its view that the prices of all three bidders were "at a sustainable level".[463] Even so, as was made clear in Artelia's Draft Tender Report, even Rydon's tender sum (the lowest) exceeded the budget then available and in those circumstances Artelia sought the TMO's permission to undertake a value engineering exercise with Rydon.[464] By that point, however, Rydon (but no other bidder) had been told by the TMO that it was "in pole position" and would be awarded the contract if it could indicate that it could make significant reductions in its price through value engineering.

53.40 There then followed some days of discussions about potential areas of savings and specific amounts, in order to arrive at an agreed figure.[465] The discussions culminated in a meeting on 18 March 2014, at which the TMO and Rydon agreed that if Rydon were awarded the contract it would reduce its price.[466] The TMO considered internally that a reduction could be achieved through the "value engineering" clauses in the proposed building contract,[467] but that was really just a euphemism for reducing the cost to enable an acceptable price to be achieved.[468]

53.41 The discussions between the TMO and Rydon, which took place at a time when the procurement process had not been completed, were not contemplated by the legislation relating to procurement. The meeting of 18 March 2014 was particularly significant, because Rydon was given an opportunity to amend its price in advance of the award of the contract, an arrangement for which the TMO could provide no reasonable justification. Those involved in the meeting knew or should have known that what they were doing was improper. The meeting was described in correspondence as taking place "offline",[469] the TMO did not invite its professional advisors, and no minutes were taken. Moreover, it had received advice from its solicitors that a meeting of that kind was not permissible.

53.42 Simon Lawrence explained to Mike Albiston of Harley that Rydon was alive to the risk that other prospective main contractors might challenge the procurement process on the grounds that they had not been given a similar opportunity to engage in the value engineering process.[470] Stephen Blake said that he never considered the potential for challenge by other contractors[471] and denied having any knowledge of Mr Lawrence's concerns,[472] but we do not accept that evidence. As we explain in Chapter 55,[473] the meeting of 18 March 2014 was organised through Mr Blake and he was the driving force at Rydon behind the early value engineering process. Mr Blake himself asserted that the TMO had been changing the basis of the tender[474] and it would be surprising if he had not considered the concerns articulated by Mr Lawrence as a result.

462 Williams {Day54/166:3-6}; Williams {Day54/168:5-8}.
463 {ART00002167/13}.
464 {ART00002167/23}.
465 See Chapter 55
466 See Chapter 55
467 Gibson {Day54/13:9-12}; {Day54/17:12-19}.
468 Per Gibson email to Rydon {RYD00003302/1-2}.
469 Chapter 55
470 {HAR00010160/6}.
471 Blake {Day28/187:1}.
472 Blake {Day28/188:6-24}.
473 Chapter 55
474 Blake {Day28/185:24} – {Day 28/186:5}.

53.43 The steps that were taken to reduce the price of the works are described in Chapter 55 However, it is striking that the TMO appears to have given no thought at any stage to asking RBKC to increase the budget to meet Rydon's tender price, rather than seeking to drive down the costs to bring them within the budget. Given that in July 2013 RBKC had been amenable to an increase in the budget by about a third (from £6,000,000 to £9,700,000),[475] it is possible, to put it no higher, that RBKC would have agreed. Indeed, in July 2014, it agreed to increase the budget to £10,300,000, without any apparent reluctance or obvious opposition from within the cabinet.[476]

The contract with Rydon and confirmation of the budget

53.44 On 18 March 2014 Rydon was told that it had won the contract. On 27 March 2014, Peter Maddison presented a paper[477] to the TMO board[478] in which he recommended that the TMO should enter into what he called a "pre-contract arrangement" with Rydon so that the project could make progress while the possibility of reducing the price was investigated, in particular by changing the cladding material and securing government funding for improving the building's energy efficiency.[479] According to the minutes of that meeting, the board asked Mr Maddison whether Rydon might have submitted a low tender in order to obtain the contract, but he confirmed that he had confidence in Rydon's pricing[480] and that any problems with the budget would be addressed during the pre-contract period.[481] In reality, the primary focus of attention during the pre-contract period was clearly on achieving a reduction in Rydon's price; at any rate, there is no evidence that the TMO board took any steps to find out whether it was realistic. Peter Maddison conceded that that had not been the purpose of the pre-contract period and said that the minutes were incorrect to the extent that they stated otherwise.[482] However, the minutes of the meeting are detailed and we consider that they probably are accurate. We think that Mr Maddison did reassure the board that the budget was sustainable and told it that any concerns that Rydon might have submitted an artificially low tender would be addressed during the pre-contract period.

53.45 Having received that assurance, the TMO board agreed to appoint Rydon as principal contractor for the Grenfell Tower refurbishment. Accordingly, it authorised an immediate agreement to cover preliminary work up to the value of £350,000 and thereafter a design and build contract for the works as a whole at a total price of £9,700,000, inclusive of fees.[483]

53.46 On 19 June 2014, Laura Johnson presented a paper to the RBKC cabinet[484] recommending an increase in the budget for the refurbishment from £9,700,000 to £10,300,000 to include a contingency.[485] The cabinet agreed the increase,[486] which was noted in an executive decision issued by Cllr Feilding-Mellen in August 2014.[487]

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475 {RBK00003316/3}; Feilding-Mellen {Day131/153:6} – {Day131/155:18}.
476 Feilding-Mellen {RBK00054433/4} page 4, paragraph 11; {Day131/161:16}-{Day131/162:18}.
477 {TMO10005583}.
478 {TMO10031040}.
479 {TMO10031040/2}.
480 {TMO10031040/3} item 3.
481 {TMO10031040/3} item 2.
482 Maddison {Day59/71:3-21}.
483 {TMO10031040/3}; {RYD00086702}; {RYD00094236/91} paragraph 215.
484 {RBK00000409}.
485 {RBK00000409/5-6} Item 3.2; {RBK00000409/8} item 6.2.
486 {RBK00018808}; Laura Johnson {RBK00034943/14-15} pages 14-15, paragraph 58; {RBK00034943/16} page 16, paragraphs 65-66.
487 {RBK00003309}.

The influence of cost in the selection of materials

53.47 In response to a suggestion that it had been concerned above all things to reduce costs the TMO argued that its choice of the more expensive cassette version of the panels for the rainscreen showed that cost had not been the sole or overriding consideration in the selection of materials.[488] However, the evidence does not support that conclusion. Peter Maddison denied that the TMO had been looking for the cheapest option; he said that it had been looking for a material that would, in his words, "achieve planning permission and ... meet the regulations".[489] As Mr Maddison's evidence makes clear, the need to obtain planning permission was a critical factor in the decision about which version of the product to use. Emails passing between Simon Lawrence and Claire Williams in May 2014 refer to the TMO's discussions with the planning committee about the different forms of fixing and the adverse cost implications if it were to prefer cassettes.[490] Simon Lawrence asked Ms Williams whether showing the committee examples of the panels in cassette form would be a risk.[491] He hoped to persuade it to accept riveted fixing by showing it a mock-up.[492] Mr Maddison was informed of the efforts being made to persuade the planning committee to accept riveted fixing[493] and had a meeting with Councillor Feilding-Mellen at which the difference in cost was discussed.[494] It is clear to us that Rydon and the TMO were seeking to persuade the planning committee to accept riveted fixing for cost reasons. In the event, however, the committee insisted on the cassette version.

Client design adviser

53.48 On 28 February 2014, Artelia had offered to act as client design adviser for the TMO, to review and advise on decisions made by the principal contractor in developing the design of the project. Following the appointment of a principal contractor under a design and build contract, the services of those engaged by the client to carry out the initial design work may be transferred to the contractor by a legal process known as novation to enable it to continue developing the design. The creation of new contractual relationships between the designers and the principal contractor creates a risk that the contractor may wish to adopt lower quality design solutions than those originally contemplated. The designers, whose client is now the contractor, are not able to advise the employer on matters of that kind. As a result, there is a risk that a design agreed with the employer before the appointment of the contractor may be watered down as a result of commercial pressures.

53.49 In early February 2014, Artelia and the TMO (represented by Jenny Jackson) were negotiating amendments to the terms of Artelia's appointment. The discussions eventually concluded with a variation to the contract agreed in July 2014. In the context of those discussions Philip Booth reviewed the scope of the services to be provided by Artelia as employer's agent and concluded that they would not overlap with the services that would be provided as client design adviser. Artelia proposed that Richmal Hardinge, an architect, be appointed in that capacity. She had acted as client design adviser to RBKC on the KALC project and had drafted the proposal for the Grenfell Tower project, which offered to set and safeguard design quality. She proposed that she should provide a "Design Compliance Report" before the contract was awarded, after reviewing the contractor's proposals to

488 Phase 2, Modules 1 and 2 Closing TMO submissions for TMO {TMO00903690/13} paragraph 52.
489 Maddison {Day59/90:9-23}; TMO submissions {TMO00903690/13} paragraph 53.
490 Emails 6 May 2014 {TMO00851142}; 23 May 2014 {RYD00005374/1-2}.
491 Email 23 May 2014 {RYD00005374/2}.
492 Email 29 May 2014 {RYD00005374/1}.
493 Emails 6 May 2014 {TMO00851142}; 2 June 2014 {SEA00011069}.
494 Diary of Peter Maddison {TMO00879770/46}; {TMO00879770_T}/60}.

ensure that they were consistent with the Employer's Requirements, the NBS Specification and British, European and other statutory standards. Ms Hardinge also proposed that, once the contract had been awarded, she would review the contractor's drawings to ensure they continued to meet the Employer's Requirements and provide advice on matters of design as required by the TMO. The proposal excluded any aspects of the mechanical and electrical ("M&E") services.

53.50 At a progress meeting on 15 July 2014, attended by Peter Maddison, David Gibson and Claire Williams on behalf of the TMO, it was agreed that the TMO would appoint a client design adviser. However, a few weeks later, on 29 August 2014, the TMO decided to perform the role itself. Claire Williams set out the TMO's reasons for that decision in an email sent to Peter Blythe and Philip Booth on 29 August 2014. They included the fact that the cladding and M&E elements were under guarantee, which she thought obviated the need for such an appointment. A note was later added to the minutes of the progress meeting confirming that the TMO would perform the role of client design adviser itself and stating that it would need to approve all design decisions.

53.51 Claire Williams told us that the TMO had come to the view that the services that would have been provided by a client design adviser role fell within the scope of the services Artelia had already agreed to provide and that she had not wanted responsibility for design to be complicated. However those are not the reasons she gave at the time, which suggest that she was more concerned about the value that a client design adviser would provide. In those circumstances we think that the TMO's decision not to appoint Artelia as client design adviser was driven by a combination of commercial considerations and an unrealistic view of the expertise available within the TMO. The TMO's rejection of that offer meant that it was unable to review effectively any of the design work carried out following the appointment of Rydon as the principal contractor. In reaching its decision the TMO significantly overestimated its ability to scrutinise the design work and chose to overlook the fact that no one within the organisation had experience of a project involving the overcladding of a high-rise residential building.

53.52 The TMO's decision not to appoint a client design adviser does not, of course, make it responsible for the quality of subsequent decisions affecting the design of the refurbishment or their compliance with the Building Regulations. That rested with Rydon and its contractors, including Studio E and Harley. However, the TMO's decision not to appoint a client design adviser at modest expense was foolish and reflected an over-confidence in its ability to manage the design aspects of the project itself.

Chapter 54
Fire safety strategies; the contribution of Exova

Introduction

54.1 This chapter examines the work done by the fire engineer, Exova, in producing fire safety strategies for Grenfell Tower in connection with the refurbishment.

54.2 Exova had been working in the field of fire safety since 1965 and described itself as having established a worldwide reputation for excellence in fire safety.[495] In the UK it had offices and facilities in London, Manchester and Warrington and it maintained a presence in other countries around the world.[496] Exova had won numerous prestigious awards for its work.[497] Due to its access to international experts in the behaviour of materials, fire testing and reaction to fire, Exova described itself (at least to Studio E) as "unique among its peers".[498]

54.3 Before the refurbishment, Exova had been instructed by Studio E as a consultant on the Kensington Academy and Leisure Centre project.[499] As a result, it was instructed by the TMO[500] to work on the Grenfell Tower refurbishment,[501] but it reported (or at least sent its reports) to Studio E.[502] There was no fresh tender or selection exercise for fire engineering services for the project. Exova was used on the Grenfell Tower refurbishment because it was known and trusted as a result of its work on the KALC project, despite certain misgivings that had been expressed by Neil Crawford of Studio E about the quality and timeliness of that work.[503]

54.4 After Rydon became the principal contractor for the project in April 2014 Exova's existing relationship with the TMO continued. Its services were not transferred to Rydon[504] and the TMO continued to pay its fees,[505] although the precise scope of its retainer became somewhat unclear and was never clarified by Exova, the TMO or Studio E. In this chapter we set out our findings and conclusions about the work that Exova carried out in relation to the refurbishment.

54.5 Before going any further, however, we think it necessary to say something about the evidence given by Dr Barbara Lane, one of the experts instructed by the Inquiry. It was not disputed that Dr Lane is a highly qualified and very experienced fire engineer with a long and distinguished career. She provided a lengthy report for the Inquiry[506] and gave evidence in person over two days.[507] While recognising her expertise, Exova argued in its closing statement on Modules 1 and 2 that she had failed to deal with the evidence accurately,

495 {TMO10037721/1}; {TMO10003885/1}.
496 {TMO10037721/1}; {TMO10003885/1}.
497 {TMO10037721/1}; {TMO10003885/1}.
498 {TMO10037721/2}; {TMO10003885/3}.
499 Sounes {SEA00014273/36} page 36, paragraph 73.
500 {SEA00004789}; {EXO00000543}; Ashton {Day17/19:4-6}.
501 TMO's procurement of Exova's services in respect of the Grenfell Tower refurbishment is explored in Chapter 50.
502 Ashton {Day17/20:1-13}.
503 {SEA00004051}; Sounes, {Day7/176:1-25}; Crawford, {Day10/8:15-16}.
504 {ART00002255/4}; Ashton {EXO00001621/14}; Ashton {Day16/117:2-10}; {Day17/185:2-3}; {Day17/187:7-10}.
505 {EXO00001204}; {EXO00001205}.
506 Lane, Phase 2 Report {BLARP20000017}; Appendix A {BLARP20000018}. A document outlining corrections and addenda {BLARP20000014}.
507 Lane {Day61/1-224}-{Day62/1-213}.

fairly or in a balanced way. It said that some of her criticisms were demonstrably wrong and that some of the evidence in her report fell outside the scope of her expertise.[508] It urged the Panel to treat her report with great caution and rely on it only insofar as it was necessary to do so and if the evidence was not contentious.[509]

54.6 As we have said, Dr Lane's expertise as a fire engineer was not in dispute. Her work is characterised by meticulous attention to detail and reflects a constant awareness that the responsibility of a fire engineer, particularly in relation to the design of a residential building, is the protection of human life. Her standards are high, but in our view they reflect those that can reasonably be expected of any competent fire engineer. Her evidence may not be beyond criticism, but in general we found her to be a thorough and reliable witness who was careful in her criticisms of Exova and was willing to modify the opinions expressed in her report after she had heard the evidence of the factual witnesses. It is also important to note that Exova did not ask us to hear evidence from a fire engineer expressing opinions that differed from those of Dr Lane. Most of the major criticisms of Exova's work relate to significant omissions from the various documents it produced in the course of its work and its conduct in relation to them. In the main they do not involve minor details but matters of real substance on which Dr Lane was well qualified to express an opinion but on which we have been able to reach our own conclusions. Although we have considered carefully Exova's criticisms of Dr Lane's evidence, we do not consider that we would be justified in rejecting her evidence about the standards to be expected of a reasonably competent fire engineer in relation to the work that Exova was asked to carry out.

Fire Engineering and the purpose of Fire Safety Strategies

54.7 Before considering Exova's work on the project we think it may be helpful to explain the role of a fire engineer and the nature and purpose of a fire safety strategy. Dr Lane referred us to recognised definitions of fire engineering and fire engineers. According to the Institution of Fire Engineers (IFE), fire engineering is "the application of scientific and engineering principles, rules, and expert judgment, based on an understanding of the phenomena and effects of fire and the reaction and behaviour of people to fire, to protect people, property and the environment from the destructive effects of fire".[510] Further, the IFE defines a "fire engineer" as a person who "through education, training and experience" understands, amongst other things, the "nature, characteristics and mechanisms of fire, the spread and control of fire" and "the likely behaviour of materials, structures, machines, apparatus and processes as related to the protection of life, property and the environment from fire".[511] Dr Lane was of the opinion that any reasonably competent fire engineer ought as a minimum to have a sound understanding of all those matters.[512]

54.8 In the context of a residential building fire safety is primarily concerned with the protection and preservation of life. The creation of an effective fire safety strategy therefore calls for high standards of skill, knowledge and professional experience. The fire safety strategy for a building is intended to fulfil a number of purposes. In particular:

a. It should address each of the five functional requirements of the Building Regulations in relation to fire (i.e. Functional Requirements B1-B5).

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508 Exova Closing Submissions {EXO00002124/34} page 34, paragraph 20.2.
509 Exova Closing Submissions {EXO00002124/52} page 52, paragraph 27.1.
510 Lane, Fire Safety Engineer Report {BLARP20000017/17} paragraph 2.6.1; The Institute of Fire Engineers, Frequently Asked Questions Website Page, "What is Fire Engineering?" {INQ00011261}.
511 The Institute of Fire Engineers, Frequently Asked Questions Website Page, "What is Fire Engineering?" {INQ00011261}.
512 Lane {Day61/9:1}-{Day61/10:7}.

b. It should provide a narrative description of the fire safety objectives for the building and how those objectives are to be met, including by means of the active and passive fire safety systems in the building.[513]

c. It should describe the characteristics of the building and the people who use it, including the details of its construction, the systems provided for use in the event of fire and the reasons for providing them.[514]

d. It should explain how the building is to be managed in order to protect persons using it from fire[515] and identify any fire risks which have either been mitigated or which it is not possible to mitigate.[516]

e. It should be written in a way that enables those managing and occupying the building to have a clear understanding about what fire protection and prevention measures are present, how they need to maintain them and how they need to educate people on what to do in the event of fire. It should also be capable of being easily understood by the Fire and Rescue Service so that firefighters are aware of the measures that have been provided for them and why.[517]

f. It should identify the fire safety performance requirements on which those responsible for the design of the building can rely. As Mr Ashton accepted,[518] the fire safety strategy is the founding source of the required performance criteria for the architect's fire drawing information and for other parties responsible for the design of fire safety systems.[519]

54.9 Dr Lane drew attention to the Fire Industry Association (FIA) Guidance Note "Scope of Works for the Fire Engineer",[520] dated May 2015, which she considered reflected good industry practice and had done so for many years before its publication.[521] It makes clear that any fire safety strategy should address all relevant design questions relating to fire safety, including "surface spread of flame requirements for surface materials",[522] "fire compartmentation requirements, including fire-stopping and cavity barriers"[523] and "external fire spread".[524] Again, Mr Ashton accepted that those were matters that ought to be included in any fire strategy.[525]

54.10 The FIA Guidance Note also makes it clear that the work of a fire engineer will often be linked to the RIBA Stages of Work. Dr Lane explained that a fire engineer has an important role before each of the RIBA stage reports are produced, so that the fire safety strategy, the architect's reports and the mechanical and electrical services reports at the end of each RIBA stage are aligned.[526] It followed, in her opinion, that the RIBA stage reports produced

513 Lane {Day61/14:17}-{Day61/15:5}.
514 Lane {Day61/15:10-14}.
515 Lane {Day61/19:6-23}.
516 Lane {Day61/15:25}-{Day61/16:3}. Published Document 7974:2002 also states: "The fire safety strategy for the building will be based on the successful trial design and is likely to comprise a range of physical fire safety measures and management procedures. A description of these measures should be provided, together with performance specifications and any recommended deviations from the relevant system codes."
517 Lane {Day61/15:16-24}; {Day61/44:25}-{Day61/45:17}.
518 Ashton {Day16/49:12-16}.
519 Lane, Phase 2 Report {BLARP20000017/48} paragraph 3.6.8; Lane {Day 61/23:10}-{Day61/24:2}.
520 {INQ00011219}.
521 Lane {Day61/24:12}-{Day61/25:12}.
522 {INQ00011219/4}.
523 {INQ00011219/4}.
524 {INQ00011219/4}.
525 Ashton {Day16/44:9-{Day16/47:3}.
526 Lane {Day61/131:21}-{Day61/132:25}.

by the architect on any project were "significant milestone documents" for a fire engineer and that any reasonably competent fire engineer would know that it was necessary to read them in full,[527] or at least to review them and digest all aspects that were relevant to fire safety.[528]

54.11 In the view of Dr Lane, a fire safety strategy for an existing building is a particularly important document and preparing it is a more demanding piece of work than working on a new project.[529] At the time in question guidance on how to create a fire safety strategy for an existing building was to be found in PAS 911:2007,[530] which contained a step-by-step guide, including guidance on the research and site activities required and on the need for discussion with stakeholders before the document is finally approved.[531]

54.12 The fire safety strategy is also an important document for the purposes of carrying out a suitable and sufficient fire risk assessment under the Fire Safety Order.[532] Conversely, any fire risk assessment of that kind is an important source of information for a fire engineer preparing a fire safety strategy for an existing building, since it should contain information about the characteristics of the building and the people using it.[533] The results of investigations undertaken to produce an existing fire safety strategy will also provide significant information for the purpose of a fire risk assessment.[534]

54.13 Having regard to the nature of a fire safety strategy, we accept Dr Lane's evidence that any reasonably competent fire engineer instructed to produce such a strategy for the Grenfell Tower refurbishment would have appreciated that they were a "designer" within the meaning of the CDM Regulations 2007. Preparation of a fire safety strategy is part of the design process which routinely includes the production of drawings, design details and specifications, including fire performance specifications.[535] As a designer preparing a fire safety strategy, a fire engineer is under a duty to take reasonable steps to avoid foreseeable risks to the health and safety of any person liable to be affected by the construction work, including the residents of any occupied building undergoing refurbishment work.[536]

Exova's early involvement in the Grenfell project

54.14 In early April 2012 Studio E began to send Exova information about the Grenfell Tower refurbishment project, including architectural drawings. At that stage it was seeking an initial assessment of the proposed fire escape strategies for the layout proposals contained in the drawings.[537]

527 Lane {Day61/131:8}-{Day61/133:11}.
528 Lane {Day61/177:7-19}.
529 Lane {Day61/28:5}-{Day61/35:13}; Lane, Phase 2 Report {BLARP20000017/49-50} paragraphs 3.6.20-3.6.23.
530 {BSI00000066}; PAS stands for Publicly Available Specification.
531 Lane {Day61/30:15}-{Day61/35:10}.
532 Lane {Day61/21:15-17}; See PAS 911:2007 {BSI00000066/37-38} paragraph 7.1.3; Lane, Phase 2 Report {BLARP20000017/338} paragraph 14.1.38; Lane {Day61/36:12}-{Day61/39:7}.
533 Lane {Day61/39:8-21}.
534 Lane, Phase 2 Report {BLARP200000017/117} paragraph 5.4.19; Lane {Day61/40:4-15}.
535 Lane {Day62/80:25}-{Day62/82:18}; Lane, Phase 2 Report {BLARP200000017/249} paragraphs 14.1.16-14.1.10; See Regulation 2 of the CDM Regulations 2007 and the definitions of "design" and "designer".
536 CDM Regulations 2007, Regulation 11(2)-(3).
537 {EXO00001743}.

54.15 On 19 April 2012 James Lee attended a design team meeting at which Bruce Sounes made it clear that the refurbishment would include the overcladding of the entire building.[538] There was some discussion about the budget for the cladding.[539] At that point, therefore, Exova ought to have understood, at least in general terms, what the refurbishment involved.

54.16 On 3 May 2012 Mr Sounes sent an email[540] to Terence Ashton and James Lee attaching some site photographs and setting out the likely scope of the project. As well as various works to the lower levels of the tower, the scope of works included overcladding. Mr Sounes asked for a fee proposal from Exova for the works, broken down into RIBA Stages C, D, E, F "and beyond (if required)" and a summary of what Exova would be doing at each stage.

54.17 On 9 May 2012 Mr Ashton responded with a fee proposal for the provision of consultancy services which included the creation of an outline fire safety strategy for the refurbishment.[541] The proposal quoted a fee of £3,300 for RIBA Stage C and £5,300 for RIBA Stages D-E. It was eventually accepted by Artelia on behalf of the TMO on 1 November 2012.[542]

54.18 On 21 May 2012 Bruce Sounes asked Exova for some advice about the feasibility of certain proposals for the works for the purposes of RIBA Stage C.[543] Mr Ashton responded on 22 May 2012 with some initial comments. He explained that the proposed alterations "must not adversely affect [the building] in relation to compliance with the requirements of Part B (fire safety)". He also said that a site visit would be very helpful in understanding the existing condition of the building.[544] Mr Sounes found Mr Ashton's comments "difficult to follow",[545] and replied attaching some photographs, inviting Mr Ashton to a design team meeting and suggesting that a site visit was essential.[546]

54.19 Mr Lee visited the tower on 29 May 2012 and took a number of photographs.[547] Thereafter there were exchanges between Studio E and Exova focusing on the lower levels of the tower where there was a proposed change of use.[548] Following his visit, Mr Lee sent Studio E a series of marked-up drawings with comments on the proposed refurbishment works.[549]

54.20 On 11 June 2012, Mr Lee sent Mr Sounes a fee proposal for the production of an Existing Fire Safety Strategy that would relate to the building in its existing state. It set out a detailed scope of work and proposed a fixed lump sum fee of £2,865.[550]

538 {EXO00001744/4} sections 5 and 6.
539 {EXO00001744/4} sections 5 and 6.
540 {EXO00001745}.
541 {EXO00000164}.
542 Email from David Hale to Margaret Treanor (Exova) on 1 November 2012 {EXO00000540} attaching approval of the Fee Proposal in the form of an email from Paul Dunkerton (TMO) {EXO00000541} together with invoicing instructions {EXO00000542}. Confirmation of approval of this fee proposal was sent to Terry Ashton on 18 July 2012 {ART00006294} and also sent to Dr Clare Barker on 24 July 2012 {ART00000184}.
543 {EXO00001748}.
544 {EXO00001748}.
545 Sounes {Day7/201:3-6}.
546 {EXO00000685}.
547 {EXO00001749}.
548 {EXO00001750}; {EXO00001751}; Lee {EXO00001740/3} page 3, paragraph 3.9.
549 {SEA00000022}; {SEA00004324}.
550 {TMO10037721/2}.

54.21 Mr Lee left Exova on 20 July 2012 before the proposal had been accepted. He was not involved in the preparation of the Existing Fire Safety Strategy and had no further involvement in the refurbishment project.[551]

The Existing Fire Safety Strategy

54.22 On 26 July 2012 Dr Clare Barker, a Principal Consultant at Exova, attended a Grenfell project meeting at the invitation of Bruce Sounes.[552] Dr Barker had had no previous involvement with Grenfell Tower and Exova's emails at the time recorded that she had "drawn the short straw" in having to attend. She explained that she was based in the Warrington office and had to cover the work because others within Exova were too busy.[553] At the meeting there were references to the overcladding. Attention was drawn to the absence of an existing fire safety strategy for the building.[554] There was no discussion of the scope of work required to produce one, but the minutes show that Exova was instructed to proceed with it.

54.23 In subsequent exchanges with Mr Sounes in late July 2012 Dr Barker indicated that she aimed to get the Existing Fire Safety Strategy to Studio E by 16 August 2012.[555] (Mr Ashton was off sick at that point, as he had been for some four weeks.)[556] However, it was not until 7 August 2012 that she instructed Cate Cooney to produce a first draft. Ms Cooney had produced existing fire safety strategies for only a small number of buildings since joining Exova and was not sure how many of those had been for high-rise residential blocks.[557]

54.24 On 7 August 2012, as part of her initial instructions, Dr Barker sent Ms Cooney Mr Sounes' email of 30 July 2012, together with some drawings.[558] Her email simply said "See below." Since they sat close to each other in the Warrington office, there were frequent, informal and unrecorded conversations between them and Dr Barker's email probably followed an informal instruction to start the process of preparing a draft strategy.[559]

54.25 Ms Cooney said that the information she had initially been given was limited.[560] At that stage she had not known the identity of the ultimate client; she knew only that she was producing a report for Studio E.[561] She could not recall having seen the fee proposal at any time before she had begun preparing her evidence for the Inquiry.[562]

54.26 As well as the drawings that Dr Barker had sent her, Ms Cooney obtained copies of the original plans of Grenfell Tower on microfiche from Studio E.[563] On 9 August 2012 she also asked Mr Sounes about certain features of the building, including whether there was a fire-fighting lift.[564] He told her that there was not.[565] However, three or four days later she received from the TMO a copy of the fire risk assessment dated 29 December 2010 prepared by Carl Stokes ("the 2010 fire risk assessment"),[566] which wrongly described

551 Lee {EXO00001740/4} page 4, paragraph 3.15-3.16.
552 {EXO00000242}.
553 Barker {Day15/19:24}-{Day15/20:23}.
554 See Minutes of Project Meeting (Number 5) on 26 July 2012 page 4, where the following appears (under the heading Quantity Surveyor), "There is no existing fire strategy for the building. Exova to proceed." {EXO00001620/4}.
555 Barker {EXO00001603/2-3} pages 2-3, paragraph 3.7.
556 Ashton {Day16/66:17-22}.
557 Cooney {Day14/37:15}-{Day14/38:4}.
558 {EXO00001613}.
559 Cooney {Day14/30:3-9}.
560 Cooney {EXO00001590/3} page 3, paragraph 3.6; Cooney {Day14/30:20-22}; {Day14/80:24}-{Day14/87:18}.
561 Cooney {Day14/34:6-17}.
562 Cooney {EXO00001590/2} page 2, paragraph 3.4; Cooney {Day14/52:4-13}.
563 Cooney {EXO00001590/3} page 3, paragraph 3.6; Cooney {Day14/80:2-16}.
564 {EXO00001592}.
565 {EXO00001593/3} and {EXO00001593/2}; Lane, Fire Safety Engineer Report (Version 2) {BLARP20000017/140}.
566 {TMO10037743}.

the lifts as "fire-fighting lifts".[567] Ms Cooney noticed the inconsistency in the information before her but did not seek to resolve it,[568] choosing instead to prefer what was said in the fire risk assessment because it was what she described as a "regulatory document" (i.e. prepared to enable the TMO to comply with its obligations under the Fire Safety Order) and, therefore, a more reliable source of information.[569] In our view that was a mistake. The distinction between a fire lift and a firefighting lift[570] is important and a reasonably competent fire engineer would have taken steps to clarify the matter by obtaining some independent authoritative information.[571] She denied that she had failed to do so because she was in a hurry to get the document finished before the 16 August deadline,[572] but we think that the short deadline for the work is likely to have played at least some part in it.

54.27 For some reason Cate Cooney was not sent the Significant Findings and Action Plan referred to at the foot of page 1 of the 2010 fire risk assessment, nor did she ask to see them.[573] She did not visit the building, despite the fact that the fee proposal provided for a site visit and that she had difficulty understanding its layout from the drawings alone. As a result, there were numerous gaps in the information available to her which led her to make a wide variety of assumptions about its state. Ms Cooney did not even have a copy of the Fee Proposal, which, although a largely standard document, would have acted as an aide memoire for what she was to do. If she had obtained a copy, as required by internal Exova guidance,[574] she could have used it as a checklist.

54.28 Ms Cooney had available to her the photographs taken by James Lee when he had visited the building in May 2012[575] and she discussed the layout of the building and other matters (including the smoke control system) with him following his visit.[576] However, when he left Exova James Lee left behind no notes of his site visit and it seems likely that he had intended to visit the tower again, because he provided for a half-day site survey in the fee proposal. Although Ms Cooney said that she took notes of her discussion with him, she was unable to produce any[577] and there is no reference in the contemporaneous documents to a discussion of that kind. We think it unlikely, therefore, that any detailed discussion about the building took place between Ms Cooney and Mr Lee for the purposes of preparing the Existing Fire Safety Strategy. Dr Barker confirmed that she had not spoken to Mr Lee about his visit to the tower, he having left Exova before her involvement in the project.[578]

54.29 In its fee proposal Exova had described itself as having a worldwide reputation for excellence in fire safety[579] and as being unique among its peers in its access to international experts in the behaviour of materials, fire testing and reaction to fire.[580] By appointing Exova, therefore, the TMO and Studio E could reasonably have expected to have access to high-quality fire engineering advice from leaders in the field. In Dr Lane's opinion, any company holding itself out as providing the highest quality of fire engineering services ought to ensure that its work has the approval of a qualified Chartered Fire Engineer who

567 {TMO10037743/4}.
568 Lane {Day61/84:15}-{Day61/86:6}.
569 Cooney {Day14/189:22}-{Day14/192:7}, especially at {Day14/190:5-13}.
570 Phase 1 Report, paragraph 34.11.
571 Lane {Day61/85:9-25}.
572 Cooney {Day14/191:2-7}.
573 {CST00000091}.
574 {EXO00001224/1-2} section 4.
575 Cooney {Day14/90:20}-{Day14/91:12}.
576 Cooney {Day14/67:3-5}; Cooney {EXO00001590/3} page 3, at paragraph 3.7.
577 Cooney {Day14/87:14}-{Day14/89:5}.
578 Barker {Day15/37:19-22}.
579 {TMO10037721/1}; {TMO10003885/1}.
580 {TMO10037721/2}; {TMO10003885/3}.

has undergone the minimum training required by the Engineering Council.[581] In the event, Dr Barker was the only member of Exova's staff engaged on the Grenfell Tower project who was qualified as a Chartered Engineer,[582] and her involvement was limited to a cursory review of the draft Existing Fire Safety Strategy produced by Ms Cooney.

54.30 On 15 August 2012 Ms Cooney sent the draft Existing Fire Safety Strategy by email to Dr Barker for review, saying that she had printed off drawings for her assistance.[583] She did not send Dr Barker either the 2010 fire risk assessment or copies of her email correspondence with Mr Sounes but she may have printed them off and left them on Dr Barker's desk, because Dr Barker said that she thought she had seen the fire risk assessment when she reviewed Ms Cooney's draft.[584]

54.31 There is reason to think that Ms Cooney may not have devoted as much time to the task as might normally have been expected. She was working under pressure because she had told Studio E that the document would be ready by 16 August 2012 and was due to go on holiday on 17 August 2012. She said that she would normally expect to take between a few days and a week to complete a task of that kind, but in this case the records show that it occupied no more than 15 chargeable hours of her time. Even allowing for the fact that she may have spent more time on it than the records show, they suggest that she completed the work rather more hurriedly than one would have expected.[585]

54.32 On 16 August 2012, almost exactly 24 hours later, Dr Barker replied to Ms Cooney's email in the following terms: "I have reviewed it and it is fine."[586] Dr Barker said that she had reviewed the draft together with the drawings, but she could not remember in how much detail she had considered the drawings themselves, nor whether she had reviewed all of them, nor even whether she had checked the measurements.[587] Nor could Dr Barker remember how long she had spent reviewing the report, although she thought that it must have been a couple of hours.[588] She said that she would usually give a more detailed response and could not remember why she had not done so on that occasion.[589]

54.33 Dr Barker accepted that 16 August was her last day in the office before she went on holiday and that she had a number of other matters to finish before she left.[590] It is hard to know exactly how long she spent considering the document, but the fact that the Exova summary of timesheets for the project do not record any time spent by Dr Barker on a peer review suggests that it was very little. If, as she hinted, she had deliberately posted the time she spent on it to another project for a different client,[591] that would have been a serious failing in the billing system and quite improper, and even an inadvertent failure to post the time to the correct account would have been surprising. There is no reliable evidence

581 Lane {Day61/66:10-25}.
582 A Chartered Engineer is a person who has been registered as a professional engineer in accordance with the requirements of the Engineering Council. The Fire Engineering Council of the Fire Industry Association is the only body that currently has a process for assessing the competence of fire engineers. It confers the qualification of Chartered Fire Safety Engineer through the chartership process overseen by the Engineering Council. See Lane {Day61/46:6}-{Day61/49:23}.
583 {EXO00000175}; Cooney {EXO00001590/3} page 3, paragraph 3.8.
584 Barker {Day15/72:4-10}.
585 {EXO00001353}; Cooney {Day14/194:3}-{Day14/195:7}.
586 {EXO00000175}.
587 Barker {Day15/71:2-15}.
588 Barker {Day15/73:10-13}.
589 Barker {Day15/80:11-14}.
590 Barker {Day15/73:20-22}; {Day15/128:10-16}.
591 Barker {Day15/78:8-10}.

to suggest that either of those events occurred and, viewing the evidence as a whole, we think it most likely that in fact Dr Barker spent too little time considering the draft to justify billing the client.

54.34 At that stage the document created by Ms Cooney was a first draft; indeed, throughout her evidence she made it clear that she had only been instructed to produce a draft,[592] which was one of the explanations she gave for the many assumptions and qualifications it contained. Ms Cooney sent the document to Mr Sounes by email later on 16 August 2012.[593]

54.35 On 17 August 2012, Cate Cooney and Bruce Sounes had a telephone conversation[594] but it is likely that their conversation related to aspects of the refurbishment other than the draft Existing Fire Safety Strategy.[595] On 30 August 2012, Mr Sounes sent an email to Mr Ashton, with a copy to Dr Barker saying that he needed to go through the draft Existing Fire Safety Strategy,[596] but in the event no discussion ever took place. Why it did not remains unclear. Exova operated a Project Completion Procedure under which the project manager was required to make a careful note of the scope of services described in the contract documentation[597] and check that all elements of the project had been completed satisfactorily. Dr Barker did not have a good recollection of the procedure,[598] although she appears to have been aware of its existence. However, she said that it did not apply at that stage because at that time the document was still no more than a draft.[599]

54.36 After the draft Existing Fire Safety Strategy had been sent to Studio E it was still not clear who within Exova was responsible for it. Dr Barker thought that Mr Ashton had assumed responsibility for it; Mr Ashton assumed that Ms Cooney and Dr Barker were dealing with it. Ms Cooney said that it had been handed back to colleagues who were dealing with the project overall.[600] Mr Ashton admitted that there had been a misunderstanding between the Exova employees,[601] but said that he "didn't think it was that important", given that there were other strands to Exova's work on the building at the time.[602] Somewhat surprisingly, Mr Ashton was not aware that the Existing Fire Safety Strategy was meant to provide the basis on which a fire safety strategy for the refurbishment was to be constructed.[603] The draft Existing Fire Safety Strategy sent to Bruce Sounes on 16 August 2012 was never finalised and the review intended to verify the assumptions it contained and provide the missing information did not take place.

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592 Cooney {Day14/30:3-9}.
593 {EXO00001396}. On 16 August 2012, only a few minutes after Dr Barker had approved the draft, Ms Cooney sent it to the Exova administration team to format before being circulated. She asked Dr Barker to authorise her signature on it. Cooney {EXO00001590/3} page 3, paragraph 3.10; {EXO00000577}. Dr Barker did so straight away {EXO00000158}, and Ms Cooney immediately sent it to Mr Sounes. She told him that she was going on holiday the next day and that if he wanted to discuss it he should telephone her before then. She thus gave him at most 24 hours to discuss it. The document remained watermarked "DRAFT" throughout.
594 {EXO00001279}.
595 {SEA00000043}.
596 {SEA00000048}.
597 {EXO00001224}.
598 Barker {Day15/83:9}.
599 Barker {Day15/85:1-15}.
600 Barker {Day15/94:11-15}; Ashton, {Day16/139:20-23}; {Day16/145:3-7}; {Day16/145:11-14}; {Day16/146:5-18}; {Day16/145:3-7}; Cooney {Day14/205:18-23}.
601 Ashton {Day16/152:13-18}.
602 Ashton {Day18/10:10}-{Day18/11:3}.
603 Ashton {Day18/11:4-7}.

54.37 At a project meeting on 6 September 2012 attended by Mr Ashton and Mr Sounes it was agreed that the draft Existing Fire Safety Strategy required "detailed interrogation"[604] but when they met on 10 September 2012 they did not consider it in any detail,[605] since Mr Ashton did not see the meeting as part of the process of getting the draft to the final stage.[606] He did not view the completion of the Existing Fire Safety Strategy as his responsibility and regarded it simply as a record of what was there.[607]

54.38 Fortified by the opinion of Dr Lane, we are satisfied that the draft Existing Fire Safety Strategy was based on an extremely brief (two-hour) site visit, was completed without the benefit of detailed site inspection notes, was based on unsubstantiated assumptions,[608] and failed to identify the relevant regulatory guidance.[609] The fee quoted (£2,865 plus VAT) represented about three-and-a-half days' work, which was insufficient for a task of that magnitude.[610] Dr Lane considered that four to six weeks' work would have been more appropriate.[611] A site visit lasting only two hours was in her view wholly insufficient to make a meaningful appraisal of the fire safety features of a building of the scale and condition of Grenfell tower.[612] She would have expected two people to spend at least a day on site.[613] While she thought that it would have been reasonable for Ms Cooney to have relied on Mr Lee's site visit if it been well documented,[614] that was not the case; there were no site notes or marked-up drawings, and the photographs,[615] according to Dr Lane, were difficult to interpret since they were not accompanied by any information or explanation.[616] There is no evidence that Mr Lee inspected the fire compartmentation during his visit, an omission which Dr Lane considered to be of crucial significance, given that the "stay put" strategy at Grenfell Tower was wholly reliant on a high degree of compartmentation.[617]

54.39 Dr Lane considered that the information available to Ms Cooney had been too limited to enable her to draft an effective fire safety strategy for the existing building.[618] In her opinion Ms Cooney ought to have listed all the information that was not available to her and set out clearly what was needed in order to analyse the building properly.[619] That would have included relevant fire safety policies, fire safety management policies and maintenance records.[620] In addition, Dr Lane pointed out that Exova had not identified within the draft Existing Fire Safety Strategy any of the shortcomings or assumptions in the

604 {ART00000404}.
605 Ashton {Day 16/151:21-25}.
606 Ashton {Day16/152:4-6}.
607 Ashton {Day16/145:3-7}.
608 Lane {Day61/72:3-18}; {Day61/77:18}-{Day61/78-13}; {Day61/78:6-8}; {Day61/80:6-9}; {Day61/91:3-24}; {Day61/95:7-18}; {Day61/99:8}-{Day61/104-4}.
609 Lane, Phase 2 Report {BLARP20000017/157} paragraph 5.7.1(e). See also {BLARP20000017/127} in relation to Cate Cooney's paragraph 3.2.1; Exova provided incorrect guidance on the spread of fire across internal linings (copying incomplete guidance from Approved Document B) and distance from the main fire outlet. Lane, Phase 2 Report {BLARP20000017/158} Table 5-10; {BLARP20000017/158} paragraph 5.7.1(q)).
610 Lane, Phase 2 Report {BLARP20000017/61} paragraph 4.3.46; Lane {Day61/72:1-18}.
611 Lane {Day61/74:23-25}.
612 Lane, Phase 2 Report {BLARP20000017/88} paragraph 4.7.14; See also Lane, Phase 2 Report {BLARP20000017/336} paragraph 14.1.21.
613 Lane {Day61/78:17-19}.
614 Lane {Day61/79:3-8}.
615 {EXO00001749}. These photographs are not acknowledged or used as part of the existing building fire safety strategy report.
616 Lane {Day61/80:14-21}; Lane, Phase 2 Report {BLARP20000017/255} paragraph 8.3.1; Lane {Day61/81:17-24}. See also Lane, Phase 2 Report {BLARP20000017/336} paragraph 14.1.19.
617 Lane, Phase 2 Report {BLARP20000017/146} paragraphs 5.4.28-5.4.29.
618 Lane {Day61/83:24-25}.
619 Lane {Day61/84:6-13}; {Day61/121:1-7}.
620 Lane {Day61/84:15}-{Day61/85:7}.

2010 fire risk assessment made by Carl Stokes. She was critical of Ms Cooney's failure to ask for the Significant Findings which formed part of Mr Stokes' 2010 fire risk assessment and of her decision to go ahead without them. Nor had Exova explained the steps it had taken to satisfy itself that the contents of that 2010 fire risk assessment were based on an accurate assessment of the condition of Grenfell Tower, something which Dr Lane would have expected a competent fire engineer to have done.[621] In her view, the proposed Existing Fire Safety Strategy was akin to an independent audit of the existing building and any differences between the strategy and the fire risk assessment, such as the status of the lifts, were important matters to identify.[622]

54.40 In Dr Lane's opinion, Ms Cooney's failure to carry out that step meant that, even as a draft, the document was wholly inadequate. It did not constitute a record of the condition of the existing building, could not be used as the basis of a fire risk assessment for the purposes of the Fire Safety Order, and could not inform the necessary mitigation measures in the refurbishment strategy.[623] The document did not adequately identify what further investigation was needed, nor did it provide an explanation of how Exova had taken the missing information into account in its overall assessment of the risk.[624] It did not warn the reader that until that information had been obtained it was unsafe to rely on the document.

54.41 Among the salient omissions identified by Dr Lane were the following:

a. The document did not state whether the means of escape were sufficient to satisfy the requirements of Article 14 of the Fire Safety Order[625] and therefore did not provide the responsible person with practical guidance on that topic.[626]

b. It did not tell the TMO what action needed to be taken under the Fire Safety Order in response to the existing condition of the building,[627] in particular, in relation to the condition of the doors, the inoperability of the smoke control system and the status of the lifts.[628]

c. It contained no assessment of the width of the stairs or of the performance of the front doors to the flats, the doors to the stair or the lift doors. (Ms Cooney did not understand that to fall within the scope of her instructions.)[629]

d. No sketches or drawings were provided to enable the reader to understand how the text related to the building.[630]

e. The document contained no consideration of the characteristics of the people who occupied the building and no evaluation of the needs of those who required assistance to evacuate in the event of a fire.[631]

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621 Lane, Phase 2 Report {BLARP20000017/147} paragraphs 5.4.39-5.4.40.
622 Lane {Day61/120:8-14}.
623 Lane, Phase 2 Report contains a list of defects in the Existing Fire Safety Strategy and their effect {BLARP20000017/157} paragraphs 5.7.1-5.7.6. Dr Lane confirmed that the evidence of Ms Cooney and Dr Barker had not caused her to change her opinions: Lane {Day61/130:23}-{Day61/131:2}.
624 Lane, Phase 2 Report {BLARP20000017/157}.
625 Which deals with emergency routes and exits from a building.
626 Lane, Phase 2 Report {BLARP20000017/129}.
627 Lane, Phase 2 Report {BLARP20000017/336} paragraphs 14.1.22-14.1.23; Lane {Day61/115:14}-{Day61/116:17}.
628 Lane {Day61/116:6-10}.
629 Cooney {Day14/171:20}.
630 Lane, Phase 2 Report {BLARP20000017/158} paragraph 5.7.1(p).
631 Lane {Day62/83:13}-{Day62/96:1}; See the relevant provisions of ADB {CLG00000173/14} section 0.19 and {CLG00000173/18} paragraph B1.v, including the Note.

54.42 We have already explained why we accept the evidence of Dr Lane both in relation to the standard of work to be expected of a reasonably competent fire engineer and in relation to the shortcomings of the draft Existing Fire Safety Strategy. We recognise that the document produced by Ms Cooney was no more than a draft, but even a draft can be expected to cover the necessary ground, identify missing information and provide a basis for the eventual completion of the finished document. Moreover, the document contained a number of material errors and omissions that should never have been made by a competent fire engineer undertaking this sort of work, such as the assumption that there was a firefighting and evacuation lift.[632] Errors of that kind should have been identified by any competently conducted peer review, but in this case they were not.

54.43 We accept Dr Lane's opinion that the information available to Ms Cooney was so limited that she should either have refused to produce a draft until further information had become available or have included an express warning that no reliance could be placed upon the document until further work had been done.[633] Much of the missing information could have been obtained and many of her assumptions tested by the simple expedient of carrying out the site visit which had been provided for in the fee proposal. In our view those were very significant omissions, not least because they deprived Exova of a proper understanding of the means of escape from the tower.

54.44 Given the shortcomings in the draft Existing Fire Safety Strategy, we doubt whether Ms Cooney properly understood the full extent of her task. Although the fee proposal stated that the purpose of the Existing Fire Safety Strategy was to inform the fire safety risk assessment and the fire risk management plan, her understanding was that it was only one of a number of documents that would be used for that purpose.[634] Although it is certainly reasonable to have expected the TMO to look at the current fire risk assessment when compiling its fire risk management plan, a fire safety strategy which provided nothing more than a checklist for statutory compliance would be of little use. The TMO required at least some guidance about the condition of the existing building, but the draft Existing Fire Safety Strategy failed to give clear advice of a kind that could affect or influence the management plan, e.g. by drawing attention to respects in which there was a failure to comply with existing requirements (as in the case of the emergency lighting) or where standards that formerly applied had become outdated (as in the location of the dry rising main outlets). Ms Cooney appeared to think that her role was simply to state whether the design of the building as it stood complied with the Building Regulations, not to provide information that would inform the management of fire safety.

54.45 Dr Barker's review of the draft was rushed, cursory and superficial and little better than a rubber stamp. She did not follow Exova's peer review system, or if she did, she did not do so thoroughly and with proper care. It was therefore all the more important for her to ensure that someone took the necessary steps to complete the production of the Existing Fire Safety Strategy, but she failed to do so. On 8 August 2012, following his return to work after a period of illness, Mr Ashton asked Dr Barker in terms whether she was taking over the project.[635] He received no reply to his question, but Dr Barker seems to have thought that he had assumed responsibility for the work from early September. However, he failed to take any steps to complete the document, apparently in the understanding that she had retained responsibility for it. The confusion thus engendered meant that there was no effective transfer of responsibility for the work, which as a result fell between

632 As summarised in Lane, Phase 2 Report {BLARP20000017/157} section 5.7.
633 Lane {Day61/83:24}-{Day61/85:7}.
634 Cooney {Day14/60:10}-{Day14/62:2}.
635 {EXO00000668/1}.

the cracks and was allowed to remain uncompleted. It amounted to a serious failure in Exova's management processes. That explains why Mr Ashton did not discuss the draft with Mr Sounes, but it does not excuse his failure to carry the work forward. Surprisingly, neither Exova, Studio E or the TMO appears to have asked why the document was no more than a draft or when the completed version would be available. Why that was so remains a mystery.

54.46 In our view Exova's work on the Existing Fire Safety Strategy fell well below the standards to be expected of a reasonably competent fire engineer. The Existing Fire Safety Strategy ought to have provided a precise record of the baseline condition of fire safety at Grenfell Tower which could inform the refurbishment fire safety strategy.[636] The document should have been a critical building block in the establishment of that strategy, since, without understanding the existing condition of the building, it was impossible to understand the full effect of the refurbishment on fire safety.[637] However, Exova's work on the Existing Fire Safety Strategy was poor and incomplete. The document failed to record the condition of the building in its existing state and did not provide a reliable baseline for the creation of a fire safety strategy for the refurbishment.

Cate Cooney's email of 17 August 2012

54.47 In addition to producing the Existing Fire Safety Strategy Cate Cooney was also involved in some of the other fire safety aspects of the refurbishment. On 16 August 2012, having received her email attaching the draft Existing Fire Safety Strategy, Bruce Sounes asked her to advise on the introduction of residential units on the mezzanine floor of the building for the purposes of a submission to RBKC's planning department the following week.[638] Later that morning Ms Cooney sent Andrew Martyn, a senior consultant at Exova,[639] an email to which she attached plans showing the layout of the new flats. Having mentioned that she had spoken to Bruce Sounes, she said:

> "We have just sent through the existing fire strategy for it, basically 1970s 24 storey residential tower with non-residential use to first 4 floors. They are now adding additional levels which merges uses around a single stair. Not great. Basically I have told him we can massage the proposal to something acceptable, with separation, lobbies etc but that there are approval risks to the project on the ff shaft / MOE front. James has been to site and given some advice, but I don't know what he's said, but it would appear not much. They are making an existing crap condition worse so it's a matter of working the worse bits out and making the new stuff work. No sprinklers wanted. LABC building control Kensington and Chelsea – do we have any contacts there?"[640]

54.48 This email gained some prominence during the hearings because of its blunt and colourful language. However, the message speaks for itself: first, the existing condition of the building raised concerns about fire safety; second, the proposed refurbishment would increase those concerns; and third, the proposals could be altered to make them satisfactory from the perspective of building control but there would remain a risk that approval would be refused because of dissatisfaction with the fire-fighting shaft and the means of escape.

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636 Cooney {Day14/71:1-19}; {Day14/92:1-10}; Barker {Day15/170:1-25}.
637 Lane, Phase 2 Report {BLARP20000017/49-50} paragraphs 5.7.3 - 5.7.6.
638 {SEA00000043}.
639 Martyn {EXO00001577/2} page 2, paragraph 3.2.
640 {EXO00001279}.

54.49 Ms Cooney denied that her use of the word "massage" had been intended to mean anything more than "change". She emphatically denied any suggestion that she had used the word in the sense of manipulation or sleight of hand in order to get the designs past building control.[641] She said that her intention was to propose substantive changes to the design to make it more acceptable to building control in accordance with the Building Regulations.[642] We accept her evidence about that.

54.50 The key to understanding the substantive points being made in the message is the reference to adding additional levels which merge uses around a single stair. That is what Ms Cooney was referring to when she used the expression "making an existing crap condition worse". The existing arrangements, under which the occupants from areas in different uses were required to use the same stair as an escape route, was not considered to be consistent with modern guidance (in her words "not ideally something we would be looking for") and would be made worse by the addition of additional flats at the lower levels. Her proposal was to introduce "new measures" to reduce the risk of building control's refusing approval.[643]

54.51 Ms Cooney did not recall her conversation with Mr Sounes about this email.[644] Although he did recall a discussion with Ms Cooney about different escape routes, he was clear that the email reflected a level of concern within Exova of which he had previously been unaware and which had not been disclosed in Exova's subsequent report to him.[645] We accept Mr Sounes' evidence on this point and we doubt that Ms Cooney ever conveyed to him the full extent of her concerns, including her view that the refurbishment was "making a crap condition worse". There is no record of those concerns having been expressed by Ms Cooney to Studio E in the plain terms in which they were couched in her email to Mr Martyn (or indeed at all). Nor do they appear to have been communicated to Dr Barker. Perhaps most importantly, there is no record of their having been expressed to Exova's client, the TMO. Given the seriousness of the concerns we would have expected Exova to have communicated them directly to the TMO and in our view, in failing to do so it fell short of the standard to be expected of a reasonably competent fire engineer.

54.52 Although Ms Cooney's message concerned the refurbishment, which was Mr Ashton's responsibility rather than hers, it was not copied to Mr Ashton, who did not see it at the time. However, he said that even if he had seen it, it would not have caused him any particular concern.[646] He told us that he had told the design team fairly forcefully at his first meeting with them (possibly on 6 September 2012) that Studio E's proposals would not receive building control approval and that serious work was required to ensure that the scheme was accepted.[647] Although Mr Sounes could not recall what Mr Ashton had said, he accepted that he might well have said something to that effect, since it was consistent with what they had understood to be the problem in a building with a single stair and limited smoke exhaust to the lobbies.[648]

641 Cooney {Day14/207:25}-{Day14/209:16}.
642 Cooney {EXO00001590/7} page 7, paragraph 5.3; Cooney {Day14/208:17}-{Day14/209:6}.
643 Cooney {Day14/209:18}-{Day14/211:8}; {Day14/225:9-17}.
644 Cooney {Day14/206:14-18}.
645 Sounes {Day8/5:17}-{Day8/7-17}.
646 Ashton {Day17/8:17-19}.
647 Ashton {Day17/5:17}-{Day17/9:12}.
648 Sounes {Day21/124:10}-{Day21/125:20}.

54.53 Dr Lane criticised Ms Cooney for failing to draw her concerns to the attention of those responsible for the building.[649] In her view the casual tone of the message demonstrated a failure to recognise that the primary goal of a fire engineer is to protect people's lives by means of the fire safety design solutions for which they are responsible[650] and in her oral evidence, she emphasised the "massive responsibility" that fire engineers have to protect people. Dr Lane thought that this email indicated a culture within the Exova team of "making things work and getting things through",[651] similar to that which she had experienced elsewhere in the construction industry. It is an approach which concentrates more on obtaining building control approval than on ensuring people's safety.[652] We agree and have noticed many examples of that attitude displayed by others involved in the refurbishment.

Ms Cooney's email of 10 September 2012

54.54 On 10 September 2012, following her return from holiday, Ms Cooney sent Mr Ashton an email in which she gave him her thoughts on the problems associated with the additional flats proposed for Grenfell Tower. After setting out how the design could be changed to make the building safer, she said:

> "The existing ventilation system is questionable and the overall scheme theoretically makes the existing conditions worse by adding the additional risk of 2 No extra residential floors to the building. It is proposed to upgrade the ventilation system, but the standard it will achieve is unknown."[653]

Ms Cooney finished by stating again that she saw a "significant approvals risk with the current proposals".

54.55 This message was a more detailed version of her email to Andrew Martyn of 17 August 2012. It does not appear that Mr Ashton responded in substance to it, although he did acknowledge receipt.[654] Mr Ashton said that it had not been necessary for him to discuss the message with Ms Cooney because it "was pretty comprehensive".[655] It did not prompt him to discuss the draft Existing Fire Safety Strategy with her or to ask her to complete it.[656] Ms Cooney could not recall ever having discussed the draft Existing Fire Safety Strategy with Mr Ashton in detail so that he could use it as a baseline for the Outline Fire Safety Strategy.[657]

The Design Note

54.56 While Exova was working on the draft Existing Fire Safety Strategy communications about the Outline Fire Safety Strategy for the refurbishment had continued. On 7 August 2012 Mr Sounes contacted Dr Barker to tell her that he would be submitting a

649 Lane {Day61/125:18-24}; Lane, Phase 2 Report {BLARP20000017/337} paragraph 14.1.30.
650 Lane, Phase 2 Report {BLARP20000017/337} paragraph 14.1.29.
651 Lane, Phase 2 Report {BLARP20000017/337} paragraph 14.1.27.
652 Lane {Day61/126:1-23}.
653 {EXO00000388}.
654 {EXO00000667}.
655 Ashton {Day17/6:11-14}.
656 Ashton {Day18/16:7-25}.
657 Cooney {Day14/218:19}-{Day14/219:1}.

Stage C type document to the client by the end of the week or during the following week. He wanted to know whether she had any comments or reservations about the scheme and whether the strategy for fire safety was achievable.[658]

54.57 Two weeks later, on 28 August 2012, Mr Sounes chased Ms Cooney for a mark-up of the plans and expressed his concern that the fire safety strategy for the proposed design was still embryonic.[659] Later, on 12 September 2012, a document describing itself as a Design Note[660] was prepared by Mr Ashton and reviewed by Sean McEleney. It was produced two days after a meeting between Mr Ashton and Mr Sounes on 10 September 2012 and purported to provide an outline fire safety strategy for the refurbishment. Mr Ashton explained that it was intended to be a series of "headlines"[661] for achieving a satisfactory fire safety strategy for the refurbished building to assist Studio E in developing the design[662] and also to put in writing what had been discussed at the meeting. Although not intended to be a RIBA Stage C report, the Design Note was issued for Stage C[663] and was included in the formal reporting package for Stage C on 31 October 2012.[664]

54.58 Mr Ashton did not visit the tower, either before drafting the Design Note or afterwards, despite having been told by Bruce Sounes in May 2012 that a site visit was probably essential[665] and despite the view that he had himself expressed at the time that it would be better to visit the building before giving the necessary advice.[666] When he gave evidence he conceded that a visit would have been desirable,[667] explaining that he failed to make one because he had "other priorities."[668] He therefore became familiar with the tower only from the drawings provided by Studio E.[669] However, he did not have any notes from James Lee's visit and did not look at Mr Lee's photographs.[670] He had no conversations with Mr Lee about the layout of the building[671] or about the plans to overclad it.[672] There appears to have been no formal handover of the work from Mr Lee to Mr Ashton and Mr Ashton made no enquiries of the TMO building maintenance team before carrying out his work.[673] If he had done so, he might have gained some important information, for example, that the smoke control system had ceased to function and that the lifts were not in fact fire-fighting lifts. He might also have obtained a better overall understanding of the condition of the building.

658 {SEA00005595/1}. He also said that he wanted "… any implications of the layout and external works is understood by the rest of the design team…" Mr Sounes, Dr Barker and Mr Ashton understood the phrase "external works" to relate to the landscaping. See Sounes {Day7/213:10-11}; Ashton {Day17/14:10}-{Day17/15:2}; Barker {Day15/58:2-30}.
659 {SEA00000058}. See also Sounes {Day8/12:22-25}-{Day8/13:1-2}.
660 {TMO10001562}.
661 Ashton {Day16/164:20}-{Day16/165:5}.
662 Ashton {EXO00001621/7} page 7, paragraph 4.2.
663 {Day16/165:7-12}.
664 {SEA00006429}.
665 {EXO00000685}.
666 {EXO00000685}.
667 Ashton {Day16/169:7}.
668 Ashton {Day16/168:8-25}.
669 Ashton {Day16/168:25}-{Day16/169:1-2}.
670 Ashton {Day16/170:7-14}.
671 Ashton {Day16/171:2-5}.
672 Ashton {Day16/172:3-7}.
673 Ashton {Day16/172:16-18}.

54.59 The Design Note itself did not identify the information that Mr Ashton had relied on for its production, but we know that he had access to the draft Existing Fire Safety Strategy,[674] some marked up General Arrangement plans[675] and the 2010 fire risk assessment,[676] which he considered to be enough for his purposes.[677] He also had access to the planning drawings available on a File Transfer Protocol (FTP) site to which Mr Sounes had sent him a link,[678] but he did not make use of them.[679]

54.60 Of the five functional requirements relating to fire safety in Schedule 1 of the Building Regulations 2010, the Design Note dealt only with Requirements B1 (Means of Warning and Escape) and B5 (Access and Facilities for the Fire Service). Mr Ashton explained that he concentrated on those two requirements because the design team wanted answers on them immediately and the other requirements were not as pressing.[680]

54.61 The Design Note contained no analysis of Requirement B4 and no reference to the cladding. Mr Ashton explained that, although he had seen a reference in Mr Sounes' email of 3 May 2012 to overcladding the tower,[681] he had not at that stage seen any specific proposals that he could comment on,[682] nor had he discussed the cladding build-up with any of the design team. Although cladding is mentioned in very general terms in the minutes of a Project Meeting on 6 September 2012 which he attended,[683] Mr Ashton did not remember anything of the discussion, suggesting that he might have left early.[684] Mr Sounes thought that, during his meeting with Mr Ashton on 10 September 2012, there had been elevation drawings on the table showing the proposed cladding and was almost sure they had discussed it,[685] but Mr Ashton did not recall having seen any drawings and said that they had certainly not discussed any. His recollection was that their discussions focused on the means of escape.[686] On balance, given that the design of the cladding system was in its infancy at that stage, we think it unlikely that Mr Sounes and Mr Ashton discussed it in any detail before the Design Note was produced. That is consistent with Mr Sounes' evidence that the contents of the Design Note reflected his conversations with Exova.[687]

54.62 The absence of an analysis of Requirement B4 did not trouble Mr Sounes, because at that stage his priority was understanding the scope of the proposed changes to the structure of the building and ensuring that the contents of the planning application were both feasible and complied with the Building Regulations.[688] He also said that the Design Note had given him reason to believe that means of escape (Requirement B1) and access facilities for the

674 {EXO00000413}.
675 Attached to the email of 10 April 12 {EXO00000468} were the following drawings: SK003-Rev00 - Existing Sections + Elevations {TMO00830016} (10.4.12); SK001-Rev01 - Existing Floor Plans (10.4.12) {TMO00831044}; SK002-Rev00 Deck 0 & Deck 1 Layout Proposals 10.4.12 {TMO00831044}.
676 {TMO10017402}.
677 Ashton {Day16/173:4-6}.
678 {EXO00000716}.
679 Email from Terence Ashton to Adrian Jess dated 19 November 2012{EXO00000601/3} "I haven't logged on to this FTP site before…"; Ashton {Day17/65:6} "I didn't access the FTP site anyway."
680 Ashton {Day16/174:13-21}.
681 {EXO00000474}.
682 Ashton {EXO00001621/7} page 7, paragraph 4.3.
683 {ART00000404/4}.
684 Ashton {Day16/178:4-8}.
685 Sounes {Day 8/48:23}-{Day8/49:6}.
686 Ashton {Day16/154:8-14}.
687 Sounes {SEA00014273/61} page 61, paragraph 128.5.
688 Sounes {Day8/21:6-19}.

fire service (Requirement B5) were the most significant matters that needed to be dealt with at that point.[689] His discussions with Exova and the contents of the Design Note had given him a degree of confidence.[690]

54.63 The Design Note indicated that the existing smoke control system serving the lobbies did not comply with current guidance and therefore needed to be refurbished or modified,[691] but it did not describe the condition of the system. That is surprising, given that the day before the document was produced Mr Ashton had been told that it was not working properly.[692] His bland description of the state of the smoke control system can be contrasted with the more strongly worded email he received from Cate Cooney on 10 September 2012.[693] Nowhere in the Design Note did he spell out that there was a significant risk that the proposals would not receive building control approval.

54.64 The Design Note also pointed out that, as stairs serving residential accommodation should not also serve non-residential accommodation, it might be necessary to provide sprinkler or water mist systems to the boxing club and office suite.[694] Yet in no version of the Outline Fire Safety Strategy did Mr Ashton advise that sprinklers might be necessary and there is no record of sprinklers having been discussed in design team meetings.[695]

54.65 Dr Lane was critical of the Design Note on the grounds that it did not provide the necessary information in sufficient detail to enable the design to be developed to RIBA Stage C with respect to fire safety.[696] It appeared to have been produced in haste in order to meet a project deadline[697] and dealt only with functional requirements B1 and B5. It therefore failed to provide adequate guidance to the design team on all those aspects of fire safety that needed to be considered in connection with the refurbishment. In our view all those criticisms are well founded.

Issue 1 of the Outline Fire Safety Strategy: 31 October 2012

54.66 Issue 1 of the Outline Fire Safety Strategy[698] was prepared by Mr Ashton and reviewed by Mr McEleney. It was addressed to Studio E. Although it does not identify the RIBA Stage for which it had been prepared, Mr Ashton said that it was appropriate for Stage C.[699] It was issued on 31 October 2012, too late to be incorporated into the formal reporting package for that stage of the works.[700] Mr Ashton said that he had not been aware that the report needed to be issued at the same time as the other RIBA Stage C reports.[701]

689 Sounes {Day8/21:20}-{Day8/23:5}; Sounes {SEA00014273/61} page 61, paragraph 128.5.
690 Sounes {Day8/24:14-15}.
691 {TMO10001562/2} under Existing Parts.
692 Email from Paul Dunkerton (KCTMO) to Terence Ashton, forwarding an email from Janice Wray {EXO00000220} which attaches KCTMO's investigation into a fire that occurred at Grenfell Tower on 30 April 2010 {TMO10001785}.
693 {EXO00000388}.
694 {TMO10001562/2}; Ashton {EXO00001621/8} page 8, paragraph 4.4. It is also listed as a potential solution to the mixing of non-residential stairs with the open base to the firefighting stair in Cate Cooney's email of 10 September 2012 {EXO00000388}.
695 Ashton {Day18/143:13-15}; Lane, Phase 2 Report {BLARP20000017/171} paragraph 6.3.16.
696 Lane, Phase 2 Report {BLARP20000017/170} paragraph 6.3.9.
697 Lane, Phase 2 Report {BLARP20000017/174} paragraph 6.3.27.
698 {EXO00000519}.
699 Ashton {Day17/23:4-16}.
700 Studio E's Stage C Report was issued on 31 October 2012 {ART00008396}; Max Fordham's Stage C report was issued on 10 October 2012 {MAX00000636}.
701 Ashton {Day17/24:4-19}.

54.67 Nowhere in Issue 1 of the Outline Fire Safety Strategy did Exova state that the refurbishment included overcladding of the building.[702] That was consistent with the description of the refurbishment in the introduction to the report, which omitted any reference to the overcladding, despite the fact that Mr Ashton was well aware by that time that it constituted an important feature of the works. Although he sought to justify that omission by saying that there had been nothing in the report relating to overcladding (as indeed was the case), he accepted that something of that significance ought to have been included in the description of the refurbishment.[703]

54.68 The only reference in the document to functional requirement B4 was in section 3.1.4,[704] which read:

> "**Compliance with B4 (External fire spread)**
>
> It is considered that the proposed changes will have no adverse effect on the building in relation to external fire spread but this will be confirmed by an analysis in a future issue of this report."

54.69 Moreover, although section 3.1.3 dealt with functional requirement B3 (unseen spread of fire in concealed spaces), it was confined to the internal structure and compartmentation generally. It did not deal with compartmentation and concealed spaces within the external wall.[705] The document contained no reference to the application of requirement B3 to the external wall, such as could be found in section 9 of the current edition of Approved Document B in relation to the requirement for cavity barriers.

54.70 Mr Ashton said that the documents on which the report had been based had not provided any information about the cladding[706] and that he had not been given any details on which he could comment.[707] He had expected that information to be provided by Studio E and had assumed that matters relating to requirement B4 would be discussed at a meeting.[708] When asked why he had not made it clear in the report that he had insufficient information to make an assessment in relation to requirement B4, he said simply, "That's not the way we chose to do it. The truth of the matter is that we didn't have any details that we could comment on."[709]

54.71 That was not entirely correct. Although the general arrangement drawings listed in the introduction to the Outline Fire Safety Strategy[710] contain no sections or elevations of the tower (and therefore no details of the external wall arrangements), Mr Ashton already had some information about the external wall build-up, having received a draft of potential work packages[711] from Adrian Jess of Studio E on 23 October 2012[712] for the purposes of a design team workshop to be held on Thursday 25 October 2012. The section

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[702] The report states that it is based on discussions with the design team and drawings (numbers 1279 RE 110 05, 1279 RE112 04, 1279 RE113 04 and 1279 RE114 03) produced by Studio E LLP {EXO00000856}; {EXO00000858}; {EXO00000860}; {EXO00000861}.
[703] Ashton {Day17/101:3-20}.
[704] {EXO00000519/8}.
[705] {EXO00000519/7-8}.
[706] Ashton {EXO00001621/10} page 10, paragraph 4.9 (D).
[707] Ashton {EXO00001621/9} page 9, paragraph 4.9; Ashton {Day17/39:17}-{Day17/41:8}.
[708] Ashton {Day17/49:8-22}.
[709] Ashton {Day17/41:4}.
[710] {EXO00000519/4}. The drawings can be found at: Proposed Floor Plans {EXO00000856}; Proposed Mezz Plan {EXO00000858}; Proposed Walkway Plan {EXO00000860}; Proposed Walkway+1 Plan {EXO00000861}.
[711] {SEA00006395}.
[712] {SEA00006394}.

entitled "Architectural Strategy" referred to overcladding comprising insulation with zinc rainscreen,[713] but it is unlikely that Mr Ashton looked at that document, since it did not have any obvious relevance to fire safety and he had not been asked to do so.[714]

54.72 The statement in Issue 1 of the Outline Fire Safety Strategy relating to compliance with functional requirement B4 led Mr Sounes to understand that it was too soon for Exova to comment on the structure of the external wall, but he took it as confirmation that Exova had no immediate concern about the proposals.[715] Mr Ashton, however, did not realise that.[716]

54.73 Studio E produced its RIBA Stage C report on 31 October 2012. It was sent to the TMO by a link in an email sent at 11.37 which was copied to the design professionals, including Mr Ashton.[717] Just under five hours later, at 16.21, Margaret Treanor, an administrative assistant at Exova, sent Issue 1 of the Outline Fire Safety Strategy to Adrian Jess at Studio E.[718] There may have been a brief interlude, therefore, in which Mr Ashton could have read the Stage C report before he released the Outline Fire Safety Strategy, but he did not read it then or later, because the email to which it had been attached had not been addressed to him and he had not specifically been asked to read it. It was not his practice to look at Stage C or Stage D reports unless specifically asked to do so.[719]

54.74 If Mr Ashton had read the Stage C report carefully, he would have seen that the tower was to be overclad,[720] with various options being considered for the rainscreen, including zinc[721] and aluminium.[722] He would also have seen that Celotex FR5000 was proposed as insulation in the external wall.[723] Mr Ashton repeatedly said that he had not been told what insulation or rainscreen was being used on the tower.[724]

Further information provided to Mr Ashton in November 2012

54.75 On 16 November 2012 Adrian Jess of Studio E sent Mr Ashton a link to Studio E's then current drawings on an FTP site.[725] Mr Ashton had not previously used the site and asked for assistance.[726] However, although Mr Jess sent him a new link to the site, he did not visit it and so did not see the drawings it contained. Nor did he ask to be given the drawings in some other way.[727] Mr Ashton's lack of interest in the information being made available to him is regrettable to say the least, but it is not clear which drawings were available on the FTP site at that time or whether they contained any information about the external wall.[728]

713 {SEA00006395}.
714 Ashton {Day17/30:1}-{Day17/32:9}.
715 Sounes {Day8/52:9-11}; See also Sounes {SEA00014273/73} page 73, paragraph 149.
716 Ashton {Day17/47:25}-{Day17/48:4}.
717 {ART00008396}.
718 {EXO00000518}.
719 Ashton {Day17/97:8}-{Day17/98:4}, {Day17/98:17-19}. Dr Pearson's evidence was also that architects would usually provide them with Stage C or Stage D reports voluntarily. Pearson {Day19/110:16-25}.
720 {SEA00006429/27}.
721 {SEA00006429/28}; {SEA00006429/31}; {SEA00006429/32}.
722 {SEA00006429/32}.
723 {SEA00006429/82-83}.
724 Ashton {Day17/92:2-14}; {Day17/95:19-20}.
725 {SEA00006666}.
726 {EXO00000601/3}.
727 Ashton {Day17/63:17-19}; {Day17/64:15-25}.
728 Proposed Walkway +1 Floor Plan, annotated {SEA00006728}; Proposed Mezzanine Floor Plans, annotated {SEA00006727}, attached to email {SEA00006726}.

54.76 In both her written and oral evidence Dr Lane was critical of Issue 1 of the Outline Fire Safety Strategy, not just for failing to record the fact that the project included the overcladding of the entire building but for expressing the view, albeit subject to confirmation in due course, that the work would have no adverse effect on the building in relation to external fire spread.[729] The purpose of obtaining an Outline Fire Safety Strategy was to provide the design team with the information they needed to ensure that when the refurbishment had been completed the building would be safe for occupation. Dr Lane said that in a document of this kind she would expect a reasonably competent fire engineer to set out, as a bare minimum, the statutory guidance relating to insulation, cavity barriers, and the external surface, with references to the relevant sections of Approved Document B.[730] That would involve making clear the performance required of each of the separate elements of the external wall.[731] She agreed that Exova could properly have made it clear that it had no information about the proposed cladding and would consider that at a later stage, but considered that to express even a provisional opinion without the benefit of any information about the cladding was unacceptable.[732]

54.77 Neither Mr Ashton nor anyone else at Exova had any information about the proposed cladding and no attempt had therefore been made to analyse the proposals for the external wall of the building. Exova therefore had no basis for expressing an opinion, even of a provisional nature, that the proposed work would have no adverse effect on the building in relation to external fire spread. Such a statement was bound to lead Studio E and the TMO to assume that, unless it was later withdrawn or modified, they could be confident that the building would comply with functional requirement B4 and be safe for occupation. Dr Lane considered that the inclusion of that statement fell short of the standards to be expected of a competent fire engineer, a view with which we agree.

Liaison with building control 2012–2013

54.78 Following the production of Issue 1 of the Outline Fire Safety Strategy in October 2012, Mr Ashton took the lead in dealing with building control in relation to fire safety aspects of the Grenfell Tower refurbishment. He sent Issue 1 of the Outline Fire Safety Strategy directly to John Allen on 31 October 2012.[733] He also organised a meeting at Kensington Town Hall on 6 November 2012 with Mr Jess and John Allen and Dave Gammon, both of RBKC building control, to introduce the scheme to them, to gauge their response and to discuss the fire strategy.[734] He said that RBKC building control could be difficult to deal with, particularly when presented with something that did not comply exactly with official guidance.[735] He told Bruce Sounes that they set their own standards, by which he meant that they were sticklers for compliance.[736]

54.79 Mr Ashton said that neither functional requirement B4 nor the overcladding of the tower was discussed during the meeting because its purpose had been to discuss Issue 1 of the Outline Fire Safety Strategy report.[737] He said he would have expected Studio E to have put overcladding on the agenda if it had needed to be discussed; he did not think it his

729 Lane {Day61/168:16-21}; Lane, Phase 2 Report {BLARP20000017/188}, paragraph 6.5.10.
730 Lane {Day61/168:16-21}; {Day61/169:18-25}; {Day61/170:5-8}; {Day61/170:18-20}.
731 Lane {Day61/169:18}-{Day61/170:20}.
732 Lane, Phase 2 Report {BLARP20000017/187-188} paragraphs 6.5.9-6.5.12.
733 {SEA00006443}.
734 Terence Ashton's notes of this meeting are at {EXO00001371}; Adrian Jess's notes of the meeting are at {SEA00006526}.
735 Ashton {Day17/66:9}-{Day17/67:19}.
736 {ART00000385}.
737 Ashton {Day17/70:7-18}. John Allen said that he did not believe that cladding had been referred to during the meeting, although he could not recall the meeting at all. Allen {Day47/175:4-11}.

responsibility to do that.[738] According to Mr Sounes, a meeting of that kind would normally begin with a brief description of the project, which would inevitably have included a description of the cladding. However, given the absence from Mr Jess's detailed notes of any reference to the overcladding,[739] we think it unlikely that it was discussed or even mentioned in a way that could have been expected to lodge in Mr Ashton's mind.

54.80 Mr Ashton met building control again for the last time on 17 September 2013 to discuss the fire strategy.[740] He agreed that he would normally have expected to have had more meetings with them[741] and indeed the Fee Proposal allowed for one meeting at Stage C and two meetings at Stage D or E,[742] but he had expected them to be arranged only if Studio E asked for them.[743] Again, there is no evidence that the overcladding of the tower was discussed at that meeting.[744] Mr Ashton said that he had never discussed with anyone from building control whether the cladding proposals complied with the guidance in Approved Document B[745] and there is no written record of any such discussion having taken place.

Issue 2 of the Outline Fire Safety Strategy: 24 October 2013

54.81 Issue 2 of the Outline Fire Safety Strategy was dated 24 October 2013.[746] It was written by Mr Ashton and reviewed by Dr Tony Pearson, a senior consultant[747] although junior to Mr Ashton at Exova. It was produced following the meeting with building control on 17 September 2013, after which alterations had been made to some of the drawings on which the previous report had been based.[748] Issue 2 of the Outline Fire Safety Strategy did not identify the RIBA Stage for which it had been written. According to Mr Ashton, it could have been intended for use at Stage D, although unknown to him Studio E had already produced its Stage D report in August 2013.[749]

54.82 Studio E's Stage D report had included Issue One of Exova's Outline Fire Safety Strategy at Appendix D,[750] a fact of which Mr Ashton was also unaware.[751] Since he had not read the Stage D report, (or, for that matter, the Stage C report),[752] it is no surprise that neither of the reports was referred to in Issue 2 of the Outline Fire Safety Strategy. If Mr Ashton had read the Stage D report, he would have seen the reference to the zinc composite rainscreen proposed for the upper levels,[753] images of cladding[754] and references to Celotex

738 Ashton {Day17/70:14}-{Day17/71:7}; {Day17/73:13-16}.
739 {SEA00006526}.
740 {EXO00000693/5}.
741 Ashton {Day17/182:13-19}.
742 {EXO00001349/2}; {EXO00001349/3}. It was also envisaged that at Stage F work would include, when appropriate, discussion with "the regulatory approvers", including attendance at up to one meeting in London.
743 Ashton {Day17/182:20-24}.
744 Sounes {Day21/135:1}-{Day21/136:9}.
745 Ashton {Day17/181:9-12}.
746 {EXO00000430}.
747 According to Dr Pearson a senior consultant was the minimum grade for reviewing other people's work, for managing a more complicated project or for leading negotiations with building control. Pearson {Day19/3:16-19}.
748 Ashton {Day17/116:11-18}; {EXO00000390}. The altered drawings can be found at {EXO00000961}, {EXO00000962}, {EXO00000980}.
749 Ashton {Day17/99:17-18}.
750 {SEA00008054/78}.
751 Ashton {Day17/97:8-11}.
752 Ashton {Day17/100:25}; Stage C report {SEA00006429}.
753 {SEA00008054/22}; {SEA00008054/29}.
754 {SEA00008054/26}.

FR5000 as the proposed insulation.[755] By that time, however, Studio E was working to the Employer's Requirements – Stage E,[756] so Mr Ashton was once again out of step with the other design professionals on the project.

54.83 When reviewing Issue 2 of the Outline Fire Safety Strategy, Dr Pearson had seen only the general arrangement floor plans and the mark-ups on the drawings produced by colleagues at Exova.[757] It would have been useful for him to have seen the minutes of the discussions with building control, but they had not been made available to him.[758] He had not seen the draft Existing Fire Safety Strategy which ordinarily he would have wanted to see when conducting a review of that kind.[759] Dr Pearson did not know what stage of the RIBA process the report was being written for, nor did he know that Studio E had issued its Stage C report in October 2012 and its Stage D report in August 2013.[760] We think that he should have known both of those things when carrying out a peer review of the fire safety strategy so that he properly understood the context in which the report was being prepared.

54.84 In the introductory section of Issue 2 the description of the refurbishment had been amended,[761] but it still omitted any reference to the overcladding of the tower. According to Mr Ashton, that was because Exova had still not given any consideration to the cladding.[762] The drawings identified at the end of the introduction were general arrangement drawings and did not show any details of the external wall construction.[763] Dr Pearson was not aware at the time that the refurbishment included overcladding,[764] nor did he have any knowledge of the arrangements proposed at the top of the tower,[765] all of which may explain why he had no concern about the treatment in the report of functional requirement B4. He assumed that Mr Ashton would carry out an analysis when further information had become available.

54.85 In Issue 2 of the report the section dealing with functional requirement B4 (external fire spread) was unchanged and therefore the single sentence at para 3.1.4 remained the only reference to that requirement of the Building Regulations.[766] Nor did the report contain any express reference to the performance requirements for an external wall. It seems that that was not something which Exova routinely included in a document of that kind.[767] Dr Pearson explained that at the time there had been an assumption within Exova that designers knew what the requirements were,[768] but with the benefit of hindsight he recognised that that assumption had been misplaced. Similarly, they had assumed that the designers would choose appropriate materials.[769]

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755 {SEA00008054/29}.
756 Sounes {Day8/67:25}; Sounes {SEA00014273/105} page 105, paragraph 241.
757 Pearson {Day19/109:5-16}.
758 Pearson {Day19/105:13-19}; {Day19/126:21-24}.
759 Pearson {Day19/107:3-4}.
760 Pearson {Day19/106:9-24}; {Day19/107:21-25}.
761 {EXO00000430/4} Two additional features were added: "…a new stair providing access to the boxing club at ground storey level;" and "…office accommodation in the mezzanine over the ground storey (mezzanine level)."
762 Ashton {Day17/100:19-21}.
763 {EXO00000430/4}. The drawings were: 1279 SEA (08) 100, "Fire Access", 24.10.13 {TMO00828152}; and 1279 SEA (08) 101, "Fire Strategy", 24.10.13 {TMO10040859}.
764 Pearson {Day19/105:6}; {Day19/122:12-17}.
765 Pearson {Day19/123:4-14}.
766 "It is considered that the proposed changes will have no adverse effect on the building in relation to external fire spread but this will be confirmed by an analysis in a future issue of this report."
767 Ashton {Day17/104:5-7}.
768 Pearson {Day19/160:8-17}.
769 Pearson {Day19/171:10-14}.

54.86 Mr Ashton said that at the time he had been slightly nonplussed by the fact that the overcladding had not been the subject of any discussion by that late stage in the development of the design,[770] yet he also said that he had not thought that there had been a general awareness in the construction industry before the Grenfell Tower fire of the need to look critically at the construction of external walls.[771] That suggests, however, that Mr Ashton was aware that he needed to ensure that this aspect of the project had been, or would be, properly addressed.

54.87 Dr Pearson did not discuss section 3.1.4 of the document or requirement B4 with Mr Ashton at the time;[772] he had absolute faith in Mr Ashton and believed that he would provide all the necessary advice on B4 when appropriate.[773] However, he was unaware at that time that Mr Ashton had no experience of advising on cladding work on high-rise residential buildings.[774]

54.88 No changes were made to the section covering functional requirement B3 (internal fire spread)[775] and therefore there was still no guidance on compliance with Section 9 of Approved Document B and the provision of cavity barriers. Dr Pearson was not concerned that the second issue of the Outline Fire Safety Strategy failed to identify the locations of concealed spaces or places where cavity barriers would be needed because the document was described as an outline rather than a detailed strategy.[776] He also failed to notice that the document incorrectly stated that the floors should provide at least 60 minutes' fire resistance, as he took it on trust that that was correct.[777]

54.89 In the process of conducting his peer review Dr Pearson added a new paragraph to the report drawing attention to the fact that, although the sharing of a means of escape between residential and non-residential accommodation was not endorsed by current statutory guidance, the proposals complied with the Building Regulations because they represented a continuation of the existing principles.[778] Mr Ashton said that amendments would usually be discussed before a document was sent out, but that there had been no discussion in this case because they had been under pressure of time.[779] Mr Ashton had asked for the document to be sent out without having read Dr Pearson's amendment and was irritated by it when he did read it,[780] because he thought that it unnecessarily drew attention to a failure to comply with Approved Document B.[781] He had noted the fact that the proposal to share the means of escape did not comply with Approved Document B in the Design Note[782] and he knew that Ms Cooney had previously expressed concern about merging the stairs serving the boxing club and office with those serving the residential units.[783] He said that he had already established with building control that there was a mixture of uses and that he was addressing it with appropriate fire safety measures,[784]

770 Ashton {Day17/104:13-16}.
771 Ashton {Day 17/104:17}-{Day17/105:7}.
772 Pearson {Day19/117:14}.
773 Pearson {Day19/130:2-21}; {Day19/171:20-22}; {Day19/110:3-9}; {Day19/121:6-13}.
774 Pearson {Day19/125:18-22}.
775 {EXO00000430/8} section 3.1.3.
776 Pearson {Day19/114:16-23}.
777 Pearson {Day19/111:7-25}.
778 {EXO00000430/6} Section 3.1.1.
779 Ashton, {Day17/175:1-13}.
780 Ashton {Day17/113:14-20}; {EXO00001444}. Dr Tony Pearson had given Terence Ashton two opportunities to comment on the amendment (at 16.13 and at 16.52) before it was sent out.
781 {EXO00001444}.
782 {EXO00000142/2}.
783 {EXO00000388}; Ashton {Day17/114:14-24}.
784 Ashton {Day17/114:14-24}.

but he did not want to draw attention to it in case they said it was not acceptable.[785] Mr Ashton's view was that it was a matter of emphasis and suggested that he had overreacted to what Dr Pearson had written.[786]

54.90 Dr Lane considered that the problem to which Dr Pearson's amendment drew attention involved a fundamental breach of the Building Regulations and she considered that Mr Ashton's attitude in hoping that building control would not notice it fell below the standards to be expected of a reasonably competent fire engineer.[787] In her view, it was important when drafting a fire safety strategy to identify any deviations from the statutory guidance so that the different readers could take account of them when making decisions about the project.[788] We agree and return to this at a later stage when we consider broader questions about Exova's work on this project.

54.91 When Mr Ashton produced Issue 3 of the Outline Fire Safety Strategy in November 2013, he retained the statement that "sharing means of escape between residential and non-residential accommodation is not endorsed by current statutory guidance",[789] but deleted from section 3.1.1 the statement that the proposals represented "a continuation of the existing principles for means of escape in the building and therefore do not create a non-compliance with the requirements of the Building Regulations".[790] Mr Ashton did not seek to discuss that amendment with Dr Pearson[791] and Dr Pearson appears not to have realised at the time that the words in question had been removed.[792]

54.92 Studio E sent Issue 2 of the Outline Fire Safety Strategy to building control by email on 25 October 2013.[793] John Allen responded on 11 November 2013,[794] saying that the information submitted was not adequate to enable an effective consultation to be had with the fire authority. Mr Ashton thought that building control's concerns related to Max Fordham's work in designing the smoke control system,[795] and that it was therefore Max Fordham's responsibility to provide whatever additional information was required.[796] There is nothing in the email to suggest that building control considered the proposals to be unacceptable because they failed to address functional requirements B3 and B4.

54.93 The very fact that Issue 2 of the Outline Fire Safety Strategy was in substance almost identical to Issue 1 produced a year earlier is itself a ground of criticism. Max Fordham and Studio E had produced their RIBA Stage D reports in August 2013.[797] Dr Lane said that she would have expected a reasonably competent fire engineer about to produce a fire safety strategy for RIBA Stage E to have asked for the Stage D report for use as a reference guide and to check the sections that were relevant to its work.[798] In her opinion Mr Ashton's failure to obtain the latest information at that stage of the design process fell short of what could be expected of a reasonably competent fire engineer who could be expected to obtain any information needed to complete its work.[799] We agree.

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785 Ashton {Day17/110:25}-{Day17/111:5}; See also Ashton {EXO00001621/11} page 11, paragraph 4.17.
786 Ashton {Day17/112:19-20}.
787 Lane, Phase 2 Report {BLARP20000017/99}, paragraphs 4.7.81-4.7.82.
788 Lane {Day61/207:7-13}.
789 {EXO00001107/6}.
790 {EXO00001107/6}.
791 Pearson {Day19/91:11-15}.
792 Pearson {Day19/93:7-23}.
793 {SEA00000121}.
794 {RBK00002985}.
795 Ashton {Day17/195:18-20}; See also Ashton {EXO00001621/12} paragraph 5.3.
796 Ashton {Day17/200:1-4}.
797 {SEA00008054}; {TMO00834924}.
798 Lane {Day61/188:7-13}.
799 Lane {Day61/188:1-23}.

54.94 Exova's failure to review the statement in relation to functional requirement B4 was again the subject of criticism by Dr Lane, who was critical of its failure to provide the guidance that in her view should have been included in Issue 1. We find it very surprising that no one at Exova recognised that the statement relating to functional requirement B4 had not been properly resolved. Mr Ashton's explanation that he had not been provided with the information he needed in order to deal with it was in our view a poor excuse. We consider that a reasonably competent fire engineer would have realised that the report remained incomplete in an important respect, would have drawn the matter to the attention of its client and would have sought the information needed to complete the report. In failing to do so Exova in the person of Mr Ashton fell below the standards to be expected of a reasonably competent fire engineer.

Correspondence with Studio E before Issue 3

54.95 After the production of Issue 2 of the Outline Fire Safety Strategy on 24 October 2013, but before the production of Issue 3 on 7 November 2013, a question was raised by the design team about the performance of the external wall. On 1 November 2013, Tomas Rek of Studio E sent an email to Mr Ashton asking him to confirm that the rainscreen cavity barriers were to have 60 minutes' fire resistance to match that of the compartmentation.[800] Mr Ashton's response on 4 November 2013 was brief, stating simply that cavity barriers needed to have only 30 minutes' fire resistance.[801] Mr Ashton did not check Approved Document B before giving that advice because, he claimed, he had known the answer off the top of his head.[802] Nor did he consider it necessary to advise Mr Rek of the performance requirements set out in Approved Document B for the external wall or the required locations of cavity barriers.[803] Although he did not have any details of the rainscreen to which Mr Rek had referred, he did not ask for further information since he assumed that it might be forthcoming in the not too distant future.[804] Regrettably, Mr Rek's email did not prompt Mr Ashton, as it should have done,[805] to address the external wall requirements in Issue 3 of the Outline Fire Safety Strategy which was produced within a week of this correspondence.[806]

Issue 3 of the Outline Fire Safety Strategy: 7 November 2013

54.96 Issue 3 of the Outline Fire Safety Strategy was produced on 7 November 2013,[807] less than two weeks after Issue 2. It had been prepared by Mr Ashton and reviewed by Mr McEleney. The stated reason for the revision was to take into account comments from the design team.[808] The document was said to be based upon discussions held with the design team and building control and on unidentified fire access and fire strategy drawings produced by Studio E.[809] Exova did not provide a set of fire strategy drawings to accompany Issue 3.

800 {EXO00000586}.
801 {EXO00000586}; Ashton {Day17/124:21}-{Day17/125:3}.
802 Ashton {Day17/123:25}-{Day17/124:1-2}.
803 Ashton {Day17/124:8-10}; {Day17/126:21-23}.
804 Ashton {Day17/120:22-25}.
805 {EXO00000586}; Lane {Day61/212:7}-{Day61/213:7}.
806 Ashton {Day17/121:6}-{Day17/122:23}.
807 {EXO00001107}.
808 {EXO00001107/2}. See also exchanges between Terence Ashton and the Studio E design team {EXO00001408} and changes to the Fire Strategy marked up in yellow on {EXO00001501}.
809 {EXO00001107/4}.

Dr Lane was critical of that omission, and explained that anyone reading the report would need both the detailed information on the drawings and the narrative in the report in order to understand the basis for the fire safety design.[810]

54.97 Again, Exova failed to specify for which RIBA stage the document had been written. Mr Ashton thought that it was another version of one intended for Stage D, but Mr Sounes said it had related to Stage E.[811] Mr Ashton had still not seen either the Stage C or Stage D report.[812]

54.98 The introduction to Issue 3 described the refurbishment works and, as in the case of Issues 1 and 2, made no mention of the overcladding.[813] The wording of the section covering B4 (external fire spread) also remained the same.[814] Mr Ashton explained that nothing had changed since the previous issue because he still had not been given the details of the external wall.[815] He said that Exova had been disengaged from the design team for a number of months between Issues 1 and 2 and that the project had "gone a bit cold".[816] He had been expecting a discussion, but none had taken place by the time the document had been produced.[817] By contrast, Mr Sounes said he had expected Mr Ashton to ask if he needed any further information to enable him to provide the advice covered by Exova's Fee Proposal, including any necessary drawings, details or specifications.[818] In oral evidence, Mr Ashton accepted that Exova should have pursued Studio E more vigorously for information about the external walls, but he rejected the suggestion that retaining the original wording without any clarification was an abdication of its responsibilities as fire strategy consultant for the project.[819]

54.99 In common with Issue 2, Issue 3 did not describe the fire performance materials needed to comply with functional requirement B4, nor did it set out the fire safety standards for the construction of external walls, which, according to Dr Lane, was the minimum Exova should have provided by way of advice.[820] Accordingly, it did not make it clear that the guidance in paragraph 12.7 of Approved Document B required any insulation product used in the external wall to be of limited combustibility. Mr Ashton explained that omission by saying that he did not include performance requirements as a matter of course in every report.[821] He accepted that he had taken no steps before the production of Issue 3 to ascertain whether the cladding would or would not be likely to have an adverse effect on the building in relation to fire spread.[822]

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810 Lane {Day61/221:10-15}.
811 Sounes {Day12/147:19-23}.
812 Ashton {Day17/128:9-18}.
813 {EXO00001107/4}.
814 {EXO00001107/9} paragraph 3.1.4.
815 Ashton {EXO00001621/12} page 12, paragraph 4.20, "Again, I had still seen no proposals in relation to any cladding, and so the report contains the same statement as before." See also Ashton {Day17/130:7-16}.
816 Ashton {Day17/131:6}-{Day17/132:6}.
817 Ashton {Day17/131:6-13}.
818 Sounes {Day12/150:15-20}.
819 Ashton {Day17/135:8-22}.
820 Lane, Phase 2 Report {BLARP20000017/214} paragraphs 6.9.12-6.9.13. See also Lane {Day62/25:22-24}; {Day62/26:12-14}.
821 Ashton {Day17/137:8-18}; {Day17/48:13-17}-{Day17/49:11-14}.
822 Ashton {Day17/130:25}-{Day17/131:5}.

54.100 Similarly, Issue 3 contained no guidance on the need for cavity barriers[823] nor any reference to the performance requirements for cavity barriers within external walls as set out in section 9 and paragraph 12.8 of Approved Document B, despite the fact that Tomas Rek had sought guidance on that very matter only days earlier.[824]

54.101 Issue 3 of the Outline Fire Safety Strategy also omitted any reference to the crown, but that was because Mr Ashton had never been asked to advise on that part of the structure. He had not seen any drawings of the crown and did not know anything about the arrangements at the top of the building.[825] Nor did it contain any reference to the draft Existing Fire Safety Strategy. Dr Pearson said that if he had been the author of the report he would have included a lengthy summary of the existing strategy,[826] but Mr Ashton was not aware that the Existing Fire Safety Strategy (even though only in draft form) was intended to be the baseline from which the Outline Fire Safety Strategy was to be developed.[827]

54.102 When addressing the means of escape and functional requirement B1, Mr Ashton advised that the design of the smoke control system would be covered in a separate report by Max Fordham.[828] No performance requirements for the new smoke control system were set out, nor was the role of the system specified. Mr Ashton told us that the performance requirements for smoke ventilation systems serving a common lobby were well known in the industry and certainly would have been well known to Max Fordham, so he did not think it necessary to spell them out.[829]

54.103 Issue 3 of the Outline Fire Safety Strategy did state that for the walkway, mezzanine and ground floor levels and in the lobby to the boxing club and community room, automatic opening vents of 0.4m² in area would be provided.[830] As Mr Ashton accepted, that did not comply with the guidance in Approved Document B, because the size of the opening vents did not comply with BS5588-5:2004,[831] but it was the best that could be achieved. He did not expressly refer to that shortcoming in the strategy because he had discussed it with building control, which appeared to be happy with it on that basis.[832]

54.104 Similarly, there was no reference in the section dealing with functional requirement B1 to the fact that the width of the stairs at 1040mm was 60mm less than the 1100mm stated in Approved Document B,[833] although Mr Ashton had been aware of the fact, having advised on the question by email in October 2013.[834] He accepted that it could have been added to the narrative discussion in the report, but did not consider that to be necessary, since it was not practicable to alter the stairs, which in his view were perfectly adequate.[835]

823 {EXO00001107/8} paragraph 3.1.3.
824 {EXO00000586}.
825 Ashton {Day17/139:16}-{Day17/140:3}.
826 Pearson {Day19/108:1-9}.
827 Ashton {Day18/11:4-7}.
828 Note under the heading "SMOKE VENTILATION OF LOBBIES", "(this supply and extract system will be overhauled as part of the improvement to the building services. This is covered in a separate report from Max Fordham.)" {EXO00001107/7} and see also Ashton {Day17/143:12-16}.
829 Ashton {Day17/143:17}-{Day17/144:3}.
830 {EXO00001107/7}.
831 Referred to in Diagram 52 of Approved Document B, Note 2 {CLG00000224/116}; See also Lane, Phase 2 Report {BLARP20000017/299}.
832 Ashton {Day17/146:5-19}.
833 Approved Document B {CLG00000224/32} section 2.33.
834 {EXO00000739/1}. In response to a question about the width of the stair, Mr Ashton replied, "If the stair were to be used as access for fire-fighters it would have to be 1100mm between walls." See also Ashton {Day17/147:16-20}.
835 Ashton {Day17/147:9}-{Day17/149:14}.

54.105 The strategy contained no advice that might have assisted the TMO in discharging its duties under the Fire Safety Order or any information about how the active and passive fire safety systems would need to be maintained in order to ensure compliance with the legislation. Nor did it contain any acknowledgement of the fact that the mixed-use nature of the building might result in there being more than one responsible person. Mr Ashton considered that that would be more appropriately addressed in a fire safety management plan.[836]

54.106 Similarly, there was no consideration in the strategy of the means of escape for those in the tower with disabilities because Mr Ashton did not think that the law required designers to consider their position.[837] He had therefore not asked for information about who was living in the building or who might be living there in the future.[838] He said that he would not have expected to be given that information by the TMO unless there had been some particular reason to consider it, for example, if the building had been purpose-built for people with disabilities.[839]

54.107 Mr Ashton did not review the Fee Proposal before putting the finishing touches to Issue 3 to remind himself of the scope of Exova's instructions; it was not something he did as a matter of routine.[840]

54.108 Issue 3 was the last version of the Outline Fire Safety Strategy produced by Exova for the Grenfell project[841] and represented the culmination of its work on the refurbishment up to and including RIBA Stages D and E.[842] Exova produced nothing commensurate with RIBA Stages E or F.[843] According to Mr Ashton, that was because Exova had not been novated to Rydon.[844] Mr Ashton said that the relatively minor nature of the differences between the three versions of the report reflected changes to the design of the lower four floors.[845]

54.109 In the event, Exova never did produce a final version of the fire strategy. Mr Ashton did not consider Issue 3 to be the final version[846] and accepted that a detailed fire strategy would have dealt with all the functional requirements from B1 to B5.[847] He acknowledged that Issue 3 did not deal with a number of subjects, including an analysis of the external wall in relation to functional requirement B4.[848] He said that his intention at the time had been to produce the final version once he had received the necessary information from the design team;[849] but he never asked Studio E for that information[850] and allowed the matter to drift in the absence of any request from Studio E for a complete analysis.[851] He did not regard completion of the fire safety strategy as a priority and he had a lot of other work on his hands at the time.[852]

836 Ashton {Day17/155:16-22}.
837 Ashton {Day17/150:1-11}.
838 Ashton {Day17/153:13-24}.
839 Ashton {Day17/158:24}-{Day17/159:4}.
840 Ashton {Day17/131:20-25}.
841 Ashton {EXO00001621/12} page 12, paragraph 4.18.
842 Ashton {Day18/165:6-9}.
843 Lane, Phase 2 Report {BLARP20000017/101} paragraph 4.7.104.
844 Ashton {Day18/166:10-14}.
845 Ashton {Day18/166:4-9}.
846 Ashton {Day 17/133:1-3}.
847 Ashton {Day16/101:1-4}.
848 Ashton {Day17/132:16-18}; {Day18/165:18-20}; {Day18/166:1-3}.
849 Ashton {Day17/133:1-6}.
850 Ashton {Day17/133:22-25}.
851 Ashton {Day17/48:5-17}.
852 Ashton {Day17/133:11-15}.

54.110 Mr Ashton said that building control had never asked for a more detailed fire safety strategy and that Exova had not received any instructions from the TMO to review it.[853] In retrospect he thought it surprising that he had had no contact with Studio E to discuss a compliance check of the design for the external wall, but he did not consider that it would have been appropriate for him to tell the TMO that further work was required.[854] In the event, Exova never told Studio E or Rydon that further work needed to be done on the Outline Fire Safety Strategy.

54.111 Issue 3 of the Outline Fire Safety Strategy was expressly incorporated into the Design & Build Contract between the TMO and Rydon.[855] Although Mr Ashton was aware that a document of that kind would usually be provided to the main contractor for information at the tender stage, he was not specifically aware that in this case it had been incorporated into the building contract.[856]

54.112 Studio E also included Issue 3 of the Outline Fire Safety Strategy in the full plans application that was submitted to building control on 29 September 2014.[857] Mr Ashton was not aware of that at the time, but he knew that it was standard practice to do so.[858] He also knew that it was unusual, when the work to a building was to include overcladding, for a fire safety strategy which did not deal with functional requirement B4 to be included in a full plans application.[859] He said that it would have been "nice" if the final version had contained such an analysis, but it had not been included because it had not been considered.[860]

54.113 Issue 3 of the Outline Fire Safety Strategy was produced at RIBA Stage E. According to Dr Lane, that was the time for the production of the final fire safety strategy which should have recorded the detailed proposals for the development, together with the promised analysis.[861] However, Issue 3 did not represent any material advance on Issue 2 and Exova failed to produce any detailed and comprehensive fire safety strategy at any stage during the project.[862] In Dr Lane's opinion Issue 3 wholly failed to provide the fire safety design guidance required by the design team, the client and the contractor.[863]

54.114 Despite having undertaken to provide a fire safety strategy for the refurbishment, Exova failed to complete the work in fundamental respects. Issue 3 represented nothing more than a stepping stone on the way to the production of the final document, as the paragraph dealing with functional requirement B4 made clear, and as a result, Exova failed to provide any guidance on the performance standards for the external wall. Dr Lane described that as a serious omission,[864] but in truth it was more than that; it represented a fundamental failure by Exova to provide the services for which it had contracted. The fact that the reports were provided to the architect rather than the lay client does not excuse that failure. Although Studio E was at fault in failing to ask questions about the Outline Fire Safety Strategy in any of its forms, and particularly in failing to ask Exova to provide a

853 Ashton {Day18/168:4-8}; {Day18/169:5-12}.
854 Ashton {Day18/171:8-25}.
855 Contract Documents for Enhancements and Improvements to Grenfell Tower, Schedule of Contract Information {TMO10041791/267} item 115.
856 Ashton {Day18/172:6-14}.
857 {SEA00000215}.
858 Ashton {Day18/172:15-22}.
859 Ashton {Day18/173:5-9}.
860 Ashton {Day18/173:11-14}.
861 Lane {Day61/210:25}-{Day61/211:9}.
862 Lane, Phase 2 Report {BLARP20000017/225}, paragraph 6.12.12.
863 Lane {Day61/222:3-7}; Lane, Phase 2 Report {BLARP20000017/224} paragraph 6.12.2.
864 Lane {Day61/174:1-12}.

concluded opinion on functional requirement B4(1), that does not excuse Exova for failing to seek the information needed to complete its work or make it clear that without it an essential part of the strategy was missing.[865]

54.115 It was also of importance for Exova to draw attention to the fact that any insulation materials in the external wall should be of limited combustibility if the designers were following the guidance in paragraph 12.7 of Approved Document B. If that had been expressly stated, others engaged on the project, including Rydon and the TMO, might have thought twice about their choice of insulation. Again, the fact that others were unaware of that requirement does not exonerate Exova.

54.116 Mr Ashton sought to justify his failure to provide final advice in relation to functional requirement B4 by relying on Studio E's failure to provide him with detailed information about the overcladding. However, that does not excuse Exova's complete failure to deal with the requirements for the external wall. The project had been introduced to Mr Ashton as one which would include overcladding,[866] he had attended at least one project team meeting (on 6 September 2012) at which the cladding had been discussed,[867] he had been sent minutes of other project team meetings referring to it[868] and he had been sent a number of work packages containing information about it.[869] At no stage, however, did he address his mind to the build-up of the external wall. Given his acknowledgement that the overcladding was, in his own words, "a fairly significant part of the design",[870] his failure to include it in the description of the project and his subsequent failure to consider that aspect of the refurbishment fell below the standards to be expected of a reasonably competent fire engineer. Something should have been included in the document to alert the designers to the need for careful consideration of functional requirement B4 in relation to the external wall and the peer reviews carried out before the production of all three issues of the strategy were defective in failing to identify that deficiency. That is so, even if each of them was understood at the time to be no more than an interim document.

54.117 None of the issues of the Outline Fire Safety Strategy contained any reference to the need for cavity barriers. When Mr Ashton prepared Issue 3 in November 2013 he had had his attention specifically drawn to the fact that there was to be a rainscreen cladding system in an email from Tomas Rek on 1 November 2013.[871] That email ought to have alerted Mr Ashton to the need to address cavity barriers in the fire safety strategy, since it should have been clear to him that the design team needed his help in understanding the basic performance requirements for the external wall.[872] In those circumstances we consider that Mr Ashton's failure to address cavity barriers and their locations fell below the standard of a reasonably competent fire engineer.[873]

865 Lane {Day61/198:14}-{Day61/202:15}.
866 {EXO00000474}.
867 {ART00000404}.
868 Meeting minutes dated 18 July 2012 {EXO00000753}, sent via email on 24 July 2012 {EXO00000751}.
869 {SEA00006394}; {SEA00006395}; Ashton {Day17/30:1-25}.
870 Ashton {Day17/49:2-14}.
871 {EXO00000586}.
872 {EXO00000586}; Lane {Day61/212:7}-{Day61/213:7}; Ashton {Day17/119:12}-{Day17/126:23}.
873 Lane {Day61/211:14}-{Day61/213:25}; Lane, Phase 2 Report {BLARP20000017/213} paragraph 6.9. Her views were unchanged after hearing the evidence of Exova's witnesses. Lane {Day61/222:22}-{Day61/223:1}.

Failure by Artelia to identify the omission

54.118 As employer's agent, Artelia was responsible for monitoring the performance of the contractor, Rydon, and reporting to the TMO.[874] It also had responsibility for establishing the roles and responsibilities of Rydon and specialist design subcontractors, confirming the scope of the building contract to the TMO and advising on additional works required by third parties.[875] It was not obliged to advise the TMO about specialist services required in connection with the project or about the design services needed under the building contract.[876] However, as administrator of the building contract it had an obligation to be aware of the appointment of specialist advisers and ensure that any work they had undertaken to perform was completed. Philip Booth accepted that Artelia's role as employer's agent included identifying any gaps in the completion of work.[877]

54.119 It was apparent from the language of Issue 3 of the draft Outline Fire Safety Strategy that further work was required to complete it. Not only was it described as a draft, but it stated in terms that the effect of the proposed changes to the building in relation to the spread of fire over the external walls would be covered in a future issue. Philip Booth told us that he had read the tender documents in November 2013 and had recognised that there was more work to be done on the fire safety strategy, which he assumed would be carried out by Rydon.[878] Of itself, that was not remarkable and we accept that at the tender stage of a design and build contract, the fire safety strategy may not be fully developed.[879] However, having recognised that there was further work to be done on it, the minutes of the contractor introduction meeting of 1 April 2014 taken by Artelia and checked by Mr Booth should not have recorded that Exova had completed the fire strategy at the tender stage.[880] Regardless of whether it had mentioned the matter to Rydon, Artelia should have drawn the attention of the TMO to the fact that Exova's work had not been completed but failed to do so. At no time did Mr Booth or anyone else at Artelia alert the TMO to the need to ensure that the fire safety strategy had been completed by a suitably qualified fire engineer. The safety of the cladding was therefore never considered by a fire engineer.

Subsequent advice

54.120 During numerous meetings on the project between April and October 2014 Rydon expressed an intention to engage Exova as consultant fire engineer, as is formally recorded in the minutes of those meetings,[881] but no one on behalf of Rydon contacted Exova for that purpose.[882] In the event, Rydon did not appoint Exova as a consultant and there is no evidence that anyone from Exova attended any design team meetings after 6 September 2012. However, between 1 April 2014, when Rydon was proposed as principal contractor,

874 {ART00005742/47} clause 1.1.4.
875 {ART00005742/48} clause 1.3.3 and clause 1.3.5.
876 {ART00005742/47} clause 1.2.5 and clause 1.2.8.
877 Booth {Day49/151:3-7}; {Day50/83:18}-{Day50/84:21}.
878 Booth {Day 50/84:25}-{Day50/87:7}.
879 Booth {Day50/86:18}-{Day50/87:7}.
880 {ART00002256/4} item 5.3.
881 Minutes of Contractor Induction Meeting of 1 April 2014 {ART00002255/4}. Simon Lawrence said that he thought his understanding at the time had been that Rydon would engage Exova as a subcontractor. Lawrence {Day23/52:16}-{Day23/53:3}; The Pre-Start Meeting of 13 June 2014 {ART00002495/3}; Progress Meeting No. 1 held on 15 July 2014 {ART00002614/2}; Progress Meeting No. 3 held on 16 September 2014 {RYD00018299/2}; Progress Meeting No.2 held on 19 August 2014 {RYD00017870}.
882 Lawrence {Day23/58:18-25}; Ashton {Day17/191:3-15}.

and 24 March 2016,[883] Exova continued to provide advice to Studio E, Rydon and its subcontractors[884] on aspects of fire safety and Mr Ashton was sent or copied in to at least 40 emails.

54.121 Rydon's attitude towards advice from Exova is evident from an email sent by Simon Lawrence to Neil Crawford on 19 September 2014. Mr Lawrence had noticed Exova's inclusion in an e-mail chain and had questioned its continued involvement in the project. He wrote: "I know that they provided information in the tender for KCTMO but I don't know if they are still working for them. I know that we haven't employed them. So if you are getting some free advice then great otherwise we will need to look at this."[885] At this point, according to Simon Lawrence, Rydon had not decided whether a fire consultant was needed. It wanted to understand the strategy relating to the lower four floors before making a decision about the services they needed and wanted to obtain the views of building control, which it regarded as a "resource."[886] During Progress Meeting No. 4 on 21 October 2014 Rydon again indicated that it would appoint a fire consultant[887] and the item remained on the agenda because Artelia retained it as a matter calling for decision by Rydon.[888]

54.122 By the time of Progress Meeting No. 5 on 18 November 2014, however, the reference to Rydon's intention to appoint a fire consultant had disappeared from the minutes.[889] Claire Williams did not notice that[890] and said she would have expected Artelia, as Employer's Agent, to pick it up.[891] Philip Booth said that the usual practice was for an item to remain on the minutes until it had been completed or resolved and that he could not recall how that particular item had been allowed to disappear.[892]

54.123 Bruce Sounes recalled a conversation with Simon Lawrence in March or April 2014 during which Mr Lawrence had said that Rydon typically did not engage fire consultants on the basis that the fire safety strategy had been established by the client's team.[893] Mr Lawrence did not recall that conversation,[894] but agreed that it was a fair description of how Rydon typically dealt with such matters and did not quarrel with the substance of Mr Sounes' evidence, which we accept.[895] He explained that Rydon did not normally engage fire consultants because it was building control's responsibility to raise any concerns over matters of that kind.[896]

54.124 Mr Lawrence told us that Rydon had been looking for advice from a fire safety consultant only in relation to the lower four floors of the tower, but he accepted that there was nothing in the documents to suggest that it had drawn any distinction for that purpose between the restructuring of the lower four floors and the installation of the cladding. We therefore think it unlikely that that distinction was present to Mr Lawrence's mind

883 {MAX00006093}.
884 For example, advice to Neil Crawford on 18 September 2014 {EXO00000714} and {HAR00012077} and advice to David Hughes (Rydon) on 24 March 2016 {MAX00006094}.
885 {SEA00011754/1}.
886 Lawrence {Day23/67:18}-{Day23/74:20}.
887 {RYD00022280}.
888 Booth, {Day50/94:20-25}.
889 {ART00003150}.
890 Williams {Day55/83:9}.
891 Williams {Day55/79:10-14}; {Day55/80:4-10}; {Day55/81:1-11}.
892 Booth {Day50/95:20-23}.
893 Sounes {SEA00014273/152} page 152, paragraph 372; Sounes {Day12/168:20}.
894 Lawrence {Day23/62:24}.
895 Lawrence {Day23/62:3-11}.
896 Lawrence {Day23/65:17-24}; {Day23/74:8-12}: he considered that Rydon "had a resource with building control."

in 2014.[897] He said that Rydon had made a positive decision not to appoint a fire safety consultant when it became clear that the lower four floors were not going to present a significant problem,[898] but there was no evidence of when or how that decision was made or by whom. Stephen Blake told us that he and Simon Lawrence had decided not to appoint Exova as a consultant because it had already produced a fire safety strategy and because it was the responsibility of Studio E to make sure that it contained all the necessary information.[899] We think it likely that Rydon decided not to engage Exova, or any other fire safety consultant because it did not think that it needed to do so in its own interests. Rydon did not tell the TMO or Studio E that it had decided not to appoint a fire consultant[900] and it seems that the matter then disappeared from sight. Artelia and the TMO should both have been aware that Rydon had not appointed a fire consultant and Artelia should have obtained a formal decision from Rydon and recorded it, together with the reasons for it, pursuant to its obligation to monitor Rydon's performance.

54.125 The failure to ensure the effective involvement of a fire engineer in the project following the appointment of Rydon as principal contractor was in our view one of the most serious flaws in the design and execution of the refurbishment. When Rydon was appointed as principal contractor the TMO continued to retain Exova, but neither the TMO nor Artelia appears to have understood clearly what services it was expected to provide or to whom. Artelia's duties included understanding where additional works by third parties were required. Artelia ought to have made it clear to the TMO that Exova's work had not been completed, that Rydon had not appointed anyone to finish it and that the TMO itself would therefore have to ensure that it was completed. For its part, the TMO, ought to have clarified Exova's position and ensured that the fire safety strategy was completed.

54.126 Mr Ashton understood that Exova's retainer had ended when Rydon was appointed as principal contractor and neither Rydon nor anyone else had asked it to continue acting.[901] Exova received no formal confirmation from the TMO that its services were no longer required, but Mr Ashton said that in his experience it was not unusual for Exova's services not to be retained in that situation.[902] We are surprised that Exova allowed client relations to be managed in such a casual manner, but the fact is that Mr Ashton never thought to ask for clarification of Exova's position, even though he was still being asked for advice on various matters from time to time on an ad hoc basis.[903] He thought that some members of the design team had assumed that Exova was still instructed; he certainly had taken no steps to disabuse them.[904]

54.127 Exova did not make a separate charge for their ad hoc advice but treated it as covered by the fee agreed with the TMO for RIBA Stages D and E.[905] Despite approving the invoices which Exova submitted to the TMO, it did not dawn on Claire Williams that Rydon had not appointed a fire consultant.[906] Mr Ashton said that in his view the advice had not been provided under Exova's contract with the TMO, but was supplementary advice given on an ad hoc basis,[907] but that is not reflected in the billing procedures.

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897 Lawrence {Day23/79:13}-{Day23/80:7}.
898 Lawrence {Day23/80:8-16}.
899 Blake {Day29/67:11-19}.
900 Williams {Day55/84:2-10}.
901 Ashton {Day18/61:11-25}.
902 Ashton {EXO00001621/14} page 14, paragraph 5.9,
903 Ashton {Day18/64:3-7}.
904 Ashton {Day18/141:9}-{Day18/142:6}.
905 {EXO00001204}; {EXO00001205}.
906 Williams {Day55/85:12-15}.
907 Ashton {Day17/184:16-25}. See also Ashton {EXO00001621/14} page 14, paragraph 5.10.

54.128 Exova gave significant ad hoc advice on two occasions: once in September 2014 and again in March 2015.

Advice in September 2014 (design of the cladding)

54.129 On 18 September 2014 Neil Crawford asked Mr Ashton for his comments on a request for information[908] he had received from Harley about the location of horizontal fire breaks within the cladding.[909] Harley thought that horizontal firebreaks might not be required between windows, because there was no "chimney effect" there. Mr Ashton replied that he had not seen details of what Studio E was doing to the external walls and asking for cross section or elevation drawings.[910] At that stage he had not given any substantive consideration to the cladding or its implications for external fire spread.[911]

54.130 Later that day, in response to Mr Ashton's request, Mr Crawford sent him a number of drawings, including drawing number 1279 SEA (06) 120 which showed zinc outer cladding and contained a reference to thermal insulation alongside the code H92/776.[912] That was the first time Mr Ashton had seen the design and specification for the cladding system.[913]

54.131 The code H92/776 referred to a paragraph in the NBS Specification[914] which specified Celotex FR5000 insulation. Mr Ashton had not seen the Employer's Requirements or the NBS Specification[915] and did not ask to see them.[916] The code meant nothing to him[917] and he did not understand that the drawings included references to the materials to be used for insulation.[918] Drawing number 1279 SEA (06) 120 also referred to "aluminium composite TBC", but, despite not being familiar with composite materials, Mr Ashton did not ask what that meant. He said that he had not looked at the drawings in any detail because Exova was no longer part of the design team.[919] In those circumstances he was not spending a lot of time on the project, although, as he accepted, he had not made that clear to Studio E.[920]

54.132 Having received the drawings from Studio E, Mr Ashton responded by saying that if the insulation in the cavities behind the rainscreen was combustible it would be necessary to provide cavity barriers as shown in drawing number 1279 (06) 120 in order to prevent fire from spreading from a flat to the one above, even if there was not a continuous cavity from the top of the building to the bottom.[921] That advice was wrong insofar as it suggested that cavity barriers were required only if the insulation were combustible.[922] In order to comply with Approved Document B cavity barriers were required around the windows and at the top of the walls, regardless of the type of insulation used.[923] He also failed to point out that in a building of over 18 metres in height the insulation should be of limited combustibility

908 {HAR00003616}; Email attaching the RFI {SEA00011703}.
909 {SEA00011705}.
910 {RYD00018154}.
911 Ashton {Day18/25:17-19}.
912 {EXO00000710}, {EXO00000709}.
913 Ashton {Day18/31:15-22}.
914 {SEA00000169/73}.
915 Ashton {Day18/127:7-8}.
916 Ashton {Day18/31:1-14}.
917 Ashton {Day18/29:11-22}.
918 Ashton {EXO00001621/15} page 15, paragraph 5.17; Ashton {Day18/29:16-22}.
919 Ashton {Day18/30:1-10}.
920 Ashton {Day18/30:1-15}; {Day18/33:1-7}.
921 {EXO00000708}.
922 Lane {Day62/44:16-25}.
923 Lane {Day62/45:7-15}.

in order to comply with paragraph 12.7 of Approved Document B. Mr Ashton accepted that his response could have been more clearly worded[924] but in our view that suggests that he had not understood the significance of the nature of the insulation.

54.133 The drawings provided to Mr Ashton by Studio E[925] also showed horizontal cavity barriers only between the windows and not around the window frames. He did not notice that omission, despite his understanding that Approved Document B contained clear guidance on the importance of cavity barriers around windows.[926] He said that that was not the question he was being asked and that he had just wanted to know in broad terms what they were doing.[927] He said he had not asked for full details of the construction in order to do hours of work for which he would not be paid.[928] He had not seen that as part of his responsibility.[929]

54.134 Later the same day Neil Crawford sent another email to Mr Ashton[930] attaching a datasheet for Celotex RS5000.[931] He asked whether Daniel Anketell-Jones was right in thinking that, because the insulation was rated Class 0, cavity barriers were not required around the windows. Mr Ashton did not open the attachment and therefore did not read the datasheet.[932] That was a serious error on his part. A reasonably competent fire engineer would have done so and, having read the datasheet, would have explained to Mr Anketell-Jones that Class 0 did not denote limited combustibility.[933] Mr Ashton said that he had not seen any need to open the attachment, since he had just been dealing with an exchange of emails about whether using a Class 0 material meant that cavity barriers were not required. If it had been necessary for him to look at it, he would have expected Mr Crawford to make some express reference to it.[934] Mr Ashton was aware of the Celotex insulation product in general and, although he had never had cause to investigate it, he knew that it was a PIR foam and therefore combustible[935], even if he did not know how exactly it reacted to fire.[936] Despite having been sent the datasheet, however, at no stage did he ask himself whether Celotex RS5000 was suitable for use on the tower; indeed he maintained in evidence that he had not known that it was being used.[937] He said that, if he had been told that Celotex was to be used, he would have said that it was not acceptable for use on the building without test evidence.[938] It did not occur to him to ask Mr Crawford what type of rainscreen cladding panel was being proposed[939] or to tell him that the Outline Fire Safety Strategy needed to be revised.[940]

54.135 Mr Ashton's response to the question posed to him was therefore directed solely to whether the use of Class 0 insulation obviated the need for cavity barriers in certain locations. He said:

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924 Ashton {Day18/39:1-18}.
925 In particular, drawing 1279 (06) 120{EXO00000710}.
926 Ashton {Day18/42:4-18}.
927 Ashton {Day18/41:10-25}.
928 Ashton {Day18/40:10-13}; {Day18/41:16-25}-{Day18/42:1-3}; {Day18/42:19-24}; {Day18/43:15-21}.
929 Ashton {Day18/42:19}-{Day18/43:5}.
930 {SEA00011724}.
931 {RYD00018155}.
932 Ashton {Day18/46:15-23}; {Day18/47:3-19}; {Day18/49:1-8}; {Day18/55:6-8}.
933 Lane, Phase 2 Report {BLARP20000017/279}; Lane, {Day62/49:11}-{Day62/50:8}.
934 Ashton {Day18/46:17}-{Day/47:11}.
935 Ashton {Day18/67:11-15}.
936 Ashton {Day18/48:1-17}; {Day18/56:12-17}.
937 Ashton {Day18/53:21-25}-{Day18/54:1-5}.
938 Ashton, {Day17/96:1-3}; {EXO00001775/2} page 2, paragraph 2.3; See also Ashton {Day18/135:4-10} Mr Ashton said he would have carried out investigations if he had known that Celotex insulation was being used in the external walls.
939 Ashton {Day18/69:2}.
940 Ashton {Day18/69:11-18}.

> "A material which has a Class 0 rating is not necessarily non-combustible although the reverse is invariably true. Some Class 0 products will burn when exposed to a fully developed fire. In any case, you need to prevent fire spread from one flat to the flat above as I stated in my earlier email. What isn't clear from the information to hand is whether or not there is a continuous cavity from top to bottom in any part of the cladding (apart from around the column casings) irrespective of the type of insulation."[941]

No one responded to his comment about the extent of the external wall cavity and he did not press for further information.[942]

54.136 According to Dr Lane, industry awareness of the dangers presented by combustible materials was evolving rapidly at that time and by September 2014 Exova ought to have been aware of the third edition of BR 135 published in 2013 and BCA Technical Guidance Note 18 Issue 0 dated June 2014 (and published in August 2014), including the warnings they contained about the use of combustible insulation.[943] It ought also to have been aware by that time of a number of cladding fires that had occurred in other countries, demonstrating the dangers posed by the use of combustible materials.[944] Mr Ashton had already received indications from a number of sources that Celotex RS5000 was being proposed for use on the tower[945] but had apparently failed to absorb the information. If he had opened the datasheet and obtained advice from colleagues in Warrington with specialist knowledge of materials[946] and their reaction to fire, it is likely that he would have alerted the design team to the risks involved.

54.137 Although at that time the drawings still specified zinc rainscreen panels, Dr Lane was clear that Mr Ashton should have known that the insulation did not comply with the guidance contained in Approved Document B and that cavity barriers were missing.[947] She said that they were "red flags" which should have prompted him to consider how the external wall was being assessed and how it could comply with functional requirement B4.[948]

54.138 Mr Crawford said that he had spoken to someone from Exova on 17 or 18 September 2014 to confirm the compliance of the Celotex insulation.[949] Mr Ashton did not recall any such conversation at about that time, nor could he recall ever having discussed with Mr Crawford Celotex insulation or its compliance.[950] Mr Crawford said that Exova had been emphatic that it was appropriate to use Celotex,[951] an assertion which Mr Ashton equally unequivocally denied.[952] Mr Crawford also told us that at about the same time he had told Mr Ashton that ACM panels were to be used on the building.[953] Again, Mr Ashton denied that. He did not recall ever having discussed with Mr Crawford the use of ACM panels

941 {EXO00001430}.
942 Ashton {Day18/59:5-22}.
943 Lane {Day62/53:12}-{Day62/56:6}; {Day61/203:6-11}.
944 Lane {Day61/202:21}-{Day61/203:5}.
945 In the Stage C Report, the link sent to him on 31 October 2012 {ART00008396}, and the datasheet sent to him for RS5000 {SEA00011724}.
946 Ashton {Day17/93:9-14}.
947 Lane {Day62/56:15-19}.
948 Lane {Day62/52:16-22}; {Day62/56:15-19}.
949 Crawford {Day9/176:23}-{Day9/177:11}.
950 Ashton {Day18/71:3-19}; Ashton {EXO00001775/2-5} page 2-5, paragraphs 2.2-2.3 and paragraphs 3.8-3.9}; Ashton {Day18/72:13}-{Day18/74:17}.
951 Crawford {Day10/58:1}-{Day10/59:1}.
952 Ashton {Day18/72:14}-{Day18/74:14}; Ashton {EXO00001775/2} pages 2, paragraphs 3.3-3.5.
953 Crawford {Day10/91:16}-{Day10/92:11}.

generally or Reynobond 55 PE panels in particular.[954] Neil Crawford said that Mr Ashton had understood the wall build-up[955] and had discussed with him the suitability of the cavity barrier strategy.[956] Mr Ashton also denied that.[957]

54.139 Mr Crawford said that his understanding of the basis on which the cladding system was considered to be compliant with Approved Document B had been derived from conversations he had had with Exova sometime around 18 September 2014.[958] Mr Ashton did not recall any such conversation.[959] Mr Crawford also said that he recalled Mr Ashton's mentioning that the fire safety strategy would need to be revisited and completed,[960] which again Mr Ashton denied.[961] Mr Crawford went on to say that at about the end of March 2015 Exova had given him the impression that the proposed cladding system was acceptable and created no risk of external fire spread and that therefore there was no need for a further report.[962] Mr Ashton also denied that.[963]

54.140 There was, therefore, in these respects a direct conflict between the evidence of Mr Ashton and that of Mr Crawford, both in relation to Exova's acceptance of the use of Celotex insulation and in relation to its recognition of the need for the work on the Outline Fire Safety Strategy to be completed in relation to functional requirement B4. Having considered their evidence carefully, we think that the evidence of Mr Ashton is the more reliable. The discussions, if they had occurred, would have been of considerable significance and would have merited confirmation by email, if not more formally. However, there is no reference to them in any of the contemporaneous documents, nor did Mr Crawford refer to them in the very full statement he made in November 2018.[964] Mr Ashton may have adopted a casual approach to the Outline Fire Safety Strategy, but his failure to complete the section dealing with functional requirement B4 reflected a lack of positive instructions from Studio E. He was aware of the importance that would inevitably be attached to any opinion expressed by Exova on matters of that kind and could be expected to have put in writing any advice of that kind. Whatever may have passed between them, we are unable to accept that Mr Ashton gave the assurances described by Mr Crawford in what could only have been the most informal manner. If Mr Crawford had thought that that was his intention, he would surely have confirmed the conversation in an email to ensure that there had been no misunderstanding.

54.141 The exchanges that took place in September 2014 between Studio E and Exova occurred at a critical moment in the life of the project. The design team was asking important questions relating to the safety of the external wall and its compliance with the statutory guidance that were not answered in the current version of the Outline Fire Safety Strategy.[965] All those involved in the exchanges, including Exova, should have realised that the sections of the strategy relating to functional requirements B3 and B4 needed to be completed and that detailed and definitive guidance was required. Even if Mr Ashton could not complete that work without further information, at the very least he should have warned the project

954 Ashton {Day18/76:1-14}; Ashton {EXO00001775/2} page 2-4, paragraphs 2.5-2.6 and paragraphs 3.6-3.7.
955 Crawford {Day10/94:1-22}; Ashton {Day18/77:5-21}.
956 Crawford {Day10/94:1-22}.
957 Ashton {Day18/74:18}-{Day18/77:24}, {Day18/124:11}-{Day18/125:6}; Ashton {EXO00001775/3} page 3, paragraphs 3.1-3.2.
958 Crawford {Day9/179:5-7}.
959 Ashton {Day18/78:7-9}.
960 Crawford {Day10/95:22}-{Day10/96:10}; {Day11/169:23}-{Day11/170:5}.
961 Ashton {Day18/78:10-20}.
962 Crawford {Day11/181:20}-{Day11/183:15}.
963 Ashton {Day18/79:3-5}.
964 Crawford {SEA00014275}.
965 Lane, {Day62/49:11-19}; {Day62/60:4}-{Day62:61:20}; {Day62/52:16-22}; {Day62/56:15-19}.

team and the TMO, his client, that important work was outstanding and that the current version of the strategy was materially incomplete. We can see no good reason why he did not do so and are satisfied that in failing to do so he fell short of the standard required of a reasonably competent fire engineer.

Advice in March 2015 (cavity barriers and fire stopping)

54.142 On 3 March 2015 Mr Crawford asked Mr Ashton for advice on "fire breaks" at Grenfell Tower,[966] attaching Harley's Specification Notes[967] which referred to Reynobond rainscreen cassettes. Mr Ashton did not respond to that email and is unlikely to have read it at the time.[968] He said that if he had read the Specification Notes, he would have drawn Studio E's attention to the fact that the use of Styrofoam in the window infill panels would not be acceptable to building control because it was combustible.[969]

54.143 On 27 March 2015 Mr Crawford sent an email to John Hoban of RBKC building control, with a copy to Mr Ashton,[970] asking for confirmation that a proposal for cavity barriers put forward by Ricky Kay of Siderise was acceptable. That appears to have been the first time that Mr Ashton had been copied in to an e-mail about the cladding sent to building control.[971] He was not concerned by the reference to rainscreen aluminium cassettes, as he was aware that aluminium was used in a variety of applications, and did not understand the term "cassettes".[972] He did not take in the fact that aluminium rather than zinc was now being proposed.[973] In Dr Lane's view, this correspondence should have prompted Mr Ashton to ask for the information he needed to complete the Outline Fire Safety Strategy,[974] but regrettably it did not do so.[975]

54.144 Earlier that month a disagreement had broken out within the design team over whether fire stopping or cavity barriers were required in the cladding at the level of compartment floors between the internal structure and the rainscreen panels. On 30 March 2015 Mr Ashton was copied in to an email from Mr Hoban to various employees of Siderise, Harley and Rydon,[976] in which he said that he interpreted Diagram 33 of Approved Document B as requiring fire stopping of the same fire resistance as the compartment floor (in this case 120 minutes) rather than a cavity barrier. On 31 March 2015 Mr Crawford sought Mr Ashton's advice, saying that he could not see any reference to that element of the design in the fire safety strategy.[977] Mr Ashton responded the same day,[978] saying that it was not something that would necessarily form part of a fire safety strategy for a building (although when he gave evidence he accepted that that had been wrong, because advice on the provision of cavity barriers would normally be part of any fire

966 {EXO00001315}.
967 {EXO00001319}.
968 Ashton {Day18/83:16-23}; Ashton {EXO00001621/17} page 17, paragraph 5.25.
969 Ashton {EXO00001621/17} page 17, paragraph 5.27(c).
970 {EXO00001434}.
971 Ashton {Day18/92:10-17}.
972 Ashton {Day18/92:21-22}.
973 Ashton {Day18/93:3-6}.
974 Lane, {Day62/52:4-12}; {Day62/61:5-11}; {Day62/62:20-24}.
975 Ashton {Day18/93:7-11}.
976 {EXO00000715/2}.
977 {EXO00000715}.
978 {EXO00000715}.

strategy for a building that was to be overclad).[979] He also expressed the view that only a cavity barrier was required in that location, since fire stopping would not stay in place in a fire, which would cause the zinc cladding to fail.[980]

54.145 Mr Ashton's cursory reading of the email chain was remarkably casual, given that he had been specifically asked to comment on the history of the discussion and to look at the correspondence in the chain below.[981] His failure to read down the short chain also meant that he failed to notice the reference to aluminium cladding cassettes and continued to labour under the misapprehension that the rainscreen panels would be composed of zinc.[982] If he had included in the Outline Fire Safety Strategy the minimum requirements in Approved Document B for satisfying functional requirement B4, those questions might not have arisen. Moreover, the design team might have been alerted to the need to analyse in more depth the choice of materials for use in the external wall of the tower.

54.146 In Dr Lane's opinion, this correspondence demonstrated exactly the problem caused by a failure on the part of a fire engineer to express minimum performance requirements in clear terms.[983] In her view, the sections of the detailed fire safety strategy relating to functional requirements B3 and B4 should have answered those questions, given that there was clearly confusion within the design team about the difference between fire stops and cavity barriers. In this case there was a need for the fire engineer to explain what they were, what they were for, and where they needed to be incorporated into the building.[984] She considered that those and some later exchanges with the design team in September 2014[985] should again have led Mr Ashton to realise that the fire safety strategy needed to be revised.[986] As an absolute minimum he should have drawn attention to the fact that it was incomplete and asked for confirmation that he could complete it.[987]

54.147 At the time Mr Ashton did not know what type of cavity barrier had been proposed for use in the refurbishment. He did not ask the design team, since he thought that the information would be provided as part of the description of the cladding, which in the event Exova did not receive.[988] His reference to zinc cladding is surprising, given that he had been sent information only a few days earlier which had included reference to the fact that aluminium rainscreen cassettes were to be used,[989] but he appears to have thought from start to finish that the rainscreen would be zinc. Mr Crawford said that he had told Mr Ashton in an email that the panels would be made of ACM,[990] but no such email has come to light and Mr Crawford's response to Mr Ashton did not refer to the nature of the rainscreen material.

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979 Ashton {Day18/95:20-25}-{Day18/96:1-9}; {Day18/96:21-25}; {Day18/99:4-9}; Ashton {EXO00001621/19} page 19, paragraph 5.29 (F).
980 {EXO00000715}.
981 {EXO00001434/2}.
982 Lane {Day62/63:24}-{Day62/64:8}.
983 Lane {Day62/60:3-10}.
984 Lane {Day62/60:23}-{Day62/61:4}.
985 Lane {Day62/73:4-23}.
986 Lane, Phase 2 Report {BLARP20000017/255} paragraph 8.2.10. In relation to additional correspondence in October 2014 {EXO00001441} Dr Lane said that it would have been perfectly normal professional practice to have suggested updating the fire safety strategy. Lane {Day62/77:5-14}.
987 Lane, {Day62/61:6-11}.
988 Ashton {Day18/100:19-21}.
989 {EXO00000715/4}.
990 Crawford {Day10/159:22}-{Day10/162:4}.

54.148 Throughout the exchange Mr Ashton was careful to confine himself to the questions asked of him,[991] focusing solely on the individual components of the external wall rather than on the wall as a whole.[992] He did not notice that the drawing[993] attached to Mr Crawford's email of 31 March 2015[994] showed cavity barriers only at the head of the window, because he did not look at it at the time.[995] He did not identify the locations where cavity barriers were required in the external wall and he did not identify the performance criteria for the external wall set out in section 12 of ADB.

54.149 Mr Ashton said that his reference to the failure of the rainscreen in the event of a fire reflected his understanding that, although debris would fall from the building, the fire would not spread externally through the cladding as zinc is non-combustible.[996] In his written statement[997] he said that producing a fire safety strategy does not normally involve advising on whether the use of a specific product would be satisfactory, but when giving evidence he agreed that, if the fire strategy consultant knew what kind of rainscreen panel the designer proposed to use, it would be essential to consider its flammability.[998]

54.150 Mr Ashton said that it did not occur to him in late March 2015 to revise the Outline Fire Safety Strategy because nothing he had seen had given him any cause for concern. He had not realised that the designers had been planning to use unsuitable materials.[999] In any event, although it had been in his mind that he might need to revise it in due course,[1000] he still did not have enough information from Studio E to enable him to do that.[1001] He accepted however that a reasonably competent fire engineer should have informed his client that the outstanding work on the Outline Fire Safety Strategy needed to be completed now that further information had become available about the design of the external wall and the choice of materials.[1002] He said he had not done that because he had been concentrating on the specific question raised in the email, which had been concerned with individual components of the external wall rather than with the wall as a whole.[1003] Overall we were unimpressed by Mr Ashton's narrow approach.

54.151 On 31 March 2015, two minutes after Mr Ashton had sent his email to Mr Crawford, he received an email from Dr Pearson on the same point.[1004] Mr Ashton did not recall having received it[1005] and Dr Pearson could not recall why he had been sent it, but thought it might have been in response to a request for advice from Mr Ashton.[1006] Mr Ashton thought that it had probably been sent because he had asked Dr Pearson for his opinion on the question that had been put to him.[1007]

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991 Ashton {Day18/111:4}; {Day18/118:21}-{Day18/119:2}.
992 Ashton {Day18/131:2-4}.
993 {SEA00002499}.
994 {SEA00013044}.
995 Ashton {Day18/123:7-15}.
996 Ashton {Day18/104:10-14}. See also Ashton {EXO00001621/19} page 19, paragraph 5.30: "My email was trying to explain that if a fire were to occur with external flaming, it would take some of the cladding panel with it, and this might cause the fire stop to fall away with it (this would of course depend on precisely how the fire stop was fixed)."
997 Ashton {EXO00001621/3} page 3, paragraph 3.6.
998 Ashton {Day17/91:8-13}.
999 Ashton {Day18/109:16-23}.
1000 Ashton {Day18/120:1-3}.
1001 Ashton {Day18/119:24-25}.
1002 Ashton {Day18/130:16-23}.
1003 Ashton {Day18/131:1-4}.
1004 {EXO00001347}.
1005 Ashton {EXO00001621/20} page 20, paragraph 5.32.
1006 Pearson {Day19/146:14-19}; {Day19/147:11-16}.
1007 Ashton {Day18/116:1-6}.

54.152 Dr Pearson's email read as follows:

> "We note that the barrier against fire spread between floors is provided through the connection of the structural floors to the existing external walls. The existing external walls are expected to provide sufficient fire resistance to prevent fire from entering the cavities at or near floor or ceiling level.
>
> We would not rule out that fire could enter the cavity if there is flaming through the windows. However, if significant flames are ejected from the windows, this would lead to failure of the cladding system, with the external surface falling away and exposing the cavity, eliminating the potential for unseen fire spread. A standard cavity barrier should be sufficient to prevent fire spread between floors while there remains a cavity.
>
> In view of the above, we do not feel that there should be a need for a 2-hour rated fire break in the cavities along the lines of the compartment floors or walls."

54.153 The message thus drew more explicit attention to the risks posed to the cladding by fire than Mr Ashton had done in his response.

54.154 When he drafted that email Dr Pearson had still not been given any detailed information about the construction of the external wall.[1008] He did not know what stage had been reached in the design process,[1009] did not look back to the Outline Fire Safety Strategy,[1010] did not check what materials it was proposed to use[1011] and directed his mind only to the specific question asked of him.[1012] Dr Pearson accepted that, generally speaking, any fire safety strategy should have been updated to include an analysis of the factors affecting external fire spread[1013] and that someone should have considered the materials being used in the external wall.[1014]

54.155 The correspondence illustrates the confusion within the design team between cavity barriers and fire stops. It also demonstrates the failure of Mr Ashton and Exova to provide clear, coherent advice on the minimum relevant performance requirements for the external wall as a whole, including the identification of cavity barriers and the locations at which they should be fitted.

Subsequent emails

54.156 On 19 October 2015, Claire Williams and Terence Ashton exchanged a series of emails relating to the changes that had been made to the layout of the lower floors of the tower[1015] and on 21 December 2015 Andrew Bridges of R J Electrics also sent an email to Mr Ashton and Dr Pearson referring to major changes to the lower four floors.[1016]

54.157 Those messages should have prompted Mr Ashton to review the Outline Fire Safety Strategy, but unfortunately it did not occur to him to do so.[1017]

[1008] Pearson {Day19/156:16}.
[1009] Pearson {Day19/157:3}.
[1010] Pearson {Day19/166:5-8}; {Day19/169:1-4}.
[1011] Pearson {Day19/170:2-8}.
[1012] Pearson {Day19/158:16-23}; {Day19/164:15-18}.
[1013] Pearson {Day19/169:15-17}.
[1014] Pearson {Day19/159:6-19}.
[1015] {ART00004926}.
[1016] {MAX00006084/6}: "I'm not sure if you've been made aware but there have been some fairly major changes to the lower levels since you issued your last Fire Strategy document, Iss 03."
[1017] Ashton {Day18/138:5-6}; {Day18/139:7-10}.

Completing the Outline Fire Safety Strategy

54.158 We find it surprising that neither the TMO, nor Studio E nor Rydon ever pressed Exova to revise its drafts or produce a final version of either the Existing Fire Safety Strategy or the Outline Fire Safety Strategy. As a result of that, and as a result of Mr Ashton's failure to ensure that he obtained the information required to enable him to complete the task, Exova never did complete either of the two pieces of work on Grenfell Tower for which it had been retained.

54.159 In January 2016 the minutes of a Clerk of Works meeting recorded[1018] that the fire strategy needed to be brought up to date in accordance with discussions on site. It was duly recorded as an action point for Rydon's site manager, David Hughes. Mr Ashton said that Mr Hughes had never asked for the fire strategy to be brought up to date.[1019] Mr Hughes' said[1020] that the minutes had not been referring to Issue 3 of the Outline Fire Safety Strategy but to the fire safety strategy drawings, which in due course had been updated.[1021] That is not how the note reads, but Mr Hughes was at the meeting and must have been aware of the nature of the discussions.

CDM Regulations

54.160 It did not occur to Mr Ashton that a completed fire safety strategy for the building was needed for the purposes of the health and safety file required by the CDM Regulations.[1022]

54.161 Dr Pearson thought that in 2013 Exova was a "designer" within the meaning of the CDM Regulations,[1023] although he could not remember how advanced his understanding of the regulations was at that particular time. Mr Ashton, on the other hand, told us that Exova generally took the view that when it was producing a fire safety strategy it was not a designer for the purpose of the CDM Regulations because it was simply applying regulations and guidance available in the public domain rather than creating something unique or original. For that reason the Fee Proposals did not refer to the CDM Regulations.[1024] As explained earlier in this chapter, Exova's work on the fire safety strategies made it a "designer" under the CDM Regulations. It therefore had a duty to avoid foreseeable risks to the health and safety of any person liable to be affected by the refurbishment work.[1025] Mr Ashton should have appreciated that.

Overview

54.162 Exova's work on the Grenfell Tower project fell a long way short of the standard to be expected of a reasonably competent fire engineer. Its work was poorly resourced, casual and both incomplete and inaccurate in a number of important respects, all of which in our assessment contributed to the lack of proper attention to fire safety matters throughout the refurbishment project. Its unprofessional approach was characterised by Cate Cooney's email of 17 September 2012, in which she described how the proposals would make

[1018] {ART00006688/5}.
[1019] Ashton {Day18/140:20}.
[1020] Hughes {Day27/183:4-17}.
[1021] {TMO10013339}; See also email from David Hughes to Neil Crawford requesting that the fire strategy drawing be updated. {RYD00082268}.
[1022] Ashton {Day18/139:11-15}.
[1023] Pearson {Day19/55:20-24}.
[1024] Terence Ashton did say that this view is changing "… in light of the fact that we sometimes design smoke extract systems and so possibly we need to look at that." Ashton, {Day16/120:1-25}.
[1025] CDM Regulations 2007, regulation 11.

"a crap condition worse,"[1026] and by Mr Ashton's response to Dr Pearson's identification of a "rather fundamental"[1027] non-compliance with statutory guidance, in which he expressed the hope that building control would not identify the problem.[1028] The latter comment revealed an approach to fire safety that we consider irresponsible.

54.163 We entirely accept that Exova was badly briefed on the project and that others, particularly Studio E, Rydon, and the TMO, failed to take a proper interest in its work. Studio E failed to provide it with important information in a timely manner, particularly information about the overcladding of the tower. Rydon demonstrated a worrying lack of concern for fire safety, in particular, in failing to obtain a completed fire safety strategy for the project. It misguidedly assumed that it could rely on others (including building control) to identify any problems and failed to appoint a fire engineer, despite having said repeatedly over many months after its appointment as principal contractor that it intended to do so. Artelia and the TMO also overlooked the fact that the fire safety strategy was incomplete and that no fire engineer had been appointed to complete it. The TMO displayed a regrettable lack of interest in fire safety and a casual attitude to its responsibilities in that regard. Those are all matters which contributed to the unsatisfactory way in which Exova carried out its work. It is, in particular, astonishing that none of the other professionals appears to have realised or warned Rydon or the TMO that Exova's work on the Outline Fire Safety Strategy was incomplete in relation to the compliance of the external wall with functional requirement B4.

54.164 However, none of that can exonerate Exova. The very fact of its involvement in the project gave the design team and the TMO as the client a false sense of security and led some to believe that fire safety matters had been properly and comprehensively addressed.[1029]

54.165 By far the most serious criticism of Exova is that a final version of the much-needed Outline Fire Safety Strategy was never produced and that it failed either to draw that fact to the attention of the design team or to warn it about the potential consequences, despite having numerous opportunities to do so. Exova's approach was to do the minimum required at the time and, when asked for advice, to adopt a narrow and blinkered approach to the questions it was asked. Consistently with that, Mr Ashton repeatedly failed to take action when he saw, or should have seen, that action was required. Dr Barker and Ms Cooney approached their work in a casual manner not consistent with its importance. None of the authors or reviewers of documents ever attended the site[1030] and the only site visit carried out by James Lee lasted a mere two hours, which was far too short for a building of the size and condition of Grenfell Tower.[1031] Insufficient time was spent drafting the reports,[1032] fewer than three working days being spent on RIBA Stage C, less than a week on Stage D/E and no time at all recorded for work on Stage F.[1033] Exova's attitude was wholly inconsistent with the careful approach to matters affecting life-safety that was

[1026] {EXO00001279}.
[1027] Lane, Phase 2 Report {BLARP20000017/99} paragraph 4.7.81; Lane, {Day61/205:15}-{Day61/207:1}.
[1028] {EXO00001444}.
[1029] For example, John Hoban of RBKC building control relied on the fact that Exova was working on the project when failing to scrutinise properly the external wall materials. Hoban {Day46/27:16-21}; {Day45/202:6}-{Day45/204:10}.
[1030] Cooney, {Day14/72:24}-{Day14/73:1}; Dr Barker did not have time to carry out a site visit herself. Barker {Day15/119:17-24}; Terence Ashton did not visit the site "possibly because [he] had other priorities". Ashton {Day16/168:8-25}.
[1031] Lane {Day61/77:18}-{Day61/78:13}; Lane, Phase 2 Report {BLARP20000017/88} paragraph 4.7.14.
[1032] For example, 15 hours was spent by Cate Cooney on the Existing Building fire strategy of August 2012. Phase 2 Report {BLARP20000017/87} paragraph 4.7.11; There is no evidence that Ms Cooney attended the site. Phase 2 Report {BLARP20000017/336} paragraph 14.1.19; For the Primary Refurbishment Project, 53 hours were invoiced for Primary Refurbishment project, 51.5 were Mr Ashton's. Phase 2 Report {BLARP20000017/90} at paragraph 4.7.23.
[1033] {EXO00001353}.

required on a project of this kind. One sees a similar attitude displayed in Mr Ashton's repeated failure to take the initiative, for example, by asking for missing information, obtaining and reading the RIBA Stage C and D reports and by regularly failing to open attachments to emails.

54.166 Exova's casual approach is also demonstrated in the operation of its peer review process. Dr Barker's review of the Existing Fire Safety Strategy drafted by Ms Cooney was cursory, to say the least, and reviews which should have been undertaken by someone of an equal or greater seniority than the author[1034] were in the case of the documents produced by Mr Ashton in fact undertaken by a more junior employee. We agree with Dr Lane that this was unacceptable and that the unsatisfactory nature of the process was demonstrated by the failure of any of Exova's reviewers to notice the inadequacies of paragraph 3.4.1 in relation to functional requirement B4.[1035] Exova's peer review procedure also applied to emails containing technical advice,[1036] but there again it was not always followed. Dr Pearson said that Mr Ashton usually led by example,[1037] but he does not appear to have followed the policy in the case of the Grenfell Tower project. One notable example is the email he sent to Mr Crawford on 31 March 2015,[1038] which was sent before he had received Dr Pearson's advice. There is nothing to suggest that the emails Mr Ashton sent on 18 September 2014 had been checked by anyone of equal or greater seniority.

54.167 Mr Ashton's cavalier approach to formal procedures was demonstrated in other ways. Exova purported to operate in accordance with the requirements of ISO 9001 and had produced a code of procedure called its "Overall Procedure Review",[1039] which was designed to help staff meet the relevant standards. Mr Ashton was familiar with it[1040] but he did not routinely follow it and did not do so in relation to the Grenfell Tower project. Instead he chose to follow procedures he had adopted on previous projects.[1041] He said that he had not followed the procedure described in the "Overall Procedure Review" because the project had not proceeded in the usual way.[1042] That was unfortunate, because if he had followed the prescribed procedure, he would have had to check that all elements of the project had been completed satisfactorily.[1043] He did not do that, however, as he was still waiting for further information about the external wall. He did not contact either the TMO or Studio E to ask them whether the services Exova had provided matched their expectations.[1044]

54.168 Mr Ashton himself had no formal training in fire engineering,[1045] no previous experience of overcladding high-rise buildings,[1046] and very little knowledge of cladding materials.[1047] In those circumstances it is perhaps unsurprising that he failed to grasp the importance of ensuring that a thorough analysis was made of the proposals in so far as they affected functional requirement B4, but that in turn makes it difficult to understand why he was

[1034] Ashton {Day17/171:4-6}, Ashton {EXO00001621/9} page 9, paragraph 4.7; Cooney {EXO00001590/3} page 3, paragraph 3.8; Ashton {Day17/174:8-11}.
[1035] Lane {Day61/209:24}-{Day61/210:7}.
[1036] Pearson {EXO00001753/3} page 3, paragraph 3.7; Pearson {EXO00001753/6} page 6, paragraph 4.5; Ashton {Day17/177:1-9}.
[1037] Pearson {Day19/41:2-13}.
[1038] {EXO00000715}.
[1039] {EXO00001209}. Issue 2 was issued on 18 December 2014 and became effective from 1 January 2015.
[1040] Ashton {Day17/161:6-19}.
[1041] Ashton {Day17/163:3-25}.
[1042] Ashton {Day17/165:1-3}.
[1043] {EXO00001209/4} paragraph 9.
[1044] Ashton {Day17/168:25}-{Day17/169:13}.
[1045] Lane Phase 2 Report {BLARP20000017/85} paragraphs 4.6.18-4.6.19.
[1046] Ashton {Day16/28:18}-{Day16/29:8}.
[1047] Ashton {Day17/76:20}-{Day17/77:6}; Ashton {Day18/86:5}-{Day18/89:25}.

assigned to lead the project in the first place. In our view that was itself a fundamental mistake. If Exova had asked a fire engineer with experience of overcladding high-rise residential buildings to manage the project, the critical importance to fire safety of the components of the external wall might have been recognised. Mr Ashton was effectively unsupervised in this work. The only Chartered Fire Engineer involved in the project at Exova was Dr Barker, whose contribution to the work was negligible.[1048]

54.169 Neither Mr Ashton, Dr Barker, nor Dr Pearson thought that when drafting a fire safety strategy for a general needs block of flats they were required to consider means of escape for those with disabilities,[1049] despite the fact that Mr Ashton had been involved in the drafting of Part 8 of BS 5588-8:1999, *Fire precautions in the design, construction and use of buildings – Part 8: Code of practice for means of escape for disabled people*.[1050] Accordingly, neither the Existing Fire Safety Strategy, nor the Outline Fire Safety Strategy contained any reference to the characteristics of those who lived in the tower or the possibility of providing additional measures for those who needed help in evacuating. In that respect Exova again fell below the standard to be expected of a reasonably competent fire engineer as it overlooked the inclusive design guidance in Approved Document B on identifying additional measures which may be required to accommodate the needs of all persons with access to the building.[1051]

54.170 Exova's failure to identify the significant fire safety risks introduced by the refurbishment was not only inadequate but positively dangerous. In order to complete its work it should have identified the nature of the proposed rainscreen, and as a result its combustible nature, and also the unsuitability of the combustible insulation and window infill panels, as well as the absence of cavity barriers in key locations. We have therefore come to the view that Exova bears considerable responsibility for the fact that Grenfell Tower was in a dangerous condition on completion of the refurbishment.

[1048] Lane Phase 2 Report {BLARP20000017/82} paragraph 4.6; Lane {Day61/51:1-25}.
[1049] Lane {Day62/85:22}-{Day62/88:23}; Pearson {Day19/133:2}-{Day19/138:25}.
[1050] Ashton {Day18/2:19}-{Day18/3:12}; {BSI00000018}.
[1051] Lane {Day62/84:11}-{Day62/96:1}.

Chapter 55
The choice of ACM PE rainscreen panels

Initial proposals

55.1 Although the initial motive for overcladding Grenfell Tower was to improve its appearance, it was soon recognised that doing so could also provide a significant improvement in the energy efficiency of the building. Adding insulation to the outside, protected by a rainscreen, was proposed by Studio E as a solution.[1052] Discussions with RBKC's Planning Department resulted in a proposal to use zinc panels as a rainscreen, but from the early part of 2012 Bruce Sounes began to think of aluminium as an alternative because it was light, presented a limited risk of corrosion and was available in a variety of colours.[1053]

55.2 At the beginning of April 2012 Mr Sounes carried out some internet searches from which he identified CEP Architectural Facades Ltd ("CEP") as a potential supplier of the rainscreen.[1054] He then contacted Geof Blades of CEP seeking information about cladding systems and prices[1055] and provided him with drawings and photographs of the tower.[1056] In response Mr Blades sent Studio E details of a high-rise cladding project on which an ACM rainscreen had been used in rivet fix.[1057] Mr Sounes met Mr Blades on 11 April 2012 to discuss potential cladding options, but they did not talk about the fire performance of any of the elements of the cladding.[1058]

55.3 Later that month Mr Sounes suggested Alucobond ACM panels as a possible option for the rainscreen, although he knew that at that stage RBKC's Planning Department did not care for aluminium on aesthetic grounds.[1059]

55.4 On 28 May 2012, Mr Sounes indicated to Chweechen Lim of Artelia that both zinc rainscreen and render were being considered for the external facade of the building[1060] and in her first budget estimate Ms Lim priced those two options.[1061] During July 2012 Studio E continued to look into various options for the cladding,[1062] but zinc rainscreen appeared to be gaining preference on aesthetic grounds.[1063] In July 2012, Studio E sent Paul Dunkerton at the TMO a technical data sheet on a VM Zinc composite panel with a fire retardant core,[1064] although Bruce Sounes had not considered whether it complied with the Building Regulations or the guidance contained in Approved Document B.[1065]

[1052] {SEA00000007}.
[1053] Sounes {SEA00014273/88} paragraphs 206 – 207; Sounes {Day20/108:11}-{Day20/113:8}
[1054] Sounes {Day20/77:4-11}.
[1055] {CEP00048112/1}; Sounes {SEA00014273/35} page 35, paragraph 71; {SEA00003965}.
[1056] {CEP000000043}.
[1057] {SEA00003941} The project involved Rockwool insulation {SEA00003942}-{SEA00003956}.
[1058] Sounes {Day20/83:8-12}. Geof Blades did not recall the content of the conversation – see Blades {Day41/85:3-7}.
[1059] {SEA00004051}; {TMO10001143/4-5}; Sounes {Day20/83:20}-{Day20/85:15}.
[1060] {ART00006104}.
[1061] {ART00005838}. Render is a plastered finish for external walls that provides a smooth surface and protects the underlying material against the elements.
[1062] Sounes First Witness Statement {SEA00014273/52} paragraph 111; Sounes {Day20/89:25}.
[1063] {EXO00000753/2}.
[1064] {SEA00005320} and {SEA00005330}. This panel was not ultimately selected for inclusion in the NBS Specification.
[1065] Sounes {Day20/89:20-25}.

55.5 On 7 August 2012 at a pre-application meeting with the Planning Department, Mr Sounes suggested zinc cladding,[1066] which was considered by the planning officer present to be acceptable.[1067]

The move towards Reynobond ACM PE

55.6 On 16 October 2012, Mr Blades arranged an introductory meeting between himself, Mr Sounes and Deborah French of Arconic.[1068] Mr Sounes thought that they had discussed the fact that Grenfell Tower was a high-rise residential block,[1069] but the others did not remember that. Ms French said she did not remember ever having thought about the height of the building.[1070] She presented the rainscreen products that Arconic offered, including a metal composite with zinc outer skins (called "ZCM") and an ACM composite which could be painted to resemble solid zinc.[1071] Neither Mr Sounes nor Ms French could remember having discussed the composition of the cores or their reaction to fire.[1072]

55.7 On 31 October 2012 Studio E issued its Stage C report,[1073] which included options for rainscreen materials, including zinc composite[1074] and aluminium.[1075] Although the Stage C Report addressed Approved Document L (Conservation of fuel and power) in detail,[1076] no detailed analysis of a similar kind was included in relation to Approved Document B.

55.8 Mr Blades remained in contact with Studio E. On 16 November 2012, he told Ms French that Studio E was inclined towards zinc but that there was still a chance for her to promote the sale of Reynobond panels.[1077] He encouraged her in her efforts because if Reynobond ACM panels were chosen for the refurbishment, there would be a chance for CEP to be engaged as fabricator.[1078] Studio E continued to consider other cladding options[1079] and on 7 December 2012 Mr Sounes suggested that aluminium might be a better choice than zinc on aesthetic grounds.[1080]

55.9 In January 2013, Mohit Kotecha of Leadbitter emailed documents to Geof Blades for cost estimation purposes.[1081] They included an outline specification showing VMZ composite zinc panels as the rainscreen.[1082] Despite that specification, Mr Blades provided a quotation[1083] pricing only Reynobond Zinc Patina finish ACM and not the specified VMZ composite zinc panels. Although the price quoted included a full facade design service,[1084] Mr Blades did not consider whether the panels were suitable for use on a building over 18 metres in height.[1085]

1066 {SEA00005602}.
1067 Sounes {SEA00014273/53} page 53, paragraph 114; {SEA00005597/1}; Sounes {Day20/92:2-8}.
1068 Sounes {SEA00014273/65} page 65, paragraph 136.6; {CEP000003961}.
1069 Sounes {Day20/96:14-17}.
1070 French {MET00053162} page 21, paragraphs 72-73; French {Day88/67:1}-{Day88/69:3}.
1071 Sounes {Day20/93:19}-{Day20/98:7}; Sounes {SEA00014273/65} page 65, paragraph 136.6; Blades {Day41/85:12}-{Day41/92:20}.
1072 Sounes {Day20/98:3-7}; French {Day88/52:2-11}.
1073 {SEA00006429}.
1074 {SEA00006429/28}; {SEA00006429/31}; {SEA00006429/32}.
1075 {SEA00006429/32}.
1076 {SEA00006429/81}.
1077 {CEP00048712}; Blades {Day41/92:21}-{Day41/93:12}.
1078 Blades {Day41/93:24}-{Day41/94:3}.
1079 {SEA00007446}; {SEA00007448}, Sounes {SEA00014273/86} page 86, paragraph 192.
1080 {ART00000584/2-3}.
1081 {CEP00048886}.
1082 {CEP00048887/6}.
1083 {CEP000000138}; {CEP000000148}.
1084 Blades {Day41/96:3-6}.
1085 Blades {Day41/101:12-17}.

55.10 Geof Blades immediately sent the documents received from Leadbitter to Arconic.[1086] They included an outline specification with drawings showing the height and dimensions of the tower,[1087] images of the tower, which showed it to be a tall building,[1088] and a scope of works which included a specification for Celotex FR5000 insulation.[1089] Although Ms French said that she did not remember whether she had looked at those documents,[1090] she accepted that she had become aware that the tower was a high-rise building.[1091] At that stage CEP was promoting Reynobond because it had a commercial interest in doing so. Mr Blades did not give any thought to whether the PE version was suitable for use on a high-rise building, but at that stage the distinction between a PE and FR core had not really come to the fore. In Mr Blades' mind "Reynobond" was synonymous with Reynobond PE.

55.11 In January 2013 the RBKC Planning Department rejected a proposal for green and yellow panels.[1092] In discussions between Artelia and Leadbitter later that month it became clear that Leadbitter's proposed costs were substantially higher than Artelia's Stage D cost budget estimate. In a costs workshop on 18 January 2013, Leadbitter made various value engineering proposals, including substituting aluminium panels for zinc, resulting in a potential saving of £250,000.[1093] On 1 February 2013, Leadbitter costed the saving to be made by using aluminium panels at £300,000.[1094]

55.12 In February 2013 Artelia asked Studio E, Curtins and Max Fordham to take a radical look at the specification to identify potential opportunities for value engineering.[1095] In the view of Studio E, one obvious possibility was to change the rainscreen from zinc to a cheaper material.[1096] Studio E had long held a preference for a Proteus Honeycomb zinc product,[1097] but it was under significant pressure from the TMO to specify a cheaper alternative to zinc.

55.13 Throughout February and March 2013 CEP continued to promote Reynobond ACM panels for use on the tower.[1098] Pursuant to the request to consider opportunities for value engineering, on 4 March 2013 CEP and Studio E met to discuss substituting ACM panels for zinc.[1099] In advance of the meeting CEP told Arconic that it would propose the Reynobond range of products.[1100] Mr Blades said that he did so out of professional loyalty to Arconic, having already introduced them to the project, and during the meeting he supported the use of Arconic's Reynobond panels.[1101] In doing so, he reinforced the impression held by Studio E that Reynobond PE was a suitable material for use on Grenfell Tower, although he had only limited knowledge of the regulatory regime governing the use of such products and, at that stage, only a limited understanding of the way in which Reynobond PE reacted to fire.

[1086] {CEP00048962}.
[1087] {CEP000000075/7}; {CEP00048966}.
[1088] {CEP000000076}.
[1089] {CEP00048971/5}.
[1090] French {Day88/64:5-11}.
[1091] French {Day88/66:18-23}.
[1092] TMO Position Statement {TMO00837466/7}; {SEA00007275}; Sounes {SEA00014273/78} page 78, paragraph 164.
[1093] {ART00006072}.
[1094] {ART00006045}; {ART00005812/7}; {SEA00007298}; {TMO00879771/10}; Maddison {Day59/84:17}-{Day59/85:13}.
[1095] {SEA00007413}.
[1096] {SEA00007415}; Sounes {Day20/102:6}-{Day20/104:7}; {SEA00007414} Studio E also identified other potential cost savings, including scaling back the crown and changing the windows.
[1097] The core of this product was an aluminium honeycomb structurally bonded between two thin sheets of metal – see {SIG00000248/9}.
[1098] Blades {Day41/117:20-24}.
[1099] Sounes {SEA00014273/85} page 85, paragraph 190.
[1100] {CEP000000150}; Blades {Day41/104:14}-{Day41/108:25}.
[1101] Blades {Day41/116:6-12}; Blades {CEP000008838/11} page 11, paragraph 7.42; Blades {Day41/117:8-19}.

55.14 In our view CEP should have taken steps to ensure that a person in the position of Mr Blades understood the behaviour, particularly in response to fire, of the products it supplied and had a general understanding of the regulatory regime that applied to them. In fact, he believed, quite wrongly, that "Class 0" was synonymous with "limited combustibility".[1102] Both he and Neil Wilson, the general manager, were under the impression that Reynobond PE had achieved Class 0,[1103] which was not the case, although it is fair to say that BBA Certificate 08/4510 relating to Reynobond ACM panels, of which he was aware,[1104] stated (wrongly) that the panels might be regarded as having a Class 0 surface.

55.15 Following the meeting, Mr Sounes felt that it might be possible to switch from zinc to ACM[1105] and reported to Alun Dawson of Artelia that other options included insulated render and Marley "Natura" fibre cement panels.[1106] At the request of Mr Blades, Ms French sent samples of various Reynobond panels directly to Adrian Jess at Studio E between 22 March and 8 April 2013.[1107] Further samples were sent between the beginning of March and the end of June 2014.[1108]

55.16 In April 2013, CGL Systems Ltd, a facade designer and manufacturer who had been visiting Studio E's offices in connection with another project,[1109] provided Studio E with the names of cladding contractors, including Harley.[1110] Harley had already become aware of the project through commercial sources and on being told by CGL that its name had been given to Studio E,[1111] it contacted Studio E by email to express its interest in the project.[1112] Harley's email included details of its previous projects, all of which involved ACM rainscreen.[1113] Studio E did not make any enquiries about Harley,[1114] nor did it investigate the construction of the external walls of the buildings involved in any of those projects.

55.17 On 17 April 2013, Studio E gave the TMO details of a number of alternative materials to zinc that could be used as a rainscreen, most of which were ACM.[1115] By that time the project had effectively stalled while the TMO made decisions about costs and procurement. Bruce Sounes said that it had been necessary to look at the cheapest options because that was what the TMO needed.[1116]

[1102] Blades {CEP00064247/14} page 14, paragraph 67; Blades {Day41/58:13-24}.
[1103] Wilson {CEP00064249/5} page 5, paragraph 21; {CEP00064249/6} page 6, paragraph 24; Blades {CEP00064247/5} page 5, paragraph 22; Blades {Day41/192:18}-{Day41/193:5}.
[1104] Blades {Day41/57:14-19}.
[1105] {SEA00007442}.
[1106] {SEA00007442} see also {SEA00000547/26}; {SEA00000909}; {SEA00007563/2}; Sounes {Day20/107:11}; Blades {Day41/8:16-19}.
[1107] {CEP000000151}.
[1108] Exhibit French DF/4 List of samples provided for the refurbishment project {MET00019919}.
[1109] Sounes {SEA00014273/89} page 89, paragraph 209.
[1110] Sounes {SEA00014273/89} page 89, paragraph 209.
[1111] {HAR00005352}; Ray Bailey {Day32/131:1-6}.
[1112] {SEA00007603}.
[1113] {SEA00007604}; {SEA00007605}; {SEA00007606}; Ray Bailey {Day32/134:23}-{Day32/135:2}.
[1114] Sounes {Day20/118:23-25}.
[1115] {SEA00007563}.
[1116] Sounes {Day20/111:21}-{Day20/112:9}.

55.18 By June 2013 Mr Blades had become aware that an ACM panel with a fire resistant ("FR") core was available[1117] and realised that it would perform better in a fire.[1118] However, he consistently promoted Reynobond 55 PE and accepted in evidence that he had relied on its Class 0 classification in the BBA certificate without having a working knowledge of the Building Regulations.[1119]

55.19 In June 2013, Studio E was given a copy of Artelia's Draft Revised Project Brief, which stated that the primary driver of the project was value for money.[1120] However, despite the fact that ACM was likely to be a cheaper option, Studio E still preferred zinc.[1121]

55.20 In July 2013, following a meeting with Councillor Rock Feilding-Mellen, Bruce Sounes prepared a document describing a range of materials and fixing methods that could be used to provide a rainscreen for insulated cladding. Both zinc and ACM panels were illustrated,[1122] but the document did not mention fire safety. Studio E submitted a revised planning application to RBKC in July 2013 in which the proposed zinc composite rainscreen remained unchanged.[1123]

55.21 On 20 August 2013, Studio E completed a revised Stage D report which included Rheinzink panels for the rainscreen with ACM panels as an alternative.[1124] The Rheinzink panel was not combustible.[1125]

The Hays Galleria meeting

55.22 On 27 September 2013, Bruce Sounes and Tomas Rek of Studio E met Ray Bailey and Mark Harris of Harley at a coffee shop in Hays Galleria near London Bridge to discuss options, costs and technical details for the cladding of Grenfell Tower.[1126] During the meeting Harley showed Studio E photographs of some of their previous projects, including Ferrier Point, a high-rise overcladding project in East London, where Harley had installed face-fixed ACM panels over mineral wool insulation.[1127] Studio E and Harley discussed cladding options, including Zinc Proteus HR with a honeycomb core and ACM.[1128] Mark Harris said[1129] that Harley had indicated to Studio E that Harley's clients were frequently forced to use ACM because it was the cheapest product available and that Harley had used ACM on tower blocks more than any other product. Ray Bailey claimed not to have expressed a preference for ACM[1130] and Tomas Rek did not recall any particular preference being expressed by Harley.[1131]

[1117] Blades {Day41/43:17-23}.
[1118] Blades {Day41/44:11-13}.
[1119] Blades {Day41/57:5}-{Day41/59:7}.
[1120] {SEA00007722}; {SEA00007721}.
[1121] Sounes {Day20/120:2-11}.
[1122] {SEA00002067}.
[1123] Sounes {SEA00014273/25} page 25, paragraph 48. The changes related predominantly to the lower 4 floors. {SEA00002077}.
[1124] {SEA00008052}; {TMO10003310}; {TMO10003310/21-26}; {SEA00014616/37}.
[1125] SEA00014616/41} at paragraph 1.2; {SEA00014616/37}.
[1126] {SEA00008375}; Sounes {Day20/129:15-25}; Harris {HAR00010159/4} page 4, paragraph 15; Harris {Day34/48:13}-{Day34/52:14}.
[1127] SEA00003497}; {SEA00003516}. Before the meeting, Harley sent an email to Studio E attaching information sheets for three projects: Castlemaine, Clements Court and Chalcots Estate, all of which used ACM as the rainscreen material {SEA00007603}.
[1128] Ray Bailey Witness Statement {HAR00010184/6} page 6, paragraph 22; Ray Bailey {Day32/139:4-23}.
[1129] Harris {Day34/51:12}-{Day34/52:16}.
[1130] Ray Bailey {Day32/146:14-18}.
[1131] Rek {Day12/68:2-15}.

55.23 Throughout the discussions between Studio E and Harley, price and aesthetics were the dominant considerations;[1132] the fire safety of the panels was not discussed at all.[1133] Mark Harris accepted that Studio E had been relying on Harley to suggest materials that were suitable for use on the tower,[1134] but the individuals involved at Harley and Studio E did not turn their minds to the risks involved in using ACM, particularly on a building over 18 metres in height. They simply assumed that it was safe because it had been used on a number of other projects involving tower blocks.[1135]

55.24 Despite the discussions about ACM at the meeting, Mr Sounes still preferred zinc or a zinc composite material. He told Harley that Studio E was looking seriously at Nedzink (a zinc composite panel)[1136] but, when he reported back to the TMO with Harley's rough estimate of £3 million based on zinc rainscreen cassettes,[1137] he pointed out that in Harley's experience budgets often forced clients to adopt face-fixed ACM.[1138] Peter Maddison responded asking whether Harley had given a similar cost estimate for aluminium rainscreen.[1139]

55.25 On 18 October 2013 Harley provided budget costs to Studio E[1140] omitting the requested quotation for Nedzink[1141] and listing three alternative options for the rainscreen, including Reynobond ACM panels and Reynobond zinc-faced panels. Mr Sounes, who was still pursuing zinc,[1142] replied asking for an indication of what the cost would be for Nedzink[1143] and explaining that the Reynobond Natural Zinc (also referred to as VM Zinc "Quartz") was not an option for aesthetic reasons.[1144]

55.26 Harley provided further costs information to Studio E in November 2013, including a quotation for Proteus HR Composite, but expressed a clear preference for ACM because it had used it on many previous projects and was confident about the costs involved.[1145] However, Mr Sounes remained adamant that Studio E had set out to use zinc and that if the budget allowed it the result would be excellent.[1146] In the same email he explained that the TMO would also want ACM options in the tender, despite the fact that the planners did not like the standard finish.[1147] On 7 November 2013, Mr Sounes forwarded his email exchange with Harley about the cost of different cladding options to Chweechen Lim of Artelia. At that stage Artelia was preparing the OJEU tender documentation and on 11 November 2013, Ms Lim told Mr Sounes that she would include ACM in the tender contract sum analysis and ask contractors to provide an optional cost for zinc panels to ensure that tenderers provided costs for both types.[1148] Ms Lim noted that Harley's quoted costs were higher than Artelia's cost plan and were also higher than the TMO's budget.[1149]

[1132] Ray Bailey {Day32/174:8-11}.
[1133] Bailey {Day32/142:17-19}; Rek {SEA00014278/10} page 10, paragraph 30; Rek, {Day12/133:7-9}.
[1134] Harris {Day34/52:20}-{Day34/53:1}.
[1135] Ray Bailey {Day32/145:2}-{Day32/146:4}; {Day32/173:18}-{Day32/174:4}; Harris {Day34/53:7-17}.
[1136] Email from Bruce Sounes to Ray Bailey and Mark Harris dated 27 September 2013, {SEA00008809} in which he states, "we are looking seriously at Nedzinc's composite panel. The small sample we have in the office looks like Alucobond but is apparently zinc." See also Sounes {Day20/138:18-25}; {SEA00008985}.
[1137] {SEA00008809}.
[1138] {SEA00008790}.
[1139] {SEA00008836}.
[1140] {HAR00005515}; budget attached at {SEA00002275}.
[1141] {SEA00008985}.
[1142] {SEA00009240}.
[1143] {SEA00009237}.
[1144] {Day20/145:19-25}.
[1145] {SEA00009736}; Ray Bailey {Day32/173:18}-{Day32/174:11}.
[1146] {ART00001895}.
[1147] {ART00001895}.
[1148] {ART00001895}.
[1149] {ART00001895}.

55.27 Mark Harris responded to Bruce Sounes some two weeks later on 21 November 2013. He failed to answer Mr Sounes' question about the rate for Nedzink, but he gave standard rates for ACM cassette and face-fixed panels. The email makes clear the close business relationship between Harley and Arconic,[1150] which led Harley to press for Reynobond panels to be used.[1151] By December 2013 Harley was seeking prices for Arconic's Reynobond ACM panels[1152] and by the spring of 2014 it had become committed to their use on the project.[1153]

55.28 Planning permission for the refurbishment was granted on 10 January 2014,[1154] subject to conditions, including a requirement that the materials to be used on the external face of the building be approved in writing by RBKC.[1155] On 15 January 2014 Arconic provided a quotation to CEP for Reynobond 55.[1156] Although silent about the composition of the core, Deborah French accepted that as a standard product it would have been polyethylene.[1157]

55.29 CEP, the only fabricator which Harley approached for the supply and fabrication of the rainscreen,[1158] sent two formal quotations on 21 January 2014. These differed only in respect of the window system proposed: Metal Technology,[1159] or Wicona.[1160] In relation to the rainscreen, the only quotation was for panels manufactured using 4mm Reynobond ACM with rivet fixings. Mr Blades confirmed that Harley had asked him to quote only for Reynobond.[1161] Following the receipt of the quotation, Harley sent its own quotation to Rydon on 29 January 2014, which did not include VM Zinc as an option.[1162]

The NBS Specification

55.30 The final version of the NBS Specification produced by Tomas Rek at Studio E was dated 30 January 2014.[1163] It specified Celotex FR5000 insulation[1164] and Proteus HR zinc honeycomb rainscreen panels.[1165] It also asked bidders to provide alternative prices for ACM rainscreen panels, including Reynobond Duragloss 5000.[1166] The TMO agreed to the inclusion of ACM options in the NBS Specification for two reasons: first, because it wanted priced options, as RBKC's Planning Department had not yet granted consent for any specific type of rainscreen;[1167] second, because it had in mind that it might consider options that were less expensive than zinc in order to reduce the cost.[1168] Peter Maddison denied that the inclusion of ACM had been driven by the TMO; he said that the TMO had included the ACM options on the advice of its professional design team and in the understanding that it was compliant with all the regulations.[1169] We accept his evidence about that.

[1150] {HAR00005509}; Harris {Day34/95:22}-{Day34/100:6}.
[1151] Harris {Day34/68:4}-{Day34/85:12}.
[1152] {CEP000000267/3}; Ray Bailey {Day32/183:10-15}.
[1153] Albiston {Day35/76:17}-{Day35/77:4}.
[1154] {ART00001999}.
[1155] See condition 3 {ART00001999/2}.
[1156] {ARC00000083}.
[1157] French, {Day88/128:22-25}.
[1158] Albiston {Day35/46:11-16}.
[1159] {CEP000000268}.
[1160] {CEP000000270}.
[1161] Blades {Day41/137:8}-{Day41/141:2}.
[1162] {RYD00002606}; {RYD00002607}.
[1163] {SEA00000169}.
[1164] {SEA00000169/73}.
[1165] {SEA00000169/65}. See section 3 for further details of the CWCT Standard 2008; Rek {Day12/75:23}-{Day12/76:11}.
[1166] {SEA00000169/64}.
[1167] Maddison {Day59/88:3-10}; {Day59/92:5-10}.
[1168] Maddison {Day59/93:1-12}.
[1169] Maddison {Day59/91:4-18}; {Day59/92:17-24}.

55.31 Studio E, which had drafted the NBS Specification, had not checked whether the materials specified for use in the cladding complied with the requirements of the Building Regulations or reflected the guidance given in Approved Document B.[1170] It appears simply to have assumed that they did because they had been used on other projects.[1171] Appearance clearly played a central part in the choice of rainscreen,[1172] which was entirely reasonable, but Studio E did not ask Exova, or any other fire engineer, to review the NBS,[1173] nor did it ask itself whether ACM was an appropriate material to use.[1174] It was not common practice at Studio E to carry out a full assessment of materials for compliance at RIBA Stage D or E.[1175]

55.32 Studio E did not investigate the fire performance of any of the proposed rainscreen panels. In his witness statement, Mr Sounes claimed that research and consultations, including with Exova, had not revealed any particular concerns or fire risks associated with the proposals or the materials,[1176] but he was unable to identify any specific research that he had done or persons he had consulted.[1177] At all events, we are satisfied that Studio E did not consult Exova on the use of ACM rainscreen panels. Until the night of the fire Mr Sounes was unaware that ACM panels could be produced with different cores, some fire retardant and some not.[1178] Indeed, he was unaware that any of the materials referred to in Harley's quotation might be available in fire-rated versions[1179] and simply did not think about the fire performance of the ACM panels.[1180] None of those involved in the refurbishment at Studio E or Harley scrutinised the BBA certificate relating to Reynobond 55 PE properly.[1181]

55.33 Following the production of the NBS Specification and throughout the discussions in early 2014 between Studio E, Harley and Rydon, everyone involved concentrated on the appearance of the rainscreen panels to the complete exclusion of their fire performance.[1182]

Previous projects on which ACM panels had been used

55.34 Between 2006 and 2011 Rydon had carried out two substantial overcladding projects on high-rise residential buildings in London, the Chalcots Estate and Ferrier Point, using Harley as sub-contractor. Chalcots Estate comprised five tower blocks, four of which were 23 storeys in height and the fifth 19 stories.[1183] Ferrier Point was a 23-storey tower block. In both cases a company in the Rydon group was appointed as principal contractor under a design and build contract for the refurbishment of the building[1184] and in both cases Rydon installed ACM rainscreen panels over mineral wool insulation.[1185] Although in each case the core of the panels was unmodified polyethylene, there was one difference: the panels

[1170] Sounes {Day20/173:12-24}; Rek {Day12/23:2}; {Day12/20:15-20}; {Day12/24:16-21}; {Day12/27:7-21}.
[1171] Sounes {Day7/170:2-5}; Sounes {SEA00014273/140} page 140, paragraph 343; Sounes {Day20/93:12}{Day20:95:14}.
[1172] Sounes {Day20/135:1-7}.
[1173] Sounes {Day20/51:2-10}.
[1174] Sounes {Day 20/105:12-15}; {Day20/72:1-4}.
[1175] Sounes {Day20/64:13}-{Day20/65:3}.
[1176] Sounes {SEA00014273/140} page 140, paragraph 343.2.
[1177] Sounes {Day8/57:2}-{Day8/58:6}.
[1178] Sounes {Day20/176:17-24}.
[1179] Sounes {Day20/144:12-18}; {RYD00003953}.
[1180] Sounes {Day20/135:4-7}.
[1181] Sounes {Day21/16:18-21}; {Day21/19:3-24}; {Day21/23:8-15}; Ray Bailey {Day33/36:11}-{Day33/37:3}; Lamb {Day38/23:17-24}; Anketell Jones {Day37/6:10}-{Day37/7:23}; Albiston {Day35/43:6-24}: Harris {Day34/178:1-5}.
[1182] Harris {Day34/115:12-25}.
[1183] {RYD00094236/25} page 25 paragraph 44-47.
[1184] {RYD00094236/26} page 26, paragraph 48-50.
[1185] {RYD00094236/51} page 51, paragraph 103.

used were face-fixed (i.e. riveted to the supporting rails), whereas the Reynobond panels installed at Grenfell Tower were cassette-fixed.[1186] For reasons that will become clear, that was an important distinction.

55.35 Rydon and Harley remained in close contact throughout the procurement process relating to the Grenfell Tower project and it is clear that they approached it as a team, so much so that Rydon's tender included notes on the background and experience of three of Harley's employees, Daniel Anketell-Jones, Mark Stapley and Robert Maxwell.[1187]

55.36 CEP had worked with Harley on ten previous projects, including the Chalcots Estate and Ferrier Point projects,[1188] but the Grenfell Tower refurbishment was the only project it had undertaken with Harley using ACM panels in cassette form.[1189] CEP had supplied ACM panels for many other high-rise residential overcladding projects in the years leading up to the Grenfell Tower refurbishment, including both panels with unmodified polyethylene cores and fire-resistant polyethylene cores.[1190]

Early discussions about value engineering

55.37 At the time of the formal procurement process Rydon also had an existing relationship with the TMO and there had been at least some discussion within Rydon of the project and its connection with Peter Maddison before 5 April 2013.[1191]

55.38 Stephen Blake, Rydon's Refurbishment Director, had known Peter Maddison and Sacha Jevans of the TMO since about 2000, having met them at various conferences.[1192] Although he had not seen either of them regularly, they had kept up a direct line of contact, as Simon Cash of Artelia recorded in an email in October 2015[1193] and as was broadly confirmed by both Mr Maddison and Ms Jevans.[1194]

55.39 On 6 March 2014, during the OJEU tender process, Mr Blake sent an email to Tim Shutler of Rydon, copied to Jeff Henton, Rydon's chief executive, in which he said that at a recent housing conference he had met senior representatives from the TMO and had been given to understand that Rydon was the leading contender to obtain the contract for the refurbishment.[1195] The housing conference to which Mr Blake referred took place between 4 and 6 March 2014 in Brighton. According to Mr Blake, the "senior representatives" of the TMO were either Mr Maddison or Ms Jevans,[1196] but both of them denied having spoken to Rydon about the tender.[1197] The tender interviews for the project were due to take place on 7 March 2014 and in our view the email speaks for itself. However it came about, it is clear to us that Rydon was given an indication of the likely outcome of the tender process while it was still going on. No other contractor was afforded the same benefit.[1198]

[1186] The distinction is important for the purposes of understanding the BBA certificate governing Reynobond PE 55. See in particular Chapter 19.
[1187] {RYD00094244/44}.
[1188] Blades {MET00040323/4} page 4, paragraph 3.3; {CEP000003010}.
[1189] Blades {Day41/24:6-8}.
[1190] {CEP000003010}; Blades {Day41/21:5} – Blades {Day41/25:7}.
[1191] Email from Steve Blake to Jeff Henton of 5 April 2013: "This is the Peter Maddison scheme which is right up our street." {RYD00001115}.
[1192] Blake {Day28/92:8} – {Day28/93:15}.
[1193] {ART00006206}.
[1194] Maddison {Day58/161:18}-{Day58/162:1}; {Day127/172:10-19}.
[1195] {RYD00086648}.
[1196] Blake {Day28/100:7-11}.
[1197] Maddison {Day58/184:11}-{Day58/187:9}; Jevans {Day127/174:17-21}.
[1198] Maddison {Day58/202:7-13}.

55.40 When he gave evidence Mr Maddison accepted that he had telephoned Mr Henton on 10 March 2014, after the TMO had interviewed all the potential contractors, to tell him that Rydon was in first position.[1199] The next day Mr Henton sent an email to Alan Sharrocks and Simon Lawrence telling them that, subject to a small amount of value engineering, he expected Mr Maddison to recommend to the TMO board the following week that Rydon be appointed as principal contractor for the refurbishment.[1200]

55.41 Mr Blake had not been included in Mr Henton's email and he was unable to say why that was,[1201] or how the conversation between Mr Henton and Mr Maddison had come about.[1202] He was asked whether at that time (11 March 2014) he had understood that Rydon's appointment would be conditional on its willingness to accommodate the TMO's desire for value engineering and initially told us that he had not known that at the time.[1203] However, he had in fact been sent a draft of the email on 10 March 2014 by Sandra Guest, Mr Henton's assistant, who had asked him to give her the names of the Rydon employees who had been involved in the bid.[1204] Despite his prevarication, it is clear that Mr Blake had been in direct contact with Mr Maddison on or before 10 March 2014 about the results of the tender, because at 7.10pm on 10 March 2014 he had written to Mr Henton to tell him as much.[1205] Having been shown the contemporaneous documents, Mr Blake ultimately accepted that he had been aware by 10 March 2014 at the latest that the TMO required significant reductions in the cost of the project by way of "value engineering" if it was to go ahead.[1206] On 12 March 2014 Mr Blake sent an email to various Rydon employees telling them that Rydon would be asked by the TMO to find some savings in addition to those identified in the tender.[1207] Mr Maddison said that he had spoken to Mr Blake to establish that Rydon was prepared to work with TMO to value engineer the project once the contract had been awarded.[1208]

55.42 When asked about that exchange Mr Blake originally denied having spoken to Mr Maddison on 12 March 2014, but having been shown the contemporaneous documents he was forced to accept that his previous evidence had been untrue,[1209] though he said he had had no recollection of the emails. He also accepted that he and Mr Henton had had personal and private access to the top decision-makers on the project at the TMO.[1210] Mr Blake insisted that their relationship with Mr Maddison and Ms Jevans had not influenced the tender process.[1211] Peter Maddison did not score the tenders; that was done by Artelia, Jenny Jackson and the TMO, each of whom provided their own independent scoring, and Rydon came top. However, we are satisfied that Mr Maddison and Ms Jevans played an important part in ensuring Rydon's appointment, both in providing information to Rydon about the tender and in negotiating with it so that its appointment would proceed.

[1199] Maddison {Day58/195:6-23}; {Day58/197:2-12}.
[1200] {RYD00003279}.
[1201] Blake {Day28/148:16}.
[1202] Blake {Day28/149:8}.
[1203] Blake {Day28/152:14}.
[1204] {RYD00086650}.
[1205] {RYD00094368}.
[1206] Blake {Day29/10:11-16}.
[1207] {RYD00003295}.
[1208] Maddison {Day58/203:12}-{Day58/204:4}; {TMO00879770/28}.
[1209] Blake {Day29/15:3}.
[1210] Blake {Day29/16:15}.
[1211] Blake {Day28/120:19-20}.

Rydon's costing error

55.43 While those discussions were going on with the TMO, Rydon was also attempting to make good a mistake in the preparation of its tender that had led to a shortfall of approximately £212,000 in its costing. On 11 March 2014, Katie Bachellier, one of Rydon's estimators, had written to Mr Blake to tell him of the error. Mr Blake's response was to look for a way to claw back the loss that would otherwise be made.[1212] That had significant repercussions, which we describe below.

Value engineering before Rydon's appointment

55.44 On 13 March 2014, Peter Maddison sent an email to David Gibson of the TMO[1213] with copies to Claire Williams and Jenny Jackson, the TMO's procurement consultant, telling him that Mr Blake was confident that a gap in the budget of £270,000 could be closed. Mr Maddison intended to include Rydon's proposals for achieving that reduction in the submission he was about to make to the TMO's board seeking its approval of Rydon as principal contractor.

55.45 Later the same day Mr Gibson sent an email to Mr Blake attaching a spreadsheet which indicated that the TMO was looking to achieve a saving in cost of around £800,000 in total.[1214] The spreadsheet identified the cladding as offering a saving of £243,000, that being the saving that Rydon had included in its tender submission in respect of new aluminium cladding.[1215] The combined result of the TMO's request for Rydon to reduce its price by about £800,000 and Rydon's own estimating error meant that Rydon needed to achieve a saving in cost of just over £1 million even before it had formally been awarded the contract.[1216]

55.46 Mr Blake responded to Mr Gibson a little over five hours later, saying that he could see no reason why the reduction in cost that Mr Gibson had asked for could not be achieved. At that stage, however, he had not taken any steps to satisfy himself that such a reduction was in fact achievable.[1217] Mr Blake clearly understood that if Rydon could provide savings to match the TMO's budget, it would be awarded the contract.[1218]

55.47 On receipt of Mr Gibson's email, Mr Blake contacted Harley more or less immediately. A log entitled "Sales/tender progress report" kept by Mark Harris recorded that he had received a call from Mr Blake who had told him that Rydon had been informed "off the record" that they were in "pole position", but that the job was over budget. Rydon had asked Harley to confirm potential cost savings for them to table in discussions with the TMO.[1219] Private discussions between Mr Blake and Mr Maddison revealed by Mr Maddison's diary entries for 12 and 13 March 2014 are likely to have been the occasions when Rydon was given that "off the record" indication.[1220]

[1212] {RYD00086654}.
[1213] Initially the email was wrongly sent to David Burns but was then forwarded to David Gibson: {TMO00850707}.
[1214] {RYD00003302}; {RYD00003301}.
[1215] {RYD00094244/15}.
[1216] Lawrence {Day23/135:1}.
[1217] Blake {Day28/169:13-25}.
[1218] {RYD00003302}.
[1219] {HAR00010160/5}.
[1220] {TMO00879770/28}.

55.48 On 14 March 2014 Mark Harris sent Rydon an email giving Harley's analysis of the savings that could be achieved by changing the materials used in the construction of the facade of the tower.[1221] He attached a document entitled "Grenfell Tower, London proposed VE cost savings", which set out the cost of Harley's "compliant bid" (i.e. its bid for provision of the facade system specified in the NBS Specification) in the sum of £3,736,595, together with two alternative window systems and four alternative cladding systems, each with an associated saving.[1222] Harley indicated savings that could be achieved by using zinc and ACM rainscreen panels as follows:

Zinc (cassette-fixed):	£157,385
Zinc (riveted):	£279,764
Cassette-fixed ACM:	£419,627
Riveted ACM:	£576,973

55.49 Stephen Blake and Simon Lawrence both said that by that time it had been accepted by Harley and Rydon that ACM panels would be used if planning permission could be obtained.[1223]

55.50 A meeting took place during the evening of Tuesday 18 March 2014, attended by Mr Lawrence, Mr Blake and Ms Bachellier on behalf of Rydon and Mr Gibson, Mr Maddison and Claire Williams on behalf of the TMO, at which they discussed how the project could be brought within the TMO's revised budget.[1224] Mr Blake said that he could not recall the meeting in any detail, but he did remember that Rydon and the TMO had discussed the need to find a significant amount of savings to enable the scheme to meet the TMO's budget.[1225]

55.51 We do not know exactly what was discussed at the meeting because no record was kept of it. Mr Maddison described it as an "offline conversation" that was not part of the formal process, but specifically denied that it had been a secret meeting.[1226] However, the TMO had been advised by its solicitors in February or early March that it was bound to assess all the tenders received for the project on the basis of the price and quality criteria set out in the tender documents and that the regulations did not allow it to enter into negotiations with individual tenderers before the contract had been awarded or even to invite all tenderers to submit revised offers. It was advised that it could run value engineering exercises with its selected tenderer only after it had entered into the contract. Ms Jackson therefore suggested that the TMO enter into the contract with Rydon at its tender price and then embark on value engineering, but she noted that there would need to be some informal discussion with the preferred contractor before they entered into a contract to ensure that it understood the TMO's approach.[1227]

55.52 Simon Cash of Artelia agreed with Ms Jackson that the TMO could have an "offline discussion" with the preferred contractor and that the TMO was entitled to look for savings and seek Rydon's agreement in principle to work with it later to achieve them. He added that some savings had been identified and others might be put forward during that

[1221] {RYD00003315}.
[1222] {RYD00003316}.
[1223] Lawrence {Day23/151:20}; Blake {Day28/182:14-17}.
[1224] Lawrence {RYD00094220/5} page 5, paragraph 22.
[1225] Blake {Day28/171:10}.
[1226] Maddison {Day59/13:11-20}; {Day59/14:24}.
[1227] {ART00006433}.

conversation.[1228] He told us that he had not been comfortable about the TMO's meeting Rydon in that way but had felt under pressure from the TMO to agree.[1229] In oral evidence, Mr Cash said he had meant that the TMO could tell Rydon what its approach to value engineering would be once the contract had been awarded,[1230] without indicating that Rydon was the preferred bidder.[1231] If that was so, however, we do not understand why Mr Cash said that suggestions for savings might be put forward before the contract had been awarded. Nor do we think that is the plain meaning of his message. As employer's agent he should not have lent his support to discussions which, in the light of the advice that he knew had been given by the TMO's solicitors, he had every reason to think might not be consistent with the procurement rules.

55.53 On 23 March 2014, after the "offline" meeting had taken place, the TMO received further advice from its solicitors.[1232] They said that the procurement process could be open to challenge if a contracting authority sought to vary a price after receiving tenders or entered into negotiations with its preferred contractor. In an email sent to Sacha Jevans, David Gibson and Claire Williams on 26 March 2014 Peter Maddison summarised that advice as "Low risk of challenge and low risk of success."[1233]

55.54 Peter Maddison said that the "offline" meeting on the 18 March 2014 and the conversations which had preceded it were in accordance with the solicitors' advice,[1234] being solely to seek agreement to value engineering in principle, and to agree a process for doing so.[1235] David Gibson, however, conceded that no record had been made of the meeting because the TMO had wanted to achieve a secret understanding with Rydon.[1236] He was aware that holding it had been contrary to the legal advice given to the TMO and that there was a risk that the procurement process would be challenged if other contractors found out about it. He ultimately conceded that one purpose of the meeting had been to identify changes to the specification that would reduce the overall cost of the project.[1237]

55.55 We do not accept Peter Maddison's characterisation of the discussions. Their clear purpose, which was understood by both the TMO and Rydon, was to achieve a reduction in the cost of the project that would be reflected in the contract price. Specific areas of savings were identified and figures were discussed. Peter Maddison said that there had been a commercial risk of challenge,[1238] but that the discussions had not been improper.[1239] No doubt the TMO was in a difficult position: only three tenders had been received and all exceeded the budget as it then stood.[1240] Repeating the procurement process would have caused considerable delay, which would have disappointed residents who had been waiting a long time for the refurbishment, and there was no guarantee that any of the contractors would bid again, or would bid again at a lower price.[1241] However, we do not accept that Peter Maddison thought at the time that the "offline" discussions were consistent with

[1228] {ART00008594}.
[1229] Cash {Day48/233:7-19}.
[1230] Cash {Day48/225:24-25}; {Day48/226:1-4}.
[1231] Cash {Day48/224/16-17}.
[1232] {TMO10005632}.
[1233] {TMO10005632}.
[1234] Maddison {Day59/12:21}-{Day59/13:3}.
[1235] Maddison {Day58/198:6}-{Day58/199:19}.
[1236] Gibson {Day54/34:21-25}.
[1237] Gibson {Day54/30:7}-{Day54/31:18}; Gibson {Day54/43:3-11}.
[1238] Maddison {Day59/15:11}-{Day59/17:3}.
[1239] Maddison {Day58/202:19}-{Day58/203: 6}.
[1240] {ART00002197}.
[1241] Maddison {Day59/16:1-24}.

the rules governing the procurement process; indeed, in answer to a question from the Chairman he accepted that they "did not strictly comply with the letter of the process."[1242] That, of course, explains why the meeting was described as "offline", i.e. secret. Secrecy was essential so far as both the TMO and Rydon were concerned because transparency might defeat its object.

55.56 On 17 March 2014, Philip Booth of Artelia had drafted a letter to Rydon formally notifying it of its status as the preferred bidder.[1243] Substantial amendments were made to the wording by Ms Jackson later that evening.[1244] The amended version, dated 18 March 2014,[1245] was sent to Rydon at 5.55pm, some time after the "offline" meeting had ended.[1246] Although Artelia had been aware of the process that the TMO proposed to adopt, there is no evidence that Artelia had been aware of the meeting itself and it is likely that it sent the letter on the instructions of Mr Gibson or Mr Maddison.[1247] The letter referred to certain conditions, but said nothing about value engineering or the need to find substantial (or indeed any) cost savings. Unsurprisingly, the letters sent to the unsuccessful bidders the same day did not refer to the contact between the TMO and Rydon.[1248]

55.57 Simon Lawrence reported to Mark Harris on 19 March 2014 that Rydon had been confirmed as the preferred contractor for the refurbishment, although the decision was yet to be formally approved. Mr Harris recorded in his log that Rydon was "keen to push this job down the face-fixed ACM route with standard colour finish".[1249] He immediately contacted Deborah French of Arconic to procure samples of ACM rainscreen that would appear similar to zinc but at a lower cost.[1250] In the weeks and months that followed, there were extensive discussions between Harley, Arconic, Studio E, Rydon and CEP about the use of ACM rainscreen cladding, but they related only to its cost and appearance;[1251] certainly, there were no discussions about its reaction to fire. Peter Maddison's diary entry for 19 March 2014 suggests that he had been advised by the TMO's solicitors to agree with Rydon that the negotiations and the contract price should both be kept confidential.[1252]

55.58 On 20 March 2014, Katie Bachellier sent Peter Maddison and others at the TMO a summary of Rydon's value engineering proposals[1253] in the form of two documents entitled "VE Options 18.03.14"[1254] and "Cladding VE Options 18.03.14",[1255] which set out the cost savings that Rydon had presented to the TMO at the "offline" meeting on 18 March 2014. The first of those documents showed a possible saving of £862,041 (enough to meet the TMO's objective) if all the suggestions were adopted.[1256] The second indicated the savings that could be achieved by the use of different rainscreen materials as follows:

Zinc (cassette-fixed):	£100,406
Zinc (riveted):	£202,372

[1242] Maddison {Day59/23:5-18}.
[1243] {TMO10005474}.
[1244] {ART00002210}.
[1245] {ART00008632}.
[1246] {ART00008755}.
[1247] Williams {Day54/192:7 – {Day54/193:3}.
[1248] {ART00002224}; {ART00002219}.
[1249] {HAR00006044} and {HAR00010160}.
[1250] {HAR00006044}; {CEP00051117}; {RYD00003525}; {RYD00003508}; {RYD00003524}.
[1251] {ARC00000089}; {RYD00003890}; {HAR00000931}; {HAR00005692}; {HAR00000933}; {SEA00010775}; {RYD00003964}; {CEP00051309}; {HAR00005737}.
[1252] {TMO00879778/4}.
[1253] {RYD00003489}.
[1254] {RYD00003490}.
[1255] {RYD00003491}.
[1256] Lawrence {Day23/159:4}; Blake {Day28/190:15}.

Cassette-fixed ACM: £293,368

Riveted ACM: £376,175

55.59 Those figures were all lower than those that Harley had given Rydon on 14 March 2014. Stephen Blake, Simon Lawrence and Zak Maynard were all asked to explain why Rydon had not disclosed to the TMO the true extent of the savings that could be achieved by changing the rainscreen. Both Mr Lawrence and Mr Maynard accepted (though not in so many words) that the purpose was to enable Rydon to retain the difference in order to make up the shortfall caused by the £212,000 error in costing.[1257] Mr Blake conceded that Rydon had seen the change of rainscreen as an opportunity to generate additional profit for itself[1258] and ultimately accepted that Rydon was showing the TMO significantly less by way of savings than it was obtaining from Harley.[1259]

55.60 At all events, it is self-evident that Rydon stood to make a greater profit from the refurbishment if the rainscreen were changed to ACM, particularly if a face-fixed (riveted) system was chosen rather than a cassette system. It was therefore in Rydon's interest to promote the selection of ACM panels, which goes some way to explaining its enthusiasm for choosing that material and method of fixing. The TMO was kept entirely in the dark about Rydon's financial interest in recommending ACM.

The BBA certificate

55.61 Arconic held a certificate issued by the BBA in respect of Reynobond Architecture Wall Cladding Panels, the most recent version of which, at the time of the refurbishment, was dated 14 January 2008.[1260] Astonishingly, at no stage of the project did anyone at Rydon, Harley or Studio E examine the certificate with any care with a view to understanding how ACM panels with unmodified polyethylene cores might react to fire.

55.62 Deborah French gave Mr Harris a copy of the BBA certificate on 23 April 2014 and he passed it straight on to Simon Lawrence,[1261] apparently without giving it any consideration. Simon Lawrence sent a copy to Mr Sounes the same day and also arranged for a copy to be provided to Mr Blake on or around 6 May 2014 as part of a pack of documents relating to a meeting with RBKC's Planning Department.[1262]

55.63 Mr Sounes did not spend long looking at the certificate; indeed he said that it had not been his practice to read the whole of a BBA certificate for any product that he was planning to recommend for a project.[1263] He admitted that he had never read section 6 of the Reynobond certificate, which related to the fire performance of the panels, and said that investigating their fire performance had not been a concern at that stage.[1264] In his view Rydon had by that time taken over responsibility for the design of the project which included responsibility for assessing the suitability of any materials that might be used. Mr Sounes was not aware of the distinction between the fire retardant (FR) and unmodified polyethene (PE) versions of the product and he never discussed the matter with Harley or CEP.[1265] For his part, Neil Crawford could not remember having looked at the

[1257] Lawrence {Day23/163:18}; Maynard {Day31/91:15}-{Day31/92:2}.
[1258] Blake {Day28/193:6-8}.
[1259] Blake {Day28/193:12}.
[1260] {ARC00000678}.
[1261] {RYD00003932}.
[1262] {RYD00003932}; {RYD00004142}.
[1263] Sounes {Day21/12:5-7}; {Day21/13:3}.
[1264] Sounes {Day21/19:24}; {Day21/16:20}; {Day21/17:8}; Sounes {SEA00014273/154} page 154, paragraph 381.
[1265] Sounes {Day21/24:7-13}.

BBA certificate before the fire and we think it unlikely that he did so.[1266] No one at Studio E sought any guidance on the meaning or effect of the BBA certificate from Exova, Rydon, Harley, Arconic or anyone else.[1267]

55.64 Although Simon Lawrence may have looked at the BBA certificate generally, he did not study it in any detail and did not pay any attention at all to the section relating to fire performance.[1268] He did not ask Harley to check the test evidence on which the certificate was based, nor did he ask it whether the panels being proposed for use on the tower were in all respects the same as those described in it. Rather, he appears simply to have assumed that ACM panels generally were suitable for use on the tower because Rydon and Harley had previously worked together to install similar panels on the Chalcots Estate and Ferrier Point projects.[1269]

55.65 Mr Lawrence could not recall having discussed the BBA certificate with Bruce Sounes or anyone else and he did not discuss the fire performance of ACM panels with anyone at any stage of the project.[1270] When he sent the certificate to Mr Blake on 6 May 2014 he specifically drew attention to the fact that it stated that the panels were rated Class 0, which might suggest that he had addressed his mind to the question of the fire performance, at least to a limited extent.[1271] However, when he was asked about that email, he said that he had merely been trying to provide Mr Blake with as much information as possible and that he had not considered that the fire performance of panels to be relevant to the meeting.[1272] Mr Blake said that there had been no discussions at all within Rydon about which, if any, of the routes to compliance for external walls in Approved Document B had been adopted.[1273] Furthermore, none of those who gave evidence on behalf of Rydon was aware that Reynobond 55 panels were available with a fire retardant core, despite that being clear from the wording of the BBA certificate.[1274] In the circumstances, we are satisfied that no one at Rydon gave any meaningful consideration at any stage to the part of the certificate that dealt with the fire performance of the ACM panels used on Grenfell Tower.

55.66 As for Harley, Ray Bailey had read the BBA certificate in 2008 at the time of the Chalcots Estate project and did not read it in detail again.[1275] He accepted that Harley was obliged to examine certificates such as the BBA certificate in order to satisfy itself that the products that were being used on the tower were appropriate,[1276] but he said he had only been concerned to ensure that the BBA certificate confirmed that the panels had a Class 0 rating.[1277] He was not aware that that classification did not extend to the smoke silver polyethylene cored panels that had been selected for use.

55.67 Despite Mr Bailey's evidence, it is difficult to resist the conclusion that no one from Harley gave any serious consideration at all to the current BBA certificate. Daniel Anketell-Jones did not read it[1278] and, despite having received a copy of the email from Ms French to

[1266] Crawford {Day10/149:22}-{Day10/150:14}.
[1267] Sounes {Day21/29:11-21}.
[1268] Lawrence {Day24/4:11-14}; {Day24/6:5-14}.
[1269] Lawrence {Day24/18:14}-{Day24/19:21}.
[1270] Lawrence {Day23/179:2-7}; {Day24/21:4} – {Day24/22:6}.
[1271] {RYD00004142}.
[1272] Lawrence {Day24/35:19}-{Day24/37:9}.
[1273] Blake {Day28/86:8-12}.
[1274] Lawrence {Day24/14:1-14}; Blake {Day28/48:20-23}; O'Connor {Day26/27:18-24}; Hughes {Day27/53:24}-{Day27/54:1}; Martin {Day30/116:4-7}.
[1275] Ray Bailey {Day32/15:11-20}.
[1276] Ray Bailey {Day33/37:4-11}; {HAR00000120}; {HAR00000391/2} at clause 4.2.
[1277] Ray Bailey {Day32/124:16-18}; {Day33/33:14-15}.
[1278] Anketell-Jones {Day37/7:22}.

Mr Harris attaching it, nor did Mike Albiston.[1279] Harley's designer, Kevin Lamb, did not consider it to be part of his job to read the certificate; indeed, it had never crossed his mind that there might be one.[1280]

55.68 We think it is clear that none of those responsible for the design of the overcladding of Grenfell Tower asked themselves whether the BBA certificate could be relied upon as evidence that the ACM panels which they proposed to use, whether in face-fixed or cassette form, would result in the creation of an external wall which complied with the Building Regulations. In her evidence to the Inquiry, Ms French, who sold the cladding for Arconic, said that this fundamental lack of curiosity in the reaction of the panels to fire was more normal than otherwise.[1281]

55.69 The approach of RBKC's Building Control Department was much the same. Mr Allen accepted[1282] scrutinising certificates such as the BBA certificate and the test data referred to within them was a core function of a Building Control officer, but Mr Hoban did not look beyond the first page of the BBA certificate with its reference to Class 0.[1283] The reliability of a BBA certificate was accepted without question by RBKC's Building Control Department, but it was not Mr Hoban's practice to read BBA certificates in any detail.[1284]

55.70 Geof Blades was aware of the existence of the BBA certificate and thought (wrongly) that it stated that Reynobond 55 PE panels had achieved a Class 0 fire rating, having failed to notice that only the FR version was said to have passed both the BS476-6 and BS476-7 tests.[1285] He did not appreciate that the certificate did not in that respect cover panels with an unmodified polyethylene core. He also thought, quite wrongly, that Class 0 was synonymous with limited combustibility[1286] and failed to consider whether the nature of the core might affect its compliance with the Building Regulations. He had no understanding of the ways in which cladding systems could be shown to comply with the Building Regulations and Approved Document B.[1287]

Negotiations with the Planning Department

55.71 From March 2014 onwards, the attention of Studio E, Rydon, Harley and the TMO turned to obtaining approval from the RBKC Planning Department for the material to be used on the external walls of the tower. From that time, the only product that was proposed for use was Reynobond 55 PE ACM panels, i.e. with unmodified polyethylene cores.[1288] The only remaining questions were about colour and whether the fixing system should be cassette or rivet.

55.72 On 1 April 2014, a meeting was held to introduce the TMO to Rydon, as the main contractor for the project. The minutes of that meeting record that the TMO was told that there was a potential saving of up to £376,175 to be made if the material used for the rainscreen were changed from zinc to ACM and if rivet fixings were used.[1289] Rydon did not tell the TMO that Harley was willing to reduce the cost of the rainscreen by as much as

[1279] Albiston {Day35/43:24}.
[1280] Lamb {Day38/23:19}.
[1281] French {Day88/187:21-25}.
[1282] Allen {Day47/80:3-13}; {Day47/77:4-12}.
[1283] Hoban {Day46/23:14-16}; Allen {Day47/80:3-24}; Menzies {Day60/97:14}-{Day60/98:6}; {Day60/99:2-16}.
[1284] Hoban {Day46/15:20}-{Day46/16:45}.
[1285] Blades {Day41/60:4-25}.
[1286] {CEP00064247/14} page 14, paragraph 67; Blades {Day41/58:11-12}; {Day41/60:19-24}; {Day41/131:10-12}.
[1287] Blades {Day41/64:7-12}.
[1288] Williams {Day55/20:9-15}.
[1289] {ART00002256}; Peter Blythe asked that the minutes of this meeting be kept confidential {RYD00003682}.

£576,000 for face-fixed ACM and if, as the minutes tend to suggest, the TMO was given to understand that the sum of £376,175 reflected the full amount of the reduction available from Harley, that was clearly false and was known by Rydon to be false.[1290]

55.73 Artelia immediately began to discuss with Rydon, Studio E, Harley, the TMO and IBI Taylor Young, an independent planning consultant appointed by the TMO, the best strategy for obtaining planning permission for the change in design.[1291] On 8 May 2014, Stephen Blake attended a meeting with the Planning Department, together with (among others) Bruce Sounes, to discuss the proposed changes to the design of the facade. In an email to Claire Williams before the meeting, Simon Lawrence listed what he described as "agenda points" for the meeting, including, in particular, a proposal for changing the rainscreen from zinc to ACM. He intended to argue that ACM was not inferior to zinc.[1292] Mr Lawrence saw Rydon as an advocate for ACM against a reluctant planning committee because it had used ACM successfully on previous occasions. He thought it was in everyone's interests for ACM to be accepted, because there was a risk that, if it were not, the project might not go ahead at all.[1293] As we have already noted, Rydon also had a powerful financial interest in the choice of ACM.

55.74 When Mr Lawrence briefed Mr Blake before the meeting, he told him that the ACM panels they proposed to use had a Class 0 rating, but there was no discussion about their fire performance at the meeting. Indeed, he could not remember any discussion about the fire safety of the panels at all.[1294] Mr Blake said that he had not been aware of any consideration having been given to the fire performance of ACM panels at any time between May and October 2014, when final planning permission was obtained.[1295] The appearance and cost of the cladding, together with concerns about the programme, were the only matters considered by the council, either in its internal discussions or those it held with Studio E.[1296]

55.75 RBKC's Planning Department was principally concerned with two matters: the colour of the panels and the method of fixing. There is no evidence that the TMO, Rydon or Harley was aware that the method of fixing might affect the reaction of the panels to fire, but it did affect the appearance of the facade and was therefore regarded as an important aesthetic consideration.[1297] Bruce Sounes said that his own examination of the technical documents provided by Arconic concentrated on the colour charts because the focus at that time had been on the building's appearance.[1298] When one of the councillors, Rock Feilding-Mellen, intervened in the debate in July 2014, the only issues on which he commented were fixing method and colour,[1299] with a heavy emphasis on the latter.

[1290] Lawrence {Day23/174:1-9}; Blake {Day28/193:9-12}.
[1291] {RYD00003898}; {SEA00010720}; {SEA00010767}; {RYD00004155}.
[1292] {RYD00086654}.
[1293] Lawrence {Day24/32:2-6}.
[1294] Blake {Day29/40:8-16}.
[1295] Blake {Day29/43:18}-{Day29/44:21}.
[1296] Feilding-Mellen {Day131/188:15}-{Day131/189:22}; {Day131/191:15}-{Day131/193:14}; {Day131/195:2-17}; {Day131/199:3-6}.
[1297] RBKC Planning also considered whether the face-fixing could rust: {SEA00011359}.
[1298] Sounes {Day21/11:9-20}; Sounes {SEA00014273/154} page 154, paragraph 381.
[1299] {RBK00033430}; {RBK00003508}.

55.76 The Planning Department had a clear preference for a cassette rather than a riveted system. On 23 May 2014, Simon Lawrence sent an email to Stephen Blake and Zak Maynard, in which he expressed his concern that the planners would accept only cassette-fixed panels on aesthetic grounds.[1300] His concern stemmed from the fact that Rydon stood to gain far less from the use of a cassette system than a riveted system.[1301]

55.77 On 17 July 2014, representatives of the planning committee visited Grenfell Tower to view a mock-up of the cladding.[1302] Arconic supplied Reynobond ACM rainscreen for the purpose free of charge to CEP, which fabricated it. On 31 July 2014 the TMO informed Rydon that the planning department had approved ACM rainscreen cladding using cassette fixings and formal planning permission was granted for those panels in "smoke silver" on 25 September 2014.[1303]

Fabrication by CEP

55.78 Once Reynobond 55 PE ACM panels had been approved, attention turned to their fabrication by CEP. Harley placed four orders with CEP for ACM panels to be used on the facade and crown of the tower, on 13 March 2015, 6 July 2015, 8 July 2015 and 9 November 2015.[1304] Harley placed separate orders for the fabrication of the windows, in October 2014 and February and May 2015.[1305]

Contemporaneous knowledge of the combustibility of ACM panels

55.79 Although it appears that neither Harley, nor Rydon nor Studio E gave detailed consideration to whether ACM rainscreen panels complied with the requirements of the Building Regulations, many of those involved in the decision to use them had some general awareness of their combustibility, in some cases as a result of personal experience. The most significant event, in our view, was the fire which occurred on the night of 16 January 2012 at Taplow House on the Chalcots Estate. Employees of Rydon and Harley, including Stephen Blake, attended Taplow House on 17 January 2012 to inspect the damage, including the damage to the ACM panels.[1306] A report produced by Harley on 17 January 2012 found that the fire had melted the windows of the flat in which it had started and had damaged the cladding, but had been prevented from spreading more widely into the cladding system (and in turn to other flats) by the cavity barriers around the windows.[1307] Mr Blake was pictured in the report pointing to the cavity barrier system around the damaged window.[1308]

55.80 After the initial inspection on 17 January 2012, Harley and Rydon agreed that an abseil survey should be conducted. It took place on 18 January 2012 and a further report was produced by Harley on 23 January 2012.[1309] The report stated that the purpose of the inspection had been to examine the external facade of the building to ensure that the

[1300] {RYD00005064}.
[1301] Lawrence {Day24/69:10}.
[1302] {RYD00012461}; {RYD00012459}.
[1303] {RYD00003932} attaching {HAR00000934}; {IBI00001802}; {RYD00014150}.
[1304] {CEP000000512}, attaching {CEP000000513}; {CEP000000527}; {CEP000000528}, attaching {CEP000000529}; {CEP000000616}; {CEP000000617}; {CEP000007550}; {CEP000001124}; {CEP000001168}.
[1305] {CEP000000447}; {CEP000000469}, attaching {CEP000000470}; {CEP000000471}; {CEP000000472}; {CEP000000492}; {CEP00053848}; {CEP000005833}; {RYD00040435}.
[1306] {HAR00010169}.
[1307] {HAR00010169/3}.
[1308] {HAR00010169/3}; Blake {Day29/121:21-23}.
[1309] {CEP000003223}.

cladding panels were safe, as the fire had caused extensive damage.[1310] The inspection revealed that the ACM panels had distorted as a result of being exposed to heat and smoke, and the report contained photographs showing that they had been seriously damaged, having melted and warped.[1311] The abseil report was circulated to, amongst others, Mr Blake, Ray Bailey and Daniel Anketell-Jones.[1312] Despite the contents of the report, Mr Blake appears to have told David Hughes (of Rydon) that he had no concerns about the safety of ACM panels arising from the Taplow House fire.[1313] Ray Bailey told us that the fire at Taplow House had demonstrated to Harley that ACM would burn[1314] and he accepted that Harley's failure to implement the lessons it had learnt from Taplow House in the designs of the windows at Grenfell Tower had been an error.[1315]

55.81 There were other events which should have made those responsible for the cladding at Grenfell Tower aware of the dangers posed by the combustible nature of ACM panels. On 13 May 2013, Deborah French of Arconic wrote to Geof Blades, Neil Wilson and Roy Fewster of CEP to alert them to press reports of a fire in a building in the United Arab Emirates that had been overclad with ACM rainscreen panels.[1316] Mr Blades knew as a result of those exchanges that ACM panels with unmodified polyethylene cores were combustible.[1317] Ms French's email followed a message to CEP a few days earlier from Richard Geater, the UK sales representative of Alucobond's, another producer of ACM panels, which referred to the Tamweel Tower fire in Dubai and described the problems that had been encountered there with the use of cheap ACM panels with polyethylene cores.[1318] Those messages ought to have prompted Mr Blades to reconsider whether it was safe to use Reynobond PE on any high-rise building in the UK, including Grenfell Tower, but regrettably he did not do so.

55.82 On 7 October 2014, Daniel Anketell-Jones attended the Annual General Meeting and Members' Meeting of the Centre for Window and Cladding Technology (CWCT), at which a presentation was given by Sarah Colwell discussing the regulatory requirements and testing regimes for the construction of facades.[1319] It is clear from the slides used at that presentation that the combustibility of rainscreen facades was discussed, including the large number of cladding fires that had affected high-rise buildings in other countries.[1320] Daniel Anketell-Jones said that he had no specific recollection of being at that presentation; he thought he had been there but that he had not been concentrating.[1321]

55.83 It is unlikely to be a coincidence that on 8 October 2014, the day after that meeting, Samuel Anketell-Jones, a junior design engineer at Harley and Daniel Anketell-Jones's brother, sent Deborah French of Arconic an email asking for information about Reynobond ACM panels with a fire-resistant mineral core.[1322] Daniel Anketell-Jones told us that when he had proposed the cladding for Grenfell Tower he had not realised that Reynobond ACM panels were available with a fire-resistant core.[1323] (Ray Bailey said that he had been aware

[1310] {CEP000003223}.
[1311] {CEP000003223/5-14}.
[1312] {CEP000003223/2}.
[1313] Hughes {Day27/42:1-18}.
[1314] Ray Bailey {Day33/143:4-5}.
[1315] Ray Bailey {Day33/146:11-16}.
[1316] {CEP00049719}.
[1317] Blades {Day41/123:14-15}.
[1318] {MET00053158_P10/157}; Blades {Day41/122:15-25}.
[1319] {CEL00001037}.
[1320] {CEL00001038/3}.
[1321] Anketell-Jones {Day36/5:16-18}.
[1322] {MET00081175}. This email was disclosed to the Inquiry by the MPS in 2022 after the conclusion of the hearings and was disclosed to core participants in April 2023.
[1323] Anketell-Jones {Day37/8:13-18}; {Day36/212:21}-{Day36/213:8}.

that two kinds of panel were available as a result of reading the BBA certificate but had assumed that they performed in similar ways and that neither he nor anyone else at Harley had ever asked Deborah French about it.)[1324] Although it is not clear to which of Harley's projects the email related, it suggests quite strongly, particularly when viewed together with the information shared at the CWCT meeting, that Harley knew more than it was willing to admit about the availability of a fire-resistant version of the Reynobond panel and the dangers of using ACM with an unmodified PE core.

55.84 In March 2015, discussions took place between Siderise, Harley and Rydon about the cavity barrier requirements for Grenfell Tower. For present purposes it is not necessary to refer to the details of the debate but it is worth drawing attention to some of the things said in the course of it by Exova, Studio E, Rydon and Harley. In an email of 27 March 2015, Daniel Anketell-Jones wrote to Ray Bailey saying, "There is no point in 'fire stopping', as we all know; the ACM will be gone rather quickly in a fire!"[1325] On 31 March 2015, Terence Ashton wrote to Neil Crawford saying, amongst other things, that it was difficult to see how a fire-stop would stay in place in a fire involving external flaming as it would cause the zinc cladding to fail.[1326] Mr Crawford agreed, expressing the view that "metal cladding always burns and falls off."[1327] Later the same day, he relayed Mr Ashton's opinion to Simon Lawrence.[1328] It is clear that Mr Lawrence read Mr Ashton's comments because he responded, "Excellent. That looks positive."[1329]

55.85 None of the witnesses was prepared to accept that those messages showed that those concerned were aware that ACM panels were combustible. Mr Ashton said that he had meant to say that metal rainscreen would not burn, but that if windows connected to metal cladding failed, the panels themselves would fall off the building in that area,[1330] not that they would actually burn.[1331] We do not accept that evidence. In our view he was aware that ACM panels would burn, but at the time he was still under the impression that the panels were to be zinc.[1332] Similar explanations were offered by Mr Crawford and Mr Anketell-Jones. Mr Anketell-Jones said that he had been referring to the fact that ACM panels and their fixings were made of aluminium, which would melt at a lower temperature than steel, and was not referring to the combustibility of the panel itself or to the fact that its core was made of polyethylene.[1333] He told us that at the time nobody had been aware that any of the materials were combustible,[1334] and went on to explain that he had meant to say that metal cladding would melt, fail and fall off.[1335] He denied that he had been aware that composite panels with a polyethylene core could contribute to the spread of flame.[1336] For his part, Simon Lawrence simply said that he did not give any thought to what would happen if the rainscreen were exposed to flames.[1337] He said that if he had been aware that ACM would quickly fail in a fire, he would have checked with Building Control that it complied with the regulations and would then have looked into it

[1324] Ray Bailey {Day33/44:4-25}.
[1325] {HAR00006585}.
[1326] {EXO00001434}.
[1327] {EXO00001434}.
[1328] {SEA00013051}.
[1329] {SEA00013051}.
[1330] Ashton {Day18/103:4-10}.
[1331] Ashton {Day18/104:10-14}.
[1332] See Chapter 54 and our findings about Exova's work.
[1333] Anketell-Jones {Day37/20:4}-{Day37/21:24}.
[1334] Anketell-Jones {Day37/27:6-8}.
[1335] Crawford {Day10/154:6-7}.
[1336] Crawford {Day10/156:2-16}.
[1337] Lawrence {Day25/11:17}.

further.[1338] In the event, it is clear that he did neither of those things. We agree with the view expressed by Deborah French in a witness statement given to the Metropolitan Police that it would have been obvious to anyone that polyethylene was plastic and flammable.[1339] We are satisfied that Mr Crawford and Mr Anketell-Jones knew that ACM was combustible; Mr Lawrence may not have known, but ought to have taken the trouble to find out after he had been asked about the reaction of the panels to fire by Claire Williams in her email of 12 November 2014.

55.86 However, even if none of them gave any real thought to the implications of using ACM panels with polyethylene cores, those representatives of Exova, Studio E, Rydon and Harley were aware that an external wall incorporating the rainscreen panels that were to be used on Grenfell Tower would not adequately resist the spread of fire across the surface of the building. That much is clear from the exchange of emails mentioned above.[1340]

The "Lacknall moment"

55.87 On 12 November 2014, Claire Williams wrote to Philip Booth and Nick Valente of Artelia asking, amongst other things, whether in the light of the fire at Lakanal House there was any requirement for materials to be flame retardant.[1341] Later the same day she sent an email to Simon Lawrence referring to Lakanal House and asking him to clarify the fire retardance of the new cladding.[1342] She was familiar with the Lakanal House fire principally because she had attended a presentation by Dr David Crowder of the BRE on 10 January 2014,[1343] but could not recall any specific aspect of the presentation that had caused her to make a connection between that fire and the fire performance of the cladding chosen for use on Grenfell Tower. She also included in her email extracts from the NBS Specification for the project, which Philip Booth had sent her as a reminder of what had been specified.[1344] He had suggested that she seek clarification from Rydon about the fire performance of the cladding. Mr Lawrence accepted that it had been part of Rydon's task as principal contractor to answer questions of that kind from the TMO and that, within Rydon, he was the person to do so.[1345]

55.88 Mr Lawrence told us that when he read Ms Williams email he had understood her to be referring to the glass reinforced concrete ("GRC") cladding that was to be installed on the lower levels of tower,[1346] but that was not what she had said in her email and, although the information she included had referred to GRC products, it had also referred to the CWCT standard for systemised building envelopes, which applied to the whole of the tower's facade. We are unable to accept that Mr Lawrence understood that message to refer only to the GRC element of the cladding installed at Grenfell Tower.

55.89 Mr Lawrence said that he would not have expected to respond to an email of that kind himself but would have sent it to the project's design team for a response.[1347] However, there is no record of his having done so, or indeed of any response to it, and Ms Williams could not recall having received any response.[1348] We think that Simon Lawrence simply

[1338] Lawrence {Day25/12:23}-{Day25/24:1}.
[1339] {MET00053162/7} page 7, paragraph 28.
[1340] {HAR00006585}; {SEA00013051}.
[1341] {ART00003042}.
[1342] {RYD00023468}.
[1343] {TMO10040126}; Williams {Day55/126:21}-{Day55/130:20}.
[1344] {ART00008527/52} page 52, paragraph 173; Booth {Day50/62:9-15}; Booth {Day50/64:15}-{Day50/65:6}.
[1345] Lawrence {Day24/166:18-23}.
[1346] Lawrence {Day24/161:12}-{Day24/168:8}.
[1347] Lawrence {Day24/164:1}-{Day24/166:23}.
[1348] Williams {Day55/145:25}.

failed to take any action at all in response to the email, possibly because he did not understand its significance, that Ms Williams did not pursue it, and that no one in the design team gave any consideration to the question she had raised, despite the fact that it was of real importance.

55.90 In both his written and oral evidence David Gibson told the Inquiry that he had raised concerns about the fire performance of the rainscreen system during a meeting chaired by Philip Booth of Artelia in March or April 2015.[1349] He said that he had become concerned when he learnt that there was to be an air gap between the insulation and the rainscreen, as he had understood that a cavity of that kind had contributed to spread of fire at Lakanal House.[1350] He said that Mr Lawrence had assured him that the rainscreen was completely inert and would not burn at all.[1351] Claire Williams supported Mr Gibson's recollection.[1352] Both Mr Gibson and Ms Williams said they recalled being given hard copies of the minutes of the meeting drafted by Artelia which recorded Simon Lawrence's advice, although their accounts of how they received them were not consistent. Mr Gibson believed he received a copy at the next scheduled meeting[1353] and said he had noted that "Lakanal" had been misspelled.[1354] Ms Williams did not think that Mr Gibson had been at the subsequent meeting; she said she had been given a hard copy which she had brought back to the office and read to him.[1355]

55.91 Neither Simon Lawrence nor Philip Booth recalled any such conversation nor any such minutes.[1356] In particular, Mr Booth said that compliance with the fire safety requirements of the regulations had not been discussed with him, because it was an absolute requirement, not a matter for debate.[1357] None of those who could be expected to have received copies of the minutes disclosed them, either in electronic or paper form, and there is no reference in any of the contemporaneous documents to an assurance of that kind. In those circumstances we are unable to regard the evidence of Mr Gibson and Ms Williams on this matter as reliable. We find the evidence of Mr Booth persuasive: as employer's agent, he was required to ensure that meetings were properly and fully recorded for the benefit of the TMO. If such an important assurance had been given at the meeting, he would have noted it. We consider it very unlikely that a paper document was produced and distributed at a meeting if no paper or electronic copy of it could be found, either on Artelia's systems or among the records or documents of any other party. Contrary to the assertions of Ms Williams that there is a gap in the minutes for February 2015,[1358] there is none.[1359]

[1349] Gibson {TMO00000887/19} page 19, paragraph 99.
[1350] Gibson {TMO00000887/18} page 18, paragraphs 94-98; {TMO00842310/8} page 8, paragraph 23; Gibson {Day53/177:9-22}.
[1351] Gibson {TMO00842310/8} page 8, paragraph 23.
[1352] Williams {TMO00842312/15} page 15, paragraph 64; Williams {Day55/159:18}-{Day55/160:6}.
[1353] Gibson {TMO00000887/19} page 19, paragraphs 101 and 103; Gibson {Day53/190:5-14}.
[1354] Gibson {TMO00842310/8} page 8, paragraph 22; Gibson {Day53/180:15-18}.
[1355] Williams {Day55/163:20}-{Day55/164:6}.
[1356] Booth {ART00008527/52} page 52, paragraph 173; Lawrence {Day24/170:6-10}; {Day24/171:15-18}; Booth {Day50/77:4-11}.
[1357] Booth {Day50/60:8-14}.
[1358] Williams {Day55/175:6-8}.
[1359] {ART00006769}, It is clear in the footer that Progress Meeting 8 was held on 13 February 2015. The body of the minutes erroneously record this as having been held on 20 January 2014, the date of Progress Meeting 7 {ART00006766}.

55.92 The matter does not end there, however. Ms Williams made no reference at all to any such assurance in her first statement; it was not until she made her second statement, produced after she had seen Mr Gibson's statement,[1360] that she first mentioned it.[1361] Ms Williams said that she simply had not remembered the conversation with Mr Lawrence when she made her first statement,[1362] but it is difficult to understand how such an important matter could have escaped her mind. Moreover, she said that she had not recalled Mr Lawrence's assurance when she became aware of the fire on 14 June 2017.[1363] Again, that is difficult to understand. If she had been told that ACM panels were inert and would not burn, that assurance would surely have come to mind as soon as she became aware of the disaster.

55.93 Finally, it is worth bearing in mind that Ms Williams sought an assurance of a similar kind in two emails sent on 12 November 2014. In the first,[1364] she told Mr Booth that she wanted to ensure that the flame retardance of the ACM panels was raised. In the second, her "Lacknall moment" email to Mr Lawrence, she said that she was writing to get clarification on the fire retardance of the new cladding. If Mr Lawrence had already given her a clear assurance before 12 November 2014, we think it unlikely that either of those messages would have been sent, or, if sent for other reasons, that she would not have referred to it. If the assurance was given after 12 November 2014 (as Ms Williams and Mr Gibson suggested), we think that she would have recalled telling Simon Lawrence that she had asked for the same information some months before but had not received a response. In the light of all the evidence we do not accept that Mr Lawrence gave Mr Gibson and Ms Williams any assurance of the kind they described.

[1360] Gibson {TMO00000887/19} page 19, paragraphs 99-103.
[1361] Williams {TMO00842312/15} page 15, paragraphs 64-65; Williams {Day55/154:1-{Day55/155:8}; {Day55/163:13-15}.
[1362] Williams {Day55/154:5-19}.
[1363] Williams {Day55/155:9-17}.
[1364] {ART00003042}.

Chapter 56
The choice of insulation

56.1 The purpose of adding insulation to a building is to keep it warmer in winter and cooler in summer. Laura Johnson, Head of RBKC's Housing Department, accepted that at the end of 2011 there was no evidence that the thermal efficiency of Grenfell Tower was sufficiently poor to justify the investment in cladding; she thought, at least at the outset, that the primary rationale for cladding it was to improve its appearance.[1365] Bruce Sounes thought that the modernisation of the heating system, the replacement of the windows and the addition of insulation were all integral to the refurbishment of the building, but he had not been involved in RBKC's original decision.[1366]

56.2 Two insulating products were ultimately used in the construction of the external wall of Grenfell Tower, Celotex RS5000 ("RS5000") and Kingspan Kooltherm K15 ("K15").[1367] RS5000 was a polyisocyanurate ("PIR") rigid foam board insulation. K15 was a phenolic ("PUR") rigid foam board insulation. Both were combustible, with a short time to ignition.[1368] Neither RS5000 nor K15 met the limited combustibility guidance in paragraph 12.7 and table A7 of Approved Document B; and neither of them had been tested in accordance with BS 8414 in combination with the other materials intended for use on the tower. It follows that the system had not been shown to meet the criteria set out in BR 135. No alternative way of establishing compliance with the Building Regulations, e.g. by way of a desktop report or a holistic fire-engineered solution, had been followed. The use of those products was therefore contrary to official and industry[1369] guidance and, as the Chairman found in his Phase 1 report, the external wall of the building as a whole, including the insulation, was combustible and did not adequately resist the spread of fire over the walls. The use of those materials was therefore a clear breach of functional requirement B4(1) of the Building Regulations. In this chapter we seek to explain how the insulation came to be chosen for use on the tower.

The initial selection of Celotex FR5000: 2012–2014

56.3 Celotex FR5000 was the insulation product specified in the contract between the TMO and Rydon. It was specified by Studio E in the NBS Specification in November 2013,[1370] which formed part of the Employer's Requirements. However, the origins of that decision can be traced back to early in the previous year.

56.4 On 24 May 2012, there had been a design team meeting at which insulation was discussed, but only in very general terms.[1371] Some consideration was given to installing insulation internally, rather than on the outside of the building,[1372] but that option had

[1365] Johnson {Day128/32:15}-{Day128/35:1}.
[1366] Sounes {Day12/190:9-12}.
[1367] See Grenfell Tower Inquiry Phase 1 Report, Volume I, Chapter 6 for a description of the construction of the external facade.
[1368] Grenfell Tower Phase 1 Report, Volume I, Chapter 6, paragraph 6.20.
[1369] For example, CWCT's Technical Note 73, Fire Performance of curtain walls and rainscreens, dated March 2011 at {CWCT0000019/6}.
[1370] {SEA00000169/73} final version of 30 January 2014: thermal insulation was specified at item 776.
[1371] Minutes at {ART00000037}. In attendance at this meeting were various representatives of the TMO, Bill Watts of Max Fordham, and Bruce Sounes of Studio E. The minutes were circulated to James Lee of Exova.
[1372] {ART00000037/2}.

been quickly rejected because it would have caused too much disruption to residents.[1373] At that meeting Max Fordham was instructed to assist the design team in establishing environmental design criteria, including U-values, ventilation openings and other matters, in order to advance the design of the cladding.[1374] U-value is a measure of the rate of heat transfer through a material or structure, measured in watts per square metre kelvin (W/m^2K). The lower the U-value, the better the material or structure's thermal efficiency; that is, the more it prevents heat loss in winter and heat gain in summer. Lambda value is a measurement of thermal conductivity of a material, measured in watts per metre kelvin (W/mK). The lower the lambda value of a material, the less is needed to achieve the desired U-value. Following the meeting, Bruce Sounes understood that Max Fordham was to provide the environmental design criteria, including the U-values.[1375]

56.5 On 18 June 2012, Matt Smith of Max Fordham sent an email to Bruce Sounes asking what U-value Studio E was seeking to achieve.[1376] Andrew McQuatt of Max Fordham understood that Mr Smith had written that email to prompt Studio E to suggest its own U-value, assuming that Studio E as architect was designing the whole system and that Max Fordham did not have the power to specify any of the elements of the cladding. The email was intended to stimulate a dialogue with Studio E about the overall design, including the U-value.[1377] In response, Mr Sounes instructed a colleague to send Max Fordham drawings of the likely build-up of the cladding system.[1378]

56.6 At a design team meeting on 25 June 2012,[1379] Bill Watts of Max Fordham suggested a target U-value of 0.15 W/m^2K for the walls of the tower.[1380] That was ambitious. It was to become the target U-value for walls of new buildings in the Approved Documents published in 2013,[1381] but in 2012 the Approved Documents required a U-value of 0.30 W/m^2K only for walls of existing buildings with external insulation,[1382] as was recorded in the minutes of the meeting.[1383] Even greater latitude was provided in the Approved Documents, which stated that where a U-value of 0.30 W/m^2K could not be achieved, the external wall should reach the best standard that was technically and functionally possible.[1384]

56.7 Max Fordham's suggestion that the designers seek to achieve a U-value of 0.15 W/m^2K was therefore twice the efficiency required by the statutory guidance for existing buildings. The purpose of doing so was, in summary, to ensure that the building would continue to perform well by future standards.[1385] In addition, Max Fordham considered that, in principle, overcladding an existing high-rise building did not differ in principle from constructing a new one.[1386] Another consideration was that the London Plan recommended reducing energy use by improving the fabric of the building first[1387] and there was also

[1373] McQuatt {Day42/35:17-21}.
[1374] {ART00000037/2}.
[1375] Sounes {Day12/192:21-24}; {Day12/193:4-6}; Sounes {SEA00014273/39} page 39, paragraph 81.
[1376] {SEA00004737}.
[1377] McQuatt {Day42/44:10}-{Day42/46:3}.
[1378] {SEA00004737}.
[1379] {ART00000096}. Attended by the TMO, Studio E and Max Fordham, among others.
[1380] {ART00000096/2}. Another U-value was suggested for the windows. McQuatt {Day42/38:3-11}.
[1381] {INQ00015203/39}.
[1382] See Approved Document L 1B at {INQ00011283/20}, Table 3 and also Approved Document L 2B {INQ00015204/25} at Table 5.
[1383] {ART00000096/2}.
[1384] See Document L1B at {INQ00011283/20}, Section 5.9 and Document L2B at {INQ00015204/24} section 5.10.
[1385] McQuatt {Day42/39:10-16}; {Day42/41:9-19}. See also {MAX00000412/6}. at table 2.1.
[1386] McQuatt {Day42/38:12-21}; {Day42/39:6-16}.
[1387] McQuatt {Day42/39:17-25}.

a widespread recognition in the industry of the importance of improving the fabric of buildings. Accordingly, it was environmental considerations, including energy efficiency, that lay at the heart of the U-value that was chosen.[1388]

56.8 When he came to work on the project, Andrew McQuatt checked that the U-values suggested by Max Fordham were consistent with Approved Document L. He understood that if the target was not achievable, it was permissible to depart from it to a U-value that was technically and functionally feasible.[1389] Max Fordham did not think that the U-value it had suggested was unduly ambitious.[1390] Bruce Sounes also shared that view,[1391] and realised that Max Fordham was seeking to match the statutory guidance relating to new buildings.[1392] Neither Max Fordham nor Studio E checked the proposed U-value against the fire safety guidance in Approved Document B to see whether a higher U-value would have to be accepted in order to comply with the guidance on insulation contained in paragraph 12.7.[1393]

56.9 Following Max Fordham's suggestion, Bruce Sounes carried out some research into insulation products. On 5 July 2012, he asked Rockwool[1394] to advise which mineral wool insulation product it would be appropriate to use within an external cladding system and what thickness would be required to achieve a U-value of 0.15 W/m^{2}K.[1395] Mr Sounes sent an email to Andrew McQuatt and Matt Smith telling them that he had sent enquiries about insulation to both Rockwool and Kingspan,[1396] attaching a spreadsheet with some calculations. At that point, neither Studio E nor Max Fordham had given any consideration to using a Celotex product, or indeed any polymeric material.

56.10 The spreadsheet contained an analysis of the thickness of mineral wool that would be required to achieve a U-value of 0.15 W/m^{2}K.[1397] Mr Sounes had carried out that analysis himself using various thicknesses of one of Rockwool's products, "Rainscreen Duo Slab". For each thickness of the product, he derived the corresponding U-value by extrapolation from the information in the datasheet. He calculated that 325mm of Duo Slab would achieve a U-value of only 0.20 W/m^{2}K.[1398] He concluded that to achieve a U-value of 0.15 W/m^{2}K about 450mm of Duo Slab would be required.[1399] It was on that basis that he said in his email to Max Fordham that the target U-value of 0.15 W/m^{2}K looked to him "a bit aspirational" and he questioned whether it would be feasible to use Rockwool, given the thicknesses apparently required to achieve it.[1400] Mr Sounes did not ask Max Fordham or anyone else to check his calculations[1401] and he did not check Approved Document L to see what U-value the guidance required.[1402]

[1388] McQuatt {Day42/40:1-9}.
[1389] McQuatt {Day42/8:4-8}; {Day42/10:15-20}; {INQ00011283/20}; Bruce Sounes was not aware that Approved Document L provided that flexibility. Sounes {Day20/10:18}-{Day20/11:3}.
[1390] McQuatt {Day42/40:12-21}.
[1391] Sounes {Day20/33:13-15}.
[1392] Sounes {Day20/9:21}-{Day20/10:17}; {Day20/18:4-9}.
[1393] McQuatt {Day42/47:21}-{Day41/48:7}.
[1394] Rockwool is a company manufacturing a range of mineral or stone wool insulation products for use in external cladding systems, among other applications. According to the CWCT in Technical Guidance Note 73 dated March 2011, mineral wool was the only insulation product which would satisfy the definition of "limited combustibility" in Approved Document B (see Chapter 49).
[1395] {SEA00004967}.
[1396] {SEA00004973}.
[1397] {SEA00001334}.
[1398] Sounes {Day20/15:17-22}.
[1399] {SEA00004973}; {SEA00004974}.
[1400] {SEA00004973}.
[1401] Sounes {Day20/25:4-9} and McQuatt {Day42/65:9-14}.
[1402] Sounes {Day20/9:11-20}.

56.11 In the light of his calculations Mr Sounes might have been expected to consider whether he should abandon the proposed U-value 0.15 W/m^{2}K in favour of a higher value that might be easier to achieve, but he does not appear to have done so. He did not think that "aspirational" meant irresponsible; it just meant trying to do the best you can.[1403] He said that Max Fordham had prided itself on being an aspirational engineer and that Studio E had followed it. He had seen no reason to abandon a U-value of 0.15 W/m^{2}K and thought that it had been in the project's interest to try to achieve it.[1404]

56.12 In his email of 5 July 2012, Bruce Sounes had referred to Max Fordham's having "asked for" a target U-value of 0.15 W/m^{2}K. Mr Sounes said in evidence that in the past Studio E had looked to Max Fordham to propose U-values and he was doing the same in connection with the Grenfell Tower project.[1405] It was part of Max Fordham's role, as set out in its fee proposal, to help the architect to comply with the energy efficiency requirements in Part L of the Building Regulations.[1406]

56.13 In our view, although Max Fordham did first suggest a target U-value of 0.15 W/m^{2}K for the external walls in its capacity as the building services engineer,[1407] it was Studio E's responsibility, as lead consultant and lead designer, to assess the feasibility of that U-value in the context of its initial design of the cladding system. Max Fordham did not "ask for" that U-value or specify it in such a way as to oblige the design team, including Studio E, to accept it without question. A reasonably competent lead consultant and lead designer would not have considered itself limited in any way in its selection of materials or the design of the cladding system by suggestions made by the M & E consultant. Mr Sounes accepted as much,[1408] and rightly so. The services to be provided by Studio E included co-ordinating the design of all constructional elements, including work by consultants, specialists or suppliers, and determining materials, elements and components, standards of workmanship, type of construction and performance in use.[1409] It was Studio E's responsibility as architect and lead designer to decide what U-value was feasible and appropriate.

56.14 Matt Smith replied to Bruce Sounes on 5 July 2012, probably after having discussed the matter with Andrew McQuatt.[1410] He had done a quick calculation using the lambda value for the Rockwool product and the thicknesses proposed by Mr Sounes. It was his view that the thicknesses of Rockwool calculated by Mr Sounes were too great and he questioned whether Mr Sounes had taken thermal bridging[1411] into account.[1412] Matt Smith's calculation did not include any thermal bridging considerations, because Max Fordham did not have any more specific details of the design of the cladding to enable him to do so.[1413] It was Andrew McQuatt's own view that Mr Sounes' analysis may have been based on rather pessimistic assumptions.[1414]

[1403] Sounes {Day20/17:24}-{Day20/18:1}.
[1404] Sounes {Day20/27:9-23}. The target U-value was never rejected by Studio E as being unachievable. Sounes {Day20/4:20-21}; {Day20/16:24-25}.
[1405] Sounes {Day20/3:23}-{Day20/4:1}; {Day20/17:20-22}.
[1406] {MAX00000075}.
[1407] McQuatt {Day42/44:4-9}.
[1408] Sounes {Day20/17:15-18}.
[1409] Appendix B: Schedule of Services {SEA00009824/7}.
[1410] McQuatt {Day42/66:3-8}; {SEA00004978}.
[1411] A thermal bridge is an area or component of an object which has higher thermal conductivity than the surrounding materials, creating a path of least resistance for the transfer of heat.
[1412] {SEA00004978}.
[1413] McQuatt {Day42/68:22}-{Day42/69:6}.
[1414] McQuatt {Day42/69:15}-{Day42/70:7}.

56.15 In the same email Matt Smith referred to a "glass fibre slab" product.[1415] It is not clear whether that was a mistake,[1416] but in any event, Andrew McQuatt said that both the mineral wool and glass fibre products were flexible and had similar lambda values, so the calculation he provided was reasonable despite any potential confusion between the two products.[1417]

56.16 Andrew McQuatt thought at this point that the U-value might need to be changed, given that Studio E considered that the necessary thickness of mineral wool could not be accommodated. However, he knew that the Kingspan rigid insulation board would be a thinner product and thought that it would be appropriate to wait to see what Kingspan said in response to Bruce Sounes' email of 5 July 2012 before commenting further.[1418]

56.17 On 6 July 2012 Bruce Sounes sent an email to Matt Smith to tell him that Kingspan had recommended 200mm of its phenolic foam product to achieve the required U-value.[1419] He also attached to his email a product datasheet for a mineral wool insulation manufactured by Superglass Insulation Ltd called "Cladding Mat 37",[1420] but that was rejected because it was thought that too great a thickness would be required.[1421]

56.18 On 24 July 2012, Ian Pritchard of Rockwool responded to Bruce Sounes' email of 5 July 2012. He said that they would normally recommend the use of Rainscreen Duo Slab for the type of construction that Mr Sounes had in mind, but that due to the low U-value required the thickness needed would be exceptionally high, probably beyond the point of sensible building practice.[1422] Bruce Sounes forwarded Rockwool's email to Matt Smith and Andrew McQuatt, drawing attention to his concerns about buildability and appearance if mineral wool were used.[1423] He did not ask Max Fordham to obtain from Rockwool a formal calculation of the thickness of material required, so apart from Matt Smith's "quick calculation" no attempt was made at any stage to determine precisely what thickness of mineral wool would be required to achieve a U-value of 0.15 W/m^2K.

56.19 Andrew McQuatt understood the email from Mr Sounes to mean that he had decided that the maximum thickness for the insulation should be 200mm.[1424] He thought that Mr Sounes' calculations formed part of a bigger picture; he did not question it because he assumed that Studio E had chosen it as the best thickness for a wide range of reasons.[1425]

56.20 There was never any serious discussion about increasing the U-value to something greater than 0.15 W/m^2K,[1426] and Studio E did not raise the possibility of doing so with Max Fordham.[1427] According to Andrew McQuatt, the design team remained confident that a reasonable technical solution to the problem could be found, so there was never any resistance to adopting the ambitious U-value.[1428]

[1415] {SEA00004978}.
[1416] McQuatt {Day42/67:4-6}.
[1417] McQuatt {Day42/67:11-23}.
[1418] McQuatt {Day42/49:15}-{Day42/50:9}.
[1419] {SEA00004986}. The calculations by Kingspan can be found at {MAX00000104}.
[1420] {SEA00001337}. Cladding Mat 37 is a form of mineral wool insulation, marketed as an A1 non-combustible product.
[1421] McQuatt {Day42/80:10-20}. Bruce Sounes did not consider the fire performance of that product. Sounes {Day20/36:2-6}.
[1422] {SEA00005276/2}.
[1423] {SEA00005276}. Neil Crawford could not recall any discussion about the use of a mineral wool product in the external wall facade but had understood that the thickness of the product required would have been impractical. He thought he got that understanding from Bruce Sounes. Crawford {Day10/67:12-21}.
[1424] McQuatt {Day42/60:17-20}.
[1425] McQuatt {Day42/61:5-9}.
[1426] McQuatt {Day42/43:6}-{Day42/44:3}.
[1427] Sounes {Day20/33:17-25}.
[1428] McQuatt {Day42/43:19-23}.

56.21 Bruce Sounes sent another email to Andrew McQuatt on 15 August 2012 asking for his help in calculating the thickness of insulation required to achieve the target U-value.[1429] He attached to his email a further calculation of the thickness of mineral wool insulation required.[1430] The exchange occurred just before a report was to be made to the Planning Department in which the proposed U-value would be disclosed, so it was important to make sure the external wall could be built to produce that U-value. Mr Sounes was concerned whether the proposed U-value could be achieved over all the different elements of the wall.[1431]

56.22 On either 15 or 16 August 2012, there was a telephone conversation between Andrew McQuatt and Bruce Sounes during which Mr McQuatt attempted to answer Mr Sounes' concern. He undertook to do some calculations based on the different areas of the building in order to determine whether the target U-value could be achieved on average across the building as a whole and to establish the thickness of insulation required to achieve the target U-value overall.[1432]

56.23 On 16 August 2012 Andrew McQuatt sent Mr Sounes his calculations[1433] and attached the product datasheet for Celotex FR5000.[1434] In order to do his U-value calculation, Mr McQuatt had needed to use the lambda value of an insulation product. In his mind there was little difference between the rigid board insulation products marketed by Kingspan and those sold by Celotex, so he went to the Celotex website and looked at a datasheet for a solid insulation board, FR5000. He obtained the lambda value from the datasheet and sent it to Mr Sounes so that he could see the source of the information he had used.[1435] He thought that Celotex FR5000 was the only type of product that would provide the required thermal performance at a thickness that could realistically be accommodated.[1436]

56.24 Celotex FR5000 was a polyisocyanurate (PIR) product. The datasheet[1437] made no reference to its being suitable for use as part of a cladding system nor did it state that it was suitable for use on buildings with a storey above 18 metres in height. It did not say that FR5000 was a product of limited combustibility, but it did say that it had Class 0 fire performance throughout the entire product in accordance with BS 476.

56.25 Andrew McQuatt did not give any thought to the fire performance of Celotex FR5000 before he sent his email to Bruce Sounes on 16 August 2012.[1438] Mr Sounes had suggested both the Rockwool product and the Kingspan product and Mr McQuatt thought that the use of Kingspan had already been established.[1439] Since Studio E had proposed a Kingspan product as an option from the outset, he had thought there was nothing wrong with using

[1429] {SEA00005818}.
[1430] {MAX00000214}.
[1431] McQuatt {Day42/53:7-22}.
[1432] McQuatt {Day42/81:21}-{Day42/82:12}.
[1433] {SEA00005840}.
[1434] {SEA00005841}. Issue 2, January 2012.
[1435] McQuatt {Day42/82:13}-{Day42/82:17}.
[1436] {SEA00005840}. When Andrew McQuatt said in this email of 16 August 2012 that Celotex FR5000 was "the only type of product that will give us the required performance", he had in mind the lambda value of the product and that, at least in his mind, FR5000 was interchangeable with a rigid insulation board marketed by Kingspan. McQuatt {Day42/85:3-9}.
[1437] {SEA00005841} Issue 2, January 2012.
[1438] McQuatt {Day42/86:20}-{Day42/87:18}.
[1439] McQuatt {Day42/85:3-9}.

it or, by extension, Celotex FR5000.[1440] He accepted that he would have been just as likely to put forward the Kingspan product if he had obtained the lambda value of one of their foam boards instead of a Celotex product.[1441]

56.26 At the time, Andrew McQuatt was not aware of the guidance given in Approved Document B about insulation materials and their combustibility, nor could he recall with any certainty having heard the expression Class 0.[1442] He was not aware of industry guidance on the construction of external walls and insulation materials and had never had cause to look at the guidance published by the Centre for Window and Cladding Technology (CWCT).[1443] He was aware that there were different types of insulation and he knew that Kingspan produced a solid board rather than a mineral wool product, but that was really the extent of his knowledge.[1444] No one had suggested to him that phenolic or PIR foam insulation boards were not appropriate for use in the external walls of buildings above 18 metres in height.[1445]

56.27 The suggestion made by Andrew McQuatt in his email of 16 August 2012 that a PIR insulation product might be used did not give Bruce Sounes any cause for concern. He told us that PIR and phenolic insulation boards had become all but standard by that time[1446] and that PIR products were widely used in the industry, which reassured him about their suitability.[1447] Mr Sounes thought that Celotex FR5000 was suitable for use as part of the cladding system partly because it had been used in the past by Max Fordham in what he had understood to be similar circumstances, but he took no steps to find out whether Max Fordham had ever used FR5000 in the past in the external wall of a building over 18 metres in height. He could not recall having read the datasheet for Celotex FR5000 when he was working on the project, nor did he recall noting at the time that it was rated Class 0,[1448] but if he had been aware of that it would have served only to increase his confidence in its use, because he understood that if a product was rated Class 0 it was, as he put it, "not hazardous".[1449] Mr McQuatt did not realise that Studio E had understood his email of 16 August 2012 as a tacit endorsement of the safety of FR5000 for use on the building,[1450] but there is no reason why he should have done so, given that his expertise did not extend to fire safety and he had not been consulted about that.

56.28 Mr McQuatt wrote a Sustainability and Energy Statement in respect of the project dated 17 August 2012,[1451] which made it clear that the recommended U-value far exceeded that required by the Building Regulations.[1452] At Tables 2.2 and 2.3 of the report, Celotex FR5000 was identified as the insulation for the spandrels and columns.[1453] When he received it, Bruce Sounes did not pause to consider whether mineral wool could be used to produce a U-value which, although higher, still complied with the regulations.

[1440] McQuatt {Day42/61:18-22}.
[1441] McQuatt {Day42/86:2-7}.
[1442] McQuatt {Day42/18:8}-{Day42/19:12}.
[1443] McQuatt {Day42/21:20}-{Day42/22:4}.
[1444] McQuatt {Day42/51:9-16}.
[1445] McQuatt {Day42/91:25}-{Day42/92:4}.
[1446] Sounes {Day20/39:2-3}.
[1447] Sounes {Day20/40:8-15}. Bruce Sounes said that every project that he had worked on involved some form of foam board in the facade, but he confirmed that those other projects had involved low-rise buildings. Sounes {Day20/39:6-14}. He said he thought he had been aware that PIR insulation had been used on high-rise buildings. Sounes {Day20/50:11-15}.
[1448] Sounes {Day12/178:4-7}; {Day12/183:14-17}.
[1449] Sounes {Day12/183:6-13}.
[1450] McQuatt {Day42/84:19-23}; {Day12/181:12-23}.
[1451] {MAX00000412/6}.
[1452] {MAX00000412/6} at Table 2.1.
[1453] {MAX00000412/6}.

56.29 On 10 October 2012, Max Fordham issued its RIBA Stage C report.[1454] Andrew McQuatt drafted most of it, with a contribution from Matt Smith.[1455] The information contained in the Sustainability and Energy Statement was repeated on page 12 of the report.[1456] Mr McQuatt explained that FR5000 had been referred to in the Stage C report solely because it delivered the U-value required at the thickness sought.[1457] He said that detailed information had been included in the report so that readers could see how the thermal conductivity value had been achieved for the insulation. If for any reason FR5000 had not been used, the technical details were available to enable a substitution to be made.[1458] He did not see it as his role to influence the design team's decision about the materials to be selected.[1459] Max Fordham's Stage C report makes no reference to fire safety because its practice was to advise on questions of fire safety only to the extent that they affected the work that the building services engineer was specifying.[1460] We therefore infer that, as Max Fordham was not responsible for choosing the insulation, it did not regard itself as responsible for giving advice in the Stage C report about its use, whether in relation to fire safety or otherwise.

56.30 Studio E issued its own RIBA Stage C report on 31 October 2012.[1461] It incorporated Max Fordham's Stage C report and referred to Celotex FR5000 as the chosen insulation.[1462] Before issuing the report, Bruce Sounes did not ask Exova or Max Fordham or any other specialists to advise on the suitability of using Celotex FR5000 in the cladding system or whether its use would comply with the Building Regulations.

56.31 In January 2013, Adrian Jess[1463] sent a draft of Studio E's Stage D report to Leadbitter, which at that stage was expected to become the principal contractor for the project. It showed EPS (expanded polystyrene) insulation at the lower levels of the tower behind rainscreen panels.[1464] On 21 January 2013 Juan Medina, Framework Design manager for Leadbitter, sent Mr Jess an email asking whether Studio E had checked with building control whether EPS insulation could be used on a tower of that kind. Mr Medina understood that EPS was a combustible material and was not allowed as part of a rainscreen cladding system. He suggested that phenolic insulation should be used instead.[1465] The email was copied to Studio E and is therefore likely to have been seen by those at Studio E who were working on the project, including Bruce Sounes. Although the discussion concerned the lower levels of the tower, it shows that Studio E was on notice from January 2013 that building control might not allow combustible insulation to be used in a rainscreen cladding system. That warning by Leadbitter ought to have prompted Studio E to pay close attention to the fire performance of the insulation materials that it had proposed for the project. However, from the documents available to the Inquiry, it does not appear that the warning resulted in any discussion of that kind within Studio E.

1454 {MAX00000636}.
1455 McQuatt {Day42/92:5-12}.
1456 {MAX00000636/12}.
1457 McQuatt {Day42/95:10-17}.
1458 McQuatt {Day41/92:18}-{Day41/93:11}.
1459 McQuatt {Day42/93:13}-{Day42/94:1}. Andrew McQuatt could not recall whether a final decision had been taken to use FR5000.
1460 McQuatt {Day42/94:16-25}.
1461 {ART00008396}; {MAX00000445}.
1462 {MAX00000445/82}.
1463 Sounes {SEA00014273/59} page 59, paragraph 124.
1464 {MET00081283/11} under Item P10.
1465 {MET00081282}.

56.32 Studio E issued its final Stage D report on 20 August 2013,[1466] which proposed the use of Celotex FR5000.[1467] Between issue of its Stage C and Stage D reports there were no communications between Studio E, Max Fordham, Exova, or any other specialist about the safety of using FR5000 product or how it reacted to fire.[1468]

56.33 On 25 October 2013, Tomas Rek commented in an internal email to Bruce Sounes that Max Fordham's U-values were "OTT", i.e. excessive.[1469] Tomas Rek thought he had had a discussion with Mr Sounes about it, but he could not recall what Mr Sounes had said.[1470] Bruce Sounes did not remember any discussion of that kind.[1471] In any event, no further attempts were taken by Mr Rek to address his concerns.[1472] Mr Sounes thus missed the opportunity properly to understand Mr Rek's concerns about the U-values and to check with Max Fordham whether they needed to be quite so ambitious.

The Hays Galleria meeting: insulation

56.34 As we have found when describing the discussions about the choice of cladding material, on 27 September 2013 Bruce Sounes and Tomas Rek met Ray Bailey and Mark Harris of Harley at a coffee shop in Hays Galleria in south London.[1473] As well as discussing the rainscreen, they also discussed the insulation for Grenfell Tower. What was said on that matter was the subject of differing recollections and the evidence about it requires detailed consideration.

56.35 Ray Bailey said that Studio E had given Harley calculations relating to U-values in advance of the meeting, from which he had seen that it intended to specify a PIR insulation product.[1474] In his witness statement, Bruce Sounes said that at the time of the meeting he had had a lingering uncertainty about the fire safety of PIR because he was dealing with a high-rise building and had not worked on one before. He thought he had asked Ray Bailey about the acceptability of using a rigid foam insulation on such a building, but did not remember having received a clear response.[1475]

56.36 Bruce Sounes said that insulation had been discussed in general as part of the assembly of the facade[1476] and that he might not have mentioned that he had Celotex in mind.[1477] Mr Sounes said that his doubt about the acceptability of a rigid foam insulation product was an afterthought and that he had not had a serious concern.[1478] Indeed, he said that he had not raised the question with Exova because it was not a genuine concern.[1479]

56.37 Bruce Sounes recalled that during the meeting he had looked at photographs of Ferrier Point under construction, in which the mineral wool insulation used in the external wall was visible. It was that, as he recalled it, which prompted him to question the use of

[1466] {MAX00000757}.
[1467] {MAX00000757/29}.
[1468] Bruce Sounes could not recall whether he had asked building control about the acceptability of using a PIR product in a high-rise building. Sounes {Day20/51:1-18}.
[1469] {SEA00014346/2}; {SEA00014346/2}; Rek {Day12/137:2-17}.
[1470] Rek {Day12/138:24}-{Day12/140:7}.
[1471] Sounes {Day20/33:3-10}.
[1472] Andrew McQuatt said in his evidence that no one had ever referred to the target U-value as "over the top" to him. McQuatt {Day42/57:22}-{Day42/58:16}.
[1473] Near London Bridge station. The purpose of the meeting was to discuss the lay concept design drawings for the refurbishment. Ray Bailey {HAR00010184/20} page 20, paragraph 77.
[1474] Ray Bailey {Day32/149:21-25}; {Day32/150:1-22}.
[1475] Sounes {SEA00014273/114} page 114, paragraph 271. Repeated in his oral evidence Sounes {Day20/49:9-12}.
[1476] Sounes {Day20/47:3-9}.
[1477] Sounes {Day20/46:24-25}; {Day20/47:1-5}.
[1478] Sounes {Day20/50:3-4}.
[1479] Sounes {Day20/50:17-22}.

rigid foam board insulation.[1480] Ray Bailey said that before the meeting Mark Harris had sent Studio E some photographs of buildings that Harley had previously worked on[1481] and agreed that it was possible that those or some similar photographs had been discussed at the meeting.[1482] However, he could not recall discussing whether the insulation proposed for use on Grenfell Tower was mineral wool or rigid foam, in contrast to that used on Ferrier Point.[1483] Mark Harris said that he did not recall having shown photographs at the meeting, but that it would not be unusual to do so and might have happened.[1484]

56.38 There is nothing in the documents to indicate that Bruce Sounes questioned the use of PIR insulation during the meeting.[1485] Tomas Rek did not recall Bruce Sounes raising the matter with him[1486] and he could not recall whether the suitability of PIR or rigid foam insulation had been discussed during the meeting.[1487] Mr Rek could not recall any discussions about fire safety or performance of the insulation during the meeting.[1488]

56.39 Neither Ray Bailey nor Mark Harris had any recollection of Bruce Sounes asking about the acceptability of using rigid foam products on high-rise buildings.[1489, 1490] Ray Bailey said that the question would have struck him as odd, because PIR was a product Harley had not used on a high-rise building at that stage.[1491] It was Ray Bailey's impression at the time that there was no flexibility in the choice of insulation and that FR5000 had already been selected.[1492] Ray Bailey said that no one at Studio E or Harley had asked him about the suitability of the Celotex insulation or whether its use complied with the Building Regulations.[1493]

56.40 There is little doubt that photographs of Ferrier Point were shown and discussed at the meeting and it is likely that there was some comment about the use of a mineral wool insulation on that building. We think it unlikely, however, that Bruce Sounes asked whether rigid foam insulation was acceptable for use on Grenfell Tower. If it had been sufficiently important in his mind for him to have done so, it is likely that Ray Bailey would have made some response and that he would have remembered what it was. It is also likely that there would have been some reference to it in the contemporaneous documents. Asking about the safety of PIR would not have been consistent with Mr Sounes' understanding of its suitability in general or with his lack of curiosity about the fire safety of the products he proposed to use in the cladding system.

[1480] Sounes {Day20/47:10-15}; {Day20/50:22}-{Day20/51:1}. The photographs at {SEA00003497} and {SEA00003516} are similar to those shown by Ray Bailey to Bruce Sounes at the Hays Galleria meeting, although Bruce Sounes could not be sure that he was shown those particular photographs. Sounes {Day20/51:12-25}.
[1481] Ray Bailey {Day32/152:2-6}.
[1482] Ray Bailey {Day32/152:10-18}.
[1483] Ray Bailey {Day32/152:23}-{Day32/153:1}.
[1484] Harris {Day34/56:8-21}.
[1485] {ART00001487}. Mr Sounes emailed various parties at Artelia, TMO and Max Fordham with a summary of the matters discussed at the Hays Galleria meeting. Mr Sounes' remarks that Harley "pointed to Ferrier Point as being very similar to Grenfell, although it is triple glazed and super insulated". Aside from this there is no reference to any discussion regarding the insulation.
[1486] Rek {Day12/135:14-16}.
[1487] Rek {SEA00014278/10} page 10, paragraph 29.
[1488] Rek {Day12/133:7-18}.
[1489] Ray Bailey {Day32/149:14-17}; {Day32/151:23}-{Day32/152:6}.
[1490] Harris {Day34/54:14-17}; {Day34/55:5-7}; {Day34/56:4-7}.
[1491] Ray Bailey {Day32/149:19}-{Day32/150:22}; Ray Bailey {Day32/153:7-16}.
[1492] Ray Bailey {Day32/153:7-16}.
[1493] Ray Bailey {Day32/153:2-6}.

Celotex FR5000 in the NBS Specification

56.41 Studio E produced three versions of the NBS Specification for the project dated 21 November 2013,[1494] 29 November 2013[1495] and 30 January 2014 respectively.[1496]

56.42 Studio E started work on the Employer's Requirements, including the proposed NBS Specification, early in 2013.[1497] The NBS Specification was prepared largely by Tomas Rek at Bruce Sounes' direction and subject to his oversight, Adrian Jess having already done some initial work[1498] before he was made redundant in March 2013. By September 2013 the project had been developed to Stage D (the Stage D report was dated 20 August 2013). Tomas Rek was told to use Studio E's Stage D report and drawings to draw up the NBS specification and Mr Sounes gave him additional information as required.[1499]

56.43 In the case of the insulation to be applied to the external concrete walls Studio E made a proprietary specification; in other words, in all three versions of the NBS Specification Celotex FR5000 was specified as the product to be used.[1500] However, that was subject to the qualification that the product could be substituted by a similar or equal alternative.[1501] The contract preliminaries provided that if a contractor wished to suggest an alternative product it was required to provide reasons for that substitution to the client.[1502] The NBS Specification was not unusually prescriptive and was no more detailed or prescriptive than specifications commonly written by Studio E.[1503]

56.44 Before specifying the product, neither Tomas Rek nor Bruce Sounes had investigated whether the use of Celotex FR5000 on a building above 18 metres in height complied with either the Building Regulations or the guidance contained in Approved Document B. Mr Sounes had not asked Max Fordham that question and he did not revisit it when overseeing the writing of the NBS Specification.[1504] Similarly, Mr Sounes did not seek advice from Exova about the suitability of FR5000 for use in the refurbishment before the NBS Specification was prepared.[1505]

56.45 Bruce Sounes said that Studio E would not usually seek to satisfy itself that all materials and products complied with the regulatory requirements before submitting a full plans application to building control.[1506] In his view it would be a waste of time to do so, because the contractor under a design and build contract might subsequently propose a change or building control might take a different view of their suitability.[1507] He said it was not common practice to do a full assessment of the suitability of products at RIBA Stages D or E.[1508] Mr Sounes did tell us, however, that before the submission of the full plans

[1494] {SEA00000152}.
[1495] {SEA00000153}. This was the version issued to tenderers.
[1496] {SEA00000169}.
[1497] Sounes {Day7/150:18-25}.
[1498] Rek {SEA00014278/5} page 5; Rek {Day12/10:22}-{Day12/11:1}. Work had already begun on the NBS specification. Rek {Day12/12:7-13}.
[1499] Rek {Day12/10:22}-{Day12/11:1}; {Day12/15:1-9}.
[1500] See the "thermal insulation" section within section H92 at item 776. In the final version {SEA00000169/73}; Sounes {Day7/162:1-9}.
[1501] {SEA00000169/64}.
[1502] Clause 2.2.2 {RYD00094235/64}.
[1503] Sounes {Day7/168:10-19}.
[1504] Sounes {Day20/42:6-11}.
[1505] Sounes {Day20/42:12}-{Day20/43:6}. Bruce Sounes said that he understood Adrian Jess and Tomas Rek to have had independent discussions with Exova, but he was not aware of their content. He said that he could not recall himself raising the use and suitability of FR5000 with CEP. Sounes {Day20/43:16-19}.
[1506] Sounes {SEA00014273/121} page 121.
[1507] Sounes {Day20/64:21-24}; {Day20/65:5-8}.
[1508] Sounes {Day20/65:1-3}.

application to building control in August 2014, he had been reasonably confident that the materials specified in it complied with the Building Regulations and Approved Document B, because all the products had (as he believed) been used before in similar circumstances, either by Studio E itself or others.[1509] However, the steps he had taken to investigate precisely what had been used and in what circumstances were negligible.

56.46 Following the submission of the full plans application to building control there was no subsequent occasion on which Studio E would check whether the materials complied with the Building Regulations. Mr Sounes said that, because this was a design and build project, once the contract had been awarded the architect was, as he put it, "sidelined" so that Studio E was not policing what other people were doing.[1510] That, however, ignores the role played by Studio E after it had been engaged by Rydon. For the reasons we have explained below and in Chapter 63, it should have given further consideration to whether the insulation complied with the Building Regulations, but failed to do so.

56.47 At the time he prepared the NBS Specification, Tomas Rek did not know that the fire performance of each of the components of the cladding would need to be considered.[1511] He had a general awareness of functional requirements B3 and B4, having come across them on a previous project[1512] which had required one part of the facade to be Class 0.[1513] In that context he had also had to consider diagram 40.[1514] It was Mr Rek's understanding that Class 0 was concerned with the external spread of flame and that if a material had that classification it would not encourage the spread of flame.[1515] However, it became clear during his oral evidence that his knowledge of Approved Document B was very limited. He was not familiar with the various different routes to compliance described in paragraph 12.5 of Approved Document B,[1516] or the definition of what would constitute a material of limited combustibility,[1517] or the guidance in paragraph 12.7.[1518] He could not recall having checked the requirements for external walls contained in Approved Document B when drawing up the specification.[1519] Nor could he recall talking to anyone at Studio E about which route to compliance with the Building Regulations it had taken in respect of the refurbishment of the external wall.[1520]

56.48 The insulation to be used as part of the cladding was specified in clause H92/776 of the NBS Specification. Within section H92/776 of the RIBA software in use at the time for compiling an NBS Specification, the details were left blank for completion. Upon selecting clause H92/776, two tabs would appear: tab G, "Guidance" and tab H, "Manufacturers". Under tab H there is a list of manufacturers available for selection derived from the NBS Plus database.[1521] At the time of drawing up the specification for the thermal insulation in November 2013, four manufacturers appeared in tab H: Kingspan with its K15 Kooltherm product, Knauf, Rockwool and Siderise.[1522] No Celotex product was listed under tab H.

[1509] Sounes {Day20/67:5}-{Day20/68:11}.
[1510] Sounes {Day20/71:3-14}.
[1511] Rek {Day12/24:16-21}.
[1512] Rek {Day12/16:7-23}.
[1513] Rek {Day12/17:1-4}.
[1514] Rek {Day12/25:24}-{Day12/26:11}.
[1515] Rek {Day12/18:9-15}.
[1516] Rek {Day12/20:15-20}.
[1517] Rek {Day12/42:6-19}.
[1518] Rek {Day12/26:20}-{Day12/27:21}.
[1519] Rek {Day12/44:10-19}; Rek {Day12/45:16-20}.
[1520] Rek {Day12/22:17-23}. Mr Rek did not himself give any consideration to that question. {Day12/22:25} – {Day12/23:2}. He did not know whether the proposed cladding system had been tested to BS 8414 and met the criteria in BR 135 criteria or if a fire engineer's report had been obtained. {Day12/27:23}-{Day12/28:9}.
[1521] {INQ00011333}.
[1522] {INQ00011366}.

Accordingly, in order to specify Celotex FR5000 it was necessary for the writer to enter the product manually. When Celotex FR5000 was manually entered under clause H92/776 a message appeared informing the compiler that that product had been authorised for an alternative clause, clause P10.[1523] Clause P10 was the section covering insulation fitted between rafters.[1524] It would therefore require a conscious decision to enter FR5000 under that section of the NBS Specification despite the warning.

56.49 Tomas Rek could not recall having seen that message but could recall having seen a similar notice when trying to alter clauses which were pre-filled.[1525] He could not, however, recall being informed that the insulation that was being specified in clause H92/776 was identified by the software as suitable for a different application.[1526]

56.50 When a person drawing up the specification for clause H92/776 clicked on the drop-down box next to the entry for "Manufacturer", the software would prompt him to select "mineral wool to BS EN 13162" as the only option and then provide a list of four manufacturers.[1527] If the writer did not wish to select a mineral wool product, that entry would have to be manually overridden.[1528] That is what happened here. Mineral wool was manually overridden and Celotex FR5000 was manually typed in at clause H92/776 of the NBS Specification.

56.51 Although he was responsible for drawing up most of the NBS Specification, Tomas Rek could not recall whether he himself had entered FR5000 or whether it had already been in the specification when he came to the project. He said that if he had entered that product he had derived that requirement from Studio E's Stage D report and probably Max Fordham's Stage C report.[1529] Mr Rek thought he would have spoken to Bruce Sounes about the specification of products.[1530] He said that he had assumed that the design of the cladding and the choice of materials had been considered by Studio E before he had started work on the project.[1531] Mr Rek did not recall any discussion with Bruce Sounes about the reasons for choosing FR5000 for use in the cladding system,[1532] nor could he recall considering whether FR5000 was combustible or non-combustible.[1533] He did not consult any of the product information about FR5000[1534] and did not discuss its fire performance with anyone else at Studio E.[1535] He did not seek any assistance or advice about whether he should override the software and manually enter FR5000.

56.52 Clauses H92/220 and H92/310 of the NBS Specification stipulated that the contractor was to comply with *CWCT Standard for Systemised Building Envelopes*, including Part 6, which related to fire performance.[1536] It is not clear whether Mr Rek put that requirement into the NBS Specification, but he remembered having thought that it should be included.[1537]

[1523] {INQ00011342}.
[1524] {INQ00011341}.
[1525] Rek {Day12/122:9-15}; {Day12/123:1-12}.
[1526] Rek {Day12/123:17-21}.
[1527] {INQ00011351}.
[1528] Rek {Day12/127:3-8}.
[1529] Rek {Day12/118:10}-{Day12/119:12}; {Day12/125:1-14}.
[1530] Rek {Day12/130:20-25}.
[1531] Rek {Day12/44:22}-{Day24/45:1}.
[1532] Rek {Day12/135:17-20}.
[1533] Rek {Day12/124:10-13}.
[1534] Rek {Day12/131:14-25}.
[1535] Rek {Day12/134:11-13}.
[1536] {SEA00000169/68-69}.
[1537] Rek {SEA00014278/33} page 33; Rek {Day12/34:18}-{Day12/35:2}.

Although he knew that CWCT had published guidance, he had not read it[1538] and was not familiar with it.[1539] Nor was he familiar with the guidance issued by the Building Control Alliance (BCA).[1540]

56.53 Tomas Rek would normally have expected tenderers to check that FR5000 complied with the CWCT performance requirements, but he did not do so himself.[1541] He said that if the material specified did not comply with that standard there would be a conflict which would have to be resolved.[1542]

56.54 The NBS Specification was not sent to either Exova or Max Fordham for them to comment on the inclusion of FR5000 (or indeed at all). Bruce Sounes did not look to Exova to provide detailed checking of the specification because he did not consider that to be the focus of its work, which was to produce the fire safety strategy.[1543]

56.55 Following the inclusion of FR5000 in the NBS Specification, no further consideration was given to it during the procurement process or before the award of the contract to Rydon in March 2014.

The "launch" of RS5000 and Harley's initial discussions with Celotex: April to August 2014

56.56 Jonathan Roome was a manager at Celotex whose work mainly related to sales.[1544] He joined Celotex in March 2014. On 28 April 2014, his colleague Jonathan Roper sent him information about the FR5000 range of products and the BS 8414 testing regime.[1545] Mr Roome then familiarised himself with Approved Document B and knew that there were particular requirements relating to high-rise buildings.[1546] He knew that if one wanted to follow the guidance in Approved Document B, a PIR product could be used in the external wall of a high-rise building only if it was of limited combustibility or formed part of a system that had undergone a BS 8414 test and met the criteria in BR 135.[1547] He was also aware that FR5000 and other PIR products were neither materials of limited combustibility nor had been tested in a system that had undergone a BS 8414 test and met the criteria in BR 135. They could therefore not be used in the external walls of buildings above 18 metres in height consistently with the guidance contained in paragraphs 12.5-12.7 of Approved Document B.[1548] He knew that there was a distinction between Class 0 materials and materials of limited combustibility[1549] and was aware of the tests which a material needed to pass to obtain that classification.[1550]

56.57 In about April 2014 Mr Roome became aware that Celotex was seeking to develop an insulation product that could be marketed for use in buildings above 18 metres in height.[1551] He understood that the new product (which was formally launched as RS5000

[1538] Rek {Day12/19:14-18}.
[1539] Rek {Day12/34:14-17}; {Day12/39:1-16}.
[1540] Rek {Day12/19:20-23}.
[1541] Rek {Day12/127:10}-{Day12/128:3}; {Day12/128:4-24}.
[1542] Rek {Day12/129:2-3}.
[1543] Sounes {Day20/51:2-10}.
[1544] Roome {Day69/7:6-10}.
[1545] {CEL00001200}; {CEL00001201}; {CEL00001203}.
[1546] Roome {Day69/32:15-20}.
[1547] Roome {Day69/39:16-22}.
[1548] Roome {Day69/19:22-24}; {Day69/20:2-10}; {Day69/39:12-15}; {Day69/30:11-15}.
[1549] Roome {Day69/36:10-15}.
[1550] Roome {Day69/25:19-23}.
[1551] Roome {Day69/43:16-25}.

in August 2014) was an equivalent product to Kingspan's K15, if not better.[1552] As we have already explained, RS5000 was simply FR5000 re-marketed with the supposed benefit of having successfully met the BR 135 criteria in a particular wall construction, but that fact was not known to Mr Roome, who had been led to believe by his seniors in the marketing department that it was a brand new product.

56.58 On 10 June 2014 Mr Roome telephoned Ben Bailey of Harley to discuss another of Harley's projects, Merit House.[1553] Ben Bailey wanted to know if Celotex had an alternative to Kingspan K15 that might be used at Merit House. Mr Roome said that because Merit House was a building above 18 metres in height Celotex did not have a suitable product, but that he would contact Harley once Celotex's 18 metre fire test was in hand. That was a reference to a BS 8414 test using RS5000 which had been carried out 2 May 2014, the results of which were awaited together with the BR 135 classification report.

56.59 By June 2014 Jonathan Roome was aware that Harley had been awarded two new overcladding projects in London[1554] and between early June and the end of August 2014 Celotex saw Harley as a potential customer for RS5000.[1555]

56.60 As a result of his conversation with Mr Roome on 10 June 2014, Ben Bailey knew that Celotex did not then have any insulation products available that could be used on buildings above 18 metres in height.[1556] When he began work on the Grenfell Tower project he read through those parts of the NBS Specification which he considered relevant to Harley's work.[1557] It did not occur to him, however, to question the specification of FR5000, despite knowing that Celotex did not have a suitable product.[1558]

56.61 Jonathan Roome met Ben Bailey on site at Merit House on 18 July 2014 when he was told that Grenfell Tower was one of Harley's prospective projects.[1559] Ben Bailey was under the impression by that time that Celotex was due to bring out an insulation product suitable for use above 18 metres[1560] which would be a competitor to Kingspan's K15.[1561] Mr Roome promised to be in touch when the result of the test involving RS5000 was available. According to Ben Bailey, Jonathan Roome was very keen to stay in contact about the RS5000 product and to secure two overcladding projects, including the Grenfell Tower refurbishment.[1562]

56.62 RS5000 was launched at a meeting on 5 August 2014 attended by a number of Celotex's employees, including Jonathan Roome.[1563] It was made clear to him that the reason RS5000 had (supposedly) been created and brought to market was for use on buildings above 18 metres in height and the communications strategy was to emphasise that it could be used on buildings of that kind.[1564] Mr Roome was provided with documents to pass on to potential customers,[1565] including a product data sheet for RS5000, a document entitled

[1552] Roome {Day69/163:14-22}.
[1553] {CEL00009874}.
[1554] Roome {Day69/160:14-21}.
[1555] Roome {Day69/174:8-13}.
[1556] And he knew that there were restrictions on insulation products being used on those buildings. Ben Bailey {Day39/55:15-25}; {Day39/56:1}.
[1557] Ben Bailey {Day39/64:21-25}; {Day39/65:1-19}.
[1558] Ben Bailey {Day39/66:16-21}; {Day39/68:13-25}; {Day39/69:3-7}.
[1559] {CEL00009875}.
[1560] Ben Bailey {Day39/61:4-20}.
[1561] Ben Bailey {Day39/58:5-13}.
[1562] {CEL00009875}; Ben Bailey {Day39/61:21-25}.
[1563] Roome {CEL00010031/7} page 7, paragraph 29; {CEL00009709}; {CEL00008668}.
[1564] Roome {Day69/48:19-24}; Roome {Day69/69:19-23}.
[1565] Rome {CEL00010031/2} page 2.

Rainscreen Cladding Compliance Guide and a document entitled *Rainscreen Cladding Specification Guide*.[1566] The purpose of the documents was to present RS5000 as a new product suitable for the insulation of buildings above 18 metres in height, which is what Mr Roome thought it was.[1567]

56.63 Having seen the documents, Mr Roome knew that RS5000 could not satisfy the requirements of paragraph 12.7 and table A7 of Approved Document B because it was not a material of limited combustibility.[1568] The construction of the system that had been tested on 2 May 2014, apparently successfully, was discussed at the presentation on 5 August 2014, from which he understood that the classification of RS5000 under BR 135 applied only to the system as tested and not to its individual components.[1569] He also knew that RS5000 could be used only in cladding systems that were identical to the system tested.[1570]

56.64 On 6 August 2014, Mr Roome sent Ben Sharman of Harley an email about RS5000 to which he attached a product comparison document, the rainscreen cladding compliance guide, the product datasheet and a rainscreen cladding datasheet.[1571] In his covering email he said,

> "I have the pleasure of informing you as of yesterday we have now launched the first PIR Board To Successfully Meet The Performance Criteria in BR 135 For Insulated Rainscreen Cladding Systems, Therefore Acceptable For Use In Buildings Above 18m in Height".

56.65 Jonathan Roome had taken that wording from a document prepared by Celotex's marketing team. It did not include the qualification that RS5000 was suitable for use on high-rise buildings only as part of a cladding system that was identical to the system that had been tested[1572] and therefore was, as he accepted, potentially misleading.[1573]

56.66 In his email of 6 August 2014 Mr Roome asked to visit Harley's offices to present the new product.[1574] Neither he nor any of Harley's witnesses could recall the precise date or circumstances in which that had occurred, but various conversations took place between Mr Roome, Daniel Anketell-Jones, and Ben Bailey about RS5000.[1575]

56.67 Ben Bailey told us that Jonathan Roome regularly visited Harley's offices and that he might have introduced RS5000 to a number of Harley's employees at different times.[1576] Mr Anketell-Jones, who was at that time the design manager at Harley, recalled a representative of Celotex visiting Harley's offices on a number of occasions to discuss RS5000, and more generally that Jonathan Roome visited the office every couple of weeks and perhaps 30 times a year.[1577] Jonathan Roome could not recall the number of visits to Harley's offices, but would visit the offices to obtain information on Harley's projects and

[1566] {CEL00007961}; {CEL00000012/2}; {CEL00000013}; Roome {Day69/100:23-25}; {Day69/101:1-5}.
[1567] Roome {CEL00010031/2} page 2, paragraph 6; {CEL00001237}.
[1568] Roome {Day69/95:16-20}.
[1569] Roome {Day69/52:1-9}.
[1570] Roome {Day69/98:8-13}.
[1571] {CEL00001237}; {CEL00001238}; {CEL00001239}; {CEL00001240}; {CEL00001241}.
[1572] Roome {Day69/167:20}-{Day69/168:10}.
[1573] Roome {Day69/168:7-10}.
[1574] {CEL00001237}.
[1575] Roome {Day69/190:15-25}; Ray Bailey {HAR00010184/29} page 29; Anketell-Jones {HAR00010149/6} page 6; Ben Bailey {Day39/63:14-17}; {Day39/64:4-7}; {Day39/75:15-25}; {Day39/76:1-11}.
[1576] Ben Bailey {Day39/63:14-17}; {Day39/64:4-7}; {Day39/75:15-25}; {Day39/76:1-11}; {Day39/76:20-21}; {Day39/77:1-4}.
[1577] Anketell-Jones {HAR00010149/6} page 6; Anketell-Jones {Day36/77:6-9}.

organise his sales pipeline.[1578] As at August 2014, Celotex was working on two projects for Harley (neither of them high-rise buildings) and Jonathan Roome hoped that Celotex could secure more work from Harley.[1579]

Harley's understanding of the fire performance of Celotex RS5000

56.68 Ray Bailey said that because RS5000 was a new product, Harley had wanted to be sure that it was safe[1580] and suitable for the Grenfell Tower project.[1581] He said that Celotex had been keen to emphasise that it complied with BS 8414 and was suitable for buildings over 18 metres in height.[1582]

56.69 Daniel Anketell-Jones recalled that Jonathan Roome had made a sales pitch for RS5000, the essence of which had been that it was the first product suitable for use on buildings over 18 metres in height,[1583] as claimed in Celotex's communications strategy.[1584] He also recalled seeing the marketing brochures provided to him by Mr Roome and recognised the pink branding on the documents.[1585] He did not, however, read those brochures; he simply passed them on to others.[1586]

56.70 Ray Bailey said it had been Mr Anketell-Jones' responsibility to examine the components of the cladding shown in the NBS Specification to check that they complied with the relevant statutory requirements[1587] and thought that he had done so.[1588] Mr Bailey himself just assumed that they were compliant and did not check for himself.[1589] He was aware of the guidance in Approved Document B that the insulation should be of limited combustibility and thought that Celotex's products were materials of limited combustibility because they were rated Class 0.[1590] He thought that a Class 0 material was safe to use on any part of a building above 18 metres.[1591] He was aware of the distinction between Class 0 and limited combustibility, and of the fact that additional tests were required to establish the latter,[1592] but he appears to have regarded them largely as interchangeable concepts.[1593] For example, he thought that Class 0 related to the outside of a product but that if it were described as Class 0 "throughout", that meant the product as a whole was of limited combustibility.[1594] He was wrong about that, as he accepted,[1595] and was therefore wrong in thinking that Celotex products were materials of limited combustibility.[1596]

56.71 Mr Anketell-Jones had no recollection of the insulation products that were used on Grenfell Tower. He did not recall that the NBS Specification had required Celotex FR5000[1597] and said that he had become aware of the products used only from media reports

[1578] Roome {Day69/174:15-23}.
[1579] Roome {Day69/175:2-16}.
[1580] Ray Bailey {Day33/68:23-25}.
[1581] Ray Bailey {Day33/69:6-8}.
[1582] Ray Bailey {Day32/16:21-24}.
[1583] Anketell-Jones {HAR00010149/6} page 6; Anketell-Jones {Day36/79:2-13}; {Day36/88:6-9}.
[1584] Roome {Day69/177:14-17}.
[1585] Anketell-Jones {HAR00010149/6} page 6.
[1586] Anketell-Jones {Day36/93:15-25}; {Day36/94:1-3}; {Day36/97:24-25}; {Day36/98:1-6}.
[1587] Ray Bailey {Day32/51:4-13}.
[1588] Ray Bailey {Day32/51:4-13}; {Day32/17:21}-{Day32/18:1}.
[1589] Ray Bailey {HAR00010184/8} page 8, paragraph 31.
[1590] Ray Bailey {Day33/22:12-15}.
[1591] Ray Bailey {Day33/6:18-25}.
[1592] Ray Bailey {Day33/9:2-9}.
[1593] Ray Bailey {Day33/10:6-8}.
[1594] Ray Bailey {Day33/12:12-15}; {Day33/13:3-10}; {Day33/14:7-12}; {Day33/15:8-11}; {Day33/11:7-9}.
[1595] Ray Bailey {Day33/19:2}.
[1596] Ray Bailey {Day33/21:3-7}; {Day33/23:2-24}.
[1597] Anketell-Jones {Day36/70:21-24}.

following the fire.[1598] He said that he had not known what "PIR" meant but considered it to be a better performing kind of insulation.[1599] He thought that Class 0 meant that a material could not catch fire.[1600] He did not investigate the materials provided in the NBS Specification to see whether they complied with the Building Regulations[1601] because he did not regard that as part of his job. He said that it had been his practice to send technical information about materials to a project's design team and building control for approval. He had not done so in the case of the Grenfell Tower project because he did not consider himself to be the main designer;[1602] that role was being performed by Studio E and building control.[1603] Mr Anketell-Jones was not aware that anyone at Harley had considered the suitability of FR5000 for the refurbishment.[1604]

56.72 Daniel Anketell-Jones was not aware that RS5000 had been tested as part of a particular cladding system or that the cladding system proposed for Grenfell Tower differed from that which had been tested.[1605] He knew nothing about the BS 8414 test or BR 135 classification and did not form any view about whether testing under those regimes meant that RS5000 could be used on Grenfell Tower.[1606] As a result of what he had been told by Jonathan Roome and what he had read on the front of the Celotex literature,[1607] he thought that RS5000 could be used on any building above 18 metres in height, regardless of the other components of the external wall.[1608] It is likely that Mr Roome pointed out the key aspects of Celotex's marketing literature to Mr Anketell-Jones,[1609] although he could not recall talking through the RS5000 specification or compliance guides with anyone at Harley or explaining the test regime.[1610] Certainly no steps were taken by Mr Anketell-Jones to satisfy himself independently that RS5000 was suitable for use in buildings above 18 metres in height,[1611] a claim which he took at face value.[1612] He did not trouble to read the RS5000 sales literature and did not see the qualifications and warnings.[1613]

56.73 Ben Bailey also remembered the pink branded Celotex marketing literature, but was unsure whether he had read it,[1614] although he did remember that the marketing literature had said that RS5000 was Class 0 throughout.[1615] He said he had seen the product comparison sheet or the rainscreen cladding specification guide[1616] and was unsure whether he had seen the rainscreen cladding compliance guide.[1617] He said that he had not been aware that RS5000 would comply with Approved Document B in relation to buildings above 18 metres in height only if it was used as part of a cladding system that corresponded exactly with the one tested.[1618]

[1598] Anketell-Jones {Day36/69:1-9}; {Day36/78:3-20}.
[1599] Anketell-Jones {Day36/89:4-18}.
[1600] Anketell-Jones {Day36/92:7-14}.
[1601] Anketell-Jones {Day36/63:19-23}.
[1602] Anketell-Jones {Day36/65:9-21}.
[1603] Anketell-Jones {Day36/71:10-22}.
[1604] Anketell-Jones {Day36/71:14-17}.
[1605] Anketell-Jones {Day36/96:4-25}; {Day36/97:1}; {Day36/104:8-11}.
[1606] Anketell-Jones {Day36/95:8-25}; {Day36/96:1-3}.
[1607] Anketell-Jones {Day36/91:6-13}; {CEL00007961}.
[1608] Anketell-Jones {Day36/90:10-13}.
[1609] Anketell-Jones {Day36/93:15-25}; {Day36/94:1-3}; {Day36/97:24-25}; {Day36/98:1-6}.
[1610] Roome {Day69/174:7-10}; {Day69/177:24-25}; {Day69/178:1-7}.
[1611] Anketell-Jones {Day36/79:14-25}; {Day36/80:1-5}.
[1612] Anketell-Jones {Day36/80:6-10}.
[1613] Anketell-Jones {Day 36/98:20}-{Day36/99:12}.
[1614] Ben Bailey {Day39/78:20-24}.
[1615] Ben Bailey {Day39/79:2-5}.
[1616] {CEL00000007}; {CEL00000013} which formed part of the package of documents sent by Jonathan Roome to Daniel Anketell-Jones on 27 August 2014 {CEL00011960}; Ben Bailey {Day39/82:10-17}; {Day39/82:1-24}.
[1617] {CEL00000012}; Ben Bailey {Day39/81:18-25}; {Day39/83:6-14}.
[1618] Ben Bailey {Day39/83:21-25}; {Day39/84:1}.

56.74 Jonathan Roome did not discuss with anyone at Harley the differences between FR5000 and RS5000, despite the fact that FR5000 rather than RS5000 had been included in the NBS Specification which Mr Anketell-Jones had seen.[1619] Similarly, Mr Roome did not point out to anyone at Harley that RS5000 could be used only on buildings over 18 metres in height if the cladding system corresponded exactly to the one that had been tested.[1620] Neither Harley nor Celotex made a comparison between the cladding system tested and the cladding system proposed for Grenfell Tower.[1621]

56.75 Jonathan Roome accepted that the limited relevance of the BS 8414 test involving RS5000 was important and that it was important that Harley understood it. He accepted, however, that he had not specifically drawn Mr Anketell-Jones's attention to it. His excuse was that Mr Anketell-Jones was a specialist and that he had thought he understood it from the information contained in the marketing literature Harley had been given.[1622] Mr Roome did not insist on seeing the composition of the cladding system proposed for Grenfell Tower to enable him to advise Harley whether RS5000 was suitable,[1623] nor did he point out to anyone at Harley that FR5000 might not be safe to use on buildings over 18 metres in height.[1624] Harley did not ask Mr Roome for information about the BS 8414 test beyond that which was contained in the marketing literature and Mr Roome did not volunteer any.[1625]

Handover to Neil Crawford: August 2014

56.76 Neil Crawford began work on the Grenfell Tower project in about July 2014.[1626] In about August 2014, Bruce Sounes had a handover meeting with him.[1627] It is likely that Mr Sounes gave Mr Crawford a general description of the NBS Specification during the handover.[1628] When Mr Crawford started work on the project, therefore, FR5000 was the insulation product included in the NBS Specification. Neil Crawford could not recall whether Mr Sounes had told him that FR5000 had been specified as the insulation to be used within the external facade, but it is likely that he had read Max Fordham's Stage C report and had seen the reference to it there.[1629]

56.77 Mr Crawford accepted that it had been the architect's duty to ensure that the insulation complied with the Building Regulations[1630] and told us that based on his knowledge of Bruce Sounes' work he would have expected Mr Sounes to have checked that FR5000 was suitable before completing the Employer's Requirements.[1631] Mr Crawford said that although he did not have any conversations with Mr Sounes about the suitability of FR5000 for use in the external wall, he had gained the impression that Mr Sounes was firm

[1619] Roome {Day69/199:18-25}; {Day69/200:1-2}.
[1620] Roome {Day69/178:19-25}; {Day69/200:3-12}; Anketell-Jones {Day 36/97:9-20}; {Day36/98:7-22}; {Day36/99:13-24}. Harley never asked Jonathan Roome to explain the precise differences between the system as tested and the proposed cladding system for Grenfell Tower. Roome {Day69/126:22-25}; {Day69/127:1-4}. Jonathan Roome did not qualify the suitability of RS5000 on buildings above 18 metres with any caveats.
[1621] Roome {Day69/201:6-11}; Anketell-Jones {Day36/81:17-19}; {Day36/96:24}-{Day69/97:2}.
[1622] Roome {Day69/179:4-20}; {Day69/200:13-16}; {Day69/201:3-5}; {Day69/200:13-20}; Anketell-Jones {Day36/79:4-8}.
[1623] Roome {Day69/127:5-8}.
[1624] Anketell-Jones {Day36/79:11-13}.
[1625] Roome {Day69/192:7-18}.
[1626] Crawford {Day9/116:19-21}.
[1627] Crawford {Day9/49:23}-{Day9/50:3}. Neil Crawford was working on the project between July and August 2014, but his involvement had been minimal: Crawford {Day9/50:4-9}.
[1628] Crawford {Day9/136:21}-{Day9/137:3}.
[1629] Crawford {Day9/135:15}-{Day9/136:5}. Neil Crawford said that he would probably have read that Stage C report when he came on to the project. Crawford {Day9/136:9-14}.
[1630] Crawford {Day10/124:11-20}.
[1631] Crawford {Day9/140:7-11}.

in his view that it was suitable,[1632] although he could not recall his saying it in terms.[1633] Bruce Sounes, however, could not recall any conversation with Neil Crawford in which he had expressed any view about the suitability of FR5000.[1634] In our view it is unlikely that by then Mr Sounes had any lingering doubts about using FR5000, and we therefore doubt that he had any reason to express a view of any kind about the suitability of FR5000 for use in the cladding system.

56.78 Neil Crawford had some recollection of having seen the product datasheet for FR5000 but could not recall when he first saw it.[1635] At all events, he did not take any steps to check it when he learnt that FR5000 had been specified for use in the external wall.[1636]

The change from FR5000 to RS5000: August to September 2014

56.79 On 27 August 2014 Jonathan Roome sent an email to Daniel Anketell-Jones attaching further information about RS5000.[1637] Mr Roome sent Mr Anketell-Jones a product comparison document, the product datasheet, the LABC Registered Details drawing and document list and certificate, a four-page version of the BRE Global Classification Report on a system which included 100mm RS5000 insulation board, the rainscreen cladding compliance guide, and the rainscreen cladding specification guide.[1638] Mr Roome was not aware at that time that the full BRE report ran to 12 pages and neither he nor Mr Anketell-Jones noticed that the four-page report was only a part of the document.[1639]

56.80 Mr Anketell-Jones said that at that time the only thing he knew about insulation was U-values,[1640] but despite his lack of knowledge about the fire performance of different kinds of insulation and his assertion that he would normally send technical information to others for their consideration,[1641] he did not send the package of documents he received from Mr Roome to anyone else within Harley or the wider design team because he did not regard himself as the designer.[1642]

56.81 Shortly after receiving the documents from Mr Roome, Mr Anketell-Jones carried out U-value calculations for FR5000 using a piece of software called "BuildDesk".[1643] On or around 28 August 2014 Mr Anketell-Jones and Mr Roome discussed those calculations. Mr Roome recorded their discussions in a note in which he recorded that Mr Anketell-Jones had said that the calculations had been performed using FR5000 but that he needed to use RS5000 at a thickness of 150mm.[1644] That is the first reference we have seen to the use of RS5000 in place of FR5000 at Grenfell Tower.

56.82 Daniel Anketell-Jones was emphatic that he had not selected RS5000 for use at Grenfell Tower.[1645] He explained that the NBS Specification as drawn up by Studio E was a prescriptive specification and the insulation product, RS5000, had been prescribed by

[1632] Crawford {Day9/139:14-24}; {Day10/51:11-14}.
[1633] Crawford {Day9/140:3-6}.
[1634] Sounes {Day20/73:5-17}.
[1635] {SEA00005841}; Crawford {Day9/142:1-12}.
[1636] Crawford {Day9/142:14-19}.
[1637] {CEL00011960}.
[1638] {CEL00011960}; {CEL00000007}; {CEL00000411}; {CEL00011963}; {CEL00011415}; {CEL00011965}; {CEL00011966}; {CEL00000418}.
[1639] Roome {Day69/209:10-19}; {Day69/213:2-9}; {Day69/213:10-12}.
[1640] Anketell-Jones {Day36/87:1-15}.
[1641] Anketell-Jones {Day36/93:15-25}; {Day36/94:1-3}; {Day36/97:24-25}; {Day36/98:1-6}.
[1642] Anketell-Jones {Day36/88:13-19}.
[1643] Anketell-Jones {Day36/106:5-23}.
[1644] {CEL00001451}.
[1645] Anketell-Jones {Day36/173:2-4}.

Studio E.[1646] However, that was plainly wrong. Studio E had specified FR5000, not RS5000, and Mr Anketell-Jones, like others at Harley, had no reason to think that they were the same product, especially in circumstances where Mr Roome himself thought that they were not. Mr Anketell-Jones thought, without any obvious foundation, that by pressing on with RS5000 Harley was simply adhering to Studio E's specification. He believed that Studio E had already checked that RS5000 was suitable before it sent the NBS Specification to Harley[1647] and assumed that it had been the subject of desktop studies.[1648] We doubt that he did think that at the time, not least because if he had done so his mistake would have been obvious. The NBS Specification had been completed in January 2014, about eight months before the launch of RS5000. Studio E could not have checked the suitability of RS5000 before the NBS Specification had been finalised because the product did not then exist under that name. We reject Mr Anketell-Jones' evidence about his reason for adopting RS5000 in place of FR5000, although we find it impossible to know what he actually thought at the time, if indeed he turned his mind to the point at all.

56.83 It is unlikely that Jonathan Roome expressly advised Harley that RS5000 was suitable for Grenfell Tower,[1649] but he accepted that he knew Grenfell Tower was over 18 metres in height[1650] and that he might well have told Mr Anketell-Jones that the product was suitable for use on such buildings because it was the only product available for that application.[1651]

56.84 Mr Anketell-Jones said that at some point he had been told that FR5000 could not be used but that RS5000 was equivalent,[1652] but he could not recall when he was told that or by whom. He said that the only reason that RS5000 would have been put forward on any project was because it was appropriate for use above 18 metres and was one of the few insulation materials that were capable of achieving the high performance required.[1653] In his mind, there was no difference between FR5000 and RS5000.[1654] However, although he was quite right about that, he had no reason to think so. There had been no conversations between Harley and Celotex which could justify his coming to that view; indeed, quite the opposite. He thought that RS5000 was a new product,[1655] not least because that was exactly what Jonathan Roome had told him. For his part, Mr Roome did not know otherwise, having been induced to think that RS5000 was indeed a new product by those at Celotex who briefed the marketing department. In circumstances where RS5000 was being marketed as a new product there is no credible basis on which Mr Anketell-Jones could have thought that it was the same as FR5000 and that there was therefore no need to investigate its fire performance.

56.85 Harley did not consider whether another insulation product, such as a mineral wool, might be more appropriate for use on the project. Mr Anketell-Jones explained that RS5000 had been specified by Studio E and that Harley was not considering any alternative products.[1656] He was not aware whether the fact that RS5000 was rated Class 0 had affected the decision

[1646] Anketell-Jones {Day36/116:13-17}; {Day36/141:13-16}; {Day36/149:18-19}; {Day36/173:2-4}.
[1647] Anketell-Jones {Day36/102:2-12}; {Day36/93:5-13}; {Day36/141:22-25}; {Day36/142:1}.
[1648] Anketell-Jones {Day36/102:13-19}.
[1649] Roome {Day69/191:10-13}.
[1650] Roome {Day69/191:5-9}.
[1651] Roome {Day69/200:3-6}.
[1652] Anketell-Jones {Day36/113:8-13}.
[1653] Anketell-Jones {Day36/154:2-8}.
[1654] Anketell-Jones {Day36/108:1-6}.
[1655] Anketell-Jones {Day36/102:13-19}.
[1656] Anketell-Jones {Day36/119:1-7}.

to use it,[1657] but even so, a change from FR5000 to RS5000 ought to have led Harley to investigate why FR5000 had originally been specified, why RS5000 was being substituted and whether it was a suitable product for use on the tower.

56.86 Daniel Anketell-Jones did not ask Rydon or Studio E whether they were happy with the use of RS5000[1658] because he did not consider himself to be the design manager on the project.[1659] He thought that was Ben Bailey's or Kevin Lamb's job as designer[1660] and assumed as a result of having worked with him before that Mr Lamb knew that was his responsibility.[1661] He said that he had expected Kevin Lamb to tell Studio E about the proposed use of RS5000 so that it could check its suitability and Rydon to have then checked with Building Control,[1662] but he did not tell Mr Lamb that that was his responsibility.[1663] For reasons explained below, we do not accept Mr Anketell-Jones' explanation of his role at Harley; in particular, we do not accept that it was as limited as he suggested.

56.87 Daniel Anketell-Jones did not have any conversation with Kevin Lamb about the use of RS5000 and did not show him the Celotex documents. He could not explain how Mr Lamb could possibly have been aware of the change from FR5000 to RS5000 to enable him to check the position.[1664] He did not know who at Harley was responsible for reading the Celotex specification guide for RS5000 and suggested that, if Mr Lamb had satisfied himself that RS5000 had been checked by Studio E and Building Control, he would not need to have read it.[1665]

56.88 Kevin Lamb was told on 12 August 2014 at his initial meeting with Ray Bailey and Daniel Anketell-Jones that the insulation to be used in the external wall was a rigid PIR-type material. He could not recall whether Celotex had been specifically mentioned but assumed that a product of that kind had been selected.[1666] He did not recall seeing FR5000 in the NBS Specification.[1667] There was no discussion between Kevin Lamb and either Mr Bailey or Mr Anketell-Jones about the specification of the insulation product; he was simply told which product had been selected.[1668]

56.89 Kevin Lamb had not previously used a product like Celotex in a rainscreen cladding system.[1669] He did not see it as his responsibility to provide advice on compliance with the relevant regulatory requirements, although he said that he had had a brief look at literature relating to the use of Celotex on buildings over 18 metres in height and a brief look at the guidance published by the CWCT.[1670] He knew that there was a difference between Class 0 and limited combustibility,[1671] but he was not aware that limited combustibility was defined by reference to specific tests.[1672] He did not consider the difference and

[1657] Anketell-Jones {Day36/93:5-13}.
[1658] Anketell-Jones {Day36/108:17-25}.
[1659] Anketell-Jones {Day36/80:15-17}.
[1660] Anketell-Jones {Day36/108:17-25}.
[1661] Anketell-Jones {Day36/66:11-14}; {Day36/74:1-12}; {Day36/105:11-16}; {Day36/73:15-25}; {Day36/73:15-25}.
[1662] Anketell-Jones {Day36/79:14-25}; {Day36/80:1-5}.
[1663] Anketell-Jones {Day36/65:20-25}; {Day36/66:1-10}.
[1664] Anketell-Jones {Day36/109:2-7}.
[1665] Anketell-Jones {Day36/94:4-12}.
[1666] Lamb {Day37/77:6-13}; {Day37/81:8-24}.
[1667] Lamb {Day38/33:25}.
[1668] Lamb {Day37/78:25}-{Day37/79:22}.
[1669] Lamb {Day37/80:5-6}.
[1670] Lamb {Day37/130:2-13}.
[1671] Lamb {Day38/83:9-12}.
[1672] Lamb {Day38/83:22-25}; {Day38/84:1-2}.

assumed that if a material was rated Class 0 it was suitable for use.[1673] He did not know that to comply with paragraph 12.7 of Approved Document B insulation materials used on buildings above 18 metres in height should be materials of limited combustibility.[1674] He did not consider it part of his responsibility to review the insulation for compliance with the Building Regulations or Approved Document B.[1675] He therefore read the Celotex Rainscreen Cladding Compliance Guide only to review the type of fixings it required within the cladding system.[1676]

56.90 Ben Bailey was not familiar with RS5000 but said he had thought that it had always been intended to use it on Grenfell Tower.[1677] He thought (though why is not clear) that Studio E had chosen RS5000 for use on Grenfell Tower and possibly that "FR" had been a typographical error in the NBS Specification.[1678]

56.91 Ben Bailey told us that there he had had a conversation with Neil Crawford in which he had questioned the choice of FR5000 because he had been under the impression that RS5000 was to be used. He said that Neil Crawford had told him that RS5000 had been chosen, which he understood to mean that RS5000 should have been specified and that it was Studio E's intention that RS5000 rather than FR5000 be specified.[1679] Ben Bailey said that there had been no discussion between them about the suitability of either FR5000 or RS5000 for use in buildings above 18 metres in height.[1680] He said that he had not told Mr Crawford that RS5000 was a new product nor had he asked him whether it complied with the Building Regulations. Neil Crawford merely confirmed, he said, that there was a typographical error in the NBS Specification; he therefore assumed that Studio E had checked the suitability of RS5000.[1681]

56.92 The difficulty with Ben Bailey's evidence is, again, that the last version of the NBS Specification was dated 30 January 2014, some eight months before the launch of RS5000. Studio E therefore cannot have intended to specify RS5000. In response to that difficulty, Mr Bailey said that he had misremembered the conversation and changed his evidence to say that Neil Crawford had confirmed his expectation that RS5000 should be the chosen product.[1682] Ben Bailey did not take any steps to amend the NBS Specification[1683] and he did not ask whether anyone had checked that RS5000 was suitable. He assumed that Studio E had done that.[1684] He did not consider whether a different kind of insulation might be more suitable for use on Grenfell Tower;[1685] nor did he consider whether the use of a PIR product rather than a mineral wool product might affect fire safety.[1686]

[1673] Lamb {Day38/83:16-17}.
[1674] Lamb {Day37/150:2-4}.
[1675] Lamb {Day37/160:15-18}; {Day37/165:13-18}; {Day37/170:4-8}.
[1676] {CEL00002047}; Lamb {HAR00010419/14} page 14; Lamb {Day38/36:20-25}; {Day38/37:1-5}.
[1677] Ben Bailey {Day39/71:13-15}; {Day39/70:19-23}; {Day39/69:6-7}.
[1678] Ben Bailey {Day39/70:19-23}; {Day39/69:6-7}.
[1679] Ben Bailey {Day39/67:6-25}; {Day39/68:1-11}; {Day39/71:3-4}.
[1680] Ben Bailey {Day39/69:8-23}.
[1681] Ben Bailey {Day39/73:6-21}. Albeit that Ben Bailey could not recall the exact words used by Neil Crawford. Ben Bailey {Day39/73:20-21}.
[1682] Ben Bailey {Day39/74:4-13}.
[1683] Ben Bailey {Day39/74:15-20}.
[1684] Ben Bailey {Day39/72:6-17}; {Day39/72:10}-{Day39/73:2}.
[1685] Ben Bailey {Day39/141:23-25}; {Day39/142:1}.
[1686] Ben Bailey {Day39/143:2-5}.

56.93 If Ben Bailey did have a conversation with Neil Crawford of the kind he described, he did not tell anyone at Harley about it. Nor did he mention it in his witness statement. Neil Crawford did not mention any such conversation and there is no indication in the documents that Studio E expected RS5000 to be used. For those reasons we do not accept Ben Bailey's evidence on that matter.

56.94 Ray Bailey thought that RS5000 was a new product and not a rebranded version of FR5000[1687] because that is what Celotex had told him. He told us that either Ben Bailey or Daniel Anketell-Jones had communicated the change to Studio E and that Neil Crawford had then accepted it.[1688] He said it had been Harley that had pointed out that there was a difference between FR5000 and RS5000 and that RS5000 needed to be accepted to enable it to be used.[1689] His evidence is at least consistent with the fact that Mr Roome thought that the RS5000 was a new product different from FR5000.

56.95 Ray Bailey was not aware of any discussions between Ben Bailey or Daniel Anketell-Jones and Studio E about the substitution of FR5000 with RS5000[1690] and he did not himself speak to Neil Crawford or anyone else at Studio E about the change.[1691] None of the other Harley witnesses and none of the Studio E witnesses suggested that Neil Crawford, or anyone else at Studio E, had been informed of the change from FR5000 to RS5000 or that Studio E had accepted RS5000 for use on Grenfell Tower, as Mr Bailey maintained. We are therefore unable to accept Ray Bailey's evidence on this question. We conclude that Studio E never investigated the suitability of RS5000 for use at Grenfell Tower and did not accept its use.

56.96 Looking at the evidence as a whole, we are satisfied that Jonathan Roome did tell Daniel Anketell-Jones that RS5000 was suitable for use in buildings above 18 metres in height. That was consistent with Celotex's communications strategy and with the evidence given by both Mr Anketell-Jones and Mr Roome himself. We think it unlikely, however, that Mr Roome gave any assurance that RS5000 was suitable for use in the specific cladding system being proposed for Grenfell Tower. None of the witnesses could recall any conversation with Celotex about the proposed construction of the external wall and, at least in September 2014, Mr Roome had not seen any relevant drawings or specifications. He therefore had no basis for giving any specific assurance. Indeed, given the presence in the marketing literature of the warning that the BR 135 classification applied only to the system as tested, we think it unlikely that Mr Roome would have given an assurance of that kind in circumstances where there was a risk that someone in the design team might eventually read it and challenge him.

56.97 As it turned out, there was no discussion about that warning. No one at Harley read the marketing literature carefully or sent it to Studio E or Exova to comment on. Harley did not ask Celotex or Studio E whether a desktop study had been done to support the use of RS5000 and did not inquire whether any other members of the design team had asked for a desktop study or other assessment to support the proposed system.[1692] Daniel Anketell-Jones simply accepted what Jonathan Roome had told him about the suitability of RS5000 for use on buildings above 18 metres in height and assumed that it complied with the relevant statutory requirements. On that basis he told Mr Roome that RS5000 was needed for use at Grenfell Tower.[1693]

[1687] Ray Bailey {Day33/65:3-10}.
[1688] Ray Bailey {Day33/75:2-7}.
[1689] Ray Bailey {Day33/74:16-23}; Ray Bailey {HAR00010184/8} page 8, paragraph 31.
[1690] Ray Bailey {Day33/75:8-17}.
[1691] Ray Bailey {Day33/76:7-10}.
[1692] Anketell-Jones {Day36/101:12-21}.
[1693] {CEL00001451}.

56.98 Although Jonathan Roome was canny enough to avoid giving any specific assurance to Harley that RS5000 was suitable for use on Grenfell Tower, we think he suspected that Harley had not understood the warning in Celotex's marketing literature. He certainly never drew Harley's attention to it, which was consistent with Celotex's marketing strategy to downplay it and tuck it away in the small print.[1694]

56.99 There was a design team meeting on 2 September 2014 at which U-values were discussed with Rydon. The question arose whether they needed to be rechecked from an M&E and insulation point of view.[1695] After a discussion everyone agreed to check their calculations. Neil Crawford did not know why Rydon had wanted to recheck the U-values; he understood that they had been derived from Max Fordham's advice but did not recall in any detail how the target had been established.[1696] Daniel Anketell-Jones and Kevin Lamb also attended that meeting and Mr Anketell-Jones checked the U-values by making another calculation using the "BuildDesk" software.[1697] This time he used RS5000 in the calculation,[1698] but that did not prompt him to consider its fire safety.[1699]

Harley's Request for Information: September 2014

56.100 On 17 September 2014, Daniel Anketell-Jones sent a formal Request for Information to Rydon and Studio E about the extent to which horizontal fire breaks were required within the cladding.[1700] In summary, Harley believed that horizontal firebreaks might be required at every floor level but not in the area between the windows, because there was no "chimney effect" at that location. Daniel Anketell-Jones accepted that he had drafted the request[1701] but said that he had been asked by someone else to send it and had not fully understood the point. However, he could not remember who had asked him to send it[1702] and said that he did not know what analysis had been done to support it.[1703] We do not accept his evidence on this point. We think he drafted the request in his role as Harley's design manager, part of which did involve considering the fire performance of the external walls which Harley was designing.

56.101 Neil Crawford sent the request to Terence Ashton of Exova and asked him to comment on Daniel Anketell-Jones' "interpretation".[1704] Exova was then provided with some Harley drawings and Mr Ashton replied on 18 September 2014 saying that if the insulation in the cavities behind the rainscreen cladding were combustible it would be necessary to provide cavity barriers even if there was no continuous cavity from the top to the bottom of the building.[1705] As we have explained in Chapter 54, that advice was incorrect in so far as it implied that combustible insulation could be used provided cavity barriers were installed.

[1694] This is consistent with Mr Roome's internal slides of 11 February 2015 {CEL00003544}.
[1695] {SEA00011581/4}; {RYD00017128}. A post-meeting note states that the "Max Fordham tender U-value document was shared to team via email".
[1696] Crawford {Day10/66:9}-{Day10/67:4}.
[1697] Anketell-Jones {Day36/118:11-19}.
[1698] {CEL00000030}.
[1699] Anketell-Jones {Day36/118:23-25}.
[1700] {HAR00003638/4}; {EXO00001291}.
[1701] Anketell-Jones {Day36/156:25}.
[1702] Anketell-Jones {Day36/157:6-18}.
[1703] Anketell-Jones {Day36/158:10-13}.
[1704] {HAR00003638/4}.
[1705] {HAR00003638/3}.

56.102 Neil Crawford sent that email on to Daniel Anketell-Jones the same day.[1706] Mr Anketell-Jones said that he had read Mr Ashton's response but formed no view about it.[1707] He did not question why Mr Ashton appeared to be linking the combustibility of the insulation to the requirement for cavity barriers.[1708] Mr Anketell-Jones replied to Mr Crawford and Rydon the same day saying that because the insulation was Class 0, he thought that a fire barrier (i.e. a cavity barrier) in those locations would not be necessary and asking for confirmation.[1709] He attached the RS5000 product datasheet to his email.[1710] That appears to have been the first time that Studio E had been informed of the change from FR5000 to RS5000.[1711]

56.103 Daniel Anketell-Jones told us that his message showed that he did not understand fire classifications or know where cavity barriers were required and that he believed that it was the responsibility of the consultants to tell Harley where they needed to be installed.[1712] We do not accept that Mr Anketell-Jones was as naïve and ignorant as he pretended. In that email, he was giving his opinion of the fire classification of the insulation (Class 0) and whether that meant that fire barriers were necessary in certain locations. It reflects his view of what was meant by Class 0. He said he had not checked his opinion with any of his colleagues or against any published guidance[1713] because he was concerned only with matters of structural engineering.[1714] It is certainly true that he did not check his opinion with anyone else or against any available guidance, but we doubt whether he made any positive decision not to do so.

56.104 Daniel Anketell-Jones said that he had looked at the product datasheet, had seen that RS5000 was rated Class 0, and had passed that on to Studio E and Rydon.[1715] Neil Crawford then asked Mr Ashton to provide his view on whether Class 0 insulation obviated the need for cavity barriers in certain locations.[1716] In response Mr Ashton pointed out that a material which has a Class 0 rating is not necessarily non-combustible although the reverse is invariably true and that it was therefore necessary to prevent the spread of fire from one flat to the flat above. It was not clear from the information he had been given whether there was a continuous cavity from top to bottom in any part of the cladding, irrespective of the type of insulation.[1717]

56.105 Mr Anketell-Jones did not give any consideration to Mr Ashton's advice that, in summary, a Class 0 insulation may not be sufficient for fire safety.[1718] Even having read that advice, it did not occur to him to question whether RS5000 was suitable, as he continued to believe that RS5000 had already been approved by Studio E, building control, and the fire engineer.[1719]

56.106 We have already concluded that Daniel Anketell-Jones' professed understanding was wrong and that RS5000 had not been checked for suitability by Studio E, nor had Studio E confirmed that RS5000 was suitable for use at Grenfell Tower. Mr Anketell-Jones' belief that the fire engineer had already approved RS5000 makes little sense, given that Exova itself

[1706] {HAR00003638/2}.
[1707] Anketell-Jones {Day36/162:1-3}.
[1708] Anketell-Jones {Day36/162:3-8}.
[1709] {HAR00003638/1}.
[1710] {HAR00012103}; {HAR00012104}.
[1711] Anketell-Jones {Day36/163:24-25}; {Day36/164:1-2}.
[1712] Anketell-Jones {Day36/164:25}; {Day36/165:1-4}.
[1713] Anketell-Jones {Day36/167:2-7}.
[1714] Anketell-Jones {Day36/167:7}.
[1715] Anketell-Jones {Day36/166:18-24}.
[1716] {HAR00003638/1}.
[1717] {EXO00001430}.
[1718] Anketell-Jones {Day36/170:13-22}.
[1719] Anketell-Jones {Day36/171:1-5}; {Day36/171:11-12}.

was inquiring about the type of insulation to be used in the external wall. It is clear that Exova did not know what insulation it was proposed to use and so could not have already approved it. Accordingly, we reject Mr Anketell-Jones' evidence that he thought that RS5000 had already been approved by Exova. In fact, at no stage did he raise with anyone at Rydon, Studio E or Exova the combustibility of the insulation,[1720] nor did he take any steps following the Request for Information to investigate whether RS5000 complied with the Building Regulations or the guidance in Approved Document B.[1721]

56.107 Although Neil Crawford was right to refer some of those questions to Exova, he regarded himself as little more than a post-box and failed to ask himself the question whether the switch to RS5000 was appropriate for Grenfell Tower. Once Studio E had been put on notice that an apparently new product was being proposed, it should have ensured that its fire performance was appropriate. Mr Crawford admitted that he had effectively taken it on trust from Harley that it was.[1722] He also said that he had read the Celotex literature and was convinced that it was suitable for use,[1723] but, if he did read it, he failed to notice that the product was not of limited combustibility[1724] or that the system that Celotex had tested was not the same as the one intended for installation on the tower.[1725] We accept Mr Hyett's opinion that Studio E's approach fell below the standards to be expected of a reasonably competent architect exercising reasonable skill and care.[1726]

Harley's request for technical information in respect of RS5000: January 2015

56.108 On 16 January 2015, Daniel Anketell-Jones sent an email to Jonathan Roome seeking help with what he described as a "headache" and asking for the test results and certificates for RS5000.[1727] Mr Anketell-Jones said that another client[1728] wanted to know how RS5000 had been installed when it had been tested in accordance with BS 8414, how it had been fixed, what it had been covered with, and what cladding and supporting structure had been used. The client also wanted to see the certificates and results for the test to BS 476 Part 7. It did not occur to Daniel Anketell-Jones that no one at Harley had asked the same questions in relation to the Grenfell project. Mr Anketell-Jones also said that Harley had been hoping to use RS5000 on most of its other cladding projects and therefore wanted to have the information about testing to hand.

56.109 Mr Roome in turn sought the BS 476 test reports from a colleague at Celotex, Jamie Hayes, on 19 January 2015, saying that he could always discuss the BS 8414-2 test report in person,[1729] and offered to visit Mr Anketell-Jones at Harley's office to do so. If that discussion had taken place, it would probably have revealed the very limited basis on which RS5000 could be used on buildings above 18 metres in height consistently with the Building Regulations and Approved Document B,[1730] but that discussion did not take place.

[1720] Anketell-Jones {Day36/171:13-16}.
[1721] Anketell-Jones {Day36/171:5-12}.
[1722] Crawford {Day10/48:5-9}.
[1723] Crawford {Day10/53:5-7}.
[1724] Crawford {Day10/50:20-24}.
[1725] Crawford {Day10/63:2-8}.
[1726] Hyett {Day65/16:23}-{Day65/19:20}.
[1727] {CEL00000019/2}.
[1728] Daniel Anketell-Jones did not recall the client, but thought it was likely to have been a main contractor or architect on a project unconnected to Grenfell Tower. Anketell-Jones {Day36/123:23-25}; {Day36/124:1-5}. He considered that it was likely to have been in connection with a job which required Harley to put forward an insulation that would meet certain U-value requirements, Anketell-Jones {Day36/124:18-22}.
[1729] {CEL00000453}.
[1730] Roome {Day70/67:2-9}; {Day70/62:8-22}. Jonathan Roome agreed with that proposition.

56.110 Mr Hayes told Mr Roome that he did not have access to those documents and had passed the request on to Paul Evans or Debbie Berger.[1731] Whether he had or not, the BS 476 test reports were never provided to Mr Roome, who, of course, was unable to provide them to Daniel Anketell-Jones.[1732]

56.111 Mr Roome did not tell Mr Anketell-Jones that RS5000 could not be used on any of Harley's projects unless the cladding system was, in each case, exactly the same as the one that had been tested.[1733] Mr Roome accepted that Mr Anketell-Jones had either not read the warnings or had misunderstood them (or even intended to ignore them), but denied that he had realised that at the time.[1734]

56.112 Mr Anketell-Jones understood that RS5000 was not suitable for all rainscreen applications and that the suitability of the product had to be determined in relation to each building individually.[1735] Despite his professed understanding, and despite the nature of the questions being asked by the client on the other project, however, he did not consider it important to check whether the proposed system was the same as the one that had been tested. He should have known by January 2015 that whether RS5000 was suitable for use in a particular application depended entirely on whether the proposed system corresponded precisely with the one tested, but he assumed, wrongly, that it depended on how the particular fire consultant or building control officer interpreted the information.[1736]

56.113 Daniel Anketell-Jones sent another email to Jonathan Roome on 20 January 2015 saying that he was hoping Celotex could provide the test information since otherwise they would have to change to Rockwool Duo Slab, which would satisfy "the specialists".[1737] Mr Roome responded on 21 January 2015, having discussed his response with his colleagues.[1738] He attached the full (12-page) BRE Classification Report, the thermocouple data from the test (showing the maximum temperatures recorded during testing) and the RS5000 product information sheet.[1739] Despite their obvious importance, Mr Roome and Mr Anketell-Jones did not discuss the documents.[1740]

56.114 The most natural reading of the emails sent by Mr Anketell-Jones on 16 and 20 January 2015 is that he knew that the construction of the external wall was critical when assessing the suitability of RS5000 for the purposes of fire safety. That has led us to doubt his attempts to play down the extent of his knowledge about fire performance testing and the importance of his role within Harley on the Grenfell project. We are satisfied that he understood more about the technical aspects of fire safety than he was prepared to admit and as design manager he should have been responsible within Harley, together with others, for checking the fire performance of the products used in the external wall. Indeed his emails suggest that he suspected that Celotex might not have the test evidence to support the claims being made for RS5000. It is a matter of serious concern, therefore, that he made no comparable efforts to check the suitability of RS5000 for use on the Grenfell Tower project, but merely assumed it without any investigation. He said

[1731] {CEL00000453}.
[1732] Roome {Day70/68:18-25}.
[1733] Roome {Day70/70:20-25}.
[1734] Roome {Day70/71:1-20}.
[1735] Anketell-Jones {Day36/128:22-25}; {Day36/129:1-4}. Although he said he had not understood how the suitability of RS5000 was to be determined.
[1736] Anketell-Jones {Day36/129:8-11}; {Day36/129:15-21}.
[1737] {CEL00000019/1}.
[1738] {CEL00000019}.
[1739] {CEL00000020} (12pp report), {CEL00000021} (thermocouple graphs) and {CEL00000022} (product information sheet).
[1740] Roome {Day70/76:9}.

that he had not read the 12-page BRE report or the thermocouple data Mr Roome had sent to him on 21 January 2015 and had not sent it to Kevin Lamb, Studio E, or anyone else because he thought that had already been done[1741] and that it was not Harley's responsibility to do it.[1742]

56.115 Again we cannot accept his evidence on that point. These exchanges occurred almost a year after the final issue of the NBS Specification. If he believed that RS5000 was a new product, Mr Anketell-Jones cannot have thought that the technical information he had obtained from Celotex had been in Studio E's possession when it specified the insulation material almost a year earlier. We consider that at that point, if not before, Mr Anketell-Jones ought to have conducted his own research and, if necessary, asked Celotex, Studio E or Rydon whether RS5000 was suitable for use at Grenfell Tower.

Celotex's exploitation of Harley

56.116 On 11 February 2015 Jonathan Roome sent Debbie Berger and Paul Evans, a market analysis for RS5000, which split potential customers into three tiers.[1743] Tier 1 comprised customers who were seen as being of no use to Celotex, because they used only non-combustible products or products of limited combustibility because they were not happy with current test data relating to combustible insulation products.[1744] Tier 2 comprised customers who were willing to consider the use of combustible insulation. By contrast, Tier 3 comprised customers who always used combustible insulation because, in some cases, they were not aware of the 18-metre restriction. In our view the existence of that document shows that Celotex was aware of the differing technical sophistication of potential buyers and that it realised that the market for RS5000 was likely to be limited to those who lacked expertise or expert advice or who did not understand, or had not bothered to investigate, the fire performance of RS5000. That reflects a deeply cynical view that there were ignorant or reckless contractors in the market of whom advantage could be taken without any regard for the safety of occupants. Certainly there is no evidence that the safety of residents played any part in Celotex's thinking on how to sell RS5000, at least when it came to Grenfell Tower.

56.117 Celotex regarded Harley as a Tier 3 customer and exploited its willingness to accept what it was told and its lack of interest in understanding when RS5000 could be used safely. It refrained from correcting Harley's misunderstanding and encouraged it to pursue the purchase regardless of the product's suitability for the project in hand. That was not the behaviour to be expected of an honest and plain-dealing manufacturer.

56.118 In our view Jonathan Roome suspected that Harley had not understood the contents of the Celotex marketing literature and in particular had failed to understand that RS5000 could not be used on a cladding project unless the proposed system as a whole was exactly the same as the one that Celotex had apparently tested in accordance with BS 8414. As noted above, Jonathan Roome accepted that Daniel Anketell-Jones had either not read the warnings to that effect or had misunderstood them or was proposing to ignore them. In our view he turned a blind eye to the failure of Daniel Anketell-Jones to ask the sort of questions in relation to Grenfell Tower that he had asked in relation to a different project in January 2015. Celotex recognised that Harley was ill-informed, or was acting recklessly, and exploited its lack of interest in the circumstances in which RS5000 could safely be used.

[1741] Anketell-Jones {Day36/124:23-25}; {Day36/125:1-6}; {Day36/141:5-12}; {Day36/142:2-5}.
[1742] Anketell-Jones {Day36/124:7-16}.
[1743] {CEL00003543]; {CEL00003544}.
[1744] {CEL00003544/3}.

Although it provided Harley with some technical information, it deliberately refrained from any attempt to ensure that Harley was fully informed about the suitability of RS5000, an approach that was entirely consistent with its marketing strategy.

Finalising the specification of RS5000: February to April 2015

56.119 Ben Bailey took over as project manager at Harley in February 2015.[1745] He assumed that RS5000 was suitable for use on Grenfell Tower because the U-value calculations made by Daniel Anketell-Jones all referred to RS5000 and because all the conversations he had had with Jonathan Roome related to RS5000.[1746] He said that, although no one at Celotex had expressly confirmed or approved the use of RS5000 in combination with ACM panels, Mr Anketell-Jones had told him that a combination of RS5000 and ACM panels had been checked. He had understood that Mr Anketell-Jones had himself been told that it was suitable for use on the project.[1747] However, by February 2015 no one working on the project had made any assessment of the suitability of RS5000, let alone in conjunction with ACM rainscreen panels, and if Mr Anketell-Jones had told Ben Bailey that RS5000 and ACM in combination had been checked, he had no basis for doing so.

56.120 On 11 February 2015, Jonathan Roome sent Ben Bailey an email asking for the final construction drawings.[1748] He said that he had done so because if components of the external wall penetrated the insulation that could have an effect on the calculation of the U-value.[1749]

56.121 Ben Bailey responded the same day by providing a link to a folder of drawings.[1750] He did not ask Mr Roome to review the drawings and advise whether the system was safe from a fire perspective.[1751] Mr Roome did not examine all the drawings, but simply selected two which showed the insulation.[1752] He did not note that the proposed cladding panels were not made of cementitious fibreboard, as used by Celotex in the BS 8414 tests on RS5000.[1753]

56.122 Jonathan Roome asked the Celotex technical team to make U-value calculations based on the drawings and sent the information back to Ben Bailey.[1754] He did not turn his mind to the nature of the rainscreen to be used at Grenfell Tower or to whether the construction was compliant with Approved Document B.[1755] He was only concerned to check the calculations made by Mr Anketell-Jones in September 2014 to support the target U-value.[1756] He said that either 200mm of RS5000 or 160mm of RS5000 would be required to produce U-values of 0.15 W/m^{2}K and 0.18 W/m^{2}K respectively.[1757]

[1745] {CEL00000024/2}; Ben Bailey {Day39/84:20-24}.
[1746] Ben Bailey {Day39/70:1-18}.
[1747] Ben Bailey {Day39/79:19-25}; {Day39/80:1-12}.
[1748] {CEL00000024/2}.
[1749] Roome {Day70/17:9-17}.
[1750] {CEL00000024}.
[1751] {CEL00000024}.
[1752] Roome {Day70/21:11-21}; {Day70/22:7-22}; {CEL00000456}; {CEL00000457}.
[1753] Roome {Day70/23:10-19}.
[1754] {CEL00000029}; At that time, it appears that the specific width of RS5000 was still under consideration in order to achieve the target U-value {CEL00000025}.
[1755] Roome {Day70/33:25}; {Day70/34:1-13}.
[1756] Roome {Day70/34:4-6}.
[1757] {CEL00000025}; {CEL00000027}; {CEL00000028}.

56.123 Mr Bailey replied eight minutes later attaching the calculations Daniel Anketell-Jones had made on 3 September 2014 following the design team meeting the day before.[1758] Mr Roome looked at them but did not appreciate that the proposed system contemplated the use of ACM rainscreen panels.[1759] No one at Harley expressly told Mr Roome that the rainscreen was to be Reynobond ACM[1760] and it did not occur to him that the construction of the external wall might be different from that tested in May 2014.[1761]

56.124 The system tested in 2014 had contained 100mm of RS5000 and had been classified on that basis. There was no BR 135 classification in respect of a system that included any thickness of RS5000 other than 100mm.[1762] Mr Roome gave no consideration to the fact that Harley thought it was permissible to use 150mm of RS5000 as opposed to 100mm and did not turn his mind to the fact that the calculations based on 200mm or 160mm of RS5000 meant that the system proposed for Grenfell Tower would not be the same as that tested and would therefore not be covered by the BR 135 classification.[1763] He said that at the time he had thought that the test related to the individual components of the system and that the classification was valid regardless of the quantity of material used.[1764] If he thought that, he was wrong, but we do not think his evidence is reliable, not least because it is inconsistent with his earlier evidence and the very warnings in the Celotex literature that he well understood.[1765]

Did Celotex tell Harley that RS5000 was safe to use on Grenfell Tower?

56.125 In the course of his evidence Ray Bailey repeatedly asserted that Celotex had told Harley that RS5000 was safe to use on buildings over 18 metres in height. Initially he said that Daniel Anketell-Jones had identified the warning in the Celotex marketing literature and that Harley had taken advice from Celotex about the suitability of RS5000.[1766] In the course of giving evidence he told us that Harley had sent details of the construction of the external wall to Celotex so that Celotex could confirm that the use of RS5000 was safe, although it did not expressly ask that question. He said he had thought that Celotex had in effect carried out a desktop study to compare the construction intended for use at Grenfell Tower with what had been tested.[1767] He also insisted that Celotex had confirmed that it was safe to use it in that way.[1768]

56.126 We do not accept Ray Bailey's evidence on that point. We doubt that he was deliberately seeking to mislead us; it is more likely that he had persuaded himself of the truth of a story he had told himself ever since the fire. We are satisfied, however, that Harley did not ask Celotex for a formal assessment of the kind he described and was not given one, let alone an unqualified assurance that RS5000 was suitable for use in the external wall construction proposed for Grenfell Tower, although it certainly allowed Harley to obtain that impression, and knew it. When pressed Mr Bailey himself accepted that he did not know whether Celotex had provided any such assessment.[1769] He knew that the classification report

[1758] {CEL00000030}.
[1759] Roome {Day70/25:3-25}.
[1760] Anketell-Jones {Day36/114:11-14}.
[1761] Roome {Day70/17:18-25}.
[1762] {CEL00007961/3}.
[1763] Roome {Day70/31:1-5}.
[1764] Roome {Day70/30:7-25}.
[1765] He contradicted his own evidence. Roome {Day69/52:1-9}.
[1766] Ray Bailey {HAR00010184/42} page 42, paragraph 170; Ray Bailey {Day33/82:7}-{Day33/83:3}.
[1767] Ray Bailey {Day33/76:16-21}.
[1768] Ray Bailey {Day33/91:1-2}.
[1769] Ray Bailey {Day33/78:4-10}.

based on the BS 8414 test applied only to the system tested[1770] and he knew that that system differed from the system proposed for Grenfell Tower.[1771] It is hard to understand, therefore, on what basis he could possibly have thought that RS5000 was suitable for use in the external wall system at Grenfell Tower. For its own part, Harley cannot avoid responsibility for its own failures by blaming Celotex for not telling it what it should have known or discovered for itself.

April 2015: further discussions

56.127 On 8 April 2015 Jonathan Roome sent BCA Technical Guidance Note 18, issue 0 to Daniel Anketell-Jones.[1772] Mr Anketell-Jones said that he had not previously seen it and had not read through it.[1773] The additional information should have led him to look again at the documentation sent to him by Celotex in August 2014, but he did not do so.[1774]

56.128 Jonathan Roome told us that he had thought at the time that Harley was adopting the desktop study route to compliance with the Building Regulations, as set out in Approved Document B.[1775] However, he had not seen any desktop study relating to the proposed external wall of Grenfell Tower, or any reference to one.[1776] In fact, none existed and Mr Roome had no grounds for thinking that that was Harley's chosen approach. We do not accept that he formed any view at the time about how Harley intended to demonstrate compliance with the Building Regulations or that he cared. He suspected that Harley had either not read or not understood the warning in the Celotex marketing literature and pursued the sale regardless of the consequences.

The first order of RS5000 for Grenfell Tower

56.129 SIG was one of a small number of major distributors of Celotex and other insulation products[1777] and supplied RS5000 for use at Grenfell Tower. SIG invoiced Harley for its first order of RS5000 on 1 April 2015.[1778]

Grenfell Tower as a "case study"

56.130 On 8 April 2015, Jonathan Roome met Ben Bailey at Harley's offices.[1779] By then the first batch of RS5000 had been delivered to site but installation had not yet begun. Mr Roome proposed that Grenfell Tower could be used as a case study because it was one of the first major projects in which RS5000 was being used on a building above 18 metres in height.[1780] Ben Bailey thought that any case study would focus on the U-value which could be achieved using RS5000.[1781] Despite intending to publish a leaflet describing the product and its use on the tower, Mr Roome did not ask Mr Bailey what the rainscreen was to be.[1782] Ben Bailey knew that RS5000 had not been widely used before, but he did not realise

[1770] Ray Bailey {Day33/85:18-21}.
[1771] Ray Bailey {Day33/86:1}-{Day33/87:6}.
[1772] {CEL00003628}.
[1773] Anketell-Jones {Day36/147:16-18}.
[1774] Anketell-Jones {Day36/127:11-14}.
[1775] Roome {Day70/80:21-24}.
[1776] Roome {Day 70/81:2-14}.
[1777] Roome {Day69/71:19-23}.
[1778] {SIG00000022}.
[1779] {CEL00000039}; {CEL00001443}.
[1780] Harley agreed. {CEL00000039}; Roome {Day70/38:10-21}; {CEL00001443}; Roome {Day70/40:1-25}; {CEL00000558}; {CEL00000566}. Roome {Day70/41:19-23}, and the first project for Jonathan Roome. {Day70/43:4-7}.
[1781] Ben Bailey {Day39/92:9-25}; {Day39/93:15-17}.
[1782] Roome {Day70/41:1-10}.

that Grenfell Tower was being treated by Celotex as a flagship project for the use of the product, although the very suggestion that it be treated as a case study might have alerted him to that fact.[1783]

56.131 Kingspan K15 insulation was used in substitution for RS5000 on Grenfell Tower from time to time when Harley encountered problems with the supply of RS5000. It was used in much smaller quantities than RS5000, but the amount was not insignificant. Photographs indicate that it was certainly used on the west side of the tower,[1784] but the precise locations where it was used are not known and cannot be established given that much of the insulation was consumed in the fire.

56.132 K15 was not included in the NBS Specification and no substitution of materials described in the Employer's Requirements or Contractor's Proposals was permitted without the prior written consent of the TMO. It was Rydon's responsibility to obtain that consent, but it failed to do so in relation to the substitution of K15 for RS5000.

The decision to use K15: March – September 2015

56.133 Although Studio E was in possession of a product datasheet for K15[1785] and both Bruce Sounes and Neil Crawford were aware of the product, neither of them knew until after the fire that it had been used on Grenfell Tower.[1786] They are not to blame for that, since they were never consulted about it, either by Harley or Rydon, and had no other means of knowing.

56.134 Harley was familiar with K15, having used it before on its Merit House[1787] and Wayland House projects.[1788] On 4 March 2015, Mark Stapley of Harley sent SIG an email requesting a quotation for K15 for comparison purposes with RS5000.[1789] Ben Bailey could not remember having talked to Mr Stapley about it; nor could he remember why Mr Stapley wanted a price for an alternative product.[1790] On 9 March 2015, he sent Mr Stapley an email to which he attached a leaflet relating to a different Kingspan insulation product.[1791] One can see, therefore, that K15 and other products were being considered for use on the project as early as March 2015,[1792] but no K15 was ordered at that time.

56.135 On 26 May 2015, Ms Walker of SIG sent an email to Ben Bailey explaining that a delivery of RS5000 that had been arranged for 3 June 2015 would be delayed until 10 June.[1793] Mr Bailey replied, asking whether SIG held K15 in stock at the same thickness.[1794] He told us that before receiving that email Ms Walker had told him that SIG had problems with obtaining products from Celotex and that in the course of their conversation Ms Walker had suggested K15 as an alternative,[1795] as being equivalent to RS5000.[1796]

[1783] Ben Bailey {Day 39/93:12}-{Day39/94:15}.
[1784] {RYD00055130} showing west face where Kingspan logos can be seen on some insulation panels, and see Hughes {Day27/147:19}-{Day27/148:23}.
[1785] {SEA00001009}; Sounes {Day12/188:2-7}.
[1786] Crawford {Day10/139:21}-{Day10/140:10}. Sounes {Day12/189:3-11}.
[1787] Ben Bailey {Day39/31:23}{Day39/32:3}; {Day39/142:11-14}.
[1788] Ray Bailey {Day33/19:20}-{Day33/20:7}.
[1789] {HAR00010030}. Quotation is at {HAR00009721}; {HAR00009722}; Ben Bailey {Day39/108:3-7}.
[1790] Ben Bailey {Day39/104:10-18}.
[1791] {HAR00009643} attaching {HAR00009644}, a brochure for Kingspan OPTIM-R which made clear, on page 7, that K15 was suitable for use in buildings over 18 metres.
[1792] {HAR00009721}; Ben Bailey {Day39/108:3-7}.
[1793] {SIG00000013/2}.
[1794] {SIG00000013/2}.
[1795] Ben Bailey {Day39/110:23}-{Day39/111:23}; {Day39/113:18-21}.
[1796] Ben Bailey {Day39/109:11-20}.

56.136 We accept that Harley decided to substitute K15 for RS5000 because of difficulties obtaining RS5000 on time,[1797] but we do not accept that Mr Bailey had a telephone conversation with SIG of the kind he described. Mr Bailey's response to Ms Walker's email of 26 May ("Are you joking?!")[1798] conveys an immediate reaction, not one that followed a telephone call during which he had already been told about the delay. Moreover, if Ms Walker had discussed with him the suitability of K15 as an alternative, it is likely that she would have referred to it in her next email. We think it much more likely that the use of K15 as an alternative to RS5000 was suggested by Ben Bailey in his reply to Ms Walker. We do not accept that she told him at any time that K15 was an equivalent product to RS5000.

56.137 Ray Bailey told us that K15 had been investigated and approved for use on high-rise buildings in in 2010 or 2011 by Graham Hackley, who was then Harley's Technical & Estimating Manager[1799] and that no further checks on its suitability had been made since it had received his approval.[1800] However, Mr Bailey conceded that there was nothing in the documents to support the conclusion that Mr Hackley had undertaken any such investigation or provided any such approval.[1801] In any event, Ray Bailey described K15 as a standard insulation product throughout the industry for tall buildings.[1802]

56.138 Ben Bailey was confident about using K15 because Harley had used it on other projects.[1803] He shared his father's understanding that K15 could be used on high-rise buildings[1804] and in combination with any rainscreen.[1805] He did not look at the LABC certificate[1806] or the relevant BBA certificate;[1807] indeed, Harley had on file only the 2008 version of the BBA certificate, which by June 2015 was more than five years old and had been superseded.[1808]

56.139 Ben Bailey's evidence was that following receipt of Ms Walker's email he had checked the U-values achievable by K15 and had looked at the 2008 BBA certificate or the product literature to check that it was rated Class 0, but no more than that. He said that he had made those enquiries in the office alongside Daniel Anketell-Jones and Mark Stapley.[1809]

56.140 Daniel Anketell-Jones told us that he had not been aware that K15 had been used on Grenfell Tower,[1810] which, if true, casts some doubt on whether Ben Bailey really did make the enquiries to which he referred. The first purchase order for K15 appears to have been sent to SIG within an hour of Ms Walker's initial email,[1811] so any research or investigation conducted by Ben Bailey must necessarily have been very limited. He did not

[1797] The evidence of all the relevant Harley witnesses was that the substitution was motivated by supply chain issues: Ray Bailey {HAR00010184/29} page 29, paragraph 114; Ben Bailey {HAR00010060/8} page 8, paragraph 26; Ben Bailey {Day39/113:4-6}; Lamb {Day38/38:8-25}.
[1798] {SIG00000013/2}.
[1799] Ray Bailey {Day32/16:6-16}; {Day32/17:10-23}; {Day32/18:3-5}; {Day33/19:6}-{Day33/20:9}. It was signed off as being "for use pretty much on all projects" {Day33/100:2-5}; {Day33/100:10-11}.
[1800] Ray Bailey {Day33/30:2-3}; {Day33/99:6-10}.
[1801] Ray Bailey {Day33/100:10-22}.
[1802] Ray Bailey {Day33/98:21-25}.
[1803] Ben Bailey {Day39/124:16-18}; {Day39/124:25}-{Day39/125:5}.
[1804] Ben Bailey {Day39/56:4-7}.
[1805] Ben Bailey {Day39/102:18-21}.
[1806] {KIN00016733}. Ben Bailey {Day39/126:2-5}. He was not aware of the LABC as a body {Day39/126:11-13}.
[1807] {KIN00000454}. The 2013 version.
[1808] {BBA00000038}. Ben Bailey did not know that the BBA certificate was out of date, a second certificate having been issued in 2013 {BBA00000036}; Ben Bailey {Day39/119:5-19}.
[1809] Ben Bailey {Day39/117:6-11}; Ben Bailey {Day39/117:22-25}; {Day39/118:1-16}; {Day39/119:1-4}.
[1810] Anketell-Jones {Day37/1:23}-{Day37/2:2}.
[1811] {SIG00000012}; {SIG00000013}; Ben Bailey {Day39/116:17-18}.

consider whether the cladding system proposed for Grenfell Tower was the same as that which had included K15 and had apparently met the criteria in BR 135 following a test in accordance with BS 8414.[1812]

56.141 Ray Bailey accepted that Harley had not investigated whether there was any test evidence which showed that K15 was of limited combustibility[1813] and agreed that Harley ought to have made further enquiries about the combustibility of K15 before using it on Grenfell Tower.[1814] There was nothing in the 2008 BBA certificate[1815] to confirm that K15 was a product of limited combustibility and nothing to indicate that it was appropriate for use in any configuration of cladding system. In short, the literature did not show that K15 was safe for use on Grenfell Tower.

56.142 Harley placed two orders for K15: 96 units with SIG on 26 May 2015[1816] and 49 units with CCF on 10 September 2015.[1817] Hugh Bailey, a project manager at Harley, asked CCF for a further 60 units on 10 September 2015, but no purchase order or invoice was raised in respect of that quantity.[1818]

56.143 Ben Bailey did not consider finding an alternative supplier for RS5000 because he thought it would take too long to open a credit account with a new supplier.[1819] He thought that the week-long delay to the supply of RS5000 was critical to the programme and Harley was under pressure from Rydon to keep up progress in accordance with the programme of works.[1820]

56.144 Ben Bailey said that in May 2015,[1821] he had spoken to Simon Lawrence or Simon O'Connor about the substitution of K15 for RS5000. He said that they had discussed the U-values of both products and the fact that they were both rated Class 0.[1822] Ben Bailey said that Mr Lawrence had understood the reason for the substitution and had agreed to it immediately.[1823] There had been no mention of the need to obtain Rydon's express consent.[1824]

56.145 The recollections of Mr Lawrence and Mr O'Connor differed substantially from that of Mr Bailey. They both said that they had been unaware of the use of K15[1825] and Mr Lawrence said that he had not been aware that Harley had ever sought permission for the use of K15.[1826] Mr O'Connor also said that he had not been aware of any discussions about a substitution.[1827] They accepted that Rydon had to obtain the TMO's permission before substituting any product specified in the NBS Specification and that Harley was obliged to obtain the written approval of Rydon before any alternative insulation product could be used in the external wall envelope.[1828] Simon Lawrence accepted that

[1812] Ben Bailey {Day39/127:21-25}.
[1813] Ray Bailey {Day33/102:17-25}.
[1814] Ray Bailey {Day33/103:7-18}.
[1815] {BBA00000038}.
[1816] {SIG00000012}; {SIG00000013}.
[1817] {CCF00000019}.
[1818] {CCF00000015}.
[1819] Ben Bailey {Day39/128:10-20}.
[1820] Ben Bailey {Day39/130:12-13}; {Day39/131:13-17}.
[1821] Ben Bailey {Day39/152:6-13}.
[1822] Ben Bailey {Day39/129:15-21}.
[1823] Ben Bailey {Day39/152:14-21}.
[1824] Ben Bailey {Day39/129:22-25}.
[1825] Lawrence {Day24/138:22-23}; {Day24/139:1-21}; {Day24/148:1-10}; {Day24/148:12-18}; {Day24/149:2-20}; {Day24/151:20-21}; O'Connor {Day26/98:8-11}.
[1826] Lawrence {Day24/150:3-12}.
[1827] O'Connor {Day26/110:10-13}; {Day26/111:10-14}.
[1828] {INQ00011211/8} condition 2.4.1; Lawrence {Day24/147:2-5}.

obtaining consent from the TMO was his responsibility during his time on the project.[1829] Mr Lawrence, Mr O'Connor and Mr Blake of Rydon said that the usual course would have been to confirm compliance with the architect before obtaining the written consent of the client to the substitution.[1830]

56.146 Ben Bailey said that Mr Lawrence had agreed to the substitution immediately, but that was not something he was entitled to do. He knew that the suitability of any substitute would need to be confirmed by Studio E before receiving the consent of the TMO. In those circumstances, we think it unlikely that Mr Lawrence would have agreed to the use of a new product without alerting Mr Bailey to the need to refer the proposal to Studio E for comment. If there had been such a conversation we are confident that it would have been recorded, or at any rate mentioned in some way, in one of the contemporaneous documents, but there is no such record and in those circumstances we are unable to accept Mr Bailey's account. We are satisfied that Ben Bailey acted on his own initiative to substitute K15 for RS5000 in order to avoid a delay to the programme. Harley's previous use of the product had led him to believe that K15 was suitable for use on high-rise buildings in conjunction with any rainscreen system. That assumption was, however, wrong.

56.147 It is not clear to us why a delay of a week was thought to make a sufficient difference to justify using a product that had not been specified and had not been considered by the design team as a substitute for one that had been prescribed in the NBS Specification and had been used extensively on the project. We think that Ben Bailey, who was a young and inexperienced site manager, succumbed to pressure, actual or perceived, from the main contractor to keep up with the construction programme. He thought that K15 was essentially the same as RS5000 and in his mind there was no reason to think that it was unsafe.

The further use of K15: December 2015

56.148 In December 2015 or January 2016 David Hughes of Rydon discussed the use of a Kingspan insulation product with Ben Bailey who was again having difficulty obtaining RS5000.[1831] Mr Bailey had sent him the K15 product datasheet and he read it to check that the U-value that could be achieved with K15 was similar to that which could be obtained using RS5000.[1832] He had described it as a "like-for-like" swap.[1833] Mr Hughes thought that Mr Bailey was asking his permission to use K15 in the future[1834] and agreed that he could.[1835] Shortly afterwards Mr Hughes told Stephen Blake and the clerk of works, Jon White, about the substitution.[1836]

56.149 K15 had first been ordered and supplied in May 2015, at least seven months before Mr Hughes' conversation with Ben Bailey, and again in September 2015. Mr Hughes said he had no recollection of those orders and did not know that K15 had already been used on the tower.[1837] It is therefore very difficult to understand why Mr Hughes should have been asking Mr Bailey about the suitability of K15 and, at least in his mind, giving Mr Bailey

[1829] Lawrence {Day24/147:6-17}.
[1830] Lawrence {Day24/156:11-14}; O'Connor {Day26/111:6-9}; Blake {Day29/116:11-18}; {Day29/116:19}-{Day29/117:11}.
[1831] Hughes {RYD00094213/10} page 10, paragraph 55.
[1832] Hughes {Day27/58:10-19}; {Day27/63:25}; {Day27/64:1-16}.
[1833] Hughes {Day27/58:21-25}; Ben Bailey's evidence was that it was "a common thought" within Harley that K15 and RS5000 were equivalent products: Ben Bailey {Day39/107:1-3}; {Day39/108:11-19}.
[1834] Hughes {Day27/59:17-24}; {Day27/60:5-9}; {Day27/63:23-25}; {Day27/66:21-22}; {Day27/71:7-11}.
[1835] Hughes {Day27/71:23}-{Day27/72:1}.
[1836] Hughes {Day27/66:6-18}.
[1837] Hughes {Day27/148:12-16}.

permission to substitute K15 for RS5000 when K15 had been used on two occasions some months earlier.[1838] For his part, Mr Bailey did not recall giving Mr Hughes the datasheet on K15, or indeed any discussion with Mr Hughes about it.[1839]

56.150 Having considered all the evidence, we have come to the conclusion that Rydon did not become aware of the use of K15 until December 2015 or January 2016, long after it had first been installed on parts of the facade. However, photographs from September and November 2015 clearly show Kingspan insulation on the building[1840] and Rydon could have noticed that, if it had bothered to look.

56.151 Stephen Blake told us that he had become aware that a quantity of K15 was being used on the building towards the end of the project[1841] and agreed that he had discussed the matter with David Hughes. He was not able to recall that conversation in any detail, however, or when it had occurred.[1842] Mr Blake said that Mr Hughes had told him that the Kingspan and Celotex products were equivalent and that he had accepted that.[1843] Mr Blake assumed that K15 was equivalent in every respect to RS5000 and did not take any steps to establish its suitability for use on the project.[1844] In fact, he thought that Mr Hughes was describing the same material manufactured by different companies.[1845] He acknowledged that he ought to have checked for himself whether the products were essentially the same.[1846]

56.152 None of the Rydon witnesses had ever seen the LABC or BBA certificates for K15 and they did not investigate the suitability of K15 for use on Grenfell Tower.[1847] No one at Rydon consulted Studio E about the substitution; nor did Rydon take any advice from Exova or any other fire engineer to confirm that K15 was safe for the intended use. There was, therefore, a complete failure on Rydon's part to investigate the suitability of K15 for its intended use. After it had become aware that K15 was being used, Rydon relied on Ben Bailey's assurance that K15 was an equivalent product to RS5000, which everyone assumed was suitable.[1848]

56.153 Neither Mr Hughes nor Mr Blake consulted the TMO or informed building control that a substitution was going to be, or had in fact been, made.[1849] Mr Hughes thought that K15 and RS5000 were very similar and that the substitution did not make any difference.[1850] Building control was not provided with any document which showed that K15 was being used as insulation and no attempt was made to obtain the TMO's consent to the substitution at that or any other stage.

[1838] Ben Bailey's explanation was that the discussion had been prompted by a change in site management. Ben Bailey {Day39/136:18}-{Day39/137:25}.
[1839] Ben Bailey {Day39/136:1-11}.
[1840] {RYD00051704}; {RYD00055130}.
[1841] Blake {Day29/109:12-21}.
[1842] Blake {Day29/14:14-25}; {Day29/111:1-11}; {Day29/112:8-13}.
[1843] Blake {Day29/111:13}-{Day29/112:3}.
[1844] Blake {day29/115:7-16}.
[1845] Blake {Day29/113:3-4}.
[1846] Blake {Day29/113:10-14}.
[1847] {KIN00016733}; {KIN00000454}. Lawrence {Day24/155:4-8}; O'Connor {Day26/109:2-6}; Hughes {Day27/59:1-6}; Hughes {Day27/64:17-21}; Hughes {Day27/65:1-6}; Hughes {Day27/147:12-17}; Blake {Day29/114:17}-{Day29/115:16}.
[1848] Blake {Day29/118:14-18}; {Day29/119:9-10}; {Day29/119:22-24}.
[1849] Blake {Day29/117:13-17}; Hughes {Day27/67:5-8}; Hughes {Day27/67:17}-{Day27/68:8}.
[1850] Hughes {Day27/68:1-8}; Hughes {Day27/70:4-5}.

Chapter 57
Cavity barriers

Introduction

57.1 In this chapter we examine the use of cavity barriers on the Grenfell Tower refurbishment project, including the formulation of a cavity barrier strategy by Studio E and Harley and the installation of the cavity barriers themselves by Osborne Berry. We have concluded that none of the construction professionals gave adequate consideration to the use of cavity barriers at any stage of the design process. Moreover, it was also an aspect of the design that received scant attention from building control, either in the course of reviewing the drawings or during inspections on site. Although there were a number of detailed discussions between the design professionals about cavity barriers, none of them paid sufficient attention to the need for an overall strategy or gave sufficient consideration to the purpose of cavity barriers in preventing the spread of fire. As a result, cavity barriers were not installed in the correct positions and were entirely missing around the windows. In addition, many of the cavity barriers which were fitted were poorly installed.

57.2 Although the failure to ensure that cavity barriers were properly installed within the cladding probably had little effect on the ultimate development of the fire,[1851] it demonstrates a worrying lack of attention to fire safety which we think it is important to record as part of our analysis of the events which led to the tragedy. Moreover, it is possible that the absence of cavity barriers around the windows played a part in enabling the fire to escape from Flat 16 and gain unrestricted access to the combustible insulation and ACM PE cassettes.[1852] For those reasons we explain below how it came about that the cavity barriers at Grenfell Tower were so poorly designed and installed.

57.3 Two types of cavity barrier were used in the external wall at Grenfell Tower. The horizontal cavity barriers were "open state", meaning that they were designed to be installed with a gap between the face of the barrier and the rainscreen to allow the passage of air and moisture. On the edge of the barrier facing the panels was an intumescent strip that expanded to close the gap when exposed to heat. The vertical cavity barriers were described as "full fill", meaning that they consisted of a solid piece of material spanning the entire cavity, thus forming a permanent vertical barrier against the horizontal spread of fire.

Consideration of Cavity Barriers at or before RIBA Stage D

57.4 Although Studio E began talking to building control at an early stage in the project, there was no discussion about the cladding or the requirement for the installation of cavity barriers within the facade.[1853] There was no mention of cavity barriers or of the need to

[1851] Grenfell Tower Inquiry Phase 1 Report, Chapter 23, paragraph 23.60.
[1852] Grenfell Tower Inquiry Phase 1 Report, Chapter 22, paragraph 22.40.
[1853] The first meeting with building control took place on 7 November 2012. Adrian Jess' email notes of that meeting dated 7 November 2012 {SEA00006526}; Sounes {Day21/132:23}-{Day21/133:3}; there was a further meeting on 17 September 2013 but, again, there was no focus on cladding or cavity barriers: Sounes {Day21/135:1-25}; Sounes {SEA00014273/129} page 129.

maintain compartmentation in Studio E's Stage D report[1854] dated 20 August 2013,[1855] nor was there any reference to the installation of cavity barriers in any version of Exova's Outline Fire Safety Strategy, including Issue 3 dated 7 November 2013.[1856]

Tender documentation: August 2013 – January 2014

57.5 The first person at Studio E to give any serious consideration to the need for cavity barriers was Tomas Rek. He had been asked to develop the NBS Specification and tender drawings to send to potential contractors.[1857] Part of that task involved revising the existing tender drawings to show the location of cavity barriers.[1858]

57.6 Although some preliminary design work on cavity barriers had been undertaken before September 2013, it was limited. Mr Rek could not recall the extent of the work that had already been done but said that the NBS Specification had not been completely blank when he started working on it.[1859] Mr Sounes' belief was that Studio E had done some work on cavity barriers between December 2012 and June 2013.[1860]

57.7 At the time of his work on the tender documents, Tomas Rek was aware of Diagram 33 in Approved Document B, which set out the requirements for cavity barriers in specified locations,[1861] but could not remember whether he had reminded himself of it at the time.[1862] Although Bruce Sounes, who was supervising him, was aware of the guidance in Approved Document B he did not review Diagram 33 at any stage.[1863]

57.8 The tender pack which Studio E prepared to send to potential contractors included several drawings depicting the "Employer's Requirements", which set out the basic principles of the design. Between 24 and 25 September 2013 Mr Rek revised one of the drawings[1864] to show cavity barriers and their locations. The original version of the drawing (dated 24 September 2013[1865]) contained a label which read, "Provision of cavity fire barrier TBC". The version produced by Tomas Rek the following day, 25 September 2013,[1866] contained some information about the location of cavity barriers. In particular:

a. Hatching had been applied to the Proposed Plan and Proposed Section drawings showing where cavity barriers were to be placed.

b. Cavity barriers were shown along the line of compartment floors, in particular,

   i. The sections entitled "Proposed Plan – Cill Level" and "Proposed Plan – Window Level" had annotations reading, "Cavity fire barrier in line with compartment wall structure. Leave no gap to cladding."

[1854] {SEA00008054}.
[1855] Sounes {Day21/76:16-19}.
[1856] See Chapter 54.
[1857] Rek {Day12/11:17-20}.
[1858] Rek {Day12/98:4-6}.
[1859] Rek {Day12/12:7-17}.
[1860] Sounes {Day21/77:5-21}.
[1861] Rek {Day12/94:7-15}.
[1862] Rek {Day12/95:6-7}.
[1863] Sounes {Day21/70:22}-{Day21/71:3}; {Day21/71:16}-{Day21/72:3}.
[1864] Studio E's drawing entitled "Employer's Requirements - Proposed Typical Bay Plans, Section & Elevation"; Rek {Day12/107:20}-{Day12/108:5}
[1865] {SEA00002155} with Studio E reference 1279 (06) 110 Rev 00.
[1866] {SEA00002163} with the same Studio E reference.

ii. The section entitled "Proposed Section – Typical Bay" contained annotations reading, "Ensure horizontal and vertical cavity barriers meet tightly" and "Cavity fire barrier in line with compartment floor structure. Leave max 25mm gap to cladding for ventilation and drainage."

c. Cavity barriers were not shown around the windows.

Mr Crawford accepted that Studio E's cavity barrier strategy did not require the installation of cavity barriers around the windows.[1867]

57.9 Although the drawing contained some unlabelled hatching next to the window reveal, Mr Rek was not sure whether he had intended to specify a cavity barrier in that position; the hatching was not labelled as such (unlike other cavity barriers shown in the drawing) and he accepted that a subcontractor looking at the drawing would not have interpreted the hatching as a cavity barrier in the absence of some other indication that that was intended.[1868] In our view, on a fair reading of the drawing it did not clearly indicate a cavity barrier in that position.

57.10 Neither Mr Sounes nor Mr Rek could remember what had been the source of the information about the location of cavity barriers that had been used to create those drawings.[1869] Mr Rek was unable to recall any discussions when he revised the drawings[1870] but said that it had been his practice to discuss drawings with Mr Sounes when he made any material changes.[1871] Mr Sounes recalled Mr Rek's having told him that he had consulted others who had specialist knowledge about such things, but he could not remember the names of any particular individuals or companies he had contacted.[1872] There is no record of any such conversations and we think it unlikely that any took place.[1873]

57.11 The drawings that Tomas Rek revised were at 1:20 scale and he was not asked to produce more detailed drawings at a 1:5 scale. He accepted in his evidence that drawings on a 1:5 scale would have clearly shown where cavity barriers were to be located.[1874]

57.12 On 1 November 2013, Tomas Rek sent an email to Terence Ashton of Exova asking him to confirm that the rainscreen cavity barriers should have 60 minutes' fire resistance to match that of the compartmentation.[1875] He did not ask Mr Ashton where cavity barriers ought to be placed or send him any drawings showing where he proposed to place them. A few days later Mr Ashton replied, saying that cavity barriers needed to have only 30 minutes' fire resistance.[1876] Mr Rek did not recall having spoken to Mr Ashton about the positioning of cavity barriers[1877] and although Mr Sounes thought that the guidance in Section 9 of Approved Document B was unclear, he did not seek advice or assistance from Exova.[1878]

57.13 At no point did Studio E produce detailed drawings of typical elevations or sections for use at tender stage showing precisely where cavity barriers were to be positioned.[1879]

[1867] Crawford {Day10/192:1-5}.
[1868] Rek {SEA00014278/30} page 30, paragraph 126; Rek {Day12/110:2-4}; {Day12/112:1}-{Day12/113:2}.
[1869] Sounes {Day21/83:8}-{Day21/84:6}; Rek {Day12/100:14-23}.
[1870] Rek {Day12/108:19-21}.
[1871] Rek {Day12/108:7-10}.
[1872] Sounes {Day 21/82:17}-{Day21/83:3}; {Day21/73:20}-{Day21/74:6}.
[1873] Sounes {Day21/83:4-7}.
[1874] Rek {Day12/115:7-15}.
[1875] {EXO00000586/1}.
[1876] {EXO00000586/1} dated 4 November 2013.
[1877] Rek {Day12/105:3-7}.
[1878] Sounes {Day21/81:2-20}.
[1879] Sounes {Day21/84:20-24}.

57.14 The tender drawings were accompanied by the NBS Specification, which contained details of the types of cavity barriers to be installed in the horizontal and vertical positions.[1880] Although there was an inconsistency in the specification, one part requiring 60 minutes' integrity and insulation and another only 30 minutes' integrity and insulation,[1881] both exceeded the minimum requirement in Approved Document B of 30 minutes' integrity and 15 minutes' insulation.[1882]

Studio E drawing design after tender

57.15 Studio E did not revise its drawings in relation to cavity barriers after the invitation to tender had been issued on 29 November 2013[1883] and as a result Harley based its design for the facade on the tender drawings.[1884] Studio E continued to be involved in the project until Harley began its detailed design work in late August 2014,[1885] but there is no evidence that it carried out any further work on the cavity barrier strategy during that time.

Harley's initial design

57.16 Harley's design work started in earnest after Kevin Lamb was appointed on 12 August 2014.[1886] Mr Lamb said that he had based his work on the plans, sections and elevations produced by Studio E for the key aspects of the external facade.[1887] He also made use of a set of preliminary drawings of a typical window detail prepared by Samuel Anketell-Jones and Ray Bailey before his involvement. They did not show any cavity barriers.[1888]

57.17 Kevin Lamb accepted that the requirements of the NBS Specification relating to cavity barriers took precedence over the tender drawings.[1889] The NBS Specification required compliance with Approved Document B and the Standard for Systemised Building Envelopes published by the Centre for Window and Cladding Technology (CWCT).[1890] Both documents clearly called for cavity barriers around windows.[1891]

57.18 On 22 August 2014, Kevin Lamb produced some preliminary drawings to establish the basic principles of the design which he sent to Simon Lawrence of Rydon and copied to Studio E and Daniel Anketell-Jones of Harley.[1892] Those drawings did not indicate where cavity

[1880] In section P10 "Sundry insulation/ proofing work" at Clause 435. All three versions of the NBS Specification (21 November 2013 {SEA00000152/263}, 29 November 2013 {RYD00001712/245} and 30 January 2014 {SEA00000169/246}) contained the same clause 435 in Section P10 in respect of ventilated cavity barriers.
[1881] The products specified were "Lamatherm CW-RSH60" and "Lamatherm CW-RSV60" which could have been interpreted as a reference to 60 minutes' integrity. However, the clause also stated: "Fire resistance rating: 30/30 to BS 476, Part 20:1987 and BS EN 1366-4:2006. See also the witness statement of Stephen Swales (Siderise) which sets out the coding conventions for Siderise cavity barriers at the time. Swales {SIL00000306/9-10} pages 9-10, paragraph 38.
[1882] Table A1 of Approved Document B: {CLG00000224/125}.
[1883] This was done by email to Studio E on 29 November 2013 {SEA00010081}. Five main contractors were invited to tender: Mullaley, Durkan, Keepmoat, Rydon, and Wates.
[1884] Lamb {HAR00010419/5} page 5, paragraph 22.
[1885] Lamb {HAR00010419/6} page 6, paragraphs 22-24.
[1886] {HAR00010418}.
[1887] Lamb {HAR00010419/5} page 5, paragraph 20.
[1888] {HAR00010432}.
[1889] Lamb {Day38/123:22}-{Day38/124:21}.
[1890] Dated September 2008 {CWCT0000046}.
[1891] Approved Document B at {CLG00000224/83} paragraph 9.3; {CLG00000224/96} paragraph 12.8; the CWCT Standard {CWCT0000046/14} section 6.4.4.2 under the heading "Cavities in rainscreen walls".
[1892] {HAR00010426}.

barriers would be placed within the facade.[1893] Neil Crawford commented on the drawings on 27 August 2014[1894] but did not draw attention to the absence of cavity barriers.[1895] He could not recall having raised the absence of cavity barriers with Harley at that time.[1896]

57.19 Mr Crawford provided further comments on Harley's drawings on 3 September 2014 following a design team meeting[1897] but did not refer to the absence of cavity barriers.[1898] On 12 September 2014, he confirmed that he had no further comments to make.[1899]

The Request for Information

57.20 On 17 September 2014, for reasons which remain unclear, Daniel Anketell-Jones sent a formal Request for Further Information to Rydon and Studio E, with a copy to Kevin Lamb, seeking instructions on the provision of horizontal cavity barriers within the area of the cladding.[1900] He suggested that cavity barriers were required at every floor level on the vertical columns, but not in the area between the windows because there was no "chimney" effect there so the cladding would not exacerbate the spread of fire.

57.21 On 18 September 2014 Mr Crawford sent the request on to Mr Ashton at Exova asking for his comments.[1901] In response, Mr Ashton asked for a set of drawings, which were provided to him by Mr Crawford, who told him that they represented an attempt to establish the basic approach.[1902] They included a drawing produced by Harley, which did not show any cavity barriers,[1903] and drawings produced by Studio E,[1904] which showed cavity barriers around each flat but not around the window frames.

57.22 Mr Ashton's response was that if the insulation in the cavities was combustible it would be necessary to provide cavity barriers in order to prevent fire from spreading from one flat to the flat above. That advice was wrong, however, because cavity barriers were required regardless of the nature of the insulation.[1905] Mr Anketell-Jones did not ask Mr Ashton why cavity barriers were required only if the insulation was combustible[1906] and Mr Ashton did not comment on the absence of cavity barriers from Harley's or Studio E's drawings.

57.23 Later that same day, Mr Crawford sent Mr Ashton's response on to Mr Anketell-Jones with copies to Simon Lawrence, Simon O'Connor and Kevin Lamb.[1907] In response, Mr Anketell-Jones asked Mr Ashton to confirm his own view that since the insulation was rated Class 0, a "fire barrier" was not required between the windows and attached the datasheet for

[1893] {RYD00016100}.
[1894] {HAR00010423/2}.
[1895] Crawford {Day10/185:2-5}.
[1896] Crawford {Day10/185:11-14}.
[1897] {HAR00010413}.
[1898] {HAR00010423/2}; {HAR00012086}.
[1899] {HAR00010423/1}.
[1900] Email dated 17 September 2014 {HAR00003638/4}; RFI attachment {EXO00001291}.
[1901] {HAR00003638/4}.
[1902] Email: {HAR00003638/3}; Studio E Drawings attached: {EXO00000710}; {EXO00000711}; {EXO00000712}; Harley Drawing attached: {EXO00000713}.
[1903] {EXO00000713} Title: Typical Bay Levels 1 to 20 West Elevation Reference: C1059-200, drafted by Kevin Lamb and dated 20 August 2014; Crawford {Day10/82:13-20}.
[1904] {EXO00000710}; {EXO00000711}; {EXO00000712}.
[1905] Ashton {Day18/39:1-18}.
[1906] Anketell-Jones {Day36/162:4-8}.
[1907] {HAR00003638/2}.

Celotex RS5000.[1908] Simon Lawrence did not pay much attention to the exchange because he expected Harley to carry out the design work and Studio E to check it before it was referred to building control[1909] for approval.[1910]

57.24 Mr Ashton replied to Mr Anketell-Jones on 18 September 2014 without having looked at the datasheet.[1911] He pointed out that a material that had a Class 0 rating was not necessarily non-combustible, although the reverse was invariably true. He said that it was not clear from the information he had been given whether there was a continuous cavity from top to bottom in any part of the cladding, thereby inviting him to provide further information.[1912] Mr Anketell-Jones sent Mr Ashton's email on to Mr Crawford the same day asking him for his view on Mr Ashton's comments about combustibility and continuous cavity paths.

57.25 The matter was allowed to rest there, however. Mr Ashton did not chase Mr Anketell-Jones for further information[1913] and Mr Anketell-Jones did not pursue the matter with either Mr Crawford or Mr Ashton.[1914]

Harley's work on the design of the windows: September 2014–March 2015

57.26 On 22 September 2014 Kevin Lamb sent Simon Lawrence a set of drawings for final approval reflecting comments made by Studio E at their previous meeting.[1915] None of them contained any details of cavity barriers.[1916] Although both Bruce Sounes[1917] and Neil Crawford[1918] both commented on the design of the windows, neither of them referred to the absence of cavity barriers around the windows. Mr Lamb expected details of the cavity barriers to be provided at a later date,[1919] so he could not have considered the drawings to be final.

57.27 Mr Lamb issued a revised set of drawings on 14 January 2015,[1920] all of which were marked as "Approved for Construction" although they did not show any cavity barriers. No one in the design team at Harley noticed the omission, possibly because Harley did not have a fully effective procedure for reviewing the status or progress of the design at particular points in the life of the project or for reviewing the design as it developed. Mr Lamb was not directly supervised[1921] and he confirmed that no one had checked the revised drawings before they had been issued.[1922]

[1908] {HAR00012104}.
[1909] Lawrence {Day24/124:4-13}.
[1910] Lawrence {Day24/123:17-22}.
[1911] Ashton {Day18/46:15-23}; {Day18/47:3-19}; {Day18/49:1-8}; {Day18/55:6-8}.
[1912] {HAR00003638}.
[1913] Ashton {Day18/59:5-22}.
[1914] Anketell-Jones {Day36/167:22-24}.
[1915] {SEA00011759}; Attached drawings at {RYD00018436}.
[1916] {RYD00000431}.
[1917] On 22 September 2014 {RYD00018537}.
[1918] On 24 September 2014 {RYD00018687}.
[1919] Lamb {Day38/89:4-7}.
[1920] {RYD00027692}; Attached drawings at {RYD00027693}; {RYD00027694}; {RYD00027695}; {RYD00027696}; {RYD00027697}; {RYD00027698}; {RYD00027699}; {RYD00027700}; {RYD00027701}; {RYD00027702}; {RYD00027703}; {RYD00027704}.
[1921] Anketell-Jones {Day36/176:4-23}.
[1922] Lamb {Day38/90:6-12}.

57.28 Despite the fact that the drawings were marked as having been approved for construction, on 16 January 2015 Mr Crawford responded with his comments.[1923] They had been marked using Studio E's stamp as being either "Status A: Conforms to Design Intent" or "Status B: Conforms to Design Intent subject to incorporation of comments. Revise and resubmit for Category A status." No mention was made of cavity barriers.[1924] Although Mr Lamb said that there had been discussions within the design team in relation to cavity barriers, he was certain that he had never discussed the detailed guidance in Approved Document B on where cavity barriers ought to be placed to comply with functional requirement B4.[1925]

The fire at Taplow House

57.29 On 16 January 2012 a fire occurred in a flat on floor 17 of Taplow House, part of the Chalcots Estate in Camden.[1926] The facade had been installed by Rydon and Harley using mineral wool insulation (probably Rockwool) and riveted Reynobond PE 55 rainscreen panels.[1927] Timothy Lovell of Harley inspected the building on 17 January 2012 and prepared an initial incident report, which was distributed to Ray Bailey and Daniel Anketell-Jones, amongst others.[1928] In it he recorded that, despite the fire and the amount of flammable items in the flat, the fire breaks had still been intact and had prevented the fire spreading between flats.[1929] Above that paragraph was a photograph showing a "fire break" at the head of the window, although Ray Bailey thought that it was in fact a firestop rather than a cavity barrier.[1930]

57.30 Mr Lovell made a further inspection on 18 January 2012 and set out his findings in a report dated 23 January 2012, copies of which were given to Stephen Blake at Rydon, Ray Bailey and Daniel Anketell-Jones, amongst others.[1931] The report again drew attention to the containment of the fire by "fire breaks" located at the head and sill of each window.[1932] Mr Anketell-Jones said that he had not been aware that "fire breaks" had played an important part in preventing the spread of fire and did not recall anyone at Harley discussing the importance of cavity barriers or firestopping around windows following that fire.[1933] He confirmed that, when Harley came to design the facade of Grenfell Tower, the fire at Taplow House appears to have been forgotten.[1934] Ray Bailey accepted that Harley's failure to implement the lessons from Taplow House was an error.[1935]

57.31 Stephen Blake of Rydon agreed that the use of cavity barriers around the windows of Taplow House had been a critical factor in preventing the spread of fire.[1936] He also agreed that he had first-hand knowledge of the importance of cavity barriers around windows,[1937] but despite that, he did not think it necessary to check with Studio E or Harley that proper cavity barriers had been included in their designs.[1938]

[1923] {SEA00012531}; Annotated drawings at {SEA00003040}.
[1924] Lamb {Day38/92:5-7}; Crawford {Day10/196:13}-{Day10/197:2}; {Day10/197:15-22}.
[1925] Lamb {Day38/92:16}-{Day38/93:9}.
[1926] Ray Bailey {HAR00010184/4} page 4, paragraph 15.
[1927] Ray Bailey {Day33/141:13-20}; {Day33/60:15-25}.
[1928] {HAR00010169}.
[1929] {HAR00010169/4}.
[1930] Ray Bailey {Day33/143:20-25}.
[1931] {CEP000003223}.
[1932] {CEP000003223/2-3}.
[1933] Anketell-Jones {Day35/149:1-8}.
[1934] Anketell-Jones {Day35/149:14-19}.
[1935] Ray Bailey {Day33/146:11-16}.
[1936] Blake {Day29/126:25}-{Day29/127:8}.
[1937] Blake {Day29/127:17-19}.
[1938] Blake {Day29/130:3-10}.

57.32 The experience at Taplow House ought to have made clear to Harley (and to a lesser extent, Rydon) the importance of installing fire protection measures around the windows at Grenfell Tower. But Harley and Rydon did not bear those lessons in mind when considering the design in the areas surrounding the windows of Grenfell Tower. Ray Bailey accepted that it was a mistake not to have done so.[1939]

March 2015 emails

57.33 On 3 March 2015, Kevin Lamb sent a set of drawings to Rydon which had been revised to include cavity barriers.[1940] He also sent copies to various persons in Harley. Mr Lamb said that he had included cavity barriers in the drawings because the cladding was going to be installed soon and so completing the design had become urgent.[1941] Mr Lamb had looked at some industry guidance in relation to cavity barriers,[1942] but only to find out what rating was required, rather than to where they should be placed.[1943]

57.34 Each of the drawings bore a revision date of 3 March 2015. Cavity barriers were marked as broken lines surrounding compartments and were labelled as "firebreaks". Mr Lamb said that "firebreak" was a generic term and that at the time of his work on the Grenfell Tower refurbishment project he would probably not have used the term "cavity barrier".[1944] There were no cavity barriers shown immediately around the heads, sills or jambs of the windows.[1945] Mr Lamb's explanation for their absence was that Studio E's drawings and Harley's instructions were to show cavity barriers only around the *compartment*.[1946] The positioning of horizontal cavity barriers above the windows and supposedly in line with compartment floors was different from that which had been shown at the tender stage by Studio E.[1947] Studio E's drawings showed a cavity barrier immediately at the head of the window, whereas Harley's drawings showed it at some distance from the head of the window in the spandrel section.[1948] That change was never expressly brought to Studio E's attention, despite Mr Lamb's acceptance that it was a development of the design made by Harley.[1949]

57.35 The detail of the window head[1950] showed a horizontal cavity barrier at some remove from the window frame, marked with honeycomb hatching and labelled "Firebreak cut around cladding rails. All joints taped on top face." When he gave evidence Mr Lamb suggested that the cavity barrier was positioned above the head of the window because the window hung down below the structure and the concrete did not provide a flat

[1939] Ray Bailey {Day33/146:11-16}.
[1940] Email {SEA00012850} sent to Simon Lawrence, copying Neil Crawford, Bruce Sounes, Daniel Anketell-Jones, Mark Stapley, Mr Robert Maxwell and Mr Ben Bailey. Drawings attached: Specification Notes C1059-100 Rev A {SEA00000256}; Drawing Register {SEA00012855}; Typical Bay Levels 1 to 20 South Elevation C1059-202 Rev C {SEA00012851}; Typical Bay Levels 1 to 20 West/East Elevation C1059-201 Rev D {SEA00003155}; Typical Bay Levels 1 to 20 East & West Elevation C1059-200 Rev I {SEA00003156}; Jamb Joint Upper Levels and Typical Joint Upper Levels C1059-305 Rev C {SEA00012856}; and, Window Head Upper Levels C1059-301 Rev E {SEA00012857}.
[1941] Lamb {Day38/97:5-14}.
[1942] Lamb {HAR00010419/13} page 13, paragraph 50 gives the following list of the guidance Mr Lamb recalls consulting: Approved Document B, the Centre for Window and Cladding Technology ("CWCT") Standard for Systemised Building Envelopes Part 6 – Fire Performance, the CWCT Technical Note 73 and Siderise technical literature.
[1943] Drawings 200 {SEA00003156}; 201 {SEA00003155}; 202 {SEA00012851}; 301 {SEA00012857}; 305 {SEA00012856} Lamb {HAR00010419/13} page 13, paragraph 50; Lamb {Day38/99:3-8}.
[1944] Lamb {Day38/100:8-12}.
[1945] Lamb {Day38/101:7-10}.
[1946] Lamb {Day38/102:4-10}.
[1947] The Employer's Requirements - Proposed Typical Bay Plans, Section & Elevation drawing {SEA00002163}.
[1948] Lamb {Day38/102:11-21}.
[1949] Lamb {Day38/110:15-20}; {Day38/111:13-15}.
[1950] Harley drawing 301 {RYD00000220}.

surface.[1951] However, he conceded that something would have to be added if the cavity barrier were positioned above the head of the window as he had suggested.[1952] Mr Lamb never considered how the integrity of the horizontal cavity barrier would be maintained if it were cut to fit around the vertical cladding rail[1953] and he gave no thought to whether the gaps created by the cladding rails should be filled to maintain the integrity of the cavity barriers.[1954]

57.36 On 3 March 2015, shortly after he had sent the drawings to the design team,[1955] Kevin Lamb sent an email to Barnaby Carrick, the Technical Applications Engineer at Siderise seeking his advice on using the horizontal barriers in a cavity which was wider than the maximum dimension shown in Siderise's literature.[1956] Mr Carrick replied the same day,[1957] confirming that the information that Mr Lamb had provided was consistent with Siderise's recommendations and that the proposed cavity barrier fell within their standard test data.[1958] He also confirmed that the fixing details shown in Harley's drawings[1959] were acceptable. Mr Lamb did not ask Siderise for any further advice on the cavity barrier strategy.[1960]

57.37 Neil Crawford responded to Kevin Lamb's email on 6 March 2015.[1961] He confirmed that he had sought advice from Exova, but that his own interpretation was that the fire rating of the cavity barriers would have to follow that of the adjacent walls. He attached the Fire Strategy drawing.[1962] Bruce Sounes confirmed that he had not looked at the drawings that Mr Lamb or Mr Crawford had sent him as, by that stage, although he was still nominally leading the design team, Mr Crawford was "fronting it".[1963] When he commented on Harley's revised drawings[1964] Mr Crawford did not draw attention to the absence of cavity barriers around the windows as, according to him, the strategy had been simply to have cavity barriers at the junctions between compartments.[1965] Similarly, Mr Crawford did not comment on Harley's note that the cavity barrier was to be cut around the cladding rail because he regarded it as a specialist item and he expected Harley to know what it was doing.[1966]

57.38 On 11 March 2015 Kevin Lamb sought further advice from Siderise about the rating of the cavity barriers.[1967] He did not ask where to place the barriers as, in his mind, it was clear where they were going to go and their positioning had been approved in discussions with Harley.[1968] Christopher Mort (Technical Officer for Fire at Siderise) replied on 12 March 2015[1969] advising that to meet the guidance in Approved Document B the area between the compartment wall and outer cladding needed only to be a cavity barrier (not a firestop) with just 30 minutes' integrity and 15 minutes' insulation. He included in his

[1951] Lamb {Day38/104:9-23}.
[1952] Lamb {Day38/106:12-18}.
[1953] Lamb {Day38/112:8-13}.
[1954] Lamb {Day38/151:7-17}; {Day38/152:6-8}.
[1955] Lamb's email to the design team {SEA00012850} was timed at 12:58. His email to Carrick was at 13:06.
[1956] {HAR00004013} the cavity was 316mm which was wider than the maximum cavity of 300mm shown by Siderise.
[1957] {HAR00004013}.
[1958] The void size was less than 325mm and a 25mm air gap was present.
[1959] Drawing C1059-305 {HAR00009737}.
[1960] Lamb {Day38/95:10-15}.
[1961] {SEA00012906}.
[1962] {SEA00003101}.
[1963] Sounes {Day21/90:13-25}.
[1964] {SEA00003160}.
[1965] Crawford {Day11/2:20-25}; {Day11/3:1-5}.
[1966] Crawford {Day11/6:1-9}.
[1967] Email from Mr Lamb to Mr Carrick dated 11 March 2015 {HAR00003999}.
[1968] Lamb {Day38/118:11-22}.
[1969] {SIL00000038}.

message a copy of Diagram 33 of Approved Document B,[1970] which showed cavity barriers around the windows and contained a label reading "Close around openings" with arrows pointing to the top and bottom of the window.[1971]

57.39 Mr Mort did not give Mr Lamb any advice about the risks associated with using cavity barriers in a rainscreen system.[1972] Nor did he provide any information about the limitations of the testing that Siderise had carried out on its cavity barriers.[1973] Despite having Diagram 33 expressly drawn to his attention and himself noticing that cavity barriers were marked around the windows, Kevin Lamb took no steps to revise the cavity barrier strategy for Grenfell Tower.[1974]

57.40 On 18 March 2015, Ben Bailey sent an email to Neil Crawford telling him that Siderise had given advice about the required rating of the cavity barriers that differed from that received from RBKC building control.[1975] Shortly afterwards, Mr Crawford spoke to Mr Hoban, who, on 20 March 2015, sent him an email informing him that the fire rating for any new elements of structure (including the cavity barriers) should be 120 minutes' insulation and integrity and drawing attention to Diagram 33.[1976] Mr Hoban was unable to recall the content of his conversation with Mr Crawford.[1977]

57.41 On 25 March 2015, Mr Lamb sent revised versions of Harley's drawings[1978] to Simon Lawrence with copies to members of the design team.[1979] The drawings contained revised details of the "firebreaks", the ratings of which had all been increased to 120 minutes' integrity and 60 minutes' insulation.

57.42 Following a discussion they had had the day before, on 26 March 2015 Ben Bailey sent an email to Richard Kay, National Facades Manager at Siderise, asking him to identify the regulations which supported Siderise's opinion that cavity barriers with 30 minutes' integrity and 15 minutes' insulation were all that was required.[1980] He asked Mr Kay to do that because he was not familiar with them himself and was wholly dependent on Siderise for advice.[1981] Mr Kay replied the following day, copying in Kevin Lamb and others at Harley.[1982] He included in his email an extract from Approved Document B[1983] which showed that 30 minutes' fire integrity and 15 minutes' insulation were recommended. Mr Bailey was unable to recall the conversation he had had with Mr Kay.[1984]

57.43 Ben Bailey forwarded that email to Simon Lawrence and Simon O'Connor on 26 March 2015 with the comment that there was quite a large difference in cost between the cavity barriers that Siderise had recommended (and the project specification required) and the

[1970] {SIL00000038/7}.
[1971] {BSD00001779}.
[1972] Mort {Day103/16:19}-{Day103/17:10}.
[1973] Mort {Day103/17:11-24}.
[1974] Lamb {Day38/120:4-24}.
[1975] {SEA00012953} The email was copied to Daniel Anketell-Jones, Mark Stapley, Robert Maxwell, John Hoban, and Kevin Lamb.
[1976] {RBK00048734}.
[1977] Hoban {Day46/112:10-14}.
[1978] Harley drawings 100 {HAR00017787}, 301 {HAR00008901}, 304 {HAR00017785}, 305 {HAR00017784}, 325 {HAR00017783} and 326 {HAR00017782}.
[1979] {HAR00017781}. Bruce Sounes, Neil Crawford, Daniel Anketell-Jones, Mark Stapley, Ben Bailey and Robert Maxwell were copied in.
[1980] {HAR00004002/3}.
[1981] Ben Bailey {Day40/61:21}-{Day40/62:3}.
[1982] {HAR00004002/2}.
[1983] Table A1 from Appendix A.
[1984] Ben Bailey {Day40/61:1-5}.

120 minute cavity barriers suggested by building control.[1985] According to Neil Crawford, there was pressure from those on site not to specify cavity barriers with 120 minutes' fire resistance due, at least in part, to the additional cost and delay that might be caused.[1986]

57.44 Subsequently Neil Crawford referred the question of the rating of the cavity barriers back to Mr Hoban.[1987] On 27 March 2015, he sent the email from Siderise to Mr Hoban and asked him to review the position. However, Mr Hoban adhered to his original view and Mr Crawford reported that to the design team later that day.[1988]

57.45 On 27 March 2015 Ray Bailey sent an email to Simon Lawrence, Neil Crawford and Ben Bailey with copies to Simon O'Connor, Kevin Lamb and Daniel Anketell-Jones, explaining the difference between a firestop and a cavity barrier.[1989] Ray Bailey did not comment on the absence of cavity barriers around the windows in the drawings produced by Harley.

57.46 Later the same day Ray Bailey sent the exchange to Daniel Anketell-Jones for his comments.[1990] Mr Anketell-Jones replied:

> "Just that it's ridiculous. There is no point in 'fire stopping', as we all know; the ACM will be gone rather quickly in a fire! The whole point is to stop 'unseen' fire spreading in the cavity and moving to other parts of the building."[1991]

We have considered that exchange in Chapter 55 where we have set out our conclusions on the choice of ACM PE rainscreen panels for use on Grenfell Tower. Mr Anketell-Jones accepted that in his email he had been expressing an opinion about the risk of fire spreading within the cavity unseen and how that affected the cavity barrier strategy,[1992] but that did not lead him to think about the importance of preventing fire from spreading from a compartment into the cavity in the first place.[1993]

57.47 On 30 March 2015 Neil Crawford sent another email to Mr Hoban, recommending that he speak to Ben Bailey,[1994] but he did not check whether Mr Hoban had spoken to Mr Bailey or anyone else at Harley.[1995] Neither Mr Hoban nor Mr Bailey was able to recall whether a conversation had taken place.[1996]

57.48 Shortly after,[1997] on 30 March 2015, Mr Hoban replied to the project team and Mr Kay of Siderise setting out his view.[1998] He referred to his email of 20 March 2015 and said that in his view Diagram 33 of Approved Document B required a firestop with 120 minutes' resistance between compartment floors.

[1985] {RYD00037117/2}.
[1986] Crawford {Day11/45:1-10}.
[1987] {HAR00003947/7}.
[1988] {RYD00037117}.
[1989] {RYD00037117}.
[1990] {HAR00006585}.
[1991] {HAR00006585}.
[1992] Anketell-Jones {Day37/22:2-16}.
[1993] Anketell-Jones {Day37/27:9-14}.
[1994] {HAR00003947/7}.
[1995] Crawford {Day11/52:3-7}.
[1996] Hoban {Day46/119:10-17}; Ben Bailey {Day40/70:24}-{Day40/71:15}.
[1997] Mr Crawford's email suggesting Mr Ashton contact Mr Bailey was at 12:49. Mr Hoban's response was at 14:22 on the same day.
[1998] {EXO00000715/2}.

57.49 The repeated references to Diagram 33 throughout the email exchanges leaves little room for doubt that all the construction professionals involved either knew or ought to have known that a cavity barrier strategy in accordance with that diagram was required, but regrettably it appears to have been ignored.

The "weak link"

57.50 On receipt of Mr Hoban's email of 30 March 2015, Mr Kay asked Harley to send him drawings of the build-up of the cladding so that his technical officer could evaluate the position and provide a formal response.[1999] In response Ben Bailey sent him two drawings[2000] with copies to Mr Mort.[2001] Mr Kay had also asked for a section drawing through the whole window to give to Mr Mort for comment,[2002] but Ben Bailey was unable to provide that drawing. That struck Mr Mort as odd, because he would normally have expected to see a full section which clarified the window details.[2003]

57.51 Mr Mort replied the same day.[2004] He said:

> "I have reviewed the drawings sent over and sketch a proposal to alleviate the issues raised by the BCO, also on the second page of the attachment I have highlighted the weak link so to speak in terms of fire and I think the [building control officer] would have also noticed this.
>
> The proposal requires the installation of RH25g 90/60 product in two layers one at the head of the window aligning with the compartment floor and the other at the top of the existing up stand, therefore two layers of 60 minutes protection that overall would provide if tested over 120 minutes protection, at the window locations…"

57.52 Mr Mort confirmed that he had prepared two sketches, one to show the proposed solution to increase the fire resistance of the cavity barriers to 120 minutes[2005] and one to identify what he called a "weak link" for fire at the head of the window.[2006] According to him, they were distinct sketches with distinct purposes.[2007] The weak link that Mr Mort had identified was a gap at the head of the window, where there was nothing to stop a fire spreading from an internal compartment into the external cavity.[2008] It was a clear error, to which Mr Mort felt he had to draw attention. It was his opinion that Harley or building control ought to have noticed it.[2009]

57.53 The first of Mr Mort's sketches described his proposed means of producing cavity barriers with 120 minutes' fire resistance.[2010] It showed two pairs of cavity barriers, one pair above the window head and another pair at the sill, each made up of two individual barriers rated 90 minutes' integrity and 60 minutes' insulation to achieve a total of 180 minutes' fire resistance and 120 minutes' insulation.[2011] Mr Mort said that it had not been clear

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1999 {HAR00003947/4-5}.
2000 Drawing 300 showing a section of the windowsill and Drawing 301 showing a section of the window head {HAR00019402} and {HAR00019403}.
2001 {HAR00019401}.
2002 As shown on Mr Mort's annotated drawing as "C-C": {RYD00037413}.
2003 Mort {Day103/29:15}-{Day103/30:13}.
2004 {HAR00018971}.
2005 {HAR00003948}.
2006 {HAR00003948/2}.
2007 Mort {Day103/33:9-19}.
2008 Mort {SIL00000298/8} page 8, paragraph 31(c); Mort {Day103/34:25}-{Day103/35:10}.
2009 Mort {SIL00000298/8} page 8, paragraph 31(c); Mort {Day103/37:24}-{Day103/38:7}.
2010 {HAR00003948}.
2011 Mort {Day103/38:15-20}.

from Harley's drawings whether there were vertical cavity barriers at the window jambs. He accepted that the cavity barriers he had added at the sill of the window in his sketch were slightly below the sill itself, but said that the drawing was a schematic rather than a detailed design.[2012]

57.54 The second sketch which Mr Mort had prepared was based on a drawing produced by Harley, to which he had added a bubble containing the note "weak link for fire".[2013] The sketch showed the new window set back from the edge of the building, exposing a gap between the window brackets, as shown below.[2014]

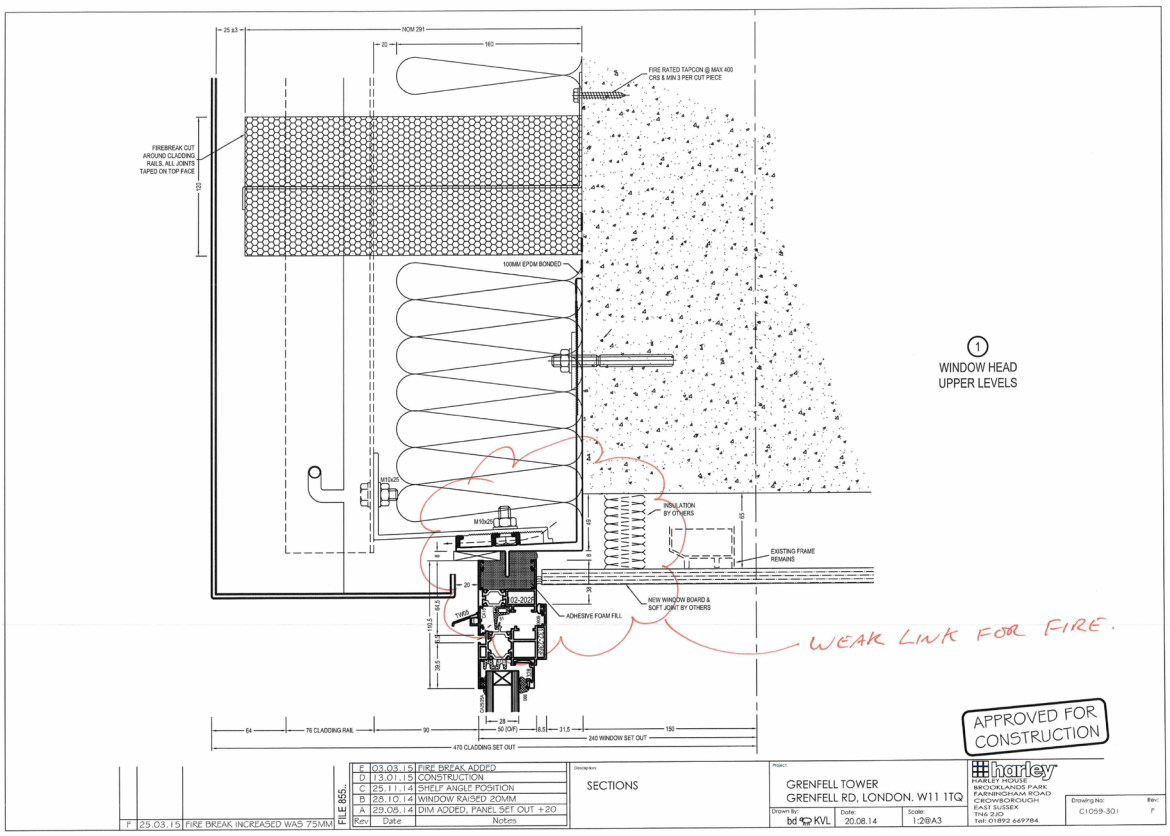

Figure 57.1 – Harley drawing 301

57.55 Ben Bailey thought that the purpose of Mr Mort's email and sketches was to provide a solution to the dispute about whether there should be cavity barriers or firestopping[2015] and he noticed that Mr Mort had drawn cavity barriers at the head and sill of the window in the first sketch.[2016] However, he did not communicate Mr Mort's views, including about the weak link for fire, to anyone at Studio E, Rydon or building control, despite Mr Mort's having said that he thought that the building control officer would have noticed the problem.[2017] Nor did he ask Mr Mort to clarify exactly what he meant.[2018] Ben Bailey's explanation was that he had read the emails together and, as Mr Hoban had changed his position shortly afterwards, he did not feel the need to refer Mr Mort's email to him.[2019]

[2012] Mort {Day103/39:21}-{Day103/40:19}.
[2013] Harley drawing 301 {HAR00003948/2}.
[2014] Mort {Day103/36:11}-{Day103/37:3}.
[2015] Ben Bailey {Day40/74:12-17}; {Day40/76:4-11}.
[2016] Ben Bailey {Day40/80:17-24}.
[2017] Ben Bailey {Day40/75:7-21}; {Day40/86:17-25}.
[2018] Ben Bailey {Day40/76:20-25}; {Day40/85:17}-{Day40/86:2}; Crawford {Day11/6:11-15}.
[2019] Ben Bailey {Day40/76:12-19}; {Day40/76:4-11}.

57.56 That explanation is far from satisfactory. It made no sense for Ben Bailey to disregard Mr Mort's concerns about the design of the window head simply because the dispute over the rating of the cavity barriers had been resolved shortly afterwards. It was foolhardy to ignore the very clear warning about the design of the window, since it should have been plain to anyone reading Mr Mort's email and reviewing his sketches that the two issues were distinct from one another.[2020]

57.57 Later the same day Ben Bailey forwarded the email from Mr Mort to others at Harley, including Ray Bailey and Kevin Lamb.[2021] He expected them to read its contents and also the attachments.[2022] Ray Bailey could not recall when he first saw Mr Mort's email and accompanying sketches, but he confirmed that it was before the end of the project.[2023] He did not bring Mr Mort's concerns to the attention of Studio E or building control, nor did he ask Mr Mort to clarify the position.[2024] His explanation was that the email needed to be read in the context of the debate about the requirement for firestopping or a cavity barrier,[2025] but for the reasons set out above, we do not accept that explanation, even allowing for the fact that he may not have seen the email until 1 April 2015, or even later.[2026] Whenever he read the email, Ray Bailey ought to have realised that the problem of the weak link was separate and distinct from the question about firestopping. Ray Bailey eventually accepted that the only sensible thing to have done was to raise Mr Mort's concern with building control.[2027]

57.58 Mr Lamb denied having noticed Mr Mort's warning about the weak link, despite admitting that he had scanned the email.[2028] Mr Lamb did not discuss the drawing with anyone at Harley or anyone else connected with the project[2029] and no changes were made to either of the drawings that Mr Mort had annotated.[2030] Mr Mort's email did not prompt Mr Lamb to consider whether the weak link could be rectified by some other change to the design.[2031]

57.59 Although Harley had been alerted in that way to the presence of a potential route for fire to spread at the head of the window, it did not take any steps to make good the defect, either by referring it to the design team for discussion, or by revising its design.

The outcome: March–April 2015

57.60 On 31 March 2015, Mr Crawford replied to Mr Hoban's email of 30 March 2015.[2032] He noted that the subject of fire barriers was causing concern on site, not least due to the effect on programme and cost. He asked for Mr Hoban's earliest response as the matter was beginning to hold up work.

[2020] {HAR00018971} In particular, Mr Mort wrote in the introductory paragraph: "I have reviewed the drawings sent over and sketch a proposal to alleviate the issues raised by the BCO, also on the second page of the attachment I have highlighted the weak link so to speak in terms of fire."
[2021] {HAR00003947}.
[2022] Ben Bailey {Day40/92:14-20}.
[2023] Ray Bailey {Day33/158:5-15}.
[2024] Ray Bailey {Day33/159:17-19}; {Day33/160:2-5}; {Day33/160:8-12}.
[2025] Ray Bailey {Day33/159:20-23}.
[2026] Ray Bailey {HAR00010184/17-18} pages 17-18, paragraph 69.
[2027] Ray Bailey {Day33/160:13-25}.
[2028] Lamb {Day38/138:8-20}; {Day38/141:24}-{Day38/142:4}.
[2029] Lamb {Day38/142:21}-{Day38/143:2}; {Day38/144:3-5}.
[2030] Lamb {Day38/144:6-14}.
[2031] Lamb {Day38/146:2-15}.
[2032] {SEA00000265}.

57.61 Mr Crawford sent the correspondence to Mr Ashton and asked for his comment.[2033] Mr Ashton responded by email later the same day.[2034] He explained that, in his view, a cavity barrier was all that was required, since fire stopping would not stay in place in a fire which would cause the zinc cladding to fail. Mr Ashton was unaware of the type of cavity barrier that had been proposed for use at Grenfell Tower and did not think it necessary to clarify that with the design team at that stage.[2035] Attached to Mr Crawford's email was a drawing produced by Studio E showing a cavity barrier at the head of the window only.[2036] However, Mr Ashton did not look at the drawing at the time and therefore did not know where cavity barriers were to be located.[2037]

57.62 On 1 April 2015 Mr Hoban replied to Mr Crawford saying that he had no objection to the proposal made by the design team, which provided for a cavity barrier with 30 minutes' integrity and 15 minutes' insulation.[2038]

57.63 Mr Crawford replied on the same day[2039] and sent Mr Hoban two further drawings relating to the lower levels.[2040] He also attached a drawing made by Harley.[2041] Mr Hoban replied to that email, thanking Mr Crawford for the further drawings and confirming that he had no adverse comments.[2042] Simon Lawrence sent that email onto Ben Bailey and Ray Bailey,[2043] copying Neil Crawford and Simon O'Connor shortly afterwards and informing them that the building control officer now agreed that the fire protection in the cladding should be a cavity barrier rather a fire stop. Ray Bailey was aware that the drawings did not show cavity barriers around the windows but did not check with Rydon or Studio E whether building control had made any comments on that omission.[2044] Mr Crawford did not expressly seek guidance from building control about the location of cavity barriers around the windows[2045] and we have seen no evidence that he asked Mr Hoban to approve or comment on Harley's cavity barrier strategy as a whole.[2046] For his part, Mr Lawrence was unaware that there ought to have been cavity barriers around the windows.[2047]

57.64 When Mr Lawrence was asked what steps he had taken to ensure that cavity barriers were included as required in the external wall design, he said that he had used a lead designer and a specialist subcontractor and had consulted building control.[2048] He accepted he had been largely a spectator in relation to the exchange of correspondence in March 2015 emails, as did the project manager, Mr O'Connor.[2049] Mr Lawrence's evidence, however, betrayed a failure to understand his responsibility for ensuring that the external wall of the building complied with the requirements of the Building Regulations. There were many occasions in the course of that correspondence when it was, or should have been, clear to

[2033] {SEA00013044}.
[2034] {EXO00000715}.
[2035] Ashton {Day18/100:13-21}.
[2036] Studio E drawing "Proposed Typical Bay Plans, Section & Elevation" {SEA00002499}.
[2037] Ashton {Day18/123:7}-{Day18/124-10}.
[2038] {HAR00013719/2}.
[2039] {HAR00013719/2}.
[2040] Detail Sections Sheet 2 Main Entrance 1279 (06) 121 Rev 00 {RYD00037743}; Detail Section Sheet 1 1279 (06) 120 Rev 00 {RYD00037744}.
[2041] Harley Drawing C1059-325 Revision C which was a Walkway +1 Level Section {RYD00037745}.
[2042] {HAR00013719}.
[2043] {HAR00013719}.
[2044] Ray Bailey {Day33/155:20}-{Day33/156:3}.
[2045] Crawford {Day11/61:24}-{Day11/62:4}.
[2046] Crawford {Day11/62:10-13}.
[2047] Lawrence {Day25/13:18-22}.
[2048] Lawrence {Day24/184:8-13}.
[2049] Lawrence {Day25/8:1-4}; O'Connor {Day26/153:11-13}.

Mr Lawrence that Harley needed assistance[2050] which it was not receiving from Studio E.[2051] It was also clear that there was a significant degree of confusion over whether and to what extent cavity barriers were required[2052] and that consideration should have been given to obtaining specialist advice. Mr Lawrence was not alive to any of these problems.[2053] He should have been.

Further advice from Siderise

57.65 Harley contacted Siderise on a number of other occasions during the life of the project seeking advice about cavity barriers.[2054] Despite that, it did not occur to Ben Bailey to inform himself about the guidance which was available in Approved Document B.[2055] The correspondence demonstrates a concerning lack of knowledge and expertise within Harley in relation to the use and siting of cavity barriers, which led to undue reliance on the advice of the manufacturer. Ben Bailey was unable to explain that lack of expertise and could not recall whether he had sought advice from Mr Anketell-Jones, Mr Lamb or Studio E.[2056] It was reasonable to expect Harley, as a specialist cladding contractor, to possess a degree of technical knowledge about the function of cavity barriers in ensuring compliance with the Building Regulations, but the evidence shows that it did not. The piecemeal requests to Siderise demonstrate the pitfalls in failing to articulate a clear and detailed cavity barrier strategy at the design stage before construction work began.

Installation of the cavity barriers

57.66 The installation of the external facade, including cavity barriers, was carried out by Osborne Berry Ltd as a subcontractor.[2057] Mr Osborne had no formal training in the installation of rainscreen cladding facades.[2058] The company had no experience of installing cavity barriers with intumescent strips and, as far as Mr Berry was aware, it had not previously installed cavity barriers manufactured by Siderise.[2059] Harley did not maintain a permanent presence on site and there was no clerk of works in the traditional sense, so there were times when Osborne Berry and their workmen were unsupervised when installing the facade.[2060]

57.67 A subcontractor progress meeting was held on 28 April 2015. The minutes record that Ben Bailey was to issue elevation drawings to Daniel Osgood, a Rydon site manager, showing the position of the cavity barriers.[2061] The minutes also recorded that windows and "firebreaks" were being fitted to the north, east and west elevations.[2062] It therefore appears that the work of installing cavity barriers had begun before Harley had issued a full set of drawings. Mr Osgood said that he had assumed that Osborne Berry knew from experience where to place the cavity barriers.[2063]

[2050] Email from Kevin Lamb to Simon Lawrence dated 3 March 2015 {HAR00017738}.
[2051] Email from Neil Crawford to Kevin Lamb, copying Simon Lawrence and others dated 3 March 2015 {EXO00001461}. Mr Lawrence was surprised that Studio E required advice on a query of this nature, Lawrence {Day24/191:20-24}; but this did not trigger him to consider Studio E's competence, {Day24/193:2-11}.
[2052] Lawrence {Day24/193:2-11}.
[2053] Lawrence {Day24/185:13-18}.
[2054] Emails 6 May 2015 {HAR00004238}; 17 June 2015 {HAR00019012/2}.
[2055] Ben Bailey {Day40/110:24}-{Day40/111:9}.
[2056] Ben Bailey {Day40/113:3}-{Day40/114:3}.
[2057] Ben Bailey {HAR00010060/3} page 3, paragraph 11.
[2058] Osborne {Day43/72:9-12}.
[2059] Berry {Day44/41:4-22}.
[2060] Ben Bailey {Day40/120:17}-{Day40/121-3}.
[2061] {HAR00000414}.
[2062] {HAR00000414/3}.
[2063] Osgood {Day30/146:25}-{Day30/147:4}.

57.68 Ben Bailey did not recall having given Osborne Berry any guidance on how to install the cavity barriers.[2064] Mr Osborne had never seen any such guidance, nor did he ask for any while he was on site.[2065] He accepted that he should have checked that he understood how to install the product, which he had not fitted before, but apparently it did not occur to him at the time to do so.[2066] Mr Berry had not seen any Siderise literature containing guidance on the installation of cavity barriers during the time he was working on the Grenfell Tower project, nor had he looked for guidance on Siderise's website.[2067] At the time that Osborne Berry was training their fitters, only horizontal cavity barriers were available on site.[2068]

57.69 Mr Osborne confirmed that the cavity barriers above the windows had been fitted above the level shown on Harley's drawings[2069] to prevent the fixing brackets penetrating the EPDM membrane.[2070] He said that the change had been specifically agreed on site after Osborne Berry had produced a mock-up of a sample cladding arrangement.[2071] He also said that it had been impossible to install the vertical cavity barriers under compression, as recommended in the Siderise product literature,[2072] because the method of attaching the cassettes to the supporting rails allowed the cavity barrier to push the panel away from the building.[2073] Mr Osborne did not raise the problem with anyone on site nor did he investigate a solution with Harley.[2074] Osborne Berry instructed their fitters to trim the cavity barriers on site as the gap between the original concrete and the facade differed at different levels on the building.[2075]

57.70 Mr O'Connor did not attempt to check the positions of the horizontal cavity barriers against the drawings, because that was not his personal responsibility, and he therefore did not notice that they had not been positioned in accordance with the drawings.[2076] However, he accepted that placing them incorrectly constituted defective workmanship, for which Rydon (amongst others) would be responsible.[2077] He would have expected that kind of poor workmanship to be picked up under Rydon's quality assurance and inspection regime and could not explain why that had not happened.[2078]

57.71 Ben Bailey was responsible for supervising Osborne Berry's work on site on behalf of Harley[2079] but he had not received any training that would enable him to ensure that the installation of the cavity barriers complied with the manufacturer's advice, directions or guidance.[2080] He thought it was likely that he had reviewed Siderise's product literature

[2064] Ben Bailey {Day40/134:4-18} such as the Siderise document "RH and RV cavity barriers for use in the external envelope or fabric of buildings" {HAR00008668}.
[2065] Mr Osborne confirmed he had not seen either Siderise document shown to him {SIL00000230} or {SIL00000227}. Osborne {Day43/139:5-21}.
[2066] Osborne {Day43/140:7-11}.
[2067] Mr Berry was shown the guide at {SIL00000227} and confirmed that he did not read any guide like it while he worked on the project; Berry {Day44/45:12-14}; {Day44/49:18-22}.
[2068] Berry {Day44/46:4-9}.
[2069] Osborne {Day43/98:6-21}.
[2070] Osborne {Day43/97:5-18}.
[2071] Mr Osborne's evidence was that this was agreed by either Daniel Anketell-Jones or Kevin Lamb at an early stage in the construction process, Osborne {Day43/97:25}-{Day43/98:5}; {Day43/98:22-24}.
[2072] {SIL00000227/6}: "This cavity barrier is fitted vertically under compression, completely filling the void."
[2073] Osborne {Day43/142:13-21}.
[2074] Osborne {Day43/142:23}-{Day43/143:7}.
[2075] Berry {Day44/51:13-21}.
[2076] O'Connor {Day26/166:25}-{Day26/167:6}.
[2077] O'Connor {Day26/167:24}-{Day26/168:15}.
[2078] O'Connor {Day26/172:18-25}.
[2079] Ben Bailey {HAR00010060/3} page 3, paragraphs 11-13.
[2080] Ben Bailey {Day40/138:15-19}.

and installation guidance,[2081] but according to Mr Berry he gave Osborne Berry no specific guidance about how the cavity barriers were to be fitted.[2082] Ben Bailey conducted visual inspections of the windows, insulation, cavity barriers and cladding rails before the cladding panels were installed on the north, east and west elevations, but not on the south elevation.[2083] No formal record was kept of those inspections.[2084] Ben Bailey's inspections involved ensuring that the components had been installed in the same way as on the previous bays; he did not check the work against the drawings.[2085] He did not notice any poor workmanship or flaws in the installation during any of his inspections.[2086]

57.72 After the fire the remaining cavity barriers were inspected and found to have various defects. In particular,

a. The horizontal cavity barriers were found to have been installed with air gaps in excess of 25mm and in some places the material had been poorly cut and fitted to the surrounding structure with gaps between adjacent barriers at joints.

b. Gaps had been left between the vertical cavity barriers and the cladding panels.

c. Incorrect fixing brackets had been used.

d. In some cases the fixing brackets had been spaced too widely.

e. Some cavity barriers in the area of the columns were missing or had gaps.

f. Horizontal cavity barriers had been used in the vertical position, with the intumescent edge installed directly against the concrete.[2087]

57.73 Ben Bailey said he had been very shocked when he was shown photographs of the cavity barriers taken after the fire. He said that he had not seen workmanship like that when he had been on site or when he had conducted his checks.[2088] In his witness statement he sought to explain why he had not noticed the problems with the installation of the cavity barriers by saying that the insulation boards had obscured the junction between the concrete walls and the back of the cavity barriers, making it impossible to see any defects without dismantling and causing damage to the completed works.[2089] However, that is in contrast with Mr Berry's evidence that there had been plenty of opportunities to inspect the cavity barriers before the insulation was fitted.[2090] Ben Bailey conceded that he ought to have been conducting inspections at each stage of the installation.[2091] If he had done so, he would have inspected the work before the insulation obscured the rear of the cavity barriers and at a time when the problems would probably have come to light. As it was, Harley's inspections of Osborne Berry's work were insufficient to ensure that the defects we have described were identified.

[2081] Ben Bailey {Day40/153:24}-{Day40/154:2}.
[2082] Berry {Day44/55:12-16}.
[2083] Ben Bailey {HAR00010060/4} page 4, paragraph13; Ben Bailey {Day40/148:13-19}; {Day40/149:17-20}.
[2084] Ben Bailey {Day40/146:15-20}.
[2085] Ben Bailey {Day40/150:4-17}.
[2086] Ben Bailey {Day40/150:19-23}.
[2087] Dr Lane, Phase 1 Report {BLAS0000008/40-48}; Swales {SIL00000306/25-26} pages 25-26, paragraphs 97-101.
[2088] Ben Bailey {HAR00010060/10} page 10, paragraph 32.
[2089] Ben Bailey {HAR00010060/10} page 10, paragraph 32.
[2090] Berry {Day44/59:9-14}.
[2091] Ben Bailey {Day40/164:1-9}.

57.74 Mr Hoban of RBKC building control also visited the site and carried out inspections. He had not received any training on the installation of cavity barriers in cladding systems,[2092] or indeed cladding systems more generally,[2093] but a building control officer could be expected to be shown on site what to look for and to be aware of the need to check the manufacturer's instructions about how the barriers should be installed.[2094] Mr Hoban did not check whether cavity barriers had been installed around the windows because most of the windows had by that time been installed and therefore it was not possible to see where the cavity barriers should have been.[2095] He did not ask to look behind the windows because he had seen cavity barriers being installed in other locations and so did not think it necessary to do so.[2096] Mr Hoban accepted that he should have checked whether cavity barriers had been fitted around the windows but that he had failed to do so.[2097]

57.75 Mr Hoban's evidence was that he would know through reading cavity barrier documentation how cavity barriers were to be installed.[2098] However he also accepted that the lack of training meant he had been unable to detect whether the cavity barriers within the facade had been properly cut and installed or whether the right kinds of cavity barriers had been placed in the right positions.[2099] He thought that the cavity barriers that he had been able to inspect when he went up the mast climbers were acceptable, and although he saw them being installed, the workmen were covering them up as they went along.[2100] At no stage did he ask for a cassette to be removed so that he could check the installation of the cavity barriers.[2101] Mr Hoban was unable to recall whether he had seen cavity barriers in place before they were covered by insulation.[2102] He did not notice that the horizontal cavity barrier at the head of the window was being installed at a level higher than that shown on the drawings made by Studio E.[2103]

57.76 Mr Jonathan White of John Rowan Partners, which was engaged by the TMO to provide site supervision and inspection services, told us that it was not part of his job to check for compliance with the Building Regulations.[2104] His role, as he saw it, was to find out whether building control had expressed any concerns about the work and report back to the TMO.[2105] Mr White did not see design drawings of the windows[2106] and did not notice during his inspections that there were no cavity barriers around the windows.[2107] Although he inspected the cavity barriers and insulation, he was generally concerned only with whether the installation was consistent and the work neat and tidy.[2108] He told us that he would have picked up any obviously poor workmanship, such as poorly fitted cavity barriers, but not defects such as horizontal barriers in a vertical orientation.[2109]

[2092] Hoban {RBK00050416/11} page 11, paragraph 34g; Hoban {Day46/126:20}-{Day46/127:4}.
[2093] Hoban {Day46/126:20}-{Day46/127:4}.
[2094] Menzies {Day60/109:24}-{Day60/111:4}.
[2095] Hoban {Day46/98:4-11}.
[2096] Hoban {Day46/98:14}-{Day46/99:5}.
[2097] Hoban {Day46/99:20-25}.
[2098] Hoban {Day46/127:13}-{Day36/128:1}.
[2099] Hoban {Day46/127:6-12}.
[2100] Hoban {Day46/128:10-20}.
[2101] Hoban {Day46/189:21}-{Day46/190:6}; {Day46/191:24}-{Day46/192:13}.
[2102] Hoban {Day46/130:11-20}.
[2103] Hoban {Day46/130:21-25}.
[2104] White {Day42/112:11}-{Day42/113:4}.
[2105] White {Day42/165:7-13}.
[2106] White {Day42/158:2-12}.
[2107] White {Day42/165:1-3}.
[2108] White {Day42/171:4}-{Day42/172:9}.
[2109] White {Day42/176:20}-{Day42/179:24}.

Siderise inspection at Wayland House

57.77 In December 2014, before Harley had begun installing the cladding at Grenfell Tower, Mr Kay of Siderise inspected the work on another of its projects, Wayland House in Brixton,[2110] which involved a curtain wall refurbishment. Mr Kay inspected the firestopping following the installation of Siderise's Lamatherm system. Following his inspection, on 19 December 2014 Mr Kay reported to Harley on the quality of the work. He found

a. Installation of fire barriers in the incorrect orientation.

b. Areas where the fire barriers had not been installed under sufficient compression, leaving gaps or loose material in the cavity.

c. Gaps between the vertical fire barriers and the structure.

Mr Kay considered it shocking to see so many defects in a cladding system[2111] and asked Harley to arrange for him to visit the building again when remedial works had been carried out.[2112]

57.78 Mr Kay confirmed that a similar inspection service would have been provided to Harley in relation to the Grenfell Tower project,[2113] but that no one from Harley had asked Siderise for it.[2114] Ben Bailey was unaware of the email or Mr Kay's findings when he began his work on the cavity barriers at Grenfell Tower.[2115] Nor did he know whether anyone at Harley had communicated those findings to Osborne Berry so that lessons could be learned.[2116] Harley failed to learn from the experience at Wayland House and did not make use of Mr Kay's report to ensure that standards were improved at Grenfell Tower.

Cavity barriers in the crown

57.79 Neither the second[2117] nor the third[2118] version of the NBS Specification contained any detailed information about the crown; each of them simply indicated that that part of the work was still to be completed.[2119] Mr Sounes accepted that because the details of the crown had not yet been confirmed, little consideration had been given to where cavity barriers were to be placed within it.[2120] During Mr Rek's time working on the Grenfell Tower project (September to December 2013) no detailed design work had been carried out on the crown and questions relating to the design, material, finish and fixing were left until after the NBS Specification had been sent out to tenderers.[2121]

57.80 As part of the Employer's Requirements prepared for the tender, Studio E prepared a drawing which showed a cross-section of different floors of the tower, including the top floor and roof (or "plant") level.[2122] The drawing bore a label "Design of the crown detail

[2110] {SIL00000321}.
[2111] Kay {Day103/97:17-25}.
[2112] {SIL00000321/3}.
[2113] Kay {Day103/106:20}-{Day103/107:23}.
[2114] Kay {Day103/175:15-17}.
[2115] Ben Bailey {Day40/157:23-25}.
[2116] Ben Bailey {Day40/158:5-10}.
[2117] Dated 29 November 2013 {SEA00000153}.
[2118] Dated 30 January 2014 {SEA00000169}.
[2119] At Clause 130 in Section H92 where it stated: "Major Nonstandard Components 'Crown': Manufacturer: TBC - Product Reference: TBC. Material: TBC. Finish: TBC…" {SEA00000153/66} and {SEA00000169/67}.
[2120] Sounes {Day 21/92:16-22}.
[2121] Rek {Day12/86:12-17}; {Day12/87:12-16}.
[2122] Drawing entitled "Detail Section Sheet 1" {SEA00002551} dated 26 September 2013 with reference 1279 (06) 120 Rev 00.

TBC by architect". One cavity barrier was shown at the head of the window between the top floor and the roof level. There were, however, no other indications of where cavity barriers would be located within the crown. Mr Sounes accepted that little thought had gone into the matter at that stage.[2123] Studio E never produced any elevation drawings showing how the horizontal cavity barriers at the top of the building would meet the vertical cavity barriers.[2124] Mr Sounes confirmed that the risk that the crown might contribute to the spread of a fire in the external wall had not been considered because no one had been aware of the risks posed by ACM panels.[2125]

57.81 Mr Crawford was involved in the design of the crown after Studio E had been novated to Rydon.[2126] He did not consider whether cavity barriers were required over and above those that would be fitted around compartments.[2127] Since there were no compartments in the crown itself, it was his view that there was no requirement for cavity barriers.[2128]

57.82 On 29 May 2015 Mr Lamb sent Mr Crawford an email attaching drawings of the crown and asking for his approval.[2129] On 12 June 2015, Mr Crawford replied attaching his comments on the design.[2130] His annotated drawings[2131] showed vertical cavity barriers which terminated at the base of the crown but no horizontal cavity barriers at the head of the columns.[2132] Harley's drawings[2133] did not show a horizontal cavity barrier at the head of the columns or at the base of the crown, unlike the drawing produced by Studio E.[2134] Mr Crawford agreed that that represented a worsening of the design[2135] but he did not mention that when he commented on the drawings.[2136] There was no discussion between Harley and Studio E about the provision of a cavity barrier at the head of the columns.[2137]

57.83 Mr Lamb intended to revisit the question of a cavity barrier in that location and left himself a note on the CAD[2138] version of the drawing to remind him to do so.[2139] However, the note appeared only on Mr Lamb's CAD file; it did not appear on the printed versions of the drawing and therefore no one else saw it.[2140] Mr Lamb said that there had been a discussion within Harley and that it had been felt that there was no need to include a cavity barrier at the head of the columns,[2141] but he was unable to recall who in Harley had been involved in that discussion.[2142] At any rate, the drawing was issued for the architect's comments without a cavity barrier.[2143] Mr Lamb explained that the drawing had then been overlooked and that it had never been re-issued as a drawing for construction.[2144] However, that did not cause him any concern because Mr Crawford had not commented on the

[2123] Sounes {Day21/92:19-22}.
[2124] Sounes {Day21/93:8-16}.
[2125] Sounes {Day21/101:5-20}.
[2126] Crawford {Day11/63:1-3}.
[2127] Crawford {Day11/63:7-12}.
[2128] Crawford {Day11/63:22}-{Day11/64:8}.
[2129] {SEA00013221}.
[2130] {SEA00013221}.
[2131] {SEA00003242}.
[2132] Crawford {Day11/66:9-11}.
[2133] For example C1058-216 {SEA00003242}.
[2134] Entitled "Detail Section Sheet 1" {SEA00002551} dated 26 September 2013 with reference 1279 (06) 120 Rev 00.
[2135] Crawford {Day11/69:20-25}.
[2136] Crawford {Day11/70:3-9}.
[2137] Crawford {Day11/71:24}-{Day11/72:4}.
[2138] Computer Aided Design.
[2139] {HAR00010427}; Lamb {Day38/166:17}-{Day38/167:2}.
[2140] Lamb {HAR00010419/10} page 10, paragraph 36.
[2141] Lamb {Day38/163:23}-{Day38/164:5}.
[2142] Lamb {Day38/164:12-13}.
[2143] Lamb {Day38/162:10-17}.
[2144] Lamb {Day38/165:7-14}.

absence of a cavity barrier in that location. In his view, therefore, there was no need to revisit the point.[2145] Despite Mr Lamb's evidence we think it unlikely that he did discuss the matter with anyone else at Harley and that he simply overlooked it.

57.84 For his part, Daniel Anketell-Jones did not give any thought to whether steps needed to be taken to reduce the risk of fire spreading at the top of the building or around the crown.[2146] and no discussions took place among the construction professionals about the risk of vertical or horizontal spread of fire at the level of the crown.[2147] Work on the crown was left quite late because Harley was concentrating on the large area of cladding represented by the elevations of the building.[2148] As a result, Mr Lamb based his design for the crown on very brief drawings from the architect and a design team meeting on site.[2149]

57.85 Mr Hoban's understanding was that cavity barriers were not required at the junction between the cladding and the crown because the crown did not represent a concealed space.[2150] Accordingly, despite the fact that he inspected the crown,[2151] he did not remark on the absence of cavity barriers or any other fire mitigation measures in that location.

[2145] Lamb {Day38/165:20-24}; see Mr Crawford's annotations on the drawing at {RYD00043547/4}.
[2146] Anketell-Jones {Day37/52:16-23}.
[2147] Anketell-Jones {Day37/52:25}-{Day37/53:14}.
[2148] Lamb {HAR00010419/9} page 9, paragraph 35.
[2149] Lamb {Day38/162:1-2}.
[2150] Hoban {Day46/102:10-19}.
[2151] Hoban {Day46/138:1-3}.

Chapter 58
Window infill panels

Introduction

58.1 The spaces between the vertical columns of Grenfell Tower were filled by window assemblies which were constructed as a single unit and contained both glazed sections (with opening parts) and solid sections acting as walls. The solid sections were known as window infill panels.

58.2 Two types of window infill panel were installed during the refurbishment of Grenfell Tower, a large panel with an insulating core, which was set between the glazed windows and a smaller panel, also with an insulating core, which housed the kitchen extractor fan.[2152] They are shown in red and orange in the following figure taken from Dr Lane's Phase 1 report.

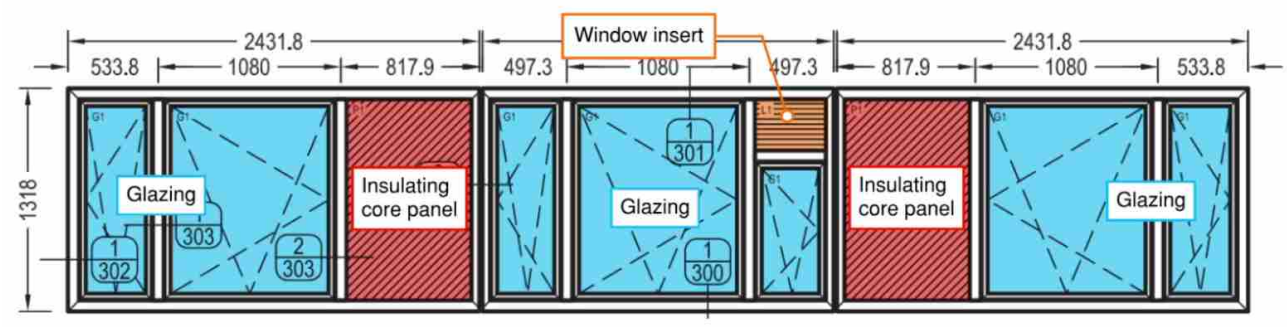

Figure 58.1 – Typical elevation for three-window configuration

58.3 After the fire it was found that both panels contained a core of Styrofoam, held between two sheets of aluminium.[2153] Styrofoam is a form of extruded polystyrene (often referred to as "XPS") and is combustible.[2154] Although in his Phase 2 experimental work Professor Bisby found that those panels made the lowest contribution to the energy available in the external wall (only about 2–3% of the total energy available per floor),[2155] he also found that they were relatively easy to ignite and, once ignited, had a comparatively high energy heat release rate per unit area.[2156] He concluded that although they were not a primary cause of, or contributor to, the spread of fire across the external walls, they may have played an important part in the early development of the fire in and immediately outside Flat 16.[2157] Accordingly, in this chapter we seek to explain how that combustible material came to be incorporated into the external wall of Grenfell Tower.

[2152] Grenfell Tower Inquiry: Phase 1 Report, Chapter 6, 6.29 and 6.31.
[2153] Grenfell Tower Inquiry: Phase 1 Report, Chapter 6, 6.29 and 6.31.
[2154] Lane, Phase 1 Report {BLAS0000008/61-62} paragraphs 8.10.36, 8.10.4 and 8.10.42.
[2155] Bisby, Phase 2 Experiments - Work Package 1 {LBYWP100000002/5} page 5, paragraph 32.
[2156] Bisby, Phase 2 Experiments - Work Package 1 {LBYWP100000002/5-6} pages 5-6, paragraphs 33-34.
[2157] Bisby, Phase 2 Experiments - Work Package 1 {LBYWP100000002/5-6} pages 5-6, paragraphs 39-40.

Specification at tender stage

58.4 In the NBS Specification, the final version of which was dated 30 January 2014, Studio E specified aluminium-faced window infill panels with insulating cores as part of the external wall. Although some thermal performance requirements were included, no particular material or product was prescribed at that stage.[2158] It was therefore left to others to select suitable products which met the stipulated requirements.[2159] Studio E did not prescribe any minimum fire performance standards for the panels.

58.5 Studio E's tender drawings showed insulating panels between the areas of glazing, but they did not identify any particular product or type of insulation either.[2160]

Harley's specification

58.6 When Kevin Lamb read the NBS Specification he thought that Studio E had simply overlooked the need to identify the insulating material to be used.[2161] On 25 September 2014 he produced a drawing of the window arrangement which was revised on a number of occasions culminating in Revision D issued on 3 March 2015.[2162] In his drawings the larger infill panels were designated "P1" and the smaller infill panels housing the kitchen extractor fans "P2". Mr Lamb also produced specification notes dated 15 January 2015 which identified the products he proposed to use.[2163] The P1 and P2 panels were both shown as comprising 2mm aluminium skins with a 24mm core of Kingspan TP10 rigid insulation. TP10 is a combustible insulation product manufactured by Kingspan.[2164]

58.7 When asked about his choice of insulating core material, Mr Lamb said that he had initially selected Kingspan TP10 for both panels because it was a standard product that he had used over many years and that he had put it into the specification as a starting point for discussions within Harley.[2165] Based on a conversation he had had many years previously with a fabricator working for another client, he was confident that the result would be a "Class 0" panel.[2166] However, he did not check the requirements of the Building Regulations or the guidance in Approved Document B before suggesting the use of TP10,[2167] nor did he take any steps to investigate its fire performance, including its suitability for use on buildings over 18 metres in height. He did not discuss the matter with anyone else at Harley.[2168]

[2158] {SEA00000169/145} clause 332.
[2159] Crawford {Day9/112:14-22}; {Day9/147:5-8}; {Day9/154:17-18}.
[2160] {SEA00002499}; Hyett, Module 1 Report {PHYR0000029/77} page 77, paragraph 4.3.90.
[2161] Lamb {Day38/169:1-22}.
[2162] {HAR00008886}. 25 September 2014 was revision A. "P1" appears in revision A. The final revision was D. dated 3 March 2015 in which both "P1" and "P2" appear.
[2163] {HAR00003866}.
[2164] Lane, Phase 1 Report {BLAS0000008/62} paragraph 8.10.39(b); BBA certificate {KIN00000276}.
[2165] Lamb {Day38/173:9-10}; {Day38/173:12-18}; {Day38/178:25}-{Day38/179:2}.
[2166] Lamb {Day38/179:5-9}.
[2167] Lamb {Day38/174:2-5}; {Day38/175:13-17}.
[2168] Lamb {Day38/178:20}-{Day38/179:18}.

58.8 The BBA certificate for Kingspan TP10 states that the product had in fact achieved a national Class 1 rating,[2169] which is inferior to national Class 0.[2170] However, Mr Lamb did not look at the certificate; instead, he went ahead on his understanding that when fabricated the panel would achieve a Class 0 rating because the outer surfaces would be aluminium.[2171]

58.9 Mr Lamb's evidence suggests that he was not familiar with the guidance in Approved Document B that insulation products used in the external walls of buildings over 18 metres in height should be of limited combustibility. Although he was aware that there was a difference between limited combustibility and Class 0, he had never considered what the difference was and simply assumed that materials with a Class 0 classification were acceptable for use.[2172] It did not occur to him that TP10 panels might contain combustible insulation and he therefore never considered whether combustible cores could be exposed in a fire.[2173] That in turn demonstrated a lack of understanding on his part about how metal panels are liable to perform in a fire, a matter to which attention had been drawn in industry guidance long before 2015.[2174]

58.10 Mr Lamb's specification notes relating to the P1 and P2 panels were subsequently changed. Someone added handwritten annotations in red to amend the specification of the P1 and P2 panels to show 25mm of Styrofoam held between two 1.5mm skins of aluminium.[2175] That involved a reduction in the thickness of the aluminium skins and a corresponding increase in the thickness of the insulation, as well as a change of product. Mr Lamb said that the changes had been made by Mark Stapley, Operations Director at Harley.[2176] We accept that evidence and think it likely that the changes were made by Mr Stapley after he had obtained the first quotation for the supply of panels.

58.11 Kevin Lamb produced a revised version of the specification notes,[2177] which reflected the changes made by Mr Stapley, save that the insulation in the P2 panel was still shown as Kingspan TP10.[2178]

58.12 Kevin Lamb said that he had been told by Ben Bailey to obtain the infill panels from a company called Panel Systems Ltd, but that that company had been able to supply panels only with Styrofoam cores.[2179] Ben Bailey, however, said that Mark Stapley had ordered the panels some time before he had become project manager.[2180] We accept Ben Bailey's evidence on this point. It is apparent from the documents that Mr Bailey did not take over as project manager until 3 March 2015. Mark Stapley made his first inquiry of Panel Systems for the manufacture and supply of the window infill panels in January

[2169] {KIN00000276/6} section 7.
[2170] See Chapter 5. National Class 1 means it has undergone testing in accordance with BS 476-7, not 476-6, which is also necessary for a national Class 0 classification.
[2171] Lamb {Day38/181:18}-{Day38/182:14}.
[2172] {CLG00000224/96} clause 12.7; Lamb {Day38/83:9-17}.
[2173] Lamb {Day38/183:25}-{Day38/184:9}.
[2174] See the 2nd Edition of BRE 135 dated 2003 {BRE00005554/17-18} and the CWCT Standard for Systematised Building Envelopes, 2008 {CWCT0000046/11} section 6.3.
[2175] {HAR00003866}.
[2176] Lamb {Day38/176:9-11}.
[2177] {HAR00003869/1}.
[2178] Now increased in thickness from 24mm to 25 mm.
[2179] Lamb {HAR00010419/16} page 16, paragraph 63; Lamb {Day38/167:4} – {Day38/168:25}.
[2180] Ben Bailey {Day39/158:2-12}; {Day39/159:19-24}.

2015,[2181] and the first invoice for the supply of panels was dated 10 February 2015.[2182] It seems clear, therefore, that the decision to obtain panels from Panel Systems Ltd was not made by Ben Bailey.

58.13 Mr Lamb's evidence was also at odds with the evidence given by Christopher Ibbotson, the owner and managing director of Panel Systems, which we have no reason to doubt. According to him, in 2015 the company manufactured composite panels using a range of materials and various insulation products.[2183] If asked to do so, it would give advice on the most suitable kind of panel to meet the customer's needs. Any advice on fire performance of a product would be based on information obtained from the manufacturer.[2184] It is worth noting that in September 2015 Ben Bailey asked Panel Systems for advice on the manufacture and supply of a panel for use in the mounting of an anti-arson letterbox at Grenfell Tower[2185] and that two days later he was sent details of its Versafire Euroclass A1 rated non-combustible board.[2186]

58.14 If a customer did not specify a core material, Panel Systems offered Styrofoam as standard[2187] because of its thermal efficiency.[2188] In those circumstances it would not generally inform the customer of Styrofoam's fire performance, nor would it tell the customer that it should check whether the use of that material in the particular circumstances they had in mind would comply with the Building Regulations.[2189] Panel Systems marketed its insulating panels by reference to the fire rating of the core material, which was the primary factor in their performance. It therefore marketed panels with Styrofoam cores as European Class E.[2190]

58.15 In the light of Mr Ibbotson's evidence, it is clear that panels with cores other than Styrofoam could have been obtained from Panel Systems and it follows that if Harley had wanted to do so it could probably have obtained panels with better fire performance which met the requirements for thermal efficiency. We are unable to say with confidence what led Mr Stapley to accept Styrofoam for the core, but the fact that it was a standard product combined with the reduction in the thickness of the aluminium skins leads us to think that considerations of cost may have played a part. At all events, there is no reason to think that anyone at Harley gave serious consideration to the fire performance of the panels.

58.16 On 19 January 2015 Mark Stapley asked Panel Systems to provide a price for the manufacture and supply of infill panels.[2191] For that purpose he sent a schedule of Harley's requirements[2192] and requested prices for aluminium spandrel panels with an overall thickness of 28mm, without specifying the core material to be used.[2193] Later that day Panel Systems gave Mr Stapley a quotation for 28mm thick Aluglaze panels with aluminium

[2181] {PAN00000012}; {PAN00000007}.
[2182] {MET00040281}; {MET00040279}.
[2183] Ibbotson {Day104/6:24}-{Day104/7:3}; {Day104/8:12-13}; {Day104/8:16-25}.
[2184] Ibbotson {Day104/14:7-21}; {Day104/16:6-19}.
[2185] {HAR00020436}; Ben Bailey {Day39/176:2}.
[2186] {HAR00002853}.
[2187] {PAN00000017/2} page 2, paragraph 2.4.
[2188] Ibbotson {Day104/20:15}–{Day104/21:2}.
[2189] Ibbotson {Day104/21:4-23}.
[2190] Ibbotson {Day104/24:21}–{Day104/25:25}.
[2191] {PAN00000012}; Ibbotson {Day104/28:20-24}.
[2192] {PAN00000006/2}; Stapley {HAR00020574/8} page 8, paragraph 28; {HAR00010003}.
[2193] {PAN00000006/2}.

skins and 25mm Styrofoam cores.[2194] On 20 January 2015, Mr Stapley sent a purchase order to Panel Systems for the supply of the panels set out in his original schedule.[2195] There was no discussion about their fire performance.

58.17 Mark Stapley said that Panel Systems had specified the core material to be used in the P1 and P2 panels,[2196] but we think that unlikely, save in the sense that its quotation was based on Styrofoam because that was the default product. Harley had not specified any minimum fire performance for the core and there had been no discussion about what fire performance was required. As an experienced member of Harley's team Mr Stapley must have expected Panel Systems to quote for a basic product, unless asked to do otherwise. The responsibility for ensuring that the fire performance of the core was appropriate rested with Harley, not with Panel Systems.

58.18 Kevin Lamb accepted that he had never considered the fire performance of the window infill panels[2197] or whether the use of Styrofoam in the external wall complied with the Building Regulations.[2198] He was not aware that Styrofoam was not a product of limited combustibility, nor did he take any steps to assess whether the panel was suitable for use on high-rise buildings.[2199] Mr Lamb assumed it was a product that Harley had used many times before.[2200]

58.19 When asked why his specification notes showed Kingspan TP10 for the P2 panel instead of Styrofoam, as had been indicated in Mr Stapley's amendment, Kevin Lamb said that Panel Systems could not produce panels with inside and outside faces in different colours, as was required in the case of the P2 panels, so the specification had not been changed and the core remained Kingspan TP10. However, that does not strike us as very plausible. After the fire some surviving P2 panels were found to contain Styrofoam cores and there is no evidence that those or any other P2 panels had been obtained from a different supplier. We think Mr Lamb simply overlooked that part of the amendment and failed to make the required change.

Studio E's review of the specification

58.20 The revised version of Mr Lamb's specification notes was sent to Studio E for review and on 26 January 2015 Mr Crawford stamped it "Conforms to design intent", subject to the incorporation of certain comments, which did not include any comment on the window infill panels. Mr Crawford told us that he had not seen the handwritten annotations on the specification notes and that he did not think that he had been aware that Styrofoam had been substituted for Kingspan TP10 in the P1 panel.[2201] He maintained that he had been commenting only on architectural intent and would not necessarily have been looking at the description of the materials in the specification.[2202] Mr Crawford had no recollection

[2194] {HAR00009866}; {HAR00009867}.
[2195] Stapley {MET00040296/15} page 15. This was the same schedule as set by Mr Stapley on 19 January 2015 {PAN00000006/2}.
[2196] Stapley {HAR00020574/10} page 10, paragraph 33.
[2197] Lamb {Day38/171:15-17}; {Day38/192:16-20}.
[2198] Lamb {Day38/187:1-9}.
[2199] Lamb {Day38/188:4-9}.
[2200] Lamb {Day38/193:1-5}.
[2201] Crawford {Day11/110:4-24}.
[2202] Crawford {Day11/111:22}–{Day11/112:5}; {Day11/115:5:13}.

of discussing the use of any particular insulation material for the infill panels with anyone at Studio E, Harley, or Rydon.[2203] Mr Hyett was critical of Studio E for failing to identify the unsuitability of Styrofoam in the course of its design reviews.[2204]

58.21 On 15 July 2015, Kevin Lamb produced a further revision of the specification notes[2205] but the specification for the P1 and P2 panels remained as it had been in the previous version. On 17 July 2015 Mr Crawford stamped it as conforming to design intent. Again, he could not recall having noticed the specification of Styrofoam and Kingspan TP10.[2206] He thought that it was for Harley to check that the use of the material complied with statutory requirements and that it was not Studio E's function to check Harley's work.[2207] Mr Crawford also said that he thought that the Styrofoam would be treated with fire retardant to limit its combustibility, but he could not recall taking any steps to find out whether that had been done.[2208]

58.22 We think it clear that Studio E had an obligation under its contract with Rydon to take reasonable steps to ensure that all designs, whether produced by itself or any sub-contractors, complied with the relevant statutory requirements, including the Building Regulations.[2209] Mr Crawford's understanding that it was not his role to check the materials specified by Harley to ensure that the external wall was compliant with the Building Regulations was therefore wrong. He ought to have applied his mind to the fire performance of the window infill panels, both as a matter of contractual obligation and in the exercise of reasonable skill and care,[2210] but he failed to do so.

Harley's understanding of the products

58.23 Harley placed a number of orders for aluminium panels with a Styrofoam core between February and June 2015.[2211]

58.24 When Ben Bailey joined the project in March 2015 he was sent Harley's drawings and specification notes[2212] but could not remember whether he had reviewed them.[2213] He was not aware that Styrofoam was extruded polystyrene and he did not know who had specified its use in the P1 infill panels.[2214] He did not himself investigate whether it was appropriate to use panels with Styrofoam cores in the external wall.[2215]

58.25 Ben Bailey thought that the Kingspan TP10 product had been specified for the P2 panel by Kevin Lamb,[2216] but it is not clear why, since he had not discussed the choice of material with Mr Lamb.[2217] He did not look at the BBA certificate nor did he consider whether panels containing Kingspan TP10 would comply with the Building Regulations.[2218]

[2203] Crawford {Day11/112:15-25}; {Day11/114:23}–{Day11/115:4}.
[2204] Hyett, Module 1 Report (revised) {PHYR0000029/135} paragraphs 4.4.140 – 4.4.141.
[2205] {RYD00046822/1}.
[2206] Crawford {Day11/116:9-18}.
[2207] Crawford {Day11/117:4}–{Day11/118:23}; {Day11/120:2-13}.
[2208] Crawford {Day11/116:22}–{Day11/117:3}; {Day11/119:6-12}.
[2209] {RYD00094228/9} paragraph 8.
[2210] Hyett, Module 1 Report {PHYR0000029/135} paragraphs 4.4.140-4.4.141.
[2211] Ibbotson {Day104/32:12-17}.
[2212] {HAR00017738}; {HAR00003953}.
[2213] {HAR00017762}; Ben Bailey {Day39/155:12-22}.
[2214] Ben Bailey {Day39/156:14-23}.
[2215] Ben Bailey {Day39/162:21-25}; {HAR00009696}; Ben Bailey {Day39/163:14}-{Day39/164:17}.
[2216] Ben Bailey {Day39/164:24}-{Day39/165:1}.
[2217] Ben Bailey {Day39/165:14}-{Day39/166:1}.
[2218] Ben Bailey {Day39/172:9}-{Day39/173:11}; {Day39/175:6-7}.

58.26 Ben Bailey also thought that the window assemblies (which included both glazed sections and fixed insulating panels) did not fall within the guidance in Approved Document B on the construction of external walls. He therefore rejected the suggestion that Harley should have taken steps to satisfy itself that the insulation in the window infill panels was suitable for use on buildings of more than 18 metres in height. Other witnesses thought differently, however. Although we recognise that a distinction can be drawn between the concrete structure (including the columns), which plainly forms the external wall, and the window assemblies containing some glazed and some solid panels, which fill the gaps between the concrete, we think it clear that the purpose of the guidance in paragraph 12.7 of Approved Document B is to reduce the risk created by the use of combustible insulation in the walls of high-rise buildings. We therefore think it clear that the reference to "external wall construction" in paragraph 12.7 includes solid window infill panels and we do not think that a competent specialist facade contractor could reasonably have thought otherwise.

58.27 Simon O'Connor, Rydon's project manager between May 2014 and August 2015,[2219] received Harley's drawings and specification notes on 6 March 2015[2220] but could not remember having looked at either the drawings[2221] or the notes.[2222] He had not come across Styrofoam, extruded polystyrene or Kingspan TP10 before.[2223]

58.28 As we noted in Chapter 62, John Hoban, the building control officer at RBKC responsible for the Grenfell Tower refurbishment, also received Harley's specification notes on 6 March 2015.[2224] He did not notice that Styrofoam and Kingspan TP10 were being proposed as the insulating material in the window infill panels[2225] and did not look at the BBA certificates relating to either material; nor did he question the use of those materials.[2226] He candidly accepted that he should have done so.[2227]

58.29 On 24 August 2015, for the first time Ben Bailey asked Panel Systems to give him a price for supplying aluminium-faced panels with a core of Kingspan TP10.[2228] On 27 August 2015, Panel Systems provided Harley with a quotation as requested[2229] but for panels with a PIR core, rather than Kingspan TP10. Michael Roache, a product manager at Panel Systems, said that he had advised Harley that Kingspan TP10 was not suitable for use as the core of a composite panel due to its manufacturing tolerance and uneven surface and that as a result a discussion had taken place (though between whom is uncertain) about an alternative PIR insulation.[2230] Mr Ibbotson agreed that a TP10 core would not bond reliably to the aluminium skin. TP10 was therefore replaced with a generic PIR product.[2231] Subsequently, Harley placed further orders with Panel Systems for panels with PIR cores.[2232]

[2219] O'Connor {RYD00094221/7} page 7, paragraph 14; O'Connor {Day26/5:4-7}.
[2220] {HAR00003951}.
[2221] {HAR00003953}.
[2222] {HAR00003955}; O'Connor {Day26/112:3}-{Day26/114:24}.
[2223] O'Connor {Day26/115:17}-{Day26/116:16}.
[2224] {HAR00003955}.
[2225] Hoban {Day46/26:15}-{Day46/27:4}; {Day46/28:8-10}. He relied on Exova having looked at this specification. Hoban {Day46/27:16-21}.
[2226] Hoban {Day46/28:18}-{Day46/29:14}.
[2227] Hoban {Day46/29:15-17}.
[2228] {HAR00020331}; {HAR00020332}.
[2229] {HAR00018872}.
[2230] Roach {PAN00000029/3} page 3, paragraph 14. Ben Bailey said that any such conversation was not with him. Ben Bailey {Day39/173:6}-{Day39/174:5}.
[2231] Ibbotson {Day104/38:8-22}; {Day104/40:12-25}; {Day104/48:23}-{Day104/49:10}; Ibbotson {Day104/49:18-21}; {Day104/42:1-5}.
[2232] {MET00040286}.

58.30 In total Panel Systems appear to have supplied a number of larger orders between January and June 2015 for panels with Styrofoam cores, and two smaller orders between August and October 2015 for composite panels with PIR cores.

58.31 Although Kevin Lamb had specified Kingspan TP10 insulation for the P2 panels[2233] and although panels with PIR insulation had been ordered by Ben Bailey,[2234] the Inquiry's experts discovered after the fire that some of the P2 panels had Styrofoam rather than PIR cores.[2235] Mr Ibbotson denied that Panel Systems had substituted Styrofoam for PIR[2236] and Ben Bailey could not shed any light on how some of the P2 panels had come to be supplied with Styrofoam rather than PIR cores.[2237] He said that most of the panels had been supplied directly to CEP for fabrication and insertion into the window frames, which might explain why the problem had not been picked up at the time.[2238] However, he could not tell the products apart by their appearance.[2239] Neither the Rydon witnesses, nor Mr Lamb could explain how Styrofoam came to be substituted for PIR.[2240] However, neither material was suitable for use in the external wall of Grenfell Tower. Given the lack of interest shown by Harley, Rydon and Studio E in the fire performance of the insulating cores of the window infill panels, we think it unlikely that any of them would have objected to the use of Styrofoam in the P2 panels.

[2233] {HAR00003869/1}.
[2234] {HAR00000445/6}.
[2235] Lane, Phase 1 Report {BLAS0000008/62} paragraph 8.10.41.
[2236] Ibbotson {Day104/48:1-22}.
[2237] Ben Bailey {Day39/167:12}-{Day39/168:21}.
[2238] Ben Bailey {Day39/168:25}-{Day39/169:25}; Ben Bailey {Day39/171:12-21}.
[2239] Ben Bailey {Day39/172:3-7}.
[2240] Lamb {Day38/177:7-12}; O'Connor {Day26/117:9-13}; Hughes {Day27/76:16}-{Day27/77:6}; Martin {Day30/54:10}-{Day30/55:4}.

Chapter 59
Window reveals

Introduction

59.1 The refurbishment of the windows at Grenfell Tower involved fitting new uPVC boards at the head of the window, the sill and the jambs (often referred to as the "window reveals"), in each case over a 25mm layer of insulation.[2241] After the fire, the insulation that had been used was identified as either Celotex TB4000 or Kingspan Thermapitch TP10.

59.2 In his Phase 1 report the chairman concluded that the window reveals had provided a route for fire to spread from the interior of Flat 16 into the cladding. He found that the fire had probably entered the cladding as a result of hot smoke impinging on the uPVC window surrounds causing them to deform and fall away, together with the insulation which was attached to them. That created a gap which allowed the fire to gain access to the cavity behind the ACM panels and ignite combustible materials.[2242] In Chapter 110 we have reconsidered that conclusion in light of the evidence provided by BRE reconstruction evidence but we consider that it remains sound. In this chapter we examine how those materials came to be present around the windows.

The original specification

59.3 In the NBS Specification Studio E specified plywood window reveals[2243] together with "compressible insulation in gaps".[2244] The compressible insulation was specified as mineral wool to BS EN 13162 manufactured by Rockwool.[2245] (Mineral wool is inorganic and non-combustible.)[2246] However, Studio E did not specify precisely which gaps were to be filled with mineral wool and the tender drawings did not do so either,[2247] although they should have.[2248]

The substitution of uPVC for plywood

59.4 Although the NBS Specification provided for the window reveals to be constructed of plywood, Harley proposed the substitution of uPVC boards as part of Rydon's value engineering exercise.[2249] Neither Harley nor Rydon appears to have given any consideration to the relative fire performance of the two materials.[2250] In general, plywood could be expected to provide a greater degree of fire resistance than uPVC, which softens and deforms at temperatures above 60°C.[2251]

[2241] Phase 1 Report, Volume I, paragraph 6.28.
[2242] Phase 1 Report, Volume IV, paragraph 22.38.
[2243] National Building Specification (NBS) {SEA00000169/249} clause 240. It also stipulated that the fire-rating for the window reveals should be "fire-rating Class 1 or Class C-s3, d2".
[2244] National Building Specification (NBS) {SEA00000169/243} clause P10.
[2245] National Building Specification (NBS) {SEA00000169/243} clause 191.
[2246] Bisby, Phase 2 Experiments Work Package 2 {LBYWP200000001/36} paragraphs 239-240.
[2247] {SEA00002499}.
[2248] Crawford {Day9/149:15}–{Day9/150:11}; Hyett, Module 1 Report {PHYR0000029/80-82} paragraphs 4.3.94, 4.3.96 and 4.3.98.
[2249] {RYD00003316}.
[2250] Dixon {Day44/171:24}-{Day44/172:5}.
[2251] Torero, Phase 1 Report {JTOS0000001/41} Figure 9; Dixon {Day 44/170:12-21}.

59.5 Simon Lawrence of Rydon originally expected Harley to undertake the package of works that included the replacement of the window reveals,[2252] but that package was removed from the scope of Harley's works when Rydon needed to find savings in its price for the work as a whole.[2253] Accordingly, Harley's detailed drawings of the window arrangements showed that the fitting of insulation around the windows would be undertaken by others.[2254]

59.6 On 16 January 2015, Neil Crawford reviewed Harley's drawing dated 13 January 2015 showing the details of the window design,[2255] which he accepted as conforming to design intent. He was not concerned that the drawing did not specifically indicate mineral wool around the windows because, as he told us, he knew that fitting the insulation was not part of Harley's work.[2256] However, he failed to take any steps to deal with the fact that there was no detailed drawing at all, whether by Harley or Studio E, which showed mineral wool around the windows in accordance with the specification. He had no explanation for that omission, which drew criticism from Mr Hyett. Mr Hyett's opinion, with which we agree, was that, in accordance with its contractual obligations,[2257] Studio E should have produced 1:5 drawings which showed in detail how the voids around the window linings would be packed with insulation and what materials were to be used.[2258]

59.7 On 12 March 2015, Jason North, Rydon's site manager at the time, asked Neil Crawford where he could find details of the insulation behind the fixed panels at the side of the windows.[2259] Mr North was referring to the gap between the larger window infill panel (panel P1) and the concrete spandrel of the original building.[2260] Mr Crawford did not respond to that request, but he told us that he thought he had directed Mr North to Studio E's 1:20 drawings.[2261] However, those drawings did not show any details of the insulation around the windows and therefore it is unlikely that he did so.[2262]

59.8 The refurbishment of the window reveals was not part of Osborne Berry's work,[2263] which was limited to the removal of the original glazed windows to enable the new double-glazed window units to be installed.[2264]

59.9 By 23 February 2015 SD Carpentry Ltd had produced for the show flat (Flat 145) an example of the window reveals showing how they were intended to appear. Various companies, including a company called SD Plastering Ltd, looked at the finished example in order to decide whether to bid for the refurbishment of the window reveals.[2265] (SD Plastering was a construction company predominantly engaged in dry-lining work and was unrelated to SD Carpentry.)

[2252] Lawrence {Day25/39:22}-{Day25/40:8}; Berry {OSB00000091/10} page 10, paragraph 16 (b); Berry {Day44/14:15-18}.
[2253] {RYD00086654/1}; Lawrence {Day25/39:22}-{Day25/40:8}; Berry {OSB00000091/10} paragraph 16 (b); Berry {Day44/14:15-18}.
[2254] {SEA00003040/5}; {SEA00003040/7}.
[2255] {SEA00003040/7}.
[2256] Crawford {Day11/98:5}-{Day11/101:1}.
[2257] Deed of appointment between Rydon and Studio E {RYD00094228/11} items 31(a)-(c).
[2258] Hyett, Module 1 Report {PHYR0000029/82} paragraph 4.3.96.
[2259] {SEA00012940}.
[2260] Crawford {Day11/104:21}-{Day11/105:2}.
[2261] Crawford {SEA00014275/41} page 41, paragraph 118.
[2262] Hyett, Module 1 Report {PHYR0000029/82} paragraph 4.3.98. Bruce Sounes' evidence was that the scale of those drawings did not permit references to the type of insulation to be used in these applications: Sounes {Day21/120:16-19}.
[2263] Berry {OSB00000091/10} paragraph 16 (b); Berry {Day44/14:15}-{Day44/16:25}; Osborne {Day43/174:3-17}.
[2264] Berry {Day44/15:22}-{Day44/16:7}; {Day44/18:17-21}.
[2265] Dixon {Day44/102:25}-{Day44/103:4}; {RYD00032519}.

59.10 SD Plastering had already been engaged to carry out remodelling work on the lower floors of Grenfell Tower when Rydon approached it to undertake the refurbishment of the window reveals.[2266] (A director of the company, Mark Dixon, had previously been employed by Rydon.)[2267] The first email correspondence in respect of the work occurred in February 2015;[2268] a progress report by Rydon dated March 2015 referred to SD Plastering's involvement.[2269]

59.11 Although it had not done work of that kind before,[2270] SD Plastering ultimately undertook all the work to the window reveals, including the packing of gaps behind the uPVC boards with insulation,[2271] apart from putting foam insulation into a small gap at the sides of the window jambs next to the columns.[2272] We have not been able to determine which company or individual was responsible for that.[2273]

SD Plastering's contract

59.12 Although SD Plastering had a formal contract with Rydon for the dry-lining work,[2274] there was no formal contract between them for the work on the window reveals. On 17 February 2015, Adam Marriott of Rydon sent Mark Dixon in connection with the dry-lining work a copy of Rydon's standard terms,[2275] which required all workmanship to comply with manufacturers' and suppliers' instructions and recommendations and current British standards and codes of practice.[2276] Mark Dixon understood that SD Plastering was required to comply with the same terms and conditions when carrying out the work on the window reveals.[2277] Mr Dixon accepted that the work had to comply with any relevant standards and it follows that it had to comply with the Building Regulations in general and functional requirement B4(1) in particular.

59.13 Under the contract between Rydon and the TMO, it was Rydon's responsibility to co-ordinate and complete the design of the window reveals, which included selecting the goods and materials to be used and setting the standards of workmanship.[2278] Rydon was also responsible for co-ordinating and supervising the work of its subcontractors, including SD Plastering. Rydon's responsibility extended to monitoring its work and providing it with the information necessary for it to do the work.[2279] Rydon ought therefore to have provided SD Plastering with a copy of the relevant part of the NBS Specification identifying the materials to be used, and ought to have provided it with Harley's drawings relating to the work, as accepted by Studio E.

[2266] Dixon {Day44/99:19}-{Day44/100:14}; Dixon {SDP00000196/3} page 3, paragraph 13. On that basis we consider that Mark Dixon's estimate that SD Plastering became involved in these works in April-May 2015 is incorrect.
[2267] Dixon {Day44/95:3-23}. He knew Simon Lawrence, Simon O'Connor, Daniel Osgood and David Hughes, Dixon {Day44/97:21}-{Day44/98:24}.
[2268] {RYD00032519}.
[2269] {RYD00035207}.
[2270] Dixon {Day44/119:3-10}; {Day44/152:6-10}.
[2271] Dixon {Day44/157:6}-{Day44/164:22}.
[2272] Dixon {Day44/172:7}-{Day44/173:8}. See this gap highlighted in red bubbles in Lane, Phase 1 Report {BLAS0000009/13} Figure 9.9 9.10.
[2273] Osborne Berry said it did not carry out that work: Osborne {Day43/171:13-18}.
[2274] {RYD00031801}; {RYD00031811}.
[2275] {RYD00031806}.
[2276] {RYD00031806/4} paragraph 2.18.1.
[2277] Dixon {Day44/137:17}-{Day44/139:4}.
[2278] {RYD00094235/63} clause 2.1.1; {RYD00094235/69} clauses 2.17.1-2.17.12.
[2279] {TMO10041791/128} part 2A/44, section A32, paragraph 110.

59.14 Under its contract with Rydon Studio E was responsible for developing the design of the window reveals, advising on the appropriate method of construction, selecting materials and co-ordinating any design work undertaken by SD Plastering.[2280]

Design of the window reveals

59.15 In February 2015 a meeting took place between Rydon and SD Plastering in the show flat, during which Simon Lawrence told Mark Dixon that he was not happy with the window reveals because, among other things, the sill was prone to bowing.[2281] It appears that Mr Dixon made some suggestions for improving the design and that Mr Lawrence asked for a quotation for the work.[2282] In the event, Rydon instructed SD Plastering to produce an alternative design for the window reveals that was more aesthetically pleasing than the example, easy to install and which remedied the problem with bowing.[2283]

59.16 At some time between February and 6 May 2015 there was another meeting in the show flat to discuss the design of the window reveals. Mark Dixon attended, together with Simon O'Connor, Daniel Osgood and James Clifton of Rydon.[2284] At that meeting Rydon and SD Plastering decided to use a rigid insulation board to fill the gaps behind the uPVC boards.[2285] However Rydon did not tell SD Plastering what materials to use or provide it with any drawings of the window reveals.[2286] In effect, Mr Dixon was simply asked to reproduce the effect of the work in the show flat but with a better finish.[2287]

59.17 SD Plastering initially tried to use plasterboard or ply packing pieces underneath the windowsill to bridge the gap and to prevent it from bowing but were unable to secure them in place. Mr Dixon said that Celotex rigid insulation board was chosen instead to achieve a better fit.[2288]

59.18 On 6 May 2015, Mark Dixon gave Rydon a quotation in which he described the work to be carried out.[2289] After removing the existing timber structure[2290] a plasterboard backing was to be applied, after which Celotex insulation would be fitted to the head, jambs and sill. Mr Dixon's intention was to use either plasterboard or Celotex 25mm insulation board or a combination of the two to cover the gaps around the windows.[2291] The Celotex board was expected to achieve the correct fit, act as a support to the uPVC and confer a thermal benefit.[2292] He said the quotation had been drafted in such a way as to give SD Plastering flexibility about which materials to use.[2293] In the event plasterboard was not used at all.[2294]

[2280] {RYD00094228/9}; {RYD00094228/10}.
[2281] {RYD00032519}; Dixon {Day44/106:3-8}; Dixon {SDP00000196/4} page 4, paragraph 17; Dixon {Day44/108:20}-{Day44/110:2}; {RYD00042486/2}; Lawrence {Day25/49:5-12}; {RYD00042487}.
[2282] Simon Lawrence's email of 23 February 2015 {RYD00032519}.
[2283] Dixon {SDP00000196/4} page 4, paragraph 19; Lawrence {Day25/56:1-5}; Dixon {Day44/116:18}-{Day44/117:12}.
[2284] Dixon {Day44/107:7-25}; Osgood {RYD00094212/2} page 2, paragraph 8.
[2285] Lawrence {Day25/56:10}-{Day25/58:7}; {Day25/62:3-7}; Cole {SDP00000220/3} page 3, paragraph 14; Dixon {Day44/112:12-18}; {Day44/112:19}-{Day44/114:15}.
[2286] Dixon {Day44/117:22}-{Day44/118:4}.
[2287] Dixon {Day44/119:25}-{Day44/120:13}; {Day44/171:15-19}.
[2288] Dixon {Day44/123:1-6}; {Day44/182:23}-{Day44/183:10}.
[2289] {RYD00088957}.
[2290] Dixon {Day44/125:10-21}.
[2291] Dixon {Day44/128:6-12}.
[2292] Dixon {Day44/127:14}-{Day44/128:4}.
[2293] Dixon {Day44/126:15-20}.
[2294] Dixon {Day44/125:3}-{Day44/127:7}; {Day44/185:1-6}; {Day44/196:16-20}.

59.19 Neither Simon Lawrence nor Simon O'Connor read the quotation and neither could recall any discussions about it. Mr Lawrence knew that some sort of rigid insulation board was being used around the windows, but not necessarily that it would be made by Celotex.[2295]

59.20 SD Plastering was never shown the NBS Specification relating to the work on the window reveals, nor was it given any instructions about the materials to be used in the gaps around the windows.[2296] It was not provided with any architectural drawings relating to the window reveals and did not discuss the design of the work or the products to be used with Studio E.[2297] Neil Crawford was not told that PIR and phenolic insulation had been used to fill voids around the windows. He was not shown the work or asked to comment on it during his site visits.[2298] There was no formal process within Rydon for approving the materials used around the windows.[2299]

59.21 Mark Dixon said that he would ordinarily have expected to receive more information from Rydon about the products to be used on work of that kind, but he does not appear to have asked for any.[2300] SD Plastering did not itself produce any drawings relating to the work.[2301]

59.22 Neither Simon Lawrence nor Simon O'Connor examined the NBS Specification to see whether any insulation product had been specified for use in connection with the window reveals. Both accepted that they should have done so, although Mr Lawrence said that the Rydon site managers should also have paid closer attention to that.[2302] If Rydon had looked at the NBS Specification it would have been obvious that the use of a rigid combustible insulation board was contrary to what had been specified.[2303] Rigid combustible insulation boards were not a comparable substitute for compressible and non-combustible mineral wool.[2304]

Compliance of the design with the Building Regulations

59.23 Pursuant to functional Requirement B4(1) and if following the guidance in Approved Document B any insulation materials used in the external wall had to be of limited combustibility.[2305] In addition, pursuant to functional requirement B3(4) the building had to be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric was inhibited. The need for compartmentation and the risk of fire spread around openings was highlighted in sections 8 and 9 of Approved Document B.[2306] Rydon ought to have instructed SD Plastering that any insulation used around the windows was to be of limited combustibility or better and should have made sure that insulation of that kind was used. It did neither of those things, however. There was no discussion between Rydon and SD Plastering about how the choice of material to fill the gaps around the windows might affect fire safety generally.[2307] Neither SD

[2295] Lawrence {Day25/36:7}-{Day25/38:15}; O'Connor {Day26/212:17-22}.
[2296] Dixon {Day44/167:20-21}.
[2297] Dixon {Day44/133:14}-{Day44/134:9}.
[2298] Crawford {Day11/106:10}-{Day11/107:7}.
[2299] Lawrence {Day25/61:19-25}-{Day25/62:7}.
[2300] Dixon {Day44/131:14-17}.
[2301] Dixon {Day44/135:12-15}.
[2302] Lawrence {Day25/45:1-22}; O'Connor {Day26/213:22}-{Day26/214:16}.
[2303] Lawrence {Day25/47:12-22}.
[2304] Lawrence {Day25/45:23}-{Day25/46:21}.
[2305] Lane, Phase 1 Report {BLAS0000011/66-67} Table 11.10; see paragraph 12.7 of Approved Document B at {CLG00000224/96}.
[2306] {CLG00000224/73} section 8; {CLG00000224/83} section 9, see in particular paragraph 9.3 which specifically warns about fire spread around openings.
[2307] Dixon {Day44/114:16-23}.

Plastering nor Rydon gave any consideration to the fire performance of the materials used to fill the gaps around the windows[2308] and it does not appear to have occurred to either of them that putting combustible insulation around the windows might affect fire safety.[2309]

59.24 Mr Lawrence accepted that Rydon had been responsible for ensuring that the products selected for the work complied with the Building Regulations and that it should have checked the choice of materials with Studio E.[2310] However, neither he nor anyone else at Rydon gave any serious consideration to whether the construction of the window reveals was likely to result in a breach of the Building Regulations.[2311] He admitted that he had not been aware that the Building Regulations might be relevant to the work on the window reveals;[2312] he had thought that they were not part of the building envelope and were therefore unregulated.[2313] Mark Dixon was also unaware that the Building Regulations might be relevant to the work.[2314] He was not aware of the guidance in Approved Document B that insulation materials used in the external wall should be of limited combustibility.[2315]

The supply and fitting of the insulation

59.25 SD Plastering purchased Celotex TB4000 insulation boards from Travis Perkins Trading Co. Ltd. When it became difficult to obtain supplies of Celotex, it obtained Kingspan Thermapitch TP10 insulation boards from a company called CCF Ltd.[2316] Mark Dixon told us that he had assumed that that was permissible because the boards were being used only to bridge the gap around the windows and provide support for the uPVC window reveals.[2317] Mr Dixon could not recall any discussions with Rydon about whether Kingspan boards could be substituted for Celotex, but he thought that he had made Rydon aware of the substitution at some point,[2318] and we think it likely that he did so.

Supervision of the work

59.26 Daniel Osgood was a site manager for Rydon until July 2015 and was responsible for supervising SD Plastering's work on the window reveals.[2319] He did not discuss the need to maintain compartmentation or the risk of fire spread around the windows with anyone else in Rydon;[2320] he just assumed that everything that was being used was "100% fireproof".[2321] He could not recall having reviewed the NBS Specification[2322] and assumed that Rydon had sent it to SD Plastering.[2323] He did not recall having noticed the use of Celotex insulation in SD Plastering's quotation.[2324]

[2308] Dixon {Day44/149:10-12}; {Day44/152:12-23}; {Day44/170:1-4}; {Day44/176:12-15}; O'Connor {Day26/207:17-22}; Osgood {Day30/181:25}–{Day30/182:12}; Cole {SDP00000220/4} page 4, paragraph 23; Dixon {Day44/152:1-5}.
[2309] Dixon {Day44/118:25}-{Day44/119:2}; {Day44/131:19-25}; {Day44/149:13-16}.
[2310] Lawrence {Day25/63:12-18}; {Day25/61:6-9}; {Day25/63:23-24}.
[2311] Dixon {Day44/153:14-19}; O'Connor {Day26/207:23}-{Day26/208:2}; {Day26/209:12-18}.
[2312] Lawrence {Day25/62:18-24}.
[2313] Lawrence {Day25/60:11-21}; {Day25/62:25}-{Day25/63:9}.
[2314] Dixon {Day44/142:23}-{Day44/143:3}; {Day44/144:24}-{Day44/145:24}.
[2315] Dixon {Day44/145:25}-{Day44/146:3}.
[2316] Dixon {Day44/147:25}-{Day44/148:12}; {Day44/141:17}-{Day44/142:14}.
[2317] Dixon {SDP00000196/7} page 7, paragraph 32.2.
[2318] Dixon {Day44/156:17-22}.
[2319] Osgood {Day30/172:19-22}; {Day30/198:11-13}.
[2320] Osgood {Day30/175:5-23}.
[2321] Osgood {Day30/183:8}-{Day30/184:3}.
[2322] Osgood {Day30/183:22}-{Day30/184:3}; {Day30/184:23}-{Day30/185:12}.
[2323] Osgood {Day30/187:23}-{Day30/188:4}.
[2324] Osgood {Day30/188:25}-{Day30/191:5}.

59.27 Gary Martin took over from Daniel Osgood as Rydon's site manager in July 2015 and became responsible for inspecting the work on the window reveals before the uPVC surrounds were fitted.[2325] He said in his witness statement that SD Plastering had been fitting a fire resistant seal between the window unit and internal sill and that a "fire barrier" was fitted around the window void so there was no gap between the window unit and inner concrete sill.[2326] However, that turned out to be merely an assumption on his part. When he was shown the photographs of the internal window reveals during his oral evidence it became clear that what he had assumed to be a fire-resistant seal or a fire barrier was in fact the aluminium foil on the insulation boards that he had seen during his site visits.[2327]

59.28 Mr Martin was not aware that combustible insulation had been used around the windows[2328] and had not seen SD Plastering's quotations, both of which referred to Celotex insulation being fitted in that location.[2329] He knew that insulation was being used but did not notice any branding on it at the time.[2330] He did not communicate any instructions to SD Plastering about the need to preserve compartmentation, the materials to be used, or fire safety generally.[2331] As far as he understood it, SD Plastering was reproducing the example provided in the show flat.[2332]

59.29 Neither Rydon nor SD Plastering knew that Celotex TB4000 was a European Class F product or that Kingspan TP10 was European Class E and that their fire performance did not therefore correspond to the guidance in Approved Document B,[2333] which called for products of limited combustibility (European Class A2).[2334]

59.30 Since it is likely that the failure of the window reveals played an important part in allowing the fire to escape into the cladding, we think we should summarise the factors that in our view contributed to their inadequate performance. First, Studio E should have produced detailed 1:5 scale drawings clearly identifying the insulation referred to in the NBS Specification and showing where it was to be placed. Next, Rydon should not have accepted Harley's suggestion that uPVC boards, with poorer fire resistance, should be used for the window reveals in place of plywood just to cut cost, because there was a significant difference in fire performance. Next, Rydon should have sent the NBS Specification to SD Plastering or should at least have given it instructions about the fire performance of the materials to be used in the window reveals. It should not have allowed combustible Celotex or Kingspan insulation to be used instead of the mineral wool insulation specified by Studio E to be fitted around the windows. Finally, neither Rydon nor SD Plastering gave any consideration to the fire performance of the insulation or the construction of the window reveals as a whole, which was unsuitable for its purpose.

[2325] Dixon {Day44/215:7-20}; Martin {Day30/43:4-18}; {Day30/44:23}-{Day30/47:5}; {Day30/48:15-19}; {Day30/34:21-23}.
[2326] Martin {RYD00094216/1-2} pages 1-2, paragraph 6.
[2327] Martin {Day30/26:6}-{Day30/29:19}; {Day30/33:8}-{Day30/34:20}.
[2328] Martin {Day30/26:14}-{Day30/27:2}.
[2329] Martin {Day30/37:8-18}.
[2330] Martin {Day30/37:20}-{Day30/38:13}; {Day30/52:23}-{Day30/53:4}.
[2331] Martin {Day30/38:22}-{Day30/39:14}.
[2332] Martin {Day30/39:14-15}.
[2333] Lawrence {Day25/62:9-14}; Dixon {Day44/153:20-22}; {Day44/154:25}-{Day44/155:5}; Osgood {Day30/188:12-21}.
[2334] Lane, Supplemental Phase 1 Report {BLAS0000011/60} paragraph 11.15.18; Hyett, Module 1 Report {PHYR0000029/141} paragraph 4.4.149.

Chapter 60
The new smoke ventilation system

60.1 If a fire breaks out in a residential building, it is likely that some smoke will enter the corridors or lobbies, for example, through the door of the flat on fire when the occupants open it to escape. The purpose of a smoke ventilation system is to protect the escape route. In a high-rise building that may involve preventing smoke from entering the stairs and it may also involve at the same time removing it from the corridors and lobbies, which will thereby also obtain a measure of protection.

60.2 There are different ways of achieving that goal. Natural ventilation systems provide a means for hot smoke to escape through its own buoyancy, typically through a shaft that is open to the atmosphere at the top and can act as a chimney.[2335] Mechanical ventilation systems use fans, ducts, vents, shafts and other features to draw smoke away from the stair and common corridors.[2336] In some cases mechanical means are used for both the inflow and exhaust functions (sometimes called a "push-pull" system); in others they may be used for the exhaust function alone (sometimes called a "mechanical extraction, natural inlet" system).[2337]

60.3 The type of system originally installed in Grenfell Tower was a system based on natural ventilation, but with the addition of fans that firefighters could operate to assist the movement of air into and out of the building. If the fans were not operated, the system functioned as a natural inlet and outlet system.[2338]

The original system

60.4 The original natural smoke ventilation system installed at Grenfell Tower consisted of fresh air shafts and smoke extraction shafts serving the lift lobbies on each residential floor. Each lobby had a pair of fresh air inlets at low level on the south side connected to a pair of shafts drawing air from an inlet above the Walkway level, and a pair of exhaust vents at high level on the north side connected to a pair of shafts venting to an outlet on the roof. The pair of fresh air inlet shafts each had an opening area of 0.24m^2, giving a total inlet area of 0.48m^2. The pair of exhaust shafts were the same size, giving a total exhaust area of 0.48m^2. Each vent had a set of motorised dampers that kept the vents closed. If smoke was detected, actuators opened the dampers on the relevant floor, while the dampers on the other floors remained closed. The mechanical ventilation "boost" function was operated by means of a switch on the ground floor.

[2335] Lane, Phase 1 Report, Appendix J {BLAS0000031/12}.
[2336] Lane, Phase 1 Report, Appendix J {BLAS0000031/12}.
[2337] Lane, Phase 2 Module 3 Report {BLARP20000035/69} Sections 1-9 and 11.
[2338] Lane, Phase 1 Report, Appendix J {BLAR00000025/14}.

60.5 The following diagram shows how the system was intended to work:[2339]

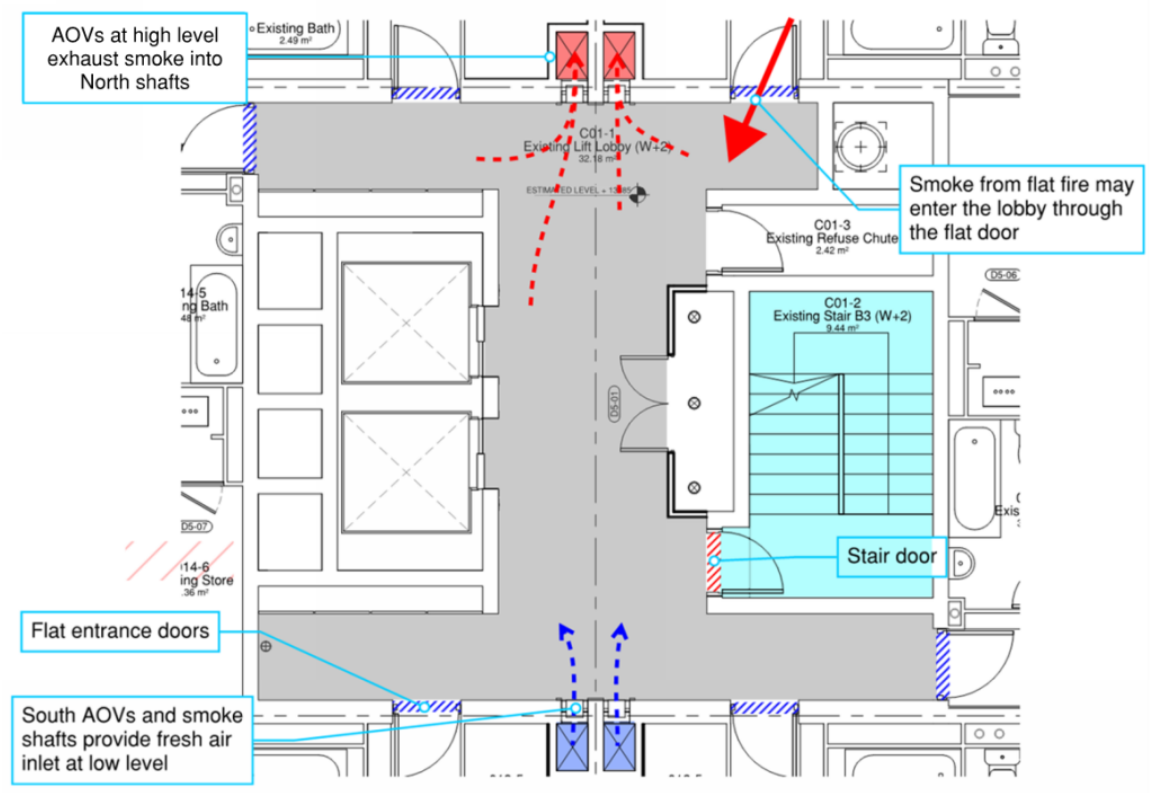

Figure 60.1 – Operation of the original smoke ventilation system on the fire floor

60.6 Accordingly, the system operated by ventilating the lobby area with the intention of protecting the escape route through the lobby.

60.7 The system did not follow the recommendations of British Standard Code of Practice CP3 1971 (the standard which appears to have been used when designing the building),[2340] section 3.4.3.1(4) of which required that for buildings with a single stairway, cross ventilation in common access areas should be provided by an opening with a free area of at least 1.5m^2.[2341] The available aggregate free area of 0.48m^2 at Grenfell Tower was significantly less than that.

The decision to refurbish

60.8 As set out in Chapter 43 of this report, the original smoke ventilation system at the tower had fallen into disrepair and had failed to work in a previous fire in April 2010. In March 2014, following a visit to the tower, the LFB issued a deficiency notice to the TMO stating that about a quarter of the system's dampers were not working[2342] and by October 2014 the TMO was aware that the system was beyond repair.[2343]

[2339] Lane, Phase 1 Report Appendix J {BLAS0000031/18} Figure J.5.
[2340] Phase 1 Report Volume I paragraph 5.1.
[2341] Lane, Phase 1 Report, Appendix J {BLAR00000025/6}.
[2342] LFB Deficiency Notice for Grenfell Tower dated 24 March 2014 {LFB00032101/3}.
[2343] Email from Alex Bosman to Claire Williams, Janice Wray and Carl Stokes dated 9 October 2014 {CST00001244/1}.

60.9 During 2011, the TMO's Assets and Regeneration Health and Safety Committee repeatedly discussed carrying out a feasibility study for the installation of a replacement smoke ventilation system.[2344] At a meeting on 15 September 2011, the Asset Investment and Engineering Health and Safety Group decided that an invitation to tender for the work should be published immediately with a view to beginning work in December 2011.[2345]

60.10 In October 2011 AECOM, an engineering consultancy firm, prepared a draft tender for the refurbishment of the dampers and the conversion of the manually activated mechanical boost function to a system activated automatically by the presence of smoke.[2346] The existing system did not comply with the statutory guidance current at the time of the refurbishment because of the size of the shafts but the AECOM proposal would have made the existing system more robust, thereby satisfying the requirement in regulation 4(3) of the Building Regulations 2010 not to make the building any more unsatisfactory in that respect than it had previously been.[2347]

60.11 At a design team meeting on 18 July 2012, the TMO instructed Max Fordham to expand the scope of the tower's refurbishment to include improving the smoke ventilation system, as AECOM had recommended.[2348] Even if the existing smoke ventilation system had been working at that time, it would have been necessary to extend it to the new lobbies that were being created on the lower floors.[2349]

Exova's consideration of the smoke ventilation system

60.12 In the draft Existing Fire Safety Strategy for Grenfell Tower dated 16 August 2012 Exova summarised the position on smoke ventilation, noting that the existing shafts did not provide sufficient capacity to meet modern standards and recommending that they be ventilated by mechanical means.[2350] The existing system was described as "significantly undersized".[2351]

60.13 Exova also said that unless the fans of any new system were capable of producing flow rates equivalent to a compliant modern system, the improved system would not meet current standards.[2352] It pointed out the particular importance of a smoke ventilation system in a building that had travel distances between flat entrance doors and the doors to the stairs of more than 7.5m. The maximum distance was said by Exova to be approximately 8.3m.[2353] Exova said that provision of ventilation was critical to the tower's "stay in place" evacuation principle and it therefore strongly recommended that the performance of both the existing and proposed smoke ventilation systems be assessed.[2354]

[2344] Minutes of the Asset Investment and Engineering Health & Safety Group dated 3 February 2011 {TMO10000823}; Minutes of the Asset Investment and Engineering Health & Safety Group dated 31 March 2011 {TMO10000842}; Minutes of the Asset Investment and Engineering Health & Safety Group dated 26 May 2011 {TMO10000868}.
[2345] Minutes of the Asset Investment and Engineering Health & Safety Group dated 15 September 2011 {TMO10000920/1}.
[2346] AECOM tender report {SEA00000004}.
[2347] McQuatt {MAX00017292/19} page 19, paragraph 82.
[2348] Studio E Notes from Meeting 5 dated 18 July 2012 {MAX00000147}.
[2349] McQuatt {MAX00017292/17-18} pages 17-18, paragraph 71.
[2350] Existing Fire Safety Strategy for Grenfell Tower dated 16 August 2012 {EXO00001074/10-11} section 3.4.
[2351] Existing Fire Safety Strategy for Grenfell Tower dated 16 August 2012 {EXO00001074/11} fourth paragraph.
[2352] Existing Fire Safety Strategy for Grenfell Tower dated 16 August 2012 {EXO00001074/11} fourth paragraph.
[2353] Existing Fire Safety Strategy for Grenfell Tower dated 16 August 2012 {EXO00001074/10} paragraph 3.3.6.
[2354] Existing Fire Safety Strategy for Grenfell Tower dated 16 August 2012 {EXO00001074/11} fourth paragraph.

60.14 Minutes of a project meeting on 6 September 2012 record that Exova needed to understand the existing situation, including whether the LFB tested the smoke ventilation system twice a year and what lay behind the proposal to improve it. The minutes recorded that action would be taken by Exova.[2355]

60.15 On 10 September 2012 Cate Cooney of Exova sent an email to Terence Ashton stating that the existing smoke ventilation system was "questionable" and that adding additional residential floors to the building would make the existing condition worse. She noted that it was proposed to improve the smoke ventilation system but that it was not known what standard the new system would achieve.[2356]

60.16 In Issue 3 of the Outline Fire Safety Strategy dated 7 November 2013 reference to the smoke ventilation system was limited to noting that it would be overhauled as part of the refurbishment of the building and would be covered in a separate report by Max Fordham.[2357] There was no further consideration of the system as part of the fire safety strategy.

Max Fordham's initial proposals

60.17 Max Fordham's initial proposals for the refurbishment of the smoke ventilation system took a similar approach to AECOM's and involved an improved version of the existing system.[2358] In November 2012 Mr McQuatt sought advice on developing the design from Atrium Airconditioning Ltd,[2359] which passed his enquiry to PSB, a specialist smoke ventilation company.

60.18 On 9 November 2012 PSB responded to Mr McQuatt saying that it did not see anything wrong with the proposed design.[2360] Following the consultation with PSB the design intent for the improved system was revised to bring it as close to the current regulations as possible within the limitations imposed by the existing shafts.[2361] In addition to providing a working smoke ventilation system, it was intended to use the system to provide ventilation to the lobbies to prevent overheating.

RBKC Building Control

60.19 During 2013 there were continuing discussions between designers and other contractors engaged in the refurbishment of the tower about the modernisation of the smoke ventilation system. They included Max Fordham, Studio E, and Exova. Max Fordham's proposals for the new system did not undergo any changes during that period, but it proved difficult to demonstrate to building control that the new system would be an improvement on the existing system or at least would not make it any worse.[2362] The fact that the existing system was not in working order and the paucity of documentation surrounding its installation made it difficult for the designers to compare its performance with the expected performance of any proposed replacement.

[2355] Studio E Notes from Meeting 8 dated 6 September 2012 {MAX00000311/2} section "Fire".
[2356] Email from Cate Cooney to Terry Ashton dated 10 September 2012 {EXO00000388}.
[2357] Exova Grenfell Tower Outline Fire Safety Strategy Issue 3 dated 7 November 2013 {EXO00001107/7} section "Smoke Ventilation of Lobbies, Walkway +1 Level".
[2358] McQuatt {MAX00017292/20} page 20, paragraph 85.
[2359] Email from Andrew McQuatt to Atrium Airconditioning dated 8 November 2012 {MAX00003356}.
[2360] Email from Fergus MacGregor to Andrew McQuatt and others dated 9 November 2012 {PSB00000002/2}.
[2361] Cross Smith {MAX00017304/10-11} pages 10-11, paragraph 28.
[2362] Cross Smith {MAX00017304/13} page 13, paragraph 36.

60.20 On 25 October 2013, Max Fordham repeated its proposals for the new system, stating that, as it was not possible to adapt the existing system to meet current standards, its intention was to bring the existing system up to as high a standard as possible.[2363] At that stage, therefore, the proposal was still to improve the existing system rather than replace it with an entirely new one. Max Fordham acknowledged that there were no directly applicable standards that could be used as a basis for the design of the improved system but considered that it was reasonable to aim at providing 15 air changes an hour.[2364] That may have been based on conversations with Exova.[2365]

60.21 On 25 October 2013 Bruce Sounes of Studio E submitted Max Fordham's proposals to RBKC building control, together with the draft Outline Fire Safety Strategy for the building prepared by Exova. In his covering email Mr Sounes said that the design team thought that agreement on the smoke ventilation system was the single biggest risk to the proposals, but that they did not think it was reasonable to leave the existing system in place.[2366]

60.22 On 11 November 2013 John Allen, the building control manager at RBKC, told Mr Sounes that the information submitted by Studio E was not adequate to enable an effective consultation to be held with the LFB.[2367] However, he said that if it could be shown that the new system was no worse than the existing system, the design would be acceptable. He suggested that if there were no data available on the existing system, a way forward might be to measure the flow rates of the existing system and provide information about the capacity of the proposed new system. For the purpose of consulting the LFB Mr Allen suggested that information about the existing system be obtained, including the method of activation, the size of the shafts, and the powered extraction rate, that could be compared to similar information about the proposed improved system.[2368] In the light of that response Mr Cross Smith decided to contact PSB to obtain further specialist advice on the design of the new system.[2369]

60.23 On 6 December 2013, in a memorandum to Mr Allen, Paul Hanson, then responsible for the Means of Escape Group within RBKC building control, provided further observations on the proposals.[2370] He noted that it was not proposed to redesign the system to bring it up to modern standards, as that was likely to require larger shafts, but that building control had indicated that, provided the performance of the system was not made worse, the Building Regulations did not require it to be replaced. He suggested that a comparison of the flow rates of the system in its current and improved forms could provide a way forward. He did not think it was acceptable to base the design on a particular number of air changes an hour, as Max Fordham had proposed, as it did not correspond to any known guidance for lobby ventilation systems, being based on a generic value used for car parks.[2371]

60.24 In his memorandum Mr Hanson also said that, if the designers wished to design the system to achieve a particular performance, they would need to provide evidence to support the proposed rate of extraction, including performance modelling. He suggested that a reasonable approximation of ventilation rates could be obtained using computational fluid dynamics (CFD) or a simpler zone model.[2372]

[2363] Cross Smith {MAX00017304/10-11} pages 10-11, paragraph 28.
[2364] Max Fordham Grenfell Tower Smoke Control Proposals Rev A, dated 25 October 2013 {MAX00000867}.
[2365] Cross Smith {Day157/174:16-20}.
[2366] Email from Bruce Sounes to John Allen and Paul Hanson dated 25 October 2013 {SEA00000121}.
[2367] Email from John Allen to Bruce Sounes dated 11 November 2013 {SEA00009805}.
[2368] Email from John Allen to Bruce Sounes dated 11 November 2013 {SEA00009805}.
[2369] Cross Smith {MAX00017304/14} page 14, paragraph 38.
[2370] Memorandum from Paul Hanson to John Allen dated 6 December 2013 {RBK00003014}.
[2371] Hanson {Day154/77:1-9}.
[2372] Memorandum from Paul Hanson to John Allen dated 6 December 2013 {RBK00003014}.

The approach to PSB

60.25 At around the end of April 2014, Mr Cross Smith asked PSB to assist with satisfying building control's request for a revised submission. That led to a proposal for the use of a pressure differential system as a possible alternative[2373] which was described in a document written by Hugh Mahoney of PSB, entitled *Smoke Ventilation Technical Proposal For Stair De-pressurisation Systems at Grenfell Tower, Regeneration Project*, dated 22 April 2014.[2374] PSB also suggested a target extraction rate of 5.0m^3/s for the system, which Mr Cross Smith incorporated into Max Fordham's latest proposals in May 2014. Apparently, that was the rate PSB always used for those purposes.[2375]

60.26 In late April or early May 2014, PSB and Max Fordham discussed CFD modelling, but by then there was insufficient time to carry it out, so it was not pursued.[2376] Simon Lay, one of the experts from whom we heard evidence, was of the opinion that, since the new system was being designed specifically for Grenfell Tower, Exova, Max Fordham and PSB ought to have ensured that a CFD analysis was carried out.[2377] He considered that in failing to do so they had fallen below the standards reasonably to be expected of them.[2378] Dr Lane also considered that Exova and Max Fordham should have made sure that a CFD analysis was carried out.[2379] She said that she would have expected PSB to advise that that should be done or to do it themselves if they had the capability, and rejected the suggestion that shortage of time was a valid reason for not doing it.[2380]

60.27 It remains unclear to us why a CFD analysis of the proposed new system was not carried out once it had become apparent that it was not possible to obtain reliable information about the performance of the existing system. If such an analysis had been carried out, it would have ensured that the performance of the new system had been ascertained with reasonable confidence and suitably documented. We agree that it should have been considered further and that PSB should have suggested it to the design team. Pressure of time was not a reasonable justification for failing to carry out such an analysis. The existing system had not been in working order for a long time and a further delay of weeks or even months was not a sufficient reason not to analyse properly the performance of the proposed replacement.

60.28 On 24 November 2014 at a meeting between building control, Studio E, the TMO and Max Fordham to discuss the system, PSB and JS Wright (Rydon's electrical and mechanical sub-contractor) put forward an alternative system, the outline of which was contained in a technical submission from PSB dated 12 November 2014 produced by Mr Mahoney.[2381]

[2373] Cross Smith {MAX00017304/15-16} pages 15-16, paragraph 44.
[2374] Smoke Ventilation Technical Proposal for Stair De-Pressurisation Systems at Grenfell Tower, Regeneration Project {PSB00001233}.
[2375] Cross Smith {MAX00017304/16} page 16, paragraph 47.
[2376] Mahoney {Day155/163:20}-{Day155/164:13}; {Day155/21:5-22}; {Day155/26:10-25}; {Day155/32:14-24}.
[2377] Lay {Day286/169:15-23}.
[2378] Lay {Day286/170:5-17}.
[2379] Lane {Day287/136:14-17}.
[2380] Lane {Day287/137:3}-{Day287/138:1}.
[2381] Smoke Ventilation Technical Submission, Revision 0 dated 12 November 2014 {PSB00000207}.

60.29 Mr Mahoney understood that the essential purpose of the proposed work on the smoke control system was simply to make it better than the existing system.[2382] In his view, provided it could be shown to deliver an extraction rate of $3m^3/s$, it would be acceptable to building control on the basis that that would be significantly better than the $1.2m^3/s$ which was the estimated capacity of the existing system.[2383]

60.30 Mr Mahoney regarded the PSB design as an alternative approach. It did not follow any published guidance but would in his view be effective to protect the stairs and ventilate the lobby. He considered it impossible to install a system that complied in all respects with current standards.[2384]

The design of the new system

60.31 The design contained in PSB's technical submission was subsequently developed, culminating in Revision 6 issued on 15 March 2016 which contained the design of the system that was ultimately installed at Grenfell Tower. All versions except the final one were produced by Mr Mahoney.

60.32 It is not necessary to describe every aspect of the system's design because we are concerned only with those that could have played a part in the fire. In summary, the following are worth considering:

a. The new system extracted air from the relevant lobby through all four vents and discharged it either at the top of the building through the north shafts or at the level of Floor 2 through the south shafts. Air entered the lobby around the door to the stairs in response to the change in pressure. Mr Mahoney saw the extraction of air from the lobby at the rate of $3m^3/s$ as the system's primary purpose,[2385] thereby moving air from the stairwell into the lobby and protecting it from the ingress of smoke. In other words, the objective was to remove smoke from the lobby to prevent it entering the stairs.[2386]

b. According to PSB's technical submission, the system was designed to provide an average air velocity of 2m/s across an open door between the lobby and the stairs. That velocity was derived from BS EN 12101:6, which contains standards for pressure differential systems, but the system was not intended to work as a pressure differential system and was not designed in full compliance with that standard.[2387]

c. The system was activated by smoke detectors in the lobbies. When smoke was detected on a particular floor, the dampers on that floor were designed to remain open and the dampers on all other floors to close, allowing the full capacity of the system to extract air from the lobby in which smoke had been detected.[2388]

d. A new pair of smoke extraction fans were installed at Level 2 and also an environmental extraction fan.[2389]

[2382] Mahoney {Day155/25:1-7}.
[2383] Mahoney {Day155/110:20}-{Day155/111:2}.
[2384] Mahoney {Day155/86:5-12}.
[2385] Mahoney {Day155/90:21-24}.
[2386] Hanson {Day154/135:1-7}.
[2387] Smoke Ventilation Technical Submission, Revision 6 dated 15 March 2016 {PSB00000214/3}.
[2388] Smoke Ventilation Technical Submission, Revision 6 dated 15 March 2016 {PSB00000214/3}.
[2389] Smoke Ventilation Technical Submission, Revision 6 dated 15 March 2016 {PSB00000214/4}.

e. Pressure sensors were also installed on every floor to control the speed of the extraction fans in order to ensure that the reduction in the air pressure in the lobbies did not prevent the door to the stairs from being opened. According to PSB's technical submission, if the pressure differential fell below-25 pascals ("Pa") (for example, if the door to the stairs were opened), the speed of the fans would increase until the differential of-25Pa had been restored.[2390]

f. New dampers were fitted to the openings in the south and north shafts on every floor. In addition, the new system included dampers within the ductwork on Level 2 to bypass the environmental ventilation ducts when the system was in smoke extraction mode. That reflected the dual purpose of the system: smoke control when smoke was detected and environmental ventilation when the building became too warm.[2391] When the system was operating in environmental mode, the dampers would open on four floors at a time for 15 minutes in sequence to cool the building down to the activation temperature.[2392]

60.33 Below is an illustration of the way in which the new smoke ventilation system was intended to operate. The blue lines indicate fresh air from the roof vent at the top of the stairs entering the lobby through the door to the stairs; the red lines indicate the movement of smoke and hot gases out of the shafts on the north and south sides of the lobby.[2393]

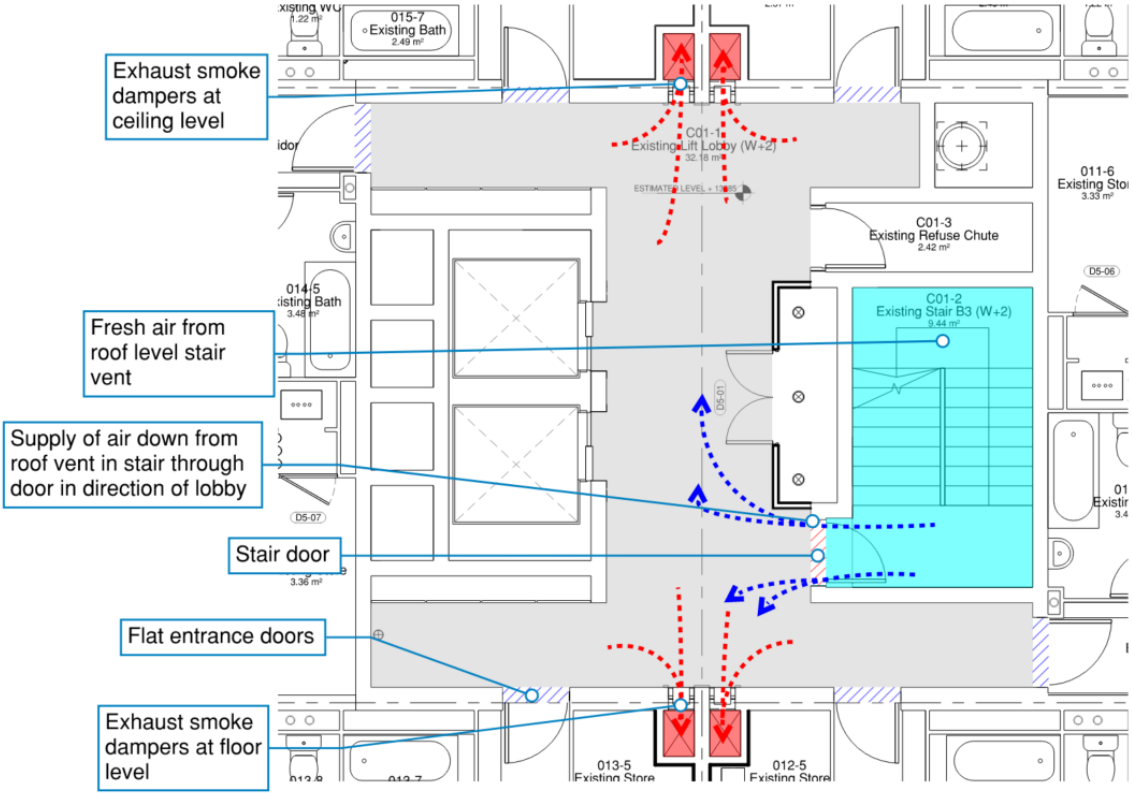

Figure 60.2 - Design intent of the smoke extract system in Grenfell Tower for Level 2 to Level 23

[2390] Smoke Ventilation Technical Submission, Revision 6 dated 15 March 2016 {PSB00000214/18}.
[2391] Smoke Ventilation Technical Submission, Revision 6 dated 15 March 2016 {PSB00000214/4}.
[2392] Lane, Phase 1 Report, Appendix J {BLAS0000031/87}.
[2393] Lane, Phase 2 Module 3 Report, Sections 1-9 and 11 {BLARP20000035/260-261}.

60.34 Mr Mahoney said that the advantage of the design was that by using four shafts rather than two to extract smoke from the lobbies, the velocity required to achieve the required rate of extraction was reduced. In his opinion, seeking to achieve a higher flow rate using only two shafts for extraction and two for the entry of air was not viable, because the higher air speed required through each shaft would have disrupted the flow. It would also have risked creating velocity jets in the lobbies where air entered the vents, which might have caused smoke to enter the stairs.[2394]

Dampers

60.35 Dampers are mechanical devices used to prevent air or gases from passing through ducts or from the openings of ducts into the space beyond. Typically they take the form of louvred plates that overlap slightly to provide a solid barrier when in the closed position. In the open position they allow the passage of air and other gases. They are often opened or closed by an electric motor known as an actuator. Different kinds of dampers with different performance characteristics are available. It may therefore be helpful to begin this section by describing the ways in which dampers are classified and the purposes they are designed to serve.

Fire dampers

60.36 Fire dampers sit within a duct or ventilation opening and are usually operated automatically. They are designed to prevent the passage of fire.[2395] A damper is classed as a fire damper if it achieves an integrity classification of at least "E" as defined in BS EN13501-3:2005 when tested in accordance with BS EN1366-2:1999.

60.37 The integrity classification "E" reflects the damper's ability to prevent the transmission of fire as a result of the passage of significant quantities of flames or hot gases from the fire to the unexposed side, thereby causing ignition either of the surface not exposed to the fire or of any material adjacent to that surface.[2396] Its purpose is to prevent the ignition of whatever is on the other side of the damper rather than to restrict the amount of smoke adversely affecting the adjoining space. A fire damper, therefore, is expected to close in the event of a fire and remain closed during it;[2397] it is not intended to open and close repeatedly as part of a system's normal operation.

Fire and smoke dampers

60.38 Fire and smoke dampers are tested and classified by reference to their ability to limit the amount of smoke passing from one side to the other.[2398] Such dampers must have been tested in accordance with BS EN 1366-2:1999 and meet both the integrity and smoke leakage criteria in EN 13501-3:2005. They are then classified "ES". The function of a fire and smoke damper is also to close and remain closed during a fire,[2399] but it must have a lower leakage rate than a fire damper.

[2394] Mahoney {Day155/82:3-16}.
[2395] Approved Document B {CLG00000224/144}.
[2396] BS EN 13501-3 (Fire classification of construction products and building elements – Part 3) {BSI00000810/9} paragraph 5.1.2.
[2397] Lane, Phase 2 Module 3 Report {BLARP20000035/86}.
[2398] Approved Document B {CLG00000224/144}.
[2399] Lane, Phase 2 Module 3 Report {BLARP20000035/88} Sections 1-9 and 11.

60.39 The ability of a damper to minimise the leakage of smoke was directly relevant to its suitability for use in the smoke ventilation system of the tower, because the vertical shafts used to extract smoke passed through the lobbies, which were part of the escape route for the occupants of the flats on those floors. A damper that prevented the passage of fire alone would not have been suitable.

60.40 The performance necessary to achieve the relevant classifications are set out as follows in EN 13501-3:2005:[2400]

a. For the classification "E" the leakage limit is 360 $m^3/h \cdot m^2$;

b. For the classification "ES" the leakage limit is 200$m^3/h \cdot m^2$ (corrected to 20°C). (The limit is the same at ambient temperature and during the fire test.)

Smoke control dampers

60.41 Smoke control dampers are described in BS EN 1366-10:2011[2401] ("Fire resistance tests for service installations, Part 10 Smoke Control Dampers") rather than in Approved Document B. A smoke control damper is a similar device that can be automatically or manually opened or closed in its operational position to control the flow of smoke and hot gases into, from or within a duct.[2402]

60.42 A smoke control damper is subject to the same performance requirements as a fire and smoke damper, but differs from the previous two types of damper in that it is capable of both opening and closing during a fire.[2403]

The design of the system

60.43 The shafts and ductwork for the smoke ventilation system were required to be in a protected area, as described in Approved Document B, in order to restrict the ability of fire and smoke to spread between compartments.[2404] The effectiveness of the dampers in preventing excessive smoke leakage from the shafts into lobbies on floors other than the one affected by a fire was therefore an important feature of the system. Leakage through the dampers also adversely affects the ability of the fans to extract smoke and thus the performance of the system as a whole.[2405]

60.44 The design of the new smoke ventilation system envisaged that dampers might be changed from the closed to the open position during a fire, because the manual control function allowed firefighters to change the floor from which smoke was being extracted as required by the location of the fire. Accordingly, a damper that had previously shut on one floor might later be opened manually if the fire brigade required the system to extract smoke from another floor.

60.45 Only a smoke control damper is designed and tested to perform in that way. The key differences between the testing of smoke control dampers and the testing of the other two kinds of damper relate to:[2406]

[2400] BS EN 13501-3 (Fire classification of construction products and building elements – Part 3) {BSI00000810/16}.
[2401] BS EN 1366-10:2011 (Fire resistance tests for service installations – Part 10: Smoke control dampers) {BSI00001777/12} paragraph 3.27.
[2402] Lane, Phase 2 Module 3 Report {BLARP20000035/90} Sections 1-9 and 11.
[2403] BS EN 12101-8:2011 (Smoke and heat control systems – Part 8: Smoke control dampers) {BSI00000048/7}.
[2404] Approved Document B {CLG00000224/73} paragraph 8.9.
[2405] Lane, Phase 2 Module 7 Supplementary Report {BLARP20000043/16}.
[2406] Lane, Phase 2 Module 3 Report {BLARP20000035/92-93} Sections 1-9 and 11.

a. the durability of operational reliability, which is tested by carrying out a minimum number of opening and closing cycles before fire testing – 10,200 for smoke control dampers but only 50 for fire dampers and fire and smoke dampers; and

b. the ability to change from open to closed position and vice versa at elevated temperatures, which is not a requirement for fire dampers or fire and smoke dampers.

60.46 In this case durability of operational reliability was important because the dampers were part of a system that also provided environmental ventilation. They could therefore reasonably be expected to open and close many times each week. As a result of having been tested through over 10,000 cycles, smoke control dampers can be expected to be effective over a much longer operational lifetime.

60.47 The ability to move between an open and closed position at elevated temperatures was also of importance in this case because firefighters might need to control the system manually if the temperature on one floor rose considerably due to the fire.

60.48 Having regard to the properties of the three kinds of damper we have described, it is clear that only a smoke control damper could be expected to meet the requirements of the new system.

The Gilberts Series 54 damper

60.49 The Gilberts Series 54 damper is shown in the open and closed positions in the following photographs taken after the fire.[2407]

Figure 60.3 – Examples of dampers in an open and closed position

60.50 It is opened and closed by an actuator (a small electric motor)[2408] that moves the blades. When smoke is being drawn up the shaft the damper prevents it from entering the lobbies. It therefore plays a vital role in protecting the atmosphere in the lobbies not directly affected by the fire.

[2407] Lane, Phase 2 Module 3 Report {BLARP20000035/296}.
[2408] Lane, Phase 2 Module 3 Report {BLARP20000035/297} Sections 1-9 and 11.

60.51 The damper was described in a brochure published by the manufacturer in October 2011[2409] as a "smoke evacuation damper", a description not found in any published guidance. The brochure also stated that it had been fully tested to the requirements of EN1366 Part 2 for one hour.[2410] However, BS EN 1366-2 contains the standard for testing fire dampers and fire and smoke dampers; it does not contain the standard for testing smoke control dampers.[2411] Moreover, the damper had been tested from the closed, rather than the open, position, as the notes attached to the original quotation confirmed. The statement in the brochure was therefore inaccurate and misleading, because the test method to which it referred requires testing from the open position. There was no suggestion by Gilberts in the brochure or otherwise that the damper was a smoke control damper in the recognised sense.

The choice of the Gilberts Series 54 damper

60.52 In January 2015 Hugh Mahoney asked Gilberts to quote for the supply of Series 54 dampers for use in a smoke ventilation system. At that stage he did not provide any information about the system in which they were to be used.

60.53 The quotation that Gilberts sent to Mr Mahoney on 22 January 2015 contained a note stating that the damper had undergone an EN 1366-2 test starting from the closed position which had lasted over 60 minutes for both fire integrity and smoke leakage (ES60) but that it had no formal certification.[2412] (As we have said, the claim in respect of smoke leakage was wrong because the test had been started from the closed position.) The information that the test had been started from the closed position would have disclosed to a reasonably knowledgeable reader that the test had not been carried out entirely in accordance with the published standard, a conclusion reinforced by the reference to the absence of formal certification.

60.54 Another note recommended that the purchaser discuss the specific technical requirements of the damper with the relevant authority to ensure that it was acceptable but there is no evidence that any of the contractors involved in designing or installing the smoke control system discussed the matter with RBKC building control.

60.55 After receiving the original quotation from Gilberts, Mr Mahoney asked for further information about the Series 54 dampers, including test results, which were sent to him by email.[2413] One of the documents attached to the email was a report dated 6 October 2011 of a fire resistance test on a Series 54 damper carried out by Exova on 23 August 2011 in accordance with BS EN 1366-2.[2414] The report showed that the damper had been subjected to an integrity test with a threshold of 360$m^3/h{\cdot}m^2$ for over 60 minutes under a pressure of about 300 Pa.[2415] The damper satisfied that test, with satisfactory performance for 74 minutes, but it failed to satisfy the requirement in relation to the leakage of smoke, for which the performance criterion was not to exceed 200$m^3/h{\cdot}m^2$ under a pressure of about 300 Pa.

[2409] Gilberts, Series 54 Smoke Evacuation Damper brochure {PSB00000201}.
[2410] Gilberts, Series 54 Smoke Evacuation Damper brochure {PSB00000201/2}.
[2411] Lane, Phase 2 Module 3 Report {BLARP20000035/93} Sections 1-9 and 11.
[2412] Quotation provided by Gilberts to PSB for Series 54 Dampers dated 22 January 2015 {GBL00000006/3}.
[2413] Email from Mark Griffiths to Hugh Mahoney {GBL00000005/2}.
[2414] Email from Mark Griffiths to Hugh Mahoney {GBL00000005/2-3}.
[2415] Email from Mark Griffiths to Hugh Mahoney {GBL00000005/42}.

60.56 In the Conclusions section of the report the test result for smoke leakage was recorded as "0 minutes", which represented an immediate failure to satisfy the performance requirement.[2416] In the Test Procedure section,[2417] Exova recorded that the specimen had been assessed on its ability to comply with the performance criteria for integrity, insulation and smoke leakage as required by BS EN 1366-2:1999 but that at Gilberts' request the damper had been in the closed position at the commencement of the test and that the test had therefore not been conducted fully in accordance with the standard. As a result, it was not possible for the damper to obtain any kind of certification.

60.57 In spite of the incorrect and misleading statements about certification and testing in Gilberts' 2011 brochure and its first quotation, any recipient of Exova's report who carried out even a cursory review of those results would have understood that the Series 54 damper held no certification whatsoever and had failed the smoke leakage test immediately. The recipients of that report included Mr Mahoney and, in due course, RBKC building control.

60.58 Mr Mahoney appears to have thought that a certified smoke control damper of a size and configuration suitable for use in the walls at Grenfell Tower was not available.[2418] He thought that the Gilbert's dampers were the best that could be found to fit within the wall of the tower.[2419] In any event, PSB chose to specify the use of the Gilberts Series 54 damper, despite the fact that it had not been classified in accordance with any of the standards mentioned earlier and had not been shown to meet the alternative specifications for dampers to be used in smoke control systems contained in the guides published by the Smoke Control Association. He could instead have specified performance criteria or a certification standard, such as ES60, against which a search of available products could have been made. Having carried out a limited internet archive search (including of the archived version of the *LPCB*[2420] *Redbook* dated 23 August 2014) for dampers available on the market at the time, Dr Lane identified two smoke control dampers that might have been suitable for use in the system,[2421] although she acknowledged that she did not have access to enough information to tell whether either of them could in fact have been used.

60.59 Mr Mahoney was aware when he designed the system that the shafts had to be protected[2422] and he discussed with Mr Cross Smith the need to have fire-rated ductwork,[2423] but he did not do enough to ensure that the dampers he selected to separate the protected shafts from the lobbies were fit for the purpose of protecting escape routes. Apart from anything else, in the absence of test data evidencing their durability there could be no confidence that the dampers would perform properly in a fire after many months of use in a combined environmental and smoke ventilation system.

[2416] Email from Mark Griffiths to Hugh Mahoney {GBL00000005/43}.
[2417] Email from Mark Griffiths to Hugh Mahoney {GBL00000005/8}.
[2418] Mahoney {Day155/203:20}-{Day151/205:2}.
[2419] Mahoney {Day155/213:20}-{Day155/214:1}.
[2420] Loss Prevention Certification Board.
[2421] Lane, Addenda and Errata Report {BLARP20000044/4-5}.
[2422] Mahoney {Day155/198:14-23}.
[2423] Mahoney {Day155/200:2-7}.

60.60 In due course, as a result of changes to the sizes of some of the dampers required, J S Wright asked Gilberts for another quotation.[2424] Following the receipt of that quotation, J S Wright placed an order for the products which Gilberts supplied.[2425] Gilberts did not provide advice on the suitability of the Series 54 dampers for the proposed system, about which it had little or no information.[2426]

60.61 Mr Hanson said that he had checked the specification of the Gilberts Series 54 damper[2427] and had concluded on the basis of the product literature that it was regarded as being of an acceptable standard by the Smoke Control Association Guide 2012.[2428] He said he could see from the drawings that the ducts were adequately fire-resistant.[2429] He accepted that the dampers were of a lower standard than smoke control dampers but, in his opinion, they were still of an acceptable standard.[2430]

60.62 The Gilbert Series 54 damper had not been tested in a way that demonstrated it was capable of acting as anything more than a ventilator, which required the lowest standard of performance in the event of a fire.[2431] It was far removed from a smoke control damper, which would have been the appropriate product to install in a complex and multi-functional system of the kind designed by PSB. Although it received a copy of the Exova report, PSB does not appear to have reviewed the specification of the dampers or to have discussed it with building control.[2432] It should have done so, but we have seen nothing to suggest that the implications of Exova's report were identified or acted upon. PSB should have realised that the Gilberts Series 54 damper was unsuitable for this application.

60.63 We do not know whether in 2015 fire and smoke dampers were available that would have been suitable for use in the system, but we are surprised that PSB does not appear to have tried to find appropriately certified dampers. At the very least, it should have told J S Wright about the limitations of the Series 54 damper so that the risks of using it could be properly assessed.

60.64 Mr Lay was of the opinion that, although the Series 54 dampers were not certified and did not meet the alternative Smoke Control Association recommendations, their performance characteristics could allow them to perform adequately as part of the system.[2433] However, we do not agree. The Series 54 dampers did not meet the requirements for smoke leakage, which was important for protecting routes of escape, and had not been shown to meet the durability requirements. In the absence of reliable test results (i.e. results of tests conducted in accordance with recognised standards) from which to draw inferences, we cannot safely make any findings about how a component *might* have performed. The point of testing standards is to provide an assurance that a product meets the specified performance criteria and no such assurance was provided in relation to the Gilberts Series 54 dampers.

[2424] Email from David Bradbury to Mark Griffiths {JSW00003607}.
[2425] Jones {GBL00000010/3} page 3, paragraph 10.
[2426] Jones {GBL00000010/3} page 3, paragraphs 11-17; {GBL00000010/4} page 4, paragraph 21.
[2427] Hanson {Day154/204:5-8}.
[2428] Hanson {Day154/208:12-15}.
[2429] Hanson {Day154/210:1-2}.
[2430] Hanson {Day154/214:10-15}.
[2431] Lane, Phase 2 Module 7 Supplementary Report {BLARP20000043/264}.
[2432] Lay, Smoke Control System Report {LAY00000001/201}.
[2433] Lay, Smoke Control System Report {LAY00000001/203}.

Effect on the system's performance

60.65 It is possible that the use of the Gilberts Series 54 dampers contributed to the breach of compartmentation by permitting more smoke to pass from the shafts into some of the lobbies than would have been the case if appropriately certified dampers had been used, but it is impossible now to tell whether that was in fact the case. However, circumstances surrounding the choice of dampers demonstrates insufficient concern for fire safety to which we think it important to draw attention as part of the events which led to the tragedy.

Other shortcomings in the design process

The lack of design records

60.66 A recurring theme of our investigation into the design of the smoke ventilation system was a failure to create a clear record of its objectives and how its performance characteristics related to the fire strategy for the building. The importance of creating such a record was made clear in the 2012 version of the Smoke Control Association's guide, which strongly recommended that, except perhaps in the simplest cases, the objectives of the system, the circumstances to be calculated or modelled, the modelling criteria, the expected reporting and the criteria for success should all be agreed and recorded before the commencement of design.[2434]

60.67 The Smoke Control Association Guide 2012 advised that the records should include at least:

i. A description of the residential area and the proposed ventilation system.

ii. The design criteria and performance objectives.

iii. The range of circumstance in which it was intended to operate.

iv. Details of the techniques used and related information.

v. The results of the analysis.

vi. A statement whether the design criteria and objectives have been met.[2435]

60.68 That information was required in this case to enable the wider design team, and ultimately the TMO as the responsible person, to understand the design of the system and its limitations but not all of it had been recorded.

60.69 Information relating to the design of the system should also have been incorporated in the fire safety strategy but that was not done either. Instead, Issue 3 of the Draft Outline Fire Safety Strategy discussed the smoke control system in very general terms and left it to Max Fordham to take the matter forward. We consider that Exova and the TMO, as the client, should have ensured that the Outline Fire Safety Strategy specifically described the final design of the smoke control system and explained how it supported the fire safety strategy for the building. A fire safety strategy necessarily relies on certain assumptions, which should be made explicit.[2436] That was particularly important in this case, since the new system did not correspond directly to any design described in the available guidance.

[2434] Smoke Control Association Guide 2012 {LFB00059241/5} Introduction and fifth paragraph.
[2435] Smoke Control Association Guide 2012 {LFB00059241/14-15} paragraph 5.4.
[2436] Torero {Day289/7:5-25}.

Extended travel distances

60.70 We heard evidence about the distances between the entrance doors to flats and the door to the stairs. The guidance in Approved Document B is that the distance in an unventilated part of an escape route should not exceed 7.5 metres.[2437] BS9991 contains similar guidance.[2438]

60.71 Measurements were made of the maximum distance between the front doors of the flats and the doors to the stairs on Floors 4 to 23. They ranged from 9.3 metres (BRE[2439]) to 10.3 metres (Dr Lane).[2440] We do not consider the difference between 9.3 metres and 10.3 metres to be material. What is significant is that, even at 9.3 metres, the maximum distances exceeded that indicated by Approved Document B.

60.72 Mr Hanson accepted that if the travel distance exceeded 7.5 metres, the Smoke Control Association Guide indicated that the primary objective of the system should be the protection of both the lobby and the staircase.[2441] His view, however, was that for an existing building it would be unreasonable to apply the standards applicable to a new building.[2442]

60.73 Mr Lay also thought that if the travel distances in a building were excessive, it would not be appropriate to concentrate solely on protecting the stairs and that protection would also need to be provided to the lobby.[2443] He referred to the LGA Guide as indicating that extended travel distances of less than 10 metres in existing residential buildings would not be considered excessive and did not require mitigation. We consider, however, that some caution should be exercised in using the LGA Guide in this context, since it is intended to provide guidance on compliance with the Fire Safety Order and the Housing Act 2004, rather than the functional requirements of the Building Regulations and is directed at housing providers and enforcing authorities,[2444] rather than designers of smoke control systems. Although that does not make it irrelevant, it is significant that the context is assessing existing fire safety arrangements, rather than controlled works under the Building Regulations. Furthermore, we note that Approved Document B stated at paragraph 0.21, that guidance documents intended specifically for assessing fire safety in existing buildings will often include provisions which are less onerous than those set out in Approved Document B and are therefore unlikely to be appropriate for use in relation to work controlled by the Building Regulations.[2445]

60.74 The LGA Guide itself states that the primary guidance is that maximum travel distances should not exceed 7.5 metres;[2446] goes on to recognise that some existing blocks of flats do not comply with that guidance,[2447] giving rise to a need to consider the overall risk.[2448] The LGA Guide also refers to compensatory measures, such as automatic fire detection and automatic fire suppression systems, which were not present in Grenfell Tower. It suggests that the acceptance of standards that differ from current benchmarks should be subject

[2437] Approved Document B {CLG00000224/28-30} Diagram 7, flats served by one common stair and Table 1.
[2438] BS 9991:2011 (Fire safety in the design, management and use of residential buildings – Code of practice) {BSI00000621/36}.
[2439] BRE Grenfell Tower Fire Investigation Report {MET00039807/24} paragraph 32.
[2440] Lane, Phase 1 Report, Appendix J {BLAS0000037/25}.
[2441] Hanson {Day154/167:16-22}.
[2442] Hanson {Day154/169:5-9}.
[2443] Lay {Day286/52:14}-{Day286/53:11}.
[2444] LGA Guide on Fire Safety in Purpose Built Blocks of Flats {CST00014237/13-14} paragraph 4.1-4.2.
[2445] Approved Document B {CLG00000224/13} section 0.21.
[2446] LGA Guide on Fire Safety in Purpose Built Blocks of Flats {CST00014237/87} paragraph 58.24.
[2447] LGA Guide on Fire Safety in Purpose Built Blocks of Flats {CST00014237/94} paragraph 62.1.
[2448] LGA Guide on Fire Safety in Purpose Built Blocks of Flats {CST00014237/94} paragraph 62.2.

to careful scrutiny, which may require assessment by a suitable specialist,[2449] in this case a fire engineer.[2450] The LGA Guide goes on to say that in ventilated lobbies and corridors, increases from 7.5m up to 10m are likely to be acceptable in most situations with no additional measures.[2451] However, we are not persuaded that any of the parties involved in the design of the new smoke ventilation system actually relied on the LGA Guide to support its design. It was not referred to in any of the design documents, the witness statements or the oral evidence of those who were involved at the time. Nonetheless, the travel distances at the tower exceeded 7.5 metres and some thought should therefore have been given to protecting the escape route within the lobbies.

60.75 Mr Hanson said that he had thought about extended travel distances at the time but had not written anything down, although he agreed that such information would have been helpful.[2452] Mr Cross Smith said that he did not recall any discussion about travel distances.[2453] Mr Whyte said that there might have been some discussion of travel distances, but he could not recall when and was not himself aware that the travel distances were more than the guidance in Approved Document B.[2454]

60.76 In the absence of any contemporaneous evidence we are not able to accept that there was any discussion with building control about the travel distances in the tower or the possible need for mitigation measures. We would have expected to have seen at least some record of such a discussion if it had occurred. Rather, the evidence suggests that the travel distances were overlooked or that it was assumed that they did not need to be considered because the increase in distance was only around 2 metres. That was not an acceptable approach. Proper consideration should have been given to whether the extended distance required mitigation. That is particularly so because the system was being changed and the focus of protection was being shifted from the lobby to the stairs. If that had been done, the design might have been considered acceptable despite the extended travel distance, taking in account the limited additional distance and the mitigation measures in place.[2455]

60.77 Considering the system as part of the wider fire safety strategy was not the responsibility of PSB but of those who were responsible for drafting that strategy, principally Exova.[2456] When it was drafting the fire safety strategy Exova should have identified the extended travel distances in the lobbies and should have recorded its view of the need for mitigating measures to be provided. When the design of the system was changed, Exova should have been asked to consider the fire strategy again to ensure that it reflected developments in the design.

Leakage

60.78 Little consideration appears to have been given to how the new smoke ventilation system would operate under different conditions of air leakage that were reasonably foreseeable. In order to assess the likely performance of the system there would need to be at least some consideration of the circumstances in which it was expected to function. Leakage paths were relevant, because the ability of the system to protect the stairs would be

[2449] LGA Guide on Fire Safety in Purpose Built Blocks of Flats {CST00014237/94} paragraphs 62.3-62.4.
[2450] Lay {Day286/63:9-25}.
[2451] LGA Guide on Fire Safety in Purpose Built Blocks of Flats {CST00014237/95-96} paragraph 62.7.
[2452] Hanson {Day154/154:8}-{Day154/156:5}.
[2453] Cross Smith {Day157/138:12-21}.
[2454] Whyte {Day158/52:12}-{Day158/53:9}.
[2455] Menzies {Day169/32:22}-{Day169/33:10}.
[2456] PSB Module 7 written closing submissions {PSB00001380/17} paragraph 82.

affected by the source of air entering the lobby. For example, the system could extract air from the lobby at a rate of 5.0m3/s but might not be able to maintain an air flow velocity of 2.0m/s across the door to the stairs if air was able to enter the lobby from other sources.

60.79 Dr Lane and Mr Lay both carried out calculations to demonstrate the effect of different combinations of door and window openings on the velocity of air through the door to the stairs. Although their analyses differed, each demonstrated that leakage paths were potentially significant. The calculations involved retrospective attempts to quantify the performance of the system; there was no evidence that those who designed it had carried out any similar analyses at the time.

60.80 Mr Mahoney said that the figure of 50% that he had used in his initial proposals to allow for unforeseen losses from all sources when calculating the appropriate rate of extraction was a notional number taken from the British Standard.[2457] Mr Lay did not think that that was the right way to design a system of that kind, but acknowledged that it had become normal in the industry to make assumptions about such things.[2458] He said that he would not have approved PSB's specification without having calculations or a computer model indicating the leakage in the system.[2459]

60.81 Dr Lane's view was that relying on experience to justify a suitable rate of extraction without explaining what assumptions about leakage had been made or without demonstrating how the rate had been calculated was not a reasonable professional approach. She said that it was not clear how Mr Mahoney had quantified the different elements that would cause resistance in the proposed system, such as leakage through the builders' work shafts and blemishes in the ductwork. Dr Lane's view was that it would be normal to identify them.[2460]

60.82 In its closing statement PSB accepted that those were matters which, with the benefit of hindsight, could, and should, have been spelled out in more detail in its technical submission.[2461] However, although PSB obviously needed to rely on its previous experience when designing the system, there still needed to be some consideration of the building itself and the circumstances in which the system would be expected to operate. That required at least some consideration of the potential leakage from the building's structure and routes of escape that would counteract the rate of extraction, rather than relying on a generic figure. The 5.0m3/s rate of extraction was a key part of the proposal and the primary basis on which the new system was said to be superior to the old one. We do not understand how that figure could reasonably be put forward as appropriate (if, for example, it failed to achieve an air flow of 2m/s across the door under certain conditions) without there being at least some consideration of how the particular nature of the building might affect leakage in a fire. The absence of any such analysis represents a defect in the design process.

Air movement into the lobby

60.83 Dr Lane pointed out that if a door to one of the flats was left open the system might continue to operate at maximum capacity, even if the door to the stairs were closed, because the pressure difference between the lobby and the stairwell would have been lost, causing smoke to be drawn from the flat into the lobby.[2462] She was of the view that if the

[2457] Mahoney {Day155/98:13-15}.
[2458] Lay {Day286/151:22}-{Day286/152:6}.
[2459] Lay {Day286/152:7-14}.
[2460] Lane {Day287/130:21}-{Day287/132:5}.
[2461] PSB Module 7 written closing submissions {PSB00001380/22} paragraph 98.
[2462] Lane {Day287/141:18}-{Day287/143:5}.

designer considered that that risk was mitigated by the presence of self-closing devices on the doors of the flats, that ought to have been made clear.[2463] It would have ensured that their importance was understood by those responsible for the operation and maintenance of the building.

60.84 We do not think it is possible to know how the system would have responded if a flat door had been left open. Apart from anything else, the precise circumstances could have varied widely and could have included a tendency for the reduction in the air pressure in the lobby to draw the door closed. The possibility was not fanciful, however, and it was important for the designers of the system to identify the circumstances under which it would no longer be able to perform in accordance with its design. The design criteria should have been taken into account in the overall fire safety strategy for the building.

Commissioning the system

60.85 Proper commissioning of a new smoke ventilation system is of critical importance in ensuring that it is capable in practice of performing the function required of it. It therefore needs to be carried out with great care and attention to detail.

60.86 Granville Partlow, PSB's Group Service and Engineering Manager,[2464] carried out the final commissioning of the new system between 26 and 28 April 2016.[2465] He accepted that there had been errors in the commissioning method statement, which he attributed to his having adapted the document rather than preparing it from scratch.[2466] He had not noticed the mistakes in the document, including in the description of the system, until he had read it again for the purposes of making a statement for the Inquiry.

60.87 Mr Partlow told us that during the commissioning process he had checked that all the fireman's override switches were working, but certain matters escaped him.[2467] PSB's technical submission said the fireman's override switches were in the stairs, when in fact they were in the lobbies, but Mr Partlow did not notice the discrepancy. It did not occur to him, therefore, that in the event of a fire they might be affected by rising temperatures in the lobbies, potentially leading to unintended activation.[2468]

60.88 There was also some confusion about measuring flow rates. Mr Partlow did not understand why building control was asking for readings of extraction flow rates in cubic metres per second, which suggests a failure of communication between building control and those designing the system.[2469] PSB did not measure the flow in that way but Mr Partlow asked Mr Whyte to measure the area of one of the doors which he used together with the average velocity across the open door to calculate the flow in cubic metres per second.[2470]

60.89 When building control approved the proposed system on 24 June 2015 it gave no reasons for its decision but did say that it should conform to the Smoke Control Association Guide 2012.[2471] That was repeated in a memorandum sent by Mr Hanson

[2463] Lane, Module 7 Supplementary Report {BLARP20000043/94}.
[2464] Partlow {PSB00001309/3} page 3, paragraph 11.
[2465] Partlow {Day156/19:14-18}.
[2466] Partlow {Day156/32:10-14}.
[2467] Partlow {Day156/94:21-23}.
[2468] Partlow {Day156/177:18-24}.
[2469] Partlow {Day156/166:9-11}.
[2470] Partlow {Day156/167:13-24}; Partlow {Day156/167:13-24}; Whyte {Day158/80:6-25}.
[2471] Hanson {Day154/143:11-23}.

to Mr Hoban on 26 January 2016,[2472] in which he said that by saying the system was acceptable he meant that it was compliant with functional requirements B1 and B5 of the Building Regulations.[2473]

60.90 The need for a cold smoke test of the system was also debated. Ms Menzies said that such a test should have been carried out as part of the commissioning process in order to demonstrate to building control that the system operated effectively. In her opinion that was an important part of the commissioning and acceptance process, since without one it would not be possible to know whether the system worked under different door-opening conditions. In her view, the failure to require a cold smoke test fell below the standard to be expected of a reasonable building control body. Mr Hanson did not think that carrying out a cold smoke test was an important part of commissioning any system protecting escape routes with extended travel distances, although he accepted it could be a useful guide.[2474] Mr Lay did not expect cold smoke testing to be part of commissioning; he would expect to take flow measurements.[2475]

60.91 Mr Partlow said that a cold smoke test had not been considered in this case because the building was occupied and it would have been very frightening for residents to walk out of a flat and be confronted by a lobby full of smoke.[2476] However, Ms Menzies, who has many years' experience as a building control officer, said that she had never heard it suggested that a cold smoke test might be a problem in an occupied building.[2477]

60.92 We think that unless detailed flow measurements under different conditions of door opening had been made, a cold smoke test should have been performed as part of the commissioning process. The practical challenges identified by Mr Partlow were far from insurmountable. The inconvenience to residents and the additional cost was justified by the benefit of assessing the system's operation in circumstances approaching those in which it would be expected to function and was to be preferred to measuring flow rates.

60.93 There were other respects in which the commissioning process had not captured all the information required to demonstrate that the system performed as intended.[2478] They included a failure to record the performance of the fans, the commissioning of all dampers, door opening forces, or pressure measurements.[2479]

60.94 Mr Hanson accepted that there should have been a record of door opening forces, at least for a representative number of doors. He said that his ability to scrutinise the commissioning report was limited because the RBKC building control team no longer had an engineer. It therefore had to rely on the professionalism of the installer and designer of the system.[2480] Ms Menzies did not think that was a reasonable approach for building control to take if it had not seen some evidence that the door opening forces had in fact been tested.[2481] She also considered that building control could not have considered

[2472] Hanson {Day154/144:8-16}.
[2473] Hanson {Day154/145:5-9}.
[2474] Hanson {Day154/151:22}-{Day154/152:6}.
[2475] Lay {Day286/160:24}-{Day286/161:3}.
[2476] Partlow {Day156/191:6-8}.
[2477] Menzies {Day169/61:4-9}.
[2478] Lane {Day287/213:7}-{Day287/214:1}.
[2479] Lane, Phase 2 Module 3 Report {BLARP20000035/409} Sections 1-9 and 11.
[2480] Hanson {Day154/201:19-24}.
[2481] Menzies {Day169/48:14-21}.

whether the system ensured an adequate means of escape without some form of testing which demonstrated that a flow rate of 2m/s through the door to the stairs could be achieved in a variety of different conditions.[2482]

60.95 There was another reason why, in the opinion of Ms Menzies, building control should not have accepted the commissioning report. An additional vent had been added to the system at its suggestion after commissioning had been undertaken. In her view, the entire system needed to be commissioned after all the work on it had been completed.[2483]

60.96 Overall, we consider that the commissioning process was not sufficient for building control to be satisfied that the system would perform as intended. That was in part because it was not provided with a set of data that enabled it to be confident that the system operated correctly, but also because it did not require other forms of testing, such as a cold smoke test, to make up for that omission. More generally, the commissioning documents did not describe the performance expected of the system, details of the situations for which it was designed or how it related to the building's fire safety strategy.

Maintenance of the system

60.97 By the time of the refurbishment the original smoke ventilation system had fallen into disrepair, partly as a result of inadequate maintenance,[2484] and the evidence suggests that maintenance remained inadequate after the system had been replaced.

60.98 The TMO had no formal procedures of its own for the maintenance of the smoke ventilation system, having entered into a contract with Allied Protection Ltd for the inspection and servicing of fire safety equipment, including the smoke ventilation system, which included the following:

a. the annual servicing and testing of hardwired standalone and linked smoke detection equipment in communal areas in accordance with British Standards; and

b. the six-monthly servicing of the smoke ventilation system in accordance with the manufacturer's instructions, including checking interfaces with the fire alarm or control system panel and the checking and servicing of all damper activators and associated mechanisms.[2485]

60.99 Although Allied Protection was required to service the system at 6-monthly intervals in accordance with manufacturer's instructions, the TMO did not provide those instructions until 14th June 2017.[2486]

60.100 Generally accepted standards for the maintenance of smoke control systems published by the British Standards Institution[2487] included the need to test each zone of a smoke ventilation system separately, ensuring that any fans and powered exhaust ventilators operate correctly and that dampers close or, where relevant, open.[2488]

[2482] Menzies {Day169/47:15}-{Day169/48:8}.
[2483] Menzies {Day169/62:5}-{Day169/64:12}.
[2484] See Chapter 43.
[2485] Packer {LAK00000525/3} page 3, paragraph 7.
[2486] Packer {LAK00000525/3} page 3, paragraph 8.
[2487] BS EN 12101-6:2005, BS 5839-1:2013 (withdrawn 31.08.2017 and replaced by BS 5839-1:2017) and BS 9999:2008 (withdrawn 31.01.2017 and replaced by BS 9999:2017).
[2488] Lane, Phase 2 Module 3 Report, Sections 1-9 and 11 {BLARP20000035/498-499}.

60.101 We were provided with copies of the inspection and servicing certificates produced by Allied Protection following maintenance visits to Grenfell Tower on 17 January 2017[2489] and 15 May 2017.[2490] The visit on 17 January 2017 was carried out by Karl Russell. The certificate records that the smoke detectors were not tested, although the inspection should have included an operational test of the 26 smoke detectors between the ground floor and Floor 23. Moreover, there was no record in the call history of the auto-dialler that the smoke detectors had been activated, although they should have operated if the tests had been carried out properly.[2491] The evidence suggests, therefore, that either the smoke detectors did not work or that an operational test of the system was not carried out on that occasion. The latter is the more likely explanation, because if the system had been tested and had failed to operate, that would have been recorded.

60.102 The inspection on 15 May 2017 was carried out by Barry McAuliffe. There were 20 logged activations of smoke detectors,[2492] but there should have been 26 if all the smoke detectors had been tested properly. It was not possible to identify from the auto-dialler log which smoke detectors had been activated and which had not, but Mr McAuliffe said that he had not tested the ground floor lift lobby detectors because he had been called away to carry out an urgent repair.[2493]

60.103 Mr McAuliffe recorded his arrival time on 15 May 2017 as 12:15 and his departure time as 14.15, a period of two hours.[2494] On each operational test of the system the maintenance engineer was required, as a minimum, to carry out the following steps to ensure that the system and all its components were operating correctly:

a. Activate the system using a smoke detector.

b. Inspect the position of the dampers in the lobbies on all floors.

c. Inspect the position of the by-pass dampers at Level 2.

d. Inspect the operation of the smoke extraction fans at roof level.

e. Inspect the operation of the smoke extraction fans at Level 2.

f. Inspect the control panel to check that it correctly indicated the system operation, floor activation and status of all dampers.

g. Reset the control panel on the ground floor once all inspections of dampers and fans had been completed.[2495]

60.104 Mr McAuliffe described testing one floor at a time by setting off each smoke detector head using his own artificial smoke and checking that the smoke extraction system started. He then proceeded to the control panel in the ground floor lobby and reset the system. He said he had done that for each floor, using the emergency stairs for access.[2496]

[2489] {LAK00000009}.
[2490] {LAK00000011}.
[2491] {THL00000019}.
[2492] {THL00000019}.
[2493] McAuliffe {LAK00000522/4} page 4, paragraph 26.
[2494] {LAK00000011}.
[2495] Lane, Phase 2 Module 3 Report {BLARP20000035/516} Sections 1-9 and 11.
[2496] McAuliffe {LAK00000522/4} page 4, paragraph 25.

60.105 The period from the start to the end of the 20 activations on that day recorded in the auto-dialler log was about 1 hour 15 minutes.[2497] That left Mr McAuliffe about 4 minutes a floor to carry out the required tests, which we do not think was long enough to carry out the tests he described.[2498]

60.106 When he was sent to inspect the system at Grenfell Tower Mr McAuliffe had had previous experience of only more basic smoke ventilation systems. He had not been provided with information about the system before his visit and called his manager to ask if he could decline the job. However, he was told to go ahead, despite making clear his lack of expertise.[2499]

60.107 Mr McAuliffe accepted that he had not opened the grilles on each floor to check that the dampers had activated properly during the tests[2500] and if the grilles had not been opened, the dampers cannot have been inspected in sufficient detail to ensure that they sealed properly when closed.[2501] It was not possible for all 91 dampers to be serviced and their operation checked during the relatively short visits made by Allied Protection, so the maintenance records did not provide any assurance that the system would operate correctly if a fire were to occur.[2502]

60.108 Overall, the maintenance documentation provided for the smoke ventilation system was poor and did not satisfy the guidance in BS 9999: 2008.[2503] Neither the limited weekly test carried out by Mr Steadman (a TMO estate services assistant) or Allied Protection's checks provided clear evidence of rigorous maintenance and inspection consistent with what was recommended by the guidance.[2504]

60.109 The smoke ventilation system was complex and contained many separate mechanical components. Dampers were subject to repeated wear through regular opening and closing while operating in environmental mode and therefore required regular inspection and maintenance. However, Allied Protection carried out inspection and maintenance visits without sight of the manufacturer's instructions and sent an engineer to carry out the inspection on 15 May 2017 who lacked the skill to do the job properly.

60.110 There is little evidence that the fans on Level 2 had been properly inspected or maintained before the fire.[2505] Mr McAuliffe said that he probably had inspected the operation of the smoke extraction fans at Level 2 but could not be certain.[2506] We are doubtful that he had, however, given that he was not aware of all the testing requirements,[2507] had little experience of complex systems of this type and had not been provided with a description of the system.[2508] He did not test the by-pass damper at Level 2 and could not recall having tested the smoke extraction fans at roof level.[2509] Moreover, it would not have been possible for him to check the operation of the fans at Level 2 given the length of his visit

[2497] {THL00000019}.
[2498] Lane, Phase 2 Module 3 Report {BLARP20000035/518} Sections 1-9 and 11.
[2499] McAuliffe {LAK00000524/1-2} pages 1-2, paragraph 5.
[2500] McAuliffe {LAK00000524/2} page 2, paragraph 9.
[2501] Lay, Smoke Control System Report {LAY00000001/315}.
[2502] Lane, Phase 2 Module 3 Report {BLARP20000035/523} Sections 1-9 and 11.
[2503] The Code of practice for fire safety in the design, management and use of Buildings.
[2504] Lay, Smoke Control System Report {LAY00000001/316-317}.
[2505] Lane, Phase 2 Module 3 Report {BLARP20000035/516} Sections 1-9 and 11.
[2506] McAuliffe {LAK00000524/6} page 6, paragraph 37.
[2507] McAuliffe {LAK00000524/6} page 6, paragraph 35.
[2508] McAuliffe {LAK00000524/1-2} pages 1-2, paragraph 5.
[2509] McAuliffe {LAK00000524/6} page 6, paragraph 37.

and the extent of the other work he had to carry out.[2510] There is little evidence, therefore, that the smoke extraction fan at Level 2 was inspected and maintained in a way that would give one confidence that it would operate effectively if there were a fire.

Operation of the system on the night of the fire

60.111 The smoke ventilation system was designed to respond to a fire on one floor of the building only. It follows that the fire that occurred at Grenfell Tower on 14 June 2017 far exceeded anything that it was or could reasonably have been designed to deal with effectively. The system itself was complex and was significantly damaged by the fire. We have carefully considered the available evidence that might shed light on its performance on the night of the fire but given the nature and scale of the disaster that evidence, which is mainly derived from the condition of the dampers and fans after the fire, is inevitably of limited value. Unfortunately, it does not enable us to draw any reliable conclusions about how the system performed during the fire or how it would have performed under the circumstances for which it had been designed.

Conclusions

60.112 The design of a new smoke ventilation system for Grenfell Tower provides a good illustration of the difficulties that can be faced by those seeking to refurbish an old building. Time and standards move on and it may be impossible because of the constraints imposed by the existing structure to provide systems that comply in all respects with current standards. In those circumstances the choice is between doing the best you can and doing nothing at all.

60.113 The Building Regulations do not require a building that undergoes a material alteration to comply with the current functional requirements on completion of the work, provided that it is no more unsatisfactory in relation to any particular requirement than it was before the work was carried out (the "no-worsening" principle). There may be good reasons for retaining that principle, but it may be due for reappraisal because one consequence is that many older buildings, including some that have been refurbished, do not meet current standards in relation to one or more of the functional requirements, including those relating to fire safety. The solution adopted by PSB in the present case was to use the existing structure in a different way that enabled it to double the volume of the shafts available for the extraction of smoke and to provide protection for the stairs that represented the main escape route as well as the means of access for the fire and rescue service.

60.114 The criticisms that were made of the design were directed in the main to PSB's failure to record the basis for its design decisions and to ensure that certain processes and calculations, in particular a CFD analysis, were carried out, either by itself or others, that would have enabled a more rigorous assessment of the proposed system to be made. As a result, although it had good grounds for feeling confident that the new system would be considerably better than the original (and therefore satisfy the "no worsening" principle), it was difficult for PSB to provide evidence to that effect and difficult also for PSB to rebut the suggestion that it had not carried out the kind of rigorous analysis of the system that was to be expected. Its difficulty in demonstrating both to building control and to us

[2510] Lane, Phase 2 Module 3 Report {BLARP20000035/497} Sections 1-9 and 11.

that the new system was better than the old one was made all the more difficult by the fact that the original system was inoperable and its performance therefore incapable of being measured.

60.115 The failure to record the basis for design decisions is not in itself a criticism of the system that was produced, but it may indicate a failure to take the process as seriously as required. However, designers need to bear in mind that there are others who need to understand the basis of their decisions, not least any fire engineer charged with producing a fire safety strategy for the building and the person responsible for the operation and maintenance of the building when in occupation. Proper recording of the calculations and assumptions that underpin the design of a complex system of that kind is therefore essential for the safety of the occupants in the longer term. Those are matters of which building control must be aware and in relation to which it must insist on being provided with cogent evidence.

60.116 The need to choose equipment and materials that have been properly tested and shown to conform to the appropriate requirements (such as the dampers for the system) should not be a contentious matter, but again it requires the careful attention of the system designer, the fire engineer and building control to ensure that appropriate decisions and choices have been made.

Chapter 61
The Health and Safety File

61.1 As we have explained in Chapter 48, the CDM Regulations applied to the Grenfell Tower refurbishment: the CDM Regulations 2007 applied up to 6 April 2015; after that date the CDM Regulations 2015 applied. Both sets of regulations require the production of a health and safety file once construction works have been completed. Under the 2007 Regulations the duty to produce a health and safety file lay on Artelia as CDM co-ordinator. Under the 2015 Regulations, the duty lay on the TMO as principal designer.

61.2 Regulation 20(2)(e) of the 2007 Regulations required the CDM co-ordinator (Artelia) to review and update any existing health and safety file for the tower or, if one did not exist, to prepare one. If the 2007 Regulations had remained in force, Artelia would have been required at the end of the construction phase to pass the health and safety file to the TMO.[2511]

61.3 The health and safety file is an important document. It contains detailed information about work carried out on a building (whether by way of a new construction or refurbishment), including fire safety information. As Dr Lane explained in her evidence, it enables anyone carrying out work on a building to know what construction work has previously been done and, of particular relevance in this case, where fire safety features are located.[2512] She described it as part of the "golden thread" of information about the building, which, together with information produced pursuant to regulation 38 of the Building Regulations and the Fire Safety Order, is intended to be simple, easy to find and clear about what it contains.

61.4 There was no health and safety file for Grenfell Tower when the refurbishment began.[2513] Work had been carried out on the tower over the years but, for reasons we do not need to consider, no health and safety file had been produced.[2514]

61.5 The Approved Code of Practice supporting the CDM Regulations 2007 advised that a CDM co-ordinator should make arrangements at the beginning of a project to collect and compile the information that is likely to be needed for the file and should have a discussion with the client about matters such as the format and type of information that should be obtained.[2515] The Approved Code of Practice also advised that the client (in this case the TMO) should make sure that the CDM co-ordinator compiled the health and safety file.[2516] Simon Cash, Artelia's project director, said that the information needed for the health and safety file was not always available until the end of a project and that he would therefore not have expected Artelia to produce a health and safety file until the end of the refurbishment.[2517] In his view that was normal practice, both on refurbishment projects and

[2511] CDM Regulations 2007 {INQ00011315/11} Regulation 20(2)(f).
[2512] Lane {Day62/175:18}-{Day62/176:11}.
[2513] {RYD00092644/18} paragraph 3.14.
[2514] Previous projects included improvements to the lifts and the replacement of fire doors. For more details see Lane, Health and Safety File Report {BLARP20000012}.
[2515] Approved Code of Practice L144 {INQ00013936/22-23} paragraph 79; Lane, Health and Safety File Report {BLARP20000012/106}, paragraph 9.7.15.
[2516] Approved Code of Practice L144 {INQ00013936/59} paragraph 261; Lane, Health and Safety File Report {BLARP20000012/106}, paragraph 9.7.17.
[2517] Cash {Day49/80:22-24}; {Day49/81:7-13}.

new construction projects.[2518] David Gibson, TMO's Head of Capital Investment, said that he had never been provided with a health and safety file before the end of the work.[2519] As a result, contrary to the guidance contained in the Approved Code of Practice, Artelia did not start gathering information for a health and safety file at the beginning of the refurbishment. It was not until February 2015 that it started work to prepare a file and sought information from contractors working on the refurbishment.[2520] On 21 April 2015, Claire Williams, the TMO's project manager, sent an email to Paul Burrows (who had taken over from Keith Bushell as CDM co-ordinator) asking him to check whether Artelia was up to date with compiling the health and safety file. Mr Burrows explained that Artelia had not received any information from contractors but that he did not think that was unusual and was expecting to receive information at the end of the project.[2521]

Change from CDM co-ordinator to principal designer

61.6 The CDM Regulations 2015 brought about some substantive changes to the legislative regime. They included the abolition of the position of CDM co-ordinator and the introduction of a new position of principal designer, one of whose duties is to prepare a health and safety file appropriate to the characteristics of the project during the pre-construction phase, to keep it up to date and to pass it to the client at the end of the work.[2522] Transitional provisions, which applied to the Grenfell Tower refurbishment, provided for the CDM co-ordinator to remain in position until a principal designer had been appointed or the project came to an end. They also imposed a duty on the client to appoint a principal designer by 6 October 2015.[2523] If the client failed to do so, it automatically became the principal designer itself.[2524]

61.7 On 2 February 2015, Keith Bushell sent an email to Nick Valente[2525] and Philip Booth[2526] informing them that, in light of the forthcoming change to the CDM Regulations, the TMO would have to appoint a principal designer.[2527] The email was internal to Artelia and we have not seen any evidence that at that time Artelia told the TMO that it would need to appoint a principal designer.

61.8 On 20 July 2015, Neil Reed of Artelia[2528] sent an email to Claire Williams attaching a revised notice under the CDM regulations naming Artelia as the principal designer for the refurbishment.[2529] Claire Williams questioned whether Artelia should be a "designer" and on 21 July 2015, Colin James[2530] of Artelia responded, explaining that the new CDM Regulations 2015 required the TMO to appoint a principal designer by 6 October 2015.[2531]

[2518] Cash {Day49/80:10-25}.
[2519] Gibson {Day54/63:4-8}.
[2520] {ART00003575}; {ART00006171}; {ART00009283}.
[2521] {ART00006299/1}.
[2522] CDM Regulations 2015 {INQ00011316/12} Regulation 12(5), (6) and (10).
[2523] CDM Regulations 2015 {INQ00011316/41-42} Schedule 4, paragraph 4.
[2524] CDM Regulations 2015 {INQ00011316/43} Schedule 4, paragraph 6(3).
[2525] Nick Valente was an assistant employer's agent employed by Artelia - Booth {ART00008527/3} page 3, paragraph 13.
[2526] Philip Booth was brought into the project in April 2013 to assist his colleague at Artelia, Robert Powell, who was the employer's agent. By July 2013 he was acting as employer's agent – Booth {ART00008527/3} page 3, paragraph 12.
[2527] {ART00009283}.
[2528] Neil Reed was employed as an employer's agent for Artelia from March 2015 – Reed {ART00006663/1} page 1, paragraph 2.
[2529] This is known as the F10 Notice for CDM purposes. It is a formal notification sent to the Health and Safety Executive containing details of the project. It is required where a project is "notifiable". Under the CDM 2007 Regulations a project was notifiable if it was likely to involve more than 30 days or 500 person days of construction work, CDM Regulations 2007 {INQ00011315} Regulation 2(3) and 21; Similar provisions apply under the CDM Regulations 2015 {INQ00011316/7} Regulation 6.
[2530] Colin James was employed by Artelia as a CDM co-ordinator – James {MET00080879/4} page 4.
[2531] {ART00009321/2-4}.

An internal email passing between employees of Artelia who were working on the refurbishment in July 2015 shows that they were aware that the TMO needed to be alerted to the change in the regulations.[2532] Claire Williams said that she had been expecting Artelia to become principal designer but that it had told her in late September 2015 that it would not do so because its professional indemnity insurance did not cover it. It is clear, however, from an internal email sent at around that time that Artelia was not willing to take on that role in any event.[2533] We note that following a progress meeting on 18 September 2015 Claire Williams was to appoint a principal designer from the TMO's consultancy framework and it therefore seems that she was at least aware of the need to appoint a principal designer before the end of September 2015.[2534]

61.9 In September 2015 Claire Williams contacted external consultants and professionals working on the project, including Rydon, to see whether they would take on the position of principal designer, but they all declined to do so.[2535] Ultimately, therefore, the TMO decided to take on the task itself on the basis of advice it had received, probably from Simon Cash of Artelia, that the design was "fundamentally complete".[2536] It took that decision on the basis that it would ask Rydon to complete the health and safety file.[2537] For the purposes of the CDM Regulations 2015, however, it was the obligation of the TMO as principal designer to prepare the health and safety file.[2538]

61.10 Under the 2007 Regulations, CDM co-ordinators were under an obligation to prepare or revise the health and safety file[2539] and pass it to the client at the end of the construction phase.[2540] Although we were told that CDM co-ordinators did not typically construct a health and safety file until the end of a project,[2541] the Approved Code of Practice said that it should be compiled as the project progressed,[2542] allowing for material to be gathered while it was fresh. Judging by the limited and largely irrelevant documents that Artelia had gathered by October 2015, it is clear that no meaningful progress had been made since the efforts in February and March 2015.[2543] Artelia did not make up for the lack of progress before October 2015, even though it must have been clear in the preceding months that the TMO and any principal designer it appointed would have been greatly assisted by the marshalling of appropriate documents.

[2532] {ART00009321/8} see email sent by Paul Burrows to Colin James on 13 July 2015 and {ART00009321/1-2} email sent by Neil Reed to Colin James and Paul Burrows on 21 July 2015.
[2533] Williams {TMO00853697/3} page 3, paragraphs 11-14; {ART00006344}; {ART00006195}.
[2534] {ART00004725/7} item 7.3.
[2535] Williams {TMO00853697/3} page 3, paragraph 15; {TMO00853697/4} page 4, paragraph 17; {ART00006174}; {ART00006195}; {ART00009336}; {ART00009342}.
[2536] Williams {TMO00853697/5} page 5, paragraph 21; Cash {ART00009416/7} page 7, paragraph 25.
[2537] {ART00009343}; {ART00005184/2-3} item 2.8; {ART00006735/2} item 2.8; Williams {TMO00853697/5} page5, paragraph 23.
[2538] CDM Regulations 2015 {INQ00011316/12} Regulation 12(5), (6) and (10).
[2539] CDM Regulations 2007 {INQ00011315/11} Regulation 20(2)(e).
[2540] CDM Regulations 2007 {INQ00011315/11} Regulation 20(2)(f).
[2541] Reed {Day50/183:17-23}; Cash {Day49/86:1-5}; Booth {Day50/101:5-14}; Artelia Modules 1 and 2 Closing Submissions for Phase 2 {ART00009458/32} paragraphs 103-106.
[2542] {INQ00013936/58-59} paragraphs 258-59.
[2543] {ART00004949} listing the only information collected, being a site inspection report {ART00004950}; CDM Reports {ART00004951}; {ART00004952}; CDM Risk Register {ART00004953}; F10 notifications {ART00004954}; {ART00004955}; Email from Rydon {ART00004957} attaching method statement and phasing plans; phase drawings {ART00004958}; {ART00004960}; {ART00004961}; {ART00004962}; Project specific method statement {ART00006176}; Rydon email {ART00004963} attaching site-wide risk assessment {ART00004964}; site layout plan {ART00004965}; emergency plan {ART00004966}; traffic management plan {ART00004967}; site rules; Rydon email {ART00005015} attaching construction phase health and safety plan {TMO00869734}; Email confirming construction phase plan is adequate {ART00004971}.

61.11 Claire Williams had been given short notice of the need to find a principal designer and the TMO was not given enough time to consider its options.[2544] A number of emails sent at the time within Artelia show that some people, notably Mr Reed and Mr Cash, accepted that Artelia had not handled the transition to principal designer well.[2545] However, the TMO was also to blame because it overestimated its own ability to review and scrutinise the health and safety file when it was produced (see further below). Neil Reed warned Claire Williams that if the TMO took on the role of principal designer, it would need someone to check the health and safety file and confirm that it was compliant. He offered to make someone available as a CDM adviser for that purpose[2546] but the offer was refused.

The health and safety file

61.12 Having been asked by the TMO to complete it, Rydon sub-contracted the preparation of the building manual for the refurbishment to a company called All Group Holdings Ltd.[2547] In addition to its work on the building manual, All Group Holdings gathered information for inclusion in the health and safety file and produced a three-page document containing cross-references to parts of the building manual. All Group Holdings sent the document to Rydon, describing it as its proposals for the health and safety file.[2548] The guidance describing the information that should be contained in a health and safety file has not materially changed since 1994.[2549] The recommended contents include (among other things) (1) a brief description of the work carried out, (2) residual hazards and how they have been dealt with, (3) the nature, location and markings of significant services, including fire-fighting services and (4) information about, and as-built drawings of, the structure, its plant and equipment.[2550]

61.13 Claire Williams had received some training on the CDM Regulations and was familiar in general terms with what a health and safety file should contain.[2551] She accepted that she would have needed help to assess the quality of the health and safety file provided by Rydon but she did not specifically ask Artelia for guidance.[2552] She checked the health and safety file, but we got the impression that, although she identified some gaps and missing information, she did not make a serious effort to ensure that the defects were made good.[2553]

Dr Lane's evidence

61.14 Dr Lane prepared a report on the health and safety file and gave evidence to the Inquiry during Module 1.[2554] Her report contained a thorough analysis of the contents of the health and safety file presented to the TMO by Rydon and identified where information was missing, inaccurate or incomplete.[2555] Her particular criticisms of the health and safety file, which we accept, were that it did not enable the persons responsible for any work on

[2544] Williams {TMO00853697/4} page 4, paragraph 19.
[2545] {ART00009356}.
[2546] {ART00004824}; {ART00004865/4} item 4.2; {ART00009364}.
[2547] Butler {MET00012822}.
[2548] {RYD00080302}; {TMOM00001932}.
[2549] Lane {Day62/178:18-23}; Lane, Phase 2, Health and Safety File Report {BLARP20000012/47-51} paragraphs 5.7.14 – 5.7.19 and Table 5.1; "Managing health and safety in construction, Construction (Design and Management) Regulations 2015, Guidance on Regulations" at Appendix 4 {HSE00000003/81-83}.
[2550] Lane, Phase 2, Health and Safety File Report {BLARP20000012/48} paragraph 5.7.14-5.7.16.
[2551] Williams {Day56/119:22}-{Day56/120:9}.
[2552] Williams {Day56/120:11}-{Day56/122:25}.
[2553] Williams {Day56/142:12}-{Day56/144:21}.
[2554] Lane, Phase 2, Health and Safety File Report {BLARP20000012}; Lane {Day62/166:2}-{Day62/202:25}.
[2555] Lane, Phase 2, Health and Safety File Report {BLARP20000012/144} paragraph 10.5.5.

Grenfell Tower to understand the condition of the building and the hazards and risks arising from the refurbishment.[2556] Nobody sought to challenge Dr Lane's evidence, which was to a large extent limited to the contents of the documents.

61.15 We are satisfied that the health and safety file did not contain the information referred to in the relevant guidance and was not presented in a form that made it readily usable. The TMO failed to ensure that the file was properly organised and contained accurate and up to date information about the refurbishment. Overall, it was incomplete, confusing and thoroughly unhelpful.

61.16 During her evidence Dr Lane was asked whether the health and safety file should have been available on the night of the fire to assist the fire brigade. Her view was that drawings containing basic information about the building should have been available rapidly.[2557] She was unwilling to speculate about what might have happened if a complete health and safety file had been available on the night of the fire[2558] and we express no view on the matter.

[2556] Lane, Phase 2, Health and Safety File Report {BLARP20000012/145} paragraph 10.5.8; Lane {Day62/196:4}-{Day62/199:17}; {Day62/202:20-25}.
[2557] Lane {Day62/206:25}-{Day62/208:11}.
[2558] Lane {Day62/208:13-23}.

Chapter 62
Building Control

62.1 In Chapter 48 of this report we described the provisions of the Building Act 1984 and the Building Regulations 2010 which govern the process by which building work falling within their scope is checked by local authorities for compliance with the statutory requirements. In this chapter, we examine the role that RBKC building control played in the refurbishment of Grenfell Tower and the events leading up to the issue of a completion certificate in July 2016.

62.2 We have been greatly assisted in our investigations by Beryl Menzies, FCABE, PPBEng, CBuildE, CABE, MRICS, a consultant in fire safety and fire-related building services. Ms Menzies has over 40 years' experience in building control, having worked in the Building Regulations Division of the Greater London Council between 1973 and 1985 and subsequently as a Chief Engineer at the London Borough of Tower Hamlets.[2559] Her evidence was not challenged by any of the core participants and we were not asked to consider evidence from anyone else with similar professional experience. We have therefore relied on her expert opinion when reaching our conclusions. RBKC also made some admissions that the work of its employees fell below the standard that could reasonably be expected of competent building control officers.[2560]

62.3 RBKC was the building control body for the Grenfell Tower refurbishment. It was first approached by Studio E for initial advice in June 2012[2561] and was involved with the refurbishment until a completion certificate was issued in July 2016.[2562] Within RBKC, two surveyors were largely responsible for the project, John Allen, the special projects manager, from 2012 to late 2013, and John Hoban, a senior surveyor, from late 2013 to July 2016.[2563] Paul Hanson, a fire engineer in the department, also gave advice on matters concerning functional requirements B1 and B5 of the Building Regulations.[2564]

62.4 Until September 2013, the building control department had been managed by John Jackson.[2565] As special projects manager John Allen had been responsible for the larger, more complicated buildings that RBKC had to deal with,[2566] including the KALC project and the Grenfell Tower refurbishment,[2567] (although it is not clear that the Grenfell Tower refurbishment would have been considered a special project but for its link to the KALC project.)[2568] In September 2013 the department was restructured and John Allen became Building Control Manager.[2569] During the restructuring, procedures for allocating work within the department changed. Thereafter work was allocated on a "patch" system, under which a surveyor was allocated to a particular area and was

[2559] Menzies, Building Control {BMER0000004/3}.
[2560] RBKC Module 1 Opening Submissions {RBK00055479/26-27} paragraphs 97-105; RBKC Module 1 and 2 Closing Submissions {RBK00064252/1} paragraph 4.
[2561] {SEA00000023}.
[2562] {RBK00018811}.
[2563] Allen {RBK00033930/1-2} pages 1-2, paragraph 3, 5, 7 and 12; Hoban {RBK00033934/1} page 1, paragraph 4.
[2564] Hanson {RBK00033894/23-25} pages 23-25, paragraphs 124-140.
[2565] Allen {RBK00033930/1} page 1, paragraph 3.
[2566] Allen {Day47/8:12-24}; Allen {RBK00033930/1} page 1, paragraphs 3-4.
[2567] Allen {Day47/95:9-16}.
[2568] Allen {Day47/95:17}-{Day47/96:3}.
[2569] Stallwood {RBK00033910/2} paragraph 6.

expected to take whatever work came into the department from that area, regardless of its scale or complexity.[2570] In December 2013, John Allen handed over day to day responsibility for KALC and the Grenfell refurbishment to John Hoban, although those projects were on another officer's "patch" at that time.[2571]

Means of Escape group

62.5 In addition to its team of surveyors, RBKC had what was known as the "Means of Escape" group, which operated as an internal consultancy on matters relating to functional requirements B1 (means of warning and escape) and B5 (access and facilities for the fire service).[2572] At the time of the refurbishment, the Means of Escape group consisted of just one person, Paul Hanson, a qualified fire engineer. Mr Hanson did not have the power to make decisions on full plans applications and did not conduct site inspections,[2573] although in the case of Grenfell Tower he did attend some meetings on site. He also attended a demonstration of the smoke control system in 2016.[2574] Although Mr Hoban formally had overall responsibility for building control matters, Mr Hanson effectively made decisions in relation to functional requirements B1 and B5 because Mr Hoban deferred to Mr Hanson on those matters. He also sought his advice on matters affecting functional requirements B2, B3 and B4 if he needed assistance.[2575] The evidence suggests that the role of the Means of Escape group within the department was not well understood, particularly by other professionals working on the Grenfell refurbishment,[2576] and Mr Hoban agreed that its relationship with the surveyors could have been clearer.[2577] Ms Menzies thought that the department could have made better use of the Means of Escape group generally, in particular because Mr Hanson was a qualified fire engineer.[2578]

Records

62.6 At the time of the refurbishment, RBKC's building control department kept records in a number of different ways: an electronic record-keeping system called "Acolaid", hard-copy files, electronic diaries, a hard-copy office diary and individual surveyors' notebooks.[2579] The department adopted a "weeding" policy in relation to hard-copy files, with the result that not all the documents originally placed on the file were retained after a job had been closed.[2580] RBKC was unable to find the hard-copy file for the Grenfell refurbishment or Mr Hoban's personal notebooks covering the relevant period,[2581] but because of the weeding policy it is not clear which documents would have been retained. Mr Hoban

[2570] Anon {RBK00029897/3} page 3, paragraph 10; Allen {Day47/97:5-20}; Hoban {Day45/101:13-20}.
[2571] {SEA00010232}; Hoban {Day45/100:20}-{Day45/101:6}; {Day45/100:17-24}. Mr Allen initially allocated the Grenfell project to Jose Anon, the deputy Building Control Manager, but Mr Anon did not feel he had the capacity to take on the additional work at the time. He also had friends who lived in the tower and felt a need to keep a professional distance. Anon {RBK00029897/8} page 8, paragraph 37-38; Allen {RBK00033930/2} page 2, paragraphs 7 and 10.
[2572] Hanson {RBK00033894/5} page 5, paragraph 31.
[2573] Hanson {RBK00033894/6} page 6, paragraph 38.
[2574] {RBK00002965}; {RBK00010784}; {RBK00003856} (this document is misdated, and the meeting took place on 7 January 2016, see email attaching the minutes) {RBK00003855}.
[2575] Hoban {RBK00033934/4} page 4, paragraph 36; Hoban {RBK00050416/3} page 3, paragraph 9(b); Hoban {Day45/121:25}-{Day45/124:15}; {RBK00048682}; {RBK00052478/7}.
[2576] {RBK00048682/1}; Crawford {Day11/128:3}-{Day11/130:25}; Lawrence {Day25/173:20}-{Day25/174:18}.
[2577] Hoban {Day45/124:16}-{Day45/125:12}.
[2578] Menzies, Building Control {BMER0000004/52} paragraph 208.
[2579] Hoban {Day45/85:5}-{Day45/86:13}.
[2580] Stallwood {RBK00033910/8} page 8, paragraphs 37-38.
[2581] Stallwood {RBK00033910/4-6} pages 4-6, paragraphs 17-24 and 27; Hoban {RBK00050416/10} page 10, paragraph 33(e).

thought that his plan check record sheet (an A4 sheet divided into topics such as "structure", "fire", "damp-proofing" and so on that he used when checking plans)[2582] and his notes would probably have been weeded out.[2583]

62.7 Mr Hoban did not use a tracker to monitor the drawings that had been submitted in support of the Grenfell full plans application,[2584] although the department did have a tracker which was available for surveyors to use, if a client requested it.[2585] However, we have seen no indication that the use of a tracker in connection with the refurbishment was proposed by building control or that it was requested by Studio E or Rydon.

62.8 The absence of complete contemporaneous records means that in many instances we have had to rely on Mr Hoban's personal recollection. That is unsatisfactory, not least because with the passage of time his memory had become understandably hazy and in places incomplete. Having said that, we are satisfied that we have been able to make reliable findings on the most important matters relating to building control's work on the Grenfell refurbishment. While some points of detail were in dispute, the key points about what Mr Hoban and his colleagues knew about the refurbishment and how they went about their work were not contentious.[2586]

Initial approach

62.9 Mr Allen first became aware of the Grenfell refurbishment when his manager, Mr Jackson, asked him to contact Terence Ashton of Exova[2587] but he could not remember when that was or exactly what they had discussed.[2588] On 6 June 2012 Studio E approached building control seeking an indication of the fee likely to be charged for the project[2589] and on 31 October 2012 Mr Ashton sent John Allen a copy of issue 1 of Exova's Outline Fire Safety Strategy.[2590]

62.10 Mr Allen told us that he had not known that the refurbishment involved overcladding the building until around the time of the full plans application.[2591] It is true that the Outline Fire Safety Strategy would not have alerted him to that fact, since cladding was not mentioned in it,[2592] but in 2012 Studio E had given him an estimate of the costs involved which had included overcladding as a line item. When that was shown to him Mr Allen accepted that he probably had read it and that he had seen that the project involved overcladding.[2593]

62.11 On 7 November 2012 Studio E and Exova had a meeting with building control to discuss the fire safety strategy.[2594] However, that meeting and subsequent communications between the design team and building control focused primarily on the lower four floors of the

[2582] Hoban {Day45/80:13}-{Day45/81:8}.
[2583] Hoban {RBK00050416/5} page 5, paragraph 18.
[2584] Hoban {RBK00050416/6} page 6, paragraph 18(b)-(d).
[2585] Allen {Day47/55:2}-{Day47/56:6}.
[2586] RBKC Module 1 Opening Submissions {RBK00055479/26-27} paragraphs 97-105; RBKC Module 1 and 2 Closing Submissions {RBK00064252/1} paragraph 4.
[2587] Allen {RBK00033930/2} page 2, paragraph 12.
[2588] Allen {Day47/173:17}-{Day47/174:10}.
[2589] {SEA00000023}; {SEA00004471}; Allen {Day47/202:4}-{Day47/203:1}.
[2590] {EXO00001368}.
[2591] Allen {Day47/176:16}.
[2592] {EXO00000519/4}.
[2593] {SEA00004471}; {ART00000053/4}; Allen {Day47/203:11}-{Day47/204:10}.
[2594] The meeting was attended by John Allen and Dave Gammon from RBKC, Terry Ashton from Exova and Adrian Jess from Studio E {SEA00006526}.

tower and the smoke ventilation system.[2595] The proposals for overcladding the tower were not discussed with building control either at that meeting or at any time before the full plans application was submitted in August 2014,[2596] but by the time he took over responsibility for the project in late 2013, John Hoban had become aware that it involved overcladding, because he had seen it on the drawings.[2597] He told us that he would have expected a contractor or architect to seek advice from building control on cladding proposals before it submitted a full plans application, but neither Rydon nor Studio E had done so in this case.[2598] Having seen that the project included overcladding, we consider that Mr Hoban should at that stage have taken the initiative and asked for more information about the project as a whole.[2599]

62.12 On 25 October 2013, Studio E sent building control its proposed fire safety strategy for the tower, including Issue 2 of Exova's Outline Fire Safety Strategy.[2600] On 11 November 2013, John Allen told Bruce Sounes that he did not think that the information on the smoke control system that had so far been submitted was adequate to enable an effective consultation to be held with the fire authority on functional requirements B1 and B5 as required by the Fire Safety Order.[2601] In January 2014, Studio E sent an email to building control asking them to consult the fire authority notwithstanding their concerns about the extent of the information available to them,[2602] but they did not do so at that time.[2603] There was no further contact between the design team and building control between January 2014 and July 2014.[2604]

The full plans application

62.13 On 4 August 2014 Studio E submitted a signed but undated full plans application to building control.[2605] By that time some demolition and site clearance work had already begun[2606] and Mr Hoban considered that the application had been made rather late in the day.[2607]

62.14 The drawings supporting the application were submitted nearly two months after the application itself[2608] and were incomplete.[2609] At the very least they ought to have shown that in principle the refurbishment was capable of complying with functional requirements B1 to B5 of the Building Regulations, but they did not. Indeed, on the basis of the information provided in relation to functional requirement B1 (means of escape) alone, the application ought to have been rejected.[2610] Mr Hoban's reason for not rejecting it was that he was trying to "work with" the applicant,[2611] but that does not provide a good reason

[2595] {EXO00001371}; {SEA00009805}; {SEA00000154}; {SEA00010232}; {SEA00010369}; {SEA00002629}; {SEA00002630}; {RBK00048649}; {RBK00003854}; {RBK00003810}. We deal with the smoke ventilation system, including the involvement of building control, in Chapter 60.
[2596] Sounes {Day21/132:23}-{Day21/133:3}; {Day21/164:4-24}; Ashton {Day17/70:7-11}; Allen {Day47/175:4-11}.
[2597] Hoban {Day45/138:2-11}.
[2598] Hoban {Day45/154:13-21}.
[2599] Menzies, Building Control {BMER0000004/9} paragraph 38; {BMER0000004/96} paragraph 303.
[2600] {SEA00009805/2}.
[2601] {SEA00009805/1}.
[2602] {RBK00048649}.
[2603] {RBK00003854}.
[2604] {RBK00003810}; Hoban {Day45/142:23}-{Day45/143:2}.
[2605] {RYD00014378} and {RYD00014379}. RBKC acknowledged receipt of the application on 5 August 2014{RBK00027424} and that is the date that the five-week statutory time limit for a decision started to run. Menzies, Building Control {BMER0000004/86} paragraph 274.
[2606] {RYD00012259}.
[2607] Hoban {Day45/154:22-24}.
[2608] {RYD00018742}.
[2609] Menzies {Day60/134:7}-{Day60/135:10}; Menzies, Building Control {BMER0000004/88}.
[2610] Menzies, Building Control {BMER0000004/9} paragraph 37.
[2611] Hoban {Day45/160:13}-{Day45/161:12}; Menzies {Day60/33:9-21}.

for failing to follow the statutory procedures. It does, however, reflect a fundamental misunderstanding among many of those who work in the construction industry, contractors, building control bodies and others, that the function of building control is to provide a service to applicants rather than to enforce the regulations robustly for the benefit of the community at large. In this case Mr Hoban accepted, in hindsight, that he ought to have rejected the full plans application for lacking the necessary supporting documentation.[2612]

62.15 As we have noted, a local authority is required to make a decision on a full plans application within five weeks of the deposit of the plans, although that can be extended by agreement to two months.[2613] However, in this case building control did not make a decision within the prescribed time and there is no evidence that any extension of time was agreed with either Rydon or Studio E. Mr Allen said that the statutory time limits did not work in the context of design and build projects and that there was little point in rejecting an incomplete application because building work could still go on.[2614] We found that part of his evidence rather disturbing, because it amounted to saying that in his eyes the legislation had to give way to commercial considerations and the practices of the construction industry. We do not think that is a proper approach to take to a statutory function and we are fortified in that conclusion by the evidence of Ms Menzies, who could see no reason why the statutory time limits could not be adhered to in the case of design and build projects.[2615]

62.16 There is a note on the Acolaid system dated 5 August 2014 headed "Meaningful response", in which Mr Hoban recorded that he had asked for details of the works,[2616] but he does not appear to have put his request in correspondence to Studio E or Rydon, either by email or letter. Mr Allen said that if a surveyor felt the need to go back to an applicant for further information, or if there was a problem with the application, such as a missing document or drawing, that should be recorded in writing, but in this case it was not.[2617] Unfortunately, Mr Hoban's response to the full plans application lacked rigour and fell short of the standard to be expected of a reasonably competent building control officer.[2618] He accepted that if he had exercised reasonable care and skill he would have asked Studio E for the information that was needed,[2619] but there is no record of his having done so, save for the "meaningful response" note, which does not record what further details he asked for.[2620]

62.17 We are not persuaded that Mr Hoban made a real effort to obtain the missing information from Studio E. He told us on more than one occasion that he had asked Rydon to provide him with information and that he had obtained some information for himself by looking at things on site,[2621] but very little of that is documented in his notes and those requests, if they were made at all, were not followed up by letters or emails.[2622] Mr Hoban ought to have asked for further information about the cladding at the full plans stage. His failure to do so represents a serious failing on the part of building control.[2623]

[2612] Hoban {Day45/161:5-12}.
[2613] Menzies, Building Control {BMER0000004/14} paragraph 62.
[2614] Allen {Day47/168:1-22}.
[2615] Menzies {Day60/33:4-7}; {Day60/34:2}-{Day60/35:2}.
[2616] {RBK00044876/69}.
[2617] Allen {Day47/48:7}-{Day47/49:25}.
[2618] Menzies {Day60/126:9}-{Day60/127:15}; Menzies, Building Control {BMER0000004/9} paragraph 37; Menzies, Building Control {BMER0000004/98-99} paragraph 317.
[2619] Hoban {Day45/96:10-22}.
[2620] {RBK00044876/69}.
[2621] Hoban {Day45/167:6-28}; {Day46/30:17}-{Day46/31:23}; {Day46/70:4-9}.
[2622] Hoban {Day45/32:2-5}.
[2623] Menzies, Building Control {BMER0000004/9} paragraph 39; Menzies, Building Control {BMER0000004/96} paragraph 303.

62.18 Mr Hoban made his first visit to the site on 29 August 2014.[2624] He discussed the works with Simon O'Connor, Rydon's Project Manager, but did not discuss the overcladding in any detail and was not told that there was an outstanding planning application to change the rainscreen from zinc to ACM.[2625] Mr Crawford said that he had met Mr Hoban on site during the week of 25 August 2014 and had given him some drawings to take away,[2626] but Mr Hoban did not recall any such meeting and said that he would not normally take drawings away from a site.[2627] Mr O'Connor thought that Mr Crawford might have been at the initial meeting but did not remember Mr Hoban taking away any drawings.[2628] The contemporaneous evidence does not refer to Mr Hoban meeting Mr Crawford on site at that time or to his taking drawings away.[2629] On the basis of that evidence and the evidence of others, we think it likely that Mr Crawford's recollection that Mr Hoban took drawings away with him is mistaken.

62.19 Studio E did not submit any drawings to building control until 24 September 2014 when Mr Crawford sent a zip file attached to an email.[2630] The contents of the zip file did not reflect the drawings listed in the covering email[2631] but Mr Hoban did not question that at the time.[2632] Some of the drawings were older revisions or otherwise out of date; for example, they showed zinc rainscreen despite the fact that ACM had been in contemplation for many months and that the final colour and finish had been selected in July 2014, subject to planning approval.[2633] The drawings did not show the type of cladding panel or insulation being proposed.[2634]

62.20 Mr Hoban was aware that insufficient information about the cladding had been provided and was waiting for more to be sent to him.[2635] He could not recall whether he had directly asked anyone about the nature of the insulation,[2636] although he said that he had asked for more details "on the job".[2637] He said that he had repeatedly asked for information and had discovered some for himself by talking with the contractor and seeing what was being done on site.[2638] However, there is no record of his asking for more information, so if he did make any such request, he probably did so in the course of an informal conversation with someone from Rydon or Studio E on site. In any event, although no further details of the cladding were formally submitted, drawings sent to building control for other purposes in November 2014 and March 2015 showed ACM rainscreen panels on the facade.[2639] Mr Hoban could not remember whether those drawings had alerted him to the change from zinc to ACM.[2640]

[2624] {RBK00052478/8}; Hoban {Day45/142:4}.
[2625] {SEA00000189}; Hoban {Day45/144:21}-{Day45/147:13}.
[2626] Crawford {SEA00014275/65} page 65, paragraph 206; Crawford {Day11/137:12}-{Day11/139:1}.
[2627] Hoban {Day45/145:14-16}; {Day45/148:1-21}; {Day45/153:10-24}.
[2628] O'Connor {Day26/217:11-18}.
[2629] {SEA00000189}.
[2630] {RYD00018742}.
[2631] Menzies, Building Control {BMER0000004/88} paragraph 277-281.
[2632] Hoban {Day45/164:9}-{Day45/165:1}.
[2633] {RYD00018750}.
[2634] {RYD00018750}.
[2635] Hoban {Day45/166:8-21}.
[2636] Hoban {Day45/166:8-21}.
[2637] Hoban {Day45/167:11-18}.
[2638] Hoban {Day45/173:10-17}.
[2639] {RYD00024038}; {SEA00000225}; {SEA00000252}; {HAR00003955}.
[2640] Hoban {Day46/7:11-13}.

62.21 On 25 September 2014 RBKC planning officers approved the use of Reynobond smoke silver cassette-fixed ACM panels but Studio E did not inform building control of that at the time and, as we have noted, the drawings submitted to building control continued to refer to zinc panels.[2641]

62.22 On 29 September 2014 Studio E provided building control with a copy of Issue 3 of Exova's Outline Fire Safety Strategy.[2642] Mr Hoban could not remember whether he had read it at the time[2643] and when it was shown to him in the course of his evidence he could not remember whether he had seen it before.[2644] However, he had read Issue 2 when that had been sent to him and he was aware of what Exova had said in it about functional requirement B4.[2645] Mr Hoban did not ask Exova (or anybody else for that matter) whether a further report had been or would be provided to complete the advice on functional requirement B4 and he conceded that he might not have gone back to the file and done everything necessary.[2646] His failure to do so was another serious omission.

62.23 The same day, 29 September 2014, Mr Hoban also asked Mr Hanson for his comments.[2647] It is not clear whether he gave Mr Hanson a copy of Issue 3 of the Outline Fire Safety Strategy, which he received shortly afterwards, although he thought he had probably given him a hard copy.[2648] (Mr Hanson had already been given a copy of Issue 2 by Studio E in October 2013.[2649]) Mr Hanson responded to Mr Hoban on 10 November 2014 saying that building control was not in a position to approve the proposals due to a lack of information about the extraction rate of the smoke ventilation system.[2650] Notwithstanding the absence of that information, on 11 November 2014, Mr Hoban submitted a formal request to the LFB for their comments on matters affecting functional requirements B1 and B5.[2651] He did not ask for its comments on functional requirement B4. The LFB would not normally comment on requirement B4 unless it had been specifically asked to do so.[2652]

62.24 On 18 November 2014 Mr Hoban told Neil Crawford that a formal decision notice on the full plans application would be forwarded shortly.[2653] At that point a response from the fire authority was still outstanding. Mr Hoban said that he had completed the standard form decision notice[2654] with a schedule of conditions but no copy was available and there is no record of the conditions. Mr Hoban said that he had put it out for the business support group to process, but there is no evidence that a notice was actually sent out[2655] and Mr Hoban did not check whether it had been.[2656]

62.25 There is no written record of the review of the full plans application that led Mr Hoban to issue the decision notice. He said that he had prepared a memorandum in relation to functional requirements B2, B3 and B4[2657] but no copy of any such document was made

[2641] {IBI00001802}; Hoban {Day45/197:20}-{Day45/198:4}.
[2642] {SEA00000215}.
[2643] Hoban {Day45/167:19}-{Day45/168:12}.
[2644] Hoban {Day45/168:20}-{Day45/168:6}.
[2645] Hoban {Day45/169:2}-{Day45/170:25}.
[2646] Hoban {Day45/169:2}-{Day45/170:25}.
[2647] {RBK00048693}.
[2648] Hoban {Day45/174:21}-{Day45/175:7}.
[2649] {RBK00027290}.
[2650] {RBK00033895/3}.
[2651] {RBK00033896}. For further detail on the process for consulting the LFB, see Menzies, Building Control {BMER0000004/139-140} paragraphs 461-467.
[2652] Menzies, Building Control {BMER0000004/139-140} paragraph 466; FSIGN 501 {LFB00054550/10-12}.
[2653] {RBK00002974}.
[2654] A blank copy of the standard form can be found at {RBK00052487}.
[2655] Hoban {RBK00050416/4}, page 4 paragraphs 12-14. A copy of a blank pro forma can be seen at {RBK00052487}.
[2656] Hoban {Day45/194:3-14}.
[2657] Hoban {Day45/185:17}-{Day45/186:9}.

available to us. When asked how he had concluded that the proposals were likely to comply with the Building Regulations, Mr Hoban said that there would have been conditions[2658] and when asked how he was able to issue a decision notice when Mr Hanson had said in his comments on functional requirement B1 that building control could not approve the proposals, he again said that it would be subject to conditions.[2659] Mr Hoban apparently felt able to approve the full plans application, even though it did not contain any details of the proposed insulation or rainscreen panels, because he had included a condition that the facade as a whole should comply with section 12 of Approved Document B.[2660] However, he did not have a specific recollection of the conditions he had attached to the decision notice and did not know whether he had recorded them elsewhere.[2661] We have not seen any documents or correspondence referring to specific conditions of any kind. Mr Allen said that he would expect any conditions applied to a full plans approval to be recorded in writing and kept on the file.[2662] In our view the failure to keep a formal record of a matter of that kind was a very serious omission.

62.26 On 12 December 2014, the LFB sent building control an email attaching a response to the consultation,[2663] but neither building control nor the LFB has been able to find the response itself.[2664] On 5 February 2016, following revisions to the smoke control proposals, building control consulted the LFB again[2665] and on 4 March 2016 the LFB expressed itself satisfied with the proposals.[2666]

62.27 Mr Hoban approved the full plans application despite Mr Hanson's advice that there was insufficient information in relation to functional requirement B1 to enable that to be done. He also consulted the fire authority without sufficient information[2667] and did not wait for a response before making his decision.[2668] In addition, he failed to carry out a methodical review of the documents submitted to him and failed to notice obvious errors and inconsistencies in the drawings. He either did not read version 3 of Exova's Outline Fire Safety Strategy[2669] or failed to appreciate that on its own terms it was incomplete in an important respect. The only evidence we have seen of a structured review of the full plans application is the memorandum prepared by Mr Hanson on Requirement B1.[2670] We accept that Mr Hoban probably made some notes on the application, but, bearing in mind the evidence we heard about his working practices at the time, we think it unlikely that he made any detailed notes of his assessment of functional requirements B2, B3 or B4. RBKC's own proforma for full plans applications, the P60 form, was basic and did not assist officers in carrying out a thorough review of a full plans application or recording their decisions.[2671] We do not know what, if any, conditions Mr Hoban attached to his approval of the full plans, but if, as he suggested, they included a condition that the cladding comply with

[2658] Hoban {Day45/187:3-8}.
[2659] Hoban {Day45/187:19-25}.
[2660] Hoban {Day45/188:2}-{Day45/190:25}.
[2661] Hoban {Day45/192:13-20}; {Day45/193:8-20}.
[2662] Allen {Day47/51:4}-{Day47/52:12}.
[2663] {RBK00033896}.
[2664] {LFB00000300}.
[2665] {RBK00033897}.
[2666] {LFB00000291}; {LFB00000292}; {SEA00014148}; {SEA00014149}.
[2667] Menzies {Day60/191:4-10}.
[2668] Mr Hoban informed Mr Crawford that a decision notice would be issued on 18 November 2014 {RBK00002974}, five days after he submitted the consultation request to the LFB {RBK00033896}.
[2669] Hoban {Day45/167:19}-{Day45/168:12}.
[2670] {RBK00033895/3}.
[2671] Menzies, Building Control {BMER0000004/65}.

section 12 of Approved Document B, that would not have been sufficient to enable him to issue a completion certificate in due course. It ought to have required Studio E to provide sufficient evidence that functional requirements B2, B3 and B4 had been met.[2672]

62.28 Other formal aspects of the application were also handled poorly. RBKC failed to issue a formal decision notice, which it accepted was a failing on its part.[2673] Mr Hoban accepted that he ought to have ensured that the decision notice he had prepared had been sent out, but he failed to do so.[2674] All in all, RBKC's approach to the full plans application shows a consistent lack of care and disregard for the procedural requirements of the Building Regulations. RBKC accepted that it bore some responsibility for the failure of the applicant to provide sufficient information in a structured and easily accessible format,[2675] but its failings at full plans stage were far more extensive than that. Mr Hoban failed to ask for basic information about the cladding, did not carry out a proper review of the information he was provided with and gave a conditional approval in circumstances where he ought to have rejected the application altogether. Mr Hoban's willingness to accommodate Studio E led him to disregard the primary function of building control, with the result that a critical opportunity to scrutinise the design of the cladding was missed.

Building control's knowledge of the construction of the external wall

Rainscreen

62.29 There is no correspondence or documentation of any kind passing between building control and any of those engaged on the refurbishment which touches on the question whether the proposed composition of the external wall complied with the Building Regulations. Moreover, no comprehensive package of up-to-date drawings and information was ever provided to building control.[2676] However, Mr Hoban knew that ACM was being used because the contractor had told him so at some stage and he had seen the materials once they had arrived on site.[2677] He could not say with certainty that he had noticed that ACM had been indicated on the drawings sent to him in November 2014[2678] or March 2015,[2679] but he thought that he had become aware that ACM panels were being used in around 2015 when he met Ben Bailey on site.[2680] He was not surprised when he saw ACM being installed instead of zinc as, in his words, "things change".[2681]

62.30 Mr Hoban said that after seeing ACM panels being installed on the building he had looked at the BBA certificate to see whether Reynobond ACM was Class 0,[2682] although he said that he had probably looked only at the first page, from which he had understood that it was.[2683] He had not mentioned that fact in any of his witness statements, however, and we think that if he had had a genuine recollection of checking the BBA certificate he would have said something about it. As a result we feel bound to treat his sudden recollection in the witness box as unreliable.

[2672] Menzies {Day60/139:2}-{Day60/140:24}.
[2673] RBKC Module 1 Opening Submissions {RBK00055479/27} paragraph 100.
[2674] Hoban {Day45/194:10-13}.
[2675] RBKC Module 1 Opening Submissions {RBK00055479/27} paragraph 99.
[2676] Menzies {BMER0000004/96} paragraph 303; Hoban {Day45/173:4-9}.
[2677] Hoban {Day45/167:2-5}.
[2678] Hoban {Day46/3:18}-{Day46/4:10}.
[2679] Hoban {Day46/7:6-13}.
[2680] Hoban {Day45/197:2-15}; {Day45/200:24}-{Day45/201:24}.
[2681] Hoban {Day45/201:10-16}.
[2682] Hoban {Day45/205:1-7}.
[2683] Hoban {Day46/18:12-25}; {Day46/23:14-17}; {Day46/23:11-17}.

62.31 Mr Hoban was not aware of the advice in Approved Document B that test evidence should be checked carefully[2684] and at the time had not been aware of the way in which the polyethylene core of an ACM panel would react to fire.[2685] He did not consider himself to be qualified to interpret test evidence and said that he would have needed the assistance of a fire engineer to do that.[2686] Mr Allen did not consider that to be a specialist area, however, and considered that scrutinising manufacturers' information was a core function of a building control officer. He did not train his officers in how to go about it because he expected them to be able to do it already.[2687] Although Mr Anon, deputy Building Control Manager at RBKC, said that building control officers do not have the technical expertise to challenge a product's certification,[2688] Ms Menzies agreed with Mr Allen.[2689] Given the nature of their role, we are satisfied that building control officers can be expected to examine certificates of that kind to ascertain whether materials are suitable for the use for which they are intended.

62.32 In view of its importance in enabling the fire to spread around the tower, it is worth noting that Mr Hoban paid little, if any, attention to the crown during his review of the drawings or his visits to the site. He was aware that it was composed of ACM panels[2690] and ought to have asked for more information about it. He should have given some thought to the risk that it might provide a means whereby fire could spread from one part of the building to another, but he failed to do so.[2691]

Insulation

62.33 Mr Hoban's evidence about his knowledge of the use of Celotex RS5000 in the external wall system and of its characteristics was not easy to follow. In his witness statements he did not specifically mention Celotex RS5000, although he did mention "Celotex insulation".[2692] He said that he had become aware that Celotex was to be used when he saw it on site, although he thought he might have been told about it before that.[2693] He said in his statements that he had looked for information about the insulation on the Celotex website[2694] and that what he had found there told him that it was fit for purpose.[2695] When he was asked about that, however, he was unable to recall any details of his research. He could not recall which product he had looked at on the Celotex website[2696] but he said he would have noted the particular brand of product in his notebook when he was on site.[2697] He told us that he had also looked up Celotex RS5000 on the LABC website,[2698] but he had not mentioned that in either of his witness statements. He could not say whether he had seen the LABC certificate, either on the Celotex website or that of

[2684] ADB Appendix A, note 2 {CLG00000224/119}. "Any test evidence used to substantiate the fire resistance rating of a construction should be carefully checked to ensure that it demonstrates compliance that is adequate and applicable to the intended use. Small differences in detail (such as fixing method, joints, dimensions and the introduction of insulation materials etc.) may significantly affect the rating." Hoban {Day46/25:14}-{Day46/26:1}.
[2685] Hoban {Day46/21:1-14}.
[2686] Hoban {Day46/77:9-22}.
[2687] Allen {Day47/77:4-25}.
[2688] Anon {RBK00029897/8} page 8, paragraph 36.
[2689] Menzies {Day60/98:1}-{Day60/100:6}.
[2690] Hoban {Day46/138:11-14}.
[2691] Menzies Building Control {BMER0000004/123} paragraph 405; Menzies {Day60/165:18}-{Day60/168:11}.
[2692] Hoban {RBK00050416/16} page 16, paragraph 43.
[2693] Hoban {Day46/30:17-24}.
[2694] Hoban {RBK00033934/8} page 8, paragraph 67; Hoban {RBK00050416/16} page 16, paragraph 43(a).
[2695] Hoban {RBK00050416/17} paragraph 43(c).
[2696] Hoban {Day46/32:18-23}.
[2697] Hoban {Day46/33:2-10}.
[2698] Hoban {Day45/39:14-15}.

LABC itself.[2699] He could not identify the document or text he had seen online, although he said that it might have contained statements similar to those in the LABC registered details and drawing document list for RS5000.[2700] That document said that Celotex RS5000 was suitable for use in rainscreen wall construction on buildings above 18 metres in height, had been successfully tested to BS 8414:2 2005, met the criteria set out in BR 135, and achieved a "Class 0" spread of flame rating.[2701] Mr Hoban could not say whether he had had any discussions about the insulation with Rydon, Studio E or Harley before looking it up on line[2702] and he could not remember whether he had asked any of them for evidence that the insulation was appropriate for use in the cladding system.[2703] However, he said he had felt confident that they knew what they were doing.[2704]

62.34 Mr Hoban said that he had been aware at the time that in other contexts manufacturers and others would misuse common expressions such as "fire retardant"[2705] and that he had been aware of the need to check that any test relied upon by a manufacturer to demonstrate a product's suitability matched the intended use of the product.[2706] He agreed that he had accepted at face value the statement that Celotex RS5000 had passed a BS 8414 test[2707] and that he had not been entitled to assume that the design and construction team had checked the suitability of the cladding materials for themselves.[2708]

62.35 Mr Hoban's evidence taken in the round has left us in some doubt about exactly what he did to identify the insulation or to satisfy himself that it complied with the Building Regulations. First, and most importantly, he failed to identify the fact that it was not of limited combustibility. It is not clear what information about Celotex he looked at online, but whatever it was, he did not examine it carefully. Instead, he simply accepted the assertion that RS5000 was suitable for use on tall buildings.[2709] Critically, he failed to investigate whether the design of the cladding system proposed for Grenfell Tower was the same as that which had been tested in the BS 8414 test to which the product literature referred and did not ask Studio E to obtain test reports to justify its use. He accepted that that had been a serious failing on his part.[2710]

62.36 Mr Hoban did not become aware that Kingspan insulation was being used and no one from Rydon, Harley or Studio E told him that it had been substituted for Celotex RS5000 on occasions.[2711] Mr Hoban said that if he had known that he would have looked at the BBA certificate relating to it.[2712]

Infill panels

62.37 Mr Hoban had not been aware that the P1 window infill panels contained Styrofoam[2713] and did not know one way or another whether they complied with the guidance in paragraph 12.7 of Approved Document B, although he agreed that Styrofoam was not a

[2699] Hoban {Day46/33:23}-{Day46/34:3}; {Day46/34:12-23}; {Day46/35:5-20}; {Day46/39:5-22}.
[2700] {CEL00000009}; Hoban {Day46/35:6}-{Day46/36:20}.
[2701] {CEL00000009}.
[2702] Hoban {Day46/31:14-17}.
[2703] Hoban {Day46/31:18-23}.
[2704] Hoban {Day46/32:9-12}.
[2705] Hoban {Day46/52:14}-{Day46/54:6}.
[2706] Hoban {Day45/56:21}-{Day45/57:3}.
[2707] Hoban {Day46/58:3-8}.
[2708] Hoban {Day46/59:10-13}.
[2709] Hoban {Day46/45:4-15}.
[2710] Hoban {Day46/45:11-16}.
[2711] Hoban {Day46/167:7-9}.
[2712] Hoban {Day46/168:10-17}.
[2713] Hoban {Day46/26:3-20}.

material of limited combustibility.[2714] However, in March 2015 he had been provided with a copy of the Harley Specification which showed that the P1 panels contained Styrofoam.[2715] When asked why he did not notice that at the time, he said that he thought that he had not read the document properly[2716] and had relied on the fact that Exova had been working on the project.[2717] He also had not checked whether the Kingspan TP10 insulation in the P2 window infill panels was of limited combustibility.[2718] Mr Hoban accepted that he ought to have questioned the use of those materials.[2719] During his site visits he ought also to have noticed that gaps around the windows were being packed with insulation and should have checked whether the material being used was of limited combustibility.

Cavity barriers

62.38 The full plans application did not include a cavity barrier strategy and the drawings supplied with it did not show any cavity barriers.[2720] Mr Hoban said that he would have expected them to be shown on the drawings and that he believed he had chased the contractor for information about them.[2721] Studio E sent drawings showing cavity barriers to building control on 6 March 2015.[2722] They showed cavity barriers in line with compartment walls and floors but not around the windows.[2723] Mr Hoban said that he had understood that the framework supporting the window (which he had thought was steel) would act as a cavity barrier[2724] but when he gave evidence he could not recall why he had thought that.[2725] It is not clear to us how he could have come to such an understanding, as there is no indication in the drawings that the framework was steel[2726] and Mr Lamb's evidence was that the use of steel had not been part of the design.[2727] We are sceptical of his explanation and think it likely that it was an afterthought on his part to explain his failure to notice the omission. At all events, Mr Hoban did not check the windows on site to see whether cavity barriers had been installed around them[2728] because the work that he had seen had, in his view, been of an adequate standard. He accepted, however, that he should have done so.[2729]

Site visits

62.39 Mr Hoban told us that he had tried to visit the site once a month while the refurbishment was being carried out,[2730] but he visited it much less often than that during the period when the cladding was being installed because the pressure of work had increased and he trusted the professionals working on the project.[2731] He did not visit the site between 15 May 2015 and 17 August 2015.[2732] In our view he should have visited more often during that period. The primary means of checking compliance with the Building Regulations is by

[2714] Hoban {Day46/28:12-20}.
[2715] {SEA00000252}; {HAR00003955}.
[2716] Hoban {Day46/26:22-23}.
[2717] Hoban {Day46/27:16-21}.
[2718] Hoban {Day46/29:3-9}.
[2719] Hoban {Day46/29:10-18}.
[2720] Hoban {Day46/91:21-24}
[2721] Hoban {Day46/92:2-12}.
[2722] {RYD00034134}; drawings attached to the email included {RYD00034136}; {RYD00034135}; {RYD00034137}.
[2723] {SEA00002499}.
[2724] Hoban {Day 46/95:6-14}.
[2725] Hoban {Day46/95:15}-{Day46/96:15}.
[2726] Hoban {Day46/102:2-9}].
[2727] Lamb {Day38/146:2-15}.
[2728] Hoban {Day46/98:4-22}.
[2729] Hoban {Day46/99:9}-{Day46/100:8}.
[2730] Hoban {RBK00050416/19} page 19, paragraph 48.
[2731] Hoban {Day46/164:16}-{Day46/166:21}; Hoban {RBK00033934/9} page 9, paragraph 84.
[2732] See site visit records {RBK00052478/4}.

visiting the site and looking at the work.[2733] That calls for careful and detailed inspection. It is clear from Mr Hoban's evidence that even when he did visit the site he did not check the installation of the cladding thoroughly and missed important defects, such as poorly installed cavity barriers.[2734]

Regulation 38

62.40 Regulation 38 of the Building Regulations requires the person carrying out the works to pass fire safety information to the Responsible Person for the purposes of the Fire Safety Order.[2735] Under regulation 17 of the Building Regulations, if the Fire Safety Order applies to a building on completion of the work (as in the case of Grenfell Tower), the local authority has a duty to issue a completion certificate confirming that the requirements of regulation 38 have been satisfied if, after taking all reasonable steps to do so, it has been able to ascertain that that is the case.

62.41 The fourth edition of the Building Regulations Procedural Guidance, which was in force until March 2015, advised that a copy of the information provided under regulation 38 should be sent to the local authority.[2736] The fifth edition, in force from March 2015 to July 2020, does not contain that guidance,[2737] but both the fourth and fifth editions advise that local authorities should not issue completion certificates unless they have received written confirmation from the applicant that the information required by regulation 38 has been provided to the Responsible Person.[2738]

62.42 Mr Hoban was aware of the requirements of regulation 38 of the Building Regulations.[2739] The practice at RBKC building control at the time of the Grenfell refurbishment was simply for officers informally to ask contractors whether they had provided the necessary information to building owners.[2740] Mr Allen said that they did not take independent steps to satisfy themselves that that had been done[2741] and that his personal practice was just to check with the client if someone happened to be on site towards the end of a project.[2742] Not surprisingly, Mr Hoban adopted the same practice. He believed that he had asked David Hughes whether Rydon had sent the information to the TMO, but he did not record either the question or the answer in writing.[2743]

62.43 The practice adopted by RBKC did not in our view amount to taking all reasonable steps to ascertain whether regulation 38 had been satisfied and did not follow the procedural guidance in force at the time. It appears that a similar practice may have been followed by other local authority building control departments. If so, it suggests a widespread failure by building control bodies to comply with the regulations. Ms Menzies accepted in hindsight that the practice was not appropriate and we agree. It does not excuse the casual approach demonstrated by RBKC building control in this case.

[2733] Menzies, Building Control {BMER0000004/61} paragraph 249.
[2734] Hoban {Day46/127:6-12}; {Day46/130:21-25}.
[2735] See Chapter 48.
[2736] Lane, Phase 2, Fire Safety Information Report {BLARP20000021/88} paragraph 12.4.2.
[2737] Lane, Phase 2, Fire Safety Information Report {BLARP20000021/92} paragraph 12.5.7.
[2738] Lane, Phase 2, Fire Safety Information Report {BLARP20000021/89} paragraph 12.4.4; Lane, Phase 2, Fire Safety Information Report {BLARP20000021/128} paragraph 14.7.3.
[2739] Hoban {Day46/197:18-23}.
[2740] Hoban {Day46/199:23}-{Day46/200:16}; Allen {Day47/188:3}-{Day47/189:20}.
[2741] Allen {Day47/189:11-16}.
[2742] Allen {Day47/190:6-9}.
[2743] Hoban {Day46/200:18-24} {Day46/201:23}.

Completion certificate

62.44 Mr Hoban caused a completion certificate for the Grenfell refurbishment to be issued in the name of Mr Allen on 7 July 2016.[2744] He agreed that, given that the external wall did not comply with functional requirement B4 of the Building Regulations, he should not have done so.[2745] We accept that when he caused the certificate to be issued Mr Hoban thought that the functional requirements of the Building Regulations had been satisfied,[2746] but his failure to scrutinise the design and execution of the work with sufficient rigour meant that his confidence was entirely misplaced. In its statements to the Inquiry RBKC has rightly accepted that a completion certificate should not have been issued.[2747]

General observations

62.45 The two most serious errors made by Mr Hoban were, first, the failure to recognise that the presence of unmodified polyethylene cores rendered the ACM panels highly combustible, and second, the failure to recognise that the insulation, which was visible on the tower during his site visits,[2748] was not of limited combustibility. For reasons we have explained elsewhere, neither of the insulation products should have been used in the overcladding of Grenfell Tower. In his statements Mr Hoban seems to suggest that the contractor might have used materials other than those that had been specified, but when he gave evidence he made it clear that he knew at the time that ACM was being used.

62.46 At the time of the refurbishment Mr Hoban was a senior building control surveyor and had worked at RBKC as a building control officer for over 25 years. However, part of the reason for those major errors was that he did not possess the knowledge and experience to be expected of a building control officer dealing with a project of that kind. In particular, there were some significant gaps in his understanding of the Building Regulations and important industry guidance so far as they concerned fire safety. He was an associate member of the Chartered Association of Building Engineers but understood that his grade of membership did not require him to engage in any regular professional training[2749] and to a large extent it was left to him to decide what additional training he required. He attended conferences from time to time and read professional magazines,[2750] but the only formal training he received was that which was provided by the department.

62.47 The building control department organised lunchtime seminars between four and six times a year[2751] (although no lunchtime seminars were held in 2016).[2752] They were generally delivered by the department's managers and were directed to specific topics relating to building control, such as the publication of a new edition of an Approved Document.[2753] Training was provided on the new Approved Document B following its publication in 2010. On occasions, manufacturers or other industry professionals, such as architects or

[2744] {RBK00018811}.
[2745] Hoban {Day46/204:7-14}.
[2746] Hoban {Day46/204:12-14}.
[2747] RBKC Module 1 Opening Submissions {RBK00055479/27} paragraph 105.
[2748] Hoban {Day46/167:21}-{Day46/168:17}.
[2749] Hoban {Day45/13:23}-{Day45/14:7}.
[2750] Hoban {Day45/14:3-24}, {Day45/23:16-23}.
[2751] Allen {Day47/74:12-18}.
[2752] {RBK00051200}.
[2753] Hoban {Day45/17:18-21}; {Day45/20:2-25}.

surveyors, were invited to deliver lunchtime seminars,[2754] but Mr Hoban had not attended any seminars dealing with the overcladding of high-rise residential buildings.[2755] Nor was he given any specific training on any other industry guidance.[2756]

62.48 The Grenfell Tower refurbishment was Mr Hoban's first residential high-rise overcladding project and, apart from the KALC project, for which he also assumed responsibility, his first design and build project. Surprisingly, Mr Allen was not aware of either fact,[2757] although we think he should have been.

62.49 Mr Hoban had a very limited grasp of industry guidance on rainscreen cladding, such as BR 135, which he had not read,[2758] and was not aware of BCA Technical Guidance Note 18.[2759] He should have been. His understanding of the BS 8414 tests and how they could be used to demonstrate compliance with functional requirement B4 was limited.[2760] None of the gaps in Mr Hoban's knowledge appear to have come to the attention of his managers and Mr Hoban himself does not appear to have taken any steps to develop his knowledge in those areas as part of his work on the refurbishment. He was aware, however, that cladding could provide a means of fire spread and that there was a need to fit cavity barriers;[2761] and he was aware that cladding fires had occurred, both in this country and abroad, having seen references to them in the media.[2762] He was not aware of the warnings to be found in industry guidance that some materials used in facades could generate molten or flaming debris and thereby contribute to the spread of fire[2763] and did not seem to have a firm grasp on whether materials such as PIR insulation were of limited combustibility. Again, he should have been aware of those matters.

62.50 Mr Hoban was aware that manufacturers tend to present fire test data in misleading ways, but he did not regard himself as competent to examine test data for himself. He thought that was the responsibility of a fire engineer. Mr Allen and Ms Menzies both took a different view. We agree with them that a building control officer should be capable of examining manufacturers' information and test data critically and we do not understand why Mr Hoban thought otherwise. If he did not know how to read manufacturers' information or how to evaluate test data, he ought to have asked someone within the department for assistance.

62.51 Mr Hoban's opinion that the materials proposed for the refurbishment were suitable for their purpose appears to have been based at least in part on the fact that none of the other experienced professionals working on the project ever suggested that they might not comply with the Building Regulations.[2764] He trusted Studio E and Exova because he had worked with them on the KALC project and was reassured by the fact that Mr Ashton was involved in the refurbishment.[2765] In his written evidence Mr Hoban said that at an initial meeting on site in November 2014 he had been told by representatives of Max Fordham, Exova and Siderise[2766] that the cladding would comply with the standards

[2754] Hoban {Day45/30:1-10}.
[2755] Hoban {Day45/27:13-15}.
[2756] Hoban {Day45/21:4-17}.
[2757] Hoban {Day45/183:20-24}; Allen {Day47/133:18}-{Day47/114:7}.
[2758] Hoban {Day45/52:12}-{Day45/53:15}; {Day45/59:15-22}; Menzies, Building Control{BMER0000004/97} paragraph 310; Menzies {Day60/81:7}-{Day60/83:4}.
[2759] Hoban {Day45/66:1-6}; {Day45/67:6-12}; Menzies {Day60/80:20}-{Day60/81:1}.
[2760] Hoban {Day45/37:21}-{Day45/40:17}; {Day45/68:6-22}; Menzies {Day60/103:21-23; {Day60/104:5-23}.
[2761] Hoban {Day45/54:21}-{Day45/59:5}; {Day45/61:15-16}.
[2762] Hoban {Day45/91:9}-{Day45/96:15}.
[2763] {BRE00005554/18}; Hoban {Day45/59:4-13}; {CEL00003364/11}; Hoban {Day45/60:4-16}; {Day45/64:7-23}.
[2764] Hoban {RBK00050416/10} page 10, paragraph 34(a).
[2765] Hoban {Day45/202:6}-{Day46/204:10}.
[2766] Hoban {RBK00050416/17} page 17, paragraph 44.

set out in Approved Document B.[2767] However, no one representing Siderise was present at that meeting, which the minutes suggest concerned the smoke control system,[2768] and Mr Ashton categorically denied having said anything of the kind.[2769] There is no record of any such assurance in Mr Hoban's notes of the meeting and Mr Crawford could not recall a meeting where the compliance of the cladding system with Approved Document B had been discussed with him.[2770] Mr Hoban was very confident in his recollection and it is possible that in the course of a casual conversation someone said that the cladding would comply with Approved Document B, but whatever was said, we do not accept that Mr Hoban was justified in relying on it to the extent of allowing important matters on a substantial project of this kind to go unchecked.

62.52 Mr Hoban also relied on statements made to him by others that the same cladding system had been used elsewhere on buildings over 18 metres in height. He told us that he had discussed the cladding system with a person whom he described as "Harley's engineer" and had been told that it had been installed on many buildings of a similar height and construction throughout England and Wales.[2771] Mr Hoban said that the person he had spoken to was probably Ben Bailey,[2772] who had been introduced to him as an engineer by Simon O'Connor, Rydon's project manager.[2773] Mr Hoban did not accept that that had led him to be complacent about compliance, but he did accept that it gave him confidence that the system was not new and had been used elsewhere.[2774] Ben Bailey could not recall having had any conversations with Mr Hoban about the cladding system[2775] and doubted that he had told him that the cladding would comply with Approved Document B.[2776]

62.53 ACM rainscreen panels and PIR insulation had been used in the overcladding of other buildings over 18 metres in height and others involved in the project also felt reassured by that.[2777] We think it quite likely that someone from Harley, possibly Ben Bailey, did tell Mr Hoban that similar materials had been used on other buildings and that that contributed to his understanding that they complied with the Building Regulations. We think he assumed that the other professionals involved in the project had satisfied themselves that the materials proposed for use in the cladding complied with Approved Document B and that he allowed himself to be lulled into a false sense of security.

62.54 Although Mr Hoban must bear primary responsibility for the failure of RBKC's building control department to deal properly with the refurbishment project, his ability to carry out his task effectively was hampered by an excessive workload and poor management of the department as a whole. He told us that he had been very busy at the time of the refurbishment[2778] and candidly accepted that that had affected his work. That had led him to give priority to other work, particularly in 2015 and 2016.[2779]

[2767] Hoban {RBK00033934/8} page 8, paragraph 67; Hoban {RBK00050416/18} page 18, paragraph 44(c).
[2768] {MAX00004666}; {RBK00052478/5}.
[2769] Ashton {Day17/121:12}.
[2770] Crawford {Day11/186:4-8}.
[2771] Hoban {RBK00050416/11} page 11, paragraph 34(d); Hoban {RBK00033934/7} page 7, paragraph 66; Hoban {Day46/72:20-25}.
[2772] Hoban {Day46/71:20-24}.
[2773] Hoban {Day46/72:2-14}.
[2774] Hoban {Day46/76:17-22}.
[2775] Ben Bailey {Day40/23:20}-{Day40/24:9}.
[2776] Ben Bailey {Day40/20:19-22}.
[2777] Crawford {Day10/148:8-19}; Rek {Day12/73:19}-{Day12/75:9}; Osgood {Day30/118:16-20}; Harris {Day34/53:2-12}; Sakula {Day125/110:3}-{Day125/111:7}.
[2778] Hoban {Day46/156:4}-{Day46/157:2}; {Day46/157:20}-{Day46/158:2}.
[2779] Hoban {Day46/164:22}-{Day46/166:12}.

62.55 The restructuring of RBKC's building control department in 2013 involved a substantial reduction in numbers.[2780] Both Mr Hoban and Mr Hanson said that at times after the restructuring they had experienced heavy workloads.[2781] John Allen said that with a small team there would be rare occasions on which a lot of work would come in at the same time and he would have to manage that and plug gaps,[2782] but he did not accept that there had been a substantial increase in the amount of Mr Hoban's work after the restructuring.[2783] He also said that he had met his officers monthly to confirm that their workload was manageable and find out whether help was needed.[2784] Mr Allen could recall occasions on which he had offered Mr Hoban help and had reallocated some work to other officers.[2785] Mr Hoban said that he had asked for help in 2015 but his suggestions for lightening his load came at that time had come to nothing.[2786] After he had left the witness box Mr Allen disclosed to the Inquiry his notes of his meetings with Mr Hoban. They show that Mr Allen had been aware that Mr Hoban had been struggling to carry out site visits between May 2014 and October 2015[2787] and that in December 2015 Mr Hoban's records were not up to date.[2788]

62.56 There is some suggestion in the documents that in 2014 the building control department was overwhelmed with work.[2789] Mr Hoban told Neil Crawford that he was working on hundreds of projects, although Mr Crawford thought at the time that he might have been exaggerating.[2790] Mr Hoban told us, however, that at that time he had been coming in to work at weekends[2791] and although Mr Allen did not think that the department as a whole was overstretched,[2792] we think that Mr Hoban clearly was. At times during the period between 2014 and 2016 he was unable to manage his workload and the quality of his work suffered as a result. He did not feel able to ask for support from his manager and there was no one else to whom he could take his concerns.[2793] As a result, he gave priority to other projects, particularly in April 2015 when an additional area or "patch" was allocated to him.[2794] He said that, in hindsight, he wished that he had been given more time to deal with the Grenfell refurbishment.[2795] Mr Hoban was also dealing with difficulties in his personal life during the summer of 2016, which he accepted may have meant that he did not do things as he should have done.[2796]

[2780] Allen {Day47/99:14}-{Day47/100:4}; {Day47/101:17-22}; {Day47/102:19}-{Day47/103:6}, Hoban {Day45/107:1}-{Day45/109:16}.
[2781] Hoban {Day45/110:7}-{Day45/113:12}. Mr Hoban's appraisal for 2015-16 refers to Mr Hoban covering the work of other colleagues {RBK00048753/3} and {RBK00048753/7}. Mr Crawford gave evidence that Mr Hoban had told him that he was overseeing "hundreds of projects" but Mr Hoban did not recall saying that, although his recollection was that he had been overseeing between 120 and 130 projects. Crawford {Day11/131:18-25}; Hoban {Day45/111:14}-{Day45/112:2}.
[2782] {Day47/46:20}-{Day47/47:3}.
[2783] Allen {Day47/121:13}-{Day47/123:20}.
[2784] Allen {RBK00033930/3} page 3, paragraph 16; Mr Hoban agreed that he would meet Mr Allen monthly but said that his workload had not been discussed. Hoban {Day45/115:3-16}.
[2785] Allen {Day47/120:24}-{Day47/121:12}.
[2786] Hoban {Day46/157:20}-{Day46/158:2}.
[2787] {ALL00000003/3}-{ALL00000003/9}.
[2788] {ALL00000003/9}.
[2789] {RYD00004218}.
[2790] Crawford {Day11/131:18-24}.
[2791] Hoban {Day45/116:5-18}.
[2792] Allen {Day47/105:8-10}.
[2793] Hoban {Day46/158:22}; {Day46/159:12}-{Day46/160:3}; Allen {Day47/137:18}-{Day47/138:17}.
[2794] Hoban {Day46/156:4}-{Day46.157:2}.
[2795] Hoban {Day46/212:22}-{Day46/213:8}; {Day46/215:21}-{Day46/216:2}.
[2796] Hoban {Day45/170:18}-{Day45/171:6}.

62.57 There was also a failure by RBKC's building control department to ensure that officers within the department received the training they needed to do their work properly. A building control body should provide continuing professional development for its officers,[2797] as is reflected in the Building Control Performance Standards.[2798] As a member of the Royal Institute of Chartered Surveyors, Mr Allen was required to undertake regular training, and in the years 2013 to 2017 he had exceeded the minimum hours required of him. He took responsibility for providing technical training to his officers on matters to do with the Building Regulations,[2799] but did not organise training on Approved Document B generally or on the fire safety risks posed by cladding systems on high-rise buildings. Similarly, there does not appear to have been any system for ensuring that officers had the knowledge and understanding to examine manufacturers' information critically, nor were they told that it was important to read certificates, such as BBA certificates, critically and in their entirety. Mr Allen expected his officers to possess those skills already.[2800] We do not think that building control officers would normally expect to receive formal training on examining product literature, but that they would normally acquire that skill through their work and from discussions with others.[2801]

62.58 On 31 December 2013, Paul Hanson sent Mr Allen a copy of a guide published by the British Standards Institution (BSI) entitled "Don't be a flaming liability".[2802] The covering email drew attention to confusion within the construction industry about the meaning of Class 0 and the tendency of manufacturers to make misleading statements about the fire performance of their products. The guide itself drew attention to the fact that manufacturers often wrongly refer to Class 0 as meaning "fireproof". Mr Allen was aware of confusion in the industry about the meaning of Class 0.[2803] Mr Hoban could not recall whether he had been aware of it[2804] but he had been aware of manufacturers' propensity to use misleading terms more generally.[2805]

62.59 In October 2015, Jose Anon (John Allen's deputy at the time) attended the London District Surveyors' general meeting where those present discussed a building in Southwark over 18 metres in height on which PIR insulation had been installed. They were told that Kingspan had confirmed that its PIR insulation was combustible. The notes of the meeting also referred to the need for cladding to be of limited combustibility.[2806] Mr Allen did not know whether Mr Anon had shared that information with the RBKC building control team[2807] but in our view Mr Anon should have ensured that information of that kind was disseminated through the department.

62.60 Mr Allen told us that he had regular meetings with the officers and would assess their general competence[2808] but we saw no concrete evidence to suggest that he actively checked the officers' skills to ensure that they had a basic knowledge and understanding of the problems that could arise. The failure to monitor the knowledge and skills of individual officers and to ensure that they received the training needed for them to carry out their function effectively was in our view a serious weakness in the way RBKC's building control

[2797] Menzies {Day60/51:6-9}; {Day60/51:19}-{Day60/52:9}.
[2798] Menzies, Building Control {BMER0000004/45} paragraph 178(a).
[2799] Allen {Day47/72:19-35}.
[2800] Allen {Day47/80:1-15}.
[2801] Menzies {Day60/99:20-22}.
[2802] {RBK00059350}; {RBK00059351}.
[2803] Allen {Day47/151:18}-{Day47/153:1}.
[2804] Hoban {Day46/47:20-24}.
[2805] Hoban {Day46/51:18-25}, {Day46/52:14-25}, {Day46/53:23-24}.
[2806] {RBK00001221/4}.
[2807] Allen {Day47/85:12-16}.
[2808] Allen {Day47/78:1-11}.

department was run. It was compounded by a failure to recognise that Mr Hoban was struggling to keep up with the work allocated to him and to take steps to ensure that he had the time and knowledge needed properly to oversee a project as substantial as the Grenfell refurbishment. The absence of a quality management system meant that the defects in Mr Hoban's work were not identified.

62.61 Record-keeping within the department was poor. RBKC accepted that there was no formal procedure for tracking the progress of applications for building control approval and that that was a failure on its part. In addition, Mr Hoban's own record-keeping was poor. He failed to make an electronic record of the conditions applied to the full plans approval and failed to record the full extent of his site visits on the Acolaid system. Someone ought to have noticed that at the time and taken steps to address it. Mr Allen was aware that Mr Hoban was behind in writing up site visit notes.[2809]

62.62 In addition to the electronic file the department maintained a paper file. Unfortunately, however, that file has been lost. That is itself a ground of criticism, but RBKC's practice of weeding files before they were sent for storage means that even if the paper file had been available, the information it contained about Mr Hoban's work on the refurbishment was likely to be limited. Weeding of files is to be discouraged because it carries a high risk that documents whose true significance is not appreciated at the time are likely to be lost. The department's poor record-keeping practices have hampered our investigation.

62.63 We have no doubt that the shortcomings in the management of the department to which we have referred played a significant part in Mr Hoban's failure to carry out his role properly.

62.64 In its opening and closing statements, RBKC candidly admitted that the work of its building control officers fell below the standard that could reasonably be expected of them, but in our view its admissions did not cover the full extent of its failures. Although we have found that other parties, in particular those responsible for the design of the cladding, bear considerable responsibility for the fact that following the refurbishment the external wall of Grenfell Tower did not comply with the Building Regulations and was dangerous, building control was the last line of defence and had a statutory obligation to check for compliance with the Building Regulations. It had a responsibility to protect the public and it wholly failed to perform that function. It therefore bears considerable responsibility for the dangerous condition of Grenfell Tower immediately on completion of the refurbishment.

[2809] {ALL00000003/9}.

Chapter 63
The contribution of Studio E

Introduction

63.1 Studio E was the architect for the Grenfell Tower refurbishment. It provided architectural services in respect of the project between approximately February 2012 and July 2016. As architect, Studio E had primary responsibility for the design of the facade of Grenfell Tower, among other aspects of the refurbishment. We have concluded that Studio E fell well below the standard to be expected of a reasonably competent architect in respect of that work. Its failures relating to the design of the external wall and the selection of materials to be used in its construction had catastrophic consequences. Studio E therefore bears a very significant degree of responsibility for the disaster.

Paul Hyett's evidence

63.2 Since we could foresee that questions of architectural practice might arise in the course of our investigations, we instructed Mr Paul Hyett to prepare a written report dealing with the various aspects of the refurbishment, including the professional standards to be expected of a reasonably competent architect, and the work of Studio E.[2810] In its closing statement Studio E suggested that Mr Hyett did not have the experience or expertise needed to express an opinion on any aspect of overcladding a high-rise building, having had little or no personal experience of such work. It also suggested that, when expressing views about the use of the materials used in the cladding, he had ignored the fact that similar materials had been used on many buildings across the country on which reputable architects had presumably been employed. He had thus chosen not to consider evidence of what a responsible body of professional architects would have done at the time of the Grenfell Tower refurbishment. We were therefore asked to place little or no weight on his evidence.[2811]

63.3 It is not in dispute, however, that Mr Hyett has had a long and distinguished career as an architect, including over 40 years of post-qualification experience in England and internationally. Between 2004 and 2020 he was a principal at HKS Architects[2812] before retiring in 2020 to run a consultancy advising on architectural services.[2813] He is a member of the Royal Institute of British Architects ("RIBA") and was its President from September 2000 to August 2002.[2814] He also has a special interest in and experience of the education of architects. He was the RIBA Council member responsible for architectural education from 1998 to 2001, has acted as an external examiner at various universities, reported to the Burton Review of Architectural Education and later acted as deputy chair to the

[2810] {PHYR0000032}; His main report was dated October 2019 and was revised in August 2020 {PHYR0000024}-{PHYR0000037}; He also produced a supplemental report in September 2020 which provided additional commentary on the opinions set out in his original report {PHYS0000001}-{PHYS0000005}.
[2811] {SEA00014645/2} paragraph 1.5.
[2812] Hyett, Module 1 Report (revised) {PHYR0000026/2} paragraph 1.1.5.
[2813] Hyett {Day63/10:1-6}.
[2814] Hyett, Module 1 Report (revised) {PHYR0000026/2} paragraph 1.1.2.

Stansfield Smith Review of Architectural Education. He is an honorary fellow of the American Institute of Architecture, the Royal Society of Architects in Wales and the Chartered Association of Building Engineers.[2815]

63.4 Mr Hyett candidly accepted that his personal experience of overcladding projects was limited.[2816] However, the breadth and depth of his career made him well qualified to advise on how an architectural practice should approach a project that is outside the scope of its primary expertise. Much of his evidence was directed to identifying the steps that a competent practice should take and the questions it should ask itself in those circumstances and did not require direct experience of overcladding projects. We have no evidence of the circumstances in which similar materials may have been used on other buildings and in any event, we do not think that the use of what may have been inappropriate materials in other circumstances can assist us. In view of Mr Hyett's professional experience we are satisfied that he was well qualified to give evidence about the standards that could reasonably be expected of a firm like Studio E when undertaking a new project such as the Grenfell Tower refurbishment. In general, we found his evidence to be thorough and careful, reflecting an awareness of what it was reasonable to expect from an architect in general practice. It is worth noting that Studio E did not ask us to hear evidence from someone whose opinions differed from his.

Studio E's experience and expertise

63.5 The refurbishment of Grenfell Tower was a new type of project for Studio E, which did not have any significant experience in refurbishing or overcladding high-rise residential buildings.[2817] Andrzej Kuszell accepted that it is unlikely that the firm would have won the commission if it had been put out to tender because of its lack of relevant experience.[2818] Having said that, we do not think that Studio E can be criticised for accepting the appointment, because architects can be expected to take on work outside their traditional areas of specialism from time to time.[2819] However, even before it had agreed to undertake the project, it should have been readily apparent to Mr Kuszell that none of the existing partners or employees had the relevant knowledge, experience or skills that would be needed. Indeed, Bruce Sounes appears to have recognised that some steps were required to improve existing knowledge and skills because he told Mr Kuszell in February 2012 that Studio E was "a little green on process and technicality" and proposed "some rapid CDP" [sic].[2820] However, he told us that his concerns related to the logistics of carrying out work in an occupied building rather than designing the external wall, which he considered to be straightforward.[2821] In the end the "rapid CPD" consisted of nothing more than a discussion with Max Fordham and some research on the internet into overcladding high-rise residential buildings.[2822]

[2815] Hyett, Module 1 Report (revised) {PHYR0000035} Appendix 4; For discussion of Mr Hyett's previous experience on particular building projects, including high-rise overcladding projects, see Hyett {Day63/54:18}-{Day63/60:16}.
[2816] Hyett {Day63/55:2-12}.
[2817] Kuszell {Day6/20:7-19}; {Day6/11:19-22}; Sounes {Day6/173:14-16}; Sounes {SEA00014273/114} page 114, paragraph 271; Hyett, Module 1 Report (revised) {PHYR0000027/15} page 15, paragraph 2.5.5; {PHYR0000027/16} page 16, paragraph 2.5.12(a).
[2818] Kuszell {Day6/70:10-16}.
[2819] Hyett, Module 1 Report (revised) {PHYR0000027/17} paragraph 2.5.12(b); {PHYR0000027/18} paragraph 2.5.14. Hyett {Day63/80:5-18}; Hyett {Day63/82:7}-{Day63/83:17}.
[2820] {SEA00003567}.
[2821] Sounes {Day6/186:1-14}; {Day6/187:2-7}; {Day6/192:12-16}.
[2822] Sounes {Day6/192: 3-16}; {Day6/192:18}-{Day6/193:14}.

63.6 In our view it was necessary for Studio E to engage someone who could bring to the firm specific experience of overcladding a high-rise residential building[2823] to ensure that it could provide the necessary services with appropriate skill and care.[2824] However, Studio E did not do so and appears to have thought, both at the time and in hindsight, that that was unnecessary because it could acquire the necessary knowledge and skills as the project progressed.[2825] As a result it failed to ensure that it was properly equipped to perform its obligations to the TMO.

Studio E's role and responsibilities

63.7 Studio E was appointed as lead consultant and lead designer. As lead consultant it was responsible for advising on the need for, and the scope of services to be provided by, consultants, specialists, sub-contractors and suppliers and for monitoring the work of other consultants. As lead designer it was responsible for co-ordinating the design of all constructional elements, including work by consultants, specialists and suppliers and for determining materials, elements and components.[2826] However, Studio E appears to have laboured under a fundamental misunderstanding about the nature of its obligations. As a result, it treated sub-contractors and consultants as solely responsible for their work and assumed, without enquiry, that it met the required standards. Throughout its evidence and submissions to the Inquiry, Studio E's witnesses sought to place responsibility on others, such as Max Fordham, Exova, Harley and building control for ensuring that work was of the required standard. In particular, Studio E maintained that it was for others to ensure that materials chosen for use in the construction of the cladding were suitable and would ensure compliance with the Building Regulations. That was clearly wrong. Although others involved in the refurbishment had incurred separate obligations of their own in relation to the quality of the work and materials used, Studio E had an overriding obligation, initially to the TMO and subsequently to Rydon, to ensure that the work was carried out properly and the choices of materials were suitable.

The outline design

63.8 Bruce Sounes was given the responsibility of managing the project on behalf of Studio E. He said that he had been aware in a general way of the requirements of Part B of Schedule 1 to the Building Regulations and Approved Document B, but he did not take any steps to familiarise himself with it in any detail at the beginning of the project and did not take the trouble to understand its significance for the project he was taking on.[2827] He occasionally referred to Approved Document B[2828] but did not read the guidance relating to requirement B4 and did not appear to have any clear understanding of what it entailed.[2829]

[2823] Hyett {Day63/86:2}-{Day63/87:23}; {Day64/3:20}-{Day64/4:3}; Hyett, Module 1 Report (revised) {PHYR0000027/17} paragraph 2.5.12(b) and {PHYR0000027/18} paragraph 2.5.14; Hyett {Day63/80:5-18}; {Day63/82:7}-{Day63/83:17}.
[2824] Hyett, Module 1 Report (revised) {PHYR0000027/17} paragraph 2.5.12(b); {PHYR0000027/18} paragraph 2.5.14; Hyett {Day63/80:5-18}; {Day63/82:7}-{Day63/83:17}.
[2825] Kuszell {SEA00014271/11} page 11, paragraph 41; Kuszell {Day6/77:1}-{Day6/78:14}, {Day6/79:12}-{Day6/80:24}; Sounes {Day6/199:11-17}.
[2826] {SEA00009824/5}.
[2827] Sounes {Day7/132:7-21}.
[2828] Sounes {Day7/135:6-9}.
[2829] Sounes {Day7/136:6-20}.

63.9 Although Mr Sounes agreed that it was Studio E's responsibility to investigate any legislative requirements relating to the project at the earliest opportunity in the design process,[2830] he did not do so or ensure that someone else did. That was a basic error and his consequent ignorance of paragraphs 12.5 to 12.9 of Approved Document B meant that he was unaware of the guidance it contained on the risks arising from the use of certain materials and the ways in which compliance with functional requirement B4(1) could be achieved. He therefore gave no thought to the manner in which compliance was to be ensured.[2831] In its opening statement Studio E suggested that, taken as a whole, its design might have been capable of complying with the Building Regulations (presumably when the work had been completed) and that projects often proceed to advanced stages with designs in relation to which the method of achieving compliance with the Building Regulations has not yet been fully considered.[2832] However, that is not consistent with Mr Sounes' own evidence[2833] or with the terms of the contract between Studio E and the TMO (and subsequently Rydon), under which Studio E had an obligation to seek to ensure that all designs complied with the relevant statutory requirements.[2834] In our view, in failing to review Approved Document B and to consider carefully its significance for the project Mr Sounes fell seriously below the standard to be expected of a reasonably competent architect.[2835]

63.10 One consequence of the approach adopted by Mr Sounes was that he did not take active responsibility for the choice of the materials that were to form part of the external wall of the building. Instead of satisfying himself independently of their suitability, he assumed that, because others appeared to be satisfied that both the ACM panels and the Celotex insulation were acceptable for use in that context, there was nothing to worry about. He therefore failed to identify that both were composed of combustible materials and failed to recognise the dangers of using them in an external wall. As a consequence, the external wall did not comply with functional requirement B4(1).[2836] Those were serious errors that had direct and catastrophic consequences.

63.11 Any reasonably competent architect should have known, or at any rate should have taken the trouble to discover, that paragraphs 12.5 and 12.7 of Approved Document B contained a warning against the use of combustible materials in external walls.[2837] Indeed, Leadbitter warned Studio E against the use of combustible insulation behind the rainscreen in January 2013.[2838] The Celotex FR5000 specified by Studio E was a polyisocyanurate material and as such was combustible. Any competent architect ought to have known that, or, if uncertain about its composition, should have discovered it. However, notwithstanding the clear terms of paragraph 12.7 of Approved Document B, Studio E specified Celotex FR5000 for use in the external wall without giving any consideration to whether the resulting structure would comply with functional requirement B4(1). That was a significant failure.[2839]

[2830] Hyett {Day64/41:4-18}; {Day64/55:12-16}; Hyett, Module 1 Report (revised) {PHYR0000027/46} paragraph 2.9.2 and 2.9.4; {PHYR0000027/47-48} paragraphs 2.9.6 and 2.9.8; Hyett {Day64/41:19-24}; Sounes {Day7/85:1-8}; {Day7/88:1-18}; {Day7/127:8-22}; {Day7/128:18-23}; {Day7/130:14}-{Day7/131:9}; {Day7/184:15-19}; {Day7/134:25}-{Day7/135:5}.
[2831] Hyett {Day64/43:6}-{Day64/44:14}; {Day64/58:5-9}.
[2832] Studio E's written opening statement {SEA00014642/20} paragraphs 9.10 and 9.11.
[2833] See the references at footnote [2655] above.
[2834] Schedule of services, clause 8.
[2835] Hyett {Day64/63:23}-{Day64/64:2}.
[2836] Phase 1 Report Volume IV paragraph 26.4.
[2837] Hyett {Day64/65:14}-{Day64/66:23}.
[2838] {MET00081282}. This email was only disclosed to the Inquiry by the MPS in May 2023.
[2839] Hyett, Module 1 Report (revised) {PHYR0000029/49} paragraph 4.3.24; {PHYR0000029/93} paragraph 4.4.41.

63.12 We have described in Chapter 56 how FR5000 came to be included in the NBS Specification and non-combustible insulation was ruled out. Mr Sounes accepted Max Fordham's suggestion that they should aim for a U-value of 0.15 W/m^{2}K, but neither he nor anyone else at Studio E gave any independent thought to whether an alternative solution was available or to whether the proposed U-value was acceptable if it could be achieved only by using combustible insulation.

63.13 As lead designer, Studio E was responsible for deciding what U-value could reasonably be achieved and how, and Mr Sounes was at fault in failing to recognise that. Max Fordham provided him with technical data relating to Celotex FR5000 by way of an example in order to assist his calculations; it was inappropriate for him to treat that as advice from Max Fordham to use FR5000. It was even more inappropriate to accept it uncritically without taking steps to understand the nature of the product and satisfying himself of its suitability. That was a serious error on the part of Mr Sounes.

63.14 Similarly, Mr Sounes did not take any steps to ensure that the rainscreen panels proposed for the cladding were consistent with the guidance in Approved Document B or were likely to meet the functional requirements of the Building Regulations. He appears to have been content to include ACM PE panels in the NBS specification (albeit as an alternative) for aesthetic reasons and because he knew they had been used on other projects,[2840] rather than in reliance on any detailed information he had obtained about the nature of the product based on the manufacturer's literature or the certificate of a recognised certifying body.[2841]

63.15 When he was first considering options for the cladding panels, Mr Sounes did not address his mind to fire performance.[2842] He did not consider whether any of the panels he had in mind were consistent with the guidance in Approved Document B and although he did propose some panels that had a fire-resistant core[2843] or were non-combustible,[2844] that was coincidental and did not reflect a judgment based on information he had obtained about their reaction to fire.[2845] Unfortunately, Mr Sounes was not aware that ACM panels could be produced with different cores.[2846]

63.16 The production of the NBS Specification, which identified the materials to be used in the facade, was left to junior assistants at Studio E, mainly Tomas Rek and before him Adrian Jess.[2847] Bruce Sounes told us that only some of the initial draft of the specification had been discussed with him and that he had trusted them to complete it without reference to him,[2848] but neither of them appears to have given any consideration to the suitability of the materials intended for use in the external wall. As the architect responsible for the project Mr Sounes should have supervised their work. In particular, he should have satisfied himself that they had properly investigated the suitability of any materials or products they had included in the specification or, if they had not, should have satisfied himself independently that they were suitable. In fact, no further consideration of the materials was undertaken after they had been included in the specification and his failure to do either of those things was a significant error.[2849]

[2840] Sounes {Day7/170:2-5}; Sounes {SEA00014273/140} page 140, paragraph 343; Sounes {Day20/93:12}-{Day20/95:14}.
[2841] Sounes {Day20/135:1-7}.
[2842] Sounes {Day20/83:8-12}; Geof Blades did not recall the content of the conversation – see Blades {Day41/85:3-7}.
[2843] {SEA00005320}; {SEA00005330}. This panel was not ultimately selected for inclusion in the NBS Specification.
[2844] {SEA00014616/41} paragraph 1.2.
[2845] Sounes {Day20/89:20-25}.
[2846] Sounes {Day20/176:17-24}.
[2847] Sounes {Day7/151:7}-{Day7/152: 3}.
[2848] Sounes {Day7/152:4-8}.
[2849] Hyett {Day64/69:6-18}; {Day64/72:21}-{Day64/73:15}; {Day64/76:14}-{Day64/77:5}; {Day64/123:23}-{Day64/124:25}.

63.17 Studio E produced three versions of the NBS Specification, one on 21 November 2013,[2850] one on 29 November 2013[2851] and one on 30 January 2014.[2852] Mr Sounes confirmed that no one at Studio E had satisfied themselves before they were drawn up that the materials referred to in any of those versions would ensure compliance with the Building Regulations.[2853] That was a fundamental failing on the part of Studio E which had significant consequences. Mr Sounes sought to explain that omission by telling us that Studio E would not usually expect to verify compliance of all materials and products before submitting a full plans application to building control,[2854] and that to do so would be wasted work if the contractor subsequently made a change.[2855] He also suggested that building control might take a different view of the proposals and that it was not common practice to carry out a full assessment of compliance with the functional requirements of Part B of Schedule 1 at RIBA stages D or E.[2856]

63.18 Mr Sounes was wrong in his understanding. Under its contract with the TMO, it was Studio E's responsibility to ensure that the materials included in the NBS Specification complied with the Building Regulations.[2857] We accept Mr Hyett's evidence that if an architect specifies a particular product to be used, he assumes responsibility for making sure that its use is compatible with the functional requirements in the Building Regulations.[2858] Tomas Rek and Neil Crawford assumed that Mr Sounes had satisfied himself that the products and materials included in the specification were suitable, but neither of them took steps to verify that assumption or to satisfy themselves independently that they were. When he handed the project over to Mr Crawford, Bruce Sounes did not warn him that he had not carried out any investigation into the materials to be used in the cladding to satisfy himself that they were suitable.[2859] In failing to satisfy itself that the materials specified would enable the refurbished building to comply with the Building Regulations, Studio E, and particular Mr Sounes, Mr Crawford and Mr Rek, fell seriously below the standard to be expected of persons in their positions.

63.19 Mr Sounes sought to justify the choice of materials by asserting that Studio E had asked for advice about them and that it was not for Studio E to satisfy itself that the products were suitable because it did not have the ability to do so.[2860] We do not accept that. We saw no evidence that Mr Sounes had asked any specialist for advice or that he had received any advice that would satisfy a reasonably competent architect that the products specified in the proposed application were suitable for the purpose and would not result in the refurbished building contravening the Building Regulations.

63.20 Mr Sounes himself did not consider whether the proposed use of Celotex FR5000 above 18 metres met the guidance in Approved Document B or would result in the external wall's complying with functional requirement B4(1). He did not ask Max Fordham that

[2850] {SEA00000152}.
[2851] {SEA00000153}. This version was issued to tenderers.
[2852] {SEA00000169}.
[2853] Sounes {Day7/170:2-5}; {Day20/173:12-24}; Rek {Day12/20:15-20}; {Day12/22:25}-{Day12/23:2}; {Day12/24:16-21}, {Day12/27:7-21}.
[2854] Sounes {SEA00014273/121} page 121, paragraph 292.
[2855] Sounes {Day20/64:21}-{Day20/65:7}.
[2856] Sounes {Day20/65:1-3}.
[2857] Appendix B: Schedule of Services {SEA00009824/7}: "co-ordinating design of all constructional elements, including work by consultants, specialists or suppliers" and "determining materials, elements and components, standards of workmanship, type of construction and performance in use".
[2858] Hyett {Day64/69:6-18}; {Day64/72:21}-{Day64/73:15}; {Day64/76:14}-{Day64/77:5}; {Day64/123:23}-{Day64/124:25}.
[2859] Rek {Day12/44:22}-{Day12/45:1}; Crawford {Day9/139:14}-{Day9/140:13}; {Day9/146:4-6}.
[2860] Sounes {Day7/170:21}-{Day7/171:4}.

question[2861] nor did he seek any advice from Exova about it.[2862] Nor did anyone else at Studio E discuss the matter with Exova. Similarly, Mr Sounes did not investigate whether any of the various alternative rainscreen products proposed in the NBS Specification were suitable, including the ACM panels which were included as an alternative to zinc.[2863] Although he said that he had carried out research and had consulted others, including Exova,[2864] he was not able to point to any particular advice he had received,[2865] and at no point did he ask Exova to comment on the suitability of any of the rainscreen products included in the NBS Specification.

63.21 Industry guidance was available at the time which contained warnings about the dangers associated with the use of certain kinds of rainscreen panels. In particular, the Standard for Systemised Building Envelopes, Part 6, published by the Centre for Window and Cladding Technology (CWCT), which was incorporated into the NBS Specification,[2866] contained important information on the fire performance of materials to be used in the external envelope of a building and specific guidance on aluminium envelope systems to include composite components as well as insulation materials.[2867] However, no one at Studio E was familiar with the CWCT standard or had even read it[2868] and no one troubled to check it at the time. Similarly, it failed to consider the warnings about use of combustible materials in cladding systems contained in BR 135, even though the publication had been included in the structural engineer's specification.[2869] As a result, Studio E specified products that did not reflect any of that guidance.

63.22 The fact is that Mr Sounes simply assumed that all the cladding panels included in the NBS Specification were suitable for the refurbishment because they had been used on other projects.[2870] In its opening statement Studio E sought to justify the use of ACM material and PIR insulation by reference to their frequency of use by others on previous projects,[2871] but we do not accept that. Relying on what others have done in the past is not good enough when the practice in question affects people's safety, is inconsistent with industry guidance and, most importantly, does not withstand rational scrutiny.

63.23 Mr Sounes was the lead designer responsible for the project at the time the NBS Specification was compiled. It was therefore his responsibility to ensure that the materials specified in it were consistent with the requirements of the Building Regulations. He failed to do so. He also failed to make it clear to the TMO, Rydon and Harley that Studio E had not taken steps to satisfy itself by reference to testing or other data that the materials included in the specification would result in an external wall that complied with the regulations. He was at fault in not doing so.

[2861] Sounes {Day20/42:6-11}.
[2862] Sounes {Day20/42:12}-{Day20/43:6}.
[2863] Sounes {Day20/173:12-24}.
[2864] Sounes {SEA00014273/140) page 140, paragraph 343.2.
[2865] Sounes {Day8/57:2}-{Day8/58:6}.
[2866] {SEA00000169/69} Clauses 310 and 342.
[2867] {CWCT0000046}.
[2868] Rek {Day12/19:14-18}; {Day12/34:14-17}; {Day12/39:1-16}; Crawford {Day9/146:15-17}; Sounes {Day7/164:14-18}.
[2869] Crawford {Day10/69:8}-{Day10/70:5}; {CCL00001449/11} paragraph 7.1.13.
[2870] Sounes {Day7/170:2-5}; Sounes {SEA00014273/140} page 140, paragraph 343; Sounes {Day20/93:12}-{Day20/95:14, {Day20/68:5-14}.
[2871] Studio E's Opening Submissions {SEA00014642/16-17} paragraph 8.16; {SEA00014262/24} paragraph 10.11; {SEA00014262/36} paragraph 15.17.

63.24 Studio E failed to devise a proper cavity barrier strategy for the overcladding system, which led to ever-increasing confusion as the project developed.[2872] The cavity barrier strategy should have been established by the time the tender documents were published.[2873] The strategy produced by Studio E was seriously deficient in failing to include a cavity barrier at the window sill.[2874] In addition, the drawings did not place the cavity barrier above the window close enough to the head of the window,[2875] there were no cavity barriers included in the bay elevations and none of the elevation drawings of the complete facade were marked to show the presence of cavity barriers.[2876] No cavity barriers had been included at the junction of the cladding and the crown.[2877] Those errors indicate that no one at Studio E had given any clear thought during the preparation of the tender documents to the strategy for dividing the cavities behind the rainscreen into fireproof compartments.

63.25 On the basis of Mr Hyett's evidence we are satisfied that at tender stage Studio E should have produced drawings showing all vertical and horizontal cavity barriers for all bay and column conditions for all four facade elevations at 1:20 scale and at 1:5 scale for details around the windows where they abutted the columns.[2878] We accept his criticism that Studio E should have identified the clash between the brackets and supporting angles and sought to resolve it.[2879]

63.26 We do not accept that the design of a cavity barrier strategy could be left entirely to Harley as the cladding sub-contractor. It was Studio E's responsibility to explore and resolve the strategy at tender stage in order that the details subsequently produced by Harley were properly based.[2880]

Consultation with Exova

63.27 Although Exova became involved in the project at an early stage, Studio E's interest in obtaining its advice was directed mainly to the work involved in creating new dwellings in the lowest floors of Grenfell Tower. In April 2012 Bruce Sounes sent Exova information about the refurbishment, including some architectural drawings, and later that month a representative of Exova attended a design team meeting at which the overcladding was discussed. However, Studio E did not consult Exova about that aspect of the project and did not keep it informed of progress generally.[2881] Most importantly, Studio E failed to take a close interest in Exova's work on the Outline Fire Safety Strategy, which, as we have noted elsewhere, remained materially incomplete in the absence of advice on the fire safety of the proposed overcladding and its effect on functional requirement B4.

[2872] Hyett, Module 1 Report (revised) {PHYR0000029/66} paragraph 4.3.69 and {PHYR0000029/76} paragraphs 4.3.83 to 4.3.86.
[2873] Hyett, Module 1 Report (revised) {PHYR0000029/64} paragraph 4.3.63 and {PHYR0000029/76} paragraph 4.3.86.
[2874] Hyett, Module 1 Report (revised) {PHYR0000029/65} paragraph 4.3.68; {SEA00002499}; {PHYR0000029/76} paragraph 4.3.83.
[2875] Hyett, Module 1 Report (revised) {PHYR0000028/62} paragraph 3.8.12.; Figure 3.30 and 3.29 produced by reference to {HAR00003958}.
[2876] Hyett, Module 1 Report (revised) {PHYR0000029/66-67} paragraph 4.3.69; figure 4.50.
[2877] Hyett, Module 1 Report (revised) {PHYR0000029/75} paragraph 4.3.81; {SEA00002551}.
[2878] Hyett, Module 1 Report (revised) {PHYR0000029/68} paragraphs 4.3.71-4.3.72; {SEA00002499}; {SEA00010474}; {PHYR0000029/76} paragraph 4.3.85; {SEA00002551}.
[2879] Hyett, Module 1 Report (revised) {PHYR0000029/69} paragraph 4.3.73; {PHYR0000029/71} paragraph 4.3.77-4.3.78; {PHYR0000029/76} paragraph 4.3.86.
[2880] Hyett, Module 1 Report (revised) {PHYR0000028/63} paragraph 3.18.13; See also {SEA00009824/7} under the subheading "Designers, including Lead Designer". Studio E had responsibility for: determining materials, elements and components, standards of workmanship, type of construction and performance in use for the design.
[2881] See, for example, the failure to send the Stage D report. Hyett {Day64/205:5-12}.

Studio E did not notice the absence from the strategy of any reference to the cladding.[2882] More significantly, at no stage did Mr Sounes ask Exova to clarify its advice on functional requirement B4,[2883] although he accepted that the implications of the overcladding for the spread of fire over the external walls of the building had never been discussed in writing by Exova or any other fire consultant.[2884] He did not discuss it with Terrence Ashton because he did not regard it as a matter of concern.[2885] Although Bruce Sounes originally expected Exova to complete its advice in a future version of the Outline Fire Safety Strategy,[2886] he ought to have pressed for it to be completed when version 3 was issued just before the tender documents were published and it was clear that part of it remained outstanding.[2887] However, he failed to do so. He thought it was the responsibility of the design and build contractor to ensure that the advice was completed,[2888] but he failed to warn the TMO or Rydon that Exova's work had not been finished.

63.28 Studio E was reassured generally by the fact that Exova had been instructed on the project, even though it did not provide Exova with the full range of information that would have enabled it to provide proper advice and did not question the limited advice that it did receive.[2889] For example, Neil Crawford said that he had felt confident about the choice of insulation and the design of the cavity barriers because he had understood that Exova had a wealth of knowledge of similar projects.[2890] However, he had no idea on what basis Exova might have concluded that the design of the external wall complied with the Building Regulations.[2891]

Design errors following the novation to Rydon

63.29 As had been envisaged at the outset,[2892] Studio E's services were eventually transferred to Rydon following its appointment as principal contractor for the refurbishment. Although proposals relating to a formal contract were exchanged in April 2014, it was not until nearly two years later that the relationship between them was eventually encapsulated in a deed dated 3 February 2016. No satisfactory explanation for the delay was put forward, although Neil Crawford said that it was not unusual for projects to run to the end with no formal contract in existence.[2893] This seems to us to be another example of a cavalier attitude to formalities which appears to have been shared by many of those involved in the project and which is liable to lead to a failure to understand where responsibilities lie.

63.30 Under the deed Studio E warranted that it had exercised and would continue to exercise reasonable skill, care and diligence in the discharge of the services covered by the deed to the standard reasonably to be expected of a competent professional experienced in the provision of professional services for works similar in size, scope, complexity, quality and nature to the development.[2894] The language thus made it clear that the undertaking covered all the work on the refurbishment that Studio E had done for Rydon in the past, as

[2882] Sounes {Day8/65:5}-{Day8/66:5} (version 1 OFSS); {Day8/68:19}-{Day8/69:3} (version 2 OFSS); {Day12/149:13-24} (version 3 OFSS).
[2883] Sounes {Day8/51:6-24}; {Day8/69:18-24}.
[2884] Sounes {Day12/155:25}-{Day12/156:6}.
[2885] Sounes {Day8/53:17-21}.
[2886] Sounes {Day8/52:12-15}.
[2887] Ashton {Day17/48:5-17}.
[2888] Sounes {Day12/157:6}-{Day12/158:20}.
[2889] Sounes {SEA00014273/140} page 140, paragraph 343.2.
[2890] Crawford {Day9/177:6-11}.
[2891] Crawford {Day9/177:3-5}.
[2892] See Chapter 52.
[2893] Crawford {Day9/68:18-19}.
[2894] {RYD00094228/3} Clause 2.3.

well as any that it might do for it in the future.[2895] Studio E also undertook to seek to ensure that all aspects of the architectural designs complied with the Employer's Requirements,[2896] and that all designs complied with the relevant statutory requirements.[2897] It also agreed to co-ordinate any design work done by consultants, specialist contractors, subcontractors and suppliers[2898] and to be responsible for co-ordinating the steps needed to obtain building control approval.[2899]

63.31 We think it clear that the deed imposed an obligation on Studio E to take reasonable steps to ensure that all designs, whether produced by itself or sub-contractors, complied with the relevant statutory requirements, including the Building Regulations 2010. That would include identifying any obvious instances of non-compliance with the Building Regulations and the associated statutory guidance, including Approved Document B, in any drawings which were provided to Studio E for review. However, Bruce Sounes did not think that Studio E had any obligation to check the work of Rydon's subcontractors to ensure that it complied with the Building Regulations.[2900] He thought that specialist sub-contractors were responsible for the design element of their work and were themselves responsible for ensuring that it complied with any statutory requirements. In his view, building control was primarily responsible for confirming compliance.[2901] Neil Crawford's understanding was fundamentally the same.[2902] They appear to have had their own understanding of the obligations being assumed by Studio E, which did not bear much relationship to the language used in the document.

Rainscreen panels

63.32 Bruce Sounes received a copy of the BBA certificate for the Reynobond ACM panels in April 2014[2903] but failed to read it in full carefully.[2904] He thought that Rydon had taken over responsibility for the design and that it was not his function to assess the suitability of any material that might be used.[2905] Mr Crawford, who came into the project in the summer of 2014, thought it unlikely that he had looked at the BBA certificate.[2906]

63.33 Although Mr Hyett did not think that the dangers posed by ACM PE panels were well known to architects generally at that time, he was nonetheless critical of Studio E's failure to investigate their fire performance. In his report Mr Hyett said that he considered it reasonable for an architect reading just the first page of the BBA certificate relating to Reynobond to conclude that the product was rated Class 0 and so met the guidance given in paragraph 12.6 and diagram 40 of Approved Document B. He said that he did not consider that an architect could be criticised for taking the statement on the front of the certificate at face value and not going on to read section 6, which contained further

[2895] And see also {RYD00094228/3} Clause 2.1 which provided that Studio E "has and will continue to perform for [Rydon] the Services in respect of the development"; Bruce Sounes understood the time that the obligation had retrospective effect: Sounes {Day7/102:15}-{Day7/103:5}.
[2896] {RYD00094228/9} Item 4. Bruce Sounes confirmed that he understood at the time that that was Studio E's obligation to Rydon: Sounes {Day7/105:6-25}; Neil Crawford said that in February 2016 he had not known that Studio E was under that obligation to Rydon: Crawford {Day9/53:4-10}; {Day9/60:15}-{Day9/61:3}.
[2897] {RYD00094228/9}; Both Bruce Sounes and Neil Crawford understood that that 'statutory requirements' included the Building Regulations and the CDM Regulations: Sounes {Day7/107:8-16}; Crawford {Day9/62:8-13}.
[2898] {RYD00094228/10} Item 13.
[2899] {RYD00094228/9} Item 7.
[2900] Sounes {Day7/112:15}-{Day7/113:8}.
[2901] Sounes {Day7/124:4-11}.
[2902] Crawford {Day9/62:20-24}; {Day9/70:25}-{Day9/71:5}; {Day9/63:7-12}; {Day9/71:20}-{Day9/72:5}.
[2903] Sounes {SEA00014273/153} page 153, paragraph 377; {SEA00002686}.
[2904] Sounes {Day21/12:5-7}; {Day21/13:1-3}.
[2905] Sounes {Day21/16:22}-{Day21/18:12}.
[2906] Crawford {Day10/149:22}-{Day10/150:13}.

information about the product's behaviour in relation to fire.[2907] Mr Hyett noted, however, that the certificate related to only one colour sample and warned that other colours might not have met the same standard.[2908]

63.34 In the course of giving evidence, however, Mr Hyett changed his opinion. Having been asked to give further consideration to the contents and structure of the BBA certificate, he accepted that the first page was directing the reader to the various sections containing more detailed information on different characteristics. He agreed that it was directing the reader to section 6 for information about the product's behaviour in relation to fire and that a reasonably competent architect would not read the statements on the first page in isolation from the rest of the document.[2909] He thought that a reasonably competent architect would conclude from section 6.4 of the certificate that the panels used at Grenfell Tower were not covered by the certificate because they were not the same colour or finish as those described in the certificate.[2910] In those circumstances he was of the view that the architect ought to have investigated the fire performance of the panels with the manufacturer.[2911] He was also of the opinion that a reasonably competent architect ought to have understood from reading the BBA certificate that the product was available in a fire retardant version,[2912] which should have prompted him to ask for advice about the difference between the two versions of the product and whether the use of the fire retardant version would be more appropriate.[2913]

63.35 We do not find Hr Hyett's change of heart surprising, because a formal document such as a BBA certificate is designed to be read as a whole. There would be no point in including the information contained in the later sections if it were not of potential importance to the reader. We accept Mr Hyett's opinion that once Studio E had become aware in or around March 2014 of the plan to substitute the Reynobond 55 PE for the zinc rainscreen panel originally specified,[2914] it ought to have conducted an urgent investigation into its characteristics in order to satisfy itself that the external wall as a whole would comply with the requirements of the Building Regulations.[2915] Studio E as lead designer was responsible for satisfying itself that the product was suitable for use and for obtaining advice from Exova if it was in any doubt.[2916] We consider that in failing to do so Studio E fell seriously below the standard of a reasonably competent architect. Mr Sounes appears to have thought that, in relation to a project being carried out under a design and build contract, the architect, having become a consultant engaged by the contractor, had no responsibility for overseeing what others were doing.[2917] That was wrong, however, because after its services had been transferred from the TMO to Rydon Studio E remained responsible for ensuring the suitability of the proposed cladding panels.[2918]

[2907] Hyett, Module 1 Report (revised) {PHYR0000029/97} paragraph 4.4.55; {PHYR0000029/106} paragraph 4.4.88; {PHYR0000029/106} paragraph 4.4.90; Hyett {Day64/137:15}-{Day64/138:23}; {Day64/144:5-13}; {Day64/145:9-14}; {Day64/148:8-16}.
[2908] Hyett, Module 1 Report (revised) {PHYR0000029/57} paragraph 4.3.35(a); {PHYR0000029/96} paragraph 4.4.51 and 4.4.54; {PHYR0000029/99} paragraph 4.4.59.
[2909] Hyett {Day64/149:2}-{Day64/150:7}; {Day64/151:8-15}; {Day64/160:1-6}.
[2910] Hyett {Day64/157:4-17}.
[2911] Hyett {Day64/157:18}-{Day64/158:3}.
[2912] Hyett {Day64/158:5}-{Day64/159:18}.
[2913] Hyett {Day64/159:20}-{Day64/160:6}.
[2914] Chapter 55.
[2915] Hyett, Module 1 Report (revised) {PHYR0000029/94} paragraph 4.4.45.
[2916] Hyett {Day64/128:25}-{Day64/130:5}; {Day64/130:15}-{Day64/131:9}.
[2917] Sounes {Day20/71:3-14}.
[2918] {RYD00094228/9} item 8 and {RYD00094228/10} item 13.

63.36 Mr Sounes and Mr Crawford should have read the BBA certificate in full carefully. It was a short document and plainly an important one. Even though by that time Studio E's services had been transferred to Rydon, it remained under an obligation to exercise reasonable skill, care and diligence in the discharge of its services,[2919] which included seeking to ensure that all designs complied with the relevant statutory requirements.[2920] We were troubled by Mr Sounes' practice of not reading the whole of the BBA certificate for any product he was planning to recommend for a project. His failure to do so fell very far below the standard of a reasonably competent architect.

Checking Harley's designs

63.37 Studio E told us that the cladding had been designed by Harley and that as specialist cladding sub-contractor it had assumed responsibility for all aspects of the design.[2921] Bruce Sounes said that he did not expect Studio E to be required to check that Harley's drawings were consistent with any legislative requirements,[2922] since that was not a role it had agreed to undertake in relation to the project.[2923] Neil Crawford's understanding was the same.[2924] They were both wrong about that, however, because they failed to pay attention to the obligations Studio E had assumed to the TMO and misunderstood the effect of the novation to Rydon.

63.38 Following the novation to Rydon, Studio E remained responsible for the design work it had already carried out for the TMO and became responsible for any further work it was required to carry out under the terms of its contract with Rydon.[2925] Studio E's design work before novation was not confined to matters of aesthetic intent or appearance and Harley clearly assumed that Studio E had satisfied itself that the tender drawings and specifications were consistent with the relevant statutory requirements and guidance.

63.39 It is clear that Studio E took an unduly narrow view of its responsibilities after the novation. Neil Crawford maintained throughout that Studio E was only responsible for checking Harley's drawings and specifications for "architectural intent", by which he meant conformity with the preliminary design only.[2926] His understanding was inconsistent, however, with the terms of its contract with Rydon, which included seeking to ensure that all designs complied with the relevant statutory requirements.[2927] Studio E's role in relation to Harley's work does not appear to have been the subject of any discussion with Rydon, which also appears to have assumed that Harley could be left to take responsibility for such matters. Neither Rydon nor Studio E appears to have understood properly the scope of their individual responsibilities.

63.40 Such a failure to understand the scope of its obligations might, perhaps, have been explicable if the terms on which Studio E had been engaged were unusual, but there is no reason to think that they were, since they were based on standard RIBA terms. Mr Hyett's understanding was that when an architect stamps a sub-contractor's drawing as complying with architectural intent it amounts to confirmation that the drawing demonstrates a proper understanding, interpretation and application of the architectural specification.

[2919] {RYD00094228/3} clause 2.3.
[2920] {RYD00094228/9} item 8 and {RYD00094228/10} item 13.
[2921] Studio E's written Opening Submissions {SEA00014642/3} paragraph 3.1.5(c).
[2922] Sounes {Day7/131:21}-{Day7/132:5}.
[2923] Sounes {Day7/113:9-17}; {Day7/122:5-18}; {Day7/123:2-8}; {Day7/125:9-11}.
[2924] Crawford {Day9/62:20-24}; {Day9/70:25}-{Day9/71:1-5}; {Day9/63:7-12}; {Day9/71:20-25}; {Day9/72:1-5}.
[2925] {RYD00094228/3} paragraphs 2.2 and 2.3.
[2926] Studio E's Opening Submissions {SEA00014642/31} paragraph 13.6; Crawford {SEA00014275/17-18} pages 17-18, paragraphs 41-42; Crawford {Day9/20:11-19}.
[2927] {RYD00094228/9} items 4, 5 and 8.

He considered that Studio E had an obligation to assess Harley's designs for compliance with the employer's requirements and the applicable statutory requirements.[2928] In the light of his evidence we think that if Studio E's work in relation to Harley's designs was intended to be as narrow in scope as has been suggested, that would have been formally recorded in some way.[2929]

Insulation

63.41 As set out at Chapter 56, Harley substituted Celotex RS5000 for the Celotex FR5000 specified by Studio E in the NBS Specification without reference to Studio E, although a copy of the datasheet for RS5000 was sent to Neil Crawford on 18 September 2014 in connection with a question about cavity barriers and insulation.[2930]

63.42 Once Studio E had been made aware of the substitution, it had an obligation to satisfy itself that the use of RS5000 was consistent with the Building Regulations and approved guidance. (Since its use was not consistent with the approved guidance, Studio E should have drawn that to the attention of Rydon.)[2931] That could have involved asking Exova to comment on the characteristics of RS5000[2932] or itself examining the suitability of RS5000 by a careful reading of the product literature.[2933] We agree with Mr Hyett that Studio E would not have performed its obligations to Rydon merely by relying on Harley to check the characteristics of RS5000 when the substitution was made. In fact, Mr Crawford took it on trust that, if Harley thought RS5000 was suitable, he did not need to investigate further.[2934] It was a serious omission on Mr Crawford's part not to have made any independent assessment of RS5000 after he had been told that Harley intended to use it.

63.43 If Mr Crawford had looked into the characteristics of RS5000 he would have realised that the external wall system described in the Celotex Rainscreen Cladding Compliance Guide and the product datasheet for RS5000 was not the same as that which had been designed for Grenfell Tower.[2935] He would, or certainly should, therefore have realised that RS5000 was not generally suitable for use on buildings over 18 metres in height and should not have been proposed for use in the refurbishment. The failure to investigate the characteristics of RS5000 was another serious failing on Mr Crawford's part.

63.44 Mr Crawford also failed to notice that Harley's specification did not identify the insulation to be used in the construction of the external wall.[2936] Despite that omission, Mr Crawford stamped the specification as conforming to design intent when it did not.[2937]

Cavity barriers

63.45 Studio E's failure to provide a comprehensive cavity barrier strategy at tender stage was carried through into Harley's design. Most significantly, three of Harley's typical bay drawings did not include cavity barriers around the window openings, contrary to the

[2928] Hyett Supplemental Report {PHYS0000002/30} paragraph 2.3.21; Hyett {Day64/16:4}-{Day64/17:14}; Hyett, Module 1 report (revised) {PHYR0000029/141} paragraph 4.4.154; Hyett {Day64/19:13}-{Day64/20:13}; {Day64/26:11}-{Day64/28:9}; {Day64/29:2-10}; {Day64/25:2-9}; {Day64/27:18}-{Day64/28:2}.
[2929] Hyett {Day64/24:9}-{Day64/26:8}; {RYD00094228/9} item 8.
[2930] {HAR00012103}; {HAR00012104}.
[2931] Hyett {Day64/183:23}-{Day64/184:3}; {Day64/204:13}-{Day64/205:4}; {Day65/17:12}-{Day65/19:20}.
[2932] Hyett {Day64/204:25}-{Day64/205:4}.
[2933] {RYD00094228/9}.
[2934] Crawford {Day10/48:5-9}.
[2935] Hyett {Day65/4:11-24}; {CEL00000416/3}; Hyett {Day65/6:3}-{Day65/7:1}; {Day65/7:3}-{Day65/9:14}; {Day65/14:9}-{Day65/15:18}; {Day65/19:9-23}; {Day65/22:1}-{Day65/24:19}.
[2936] {HAR00003866}; {HAR00003869/1}; {HAR00017762}; {HAR00003955}; {RYD00046822/1}.
[2937] {RYD00046822/1}; Hyett, Module 1 Report (revised) {PHYR0000029/89} paragraph 4.4.29.

guidance in Approved Document B. Studio E failed to notice that omission. Neil Crawford's own view was that it was not possible to place cavity barriers around the windows[2938] but Mr Hyett's indicative scheme demonstrates that it was.[2939] Studio E also failed to identify the fact that Harley had not provided for cavity barriers at the window head and sill level.[2940] Ultimately, therefore, Studio E failed to recognise that the arrangement shown on Harley's drawings would not inhibit the passage of fire around the windows in a way that complied with Approved Document B.[2941]

63.46 Harley's construction drawings that were endorsed by Studio E were deeply flawed. Once fire was present within a cavity zone it could move freely up the sides of the windows and within the adjoining columns.[2942] We agree with Mr Hyett that Studio E's failure adequately to review Harley's drawings flowed from a lack of technical knowledge and experience, exacerbated by the lack of a basic scheme design, which should have been completed at tender stage, against which Harley's work could have been competently checked.[2943]

63.47 Studio E's lack of technical knowledge and experience in respect of cavity barriers is evident from Neil Crawford's approach to Harley's request for information in September 2014.[2944] Harley asked for confirmation from Rydon, through Studio E, on the placing of cavity barriers.[2945] Mr Crawford sent the request on to Exova asking for advice. We agree with Mr Hyett that questions of that kind should have been resolved by Studio E much earlier, but at that point the parties were only starting to establish the basic approach.[2946] It is clear from the email correspondence between Terence Ashton, Neil Crawford and Daniel Anketell-Jones that Mr Crawford abrogated responsibility for answering Harley's questions about cavity barriers.[2947] He simply passed information between Exova and Harley without becoming directly involved. For reasons we have already explained, it was quite wrong for Studio E to take the view that Harley alone was responsible for formulating the cavity barrier strategy.

63.48 Studio E also failed to notice that materials specified by Harley, including Styrofoam in the P1 window infill panel and Kingspan TP10 in the P2 panel, were not suitable for use in their intended applications.[2948] Despite that, Mr Crawford accepted the specification without commenting on the choice of those materials.[2949] We reject Mr Crawford's assertion that it was not Studio E's function to check that the designs complied with the statutory requirements.[2950] Its contract with Rydon provided otherwise and we agree with Mr Hyett that Studio E should have noticed that unsuitable insulation products had been specified by Harley and should have challenged their use.[2951]

63.49 Harley's construction drawings did not specify the materials to be used at the head, jamb and sill behind the window reveals. We agree with Mr Hyett that Studio E should have ensured that they did so, or should at least have referred to the NBS Specification to make

[2938] Crawford {Day10/176:4}-{Day10/177:7}.
[2939] Hyett, Module 1 Report (revised) {PHYR0000028/39} paragraph 3.7.20; {PHYR0000028/40-43} figures 3.16 – 3.19 and {PHYR0000028/58-59} paragraphs 3.8.8-3.8.11.
[2940] Hyett, Module 1 Report (revised) {PHYR0000029/112} paragraph 4.4.102.
[2941] Hyett, Module 1 Report (revised) {PHYR0000029/115} paragraph 4.4.105.
[2942] Hyett, Module 1 Report (revised) {PHYR0000029/131} paragraph 4.4.134
[2943] Hyett, Module 1 Report (revised) {PHYR0000029/142} paragraph 4.4.155.
[2944] See Chapter 54 See also Hyett, Module 1 Report (revised) {PHYR0000029/119} from paragraph 4.4.109.
[2945] {RYD00018043}.
[2946] {EXO00000708}.
[2947] {EXO00000714}.
[2948] See Chapter 58.
[2949] Crawford {Day11/116:9-18}.
[2950] Crawford {Day11/117:4}-{Day11/118:23}; {Day11/120:2-13}.
[2951] Hyett, Module 1 Report (revised) {PHYR0000029/135} paragraphs 4.4.140-4.4.141

it plain to whoever undertook the refurbishment of the window reveals that mineral wool (Rockwool) had been specified by Studio E.[2952] Studio E ought to have identified that omission on Harley's part and sought to rectify it.

Communication with building control

63.50 Studio E's contract with Rydon included responsibility for co-ordinating Building Regulation approval.[2953] However, its full plans submission to RBKC building control contained drawings that were out of date or inaccurate[2954] and was insufficient to demonstrate compliance with the Building Regulations.[2955] Further information was sent on a piecemeal basis. No complete package was ever sent to building control with clear information about the materials that were intended to make up the facade.[2956] Studio E's failure to provide comprehensive and accurate information to building control made it difficult for RBKC to discharge its own functions under the Building Regulations.[2957]

Quality control and training

63.51 Studio E's internal review processes and quality assurance systems were weak and contributed to the failures in design that we have described above. Although Mr Sounes recognised at the outset of the project that it was necessary for the firm to educate itself in what was involved in overcladding a high-rise building, no obvious attempt was made to do so.[2958] A reasonably competent architect undertaking a project of that kind for the first time would have researched it both from a technical and regulatory perspective.[2959] That would have included identifying and familiarising itself with any relevant regulations and guidance, including guidance published by reputable industry bodies. As far as we can see, Studio E did none of that.

63.52 Studio E had processes in place under which design work was intended to be subject to peer review, including in relation to matters of regulatory compliance,[2960] but the technical and design reviews it carried out on the Grenfell Tower project fell well short of what could reasonably be expected.[2961] The technical review was carried out far too late[2962] and no senior technically experienced member of staff not otherwise involved in the project had any involvement in checking the designs, in particular for compliance with the Building Regulations.[2963]

[2952] {HAR00008469}; {HAR00008470}; {HAR00008880}; Hyett, Module 1 Report (revised) {PHYR0000029/139} paragraph 4.4.145; {PHYR0000029/141} paragraph 4.4.149.
[2953] {RYD00094228/9}.
[2954] See Chapter 62, see also Hyett, Module 1 Report (revised) {PHYR0000030/60-64} paragraphs 5.4.29-5.4.34.
[2955] Menzies Module 1 Report {BMER0000004/9} paragraph 37.
[2956] Menzies {Day60/137:9}-{Day60/138:10}.
[2957] Hyett, Module 1 Report (revised) {PHYR0000030/64} paragraph 5.4.34.
[2958] {SEA00003567}.
[2959] Hyett, Module 1 Report (revised) {PHYR0000027/17} paragraph 2.5.14 and paragraph 2.5.12(b); Hyett {Day63/80:5-18}; {Day63/82:7}-{Day63/84:10}.
[2960] Kuszell {SEA00014271/7} page 7, paragraph 24.2; Kuszell {Day6/119:7-18}; Sounes {SEA00014273/62} page 62, paragraph 130.
[2961] Hyett, Module 1 Report (revised) {PHYR0000031/33-38} paragraphs 6.7.10-6.7.15 and 6.8.6.
[2962] Only one technical review was carried out by Studio E, on 28 October 2015. That was more than a year after it had submitted the full plans application to RBKC building control and when the external facade works were 60% complete – {RYD00014378}; {SEA00013508}; Hyett, Module 1 Report (revised) {PHYR0000031/33} paragraph 6.7.11.
[2963] As Mr Kuszell said should have happened, usually at RIBA Stage E/F – see Kuszell {SEA00014271/7} page 17, paragraph 24.2 and Sounes {SEA00014273/62} page 62, paragraph 130.

"As-built" drawings

63.53 It was Studio E's responsibility under its contract with Rydon to provide a set of "as-built" drawings at the end of the project.[2964] Although Studio E did so, the "as-built" drawings did not accurately record the structure of the building. For example, they did not contain reference to the type of insulation used[2965] and they inaccurately recorded that both zinc and ACM panels had been used in the cladding.[2966] "As-built" drawings are part of the information that should be handed over to the building owner as part of the health and safety file[2967] and are clearly an important record of the construction for future users of the building.

[2964] {RYD00094228/10} item 19.
[2965] {SEA00003436}.
[2966] {SEA00003436}.
[2967] See Chapter 61.

Chapter 64
The contribution of Rydon

Introduction

64.1 Rydon failed in a number of important respects properly to perform its role as primary contractor for the Grenfell Tower refurbishment. It promised the TMO that when completed the refurbishment would comply with the Building Regulations, but it did not. When co-ordinating, supervising and monitoring the work it did not give sufficient importance to the safety of the building's occupants and it displayed a casual attitude to fire safety throughout the project. As a result, Rydon bears considerable responsibility for the fire at Grenfell Tower.

The nature of Rydon's responsibilities on the project

64.2 Under its contract with the TMO Rydon was responsible for all aspects of the design and construction of the refurbishment[2968] and was obliged to ensure, among other things, that when completed the building complied with the Building Regulations. That obligation existed whether the work was carried out by Rydon itself or by its sub-contractors, consultants or other specialists.[2969]

64.3 Although the contract contemplated that Rydon might delegate design work to specialists,[2970] it remained responsible for the quality of the work carried out by those whom it engaged for that purpose. It also had an obligation to co-ordinate, integrate, supervise and monitor the work.[2971] However, many people other than Rydon and the TMO were liable to be affected by work carried out by sub-contractors and consultants, not least those who would occupy the building when the refurbishment had been completed. It is of no comfort to them to be told that Rydon remains responsible to the TMO for poor design or faulty workmanship or worse, when they have to suffer the consequences. In our view, therefore, regardless of any legal obligations, Rydon should have ensured that those it appointed as sub-contractors and consultants were sufficiently qualified to undertake the work and provide the services required of them effectively. Accordingly, Rydon cannot avoid all blame simply by relying on the engagement of specialist sub-contractors and designers, such as Studio E, Harley and Exova.[2972] Apart from anything else, Rydon itself had the important responsibility of overseeing their work and ensuring that it complied with the contract.

64.4 That was all the more so, given that Rydon was also the principal contractor under the CDM Regulations 2007 and 2015. Pursuant to the CDM Regulations 2007, its primary duty as principal contractor was properly to plan, manage and co-ordinate work during

[2968] JCT Design and Build Contract 2011 {RYD00094235/69} clause 2.17.1.3.
[2969] JCT Design and Build Contract 2011 {RYD00094235/69} clause 2.17.1.2.
[2970] JCT Design and Build Contract 2011 {RYD00094235/69} clause 2.17.1.1.
[2971] JCT Design and Build Contract 2011 {RYD00094235/69} clause 2.17.1.2; the Preliminaries, part 2A/44, s.A32 {TMO10041791/128} paragraph 110, which provided that Rydon was obliged to: "*Accept responsibility for coordination, supervision and administration of the Works, including subcontracts*"; the Preliminaries part 2A/57, s.A33 {TMO10041791/141} paragraph 630, which provided that Rydon had to establish and maintain quality control procedures, including in respect of the work of sub-contractors so that it complied with specified requirements.
[2972] See, for example, Rydon's Closing Submissions for Modules 1 & 2 at {RYD00094564/9} paragraphs 1.35-1.36.

the construction phase in order to ensure that health and safety risks were properly controlled.[2973] That included ensuring that it was competent to deal with any health and safety problems that arose during the construction phase,[2974] including risks from fire. It also included satisfying itself that the designers it engaged were competent and adequately resourced[2975] and ensuring co-operation between contractors and designers and the co-ordination of their work.[2976] In the event, Rydon failed to give fire safety the importance it deserved.

Rydon's expertise

An inexperienced team

64.5 Rydon's team working on the Grenfell Tower project were notably inexperienced. Simon Lawrence (contracts manager), Simon O'Connor (project manager) and Zak Maynard (commercial manager) were all acting in those capacities for the first time.[2977] That was not necessarily inappropriate, but Rydon should have responded to their lack of experience by taking steps to ensure they received sufficient supervision, training and support from others with greater experience. In the event, it plainly failed to do so.[2978] Although Stephen Blake said that Simon O'Connor's promotion to project manager had been nominal, in the sense that his role on the project had been effectively that of a site manager, no attempt was made to explain that to him or to ensure that the position of site manager was filled by someone else with suitable experience.[2979]

64.6 Rydon's failures in that respect contributed to a general lack of clarity about the responsibilities that its employees were expected to shoulder, a confusion that extended beyond Rydon. In many cases staff did not recognise the descriptions of themselves that Rydon had included in its tender documents. For example, Simon O'Connor was described as holding an HNC[2980] in Building Studies and as being responsible for "co-ordinating design", as "lead[ing] the on-site team in terms of design" and as "contribut[ing] technical expertise during value engineering", but, when asked for his comments, he disagreed with each of those assertions. He did not have an HNC and had not been involved in any value engineering process on any project.[2981] Stephen Blake accepted that the way in which Mr O'Connor's qualifications and experience had been described was thoroughly misleading.[2982]

A lack of knowledge

64.7 Those whom Rydon employed on the project lacked even the most basic knowledge of the regulatory regime within which the refurbishment was being carried out, including the relevant statutory and industry guidance and descriptions of best practice. None of Rydon's employees had any substantive knowledge of the Building Regulations or of the approved

[2973] Regulation 22(1) of the CDM Regulations 2007 {INQ00011315/11}; Approved Code of Practice to the CDM Regulations 2007, L144 {INQ00013936/36} paragraph 146.
[2974] Approved Code of Practice to the CDM Regulations 2007, L144 {INQ00013936/36} paragraph 150(b).
[2975] Approved Code of Practice to the CDM Regulations 2007, L144 {INQ00013936/37} paragraph 150(h).
[2976] Regulation 22(1)(i) of the CDM Regulations 2007 {INQ00011315/11}; Approved Code of Practice to the CDM Regulations 2007, L144 {INQ00013936/37} paragraph 151.
[2977] Email from Stephen Blake on 9 May 2014 regarding changes of structure and promotions {RYD00004258}.
[2978] O'Connor {Day26/179:15-23}; Blake {Day28/30:11}-{Day28/33:5}.
[2979] Blake {Day28/31:12}-{Day28/33:5}.
[2980] Higher National Certificate.
[2981] O'Connor {Day26/19:2}-{Day26/22:16}.
[2982] Blake {Day28/40:10-14}.

documents that applied to the project.[2983] Many of its witnesses did not even know that different kinds of rainscreen cladding panels were available, and those who did had no understanding of the ways in which the different materials reacted to fire.[2984]

64.8 Rydon had no, or no effective, system for ensuring that its employees received regular training during their employment. Simon Lawrence had never discussed training with his peers or supervisors and Stephen Blake conceded that he had not undertaken any continuing professional development in the period between leaving university in 1985 and the fire in 2017.[2985] Rydon thus failed to take any steps to maintain or improve the competence of its employees or its awareness as a business of matters affecting fire safety.

Reliance on third parties

64.9 The lack of knowledge and experience among Rydon's own employees was such that it did not have a clear understanding of fire safety matters or any way of determining for itself whether the work of its sub-contractors satisfied basic fire safety standards, let alone the requirements of the Building Regulations. Importantly, it was in no position to know whether the right questions had been asked or to evaluate the information given to it. As far as fire safety was concerned, the evidence of Rydon's witnesses showed that it was untroubled by either consideration and failed to consider even the simplest questions relating to the design of the facade from the point of view of fire safety. There was, for example, no discussion internally about the Building Regulations or Approved Document B, nor about which route to compliance was being followed for the cladding system, and it did nothing itself to find out whether the ACM panels proposed for use on the tower were suitable for that purpose.[2986]

64.10 Although Rydon was of course entitled to expect its sub-contractors to carry out their work competently and in accordance with their own contractual obligations, that did not relieve it of its responsibility to the TMO for the quality of their work, nor did it relieve it of its responsibility to co-ordinate and supervise their work. At the very least, Rydon should have been aware of all those aspects of the design that required the attention of appropriately qualified professionals so that it could satisfy itself that people with the necessary skill and training had applied their minds to them. That is what is involved in co-ordinating and supervising the design process. Rydon was not aware of any of the questions that needed to be considered as part of the design process and so failed to exercise the degree of supervision that we consider was required.

64.11 Rydon conceded that in substance it had provided the TMO with nothing more than a management service.[2987] In reality, it had organised the work being carried out by a web of sub-contractors and consultants, acting as a channel of communication between the TMO and the various persons contributing to the project in their different capacities. However, it is clear that Rydon failed in number of important respects to perform even its management role properly. It was not appropriate or safe for a contractor undertaking a project on the scale of the Grenfell Tower refurbishment to conduct its business in that manner.

[2983] Lawrence {Day22/71:1-4}; O'Connor {Day26/75:16-23}; Hughes {Day27/28:25}-{Day27/29:12}; Blake {Day28/63:11-13}; Martin {Day30/16:17}-{Day30/18:16}; Osgood {Day30/107:4-10}.
[2984] Lawrence {Day24/21:13-23}; O'Connor {Day26/27:18-24}; Hughes {Day27/53:24} –{Day27/54:1}; Blake {Day28/48:20-24}; Osgood {Day30/141:5-7}; {Day30/184:1-3}; {Day30/185:17-24}; {Day30/188:9-11}; {Day30/115:13-15}; {Day30/141:5-7}; {Day30/110:1-6}.
[2985] Lawrence {Day22/104:22-24}; Blake {Day28/41:10-15}.
[2986] Blake {Day28/86:8-12}; Lawrence {Day23/179:2-7}.
[2987] Blake {Day28/66:21}-{Day28/69:1}; Email from Simon Lawrence to David Brissenden on 22 April 2015 {RYD00039525/3}; Lawrence {Day22/108:10-19}.

Failure to investigate the competence of sub-contractors

64.12 Although Rydon relied entirely on its sub-contractors and consultants to perform its own contractual obligations to the TMO, it made no serious effort to find out whether the bodies it proposed to engage for that purpose were competent.

64.13 Studio E had been responsible for producing the outline design for the refurbishment and the NBS Specification. Although Rydon was required under its contract with the TMO to accept Studio E as lead designer and enter into a contract with it,[2988] it did not attempt to assess the quality of the work that Studio E had already done.[2989] Instead, it relied entirely on an assumption that Harley would take the initiative by raising any concerns it had about Studio E's work. For its own part, Rydon never asked Harley to examine Studio E's work on its behalf and never asked Harley directly whether it had evaluated the work Studio E had done.[2990]

64.14 Rydon did not become aware that Studio E had not previously undertaken a project of that kind and never had a clear understanding of, or even a desire to understand, the extent to which Studio E was conversant with the requirements of the Building Regulations or Approved Document B in so far as they applied to it.[2991] If it had been aware of Studio E's lack of experience in overcladding high-rise buildings, it is possible that Rydon would have taken more seriously the need to instruct a fire engineer to assess the safety of the external wall.

64.15 Similarly, Rydon made no specific assessment of Harley's competence to undertake the refurbishment project, relying largely, if not solely, on the fact that it had previously employed Harley as a sub-contractor on other projects, including the Chalcots Estate and Ferrier Point projects.[2992]

The fire safety strategy

64.16 As principal contractor it was Rydon's responsibility to ensure that sufficient expertise and resources were made available to the project and that the work carried out by external consultants, such as Exova, was satisfactory. In the event, Rydon's approach to Exova, and to fire engineering generally, was alarmingly complacent.

64.17 Rydon appears to have had no interest in the use of a fire engineer on the Grenfell Tower project. It attended a contractor induction meeting on 1 April 2014, two weeks after it had been appointed as principal contractor, at which the involvement of Exova was discussed.[2993] The minutes of that meeting record that Exova had completed the fire strategy at the tender stage and that the company's services had not been transferred to Rydon but that Mr Lawrence would contact it with a view to instructing it for the future.[2994] (The minutes, drafted by Artelia, were misleading because the fire strategy had not been completed at the tender stage and indeed never was completed.) Despite that commitment, however, he made no attempt to find out who was Exova's client or what

[2988] {RYD00003489/115} clause 7F.
[2989] Rydon was fully responsible for the design of the works, including any design contained in the Employer's Requirements, and for any discrepancy in or divergence between the Employer's Requirements and/or the Contractor's Proposals and/or any drawings, details, documents and other information submitted by him. It was also responsible for adopting and taking responsibility for any design work carried out by professional consultants at the request of the TMO {RYD00094235/69} clause 2.17.1.2; Lawrence {Day22/132:1}-{Day22/139:5}.
[2990] Lawrence {Day22/133:11} – {Day22/135:5}.
[2991] Lawrence {Day22/135:6}-{Day22/136:10}.
[2992] Lawrence {Day23/48:17-25}.
[2993] {ART00002255}.
[2994] {ART00002255/4} item 5.3.

were the terms on which it was acting.[2995] He had no discussions with the TMO, Studio E or Artelia about the role that Exova might play in the future of the project.[2996] He repeated his assurance that he would contact Exova at several subsequent site meetings, but failed to take any action in respect of it.

64.18 Mr Lawrence explained to Bruce Sounes in March or April 2014 that Rydon did not normally appoint fire engineering consultants on the assumption that the safety of the design had been established before it had been appointed and was not its responsibility.[2997] In his view, it was the responsibility of building control to identify any defects in the design.[2998]

64.19 Simon Lawrence said that Rydon had considered asking Exova to advise on the alterations to the lower four floors of the tower between April and October 2014,[2999] but there is no contemporaneous evidence that it considered using Exova or any other fire engineer for that purpose.[3000] We do not think that Rydon gave any genuine consideration to seeking the advice of a fire engineer in respect of the lower four floors, or indeed at all.

64.20 In the event, Rydon took a positive decision not to appoint a fire engineer, probably because it did not think that it needed to do so in order to protect its own interests. The decision was taken without consulting the TMO, Studio E, Harley or any other party that might have had an interest in receiving fire safety advice.[3001] Indeed, there is nothing in the contemporaneous evidence to indicate that Rydon told anyone that it had made a decision of that kind. Simon Lawrence professed not to know whether Rydon had told the TMO or Studio E that it was no longer considering the appointment of a fire engineer,[3002] but the complete absence of any indication that it did so suggests strongly that it did not. Rydon should have appreciated that it was ill-equipped to make an informed judgement about the need for fire engineering advice and should therefore have consulted the TMO (its client) and Studio E (its principal designer) before making any decision.

64.21 To the extent that Rydon investigated the quality of Exova's work at all, its actions were cursory and superficial. Rydon received Issue 3 of Exova's Outline Fire Safety Strategy as part of the tender documents[3003] and accepted that it contained the fire safety strategy underpinning the design work that had been carried out before its appointment.[3004] Nonetheless, it did not ask Studio E whether Exova's work had been sufficient for its purposes and did not attempt to familiarise itself with the terms on which Exova had been appointed.[3005] It does not appear to have occurred to Rydon that the title of the Outline Fire Safety Strategy itself suggested that it might not be in final form.[3006] Each of those was a serious failure on the part of Rydon.

64.22 Rydon's evidence was that it believed that Issue 3 of Exova's Outline Fire Safety Strategy was comprehensive and provided all the information needed to ensure that the design of the refurbishment was safe.[3007] That was self-evidently not the case, however, given the

[2995] Lawrence {Day23/51:9-15}; {Day23/53:11-21}.
[2996] Lawrence {Day23/52:4-10}.
[2997] See Chapter 54; Sounes {SEA00014273/152} page 152, paragraph 372.
[2998] Sounes {SEA00014273/152} page 152, paragraph 372; Lawrence {Day23/65:17-24}; {Day23/74:8-12}.
[2999] Lawrence {Day23/63:14-20}.
[3000] See Chapter 54; Lawrence {Day23/79:13}-{Day23/80:7}.
[3001] Lawrence {Day23/80:8-21}.
[3002] Lawrence {Day23/80:22}-{Day23/81:17}.
[3003] {TMO10007081/3} Item 115.
[3004] Lawrence {Day23/85:4-6}; {Day23/88:4-9}.
[3005] Lawrence {Day23/85:16-25}.
[3006] Lawrence {Day23/89:2-7}.
[3007] Lawrence {Day23/89:24}-{Day23/90-1-2}.

expressly provisional nature of the opinion provided in respect of functional requirement B4(1). Furthermore, Rydon did not ask what information Exova had used in compiling it, assuming instead that it had been prepared on the basis of all the information in the tender pack.[3008] However, Simon Lawrence did not know whether Exova had seen the NBS Specification[3009] and no one at Rydon appears to have noticed that Exova's description of the project did not include overcladding or any reference to the system it was proposed to use.[3010] Mr Lawrence assumed that Exova had been involved in the design of the refurbishment from the outset, but did not ask anyone whether that had actually been the case.[3011]

64.23 In fact, Issue 3 of the Outline Fire Safety Strategy contained no proper assessment of compliance with functional requirements B3 or B4 of the Building Regulations, and in the case of functional requirement B4 stated only that the provisional opinion that the proposed changes would have no adverse effect on the building in relation to external fire spread would be confirmed by an analysis in a future issue of the report.[3012] Although Simon Lawrence had reviewed Issue 3 of the Outline Fire Safety Strategy in late 2013 or early 2014 and again in September 2014,[3013] he failed to notice that no further issue of the report had been produced.[3014] Rydon therefore took no steps to ensure that it was forthcoming.[3015]

64.24 Simon Lawrence appears to have understood that part of the report to mean that the cladding would have no adverse effect on the fire safety of the tower provided Rydon ensured that it complied with functional requirement B4.[3016] However, if that had been its meaning, it would have rendered Exova's analysis pointless. There could be no reasonable basis for any such understanding.

64.25 Rydon appears to have thought that any defects in the design or choice of materials would ultimately be identified by building control,[3017] but that reflected a fundamental misunderstanding of the role of building control.

64.26 When giving evidence Simon Lawrence accepted that it was the responsibility of a design and build contractor to satisfy itself that the fire strategy for a given project was correct.[3018] It seems clear to us, however, that Rydon simply did not trouble to understand what Issue 3 of the Outline Fire Safety Strategy did and did not cover and what reliance could reasonably be placed on it. Rydon understood that it was ultimately responsible for ensuring the fire safety of the refurbished building,[3019] but it abdicated that responsibility by failing to take an interest in Exova's work.[3020] Rydon should have been aware that Exova had not provided

[3008] Lawrence {Day23/90:13}-{Day23/91:1}.
[3009] Lawrence {Day24/115:11-25}.
[3010] Grenfell Tower Outline Fire Safety Strategy {CST00000085/4}; Lawrence {Day23/91:9}-{Day23/92:1}.
[3011] Lawrence {Day23/92:18-24}.
[3012] Grenfell Tower Outline Fire Safety Strategy {CST00000085/9} paragraph 3.14.
[3013] Lawrence {Day23/84:20}-{Day23/85:2}; {Day23/94:14-16}.
[3014] Lawrence {Day23/94:17}-{Day23/95:11}.
[3015] Lawrence {Day23/95:12-19}.
[3016] Lawrence {Day23/95:21-24}; {Day23/97:4-7}.
[3017] Lawrence {Day23/94:17}-{Day23/97:21}.
[3018] Lawrence {Day23/70:24}-{Day23/71:5}.
[3019] Lawrence {Day23/83:17-25}.
[3020] Lawrence {Day23/83:2-7}.

a final opinion on compliance with functional requirement B4[3021] and should have ensured that it was provided. Simon Lawrence was content for Studio E to obtain free advice from Exova but clearly decided that Rydon would not be paying for it.[3022]

64.27 We have concluded that the exchanges of emails in September 2014 involving Exova[3023] should have alerted Rydon to three important things. First, it should have been clear to Rydon that Exova was giving advice to the design team on the basis of incomplete information. Second, Rydon should have noticed that Harley and Studio E were unable to reach a settled view on the appropriate design strategy for cavity barriers in the facade of the tower and that they might therefore benefit from the assistance of an independent fire engineer. Third, if Rydon had been aware that in Issue 3 of its Outline Fire Safety Strategy Exova had provided only a provisional conclusion on compliance with functional requirement B4, it should have been alerted to the need to obtain a fully considered opinion to complete the work. None of those matters required Rydon to have its own specialist design or fire engineering expertise. On the contrary, they fall well within the capacity of a reasonably competent design and build contractor.

64.28 As we have already said, Rydon's role was to take the lead in ensuring that important issues such as fire safety were properly considered. In our view, its approach to the involvement of Exova represents a serious failing. It is telling that Simon Lawrence conceded, in hindsight, that the advice of a fire engineer is essential on any construction project with any significant degree of complexity.[3024] That Rydon did not realise that at the time indicates the extent of its general lack of concern for fire safety in relation to the project.

Failure properly to evaluate and co-ordinate design work

64.29 Rydon's internal system for evaluating and co-ordinating the design work was inadequate. One effective tool that it could and should have used to co-ordinate the design process effectively was a matrix of responsibilities identifying which of the many sub-contractors and consultants was responsible for particular aspects of the work. Such a matrix should ensure that everyone involved in a project knows where responsibility lies for each decision and is important for the effective management of any design and build contract.[3025] In the absence of a matrix of responsibilities it was extremely difficult, if not impossible, for Rydon to ensure that its sub-contractors and consultants properly understood their separate responsibilities or that Rydon itself understood where responsibility for individual decisions lay. Its failure to establish a matrix of responsibilities resulted in a failure on the part of those responsible for the design of the cladding to recognise that they were responsible for various critical decisions affecting fire safety, including the compliance of the cladding with the Building Regulations.

Failure properly to monitor sub-contractors

64.30 Rydon appears to have assumed that Studio E was co-ordinating the design work. As early as April 2014, it authorised Studio E and Harley to talk directly to each other about matters of design, provided that all correspondence was copied to itself.[3026] For such an approach to be successful, however, Rydon had to take active steps to ensure that Harley and

[3021] Hyett, 'Failures of Statutory Compliance' (Amended Report) {PHYR0000029/28} paragraph 4.2.22.
[3022] Email from Simon Lawrence to Neil Crawford cc Simon O'Connor on 19 September 2014 at 14:25 {SEA00011754/1}; Lawrence {Day23/72:12-18}.
[3023] {SEA00011754}.
[3024] Lawrence {Day23/48:6-9}.
[3025] Hyett, 'Failures of Statutory Compliance' (Amended Report) {PHYR0000029/87} paragraphs 4.4.17-4.4.18.
[3026] {HAR00000927}; Lawrence {Day23/167:6}-{Day23/168:12}.

Studio E were working effectively together and that all relevant matters of design were being considered, but it failed to do so. On the contrary, it relied on Studio E and Harley to lead the design process, which it saw as a "free flow" of information between Studio E and Harley, in which it did not need to play an active role.[3027] It intervened only if it saw that an element of the design was missing or if one of them complained about the other's performance,[3028] but it was ill-equipped to determine whether something was missing, given that it had no proper system for monitoring the design process and employed no one qualified to identify any defects.

64.31 Rydon also failed to make use of an electronic drawing control system, which meant that it was not able to co-ordinate the exchange of drawings between Harley and Studio E or indeed to understand which drawings had been issued and which were missing.[3029] Rydon did not tell anyone at Studio E that it was expecting Studio E to co-ordinate the drawing exchange process on its behalf or that it had no proper drawing control system of its own.[3030] Moreover, Rydon had no system in place for recording design changes throughout the project, save for a tracker that Simon Lawrence started himself to monitor changes that had programme and cost implications.[3031]

64.32 Design drawings produced by Harley were sent to Studio E for comment, but Studio E reviewed them only to ensure that they complied with architectural intent and contained no obvious errors. Rydon does not appear to have asked itself whether such a limited examination was sufficient to enable Studio E to discharge its contractual obligation to examine Harley's drawings and report on them, or to discharge Rydon's own obligation to the TMO to ensure that the design of the refurbishment complied with statutory requirements.[3032] Indeed, Rydon never turned its mind to the question whether Studio E was actually considering statutory compliance when it reviewed design drawings.[3033] By failing to ask those questions Rydon failed to ensure that the design of the cladding was safe, at least as far as fire was concerned.

Undue reliance on previous projects

64.33 Insofar as Rydon turned its mind to the fire performance of the products used in the refurbishment at all, it assumed they were safe because it had used them on previous projects, particularly the Chalcots Estate and Ferrier Point projects, where it had worked with Harley to install ACM rainscreens.[3034]

64.34 However, Rydon failed to learn important lessons from the fire that took place at Taplow House on the Chalcots Estate on 16 January 2012. The fire gave it direct experience of the potential importance of fire barriers, particularly around windows, in preventing the spread of fire over the walls of high-rise residential buildings, but there is no evidence that it applied that knowledge to the Grenfell Tower refurbishment.[3035] Rydon had no system for sharing that experience or the learning derived from it with its employees. Nor did it have any system for ensuring that such lessons were heeded in its future work.[3036]

[3027] Lawrence {Day22/181:18-23}; Lawrence {Day23/25:17}-{Day23/28:14}.
[3028] Lawrence {Day23/27:1-6}; O'Connor {Day26/37:16-24}.
[3029] Lawrence {Day22/165:9}-{Day22/167:23}.
[3030] Lawrence {Day22/168:1-9}.
[3031] Lawrence {Day23/31:20}-{Day23/40:17}; {ART00003086}; {ART00008861}; {RYD00022907}.
[3032] Lawrence {Day22/182:11}-{Day22/185:20}; Crawford {SEA00014275/78} page 78, paragraph 256; Crawford {Day9/85:11}-{Day9/92:12}.
[3033] Lawrence {Day22/185:10-20}.
[3034] Lawrence {Day22:178/11}-{Day22/179:8}.
[3035] Blake {Day29/127:9-19}.
[3036] Blake {Day29/124:3-9}.

Inappropriate reliance on building control

64.35 Rydon attempted to mitigate its lack of expertise by excessive and inappropriate reliance on building control, epitomised by Simon Lawrence's evidence that he saw building control as a "resource" on which he could rely because Rydon was paying a fee for it.[3037] Rydon viewed building control as the body that would ensure that its sub-contractors were complying with their contractual obligations,[3038] but in our view it is never appropriate for a principal contractor (or any other party) to rely on building control to ensure that its designs comply with the Building Regulations.

64.36 In this case, it was particularly inappropriate and unsafe for Rydon to rely on building control to the extent that it did because its haphazard communications with building control meant that it could never be confident that it had given building control the information it needed properly to evaluate the design. For example, Rydon approved the substitution of Celotex RS5000 by Kingspan K15 (a product with a different chemical composition) and took no steps to conduct any investigation of its own into the suitability of the product or to ensure that building control and the TMO had been alerted to the change.[3039]

Failure to respond to concerns about fire safety

64.37 Rydon failed on at least two occasions to provide proper responses to specific enquiries about fire safety, indicating a lack of interest in the subject.

64.38 On 12 November 2014 Claire Williams wrote to Simon Lawrence seeking clarification on the fire retardance of the new cladding and saying that she had just had a "Lacknall moment".[3040] There is no evidence that he or anyone else at Rydon responded in any way to the email.

64.39 On 10 April 2015, Ms Williams wrote to Simon O'Connor and asked him for the fire rating of the cladding and fixings and to confirm their acceptance by building control.[3041] Although Ms Williams chased for a response, Rydon appears to have taken no action in response to her request.

The window reveals

64.40 As set out in detail in Chapter 56, Rydon failed to ensure that the non-combustible insulation material which had been specified by Studio E in the NBS Specification was used around the windows and instead allowed the use of combustible Celotex and Kingspan insulation products. Rydon also changed the internal window surrounds from plywood to uPVC without seeking the approval of the TMO or considering the fire safety consequences of doing so. The consequences were very serious because the deformation of the uPVC window surrounds in the kitchen of Flat 16 is most likely to have been the means by which fire first entered the cladding on 14 June 2017.

[3037] Lawrence {Day23/74:1-12}.
[3038] Lawrence {Day22/68:7-15}; {Day23/2:21}-{Day23/3:12}; {Day24/192:12}-{Day24/199:10}; {Day25/12:18}-{Day25/14:1}; {Day25/18:14}-{Day25/24:9}; O'Connor {Day26/167:24}-{Day26/168:2}; Hughes {Day27/18:12}-{Day27/19:10}; Blake {Day29/70:22}-{Day29/74:1}; Sounes {SEA00014273/152} page 152, paragraph 372.
[3039] Blake {Day29/117:13-17}.
[3040] {RYD00023468}.
[3041] {TMO00858290}.

Failures in site supervision

64.41 Rydon was responsible for inspecting the work done by Harley and other sub-contractors at Grenfell Tower,[3042] but the inspections it carried out were inadequate because they failed to detect some serious defects in workmanship, particularly in relation to cavity barriers. In many cases the effectiveness of cavity barriers was reduced as a result of poor attachment to the concrete walls, fitting in the wrong orientation or installation in the wrong location.[3043] Rydon accepted that the quality of workmanship in those cases was very poor, but could not explain how it had failed to detect it.[3044] In substance, Rydon's employees appeared to have regarded its quality control process as little more than a snagging inspection, but that fell far short of performing its obligation to ensure that the work had been properly carried out.

64.42 One important reason for Rydon's failure to ensure that the work done at Grenfell Tower was of proper quality was that those appointed to manage and inspect it were ill-equipped to do so. Daniel Osgood was brought onto the project between 27 April 2015 and 24 July 2015 to oversee the installation of the cladding.[3045] Although he had previously worked on similar projects as a fitter, he had never worked with ACM panels.[3046] He had never received any training in how to inspect cladding installations or in the requirements of the Building Regulations and he did not know that there was statutory guidance on the construction of the external walls of buildings over 18 metres in height.[3047] Mr Osgood assumed that all materials installed on the outside of buildings were entirely "fireproof".[3048] He did not know of the need for cavity barriers to be installed around windows and was not aware of the difference between Rockwool (a non-combustible mineral wool insulation product) and Celotex RS5000 (a combustible PIR insulation product).[3049]

64.43 David Hughes was appointed in October 2015 as lead site manager, which required him to take responsibility for the inspection of Harley's work at a critical stage of the project.[3050] He had not previously worked on a project that involved fitting cladding to a high-rise building.[3051] He did not understand, even in broad terms, the functional requirements of the Building Regulations, was not aware that the external walls of buildings should adequately resist the spread of fire over the surface, was not aware that guidance had been published on the construction of the external walls of buildings over 18 metres in height, was not aware of the expression "limited combustibility" and was not aware that cavity barriers should be fitted around windows.[3052]

64.44 Rydon compounded the problem by failing to ensure that inspections were carried out in accordance with relevant guidance, such as the overcladding specification produced by Curtins Consulting and the manufacturers' instructions for the installation of insulation and

[3042] {TMO10041791/141} at A33/630.
[3043] Lane, 'Section 8 – The External Wall – Materials and Construction' {BLAS0000008/40} figure 8.42; {BLAS0000008/41} figure 8.44; {BLAS0000008/44} figure 8.47; {BLAS0000008/46} figure 8.50; Hughes {Day27/115:5}-{Day27/116:11}.
[3044] Osgood {Day30/154:17}-{Day30/158:11}; O'Connor {Day26/172:18-25}.
[3045] Osgood {Day30/100:2}-{Day30/103:1}.
[3046] Osgood {Day30/95:4}-{Day30/97:13}.
[3047] Osgood {Day30/97:14}-{Day30/109:23}.
[3048] Osgood {Day30/110:4-6.}; {Day30/115:13-15}; {Day30/118:19-20}.
[3049] Osgood {Day30/141:5-7}; {Day30/184:1-3}; {Day30/185:17-24}; {Day30/188:9-11}; {Day30/115:13-15}; {Day30/110:1-7}.
[3050] Hughes {RYD00094213/5} page 5, paragraph 22.
[3051] Hughes {Day27/6:7-9}.
[3052] Hughes {Day27/28:25}-{Day27/34:20}.

cavity barriers.[3053] Rydon also exercised little, if any, meaningful control over the materials that were used on site by its sub-contractors, trusting them instead to use only those which were appropriate.[3054]

64.45 It is also clear that the quality of Rydon's work and its approach to the project more generally was poor. From mid-2015, when the project was nearing completion, the TMO and Artelia repeatedly raised concerns with Rydon about the resources it had dedicated to the project and its apparent inability or unwillingness to resolve complaints about the quality of the work.[3055] In June 2015, Simon Lawrence candidly reported to Stephen Blake that they had a poorly performing site, mainly the result of poor surveying and cheap, incompetent sub-contractors.[3056] In May 2016 Neil Reed of Artelia reported to Simon Cash that he had never before worked with a contractor demonstrating such a level of nonchalance.[3057] Both Simon Lawrence's and Neil Reed's statements reflect a contemporaneous perception, supported by other evidence before us, that the general quality of Rydon's work fell significantly below that which could be expected of a reasonably competent design and build contractor.

Regulation 38 and the health and safety file

64.46 Rydon sub-contracted the collation of information required for the purposes of complying with regulation 38 of the Building Regulations and the preparation of the health and safety file required by the CDM Regulations to All Group Holdings Ltd. However, nobody at Rydon checked the operation and maintenance manual or the health and safety file to ensure it was complete and accurate. Stephen Blake did not consider that to be Rydon's responsibility.[3058] Mr Hughes said that he had taken a quick look at a draft of the operation and maintenance manual[3059] but had not received the final version.[3060] Rydon ought to have checked All Group Holding's work. It is doubtful whether the information provided to the TMO satisfied either regulation 38 or the requirements of the CDM Regulations.

64.47 Mr Hoban said that he had asked David Hughes whether Rydon had given the TMO the information required by regulation 38 and that Mr Hughes had told him that the necessary information was being sent to the TMO. We do not understand how Mr Hughes was able to give that assurance.[3061]

[3053] {ART00000914}; Lawrence {Day22/58:22}-{Day22/60:19}; Hughes {Day27/21:1-22}.
[3054] O'Connor {Day26/96:15-24}.
[3055] {ART00006206}; {TMO00859230}; {ART00006681/3}; {ART00006657}; {ART00006641/1}.
[3056] {RYD00044349}.
[3057] {ART00006672}.
[3058] Blake {Day29/170:16}-{Day29/171:9}.
[3059] Hughes {Day27/205:1-2}.
[3060] Hughes {Day27/205:3}.
[3061] Hoban {Day46/200:18-24}; Hughes {Day27:202:25}-{Day27/203:8}.

Chapter 65
The contribution of Harley

Introduction

65.1 In July 2014 Rydon appointed Harley as a sub-contractor to carry out the design and construction of the overcladding of Grenfell Tower. On 25 July 2014[3062] Zak Maynard sent an undated letter of intent signed by Simon Lawrence[3063] on behalf of Rydon as an attachment to an email to Mark Harris of Harley. The letter of intent stated that Rydon intended to appoint Harley as the envelope package sub-contractor. On 16 September 2014 Zak Maynard confirmed that the scope of the letter of intent had been increased to cover the full value of the work. Although the letter of intent contemplated that the parties would enter into a formal contract for the work, Rydon did not provide a document and Harley does not appear to have pressed for one. As a result, the parties did not execute a formal written agreement and their relationship was governed at all material times by the terms of the letter of intent.[3064]

65.2 The letter of intent provided that the contract between Harley and Rydon was subject to the terms of the DOM2 Articles of Agreement[3065] and Subcontract Conditions.[3066] It described the work to be carried out and the conditions under which the contract was to be performed by reference to nine Appendices.[3067] Under the contract Harley was responsible for all aspects of the design of the facade. In particular, it bore responsibility for ensuring that the design of the facade complied with all statutory requirements, including the requirements of the Building Regulations. Moreover, all the provisions of the draft building contract between Rydon and the TMO were incorporated into the letter of intent, insofar as they were relevant to the sub-contract works.[3068] They included an obligation to accept full responsibility for the design of the project and the selection of materials, including the work carried out by Studio E.[3069] In those circumstances, Harley accepted responsibility to Rydon for the contents of the NBS Specification insofar as they related to the design of the facade.[3070]

65.3 In its closing statement Harley pointed out that it had no formal contract with Rydon, simply a letter of intent with a large number of appendices which incorporated the terms of Rydon's contracts with the TMO, not all of which it had read in full.[3071] That was put

[3062] {RYD00013524}.
[3063] Letter of Intent {HAR00000120}.
[3064] Letter of Intent {HAR00000120}; Maynard {Day31/44:8-17}; {Day31/51:11-20}; {Day31/54:11}-{Day31/55:1}; Bailey {Day32/57:4-25}; Harris {Day34/14:7-11}; {Day34/16:2-7}.
[3065] DOM2 2011 Sub-Contract Articles of Agreement {INQ00011295}.
[3066] DOM 2011 2011 Sub-Contract Conditions {INQ00011211}.
[3067] Appendix A: Scope of Works & Ascertainment of Lump Sum Price (Envelope Package) dated 25 July 2014 {HAR00000397}; Appendix B: Rydon Standard Terms and Conditions {HAR00000389}; Appendix C: The Rydon Way {HAR00000390}; Appendix D: Subcontractor Pre-Contract Interview dated 16 June 2014 {HAR00000391}; Appendix E: Traffic Management Plan {HAR00000392}; Appendix F: Schedule of Information {HAR00000396}; Appendix G: Site Protection Policy {HAR00000393}; Appendix H: Payment Schedule {HAR00000394}; Appendix P: Programme of Works {HAR00000395}.
[3068] Letter of Intent {HAR00000120/2} clause 2(b).
[3069] Letter of Intent {HAR00000120/2} clause 2(b); DOM2 Subcontract Conditions {INQ00011211/8} clause 2.5.1; The Design and Build Contract {RYD00094235/69} clause 2.17.
[3070] Ray Bailey {Day32/85:12}-{Day32/87:10}.
[3071] {HAR00020580/6}, paragraph 12.

forward as an explanation of its failure to understand the full extent of its contractual obligations and as a reason for following common practices within the industry. However, it is clear that any organisation that enters into a contract of this kind, no matter how complex its terms, has a responsibility to understand the nature of the obligations it has undertaken. Simply failing to understand the contract and following industry practices will not do. Despite that, however, Harley was aware that it had a responsibility to check that the materials described in the NBS Specification were suitable and to ensure that on the completion of the work the external walls of the tower complied with the Building Regulations, including functional requirement B4(1).

65.4 It is clear that Rydon and Studio E both regarded Harley as an expert in the design and construction of ventilated rainscreen facades and expected it to bring to bear the skill and experience that could be expected of an expert sub-contractor of that kind. If it had stopped to think about it, Harley must have known that. With that in mind we obtained a report from Mr Jonathan Sakula MA, Ceng., FIStructE, FICE,[3072] to help us understand what could be expected of a reasonably competent facade contractor in the period between January 2012 and June 2017. Mr Sakula also gave oral evidence.[3073]

65.5 In a closing statement Harley challenged Mr Sakula's evidence on the grounds that he had limited experience of the use of ACM products on high-rise buildings and was himself a facade consultant rather than a cladding contractor, the suggestion being that he had little experience of the practical world in which companies such as Harley operate. We found that argument surprising, not only because it proceeds on the footing that Harley was not an expert in designing and installing building facades, but also because Harley accepted that it had undertaken significant responsibilities for ensuring the suitability of the materials that others had proposed using. We found Mr Sakula an impressive witness and we were not asked to hear evidence from anyone else who had experience of the cladding industry at the time in question. Although we have been mindful of the scope of his experience and of the various arguments put forward on Harley's behalf, we have generally accepted his evidence as reliable.

65.6 In the light of the evidence as a whole, we consider that Harley's work on the refurbishment was characterised by a failure to take its responsibilities seriously, ignorance, complacency and a failure properly to manage its staff. As the specialist contractor responsible for the external wall of the tower, the standard of Harley's work fell well below that to be expected of a reasonably competent cladding contractor and it must therefore bear a significant degree of responsibility for the fire.

Technical competence

65.7 We are satisfied that Harley failed to achieve the standard of a reasonably competent cladding contractor in several different aspects of its work. Many of those failures had the same root cause, namely, the inadequate technical expertise of its employees and representatives.

[3072] Sakula, Grenfell Tower Inquiry, Phase 2, Module 1, Report of Facade Expert {JOS00000001}.
[3073] Sakula {Day125}.

The Building Regulations and Approved Document B

65.8 At the time of the refurbishment Ray Bailey considered himself to be as well placed as anyone in the specialist cladding industry to advise on whether materials used in the construction of an external wall complied with the applicable regulations.[3074] However, he conceded that he had not read through Approved Document B for some years and had then found it quite complicated.[3075] He considered himself to have a working, but not a detailed, knowledge of it.[3076]

65.9 Although Daniel Anketell-Jones later completed an MSc in facade engineering, at the time of the refurbishment his knowledge of the Building Regulations did not extend beyond matters relating to structural stability and he was not very familiar at all with Approved Document B.[3077] Ben Bailey said that he had seen parts of Approved Document B but had never received any training to help him understand the Building Regulations, Approved Document B or any of the associated guidance.[3078] Both Mark Harris and Mike Albiston candidly admitted that they had not been competent to advise on any question of compliance with the Building Regulations or Approved Document B.[3079]

65.10 Before he became involved in the refurbishment, Kevin Lamb had never undertaken any formal training on the Building Regulations or the guidance in the approved documents.[3080] He said that he had taken steps to refresh his memory of Approved Document B during the refurbishment[3081] but did not think that it was his responsibility to look at it in any detail.[3082] He did not give a second thought to which route to compliance was being adopted.[3083]

65.11 Accordingly, Harley's own evidence was that none of those engaged on the refurbishment had any more than a passing familiarity with the relevant Building Regulations or approved documents. That, in our view, was unacceptable for an organisation which held itself out to be a specialist cladding contractor.[3084]

65.12 Harley held itself out as a specialist cladding contractor with sufficient technical expertise to undertake what was, on any view, a large and complicated project. Under its contract with Rydon it was responsible for the design of the cladding and for ensuring that it complied with the relevant statutory requirements.[3085] At the very least, therefore, it should have been familiar with the regulations and with any statutory and industry guidance that was relevant to its work. It is difficult to understand how Harley could reasonably have believed it could discharge its obligations to Rydon without having that essential technical knowledge.

65.13 According to Jonathan Sakula, whose expert opinion on this point we accept, at that time a reasonably competent cladding contractor would have had a system in place for checking the suitability of any products proposed for use on a refurbishment project of that kind.[3086] In order for such a system to function effectively it would have to be managed by someone

[3074] Ray Bailey {Day32/8:2-9}.
[3075] Ray Bailey {Day32/6:20-21}.
[3076] Ray Bailey {Day32/6:21-22}.
[3077] Anketell-Jones {Day35/119:3-15}; {Day35/122:22-23}.
[3078] Ben Bailey {Day39/18:10-24}.
[3079] Harris {HAR00010159/8} page 8, paragraph 34; Harris {Day34/7:12-24}; Albiston {Day35/35:18-25}.
[3080] Lamb {Day37/70:18-22}.
[3081] Lamb {Day37/130:2-5}.
[3082] Lamb {Day37/131:3-5}.
[3083] Lamb {Day37/142:1-14}.
[3084] Sakula {Day125/27:16}-{Day125/30:12}; {Day125/34:1-7}.
[3085] Undated Letter of Intent from Rydon Management Systems to Harley Curtain Wall Ltd {HAR00000120/1-2} Item 1.
[3086] Sakula {Day125/26:23}-{Day125/27:2}; {Day 125/26:2-12}.

with sufficient technical knowledge.[3087] However, Harley had no such system and does not appear to have employed anyone capable of managing one, despite its obligation to Rydon to ensure that suitable products and materials were used.

65.14 In our view Ben Bailey lacked the competence and experience to act as Harley's project manager on a project of the size and complexity of the Grenfell Tower refurbishment. The project manager's responsibilities included ensuring that work was done to a high standard;[3088] and for that reason the project manager was the most senior person from Harley who regularly attended the site.[3089] However, Ben Bailey was at the time a 25 year old graduate with a foundation degree in motor sport engineering, who had not previously held the position of project manager and had no obvious qualifications for the role. We consider that, for a project of this nature, Harley ought to have appointed as project manager someone who had the training and experience required to manage a large project of that kind. It failed to do so.

Testing regime

65.15 It is clear from the evidence that none of those employed by Harley on the refurbishment had even a basic grasp of the fire testing regime that applied to the products used in the external wall of the tower. Ray Bailey thought that a Class 0 classification meant that a product was "difficult to ignite and if you take the source of flame away from it, it won't continue to burn".[3090] He also thought, quite wrongly, that a Class 0 classification meant that a product was safe to use in any application on any building over 18 metres in height.[3091] For the senior executive and owner of a specialist cladding sub-contractor, that was a striking misconception.

65.16 Daniel Anketell-Jones said that he had been unaware of the difference between "non-combustible", "limited combustibility" and "Class 0"[3092] and thought that "Class 0" meant that the material could not catch fire.[3093] Such ignorance on the part of the one person whom Harley regarded as having technical expertise in matters of fire safety is remarkable. Mr Lamb claimed to have understood what Class 0 meant, but he said that he had had no need to understand the tests that underpinned that classification.[3094] His assertion that all major elements of an external wall cladding system would have to be Class 0 betrayed a fundamental ignorance of the basic principles underlying the testing and classification regime set out in Approved Document B. If a designer seeks to follow the guidance provided by what has been called the "linear route" in relation to a building over 18 metres in height, paragraph 12.7 requires insulation products to be materials of limited combustibility. Mr Lamb did not understand that distinction. We consider that to be inexcusable in one who was employed to carry out design work.[3095]

65.17 Mr Anketell-Jones also claimed to be unaware of the BS 8414 test methods or the BR 135 criteria and said that he had never considered whether they were relevant to the question whether products were safe for use on high-rise buildings.[3096] However, on 16 January

[3087] Sakula, Grenfell Tower Inquiry, Phase 2, Module 1, Report of Facade Expert {JOS00000001/25-26}; Sakula {Day125/140:25}-{Day125/141:9}.
[3088] Ben Bailey {Day39/13:2-3}.
[3089] Ben Bailey {Day39/13:4-10}.
[3090] Ray Bailey {Day33/6:14-17}.
[3091] Ray Bailey {Day33/6:18-25}.
[3092] Anketell-Jones {Day35/180:23}-{Day35/181:5}.
[3093] Anketell-Jones {Day36/92:7-14}.
[3094] Lamb {Day37/144:1-5}.
[3095] Lamb {Day37/149:22}-{Day37/150:4}.
[3096] Anketell-Jones {Day36/95:8}-{Day36/96:3}.

2016, he sent an email to Jonathan Roome of Celotex asking for the test results and certificates for RS5000 for the purposes of advising a different client on a different project altogether. In that email he made detailed references to the fire testing regime and the limitations of the BS 8414 test.[3097] We think, therefore, that he was seeking to play down his technical knowledge when giving evidence before us and that he knew more than he was prepared to admit.

65.18 Mr Sakula told us that at the time of the refurbishment it had been the practice of reasonably competent cladding contractors to obtain from one source or another information about technical developments and to make arrangements for disseminating that information within their organisations.[3098] However, Harley had no such system in place and in that respect fell below the accepted standards prevailing at the time.

65.19 The general lack of understanding of these matters within Harley arose from its failure to take adequate steps to ensure that its employees were properly trained. Ray Bailey said that Harley's previous Estimating and Technical manager, Graham Hackley, had attended a course run by the CWCT and that it had been his responsibility to ensure that knowledge gained in that way was shared with the rest of the team.[3099] However, there is no evidence that Mr Hackley's role involved training other employees of Harley and it was ultimately the responsibility of Ray Bailey, not Graham Hackley, to ensure that Harley was competent to perform the work it took on. In any event, whatever Mr Hackley may have learnt of any value, it seems that it was not shared. When Mr Hackley left Harley in late 2012 or early 2013[3100] his expertise, such as it was, does not appear to have been replaced. Daniel Anketell-Jones took over as technical manager but was scarcely qualified to do so given that it was not until 2014 that he began studying part time for an MSc in facade engineering (which he had still not completed when he left Harley in 2016).[3101]

Other standards and guidance

65.20 Harley's knowledge of the industry standards and guidance that were relevant to its work was similarly weak. Ray Bailey said that he had read the CWCT Standard for Systemised Building Envelopes issued in 2008 in the past but conceded that he did not know it in detail.[3102] He had not seen the CWCT's Technical Guidance Note 73, published in March 2011, until after the fire.[3103] Even at the time of their oral evidence to the Inquiry in September 2020, neither he nor Mr Anketell-Jones could recall ever having seen the Curtins specification.[3104] That was a significant omission because the Curtins specification had been expressly incorporated into Harley's contract and required the facade system to comply fully with the recommendations of the BRE document *"Fire performance of External Insulation for Walls of Multi Storey Buildings"*, 2nd ed. (2003) (BR 135). It also contained broader performance standards, such as a requirement that the system should not be a fire risk at any stage of installation, nor constitute a fire hazard after completion if for any reason the insulation were to become exposed.[3105] Harley should have read in full and complied with the documents that were incorporated into its sub-contract.[3106]

[3097] See Chapter 56 for further detail.
[3098] Sakula, Grenfell Tower Inquiry, Phase 2, Module 1, Report of Facade Expert {JOS00000001/29}.
[3099] Ray Bailey {Day33/19:6-9}.
[3100] Ray Bailey {Day32/9:8}.
[3101] Anketell-Jones {HAR00010149/2} page 2, paragraphs 7-8.
[3102] Ray Bailey {Day32/7:15-25}.
[3103] Ray Bailey {Day33/2:1-13}.
[3104] Ray Bailey {Day32/64:4-19}; Anketell-Jones {Day35/201:22}-{Day35/202:2}.
[3105] {CCL00001449}.
[3106] Sakula {Day125/151:12-17}.

65.21 Daniel Anketell-Jones said that he had not been aware that the facade had to meet the requirements of the CWCT Standard for Systemised Building Envelopes[3107] or the Curtins specification,[3108] that he had not been familiar with BR 135,[3109] and that he had not been aware of any guidance published by the CWCT or the Building Control Alliance.[3110] Indeed, he said that it was not until about the end of 2015 that he had begun to appreciate that those documents existed.[3111] He said he had not been aware that there was any industry guidance that emphasised the importance of closing cavities around the windows of high-rise buildings,[3112] and had not been aware that window openings required protection from the spread of fire at all.[3113] If the gaps in his knowledge were as wide as he suggested, he should not have been working on the refurbishment in a design capacity. If they were not, his failure to take action was all the more serious.

65.22 Mr Anketell-Jones said many times during his evidence that his expertise was limited to structural matters,[3114] but the contemporaneous evidence suggests that he knew rather more about the fire performance of some construction products than he was prepared to admit. For example:

a. He was sent the abseil report on the fire at Taplow House, a Harley development on which ACM PE cladding had been used.[3115]

b. In response to a question from a client that he described as a "headache", he made a detailed request to Celotex for certificates demonstrating that RS5000 insulation had passed certain fire performance tests.[3116]

c. He sent an email in which he expressed the view that ACM panels would disappear rather quickly in a fire.[3117]

d. He attended the Annual General Meeting of the CWCT on 7 October 2014[3118] at which Sarah Colwell of the BRE gave a detailed presentation on BS 8414 and BR 135,[3119] as well as providing a list and images of previous national and international cladding fires.[3120]

65.23 In the light of those matters it is difficult to believe that Mr Anketell-Jones was as ignorant of matters relating to fire safety as he would have had us believe. Accordingly we can place little reliance on his protestations of ignorance or lack of expertise. We think that he knew more than he was prepared to admit about the combustibility of ACM PE and the technical requirements the cladding was required to meet. That is why he was regarded within Harley as the person who could give advice on fire safety matters.

65.24 Although Kevin Lamb was certain that he had reviewed the CWCT Standard for Systemised Building Envelopes during his work on the Grenfell Tower project, that had not gone beyond a brief look and he candidly admitted that he had not considered whether his

[3107] Anketell-Jones {Day36/67:12-15}; {Day37/37:23-25}.
[3108] Anketell-Jones {Day35/201:15-21}.
[3109] Anketell-Jones {Day35/203:8-11}.
[3110] Anketell-Jones {Day35/36:6-10}; {Day35/193:8-13}.
[3111] Anketell-Jones {Day35/179:17-23}.
[3112] Anketell-Jones {Day35/188:1-5}.
[3113] Anketell-Jones {Day35/188:6-9}.
[3114] For example, Anketell-Jones {Day36/10:7-13}; {Day36/72:8-12}.
[3115] {HAR00010169/1}.
[3116] Email from Daniel Anketell-Jones to Jonathan Roome on 16 January 2015 {CEL00000019/2}.
[3117] {HAR00006585/1}.
[3118] {CEL00001037}.
[3119] {CEL00001038/4-7}.
[3120] {CEL00001038/2-3}.

designs complied with it.[3121] It was not until March 2015, when a conversation took place between Harley, Exova, Rydon and building control in respect of the fire performance of the cavity barriers,[3122] that he had consulted any external guidance.[3123]

65.25 Since Mr Lamb was a sub-contractor, Harley ought to have referred him to relevant guidance documents or standards and ensured that he considered them.[3124] It ought also to have had a system for checking that his work complied with the relevant statutory requirements and guidance documents.[3125] Regrettably, however, it did not. Instead, neither Harley nor Kevin Lamb gave sufficient consideration to the documents which were key to their work, namely, BR 135, CWCT's Standard for Systemised Building Envelopes, CWCT's Technical Note 73 and BCA Technical Guidance Note 18 (Issue 0 and Issue 1).[3126] A reasonably competent cladding contractor would have been aware of those documents and would have considered them, together with the functional requirements of the Building Regulations and Approved Document B.[3127]

International cladding fires

65.26 None of Harley's staff involved in the refurbishment were aware of the many fires overseas involving ACM PE cladding, although they were well known within the cladding industry.[3128] We are satisfied that a reasonably competent contractor in Harley's position would have been aware of them and would have had them in mind when considering the suitability of ACM for Grenfell Tower.

Conclusion

65.27 Harley's striking lack of technical knowledge and its failure to implement any proper system to monitor and improve it fell far short of the standard of a reasonably competent cladding contractor. That fundamental failure was the cause of much of its inadequate work on the refurbishment.

65.28 It may be that, in the years when Harley was involved in the refurbishment, its understanding of the Building Regulations, Approved Document B, Class 0 and the concept of combustibility was similar to that of some other cladding contractors.[3129] As the evidence of government officials, BRE and the certification bodies revealed, there was some confusion about those matters. Harley may well not have been alone in 2013 in thinking that all that was required in the case of a rainscreen panel was a Class 0 classification, but in our view a reasonably competent cladding contractor should have been aware of the guidance in paragraph 12.7 of Approved Document B and of the distinction between Class 0 and limited combustibility. In any event, the position became clearer in the summer of 2014 when the Building Control Alliance published its Technical Guidance Note 18 (issue 0) which stated in terms that all elements of the external wall had to be of limited combustibility. A reasonably competent cladding contractor would quickly have become

[3121] Lamb {Day37/130:11-13}; {Day37/135:21}-{Day37/136:18}.
[3122] See Chapter 57.
[3123] Lamb {HAR00010419/13} page 13, paragraph 50; Lamb {Day37/162:5}.
[3124] Sakula {Day125/72:8-21}.
[3125] Sakula {Day125/72:22}-{Day125/73:1}.
[3126] Sakula, Grenfell Tower Inquiry, Phase 2, Module 1, Report of Facade Expert {JOS00000001/38-46}.
[3127] Sakula, Grenfell Tower Inquiry, Phase 2, Module 1, Report of Facade Expert {JOS00000001/38-44}; Sakula {Day125/85:11-21}.
[3128] Sakula, Grenfell Tower Inquiry, Phase 2, Module 1, Report of Facade Expert {JOS00000001/34} paragraph 8.1.1; {JOS00000001/36-37} paragraphs 9.2-9.5.
[3129] Sakula, Grenfell Tower Inquiry, Phase 2, Module 1, Report of Facade Expert {JOS00000001/54} paragraph 14.11; Sakula {Day125/48:6}-{Day125/49:21}.

aware of that guidance note and of the clarification it offered. It would also have been aware that Class 0 was not a measure of combustibility and therefore would not have thought that it equated to limited combustibility.

The choice of ACM panels

65.29 Harley bears a significant degree of responsibility for the decision to use Reynobond ACM PE panels on the tower. Between late 2013 and September 2014, Studio E continued to seek assistance from Harley in relation to the products that would be included in the NBS Specification and, ultimately, in the TMO's tender information for prospective contractors. During that process, Harley continued to promote the use of Reynobond ACM PE panels.[3130] It had a strong preference for the use of ACM for the rainscreen because it was familiar with the product, having used it on many previous buildings, and could calculate its costs with confidence. It therefore encouraged the use of Reynobond PE 55 in its own interests,[3131] among which were maintaining its commercial relationship with Deborah French (Arconic's UK sales representative).[3132] It is right to point out that Harley's involvement at that stage was entirely voluntary in the hope of being appointed to the project by whoever was appointed by the TMO as main contractor. It was under no contractual obligation to give advice to Studio E or to investigate the suitability of ACM PE, but in encouraging its use as the rainscreen Harley had a responsibility to satisfy itself that it was suitable for that purpose.

65.30 Mark Harris accepted that he thought Studio E was relying on Harley, as the specialist cladding contractor, to propose materials that were suitable for use on the tower,[3133] and although Ray Bailey did not think that Studio E was relying on Harley at all,[3134] he agreed that Harley would not recommend a product that it did not believe complied with the Building Regulations.[3135] However, the question whether ACM was suitable for use on the tower was never raised by Harley with Studio E (or indeed vice-versa). Both assumed that the product was safe because it had been used on many other buildings, but neither of them took any steps to investigate its fire performance.

65.31 That assumption was born of complacency and incompetence. The view of Mr Sakula, which we accept, was that no reasonably competent cladding contractor would have relied simply on the fact that ACM PE had been used on buildings for many years.[3136] It is particularly surprising that Harley was able to make such an assumption, given the dramatic fires that in the previous two years had affected buildings overseas clad in ACM panels. They were well known in the cladding industry generally and, as a specialist cladding contractor, Harley ought to have been aware of them. A reasonably competent cladding contractor would have known about the combustibility of ACM PE and should therefore have known about the risks posed by the use of such material.[3137]

65.32 The NBS Specification was completed by Studio E on 30 January 2014. It included the use of Proteus HR zinc honeycomb rainscreen panels but required tendering contractors to provide alternative prices for other products, including Reynobond Duragloss 5000 ACM.[3138]

[3130] {HAR00005509}; Harris {Day34/95:22}-{Day34/100:6}.
[3131] Email from Mark Harris to Tomas Rek CC Ray Bailey, Mike Albiston, Bruce Sounes on 7 November 2013 {HAR00010172/3}.
[3132] Harris {Day34/95:10}-{Day34/97:14}; {Day34/99:15}-{Day34/100:2} and {HAR00010172}.
[3133] Harris {Day34/52:20}-{Day34/53:1}.
[3134] Ray Bailey {Day32/145:3-11}.
[3135] Ray Bailey {Day32/144:22}-{Day32/145:1}.
[3136] Sakula {Day125/109:14}-{Day125/110:16}.
[3137] Sakula, Grenfell Tower Inquiry, Phase 2, Module 1, Report of Facade Expert {JOS00000001/59}.
[3138] {SEA00000169/65}.

At no point did Studio E and Harley ever discuss whether the Reynobond product was suitable for use on Grenfell Tower;[3139] they both appear simply to have assumed that ACM PE would perform well on any high-rise building.

65.33 Harley's relationship with Arconic and its consequent ability to offer a significant reduction in the price of Reynobond panels was a factor which helped Rydon secure the contract, and in due course Harley was appointed by Rydon as cladding sub-contractor.

65.34 Once Rydon had secured the contract for the Grenfell Tower refurbishment in March 2014, there was no way back. Unless RBKC's planning department objected on aesthetic grounds, it was inevitable that Reynobond PE 55 would be chosen for the rainscreen panels simply on the grounds of cost. Harley's involvement thus made a significant contribution to the eventual use of ACM PE on Grenfell Tower.

65.35 The letter of intent and the DOM 2 sub-contract conditions, which in due course constituted the terms under which Harley carried out the work on the refurbishment, incorporated all the provisions of the contract between Rydon and the TMO relating to the installation of the cladding, including in relation to the choice of materials.[3140] As a result, Harley had an obligation to ensure that the materials chosen for the work were suitable and it is therefore not surprising that Ray Bailey accepted that Harley had an independent obligation to examine the NBS Specification to ensure that the products to which it referred complied with relevant statutory requirements.[3141] Harley failed to do so, however, because it assumed that if a material or product had been included in the specification, someone, principally Studio E, had ensured that it was suitable for its intended purpose. Kevin Lamb, who was responsible for producing most of the drawings required for the fabrication of the rainscreen, did not think that Harley was responsible for ensuring the suitability of the materials or products identified in the NBS Specification.[3142] Ray Bailey said that he had assumed that Daniel Anketell-Jones had checked that they were suitable, but Daniel Anketell-Jones said that he had not turned his mind to the question.[3143]

65.36 That evidence is surprising because on 7 October 2014 Daniel Anketell-Jones attended the CWCT Annual General Meeting, together with Mark Stapley, at which a presentation was given which expressly referred to a number of cladding fires in high-rise buildings abroad and to the availability of fire-resistant cladding panels.[3144] The next day Daniel Anketell-Jones's brother, Samuel Anketell-Jones, who was also employed by Harley, asked Deborah French of Arconic for information about Reynobond ACM panels with fire-resistant cores.[3145] Although we did not hear evidence on the question, his email strongly suggests that he had spoken to one or both of Daniel Anketell-Jones or Mark Stapley and that Harley knew more than it was willing to admit about the availability of panels with fire-resistant cores and about the dangers posed by panels with unmodified polyethylene cores.[3146]

65.37 The section of the NBS Specification that dealt with the design of the cladding was 11 pages long. We consider that Daniel Anketell-Jones, and indeed every other Harley employee involved in the refurbishment project, should have read and understood at least

[3139] Harris {HAR00010159/6} page 6, paragraph 22; Harris {Day34/115:12-25}.
[3140] Letter of Intent {HAR00000120} paragraph 2(b); DOM2 Subcontract Conditions {INQ00011211/8}) clause 2.5.1; Design and Build Contract {RYD00094235/69} clause 2.17.
[3141] Ray Bailey {Day32/85:12-{Day32/87:10}.
[3142] Lamb {Day37/110:4-7}.
[3143] Ray Bailey {Day35/51:4-13}; Anketell-Jones {Day36/69:1-9}; {Day36/78:1-20}.
[3144] {CEL00001038/3}.
[3145] {MET00081175}.
[3146] See Chapter 55.

those sections and should have kept them under consideration throughout the work. In our opinion, there is no reasonable excuse for a specialist contractor in Harley's position not ensuring that they did so.

65.38 Unsurprisingly, perhaps, no check on the suitability of the ACM PE panels was subsequently carried out by anyone at Harley. ACM panels were included in the "Specification Notes" produced by Kevin Lamb in early 2015 describing the products that would be used in the construction of the external facade of the tower.[3147]

65.39 In the light of Mr Sakula's evidence, we consider that the approach demonstrated by Harley generally fell below the generally applicable standards of the time. A reasonably competent cladding contractor would have carefully considered whether ACM PE cladding panels were suitable for use on a building such as Grenfell Tower and would have ensured that all other construction professionals involved in the project were aware of their combustibility.[3148]

Certifications and product literature

65.40 Mr Sakula thought that it was reasonable for a cladding contractor in Harley's position to rely on certificates such as those issued by the British Board of Agrément (BBA) and Local Authority Building Control,[3149] but he also said that he would have expected the contractor's technical department to have looked at the details of the certificates more closely. In the light of his evidence we consider that a reasonably competent cladding contractor would have examined such certificates carefully and also the sales and technical literature produced by the manufacturer in order to understand the claims being made for the product and their relevance to the refurbishment. In that respect also, Harley failed to act appropriately.

65.41 On 23 April 2014 Deborah French of Arconic sent Harley a copy of the British Board of Agrément certificate for Reynobond PE 55 cladding panels.[3150] Although Harley had an obligation under its contract with Rydon to consider documents of that kind in order to satisfy itself that the products being used on the tower were suitable, no one at Harley gave it more than the most cursory examination at any time.[3151]

65.42 Ray Bailey had read the British Board of Agrément certificate when it was first published in 2008 but did not look at it again after that or discuss it with anyone.[3152] Daniel Anketell-Jones could not remember having seen the British Board of Agrément certificate during the Grenfell Tower project.[3153] Kevin Lamb did not consider that it was part of his job to look at British Board of Agrément certificates relating to products that were included in his designs.[3154]

65.43 If Harley had examined the British Board of Agrément certificate carefully, it would have recognised that it included several important qualifications, among them that it applied only to panels with a grey/green Duragloss 5000 coating,[3155] and that the fire performance of a wall incorporating the panel could not be ascertained from the certificate alone.[3156]

[3147] {RYD00046822}; {HAR00010160/5}.
[3148] Sakula {Day125/199:12}-{Day125/200:20}.
[3149] Sakula {Day125/161:7}-{Day125/162:4}.
[3150] {RYD00003932}.
[3151] Ray Bailey {Day32/124:16-18}; {Day33/33:14}.
[3152] Ray Bailey {Day33/35:15}-{Day33/36:20}.
[3153] Anketell-Jones {Day37/6:16}-{Day37/7:22}.
[3154] Lamb {Day38/24:15-18}.
[3155] {BBA00000047/5} section 6.4.
[3156] {BBA00000047/5} section 6.5.

In the light of Mr Sakula's evidence, we are satisfied that a reasonably competent cladding contractor would have read the certificate in full, would have had the qualifications in mind,[3157] would have alerted the design team to its limitations,[3158] and would have asked the manufacturer for more information about the tests that had been carried out on the product before deciding whether it was suitable for use.[3159]

Insulation

Celotex RS5000

65.44 From early June 2014, Harley was in close communication with Celotex in relation to the launch of Celotex RS5000 insulation[3160] and representatives of Celotex, principally Jonathan Roome, subsequently made several visits to Harley's offices to promote the new product.[3161]

65.45 The use of RS5000 in place of FR5000 resulted from those discussions. Since RS5000 was being promoted as a new product, Harley should have taken steps to satisfy itself that its use complied with the Building Regulations and any relevant statutory and industry guidance. However, it failed properly to do so.

65.46 Although Harley expected to be, and in due course was, appointed as a specialist cladding sub-contractor with responsibility for the design of the cladding, no one appears ever to have asked how functional requirement B4(1) was to be satisfied or which (if any) of the routes to compliance set out in Approved Document B it was proposed to follow. That was a serious failure, because unless it knew the answer to that question it could not tell whether RS5000 could properly be used. Indeed, Harley does not appear to have paid much attention to the fact that RS5000 was on the face of it a different product from that specified in the NBS Specification. The fact that RS5000 was in fact identical to FR5000 just means that in that respect Harley's incompetence did not result in any harm.

65.47 As a result of the conversations between Jonathan Roome and Ben Bailey in June 2014, Harley was well aware that Celotex did not at that time offer a product that was suitable for use on buildings above 18 metres in height.[3162] There was therefore no reasonable basis on which Daniel Anketell-Jones could have thought that the fire performance of RS5000 had been investigated by Studio E during the preparation of the NBS Specification or that it had been "checked through with desktop studies",[3163] not least since RS5000 was not in the NBS Specification. Indeed, it could not have been because it did not exist as a separate brand in November 2013.

65.48 Ben Bailey claimed that after he had become involved in the project in February 2015 he had read the parts of the NBS Specification that concerned Harley's work.[3164] They clearly prescribed the use of a different Celotex insulation product, FR5000. Nonetheless, he did not question the use of RS5000 even though he must have realised that it was not the

[3157] Sakula, Grenfell Tower Inquiry, Phase 2, Module 1, Report of Facade Expert {JOS00000001/49} paragraph 12.1.
[3158] Sakula {Day125/166:7-17}.
[3159] Sakula {Day125/163:17}-{Day125/164:18}.
[3160] Task call record following call from Harley Facades regarding insulation {CEL00009874}.
[3161] See Chapter 56.
[3162] Ben Bailey {Day39/55:15-25}; {Day39/56:1}.
[3163] Anketell-Jones {Day36/102:13-19}.
[3164] Ben Bailey {Day39/64:21-25}; {Day39/65:1-19}.

product specified. Mr Anketell-Jones said that he was not aware that anyone at Harley had considered whether Celotex FR5000 was suitable;[3165] indeed, he could not remember that it had been included in the specification at all.[3166]

65.49 Harley also failed properly to examine the sales and technical literature relating to the Celotex RS5000 insulation. On 27 August 2014, Jonathan Roome sent Daniel Anketell-Jones a pack of information about Celotex RS5000, which included a detailed specification and testing information.[3167] Mr Anketell-Jones said that his usual practice had been to pass information of that kind to others so that the suitability of the materials in question could be checked, but in that particular case he had not sent it to anyone else, nor had he taken any other steps to check whether the fire performance of RS5000 made it suitable for use.[3168] His explanation was that he would have done so if he had been the designer, but that he had not considered that to be part of his responsibility.[3169]

65.50 In fact, Mr Anketell-Jones did not know, or trouble himself to find out, whose job it was within Harley to check such matters and he appears not to have considered whether Kevin Lamb was likely to have read the information.[3170] For his part, Ray Bailey did not read the literature himself; he simply assumed that Mr Anketell-Jones had read it.[3171] Kevin Lamb said that he had read what he described as a "compliance guide" on RS5000 produced by Celotex but did not discuss its contents with anyone or look into the suitability of the product.[3172] If Harley had properly considered Celotex's product literature or got beyond the pink banner on the first page, it would have seen that the claim that RS5000 had been classed as suitable for use above 18 metres applied only if the product was incorporated into a cladding system identical to the one that had been tested.[3173]

65.51 Harley's Specification Notes of 15 July 2015[3174] did not specify the type of insulation that was to be used. Further, although its drawings included references to insulation, they did not include a description of what product was to be used either. That deprived others who might review the drawings of the ability to identify the products and conduct their own checks.

Kingspan K15

65.52 As we have said,[3175] Kingspan K15 was used as a last-minute substitute for Celotex RS5000 when there was a delay in obtaining supplies of that product. It was used without any proper investigation being made into its suitability for that purpose or into whether its use would result in an external wall that complied with the Building Regulations or was consistent with statutory or industry guidance. Harley must bear primary responsibility for that failure, which was the result of a decision made without consulting Rydon or Studio E.

[3165] Anketell-Jones {Day36/71:10-22}.
[3166] Anketell-Jones {Day36/70:21}-{Day36/71:4}.
[3167] {CEL00011960}; {CEL00011961}; {CEL00011962}; {CEL00011963}; {CEL00011964}; {CEL00011965}; {CEL00011966}; {CEL00011967}.
[3168] Anketell-Jones {Day36/88:13-19}.
[3169] Anketell-Jones {Day36/88:17-19}.
[3170] Anketell-Jones {Day36/93:4-13}.
[3171] Ray Bailey {Day33/78:4-20}.
[3172] Lamb {Day38/37:24}-{Day38/38:4-7}.
[3173] {CEL00000012/3}.
[3174] {RYD00046822}.
[3175] See Chapter 56.

65.53 Ben Bailey was aware that K15 had not been included in the NBS Specification, but the fact that Harley had installed it on other projects led him to assume that it was suitable for use on Grenfell Tower.[3176] He said that he had asked around in the Harley office whether it could be substituted for RS5000, despite the fact that it was not referred to in the NBS Specification.[3177] He referred to the version of the British Board of Agrément certificate relating to K15 dating from 2008, rather than the more recent version, because Harley happened to have had a copy on file at the time. He was not aware that a more recent certificate had been issued.[3178]

65.54 Ben Bailey did not examine the relevant LABC or British Board of Agrément certificates for the product (indeed, Harley possessed only a copy of the British Board of Agrément certificate issued in 2008, which was long out of date[3179]) and took no steps to find out whether Kingspan K15 was a material of limited combustibility.[3180] Nonetheless, he proceeded to place orders for K15 in May and September 2015 and to install it on the tower without telling Rydon (or anyone else) that it was being used.[3181] In both respects Harley failed to meet the standard of a reasonably competent cladding contractor.

65.55 It was not until December 2015 or January 2016, that Harley, facing another interruption to the supply of RS5000, sought permission from Rydon to substitute Kingspan K15 for Celotex RS5000.[3182] Permission was readily granted, but without any thought having been given to the characteristics of the material.[3183] Ben Bailey assured Rydon that the products were substantially the same, although he had no basis for doing so, both because he did not have the technical expertise to make that assessment and because he had taken no steps to check that it was correct.[3184] Rydon failed to enquire into the suitability of the product or to inform the TMO or building control that it was being used.[3185]

65.56 Viewing the evidence in the round, it is clear to us that Harley failed adequately to examine the information it had been given about the products that it included in its designs. A reasonably competent cladding contractor would have taken steps to satisfy itself that any information it was given was relevant and reliable, but Harley failed to do so. In that respect it fell below the standard to be expected of a reasonably competent cladding contractor.

Window infill panels

65.57 When he first prepared Harley's Specification Notes in January 2015, Kevin Lamb proposed the use of Kingspan TP10 for the insulated panels within the window assemblies,[3186] but he did not consult Approved Document B or any other guidance to help him understand the fire performance required of materials to be used for that purpose.[3187] He had not seen any certificates relating to TP10 and failed to investigate its fire performance or

[3176] Ben Bailey {Day39/31:23}-{Day39/32:3}; {Day39/142:11-14}.
[3177] Ben Bailey {Day39/117:3-19}.
[3178] Ben Bailey {Day39/118:20}-{Day39/119:7}.
[3179] {BBA00000038}; Ben Bailey {Day39/119:5-19}.
[3180] Ray Bailey {Day33/102:17-25}; Ben Bailey {Day39/127:21-25}.
[3181] {SIG00000012}; {SIG00000013}.
[3182] Hughes {RYD00094213/10} page 10, paragraph 55.
[3183] Hughes {Day27/71:23}-{Day27/72:1}.
[3184] Ben Bailey {Day39/107:1-3}; {Day39/108:11-19}.
[3185] Blake {Day29/115:7}-{Day29/117:11}; Hughes {Day27/67:5}-{Day27/68:8}; {Day27/70:4-6}.
[3186] {HAR00003866}.
[3187] Lamb {Day38/174:2-5}.

otherwise to check that it was suitable for that purpose.[3188] The specification for the panels was ultimately changed to Styrofoam, but, again, Harley did not take any steps to find out whether the material was suitable for the use to which it was to be put.[3189]

65.58 The guidance given in Approved Document B was that the insulation in the window infill panels should be of limited combustibility in order to comply with the requirements of the Building Regulations. We are satisfied that a reasonably competent cladding contractor would have carried out careful and thorough checks on products of that kind each time they used them.[3190] We have concluded that Harley failed to act in accordance with the standards to be expected of a reasonably competent cladding contractor in selecting those products without properly investigating their suitability.

Cavity barriers

65.59 Between August 2014 and May 2015, Harley produced fabrication drawings of the details around the windows of Grenfell Tower which contained a series of fundamental errors that were identified by Mr Hyett. The structures they described did not comply with the Building Regulations and did not reflect the guidance given in Approved Document B.[3191]

65.60 The initial design of the cavity barriers had been produced by Studio E and passed to Harley for development in August 2014.[3192] Kevin Lamb first produced detailed drawings of the window arrangements on 22 August 2014,[3193] but they did not show cavity barriers within the facade. As such, they did not reflect the guidance in Approved Document B and could not be expected to produce a building that complied with functional requirements B4(1) and B3(4) of the Building Regulations. Thereafter, further versions of Kevin Lamb's designs were provided to Rydon and Studio E and were reviewed in design team meetings[3194] but no one commented on the absence of cavity barriers.[3195]

65.61 Harley should have been aware of the need to install cavity barriers around windows because of its experience of the fire at Taplow House on the Chalcots Estate in January 2012. That was one of its previous overcladding projects which had suffered a fire but at which cavity barriers around the window had played a significant part in preventing the fire from spreading into the external wall. The significance of the cavity barriers had either not been properly appreciated or the lesson had been forgotten by the time Harley came to design the external wall of Grenfell Tower.

65.62 Nonetheless, the request for information which Daniel Anketell-Jones sent to Rydon and Studio E on 17 September 2014, in which he asked about the need for horizontal firebreaks within the cladding areas,[3196] shows that Harley had given some thought to the need for cavity barriers and that it understood that cavity barriers were required within the facade at least to some extent. However, no one at Harley appears to have considered any of the available guidance before making that request.[3197]

[3188] Lamb {Day38/179:10-18}.
[3189] Lamb {Day38/187:1-9}.
[3190] Sakula {Day125/111:18-24}.
[3191] Hyett, Section 4 – Failures of Statutory Compliance {PHYR0000029/107-132} paragraphs 4.4.91-4.4.136.
[3192] {HAR00010412/2}.
[3193] {HAR00010426}.
[3194] See Chapter 57.
[3195] Crawford {Day10/185:2-5}; {Day10/185:11-14}; {HAR00010423/2}.
[3196] {SEA00011703}.
[3197] Anketell-Jones {Day36/158:10-13}, Lamb {Day38/74:5-11}.

65.63 Harley asked for advice from Studio E, Exova and building control on the level of fire resistance that was required for the horizontal cavity barriers within the facade.[3198] On 18 September 2014, Daniel Anketell-Jones asserted in an email to Neil Crawford that cavity barriers were not required in certain locations since the insulation was Class 0,[3199] but that was wrong. In his oral evidence, he accepted that in that email he had been expressing an opinion on what was required to comply with the guidance given in Approved Document B,[3200] but he had not looked at it before doing so, nor had he sought any other advice to confirm that his view was correct.[3201]

65.64 Between September 2014 and March 2015, Harley (in particular, Kevin Lamb) continued to develop the design of the windows. Further versions of Harley's drawings were circulated among the design team, none of which showed cavity barriers.[3202] Ray Bailey was aware of the importance of effective cavity barriers around windows but did not draw attention to the absence of cavity barriers around the windows in Harley's drawings. There appear to have been no discussions within Harley about what Approved Document B recommended in that respect.[3203]

65.65 It was not until 3 March 2015 that Kevin Lamb included cavity barriers in his designs for the first time.[3204] His explanation for their inclusion at that stage was that completion of the designs had by then become urgent because construction had already begun and the cladding would soon be installed.[3205] Even at that extremely late stage, however, Harley made no effort to satisfy itself that its designs complied with the guidance given in Approved Document B. In fact, as Mr Hyett explained, they did not. Among other things, there was still no provision for cavity barriers around the windows.[3206]

65.66 Harley and the design team more generally were evidently deeply unsure about what was required in the way of cavity barriers, because there followed further discussions between Studio E, Exova, building control and Siderise (the manufacturer) in an effort to ascertain whether Harley's designs were acceptable.[3207] The result of those conversations was yet further confusion and disagreement, largely because building control and Siderise differed in their view of what was required.[3208] The issue was finally resolved to the satisfaction of building control in April 2015,[3209] but Harley continued to seek advice from Siderise in May and June 2015.[3210]

65.67 This episode reflects very poorly on all those involved. As a result of the fire at Taplow House in 2012, at which cavity barriers had played an important part in restricting the spread of fire, Ray Bailey and Daniel Anketell-Jones should have been aware of their importance for fire safety, but the significance of that incident appears to have been forgotten.[3211]

[3198] {HAR00003638/3-4}; see also Chapter 57.
[3199] {HAR00012103}.
[3200] Anketell-Jones {Day36/166:2-16}.
[3201] Anketell-Jones {Day36/166:25}-{Day36/166:7}.
[3202] {SEA00011759}, attaching {RYD00018436}; {RYD00018537}; {RYD00018687}; {SEA00012531} attaching {SEA00003040}.
[3203] Lamb {Day38/92:16}-{Day38/93:9}.
[3204] {SEA00012850}.
[3205] Lamb {Day38/97:5-14}.
[3206] Lamb {Day38/101:11-14}.
[3207] {HAR00004013}; {EXO00001319}; {SEA00012906}; {SEA00000252}; {SEA00012927}; {HAR00003999}.
[3208] See Chapter 57.
[3209] See Chapter 57.
[3210] {HAR00004238}; {HAR00019012/2}.
[3211] Anketell-Jones {Day35/149:14-19}.

65.68 The evidence indicates that Harley was largely ignorant of the technical aspects of using cavity barriers and as a result was forced to rely too heavily on the advice of other members of the design team and the manufacturer. As the specialist cladding contractor, Harley could reasonably have been expected to possess a far greater degree of technical knowledge of the Building Regulations and Approved Document B in relation to the use and installation of cavity barriers than was the case.

65.69 It is particularly troubling that, although Kevin Lamb noticed that Studio E had failed to include cavity barriers around the windows[3212] and told us that he had understood that Approved Document B required them in that location as an important means of ensuring the safety of residents,[3213] he nonetheless failed to ask why they were missing or whether the designs complied with regulatory requirements. We do not accept his evidence that it was not his place to raise the matter.[3214] He had no reason to think that others at Harley considered that cavity barriers were unnecessary or that anyone at Harley had consulted Studio E.[3215]

65.70 Harley ought to have played an active part in the design of the cavity barriers and should have ensured that a detailed cavity barrier strategy had been established before construction work began. Even by March 2015, however, some eight months after it had been appointed by Rydon,[3216] Daniel Anketell-Jones remained unaware that Harley was working to the NBS Specification or what it contained.[3217] The NBS Specification required Harley to design a system that contained fire stopping in accordance with the requirements of the Building Regulations, but Daniel Anketell-Jones did not ask himself what that meant because he failed to read it.[3218] He repeatedly claimed that he did not have time to engage with the details of the NBS Specification, or design generally, because he was working on other projects.[3219]

65.71 Harley's work on the architectural crown was carried out at a late stage.[3220] Its designs for the crown omitted the cavity barrier at the top of the columns that had been included in the drawings produced by Studio E[3221] and thus detracted from the original design.[3222] Kevin Lamb said that he had intended to check whether the design required amendment to include a cavity barrier after it had been reviewed by the architect, but said that his question had ultimately been overlooked.[3223] Overall it is clear that Harley failed to give any proper consideration to the fire performance of the crown. While the failure to include cavity barriers in the crown may not have contributed significantly to the spread of the fire,[3224] it reflects Harley's failure to give proper consideration to the fire safety of the facade.

[3212] Lamb {Day38/54:5}-{Day38/56:24}.
[3213] Lamb {Day38/58:5-18}.
[3214] Lamb {Day38/56:23-24}.
[3215] Lamb {Day38/57:25}-{Day38/58:3}.
[3216] {HAR00005867}.
[3217] Anketell-Jones {Day37/26:1-5}.
[3218] Anketell-Jones {Day37/38:10-22}.
[3219] Anketell-Jones {Day35/133:10-24}; {Day37/40:6-10}; Anketell-Jones {HAR00010149/3-4} pages 3-4, paragraph 14.
[3220] Lamb {HAR00010419/9-10} pages 9-10, paragraph 35.
[3221] {SEA00003242}; Crawford {Day11/66:9-11}; {SEA00002551}.
[3222] Lamb {Day38/163:23}-{Day38/164:5}.
[3223] Lamb {Day38/165:7-14}.
[3224] Grenfell Tower Inquiry Phase 1 Report, Volume IV, {INQ00014817/59} paragraph 23.60.

The design process

65.72 Harley's failure to produce designs for the refurbishment that complied with its contractual obligations reflected a failure properly to manage its own resources and a misunderstanding of its role in the refurbishment and the roles of other members of the design team.

Supervision and management

65.73 As an organisation, Harley failed to ensure that the various people engaged on the project were aware of the scope of their individual responsibilities. Ray Bailey and Ben Bailey both thought that Daniel Anketell-Jones was responsible for ensuring that designs produced by Harley (including those produced by Kevin Lamb on its behalf) complied in all respects with regulatory requirements.[3225] For his part, although he had been designated as design manager for the refurbishment, Mr Anketell-Jones said that he had not considered supervision of the design process to be part of his responsibility.[3226] We find that difficult to understand and think his evidence is probably best explained by the fact that the amount of work he had on other projects made it difficult for him to look at the designers' work.[3227]

65.74 As we have already said, we do not think that as a witness Mr Anketell-Jones was always candid or reliable. In particular, we do not accept that his role in the design process was as limited as he suggested. His evidence was inconsistent with communications between Harley and Rydon, which indicated that he would be reviewing drawings on Harley's behalf.[3228] We prefer the evidence of Ray Bailey and Ben Bailey that he was given responsibility for checking the design work carried out by Harley, including the work done by Kevin Lamb on its behalf.

65.75 Mr Anketell-Jones had not read the contract between Harley and Rydon and did not accept that it was important for him to understand the nature of Harley's contractual responsibilities.[3229] He thought that his responsibility as design manager was simply to ensure that the designers, in particular Kevin Lamb, were keeping up with the programme[3230] and that the architect was responsible for approving the drawings Mr Lamb produced.[3231] He was not aware, therefore, that Harley was contractually responsible for ensuring that the facade of the tower complied with the relevant statutory requirements[3232] and did not apply his mind to the question whether the materials to be used would ensure that was the case.[3233] If he did think at the time that the architect was responsible for checking the drawings produced by Mr Lamb (which we doubt), he was wrong and his responsibilities had not been properly explained to him. It was an important part of his role as design manager, and of Harley's generally, to supervise the work of Kevin Lamb in order to ensure that the designs he produced would result in a building that complied with

[3225] Ray Bailey {Day32/17:21}-{Day32/18:2}; Ben Bailey {Day39/19:13-21}.
[3226] Anketell-Jones {Day35/133:10-14}.
[3227] Anketell-Jones {Day35/133:17-19}.
[3228] Email dated 24 April 2014 from Mark Harris, "Our Dan will be taking a look at these on Monday" {HAR00005711}; Email dated 31 July 2014 from Mark Harris, "Lead designer will be Dan Anketell-Jones." {HAR00005916}.
[3229] Anketell-Jones {Day35/195:3-15}.
[3230] Anketell-Jones {Day36/19:16-18}.
[3231] Anketell-Jones {Day35/195:3-15}.
[3232] Anketell-Jones {Day35/195:16-21}.
[3233] Anketell-Jones {Day35/183:13}-{Day35/184:5}.

the Building Regulations.[3234] For his part, Kevin Lamb assumed that the suitability of the materials intended for use in the refurbishment had been considered and settled before he became involved on the project.[3235]

65.76 The development of the design of the windows of Grenfell Tower between September 2014 and March 2015 provides a telling example of Harley's failure properly to supervise Mr Lamb's work. During that period, Mr Lamb produced detailed drawings of the windows, none of which included cavity barriers in the required positions. The omission was not detected by Harley because it did not review the development of the design or examine with any care the drawings he produced.[3236]

65.77 In the light of Mr Sakula's evidence, we are satisfied that a reasonably competent cladding contractor would have established a system for supervising its sub-contractors. Such a system should have ensured that the work they carried out complied with relevant statutory requirements, industry guidance and normally accepted standards of safety.[3237] In our view there were fundamental deficiencies in Harley's management which directly led to the creation of a design that did not comply with statutory guidance and could not be expected to result in a building that complied with the functional requirements of the Building Regulations. In that respect Harley fell short of the standard to be expected of a reasonably competent cladding contractor.

Relationship with Studio E

65.78 Harley also failed properly to manage its relationship with the other key designer, Studio E. It was content to assume that Studio E had considered and checked all those aspects of the external wall construction that had a bearing on fire safety. That was not the case, however, and it was not appropriate or reasonable for Harley to make that assumption, particularly in the face of clear evidence that Studio E had not done so.[3238] Harley should have taken steps to satisfy itself independently that the form of construction and the materials described in those drawings would result in a building that complied with the Building Regulations, but it failed to do so.[3239]

65.79 Daniel Anketell-Jones' belief that Studio E was checking the drawings produced by Harley for compliance with the relevant requirements was founded on nothing more than an assumption; he did not speak to Studio E or take any other steps to confirm his understanding.[3240] Ray Bailey said that if Harley was not entirely clear on a question of compliance, it would ask the architect and ultimately expect building control to decide whether the design complied with the regulations.[3241] However, he assumed that the drawings were being checked by Studio E without ever taking steps to verify whether that was so.[3242] There is very little evidence, however, that Harley ever sought to resolve doubts about compliance by referring a question to a third party. The reason may not be far to seek: it regarded everyone involved in any aspect of the design, other than itself, even including building control, as responsible for ensuring fire safety. Its approach to a matter of such importance was irresponsible, regardless of its contractual obligations.

[3234] Anketell-Jones {HAR00010149/3-4} pages 3-4, paragraph 14.
[3235] Lamb {Day38/21:2}-{Day38/22:12}.
[3236] Anketell-Jones {Day36/176:4-23}; see also Chapter 57.
[3237] Sakula {Day125/72:22}-{Day125/73:17}.
[3238] For example, Harley knew that Studio E had not approved the use of Celotex RS5000, which did not appear in the NBS Specification – see Chapter 56.
[3239] Ray Bailey {Day32/51:15}-{Day32/52:13}.
[3240] Anketell-Jones {Day36/34:6-11}.
[3241] Ray Bailey {Day32/53:7-12}.
[3242] Ray Bailey {Day32/51:15}-{Day32/52:13}.

65.80 Studio E considered that its obligation to review drawings produced by Harley was limited to ensuring that they conformed to "architectural intent", meaning that they were consistent with the appearance contemplated by the original design. We have already concluded that its understanding about that was wrong; it was not consistent with its contract with Rydon, nor did it reflect common practice among architects, as confirmed by Mr Hyett. However, as the specialist cladding sub-contractor, Harley should have taken steps to ensure that its own designs complied with any relevant legislation and guidance, regardless of Studio E's approach to its work.

Kevin Lamb

65.81 Kevin Lamb pointed out, correctly, that the decision to use ACM panels in place of the zinc originally specified by Studio E had been made before he had become involved in the work.[3243] However, he took no steps to familiarise himself with the products that were the subject of his designs, particularly their fire performance. He understood that ACM panels comprised a core material between two thin sheets of aluminium but did not know what the core was made of and made no effort to find out.[3244]

65.82 Despite being responsible for creating Harley's drawings, Kevin Lamb gave no thought to questions of compliance with the Building Regulations and was instead content to assume that such matters were being considered by someone else.[3245] He said that it had never crossed his mind to consider whether there was a British Board of Agrément certificate for Reynobond PE 55 ACM,[3246] let alone to look at it.

Installation

65.83 Harley's failure properly to supervise and manage its own staff extended to its management of Osborne Berry, which it had engaged to install the facade. Ben Bailey described his shock at seeing photographs of the cavity barriers taken after the fire and said that he had not seen workmanship like that on site.[3247] He sought to explain his failure to notice the defects by suggesting that the insulation had covered the junction between the cavity barriers and the existing concrete walls, making it impossible to identify any defects without dismantling and damaging the finished works.[3248] We do not accept that explanation, however, as there must have been many opportunities to inspect the cavity barriers before the insulation was fitted.[3249] Ben Bailey accepted that he ought to have been carrying out inspections at each stage of the installation.[3250] If he had done so, he would have inspected the work before the insulation obscured the back of the cavity barriers and it is likely that at least some of the problems would have come to light. We are satisfied that Harley failed to inspect the work of Osborne Berry with sufficient frequency or care to ensure that the defects noted above were identified. In our view the defects in the installation of the cavity barriers reflect a serious lack of competence on the part of Harley itself and Osborne Berry.

[3243] Lamb {HAR00010419/5} page 5, paragraph 20.
[3244] Lamb {Day38/19:2-14}.
[3245] Lamb {Day38/19:15-19}; {Day38/37:14}-{Day38/38:7}; {Day38/40:7-10}.
[3246] Lamb {Day38/23:17-20}.
[3247] Ben Bailey {HAR00010060/10} page 10, paragraph 32.
[3248] Ben Bailey {HAR00010060/10} page 10, paragraph 32.
[3249] Berry {Day44/59:9-14}.
[3250] Ben Bailey {Day40/164:1-9}.

Failure to concern itself with fire safety

65.84 Viewing the evidence as a whole, we are left with the clear impression that Harley did not concern itself sufficiently with fire safety at any stage during the refurbishment. Its attitude appears to have been that there was no need for it to do so, because others involved in the project, and ultimately building control, would ensure that the design was safe. Its approach is reflected in its response to the following situations.

65.85 The first arose from the formal request for information about the incorporation of cavity barriers or fire breaks in the external wall of the tower, in the course of which Mr Ashton referred to the possibility that the insulation might be combustible.[3251] That should have prompted Harley to consider whether RS5000 was combustible and whether it could safely be used in that situation. It is particularly surprising that Mr Anketell-Jones did not think it necessary to make such enquiries, given that he understood it to be a different product from FR5000 that had been specified,[3252] but he did not raise the question with any other member of the design team, nor did he take any other steps to find out whether the new product was acceptable to Rydon or Studio E.[3253] He said that he had expected Kevin Lamb to tell Studio E that Harley intended to use Celotex RS5000 so that Studio E could consider its suitability,[3254] but he had not discussed the use of Celotex RS5000 with Kevin Lamb and had not provided any of the relevant information to him.[3255]

65.86 The second arose out of a discussion in March 2015 about the fire resistance required of the cavity barriers to be installed in the external wall. In the course of that discussion Mr Anketell-Jones referred to the likelihood that ACM panels would disappear quickly in a fire. That did not, however, prompt him to look into the characteristics of ACM PE or to ask himself (or anyone else) whether it was suitable material for use on the tower. That is surprising because only a few months earlier, in October 2014, he had attended the Annual General Meeting of the CWCT at which a presentation had been given by Dr Colwell of BRE on the then recent spate of cladding fires in various countries.[3256] Natural curiosity, if not professional competence, might have led Mr Anketell-Jones to enquire into the nature of Reynobond 55 PE to see whether it might give rise to a similar problem, but regrettably neither caused him to make or instigate the kind of enquiries that a reasonably competent cladding contractor would have made under those circumstances.

65.87 The third relates to a warning given by Mr Mort of Siderise Ltd, the company which made the cavity barriers, that the design of the window fixings contained what he described as a "weak link for fire." Mr Mort identified the area of weakness on a copy of a drawing sent to him by Ben Bailey, but Ben Bailey failed to pass the comment to Studio E, Rydon or Exova and took no steps to ensure that it was removed. Mr Mort copied his email to Kevin Lamb and Ray Bailey, but neither of them took any action in response to it. Kevin Lamb said that he had not noticed the warning about a weak link at all, despite having read the email,[3257] and did not raise the matter with any other member of the design team.[3258] Ray Bailey could not explain why he had not pursued the matter with Mr Mort[3259] but he ultimately accepted that the only sensible course of action had been to raise the matter

[3251] See Chapter 54 and Chapter 57.
[3252] Anketell-Jones {Day36/102:13-19}.
[3253] Anketell-Jones {Day36/171:13-16}; {Day36/108:17-25}.
[3254] Anketell-Jones {Day36/79:14}-{Day36/80:5}.
[3255] Anketell-Jones {Day36/65:20}-{Day36/66:10}.
[3256] {CEL00001038}.
[3257] Lamb {Day38/138:8-20}; {Day38/141:24}-{Day38/142:4}.
[3258] Lamb {Day38/142:21-24}; {Day38/144:3-5}.
[3259] Ray Bailey {Day33/160:2-7}.

with building control to ensure that the design was safe.[3260] The result of their inaction was that no attempt was made to address the weak link, which became part of the external wall of the tower.

[3260] Ray Bailey {Day33/160:13-25}.

Chapter 66
The contribution of the Tenant Management Organisation

66.1 Responsibility for the dangerous condition of Grenfell Tower following the refurbishment project, including the presence of combustible materials in the walls and around windows, rests primarily on those who designed, constructed and approved the work and some of those who manufactured and sold the materials they used. However, the TMO itself must take a share of the blame for the disaster. In Chapters 51, 53, 54 we have made a number of criticisms of the TMO in its role as client and in Parts 4 and 5 we have described certain shortcomings in its management of the building. Overall, we have concluded that as the client for the refurbishment, the TMO failed to take sufficient care in its choice of architect and paid insufficient attention to fire safety matters, including the work of the fire engineer.

The procurement of professional consultants

66.2 Neither Mark Anderson, the interim Director of Assets and Regeneration, who was primarily responsible for managing the project, nor anyone else within the TMO, gave proper attention to the choice of architect for the refurbishment project, being content to acquiesce in the desire of RBKC to engage the team that it had used on the KALC project in the hope of reducing both cost and delay.[3261] Minimising cost and delay was a laudable aim, but not one that could justifiably be pursued at the risk of appointing a firm that lacked the necessary experience.

66.3 As a result of the TMO's decision to appoint Studio E, there was no competitive process for the appointment of the architect and therefore no independent assessment of its experience in designing a project of the kind under consideration.[3262] Instead, the TMO assumed that Studio E had the skills, knowledge, experience and resources to carry out a high-rise residential overcladding project, which was fundamentally different from designing a school or leisure centre. That assumption turned out to be incorrect and led to a series of decisions which had disastrous consequences.

66.4 As the client under the CDM Regulations 2007, the TMO had a duty to take reasonable steps to ensure that any designer, principal contractor or contractor it appointed was competent to take on the role in question[3263] and had allocated sufficient time and resources to the project.[3264] There is no evidence that the TMO was aware of that obligation.

66.5 The TMO ought to have taken steps to satisfy itself that Studio E had, or could obtain, the right skills and resources to carry out the work efficiently. If it had done so, it would have learnt that Studio E had no experience of overcladding a high-rise residential building and in those circumstances it might have looked elsewhere for an architect or insisted that Studio E hired someone with expertise in facade engineering.[3265]

[3261] Chapter 52.
[3262] Chapter 52.
[3263] {INQ00011315/4} Regulation 4(1).
[3264] Regulation 9 of the CDM Regulations 2007; Approved Code of Practice L144 {INQ00013936/15} paragraph 43 (a); {INQ00013936/16} paragraph 47.
[3265] Hyett {Day63/86:2}-{Day63/87:23}; {Day64/3:20}-{Day64/4:3}.

66.6 The failure of the TMO to concern itself with Studio E's previous experience is all the more remarkable in view of the fact that one of the residents of Grenfell Tower had raised that very question. At a meeting of the Lancaster West Estate Management Board on 15 May 2012, at which representatives of the TMO and Studio E were present, Edward Daffarn asked whether Studio E had experience of working on tower blocks and, if not, why it was proposed that it should be appointed as architect for the refurbishment.[3266] Although he was told by Cllr Coleridge at some stage that Studio E had been chosen in the interests of financial and practical efficiency, it does not appear that Mr Daffarn ever received an answer to his question from the TMO.[3267] It certainly never prompted the TMO to ask that question of itself or anyone else.

Avoiding the procurement rules

66.7 We have described in Chapter 52 how in order to avoid holding a formal competitive procurement procedure for professional services the TMO insisted that the architect's fees for work carried out before the appointment of a principal contractor be capped at £174,000.[3268] Since that was insufficient to cover the amount of work required to produce the tender documents, it was necessary to resort to the device of deferring part of those fees until after the principal contractor had been appointed.[3269] We need hardly say that it was quite improper for the TMO to resort to a scheme of that kind in order to evade the rules on procurement and, as Simon Cash implicitly accepted,[3270] Artelia, as employer's agent, ought to have made it clear to the TMO that it was in breach of procurement rules by capping the fees of its consultants. Instead, it appears that it simply acquiesced in the TMO's plan. The unfortunate practical result was that the TMO deprived itself of the opportunity to select an architect from a wider range of applicants, some of whom might have had more relevant experience.

Failure to notice that Exova's work was incomplete

66.8 It does not seem that anyone at the TMO read any of the versions of Exova's Outline Fire Safety Strategies, in detail or at all, even though they were produced for it as Exova's client.[3271] Both the draft Existing Fire Safety Strategy and the draft Outline Fire Safety Strategy should have been documents of particular interest to the TMO, both as a client which was managing works in a mixed-use occupied residential block and as the responsible person under the Fire Safety Order. The TMO should have taken care to make sure that the safety of the residents from fire had been comprehensively and finally addressed in detail. Instead, it assumed that others had considered the fire safety of the building and failed to appreciate its own responsibility for a matter of such importance.

66.9 David Gibson, Peter Maddison and Claire Williams should all have read Exova's fire safety strategies carefully. In our view, the draft Outline Fire Safety Strategy was not difficult to understand and they should certainly have noticed that, in relation at least to the external wall, the advice it contained was provisional only. It appears, however, that none of them read it or, if they did, that they did not take proper note of its contents.[3272] If they had paid attention to what it said, they would have realised that the strategy was incomplete in relation to functional requirement B4(1) and that it required further work.

[3266] Treasury Report of 15 May 2012 at {TMO00848807/4}.
[3267] Daffarn {Day118/20:17}-{Day118/22:1}.
[3268] Chapter 52.
[3269] Chapter 52.
[3270] Cash {Day48/113:19}.
[3271] Williams {Day55/69:14}-{Day55/70:19}.
[3272] Gibson {Day53/142:23}-{Day53/143:22}; Maddison {Day59/122:11}-{Day59/128:20}.

66.10 There were at least two occasions during the life of the project when it was made clear to the TMO that Exova's work was incomplete. Terry Ashton told Claire Williams on 4 November 2013 (three days before Issue 3 of the Outline Fire Safety Strategy was produced) that after invoicing everything as of that date, there would be a balance remaining from the initial quotation.[3273] That should have alerted her to the fact that Exova had not by then done all that it had expected to do under its contract. By November 2013, many key design decisions had not been made, including the choice of rainscreen cladding. If anyone at the TMO had turned their minds at that stage to the point, they would have realised that the fire safety strategy had not been completed and that further work had to be done on it. Not to have done so was a serious failing on its part.

Failure to challenge Rydon's decision not to appoint a fire safety consultant

66.11 The TMO failed to ask why a fire engineer had not been engaged by Rydon after it had been appointed as principal contractor. The matter was raised at successive project meetings between June 2014 and October 2014 attended by the TMO and was mentioned in the minutes as requiring action by Rydon.[3274] After October 2014 the matter ceased to be mentioned in the minutes, but the TMO appears to have taken no steps to find out whether a fire engineer had been appointed and if not, why. The TMO ought to have obtained a clear decision from Rydon and, if Rydon was unwilling to appoint a fire engineer, an explanation for it. Although Artelia, as employer's agent, should have asked the same questions, the TMO as the employer had a responsibility of its own to monitor the work and ensure that it was being carried out effectively. In that case it failed to do so.

66.12 The TMO continued to retain the services of Exova, but in an unstructured way and on ill-defined terms. Members of the design team sought its advice from time to time, even though it was not a member of that team and had no insight into its thinking. The TMO paid for that advice as and when it was given but took no steps to clarify the terms of Exova's engagement or to understand what services it wanted it to provide.[3275]

66.13 In these, as in other respects, the TMO relied too heavily on its professional advisers and failed to take responsibility for ensuring that the work was being carried out properly.

Failure to resolve fire safety concerns

66.14 Having raised the fire performance of the cladding with Rydon in her email of 12 November 2014,[3276] Claire Williams ought to have insisted on receiving a written response to her question. The matter was too important to be allowed to pass without comment. The fact that it had to be asked at all, in particular at what was a relatively late stage in the project (a year after the NBS Specification had been produced), is a matter of criticism in itself. The fact that an answer was not obtained is difficult to explain, even as an oversight.

[3273] {TMO00855925}.
[3274] Chapter 54.
[3275] Chapter 54.
[3276] Chapter 55.

Failure to involve residents

66.15 Since the refurbishment was being carried out while the building was occupied, it was particularly important for the TMO to engage with and consult the residents, both of the tower and of the surrounding area, in a meaningful and constructive way. Regrettably, however, it did not comply with the consultation and participation requirements in Schedule 3 of the Management Agreement.[3277] No client review group[3278] was established and no one from among the residents was nominated to join the project team or take part when consultants were appointed.

66.16 Similarly, as we have found in Chapter 53, any engagement the residents had with the procurement process was largely symbolic. Although consultation exercises and meetings with residents did take place,[3279] they were given no formal role and had no voice during the refurbishment. In particular, they were given no opportunity to question or challenge key decisions, including decisions on the appointment of consultants and matters affecting fire safety.

[3277] Volume 2, Chapter 2, Schedule 3 of the 2006 Modular Management Agreement {RBK00019006/163}.
[3278] Paragraph 2.1 of Schedule 3 {RBK00019006/165}.
[3279] See for example Sounes {Day 21/34:21}-{Day21/56:4}.

Chapter 67
Conclusions

67.1 Having examined in the previous chapters the parts played by the main participants in the refurbishment, we are in a position to draw certain broader conclusions about the way in which they approached and carried out the project. It is appropriate to do so, because a number of common themes can be seen running through the story which, due to their nature, we think are likely to be repeated widely across the construction industry. By drawing attention to them now, we hope that we may encourage a change in the way that the various parties to large construction projects approach their work.

Creating and understanding the contract

67.2 As the evidence progressed it became clear that many of those engaged on the project did not properly understand the nature and scope of the obligations they had undertaken, or, if they did, failed to pay much attention to them. The terms of Rydon's contract with the TMO were lengthy and detailed, but in substance they imposed on it an obligation to carry out the whole of the design and construction work in accordance with all relevant statutory requirements. In particular, Rydon assumed responsibility to the TMO for all the design work that had previously been done by Studio E, including drawing up the NBS Specification and the Employer's Requirements.

67.3 It is likely that some within Rydon were aware of the nature of the obligations it was taking on, but that does not appear to have been so in the case of those who were more directly involved in the construction work. Simon Lawrence, the contracts manager in charge of the Grenfell Tower project, appeared not to realise that Rydon was contractually responsible to the TMO for any mistakes made by Studio E in the pre-contract stage and by its various consultants and sub-contractors during the construction stage. However, at least Rydon had a formal contract to which it could resort to identify its obligations should the need arise.

67.4 Regrettably the same cannot be said of Harley, whose work as facade sub-contractor was carried out under a letter of intent that was clearly intended to be superseded by a formal contract but never was. The letter of intent expressly incorporated into the contract between Harley and Rydon the terms of Rydon's contract with the TMO and contained a number of detailed appendices. Harley did not bother to read them, however, and in the absence of a formal contract did not concern itself with its legal obligations but set about its work following what it regarded as the standard practice in the industry.

67.5 Kevin Lamb was engaged to produce design drawings on behalf of Harley, but without any formal contract of any kind.

67.6 An even greater degree of informality affected the arrangements under which Osborne Berry was engaged to carry out the work of installing the cladding, comprising the insulation, the cavity barriers, the supporting rails and the rainscreen panels. The terms on which it was engaged were never reduced to writing; everything was done by word of mouth. It is not clear whether Mr Osborne or Mr Berry could have described in any detail the terms on which they were working.

67.7 A similar absence of formality characterised the engagement of some of the consultants. Although Studio E's services were transferred from the TMO to Rydon in about April 2014, the deed containing the terms of that engagement was not executed until February 2016, when the work had been substantially completed. Exova, which had been instructed to produce fire safety strategies for the building, continued to be retained by the TMO after the appointment of Rydon, but neither the TMO nor Rydon nor Exova itself appear to have had a clear understanding of the terms on which it was acting or of its role or responsibilities, or to whom it owed them.

67.8 In our view, such a casual approach to contractual relations is a recipe for disaster if events take an unexpected turn. All those involved in whatever capacity in a complex project need to understand clearly what they have agreed to do and what they are responsible for. What appears to be a widespread culture of getting on with the job without waiting for terms to be formally agreed is unprofessional and likely to result in a failure by those carrying out the work on site to understand the scope of their responsibilities. It is an area in which the principal contractor has an important part to play, because it is at the level of sub-contracting and the engaging of consultants that the problem appears to be most acute. The principal contractor is the only person who can ensure that clear, documented contractual arrangements are in place before a sub-contractor or consultant begins work.

Failure to identify responsibilities

67.9 The failure to put clear contract terms in place at the outset was likely to result in confusion if anything went wrong, but in this case it laid the ground for what turned out to be a more serious problem. As principal contractor, Rydon saw its role as little more than the conductor of a large and varied orchestra. It did not employ any of those whose knowledge and skills were required to design or carry out the refurbishment. They were engaged as sub-contractors and consultants as and when Rydon considered it necessary to obtain their services. Rydon saw its role as being to engage and manage a body of construction professionals, not to carry out any of the tasks itself. Insofar as it understood the broad scope of its obligations to the TMO, it considered them to have been satisfied by appointing others to perform them.

67.10 That had a number of unfortunate consequences. First, Rydon itself was ill-equipped to oversee the work of its sub-contractors and consultants, particularly those whose skills or expertise were of a more technical nature. Secondly, it was free to decide whether to obtain expert assistance and advice or do without it. Thus, in this case, Rydon originally agreed at the first project meeting in April 2014 that it would be desirable to instruct Exova to provide advice on fire safety, but eventually failed to make the appointment, probably because it thought it could manage without it, no doubt at a saving in cost. Thirdly, and in our view most importantly, there was a failure to establish clearly who was responsible for what, including who was responsible for ensuring that the designs were compliant with statutory requirements. That eventually resulted in the unedifying "merry-go-round of buck-passing" in which the construction professionals all pointed the finger at each other as being the person whose responsibility it was to make one or other of the critical decisions.

67.11 Such is the complexity of modern construction that no principal contractor, particularly under a design and build contract, can be expected to retain in its own employment people with the full range of skills required for every project it takes on. Sub-contracting has been a feature of the construction industry for a very long time and will inevitably continue. Many sub-contractors are experts in their particular field and can afford to maintain skills and expertise in relation to a relatively narrow range of work of a kind that might be required by a principal contractor only occasionally. We do not criticise Rydon, therefore, for organising the work in a way that involved engaging sub-contractors to carry out individual elements, particularly of a specialist nature. However, if a contractor is to perform its obligations to the client in an effective and responsible way, it must ensure that within its organisation it has access to sufficient knowledge and expertise to be able to monitor the work of its sub-contractors and consultants effectively and to satisfy itself that their work complies with their obligations and with its own obligations to the client. In the present case, we do not think that Rydon did have that knowledge and expertise at its disposal. Instead, it relied blindly on its sub-contractors and consultants to exercise all relevant skill and care without being in a position to assess the quality of their work.

67.12 Although the model adopted by Rydon cannot in itself be criticised, it does make it essential that, as part of co-ordinating the work, the principal contractor establish clearly which person or organisation is to take responsibility for particular decisions. One of the striking features of the evidence was the number of times those involved in the refurbishment told us that a particular decision had been someone else's responsibility. Rydon, as principal contractor, should have considered the various steps involved in designing and carrying out the work and identified which person, firm or company was responsible for the decisions relating to each of them. Since it undertook an obligation to the TMO for work done before it had been appointed, that should have included a retrospective examination of the preliminary design work, including the contents of the NBS Specification and the choice of materials included in it. It should also have identified clearly who was to take responsibility for the selection of materials chosen as a result of any value engineering exercise subsequently undertaken. In this case Rydon failed to do that and as a result all those involved, including Rydon itself, appears to have assumed that someone else was, or should be, taking responsibility for critical decisions, such as the choice of insulation, rainscreen panels and other materials.

Competence

67.13 If the construction industry is to provide an effective service to society it is essential that those engaged in it at all levels and in whatever capacity be competent to carry out their functions and exercise all reasonable skill and care in doing so. Regrettably, the Grenfell Tower refurbishment was marked by a serious lack of competence on the part of many of those engaged on it and, in the case of some manufacturers of construction products, outright dishonesty.

67.14 It is not necessary to repeat here what we have said about the shortcomings of individual persons and bodies engaged in the refurbishment. It is clear from the findings we have made in the earlier chapters of this part of the report that in many respects those who were directly involved in the design and construction of the refurbishment failed in significant ways to meet the standards to be expected of competent professionals. That is particularly true of Studio E, Harley and Rydon. We were surprised at the limited knowledge of the Building Regulations, the statutory guidance and indeed industry guidance displayed by their employees, for whom a working knowledge of the regulatory regime should have been a fundamental requirement. We were also surprised by their

failure to inquire into the fire performance of the materials proposed for the external wall and their lack of concern about fire safety generally. None of them appears to have thought it possible that materials that had been used on previous occasions might not in fact be suitable in the context of the refurbishment and no one asked for advice or confirmation from a fire engineer. It is astonishing that none of those to whom Exova's draft Outline Fire Safety Strategy was sent noticed that it was incomplete or thought it necessary to make sure that Exova had been given details of the build-up of the external wall.

67.15 The professionals' lack of competence was also demonstrated by the way in which they communicated with each other in relation to the project. Although the TMO raised the fire safety performance of the cladding with Rydon on two occasions, it simply failed to respond and so a critical question at a key moment in the life of the project was left unanswered. The provision of information to building control was piecemeal and disorganised. Studio E on behalf of Rydon submitted old versions of drawings showing key features of the external wall that were never replaced with current versions. There was no attempt properly to document and record important design changes, not least the switch from zinc to ACM PE rainscreen panels, the introduction of Kingspan insulation when Celotex became unavailable and the use of uPVC window surrounds in place of plywood. At the end of the project the documentation provided was inaccurate, incomplete and disordered, not least the Health and Safety file required by the CDM Regulations. One result of that casual approach to record-keeping was that several of those involved in the project, including Exova and building control, were not told that ACM PE had been used for the rainscreen panels.

67.16 The way in which the Grenfell Tower refurbishment was handled raises serious questions for the whole of the construction industry. We were not asked to investigate the industry at large and we do not know whether the shortcomings we have identified are typical, although, judging by the evidence we heard, we think they are likely to have been widespread. It is not acceptable for large projects of this kind to be undertaken without proper contractual arrangements by parties who do not concern themselves with the regulatory regime and insist instead on carrying on in what they regard as the usual way. There is nothing wrong with a desire to "make it work", provided that is not regarded as a sufficient reason for ignoring formalities and failing to keep safety high on the agenda.

67.17 Incompetence in the form of ignorance of the regulatory regime affecting construction has also infected both the approach of construction professionals to building control and, in some cases, the approach of building control itself. It became apparent that most, if not all, of those involved in the project regarded building control as, in effect, an additional consultant, whose function was to give advice on the design and choice of materials and act as a safeguard to ensure compliance with the Building Regulations. That contributed to a failure on the part of Rydon, Studio E and Harley to take proper responsibility for ensuring that the design of the external wall and the choice of materials it contained complied with the Building Regulations. That was bad enough, but it was compounded by the adoption of a similar attitude on the part of RBKC's building control department, which saw its function as being to "work with" employers and contractors by enabling them to complete the work, rather than to act as the custodian and enforcer of the Building Regulations in the public interest.

67.18 In our view there is a great deal to be done to raise the overall level of competence of those in the construction industry. They need to have a better knowledge and understanding of the regulatory regime and how it applies to the work they are carrying out. The disaster at Grenfell Tower has shown that it is not safe to assume without question that the way things have been done in the past is safe or satisfactory. A greater degree of scrutiny is called for, as is a better understanding of the function of building control. That needs to go hand in hand with a change in the way in which building control bodies understand their function, which is to police the regulatory regime. Their role is not to advise the applicant or building professionals how to comply with the regulatory regime and they should not be regarded by building professionals as a "safety net".

The role of the client

67.19 Even under a design and build contract the client has an important part to play because, among other things, it appoints the architect, who carries out the preliminary design work and in many cases continues to develop the design under a contract with the principal contractor. In most cases the choice of architect is likely to be dictated, at least in part, by experience of projects of a similar kind, unless the client is satisfied from enquiries that a particular firm has the capacity to undertake a project of the kind under consideration.

67.20 In the present case Studio E was chosen for reasons of a different kind and no steps were taken by the TMO to satisfy itself that the firm had the ability to tackle a project of a kind that it had not previously undertaken. That was a mistake, but not necessarily a serious one. In the event the real error lay in the failure of any of those at Studio E involved in the choice of materials for the external wall to pay proper attention to their reaction to fire.

67.21 The TMO consistently portrayed itself as an unsophisticated client, dependent on its professional consultants for advice. We accept that to a large degree it was, but there were some respects in which it failed to act as a prudent client. One conclusion that emerges clearly from the evidence is that the TMO was unduly concerned with reducing costs. From the outset the TMO was struggling to keep the project within budget. As the costs rose, it was dependent on the council for additional funds and from time to time they were made available, but still the TMO looked for reductions in the cost of the project rather than go back to the council for more money. The decision to appoint Studio E was driven in a large measure by a desire to keep the costs down, as evidenced by the device employed to avoid a proper procurement exercise, and costs played a part in the choice of Rydon as principal contractor, as evidenced by the "off-line" discussions that took place before it was awarded the contract. The decision to choose Reynobond PE was part of a "value engineering" exercise performed at the TMO's insistence and designed to keep costs down, but responsibility for that disastrous decision cannot be laid at the door of the TMO. It is one that must be borne by those who could be expected to know, or at any rate discover, the nature of the product being recommended.

67.22 Cost is always an important factor in any construction project, of course, if only because clients want the maximum result for the minimum expense and contractors are usually working on narrow margins. Realism, however, is essential and a sound understanding of the nature of the exercise being undertaken. In this case, the cost of employing an independent professional project manager would have been money well spent.

67.23 Any substantial construction project needs to be managed by or on behalf of the client and unless the client has the necessary experience and skill to undertake that task, it will usually appoint a professionally qualified project manager. In the present case Artelia would have been willing to act as project manager, but the TMO persuaded itself that it could

perform that function itself. That was a mistake because it did not have the necessary skills or experience to undertake that task and to ensure that Rydon, and through it the other professionals involved in the refurbishment, carried out their work effectively.

67.24 What we have observed in the course of the evidence has led us to the conclusion that there is not only a need to improve the education and training of those involved in the construction industry but also a change in approach on the part of all concerned which prioritises safety over speed and cost and lays much greater emphasis on an understanding of the regulatory regime and its purpose.

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