Report
for
The Grenfell Tower Inquiry

LEGISLATION, GUIDANCE AND ENFORCING AUTHORITIES RELEVANT TO FIRE SAFETY MEASURES AT GRENFELL TOWER

C. S. TODD & ASSOCIATES LTD
Fire Safety Consultants

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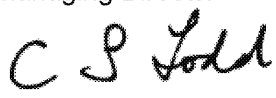

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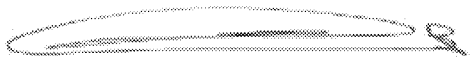

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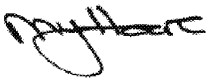

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1. INTRODUCTION

1.1 I have prepared this report on the instructions of the Grenfell Tower Inquiry ("the Inquiry"). My instructions were set out in a letter, dated 13 November 2017 and signed by Ms Cathy Kennedy, Deputy Solicitor to the Inquiry.

1.2 My instructions require that, to assist in Phase 1 of the Inquiry, I prepare a report that addresses the following issues namely:

i.) Relevant statutory and regulatory requirements in force at the different stages of the design, construction and refurbishment of Grenfell Tower, with a view to creating a regulatory framework which can be relied upon by all of the Inquiry's expert witnesses.

ii.) How the needs of vulnerable persons must be considered and met in accordance with the 15 duties imposed by Articles 8-22 of the Regulatory Reform (Fire Safety) Order 2005 ("the Fire Safety Order").

1.3 Grenfell Tower is a high-rise residential tower block of 24 floors and so a height (to the topmost storey) of around 63m. The upper surface of the plant room is approximately 70m above ground. At the time of the fire on 14 June 2017, the building incorporated 129 one and two-bedroom flats, the majority of which were tenanted, but around 15 of which were leasehold flats; some leasehold flats may have been sub-tenanted. Flat entrance doors open into lobbies, which are separated from the stairway by a fire-resisting door.

1.4 On each floor, there is a refuse chute room, which is separated from the adjacent flat lobby area by a substantial door. In addition, there are various plant rooms, typically found in a block of flats, including a basement boiler room and roof level lift motor room. At ground floor level, there is an electrical sub-station and bin room, both of which are accessed from open air.

1.5 In common with many similar tower blocks, the building was served by a single stairway, which provided the means of escape from upper floors in the event of fire. Upper floors could be accessed by means of two lifts. As is normally the case in modern, high-rise blocks of flats, there was no communal fire alarm system, but smoke detectors were provided in the communal flat lobbies as part of the building's smoke control system. Hardwired domestic smoke and heat alarms (smoke alarms in entrance hallways and heat alarms in kitchens) were provided within flats to provide a warning to each resident in the event of a fire within their own flat.

1.6 The building was constructed in the early 1970s, but was subject to various alterations or refurbishments, the latest of which was completed in 2016 and included overcladding with proprietary thermal insulation and rainscreen cladding. As part of the refurbishment, nine of the 129 flats were incorporated, and accommodation was provided for a boxing club and a nursery, the latter of which was accessed externally, while access to the boxing club was located in the ground floor hallway.

1.7 For the purpose of this report, I have interpreted the need for advice on relevant legislation to extend to the relevant guidance produced, or used by enforcing authorities, in support of the legislation, and to the authorities responsible for application of and/or enforcement of the legislation ("enforcing authorities").

1.8 Over the life of Grenfell Tower, the relevant legislation and guidance was subject to periodic change. In this connection, there is a lack of clarity as to the date on which approval for the original design of the building was granted under relevant building legislation. Given that changes occurred in the relevant guidance around the time of construction of Grenfell Tower, this does create some ambiguity in relation to the requirements that would have been imposed under building legislation.

1.9 In this connection, I reproduce, as Annex A to this report, the relevant chronology provided to me by Ms Cathy Kennedy, which I understand was prepared by the Royal Borough of Kensington & Chelsea ("RBKC"). It will be noted from this chronology that the building is said to have been designed in 1967, and that construction took place between 1972-1974. This would be consistent with my understanding that approval under building legislation was granted around 1971.

1.10 In preparing the advice contained in this report, I do not hold myself out as qualified in the field of law. My advice is based on my practical experience of the relevant legislation and my long-standing working relationships with both regulators (by which I refer to the relevant Government Departments) and enforcing authorities, particularly fire and rescue authorities.

1.11 The following section of this report contains a short summary of the report. In Section 3, I describe the two branches of legislation under which fire safety is controlled. Thereafter, my report is divided into three parts; Part 1 is concerned with the first of the two branches of legislation, namely building legislation, which applies when a building is designed and built or subsequently altered, while Part 2 is concerned with the second branch, namely fire safety and housing legislation, under which there is ongoing control of fire safety after the building is in use. In Part 3, I consider the needs of vulnerable persons in relation to the duties imposed by the Regulatory Reform (Fire Safety) Order 2005 ("the Fire Safety Order").

1.12 Part 1, Section 4 of this report is concerned with London building legislation, which was applicable to building work carried out at Grenfell Tower until 1986 and, to some extent, until 2013. Section 5 addresses the Building Regulations in England and Wales, which applied to building work carried out at Grenfell Tower from 1986 until the time of the fire. In both sections, I discuss the relevant guidance produced in support of the legislation; in practice, it was the recommendations of guidance, rather than the legislation itself, that would have influenced the design of fire safety measures at Grenfell Tower.

1.13 In Part 2, I have endeavoured to include all legislation that had the potential to impact on fire safety at Grenfell Tower, as an occupied building, after the time of construction, other than in relation to new building work, which was a matter for the legislation described in Part 1. Within Part 2, I have included legislation that had only the most minimal of impact on fire safety at Grenfell Tower, lest reference be made to such legislation during the course of the Inquiry. As in Part 1, I discuss recommendations of the relevant guidance produced in support of the legislation.

1.14 In Section 6, I discuss the (now repealed) Fire Precautions Act 1971. In Section 7, I discuss section 72 of the Building Act 1984. In Section 8, I discuss the Workplace Fire Precautions Legislation, which is the name formally given to a combination of the (now revoked) Fire Precautions (Workplace) Regulations 1997 (as amended) and certain (now revoked) requirements within the Management of Health & Safety at Work Regulations 1999.

1.15 In Section 9, I discuss the Fire Safety Order, while, in Section 10, I discuss the Housing Act 2004. In practice, it was the Fire Safety Order and the Housing Act that had the greatest relevance to ongoing control over fire safety at Grenfell Tower at the time of the fire (after control of any material alterations under the Building Regulations).

1.16 In Section 11, I discuss the Smoke & Carbon Monoxide Alarm (England) Regulations 2015. These Regulations did not apply to RBKC, but did impose requirements on any private sector landlord of any flat(s) in Grenfell Tower.

1.17 In Part 3, Section 12 is concerned with the evacuation and rescue of vulnerable people.

1.18 As noted above, in Annex A, I set out the relevant chronology of Grenfell Tower. In Annex B, I summarize, in the form of a timeline, the legislation that applied at the time of various milestone events in the construction, alteration and use of the building.

1.19 References to which I refer in this report are set out in Annex C. Where, within the report, I first (and, with significance, subsequently) refer to a document in Annex C, the number of the document in that annex is shown in square brackets. Where I highlight specific recommendations within a document listed in Annex C, I provide a reference to the relevant paragraphs, sections or parts, thus, for example, (see paragraphs xxx-xxx). Annex C also includes relevant bibliography, to which I have not made specific reference in the report. Annex D provides information on various bodies to which I refer in this report. In Annex E, I set out my qualifications and experience in the field of fire safety.

1.20 In preparing this report, I understand that my duty is to assist the Inquiry on matters within my expertise. I have complied, and will continue to comply, with that duty. I am aware of the requirements of Part 35 of the Civil Procedure Rules (CPR 35) and the supporting Practice Direction 35 (PD 35), and of the Civil Justice Council Guidance for the Instruction of Experts in Civil Claims 2014.

1.21 I confirm that I have made clear which facts and matters referred to in this report are within my own knowledge and which are not. Those that are within my own knowledge I confirm to be true. The opinions I have expressed represent my true and complete professional opinions on the matters to which they refer. Where, in my experience, a range of opinions on any matter exists amongst fire safety specialists, I have summarized the range of opinion, while clearly giving my opinion along with the reasons for it. I have also identified any assumptions that I have made in reaching my conclusions.

1.22 In preparing Parts 1 and 2 of this report, I have made best endeavours and taken due care accurately to set out relevant requirements of legislation and recommendations of supporting guidance. However, the legislation and guidance were subject to many amendments, and, in the case of legislation, repeals or revocations, over the life of Grenfell Tower, both minor and major in extent and sometimes of a subtle nature, though potentially influential on building work carried out at Grenfell Tower.

1.23 Moreover, particularly in the case of guidance, I have set out only the key issues that, subjectively, I consider might be most relevant to the Inquiry. Accordingly, before relying on these Parts of this report in relation to any significant findings of the Inquiry, reference should be made to the full copies of the legislation and guidance, as amended at the relevant time.

1.24 I confirm that I have no conflict of interest of any kind, other than any which I have already set out in this report. I do not consider that any interest which I have disclosed affects my suitability to give expert evidence to the Inquiry on any issue on which I have given evidence and I will advise the Inquiry if, between the date of this report and the Inquiry hearings, there is any change in circumstances which affects this statement.

1.25 I reserve the right to alter my opinions and conclusions in the light of any further information of which I am currently unaware. Under such circumstances, I recognize, and will comply with, my obligation to inform the Inquiry.

2. EXECUTIVE SUMMARY

2.1 Legislative control of fire safety is divided into two branches. The first branch, comprising building legislation, imposes requirements on the design of new buildings, and on extensions, material alterations and material changes of use of existing buildings. Ongoing control of fire safety is controlled under the second branch of legislation, which principally comprises the Fire Safety Order.

Building Legislation

London Building Legislation

2.2 When Grenfell Tower was built, London had its own system of building legislation, comprising the London Building Acts 1930 to 1939, in conjunction with the London Building (Constructional) By-laws of various dates. Section 34 of the London Building Acts (Amendment) Act 1939 required that the means of escape from fire were satisfactory, while section 20 imposed additional fire safety requirements in view of the height of the building.

2.3 More detailed technical requirements were imposed by the By-laws, the latter of which made requirements for the fire performance of roofs, external walls, elements of construction, etc. Any external cladding was subject to approval by the District Surveyor of the Council.

2.4 Requirements for means of escape followed the recommendations of either the 1962 or 1971 version of a British Standard, namely CP3: Chapter IV: Part 1 ("CP3"). Both versions of CP3 made recommendations relating to certain internal doors within flats, flat entrance doors and staircase doors, all with the intention of protecting the communal means of escape from a fire within a flat. All of these doors were to be fire resisting and self-closing.

2.5 To ensure availability of stairways for escape, the 1962 version of CP3 offered two alternatives, namely the provision of two staircases or a single staircase with a double lobby between each flat and the staircase; in the latter case, there were then three doors between a flat and the staircase (i.e. the flat entrance door, a door into a lobby and a door between the lobby and the single stairway). This became known as *smoke containment*.

2.6 In the single stairway design, one of the two lobbies was permanently ventilated to open air to clear smoke from the lobby. The single stairway arrangement was stated by CP3 to be the preferable design. The ventilated lobby arrangement was said to be so safe that a single stairway was adequate.

2.7 In the 1971 version of CP3, smoke containment, with the double lobby, was still recognized, but the alternative of *smoke dispersal* was offered. Smoke dispersal permitted a single stairway with a lobby between any flat and the stairway, so that there were just two doors between each flat and the stairway (i.e. the flat entrance door and the door between the lobby and the stairway).

2.8 To protect the stairway from ingress of smoke, there was "cross ventilation" within the lobby, comprising ventilation openings on the opposing walls of the lobby. The theory was that the flow of air through the lobby would disperse smoke. Cross ventilation is now discredited, because its effectiveness is dependent on wind pressure and wind speed; it was also, ultimately, considered to be impracticable because of the unfavourable environment that the permanently open vents created for residents.

2.9 Neither the 1962 nor the 1971 version of CP3 recommended the provision of emergency lighting or a fire alarm system. So that stairway lighting would not be affected by a fire in a flat or the stairway lobby, stairway lighting circuits were to be independent of lobby lighting circuits, unless the stairway had natural lighting. Passenger lifts were to be designed as "fire lifts", control of which could be taken by the fire service in the event of fire; by operation of a switch at fire service access level, the lifts are returned to that level, after which the lift is operated by controls within the lift car, while lift call buttons on each landing are disabled. Rising mains were to be provided in buildings over 18m in height; these could be dry rising mains unless the height of the building was over 61m, in which case wet rising mains were specified.

2.10 CP3 1962 advised that it might be necessary to evacuate the floor on which a fire occurred, but it was intended that occupants of flats on levels above a fire should be able to remain safely within their own flat. The 1971 version advised that, owing to the compartmentation (whereby each flat is enclosed in fire resisting construction), the spread of fire and smoke from one flat to another was unusual, so that it should not now be assumed that entire storeys, or even adjoining flats, need be evacuated if a fire occurred in a flat. In subsequent years, this principle became known as "stay put"; the principle is supported by requirements for compartmentation imposed under building regulations.

2.11 Both the 1962 version and the original 1971 version of CP3 recommended that advice on fire safety be disseminated to tenants, but this largely related to measures to prevent fire; there were no recommendations for advice to residents on the "stay put" strategy.

2.12 However, following a recommendation by Parliament, the 1971 version was amended in 1978 to recommend provision of enhanced advice to residents. Residents were to be advised that, if a fire occurred elsewhere than in their own flat, they would normally be safe to stay within their flat, but they should leave at once if smoke or heat entered the flat.

2.13 The objective of section 20 of the 1939 Act was to impose measures to limit fire spread, ensure the safety of the structure against fire, provide fire-fighting facilities for the fire brigade, and, more generally, to safeguard occupants of high-rise buildings. No details of these requirements were contained in section 20 itself.

2.14 However, guidance produced by the then Greater London Council (GLC) advised on the additional measures required in high-rise buildings for

compliance with section 20. This 1970 code of practice was revised by the GLC in 1974. The GLC code was replaced by a new code, which was published by the London District Surveyors' Association (LDSA) in 1990.

2.15 The GLC codes noted that the Council reserved the right to require a more substantial form of external enclosure than would be required for low-rise buildings in view of the risk of external fire spread from one storey to another above the height which was accessible to external fire brigade equipment. These codes also advised on the need for dry rising mains (or wet rising mains in buildings exceeding 61m in height), fire lifts, and smoke control measures in single stairway blocks of flats. The 1974 code permitted the smoke control arrangements in the 1971 version of CP3 as an alternative to the recommendations in the GLC code.

2.16 The LDSA code advocated the provision of smoke control facilities, dry rising mains (or wet rising mains in buildings where any storey exceeded 60m in height) and fire-fighting shafts, comprising stairways and lifts for use by the fire service. The LDSA code also advocated the provision of sprinkler systems, hose reels and fire extinguishers in section 20 buildings, but advised that these would not necessarily be required for blocks of flats. It was also noted that fire alarm systems were not required in blocks of flats.

2.17 When Grenfell Tower was built, approval under the London Building Acts and the associated By-laws was the responsibility of the GLC. From January 1986, building work in Inner London (including Kensington and Chelsea) was brought within the scope of the Building Regulations 1985, which applied throughout England and Wales.

2.18 Building control remained the responsibility of the GLC until its abolition on 1 April 1986, when responsibility for building control was transferred to the London Boroughs. However, section 20 of the 1939 Act remained in force (so that both the Building Regulations 1985 and section 20 of the 1939 Act would have applied to any new building work carried out at Grenfell Tower) until repeal of section 20 in January 2013.

National Building Regulations

2.19 The Building Regulations 1985 (and all subsequent Building Regulations) made no detailed technical requirements in relation to fire safety, but contained only *functional requirements*. A functional requirement can be regarded as a simply expressed objective that must be achieved, but there are no "rules" as to how the functional requirement must be satisfied.

2.20 This provides flexibility for designers to achieve the objective by various means, though, in any such goal-based legislative regime, there can be variance in opinion as to whether a design satisfies the required objective. Expression of the Building Regulations in functional form enables novel design of buildings, the use of fire engineering and avoidance of rigid application of "rules" that are often of an arbitrary nature.

2.21 In the Building Regulations 1985, there were four functional requirements, which were (and continue to be) set out in Part B of Schedule 1 to the Regulations. The four functional requirements are described as Requirements B1-B4. I summarize these requirements in the following paragraphs. The functional requirements are not retrospective, but apply to new building work.

2.22 Requirement B1 requires that there are adequate means of escape from fire. Requirement B2 relates to limitation of internal fire spread via the surfaces of materials used on the walls and ceilings.

2.23 Requirement B3 relates to limitation of internal fire spread via the structure of the building. In the event of fire, the structure of the building must remain stable for a reasonable period. The building needs to be sub-divided, where necessary, into compartments by fire-resisting construction. Concealed spaces need to be sealed and sub-divided where necessary to inhibit the unseen spread of fire and smoke.

2.24 Requirement B4 relates to limitation of external fire spread. In effect, there are three distinct requirements. The external walls of a building must offer adequate resistance to the spread of fire over the walls. The external walls must also offer adequate resistance to spread of fire from one building to another. The roof of the building must offer adequate resistance to the spread of fire over the roof and from one building to another.

2.25 The relevant Government Department produces guidance on the means by which the functional requirements can be achieved. This takes the form of Approved Document B ("ADB"). However, there is no obligation for a designer to follow the recommendations of ADB. A designer may choose an alternative approach that results in a quite different technical solution, provided the designer can demonstrate to the building control body that the relevant functional requirements are satisfied.

2.26 Under the 1985 Building Regulations, Requirement B1 could only be satisfied by following "Mandatory Rules", as guidance on means of escape was not included in ADB. For blocks of flats of three or more storeys, the Mandatory Rules required compliance with specified clauses of CP3.

2.27 This changed in 1992, when the Building Regulations 1991 came into force. Requirement B1 was no longer subject to Mandatory Rules, so non-mandatory recommendations were incorporated into ADB, enabling alternative solutions for means of escape from fire. For compliance with Requirement B1, ADB recommended the provision of smoke alarms in dwellings. The Building Regulations 1991 also incorporated a new, fifth functional requirement, Requirement B5, relating to access and facilities for the fire service.

2.28 The Building Regulations 1991 were subject to amendment on nine occasions before they were revoked by the Building Regulations 2000. None of these amendments were greatly significant, with the exception of an amendment in 1999, which amended Requirement B1, such that it required not only adequate means of escape but adequate provisions for the early warning of

fire. In relation to blocks of flats, the only effect of this amendment was to make provision of smoke alarms in flats, in effect, a functional requirement, rather than simply a recommendation of ADB in relation to means of escape.

2.29 The Building Regulations 2000 came into force on 1 January 2001 and revoked the Building Regulations 1991. The functional requirements of the Building Regulations 2000 were identical to those in the 1991 Regulations (as amended in 1999 to include provision of the early warning of fire).

2.30 Prior to revocation of the Building Regulations 2000 by the Building Regulations 2010, the 2000 Regulations were amended 17 times. The most significant of these amendments occurred in 2006. In that year, Requirement B3 was amended such that, where reasonably necessary to inhibit the spread of fire within a building, there was a requirement, either as an alternative or as an addition to sub-division of the building with fire-resisting construction, for installation of a suitable fire suppression system (normally a sprinkler system).

2.31 A corresponding amendment was made to ADB to provide guidance on this new requirement. The 2006 version of ADB, which came into effect in April 2007, recommended that, for compliance with Requirement B3, sprinkler protection be provided within flats in blocks of flats of over 30m in height. As in the case of any fire safety requirements within the Building Regulations, this measure could not be applied retrospectively to existing blocks of flats. (I would also note that, in my opinion, it could not reasonably be suggested that a sprinkler system should have been installed retrospectively at Grenfell Tower.)

2.32 Other amendments to the Building Regulations 2000 were less significant in respect of fire safety. There was a new requirement that, on completion of building work, fire safety information must be provided to assist the Responsible Person to operate the building with reasonable safety. (This requirement is now imposed by Regulation 38 of the current Building Regulations). In addition, the amended Building Regulations accepted self-certification by certain registered firms in relation to building work consisting only of the installation, or replacement, of a window or door in an existing building.

2.33 Also, by amendment of the Building Regulations 2000, a new Part P to Schedule 1 of the Building Regulations 2000 came into force in January 2005. The new Part P made requirements for safety of domestic electrical installations.

2.34 The Building Regulations 2010 came into force on 1 October 2010 and remain current. The 2010 Regulations revoked the Building Regulations 2000. For the purpose of this summary, the 2010 Regulations are not significantly different from the Building Regulations 2000. The Building Regulations 2010 have been amended on five occasions, but I am not aware of any amendment that is material to this report.

2.35 As it is likely that Requirement B4(1) will be relevant to the Inquiry, I draw the attention of the Inquiry to the wording of that Requirement, namely "*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*".

2.36 Interpretation of this Requirement rests on the meaning of the word "*adequately*". However, one intent of this Requirement is, in my opinion, to minimize the potential for external spread of fire from one floor to another.

2.37 While it is well-known that the dynamics of fire can, potentially, result in the external vertical spread of fire from one flat to the flat immediately above (even if the walls are of masonry construction), fire spread significantly beyond such an extent would, in my opinion, demonstrate a failure to comply with Requirement B4(1). In passing, I would note that this principle was recognized at least as long ago as 1970 in the GLC code of practice for section 20 buildings.

2.38 The principle has also been recognized in ADB, since the original version of ADB was published in 1985. The 1985 version of ADB recommended that, for compliance with Requirement B4(1), external walls were to be constructed of materials of limited combustibility. (While this term may sound somewhat vague, it is fully defined in ADB by reference to fire tests, which I describe in the relevant section of this report.)

2.39 The 1985 version of ADB advised that external cladding could be combustible, subject to certain recommendations in relation to fire performance. Cladding at a height of 15m or more above ground was to achieve Class 0 performance (a term defined specifically for the purpose of the Building Regulations and discussed in the relevant section of this report).

2.40 Subsequent changes to advice regarding external walls and cladding in later versions of ADB took into account the circumstances of two high-profile fires that involved "cladding" in blocks of flats. In a fire at Knowsley Heights in Merseyside in 1991, fire spread vertically up the entire face of this 11-storey block, within a cavity behind rainscreen cladding, though no deaths occurred and the fire did not enter the building.

2.41 In the 1992 version of ADB, there was a recommendation that, for compliance with Requirement B3, cavity barriers were to be provided in the void behind rainscreen cladding at every floor level, and on the line of compartment walls abutting the external wall, of buildings that had a floor of more than 15m above ground level. The figure of 15m was later changed to 20m.

2.42 The 1992 version of ADB also incorporated a stated objective of reducing the danger from fire spread up the face of a building. There was a warning that the use of combustible materials for cladding framework, or of combustible thermal insulation as an over-cladding, may present a risk to health and safety in tall buildings.

2.43 Accordingly, there was a recommendation in ADB 1992 that, in buildings over 15m in height, insulation material used in external wall construction should be of limited combustibility. (The figure of 15m was later changed to 20m.) An amendment to ADB 1992 incorporated a reference to a BRE publication (BR 135), which had been first published in 1988 to provide advice on fire performance of thermal insulation in multi-storey buildings.

2.44 In the light of the Knowsley Heights fire, the Building Research Establishment (BRE) published their Fire Note 9 in 1999. Fire Note 9 described a large-scale fire test for the performance of external cladding systems. This test was developed because the Knowsley Heights fire had suggested that small-scale fire tests were inadequate to address the fire hazards of modern cladding and insulation; the small case tests were not considered properly to evaluate the performance of complete cladding systems in a real fire.

2.45 Further attention to the matter of cladding arose from the second of the two fires to which I referred in paragraph 2.40. This fire occurred at Garnock Court in Ayrshire in 1999. A fire in a flat spread externally (via spandrel panels beneath windows) up a strip of wall from the fifth floor to the 13th floor of this 14-storey block of flats. This resulted in a Select Committee Inquiry into the fire risks of cladding systems and the regulations pertaining to their use.

2.46 The Select Committee noted that there had been few recorded incidences of serious fire spread involving external cladding and few, if any, deaths from such fires. However, the Select Committee took the view that it should not take a serious fire in which many people are killed before all reasonable steps were taken to minimize the risk from fires in external cladding.

2.47 Accordingly, the Select Committee recommended that all external cladding systems should be required either to be non-combustible, or be proven through full-scale testing not to pose an unacceptable level of risk in terms of fire spread. The Department of Environment, Transport and Regional Affairs (DETR) responded to the Select Committee, endorsing the view that it should not take a multiple fatality fire to result in steps to minimize risks.

2.48 The DETR had arranged for a group of experts to review Part B of Schedule 1 to the Building Regulations and ADB. While it was not found that compliance with ADB in relation to external cladding would result in an unsafe situation, the DETR requested BRE to review their guidance in BR 135 and to carry out large-scale fire tests to assess the fire performance of existing and new external cladding systems.

2.49 In the 2000 version of ADB, the full-scale fire test of BRE Fire Note 9 was offered as an alternative to the guidance in ADB on the fire performance of the external surface of cladding. In addition, Fire Note 9 was submitted to BSI for development as a British Standard. After some amendments, the fire test method was published as BS 8414.

2.50 In 2002, ADB was amended to recognize European specifications and test methods in pursuance of a move towards the Single Market. Thus, for

example, in situations in which ADB recommended materials of limited combustibility, ADB advised equal acceptance of materials that were classified as Class A2 under the harmonized European standard, published in the UK as BS EN 13501-1.

2.51 The current version of ADB is that published in 2006, and amended in 2007, 2010 and 2013. The amendments did not result in changes that are material for the purposes of the Inquiry; the relevant recommendations have not changed since 2006. With regard to external wall construction and cladding, ADB includes a verbatim reminder of each of the five functional requirements, including, therefore, the (very clearly and simply stated) requirement that the external walls of the building shall adequately resist the spread of fire over the walls.

2.52 ADB also repeats this requirement in equally lay language by advising that the external envelope of a building should not provide a medium for fire spread if it is likely to be a risk to health and safety. There is then what might be regarded as a "health warning" that the use of combustible materials in the cladding system and extensive cavities may present such a risk in tall buildings. The Inquiry might consider that this (in my opinion, clearly stated) requirement and warning resonates with the tragic circumstances of the fire at Grenfell Tower.

2.53 The above warning is a precursor to recommendations that then follow on the means for satisfying the functional requirement. Designers are offered two options in this respect. The first is that they may follow recommendations incorporated within four succinctly written paragraphs within ADB.

2.54 Alternatively, the external cladding system, including thermal insulation, cavities and the outer cladding material, may be demonstrated to meet the criterion set out in BR 135, when tested in accordance with BS 8414. Put simply, this quite aggressive fire test simulates a fire within a compartment in which all contents are alight, such that the window breaks and flames impinge on the surface of the cladding.

2.55 The "pass" criterion set out in BR 135 is intended to ensure that, for a specified period of time, there is no spread of fire beyond a limited height of the cladding, either on the face of the cladding or internally within the insulation or cavities.

2.56 If the first, somewhat prescriptive alternative is adopted, in the case of a building over 18m in height (typically, around six storeys), for compliance with ADB, "*any insulation product, filler material (not including gaskets, sealants and similar) etc. used in the external wall construction should be of limited combustibility*".

2.57 The equivalent recommendation in ADB 2000 was less onerous, in that the recommendation for materials of limited combustibility applied only to insulation material used in ventilated cavities in the external wall construction; nevertheless, there was a warning that the use of combustible materials for cladding framework, as well as this thermal insulation, may present a risk in

tall buildings even though the provisions for external surfaces, as set out in ADB, may have been satisfied.

2.58 The reference to "*filler material, etc*" was added in the 2006 version of ADB. The Inquiry may be aware that, since the Grenfell Tower fire, there has been contention as to whether this term applies to the core of Aluminium Composite Material (ACM), though, in my opinion, it would be somewhat illogical for it not to do so. However, I am not aware of contention as to what is intended by the term *insulation material*.

2.59 Accordingly, my interpretation of ADB is that, if a proposed over-cladding system contains thermal insulation that is not of limited combustibility (regardless of the nature of any outer facing), it would be necessary to demonstrate that the cladding system could meet the BR 135 criterion if tested in accordance with BS 8414. The only other option would, in theory, be to demonstrate that an alternative "fire engineering solution" achieved an equivalent level of safety (though I find such a solution difficult to envisage). This understanding appears consistent with advice published by the Building Control Alliance and the NHBC (formerly known as the National House-Building Council).

2.60 My understanding is that, prior to the Grenfell Tower fire, no BS 8414 tests of cladding incorporating ACM had been carried out in the UK. However, I am aware that certain laboratories and consultants had undertaken "desktop assessments", which gave an assessment as to whether certain wall construction, incorporating combustible thermal insulation and ACM cladding, would pass the BS 8414 test, so precluding the need to carry out the test (albeit those of which I am aware did not incorporate ACM with the polyethylene core that has been said to be present at Grenfell Tower).

2.61 Desktop assessments have been considered a valid means of demonstrating compliance with the functional requirements of the Building Regulations, but only if the assessment can legitimately be extrapolated from test results or published data. The principle of desktop assessments is acknowledged by the Building Control Alliance.

2.62 Moreover, in July 2016, NHBC produced guidance to the effect that, having been previously presented with the results of many large-scale fire tests and desktop assessments, certain wall construction incorporating ACM, of specific fire performance, and certain proprietary insulation would be accepted by NHBC as satisfying Requirement B4(1) of the Building Regulations. There is, in my opinion, some ambiguity in this guidance as to whether acceptance of these desktop assessments excludes ACM with a polyethylene core or simply excludes such ACM that does not meet a specified fire performance.

2.63 With regard to recommendations of ADB relevant to the other functional requirements of the Building Regulations, guidance on means of escape and compartmentation addresses the fire resistance of internal doors within flats, walls and floors separating flats from common parts and other flats, the flat entrance doors (which should be fire-resisting and self-closing) and fire

stopping of service penetrations to maintain the integrity of compartmentation where fire resisting barriers, such as walls and floors, are breached by the penetrations.

2.64 As a supporting provision for the means of escape, emergency lighting of escape routes is recommended by ADB. In addition, recommendations are made in relation to smoke control. The purpose of the smoke control is to prevent the ingress of smoke into the escape stairway, though it will also assist in smoke clearance from lobbies or corridors.

2.65 There is no recommendation in ADB for a communal fire alarm system in a block of flats. This reflects long-standing conventional (and current) wisdom that such systems are undesirable as they conflict with the "stay put" strategy adopted in blocks of flats. Smoke alarms are recommended within the flats for compliance with Requirement B1. As noted in 2.31, for compliance with Requirement B3 (internal fire spread), sprinkler protection is recommended for flats within a block of flats that is higher than 30m above ground level. Guidance is given on access and facilities for the fire and rescue service to assist in compliance with Requirement B5.

2.66 I am aware that refurbishment work was carried out at Grenfell Tower and completed in 2016. In carrying out that work, by virtue of the Building Regulations, the building was required, following refurbishment, to be no less compliant with Requirements B1, B3, B4 and B5 of Part B of Schedule 1 to the Building Regulations 2010 (as amended) than it was previously prior to the refurbishment.

Fire Safety and Housing Legislation

2.67 In the paragraphs above, I addressed the first branch of legislation to which I referred in paragraph 2.1. I now turn to the second branch.

Fire Precautions Act 1971

2.68 I consider, firstly, the Fire Precautions Act 1971, which was enacted with the intention of consolidating fire legislation applicable to all premises into one single Act, which operated via a system of certification of premises by fire authorities. However, as explained below, this did not come to pass before the Act was repealed in 2006.

2.69 In particular, blocks of flats were never brought within the scope of the Act (other than that there was a power to prohibit or restrict the use of a block in the event of serious risk from fire). Accordingly, contrary to implications of certain statements made by various parties after the Grenfell Tower fire, there never was any certification or other enforcement of fire safety measures by the fire service in blocks of flats under the Fire Precautions Act.

Workplace Fire Precautions Legislation

2.70 The Workplace Fire Precautions Legislation (WFPL) came into force in 1997 to implement European Directives on health and safety of employees at work. It failed properly to implement the Directives, so was amended to do so in 1999. The wording of the WFPL simply copied out wording in the Directives, so resulting in convoluted, vague and unfamiliar language.

2.71 The application of the Directives was generally regarded as unnecessary in the UK, because deaths of employees from fires in workplaces had already been adequately controlled by other legislation. Accordingly, the requirements of the WFPL were constructed to constitute the minimum necessary under the Directives, and Government advised fire authorities to adopt a "lighter touch" in enforcement.

2.72 Arguably, the common parts of blocks of flats fell within the definition of the workplaces to which the WFPL applied, particularly if staff were employed to work within the block, albeit that this was not highlighted in Government guidance on the legislation. However, if the fire safety measures in a block were even remotely adequate for the safety of residents, they would have been more than adequate for protection of employees.

2.73 The WFPL required that employers carry out fire risk assessments. In my experience, very few fire risk assessments were ever carried out for blocks of flats under the WFPL. Moreover, in the case of blocks of flats, I am not aware of any material enforcement of the legislation by fire authorities before its revocation by the Fire Safety Order in 2006.

The Regulatory Reform (Fire Safety) Order 2005 ("the Fire Safety Order")

2.74 The Fire Safety Order came into force on 1 October 2006. The purpose of the Order was to rationalize and simplify fire safety legislation. Domestic premises fall outside the scope of the Order, but the Order does apply to parts of premises used in common by the occupants of more than one private dwelling.

2.75 Accordingly, in a block of flats, the Fire Safety Order applies to lobbies, stairways and other common parts, plant rooms, etc. However, there is a body of opinion that the external walls of a block of flats fall outside the scope of the Order. (After the Grenfell Tower fire, the DCLG advised local authorities of powers under the Housing Act 2004 to take action in relation to hazardous cladding.)

2.76 The application of the Fire Safety Order to blocks of flats arose from the view of the relevant Government Department that the common parts may be a workplace, so that the European Directives would require their inclusion in UK fire legislation; their inclusion was not the result of concerns over fire safety in blocks of flats, as, in any case, the vast majority of fire deaths in blocks of flats occur in the flats in which fire occurs, which are outside the scope of the Order.

2.77 Scottish Government took a different view, so blocks of flats fall outside the scope of equivalent legislation in Scotland (and in Northern Ireland, where the legislation copied the Scottish legislation). This does not appear to result in any significant number of deaths from fire in blocks of flats in these regions of the UK; throughout the UK it is very rare for a fire death in a block of flats to occur beyond the flat in which fire starts.

2.78 In view of the above, initially, fire and rescue authorities carried out very little inspection or enforcement of the Fire Safety Order in blocks of flats, quite reasonably concentrating on high risk premises in which the application of the Fire Safety Order had potential to control deaths and injuries from fire. This policy changed dramatically following the fire at Lakanal House in London in 2009, in which six people died in flats other than that in which the fire occurred.

2.79 The Fire Safety Order imposes fire safety duties on Responsible Persons and other persons who have control of the premises. In a block of flats, these dutyholders comprise the freeholder/landlord, managing agents and contractors who maintain fire protection equipment or carry out fire risk assessments. The Responsible Person must arrange for a fire risk assessment to be carried out to determine the appropriate fire precautions.

2.80 The Responsible Person is normally an organization, rather than a living person. However, other persons having control of premises, though often also an organization, may include employees who, under a contract of employment, have responsibilities for maintenance or repair of the premises, or anything in or on the premises, or the safety of the premises.

2.81 In addition, where an offence is committed by a body corporate with the consent or connivance of, or is attributable to any neglect on the part of, any director, manager, secretary or other similar officer of the body corporate, or any person purporting to act in any such capacity, he as well as the body corporate is guilty of that offence.

2.82 The wording of Articles 8-22 of the Fire Safety Order, which impose fire safety duties, largely follows the wording of the WFPL and so, in my opinion, suffers from the same lack of clarity. However, the fire safety measures in the common parts of a block of flats need not only be sufficient to safeguard employees from fire, but also "*relevant persons*". Residents of the flats are relevant persons as a result of their proximity to the common parts.

2.83 For the purpose of the Fire Safety Order, the common parts include the flat entrance doors, which must be fire-resisting and self-closing. Indeed, arguably, this is the most important fire safety measure in a block of flats closely followed by the adequacy of the stairway doors and the effectiveness of fire stopping of service penetrations.

2.84 The fire safety measures required in a block of flats by the Fire Safety Order include adequate means to prevent fire and the spread of fire, adequate means of escape and emergency lighting, adequate arrangements for

managing fire safety, suitably formulated and disseminated fire procedures and adequate maintenance of fire safety equipment.

2.85 Guidance on the Fire Safety Order was produced by Government for both enforcing authorities and Responsible Persons. Guidance on interpretation of the Order has also been produced by the then Chief Fire Officers' Association.

2.86 The Guide that was relevant to blocks of flats was a guide that addressed a wide and disparate group of premises in which people sleep. It was most relevant to hotels and similar premises and gave very little specific guidance on blocks of flats.

2.87 After the fire at Lakanal House, the guidance was considered inadequate for enforcing authorities, Responsible Persons and fire risk assessors, all of whom were, on occasions, failing correctly to interpret the requirements of the Fire Safety Order, often resulting in inappropriate fire precautions.

2.88 As a result, the DCLG funded new guidance (entitled "Fire Safety in purpose-built blocks of flats"), which is specific to existing purpose-built blocks of flats and was, after a major consultation exercise with the fire and housing sectors, written by my consulting practice and published by the Local Government Association. This "LGA Guide" was published in 2011 and remains current.

2.89 The LGA Guide notes that high rise does not mean high risk. After fire breaks out, there is no greater likelihood of a fatality in a high-rise block than a low-rise block or, indeed, a bungalow. This is because very few people die as a result of a fire in a neighbour's flat. Nearly all fire deaths in blocks of flats occur in the flat in which fire starts. The extent to which the Grenfell Tower fire was an exception to this experience is unique and, as it has commonly been described, unprecedented.

2.90 The LGA Guide also stresses the safety of the "stay put" principle, citing statistics in which, in a typical year, less than 0.3% of fires in blocks of flats necessitated evacuation of more than five people with the assistance of the fire and rescue service. Accordingly, the Guide advises that communal fire alarm systems should not be installed unless it can be demonstrated that there is no other practicable way of ensuring safety, and unless there is staff to manage the system and the evacuation at all times. Similarly, fire extinguishers are not necessary within common parts.

2.91 The Guide provides extensive advice on means of escape and compartmentation. It is advised that original fire doors might not need to be upgraded or replaced to meet current standards. There are warnings regarding the potential for compartmentation to be undermined by service penetrations and shared extract ducts.

2.92 The LGA Guide also discusses fire suppression systems. It is advised that it is unlikely that retrofitting sprinklers or watermist systems would normally be considered as reasonably practicable for existing blocks, taking into account cost, practicality and benefit. Equally, the LGA Guide notes that retrofitting of

sprinklers is not precluded where there is clear justification and appropriate considerations of the practicalities of their installation and maintenance.

2.93 It was also recognized in the LGA Guide that the current requirement, under the Building Regulations, for sprinkler protection of new blocks of flats that exceed 30m in height will, in the future, greatly enhance the safety of residents from fire in high-rise blocks of flats, making a death from fire, even in the flat in which fire starts, unlikely.

2.94 Two new concepts were introduced in the LGA Guide. The first relates to fire risk assessment. Four different types of fire risk assessment are defined; a Type 1 fire risk assessment, which involves non-destructive inspection of the common parts, is generally the default for compliance with the Fire Safety Order. However, even this assessment should include examination of a sample of flat entrance doors and service risers.

2.95 The second new concept relates to housekeeping in the common parts. Poor housekeeping is described as a significant fire hazard, so the Guide describes two policies for the common parts, namely "zero tolerance" and "managed use". The policy adopted should be made clear to residents.

2.96 The matter of external cladding is discussed in the Guide; it is noted that it should not provide potential for extensive fire spread. There is a warning of the risk of combustible cladding materials, with advice that attention should be given to rainscreen cladding that has been applied to existing blocks.

2.97 As a result of the lessons learned from the Lakanal House fire, the LGA Guide stresses the importance of engagement with residents, so that they are aware of relevant fire safety information, including the "stay put" strategy, the meaning of which must be communicated to residents. The Guide notes the importance of communicating the information to non-English speaking residents.

2.98 The LGA Guide is comprehensive in its consideration of fire safety in blocks of flats. While, as discussed above, it provides guidance on compliance with the Fire Safety Order, it goes further than this by advising on compliance with the Housing Act 2004 and general good practice.

2.99 The scope of the Housing Act is not limited to the common parts, but adopts the Housing Health & Safety Rating System (HHSRS), which addresses 29 hazards to residents of housing, including fire hazards within their own flat and the common parts. The Housing Act is enforced by the local authority, but the local authority cannot take enforcement action against itself.

2.100 Generic guidance on fire risk assessment for all types of buildings is given in the British Standards Institution (BSI) publication PAS 79. Prior to the Grenfell Tower fire, there were plans to include reference to the subject of external cladding in the next revision of this guidance. Following the Grenfell Tower fire, the publication of a new part of PAS 79, which would provide specific guidance on fire risk assessment for housing, is under consideration.

Evacuation or Rescue of Vulnerable People

2.101 I am instructed to consider the impact of the fire safety duties imposed by the Fire Safety Order on vulnerable persons. Those particularly vulnerable to fire include anyone with an ability to react and respond to fire that is less than the general population. This includes people with mobility problems, cognitive difficulties and living with dementia. Risk to vulnerable people can also arise from their propensity to start a fire.

2.102 There are two relevant scenarios, namely a fire within a vulnerable resident's own flat and the much rarer scenario of a threat to a vulnerable resident from a fire elsewhere in a building.

2.103 Prevention of a fire within any resident's own flat, and arrangements for evacuation of a vulnerable resident when fire occurs in their flat, are not matters addressed by the Fire Safety Order. It is difficult to envisage how this could be otherwise, given that, in a general needs block of flats, there are no staff to assist vulnerable residents.

2.104 This does not imply that nothing can, or should, be done to address the risk to vulnerable residents from a fire within their own flat. On the contrary, this is important, but it is a matter for multi-agency co-operation to identify vulnerable persons, assess their risk and provide appropriate support. Relevant guidance on this person-centred approach is incorporated within a new guide on fire safety in specialized housing, published in 2017 by the National Fire Chiefs Council.

2.105 With regard to the second scenario, by provision of adequate compartmentation and means of escape, there should be no need for evacuation of a vulnerable resident if fire occurs elsewhere in the building. In this sense, a "stay put" strategy is actually favourable to vulnerable people and consistent with the principles of equality.

2.106 While the role of the fire and rescue service does not extend to routine evacuation of occupants of buildings with a simultaneous evacuation strategy, such as hotels and places of work, in a block of flats with a "stay put" policy, routine evacuation of residents should not arise. If a vulnerable resident cannot evacuate when it is necessary to do so, either because of a fire in their flat or because of an instruction to do so by the fire and rescue service, there is a need for rescue, which is the role of the fire and rescue service.

3. THE TWO BRANCHES OF FIRE SAFETY LEGISLATION

3.1 Historically, legislative requirements in respect of fire safety measures tended to follow serious, normally multiple-fatality fires. For example, this assertion would be applicable to the earliest forms of building regulations, which made requirements (within a limited geographical area, such as London) regarding prevention of fire, and prevention of spread of fire beyond the building of fire origin, following the "great fires" in urban conurbations in the middle ages and early modern history.

3.2 In contemporary history, the (now repealed) fire safety provisions of the Factories Act 1961 followed a fire at a mill in Keighley in 1956, in which eight people died (and calls for a public inquiry were rejected by Government); the Act consolidated fire safety requirements in previous Acts. The (now repealed) fire safety provisions of the Offices Shops and Railway Premises Act 1963 followed a fire at a department store in Liverpool in 1960, in which 11 people died (one of only three significant multiple-fatality fires in retail premises in over 50 years).

3.3 This led to piecemeal development of fire safety legislation. Proposals for rationalisation of the approach to fire safety legislation were a major outcome of the recommendations of the Holroyd Committee, which sat between 1967 and 1970. The Holroyd report [C1] recommended that control of fire safety provisions be divided into two main branches, one applying to new buildings and alterations to existing buildings, while the second branch would deal with fire safety measures in occupied buildings after construction or alteration.

3.4 It was recommended that enforcement of the second branch should be the responsibility of fire authorities, who should use the services of their fire brigades for pursuance of this statutory responsibility. The Holroyd Committee had been advised by the then Home Departments that only those with practical fire-fighting experience can properly assess the adequacy of what the Committee described as "fire prevention provisions" in premises, since only they have an adequate knowledge of the "*chief fire dangers, the way in which fire is likely to behave in the particular circumstances of the occupancy and the likely reactions in a fire of people in the building*".

3.5 In my opinion, at the time of the Holroyd report, there was some (but, arguably, not total) merit in this view. In my further opinion, as a result of increased complexity in the design of buildings and their fire precautions, the introduction of fire engineering, changes in the training of fire safety officers in fire and rescue services, education of fire safety practitioners outside the fire and rescue service, as well as changes in approach to enforcement of fire safety legislation, there is no material merit in this view today.

3.6 The concept of two branches of legislation, which was, for some time thereafter, known as the "Holroyd Divide" has largely been adopted virtually from the time of its proposal. Fire precautions incorporated within "building work" (including the construction, extension, material alteration or material

change of use of a building) are a matter for national building regulations, which, at the time of the Holroyd report, were a relatively recent form of legislation, the first Building Regulations in England and Wales having been produced in 1965 (though in Scotland, a year earlier).

3.7 The first endeavour to consolidate fire precautions within occupied buildings took the form of the Fire Precautions Act 1971 (see Section 6). It is widely accepted that the Act resulted from a fire at a hotel in Saffron Walden in 1969, in which 11 guests died (though other political theories exist as to the expediency in the introduction of the Act).

3.8 The principle of the Act was that it empowered the Secretary of State gradually to bring virtually all categories of premises within the scope of the Act by means of "designation orders". In fact, this never came about, but, by virtue of two designation orders during the 1970s, most common places of work, hotels and boarding houses were brought within the scope of the Act prior to its repeal by the Fire Safety Order in 2006.

3.9 Section 10 of the Act also made provision for issue of a notice ("a Prohibition Notice") prohibiting or restricting use of a very wide range of premises (regardless of whether they fell within the scope of a designation order), including blocks of flats, if the risk to persons from fire was sufficiently serious. Originally, the Notice could only be issued by a Court, but, following amendment of the Act, fire authorities were empowered to issue prohibition notices without reference to a Court.

3.10 In 2006, the Fire Safety Order (see Section 9) brought about the first major reform of fire safety legislation that was not the consequence of a multiple-fatality fire. On the contrary, until the Grenfell Tower fire, the annual number of deaths in premises to which the Fire Safety Order applies did not reach three figures. The objective of the reform was principally related to deregulation by rationalisation and simplification of fire safety legislation, which, until the introduction of the Fire Safety Order, was embedded within a disparate range of legislation.

3.11 In the following parts of this report, I consider, in detail, the two branches of fire safety legislation successively by specific consideration of the relevant primary or secondary legislation within each branch.

PART 1: BUILDING LEGISLATION

4. LONDON BUILDING LEGISLATION

4.1 The Legislation

London Building Acts

4.1.1 Building legislation of various kinds has existed in London for many centuries. From the 19th century, the relevant legislation took the form of a series of London Building Acts.

4.1.2 These culminated in the London Building Acts (Amendment) Act 1939 ("the 1939 Act"), which, in conjunction with the London Building Acts 1930 and 1935, is cited as the London Building Acts 1930 to 1939. The 1939 Act amended, or repealed and re-enacted, specific sections and parts of the London Building Act 1930 and the London Building Act (Amendment) Act 1935, while enacting further provisions.

4.1.3 As construction of Grenfell Tower pre-dates my career in fire safety, advice in this report on relevant early London legislation is based on my general knowledge of the history of this legislation, and on considerable research involving study of the legislation and guidance, rather than first-hand experience of work involving application of the legislation.

4.1.4 It would appear to me that it would have been under the London Building Acts 1930-1939 that the design of certain fire safety provisions at Grenfell Tower would have been controlled at the time of its design, construction and completion. In this connection, I draw attention to sections 20 and 34 of the 1939 Act, which, at the relevant time, were, in my experience, carefully and rigorously enforced by the Greater London Council (GLC) at the design stage of buildings.

4.1.5 Section 34 required that every new building (with certain exceptions) which had a storey at a greater height than 20 feet above ground should be provided with such means of escape in case of fire as could reasonably be required. The scope of section 34 included buildings that were to be let in self-contained flats. Section 34 required that the means of escape must be in accordance with plans approved by the Council (originally the London County Council and thereafter the GLC until the time of its abolition in 1986).

4.1.6 Section 20 required consent of the Council for erection of, *inter alia,* any building with a storey or part of a storey at greater height than 100 feet above ground (or 80 feet if the area of the building exceeded 10,000 square feet). The purpose of section 20 was to enable the Council to require additional fire precautions in these high buildings. Accordingly, section 20 provided that the Council could not withhold consent if they were satisfied that, having regard to the proposed use of the building, proper arrangements were made and maintained for lessening, so far as was reasonably practicable, danger from fire in the building.

4.1.7 For the purpose of section 20 of the 1939 Act, the height of any storey was to be measured, at the centre of that face of the building where the measurement was greatest, from the level of the footway immediately in front of that face, or, where there was no such footway, from the level of the ground before excavation, to the level of the highest part of the interior of the storey [C42].

4.1.8 Under section 133 of the 1939 Act, there was a requirement for fire precautions, including means of escape, to be kept and maintained in good condition and repair and in efficient working order by the owner of the building. On 1 October 2006, under the Regulatory Reform (Fire Safety) Order 2005, section 133 of the 1939 Act was disapplied in case of premises to which the 2005 Order applied, as maintenance was required under the Order.

4.1.9 The London Building Acts also controlled alterations and additions to buildings, such that it was necessary for the altered or extended building to continue to comply with the London Building Acts and by-laws made thereunder.

4.1.10 From January 1986, the Building (Inner London) Regulations 1985 amended the Building Regulations 1985 (see Section 5 of this report), such that the 1985 Regulations (which previously applied to England and Wales, with the exclusion of Inner London) thereafter applied to Inner London. Accordingly, these 1985 Regulations also amended the London Building Acts 1930 to 1939.

4.1.11 For the purpose of this report, the relevant amendments were, *inter alia*, as follows:

i.) Section 34 of the 1939 Act was amended, such that it no longer applied if a requirement for adequate means of escape in case of fire was imposed under the Building Regulations 1985.

ii.) Section 20 of the 1939 Act was amended, such that the height above which it applied was expressed in metric units (30m or 25m if the area of the building exceeded 930m^2); in addition, measures that could be required were specified, namely:
- Fire alarms;
- Automatic fire detection systems;
- Fire extinguishing appliances and installations;
- Effective means for removing smoke in case of fire;
- Adequate means of access to the interior, exterior and the site of the building for fire brigade personnel and appliances.

4.1.12 Section 20 of the 1939 Act was repealed in January 2013 by the Building (Repeal of Provisions of Local Acts) Regulations 2012.

<u>London Building (Constructional) By-laws</u>

4.1.13 The London Building Acts 1930 to 1939 gave powers for secondary legislation to be produced in the form of the London Building (Constructional) By-Laws. At the time of approval of the plans for Grenfell Tower, these by-laws would have comprised the following:

i.) the London Building (Constructional) By-laws 1952 (which were largely repealed and probably had no material relevance);

ii.) the London Building (Constructional) Amending By-laws (No.1) 1964 (the main relevant by-laws);

iii.) the London Building (Constructional) Amending By-laws (No.2) 1964 (which were concerned with roof coverings);

iv.) the London Building (Constructional) Amending By-laws 1966 (which simply amended the main by-laws to deal with brittle fracture in steel);

v.) the London Building (Constructional) Amending By-laws 1970 (which amended the main by-laws to address wind loading and strengthening buildings against accidental failure, following the Ronan Point gas explosion in 1968).

4.1.14 Unlike the London Building Acts, the by-laws set out quite complex and detailed requirements for the fire performance of roofs, external walls, elements of construction, etc. The requirements were, for many applications, quite stringent.

4.1.15 The 1964 Amending By-laws (No. 1) specified the period of fire resistance required for elements of construction, which I understand, in the case of Grenfell Tower, would have been one hour, and the construction was required to be non-combustible. These by-laws also made requirements regarding the fire performance of external enclosures of buildings, with a specific by-law addressing the subject of external cladding, which was to be of such materials, of such thickness and fixed and supported in such manner as the District Surveyor (of the Council) may approve.

4.1.16 All the above by-laws were revoked in March 1973 by the London Building (Constructional) By-laws 1972. In the 1972 by-laws, it was also required that external cladding satisfy the requirements of the District Surveyor, but it could comprise 1mm of combustible material applied to a non-combustible backing, such that the composite material would achieve a Class 1 surface spread of flame (the highest performance), if tested in accordance with BS 476-7.

4.2 Guidance

4.2.1 The London Building Acts generally gave powers for fire safety measures to be required, rather than specifying these measures in any technical detail. Accordingly, to a large extent, the design of buildings in respect of fire safety (to which, hereafter, I refer as fire safety design) followed guidance documents or authoritative codes of practice.

4.2.2 The London County Council produced guidance on means of escape in case of fire, which applied to the design of early blocks of flats (and required two stairways for escape in blocks of over 42 feet in height). However, national guidance on fire precautions (particularly means of escape) in blocks of flats of over 80 feet (typically around eight storeys) in height was produced in 1962 in the form of the British Standards Institution (BSI) code of practice, CP 3 Chapter IV Part 1: 1962 [C2]. In 1971, this code of practice was superseded by CP3: Chapter IV : Part 1 : 1971 [C3], which applied to all blocks of flats of over two storeys in height.

4.2.3 It is likely that, for compliance with the London Building Acts, particularly the requirements of section 34 of the 1939 Act (in relation to adequate means of escape), CP 3 Chapter IV Part 1 would have been adopted in the design of Grenfell Tower. In this connection, London County Council were a member of the BSI technical committee responsible for the 1962 version, while the Greater London Council (GLC) were a member of the technical committee responsible for the 1971 version. Moreover, a GLC code of practice on means of escape in case of fire [C4] advised that the recommendations of the 1971 version of CP3: Chapter IV : Part 1 had been adopted (see below).

4.2.4 Given the time period between design of Grenfell Tower and its completion, I cannot opine as to which version of CP 3 Chapter IV Part 1 would have been adopted. Moreover, it does not seem appropriate, for the purpose of this report, to set out, in its entirety, the guidance given in each version of the code of practice (which, in the case of the 1962 version, is 34 pages long, and, in the case of the 1971 version, is 62 pages long). However, in the sub-sections that follow, I set out, in the form of Roman numbered paragraphs, key recommendations that may resonate with issues of interest to the Inquiry.

CP3: Chapter IV : Part 1 : 1962

4.2.5 Key points that might be considered relevant by the Inquiry comprise the following:

i.) The Code only applied to blocks of flats with a storey more than 80 feet above the ground because that height was considered the maximum height at which rescue or fire-fighting from a mobile ladder would be possible (see Introduction within the standard).

ii.) It was acknowledged that there was no implication that the possibility of rescue in lower buildings would necessarily be a factor in recommendations for such buildings (see Introduction within the standard).

iii.) A fundamental principle of the guidance was that it should not be assumed that a high residential building should be evacuated in the event of fire. In particular, it was recommended that blocks of flats be designed such that the occupants of floors above a dwelling which is on fire may, **if they choose** (my emboldening), remain safely on their own floor (see Introduction within the standard).

iv.) It was acknowledged that it might be necessary to evacuate the floor on which a fire occurs and, in some circumstances, those floors in the vicinity of the fire, but the expectation was that the occupants of these floors should be free to reach safety in any other part of the building via the staircase (see Introduction within the standard).

v.) Flat entrance doors were to be fire resisting and self-closing (see sub-clause 203c.).

vi.) The maximum distance of travel from a flat entrance door to a "smoke-stop" door opening into a place of safety was 15 feet, albeit that it was acknowledged that this figure was arbitrary (see sub-clause 203c(iii)).

vii.) The possibility that smoke could enter a staircase was acknowledged. The recommended solution was either to provide two staircases or to arrange that entry to a single staircase was via a lobby into which no flat entrance doors opened. A door was provided between that lobby and the corridor or lobby into which flat entrance doors opened. This created a form of double lobby between each flat and the staircase; each flat entrance door opened into a circulation space, from which a door opened into a further lobby that then opened, through a door, into the staircase. There would, therefore, be three doors between a fire in a flat and the staircase, namely the flat entrance door, the door into the staircase lobby, and the door between the lobby and the staircase. One of the two lobbies was permanently ventilated to open air to reduce the potential for smoke to spread into the stairway (see clause 204).

viii.) Of the above options, the single staircase option was regarded in CP3 as the more effective, as it was considered that, even if two staircases were provided, they could both be affected by smoke, whereas it was considered that the ventilated lobby arrangement was so safe that a single staircase was adequate (see clause 204).

ix.) Where a main staircase was not situated against an external wall, or had no opening windows, it should have a permanent vent at the top (see sub-clause 203e.).

x.) The fire resistance of columns and loadbearing walls, beams and floors was to be not less than 90 minutes. Floors which were not essential to the stability of the building were to have a fire resistance of at least 60 minutes (see clause 303).

xi.) All flat entrance doors were to have a fire resistance of at least 30 minutes and be hung on rising butt hinges or be fitted with a self-closing device (see clause 310). (A rising butt hinge is a hinge designed such that, when a door is opened, it rises above the floor and closes when released.)

xii.) Within the flats, dining room, living room and kitchen doors were to be 30 minute fire-resisting doors and be hung on rising butt hinges or be fitted with a self-closing device. Bedroom doors were not required to be fire resisting or self-closing (see sub-clause 206(i)).

xiii.) Staircase doors were to have a fire resistance of 30 minutes and be self-closing (see sub-clause 310c.).

xiv.) Smoke-stop doors were to have a fire resistance of 30 minutes and be self-closing (see sub-clause 310d.).

xv.) Emergency lighting was not required. The lighting of staircases and corridors was to be exclusive to the staircase and corridors. Where a staircase had no natural lighting, its lighting circuits were to be independent of the corridor lighting (see clause 501).

xvi.) A fire alarm system was not considered necessary (see clause 601).

xvii.) "Fire lifts" were to be provided for use by the fire service. These were, effectively, simply normal, suitably sited passenger lifts, with a "fire switch" that disabled the call buttons on landings (see clause 706).

xviii.) In buildings of not more than 200 feet (61m) in height to the topmost floor on which there was a dwelling, dry rising mains were to be provided. In buildings of a greater height than this, wet rising mains were to be provided (see clause 704). (A dry rising main is a vertical pipe installed in a building, with inlet connections at fire and rescue service access level, and outlet connections (known as landing valves) on each storey. The pipe is dry under normal conditions, but can be charged with water, pumped from fire and rescue service appliances, in the event of fire. A wet rising main is similar to a dry rising main, except that the main is permanently charged with water from a pressurized supply.)

xix.) It was recommended that advice on fire safety, particularly prevention of fire, be provided to tenants and distributed in rent books, rate demands, etc, as well as posted in the form of fire procedure notices in a building. There were no recommendations regarding promulgation of advice on a "stay put" strategy (see clause 801).

CP3: Chapter IV : Part 1 : 1971

4.2.6 Key points that might be considered relevant by the Inquiry comprise the following:

i.) The 1971 Code applied to all blocks of flats over two storeys in height.

ii.) It was now acknowledged that reliance on external rescue by the fire service (e.g. using mobile ladders) was unsatisfactory (see Foreword of the standard).

iii.) It was now advised that, in contrast with the 1962 code of practice, it should not be assumed that entire storeys, or even adjoining flats, need be evacuated if a fire occurs in a flat. It was recognized that, owing to the high degree of compartmentation, the spread of fire and smoke from

one dwelling to another, and the consequent need to evacuate the occupants of adjoining flats, was unusual; the occupants should be safe if they remain in their flats. However, provision was made for occupants to leave their flat if they chose to do so, using adequately protected escape routes within the building without outside assistance (see Foreword of the standard).

iv.) A new choice was given between "smoke containment" and "smoke dispersal" (see point x.) below), either by natural cross ventilation or by mechanical means. If smoke dispersal was adopted, travel distances from flat entrance doors to a door leading to a place of relative safety were increased compared with those in the 1962 code of practice (see below), (see sub-clause 2.3.7).

v.) Recommendations concerning construction were largely eliminated on the basis that this was a matter for building regulations; national building regulations had been introduced in England and Wales in 1965.

vi.) It was acknowledged that the recommendations of the code of practice might be different from requirements imposed under the London Building Acts (see Foreword of the standard).

vii.) Various different internal layouts within flats were recognized. Further comments are based on an arrangement, whereby (as at Grenfell Tower) there is only one exit from each flat.

viii.) The "double lobby" arrangement, whereby there were, in effect, two lobbies, one of which was permanently ventilated, between a flat entrance door and a stairway door, was still recognized, but was now described as "smoke containment". However, an alternative arrangement, described as "smoke dispersal" was recognized (see sub-clause 2.3.7).

ix.) In smoke dispersal (sometimes described as "cross ventilation"), there is a single lobby between each flat entrance door and the stairway doors, such that there are only two doors between a flat and the stairway, rather than three doors as in smoke containment (i.e. a flat entrance door and the stairway door).

x.) The smoke dispersal concept comprises a ventilation opening on opposing walls of the lobby (or at each end of a corridor if the route from a flat to a stairway is along a corridor). The theory was that the flow of air through the lobby or corridor would disperse smoke, so preventing the smoke from entering the single stairway. The ventilation openings were either permanent or comprised automatically-opening vents, operated by smoke detectors. A vent, openable by the fire service, was provided at the head of the stairway. (Cross ventilation using natural vents is now discredited, as its effectiveness is dependent on wind pressure and wind speed [e.g. see C44 and further references therein]. It was also, ultimately, considered to be impracticable, as the permanent vents most commonly used created an environment that was unacceptable to residents [C10].)

xi.) In a single stairway building, where smoke dispersal was provided, the maximum travel distance from a flat entrance door to a stairway door was 15m (see sub-clause 3.3.4.3.1).

xii.) All flat entrance doors were to have a fire resistance of at least 20 minutes and be fitted with a self-closing device. Rising butt hinges were no longer acceptable (see sub-clause 4.3 and Figure 16 in the standard).

xiii.) Within the flats, all rooms, other than bathrooms and WCs, opening off the hallway were to be fitted with a 20 minute self-closing fire-resisting door. Rising butt hinges were acceptable in this case (see sub-clauses 2.2.2.2, 3.2.1.1 and 4.3.2.3).

xiv.) Stairway doors were to have a fire resistance of 30 minutes and be fitted with a self-closing device. Rising butt hinges were no longer acceptable (see Figure 16 in the standard).

xv.) Emergency lighting was still not required. Circuit requirements were as per the 1962 code (see sub-clause 6.1).

xvi.) A fire alarm system was still not considered necessary (see sub-clause 7.7).

xvii.) "Fire lifts", as described in the 1962 code of practice were to be provided (see sub-clause 7.6).

xviii.) In buildings with any storey higher than 18m, dry rising mains were to be provided; in buildings with any floor higher than 60m, wet rising mains were to be provided (see sub-clause 7.1.1).

xix.) Advice to residents was enhanced by an amendment to the code of practice in August 1978, following a report on fire safety in high-rise blocks of flats [C5] and a recommendation by Parliament [C6] that advice contained in that report should replace existing advice in CP3: Chapter IV : Part 1. The guidance advised residents that, *inter alia*, if a fire was evident or reported elsewhere than in a resident's own flat, they would normally be safe to stay within their flat. They were advised to close doors and windows, but to leave at once, closing doors behind them, in the unlikely event of smoke or heat entering the flat before doors and windows could be closed (see clause 8).

4.2.7 It will be noted that, in the above recommendations (and in the recommendations of virtually every other guidance document to which I refer in this report) there are recommendations in relation to a parameter known as "*fire resistance*". For clarity, fire resistance (which is always expressed as a period of time) is, by definition, the ability of an element, such as a door, floor or wall, to withstand exposure, in a standard test, to a furnace without the occurrence of certain failure criteria (set out in the test specification). The failure criteria relate to the ability of the element to resist the passage of flame, and/or to afford, in the case of some elements, thermal insulation and/or, in the case of loadbearing elements, to maintain its ability to support a test load.

4.2.8 The temperature within the furnace is required to follow a temperature/time curve specified in the test standard. (The pressure in the furnace is also controlled.) The test method does not quantify the behaviour of the element, for a precise period of time, in any real fire; it is simply a means of comparing the fire resistance of different products. To the extent that the test would be similar to a real fire, it would be a fully developed fire (a fire that had reached a stage known as flashover, in which all combustible materials within the space are alight).

4.2.9 Thus, it is known that an element, such as a non-loadbearing wall, with 60 minutes fire resistance will be capable of preventing the passage of flame and limiting the passage of heat for longer than an element of 30 minutes fire resistance. The actual period for which the element will resist any specific real fire is indeterminate. It is common experience that the period can be significantly longer than that determined in the fire resistance test, such that all combustible materials within a space may be consumed before any failure of the fire resisting enclosure of the space (or the fire may simply fail to grow to a significant size due to the limited quantity of combustible materials or lack of sufficient oxygen to sustain the fire).

4.2.10 It will also be noted that the above codes of practice make specific recommendations for the fire resistance of doors. The matter of fire resistance of doors is likely to receive some attention in the course of the Inquiry. Accordingly, at this stage, some comments on the matter might be of assistance.

4.2.11 As a result of a change in the method of testing the fire resistance of doors following the introduction of a new test standard in 1972 [C7] (such as a requirement for the test furnace to be operated at positive pressure), doors that might have achieved 30 minutes' fire resistance if tested in accordance with the previous standard [C8] were, after 1972, likely to achieve no more than 20 minutes' fire resistance.

4.2.12 In practice, doors that met the standard for 30 minutes' fire resistance prior to 1972 have generally proved satisfactory in real fires (see also Section 9 of this report) and were accepted, for some time thereafter, by the GLC for the purpose of the London Building Acts. However, since 1972, to achieve 30 minutes' fire resistance in the British Standard fire resistance test, it has been necessary for timber doorsets to be fitted with intumescent strips, which, when exposed to fire, will expand and seal gaps around the door.

4.2.13 Intumescent strips only expand when exposed to a serious fire, by which time significant amounts of smoke can pass through gaps around the doors. This has led to the use of smoke seals (somewhat akin to draught seals), which are now fitted to doors that are installed to protect escape routes against the ingress of smoke. A test standard for smoke penetration through doors was first published in 1983 [C9]. However, use of smoke seals (which are normally combined with the intumescent seals) was not specified in the relevant British Standard for blocks of flats until CP3: Chapter IV : Part 1 was superseded by BS 5588-1 [C10] in 1990.

GLC Code of Practice for Means of Escape in Case of Fire

4.2.14 This GLC code of practice was published in June 1974 and revised in June 1976 [C4]. It was stated within the code that it did not embrace means of escape in case of fire in respect of flats and/or maisonettes, as the GLC had, "*for the time being*" (my italics) adopted the standards contained in CP3: Chapter IV : Part 1 : 1971.

4.2.15 However, guidance within the code of practice on safety lighting (which, at the time of publication of the code of practice was synonymous with what would now be described as emergency lighting or, more specifically, escape lighting) recommended that, while safety lighting would not normally be required in blocks of flats, it should be provided in a staircase that was devoid of natural lighting. It should be noted that this goes beyond the guidance in CP3: Chapter IV : Part 1, which did not make any recommendations for the provision of such lighting.

GLC Code of Practice for "Section 20 Buildings"

4.2.16 As noted above, the London Building Acts, including section 20 of the 1939 Act, simply gave powers to the Council to require fire precautions, without specifying any technical detail in respect of the fire precautions or, in the case of section 20, prior to its amendment, what these fire precautions might be.

4.2.17 In the case of "section 20 buildings", the requirements of the GLC, which were to be taken as a general guide, were set out in a code of practice produced by the GLC, but this did not constrain the GLC from making other requirements. (There was nothing unusual in this manner of application of what were known as "Local Acts"; similar broad powers were granted to local authorities in various, but not all, administrative areas of England and Wales, normally without any publicly available supporting code of practice.)

4.2.18 It appears likely that requirements imposed on the fire safety design of Grenfell Tower under section 20 would have followed the relevant code of practice published in 1970 (as opposed to the revised version of the code of practice, which was published in 1974) [C42]. The measures specified in the code were intended to:

i.) contain a fire;

ii.) prevent rapid spread of fire throughout a building or to adjoining buildings;

iii.) ensure the safety of the structure against fire;

iv.) provide fire-fighting facilities to assist the fire brigade;

v.) in conjunction with the requirements of the Council for means of escape in case of fire, safeguard the occupants of the building.

4.2.19 As in the case of my review of CP3: Chapter IV : Part 1, I set out below some key points within the 1970 section 20 code of practice:

i.) For section 20 buildings, the Council reserved the right to require the provision of a more substantial form of external enclosure (i.e. external walls), having a prescribed standard of fire resistance, than would be required by the London Building (Constructional) Amending By-laws (No.1) 1964, particularly in the case of a high building, in view of the risk of external spread of fire from storey to storey above the height which was accessible to external fire brigade equipment (see item 4.02 3).

ii.) The entrance to a staircase, or to its lobby, was to be sited not more than 40 feet or the depth of one dwelling unit from the end of the building, whichever was the lesser dimension (see item 4.08 1c).

iii.) Fire lifts were required for use by the fire service (see Appendix A Part III).

iv.) Dry rising mains were required (see item 6.02 3). In buildings exceeding 200 feet (61m) in height, measured to the underside of the ceiling of the topmost storey, wet rising mains were to be provided, rather than dry rising mains.

v.) Automatic sprinkler systems were not required for blocks of flats (see item 6.02 6).

vi.) Fire alarm systems and automatic fire detection were required in certain buildings. However, in practice, this did not include blocks of flats (see items 6.03 1 and 6.03 2).

vii.) In single staircase blocks of flats with cross ventilation, the staircase lobby was to be cross ventilated by means of permanent openings totalling in net area not less than 25% of the vertical cross section of the lobby or 30 square feet, whichever was the greater. Alternatively, the total amount of ventilation was to be 30 square feet divided into at least two areas to provide good cross ventilation; one third of that amount was to be in the form of permanent vents, but the remainder could take the form of windows (see item A2.03 1).

viii.) If the stairway was not on an external wall, it was to be ventilated into a vertical shaft with an openable casement window on each floor level, having an openable area equal to 15% of the internal area of the staircase enclosure or 15 square feet, whichever was the greater; in addition, a permanent vent was to be provided at the top of the staircase equal in area to 5% of the internal area of the staircase. As an alternative to this shaft, there could be a permanent opening to open air at the bottom and top of the staircase, having an unobstructed area of not less than 10 square feet (see item A2.03 3).

4.2.20 The 1970 code of practice was reprinted in 1974, incorporating an addendum produced in June 1973. However, this did not appear to affect the key issues to which I referred above. An addendum to the 1974 code of practice was produced in March 1974. This permitted the smoke control arrangements

recommended in CP3: Chapter IV : Part 1 : 1971 as an alternative to the recommendations of the GLC code of practice.

London District Surveyors' Association Fire Safety Guide No. 1: Fire Safety in Section 20 Buildings

4.2.21 New guidance on fire safety in section 20 buildings was published by the London District Surveyors' Association (LDSA) in June 1990 [C11]. (For information on the LDSA, see Annex D.) This new guidance was simpler than the equivalent GLC code of practice.

4.2.22 Key points that might be considered relevant by the Inquiry comprise the following:

i.) The code noted that, under section 20 (as amended), the Council was empowered, after consulting the fire authority, to impose conditions for the provision and maintenance of fire alarms, fire detection systems, fire extinguishing appliances and installations, effective means for removing smoke in case of fire and adequate means of access for fire brigade personnel and appliances (see 1.02 6).

ii.) It was noted that fire alarm systems were not required in buildings containing flats (see 2.01).

iii.) Dry rising mains were to be provided in the corridor or lobby adjacent to the fire-fighting shaft in a block of flats (see 2.04 b).

iv.) Wet rising mains were to be provided where any storey exceeded 60m (approximately 20 storeys in height) (see 2.05).

v.) Automatic sprinkler systems were to be provided throughout all section 20 buildings, but consideration would be given to their omission in blocks of flats (see 2.07 1ci). (In practice, sprinkler protection was not required for blocks of flats.)

vi.) Hose reels and fire extinguishers were to be provided in all section 20 buildings, but consideration would be given to their omission in blocks of flats (see 2.09).

vii.) Smoke extraction was to be provided from each storey by openable windows or a mechanical smoke extract system, while noting that more complex smoke control might be required in some buildings to support means of escape. Mechanical smoke extract systems, including fans, were to be capable of extracting smoke at a temperature of 300°C for a period of at least one hour. Wiring for the smoke control equipment was to be fire resisting, and there was to be a secondary source of electrical power (see 2.10 1, 2.10 3d and 2.10 3e).

viii.) Fire-fighting shafts were to be provided in accordance with the recommendations of BS 5588-1 [C10]. These shafts incorporated, *inter alia*, "fire-fighting lifts", which incorporated additional safeguards for their use by fire-fighters during a fire, over and above the measures incorporated within the "fire lifts", to which I previously referred in this report (see 2.15 3).

4.3 Enforcing Authority

4.3.1 At the time of the original design of Grenfell Tower, approval under the London Building Acts and the London Building (Constructional) By-laws was the responsibility of the Greater London Council.

4.3.2 On 6 January 1986, the Building (Inner London) Regulations 1985 came into force, so bringing about the unification of building regulations in London with those in the remainder of England and Wales (see Section 5 of this report). From that date, the Building Regulations 1985 (with certain limited exceptions) applied in Inner London. Building control remained the responsibility of the GLC until abolition of the GLC by the Local Government Act 1985 on 1 April 1986, when responsibility transferred to the London Boroughs and the Corporation of the City of London.

4.3.3 The Building (Inner London) Regulations 1985 also brought about in London the application of the Building (Approved Inspectors etc) Regulations 1985, whereby approval of plans under the Building Regulations could be granted by a private sector Approved Inspector, rather than the building control department of the Council (see Section 5). However, approval of work under section 20 of the 1939 Act continued to rest solely with the Council until repeal of section 20 by the Building (Repeal of Provisions of Local Acts) Regulations 2012 on 9 January 2013.

4.3.4 When responsibility for application of section 20 rested with the GLC, the GLC consulted London Fire Brigade before passing plans for section 20 buildings. For many years, London Fire Brigade carried out inspections of section 20 buildings, either by inspecting officers in their fire safety departments or, sometimes, by operational crews of local fire stations.

4.3.5 The inspections were concerned with checking fire safety installations and equipment, including for example, dry rising mains and, in certain commercial buildings, metal fire-resisting shutters. These inspections were carried out at the time of installation and periodically thereafter. When responsibility for building control in Inner London transferred to the Boroughs, this activity continued, but eventually ceased.

4.3.6 My understanding is that London Fire Brigade were under no statutory obligation to carry out these section 20 inspections. Moreover, my further understanding is that the inspections were carried out in non-domestic premises, but not blocks of flats. However, over a period of years, London Fire Brigade did carry out tests of dry rising mains in buildings within both Inner London and Outer London until, ultimately, this practice also ceased, after which such work was carried out by private sector companies on the instruction of the building owners or occupiers.

5. NATIONAL BUILDING REGULATIONS

5.1 The Legislation

5.1.1 In England and Wales, national building regulations, which replaced around 1,400 local by-laws, first came into force in 1965. Unlike the London Building Acts, the 1965 regulations made no requirements for means of escape in case of fire until amendment in 1974, following a recommendation by the Holroyd Committee (see Section 3) that they should do so. The purpose of building regulations is to secure the health and safety of people in and about buildings; such regulations are not concerned with protection of property or continuity of function of an organization.

5.1.2 As noted in Section 4, the Building Regulations did not apply within Inner London until 6 January 1986, when the Building Regulations 1985 were amended by the Building (Inner London) Regulations 1985. Accordingly, from 6 January 1986, the Building Regulations applied to building work carried out at Grenfell Tower.

5.1.3 From that time until the time of the fire, new building regulations came into force on a number of occasions, such that building work was successively controlled under the 1985, 1991, 2000 and 2010 Regulations. However, as discussed in Section 4 of this report, section 20 of the London Building Acts (Amendment) Act 1939 also continued to apply until its repeal on 9 January 2013. At the time of each change in the Regulations, transitional provisions were incorporated in the new Regulations to enable completion of work in accordance with the previous Regulations if an application had already been made for approval under these Regulations.

5.1.4 The Building Regulations are not retrospective, nor do the Building Regulations make requirements for maintenance of measures required under the Regulations (though the 1939 Act did require maintenance of measures provided for compliance with section 20 of the Act). Accordingly, contrary to what the title of the Regulations might imply, the Building Regulations are not applied to buildings, but to work carried out for the purpose of, *inter alia*, erecting a building, extending a building, materially altering a building or materially changing the use of a building. Consequently, the Building Regulations do not require upgrading of fire precautions in existing buildings, but merely that, on completion of building work, the building is no less compliant with the requirements of the Regulations than it was before the work was carried out.

5.1.5 Prior to 1985, the Building Regulations were what would now be called *prescriptive*, meaning that they set out, in great technical detail, a set of what were effectively rigid rules, with which it was necessary to comply. Thus, for example, the Building Regulations 1976, which were produced under powers granted by the Public Health Act 1936, comprised an A5 publication of 306 pages, of which 44 pages were devoted to safety in fire.

5.1.6 In relation to means of escape, under the 1976 Regulations, the requirement to provide adequate means of escape was deemed to be satisfied if the building complied with CP 3: Chapter IV : Part1: 1971, key recommendations of which I set out in the previous section of this report.

5.1.7 Any proposed departure from the pre-1985 Regulations required a relaxation from the Secretary of State or, under some circumstances, the local authority building control department unless the applicant was the local authority itself.

Building Regulations 1985

5.1.8 The Building Regulations 1985 (and all subsequent Building Regulations) were introduced pursuant to the powers granted by the Building Act 1984. The Regulations came into force on 11 November 1985. The new legislation resulted in a radical change in the requirements of, and means for demonstrating compliance with, the Building Regulations.

5.1.9 The Building Regulations 1985 extended to only 25 pages (cf. the 306 pages of the 1976 Regulations). This colossal shrinkage of the Regulations was achieved by the elimination of all technical requirements from the Regulations, which were now cast in "*functional form*", such that they contained only "*functional requirements*" in relation to the matters controlled under the Regulations.

5.1.10 In simple terms, a "*functional requirement*" may be regarded as a simply expressed objective that must be achieved (e.g. 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). The articulation of the requirements of the Regulations in this style provides great flexibility for the designer in the technical solutions that may be adopted for compliance with the Regulations. (Where functional requirements apply, relaxations from these requirements cannot be granted, as, to do so, would imply that it was acceptable for a fire safety measure to be inadequate. However, theoretically, a building control body can dispense with a functional requirement, though this would be exceptionally rare.)

5.1.11 In my opinion, this approach is now essential to enable novel designs of buildings, the use of fire engineering and, even in simple building designs, avoidance of rigid application of "rules" that, when their origin is traced, are often quite demonstrably of a relatively arbitrary nature. Equally, in any goal-based (or risk-based) legislative regime, determination as to whether a "goal" has been achieved (or risk has been adequately reduced) is inherently and inevitably often quite subjective and hence open to variance in opinion and consequent debate.

5.1.12 In the Building Regulations 1985, there were only four functional requirements in relation to fire safety, which were set out, in tabular form, in only 1.5 pages of A4 (cf. the 44 A5 pages of detailed text in the 1976 Regulations). In the 1985 (and all subsequent) Regulations, the functional requirements in relation to fire safety were set out in Part B of Schedule 1 to the Regulations.

5.1.13 The four topics addressed in Part B of Schedule 1 were (and, in conjunction with a further topic continue to be) described in the Schedule as:

i.) Means of escape;

ii.) Internal fire spread (surfaces);

iii.) Internal fire spread (structure);

iv.) External fire spread.

5.1.14 The specific requirements, known as Requirements B1, B2, B3, and B4 were expressed as follows:

Means of escape

B1. (1) There shall be 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 (surfaces)

B2. In order to inhibit the spread of fire within the building, surfaces of materials used on the walls and ceilings –

(a) Shall offer adequate resistance to the spread of flame over their surfaces; and

(b) Shall have, if ignited, a rate of heat release which is reasonable in the circumstances.

Internal fire spread (structure)

B3. (1) The building shall be so constructed that, in the event of fire, its stability will be maintained for a reasonable period.

(2) The building, or the building as extended, shall be sub-divided into compartments where this is necessary to inhibit the spread of fire within the building.

(3) Concealed spaces in the structure or fabric of the building, or the building as extended, shall be sealed and sub-divided where this is necessary to inhibit the unseen spread of fire and smoke.

(4) A wall common to two or more buildings shall offer adequate resistance to the spread of fire and smoke.

(5) For the purposes of sub-paragraph (4) a house in a terrace and a semi-detached house are each to be treated as being a separate building.

External fire spread

B4. (1) The external walls of the building shall offer adequate resistance to 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 offer adequate resistance to the spread of fire over the roof and from one building to another, having regard to the use and position of the building.

5.1.15 The 1985 (and all subsequent) Regulations might be said to offer designers the "best of both worlds". Approved Documents were produced by the relevant Government Department, setting out guidance as to the means by which compliance with the functional requirements could be achieved. One Approved Document addressed each Part of the functional requirements set out in Schedule 1 of the Regulations; so, more specifically, Approved Document B provided guidance as to the means for compliance with the four functional requirements in relation to fire safety set out in Part B of Schedule 1.

5.1.16 For the majority of buildings, particularly simple buildings, designs followed Approved Document B as though its recommendations were prescriptive rules. Even today, it is not uncommon, even for fire safety specialists, to refer to the guidance in Approved Document B, using phraseology such as "*…the Building Regulations require…*" some fire safety measure, when, in fact, they mean that the measure is advocated in Approved Document B.

5.1.17 Indeed, the Inquiry will be aware that, since the Grenfell Tower fire, many parties have publicly alleged that they have called for review of the fire safety requirements of the Building Regulations for some years; in my opinion, to the extent that such calls were made, they often related to a review of Approved Document B, and not a review of the functional requirements of the Building Regulations.

5.1.18 However, it is important to stress that there is no obligation to follow the recommendations of Approved Document B. A designer may choose an alternative approach that results in a quite different technical solution, provided the relevant functional requirement is satisfied.

5.1.19 I discuss Approved Document B under a further sub-heading below. However, at this stage, I would note that the 1985 version of Approved Document B specified largely the same measures as the Building Regulations 1976, but as recommendations, rather than requirements. However, by means of diagrams and more logical presentation, Approved Document B was (and remains), in my opinion, much easier for a non-specialist to follow than previous prescriptive regulations.

5.1.20 The flexibility in means for compliance with the functional requirements of the Building Regulations 1985, which I described above, did not apply to Requirement B1, which was, therefore, not addressed in the 1985 version of Approved Document B. Instead, prescriptive requirements continued to apply in relation to means of escape. These took the form of what were known as the "Mandatory rules for means of escape in case of fire" ("the Mandatory Rules") [C12]. Compliance with Requirement B1 could only be satisfied by compliance with the Mandatory Rules.

5.1.21 In congruence with Requirement B1 of the Building Regulations 1985 itself, the Mandatory Rules only applied to certain buildings, but this included a building which was erected and which contained a flat and was of three or more storeys. In the case of such buildings, the Mandatory Rules required compliance with specified clauses of CP 3: Chapter IV : Part 1 : 1971.

5.1.22 By virtue of specification of specific clauses in the above code of practice, compliance with the Building Regulations 1985 effectively necessitated the measures and arrangements that I described in paragraph 4.2.6 of this report, with the exception of recommendations in relation to staircase lighting, fire lifts, a fire alarm system (which would not be required) and advice to residents (which is arguably outwith the scope of Building Regulations).

5.1.23 It should also be noted that the wording of the Mandatory Rules was such that it applied to the erection of blocks of flats (other than those of two storeys), but not the alteration of such blocks. On this basis, I make the assumption that, in the case of any alterations at Grenfell Tower during the currency of the Building Regulations 1985, the Mandatory Rules did not apply; alterations to means of escape would, presumably, have been addressed under the London Building Acts (Amendment) Act 1939.

5.1.24 However, in practice, the distinction is academic since, in both cases, the guidance in CP 3: Chapter IV : Part 1 : 1971 would have been adopted and, in both cases, to the extent relevant, the requirements of section 20 of the 1939 Act, as supported by the guidance discussed in Section 4 of this report, would have applied.

5.1.25 The Building Regulations 1985 were subject to amendment from 1 April 1990. However, that amendment had no impact on the matters discussed in this report.

Building Regulations 1991

5.1.26 The Building Regulations 1991 came into force on 1 June 1992. The Regulations revoked, and replaced with amendments, the Building Regulations 1985.

5.1.27 The main changes to the Building Regulations brought about by the 1991 Regulations were, as follows:

i.) In Part B of Schedule 1 to the Regulations, Requirement B1 (means of escape) was no longer subject to Mandatory Rules. As in the case of other requirements in Part B, non-mandatory guidance was incorporated into Approved Document B, so enabling alternative solutions to be adopted to means of escape from fire.

ii.) A new Requirement B5, relating to access and facilities for the fire service, was incorporated in Part B of Schedule 1.

5.1.28 Requirements B1-B4 remained largely unchanged, other than by virtue of relatively minor editorial amendments. However, these amendments added

or removed the word "adequate" to or from certain requirements. Accordingly, for accuracy and completeness, I set out below the exact requirements, including the new requirement B5 as contained within Part B of Schedule 1 to the 1991 Regulations.

Means of escape

B1. The building shall be designed and constructed so that there are 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 (linings)

B2. (1) To inhibit the spread of fire within the building the internal linings shall –

(a) resist the spread of flame over their surfaces; and

(b) have, if ignited, a rate of heat release which is reasonable in the circumstances.

(2) In this paragraph "internal linings" means the materials lining any partition, wall, ceiling or other internal structure.

Internal fire spread (structure)

B3. (1) The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period.

(2) A wall common to two or more buildings shall be designed and constructed so that it resists the spread of fire between those buildings. For the purposes of this sub-paragraph a house in a terrace and a semi-detached house are each to be treated as a separate building.

(3) To inhibit the spread of fire within the building, it shall be sub-divided with fire-resisting construction to an extent appropriate to the size and intended use of the building.

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

Access and facilities for the fire service

B5. (1) The building shall be designed and constructed so as to provide facilities to assist fire fighters in the protection of life.

(2) Provision shall be made within the site of the building to enable fire appliances to gain access to the building.

5.1.29 Prior to revocation of the 1991 Regulations, the Regulations were subject to amendment in 1992, 1994, 1995, 1997, 1998, 1999 (two amendments) and 2000, after which they were revoked by the Building Regulations 2000.

5.1.30 Only the Building Regulations (Amendment) (No. 2) Regulations 1999 affected the fire safety requirements contained within Part B of Schedule 1 to the Regulations. The major change in this respect was an amendment to Requirement B1, such as to require not only appropriate means of escape, but also appropriate provisions for the early warning of fire. This change brought the provision of fire detection and fire alarm systems (to the extent that such systems were necessary) within the scope of the Building Regulations for the first time.

5.1.31 In fact, provisions for the early warning of fire in dwellings (in the form of domestic smoke alarms) had, in practice, been necessary since 1992 by virtue of a recommendation in the 1992 edition of Approved Document B, which advised that the provision of smoke alarms in dwellings was necessary to achieve adequate means of escape from dwellings.

5.1.32 This was, in my opinion, not logical, since it has always been understood (and continues to be understood) that means of escape and fire warning are two entirely different and independent, albeit complementary, fire safety measures. The somewhat inelegant approach adopted in the 1992 version of Approved Document B was brought about purely for expediency following the Royal Assent for the Smoke Detectors Bill, resulting in the Smoke Detectors Act 1991.

5.1.33 The Smoke Detectors Bill was originally a Private Members' Bill, introduced by the then Member of Parliament for York, which received all-party support and would have required the installation of smoke alarms in new dwellings. However, the view of Government was that this requirement should not be brought about by primary legislation, but should, ultimately, be incorporated within national building regulations.

5.1.34 Accordingly, the Smoke Detectors Act 1991 included a provision that the Act would not come into force until such time as the Secretary of State ordered by means of a statutory instrument. No such statutory instrument was ever produced. In Scotland and Northern Ireland, building regulations were amended to require the provision of smoke alarms in new dwellings. In England and Wales, rather than, at that time, amend the Building Regulations, the measure was incorporated within the 1992 version of Approved Document B. The Smoke Detectors Act 1991 was repealed by the Fire Safety Order in 2006.

5.1.35 In addition to the amendment to Requirement B1, the Building Regulations (Amendment) (No. 2) Regulations 1999 amended Requirements B2, B3 and B4 by the insertion of the word "*adequate*" (perhaps, simply because it had

previously been omitted in error – see paragraph 5.1.28 – or, perhaps, simply better to reflect the philosophy of the functional requirements, which are not intended to be absolute), such that:

i.) internal linings were *adequately* to resist the spread of flame;

ii.) a wall common to two buildings was *adequately* to resist the spread of fire between buildings;

iii.) external walls were *adequately* to resist the spread of fire over the walls;

iv.) the roof of a building was *adequately* to resist the spread of fire over the roof and from one building to another.

5.1.36 The 1999 Amendment (No. 2) Regulations also amended the wording of Requirement B5, such that the facilities to assist fire-fighters and the provision for access to fire appliances should be "*reasonable*".

5.1.37 The Building Regulations (Amendment) (No. 2) 1999 came into force on 1 July 2000, but was subsequently revoked on 1 January 2001 by the Building Regulations 2000.

Building Regulations 2000

5.1.38 The Building Regulations 2000 came into force on 1 January 2001. The Regulations revoked the Building Regulations 1991 (as amended).

5.1.39 The Requirements set out in Part B of Schedule 1 to the 2000 Regulations were identical to those in Part B of Schedule 1 to the 1991 Regulations (as amended in 1999). However, for ease of reference, I again set out these Requirements in full below.

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 (linings)

B2. (1) To inhibit the spread of fire within the building the internal linings shall -

(a) adequately resist the spread of flame over their surfaces; and

(b) have, if ignited, a rate of heat release which is reasonable in the circumstances.

(2) In this paragraph "internal linings" mean the materials lining any partition, wall, ceiling or other internal structure.

Internal fire spread (structure)

B3. (1) The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period.

(2) A wall common to two or more buildings shall be designed and constructed so that it adequately resists the spread of fire between those buildings. For the purposes of this sub-paragraph a house in a terrace and a semi-detached house are each to be treated as a separate building.

(3) To inhibit the spread of fire within the building, it shall be sub-divided with fire-resisting construction to an extent appropriate to the size and intended use of the building.

(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.

Access and facilities for the fire service

B5. (1) The building shall be designed and constructed so as to provide reasonable facilities to assist fire fighters in the protection of life.

(2) Reasonable provision shall be made within the site of the building to enable fire appliances to gain access to the building.

5.1.40 Prior to revocation of the 2000 Regulations, the Regulations were subject to amendment by Statutory Instruments, in 2001, 2002 (two amendments), 2003 (two amendments), 2004 (three amendments), 2006 (two amendments), 2007, 2008 (two amendments), 2009 (three amendments) and 2010, after which they were revoked by the Building Regulations 2010.

5.1.41 For the purpose of this report, in relation to fire safety, there would appear to be two relevant amending Regulations, namely the Building (Amendment) (No. 2) Regulations 2002 and the Building and Approved Inspectors (Amendment) (No. 2) Regulations 2006.

5.1.42 The first of these amendments was relatively trivial; it amended Requirement B2, such that, in the case of linings, the term "*rate of heat release*" was changed to "*rate of heat release or rate of fire growth*", while the reference in that Requirement to *"materials"* was changed to "*materials or products*".

5.1.43 The second Amendment was much more significant. The 2006 Amendment (No. 2) Regulations changed Requirement B3(3) in Part B of Schedule 1 to the Regulations (relating to internal fire spread (structure)), such that, where reasonably necessary to inhibit the spread of fire within the building, either as an alternative or as an addition to the sub-division of the building with fire resisting construction, there was a requirement for the installation of suitable automatic fire suppression systems.

5.1.44 It was as a result of this amendment that, by virtue of a corresponding change in the interpretation of Requirement B3(3) (relating to internal fire spread) within Approved Document B, sprinkler protection of blocks of flats of over 30m in height became necessary (see later in this section of my report).

5.1.45 The 2006 Amendment (No. 2) Regulations also inserted a new regulation, Regulation 16B, which required that, 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 of a building) and Part B of Schedule 1 imposes requirements, the person carrying out the work shall give fire safety information to the Responsible Person (as defined in the Fire Safety Order) on completion of the work, or occupation of the building or extension; the fire safety information is provided for the purpose of assisting the Responsible Person to operate the building or extension with reasonable safety.

5.1.46 In addition to the above amendments, both of which are directly applicable to fire safety, the Inquiry may wish to be aware of a further amendment to the Building Regulations 2000, brought about by the Building (Amendment) Regulations 2002. This amendment inserted a new Regulation and a new schedule 2A. By virtue of these amendments, where building work consists only of the installation, and the replacement of, *inter alia*, a window (or door) in an existing building and the work is carried out by a person who is registered under the Fenestration Self-Assessment Scheme by Fensa Ltd in respect of that type of work, the local authority was authorized to accept, as evidence that the requirements of Regulations 4 and 7 of the Building Regulations 2000 had been satisfied, a certificate to that effect by the person carrying out the building work.

5.1.47 For clarity, Regulation 4 required that building work must be carried out so that it complied with the requirements of Schedule 1 to the Building Regulations 2000, and that, after completion of the work, the building continued to comply with the applicable requirements of Schedule 1, or was no more unsatisfactory in that respect than before the work was carried out. Regulation 7 required that building work be carried out with adequate and proper materials, and be carried out in a workmanlike manner.

5.1.48 The Inquiry might also wish to be aware of a new requirement relating to domestic electrical safety, which was incorporated within the Building Regulations 2000 by the Building (Amendment) (No. 2) Regulations 2004 and came into force on 1 January 2005. The new requirement was incorporated within Part P of Schedule 1 to the Building Regulations 2000.

5.1.49 Requirement P1 required that reasonable provision be made in the design, installation, inspection and testing of electrical installations in order to protect persons from fire or injury. Requirement P2 required that sufficient information be provided so that persons wishing to operate, maintain or alter an electrical installation could do so with reasonable safety.

5.1.50 The requirements of Part P applied (and continue to apply) only to electrical installations that are intended to operate at low (i.e. normal mains) or extra-low voltage and are, *inter alia*, in a dwelling or in the common parts of a building serving one or more dwellings, but excluding power supplies to lifts, or in a building that receives its electricity from a source located within or shared with a dwelling. Certain minor electrical work was excluded from the scope of this requirement. In addition, self-certification of relevant electrical work by persons certificated by various third-party certification bodies was acceptable by virtue of the Building (Amendment) (No. 3) Regulations 2004.

Building Regulations 2010

5.1.51 The Building Regulations 2010 came into force on 1 October 2010 and remain current. The Regulations revoked the Building Regulations 2000 (as amended).

5.1.52 Part B of Schedule 1 remained as it was previously in the Building Regulations 2000 (as amended), other than in respect of largely editorial amendments to Requirement B3(3) in relation to sub-division of buildings with fire-resisting construction. Accordingly, I do not, within this report, reproduce the current version of Part B to Schedule 1.

5.1.53 In the 2010 Regulations, Regulation 16B, which, as discussed above, had been inserted as an amendment to the 2000 Regulations, became Regulation 38. In addition, the arrangement for "self-certification" for replacement windows was extended to include, within Schedule 3 to the 2010 Regulations, self-certification by persons registered by a number of other certification bodies, rather than only by Fensa Ltd.

5.1.54 Also, in the 2010 Regulations, with regard to requirements for domestic electrical safety, Requirement P2 was deleted, while Requirement P1 was amended such that it now requires reasonable provision in the design and installation of electrical installations in order to protect persons operating, maintaining or altering the installations from fire or injury.

5.1.55 Given that the requirements of the Building Regulations are cast in functional form, interpretation of the requirements relies, to some extent, on the guidance contained in the Approved Documents, which, by virtue of advising on means of compliance, assist in interpretation of the functional requirements. I discuss the Approved Documents in the next sub-section of this section of my report. However, it might assist the Inquiry if, at this stage, I offer some comment on interpretation of certain aspects of Requirements B1 (in relation to means of escape), B3 (in relation to internal fire spread) and B4 (in relation to external fire spread), specifically in relation to blocks of flats.

5.1.56 In blocks of flats, the requirements of B1 and B3 are complementary in relation to the fundamental fire strategy. It is universally accepted that, in a block of flats, compliance with Requirement B3 necessitates that walls and floors of flats be substantially fire resisting, such that each flat is, effectively, a fire-resisting "box", beyond which a fire within a flat should not be able to spread.

5.1.57 This principle of *compartmentation* supports the strategy commonly described as "stay put", whereby, in the event of a fire in one flat, occupants of other flats should be safe to remain within their own flat. As discussed in Section 4 of this report, the safety of this strategy was acknowledged in CP3: Chapter IV : Part 1 : 1971 (and, to a lesser extent, in the 1962 version of the code of practice), as well as all later authoritative guidance on fire safety in modern blocks of flats.

5.1.58 However, the "stay put" principle does not imply that all individual residents **must** remain within their own flats (though, if all residents in a high-rise block chose to evacuate simultaneously, this might well place residents at risk and would create a major impediment for fire-fighting activity by the fire and rescue service). Compliance with Requirement B1 should ensure that escape routes, such as corridors, lobbies and stairways, remain relatively safe for use by residents if they leave the building, whether by choice, as a result of smoke or fire spread into their flat, or on an instruction from the fire and rescue service to do so; it is inherent, within the "stay put" principle, that there may be a stage in a fire at which "stay put" needs to be abandoned by some, or even all, residents, albeit that occasions on which this occurs are rare. The protection of the means of escape required by Requirement B1 relies, in part, on the compartmentation required by Requirement B3.

5.1.59 With regard to Requirement B4, and more specifically Requirement B4(1), the single sentence of the latter Requirement actually constitutes two associated, but to some extent independent, requirements (which, for comparison, are set out as two, quite separate functional requirements in the equivalent Scottish building regulations).

5.1.60 In this connection, I refer the Inquiry to the wording of Requirement B4(1), namely "*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*". The second part of the Requirement, relating to spread of fire from one building to another, is directly related to the earliest forms of building legislation (several centuries ago), which were concerned with prevention of major conflagrations, involving multiple buildings, in urban conurbations.

5.1.61 In relation to Grenfell Tower, without wishing to pre-empt the findings of the Inquiry, it is the first part of the sentence contained within Requirement B4(1) that is greatly significant. The Inquiry will note that this part of the sentence requires that the external walls of the building shall adequately resist the spread of fire over the walls, having regard to the height, use and position of the building.

5.1.62 While, clearly, interpretation of this requirement rests, to a great extent, on the meaning of the word "*adequately*", the intent of this requirement is, in my opinion, to minimize the potential for external spread of fire from one floor to another. While it is well-known that the dynamics of fire can, potentially, result in the external vertical spread of fire from one flat to the flat immediately above, via windows, rapid spread significantly beyond such an extent would, in my opinion, demonstrate a failure to comply with Requirement B4(1).

5.1.63 I return to this matter at a later stage in this section of my report. However, at this stage, I would further comment that, in a high building, the importance of limiting external fire spread from one floor to another as a result of wall construction was recognized by the GLC in their 1970 code of practice for section 20 buildings.

5.1.64 That code of practice advised applicants for approval of a building under the London Building Acts that, particularly in a high building, the Council might require a higher standard of external enclosure of the building than would otherwise be necessary under the London Building (Constructional) Amending By-Laws (No. 1) 1964 "*…in view of the risk of the external spread of fire from storey to storey above the height which is accessible to external fire brigade equipment…*".

5.1.65 The Building Regulations 2010 were amended in 2011, 2012, 2013, 2014 and 2015. However, I am not aware of any amendment that would materially affect the content of this report.

5.2 Guidance

Government Guidance

5.2.1 In this sub-section, I consider the guidance available to designers in relation to compliance with the functional requirements of the Building Regulations. In that connection, I focus primarily on Approved Document B (to which I refer hereafter as ADB), which is official guidance produced by the Secretary of State in accordance with powers granted by the Building Act 1984.

5.2.2 As discussed in the previous sub-section, the designer is not compelled to comply with the recommendations of ADB, but only with the functional requirements set out in Part B of Schedule 1 to the Regulations. However, under the Building Act 1984, in any civil or criminal proceedings in which a contravention of a provision of the Building Regulations is alleged, failure to comply with an approved document may be relied upon as tending to establish liability, while proof of compliance with an approved document may be relied on as tending to negative liability.

5.2.3 In a further sub-section, I also refer to guidance produced by other bodies on compliance with Requirement B4(1) with particular reference to external cladding; this matter is likely to feature prominently in the deliberations of the Inquiry. I also consider guidance contained within relevant British Standards, as this may also prove relevant.

Approved Document B 1985

5.2.4 In 1985, the first version of ADB was published (by the Department of the Environment and Welsh Office) in support of the Building Regulations 1985. However, as discussed in the previous sub-section of this report, the 1985 version of ADB provided guidance only on the matter of fire spread (i.e. Requirements B2, B3 and B4). Compliance with Requirement B1 necessitated compliance with the Mandatory Rules for Means of Escape, which, in turn, required compliance with specific clauses of CP3: Chapter IV : Part 1, the key recommendations of which can be found in Section 4 of this report.

5.2.5 Key recommendations of ADB 1985 in respect of blocks of flats of the height of Grenfell Tower that might be considered relevant by the Inquiry comprise the following:

i.) The minimum fire resistance of elements of structure was 1½ hours, but this was reduced to one hour for any compartment wall between a flat and any other part of the same building, provided the wall was non-load bearing and did not form part of a protected shaft (see Table 2.1).

ii.) External walls were to be constructed of materials of *limited combustibility* (see paragraph 2.7).

iii.) External cladding could be combustible, provided it was not relied on to contribute to the fire resistance of the wall. Any cladding less than 15m

above the ground could comprise timber at least 9mm thick or any material with an *index of performance, I*, (an index determined by testing the material in accordance with BS 476-6 -see below) of not more than 20. Any cladding at a height of 15m or more above the ground was to be *Class 0*, which is a superior fire performance to a value of *I* of 20 (see Table 2.2).

iv.) Flat entrance doors were to afford 20 minutes' fire resistance, while stairway doors were to afford 30 minutes' fire resistance (see Table A1).

5.2.6 For the assistance of the Inquiry, at this stage, I discuss, in the paragraphs below, the concepts of *limited combustibility, Class 0* and the *parameter I*. These are of significance in all later versions of ADB.

5.2.7 Limited combustibility materials are materials that are either non-combustible or that, if involved in a fire, release so little heat that they do not materially assist in the development of the fire. Such materials include materials, such as plasterboard, that do not satisfy the British Standard test for non-combustibility [C13] as they are not completely inert (e.g. plasterboard contains paper on the facings), but that met the definition for limited combustibility in ADB 1985, by reference to performance in the test specified in BS 476-11 [C14].

5.2.8 In that test, a sample of the material is inserted into a furnace at a temperature of 750°C. Thermocouples measure the temperature of the specimen and the furnace. For the purpose of ADB 1985, a material was classed as having limited combustibility if it was a material of density 300kg/m^3 or more, which, when inserted in the furnace, did not flame and the temperature of the furnace did not increase by more than 20°C. Alternatively, for some applications, limited combustibility could be materials of density less than 300kg/m^3 which did not flame for more than 10 seconds and the rise in temperature on the specimen was not more than 35°C and, in the furnace, not more than 25°C. Also, a limited combustibility material could comprise a non-combustible core of 8mm thick or more, having combustible facings not more than 0.5mm thick. In simple terms, a limited combustibility material is not quite non-combustible, but is very nearly so.

5.2.9 As in the case of *limited combustibility,* the term *Class 0* is defined specifically for the purpose of ADB. A *Class 0* material is, by definition, either a material of limited combustibility or a material that satisfies specified performance in two small-scale fire tests, involving relatively small samples of the product, namely BS 476-6 [C15] and BS 476-7 [C16]. These tests were originally designed to enable fire performance of internal linings of walls and ceilings to be expressed in terms of the extent to which fire could spread over the surface of the lining, and the extent to which the material could contribute to the growth of a fire.

5.2.10 BS 476-7 describes a small-scale test for the extent to which flame may spread over the surface of a material. A sample of the material is exposed to a radiant panel, a small pilot flame is applied to the material, and the extent of flame spread over its surface during the period of the test is determined.

Under the test, materials are classified as Class 1, 2, 3 or 4. The highest level of performance is designated Class 1. An example of a Class 1 product is plasterboard. The lowest level of performance (furthest distance of spread and fastest flame spread during the 10 minute test) is designated Class 4. An example would be a low density timber product.

5.2.11 In the BS 476-6 test (commonly known as the "fire propagation test"), the sample is exposed to a heating regime in a combustion chamber. The temperature of the flue gases is measured to determine the extent to which they rise in the presence of the sample. The parameter *I* is the summation of indices i_1, i_2 *and* i_3, which are dimensionless sub-indices related to the temperature rise at three successive stages of the test. The sub-index i_1 *is* regarded as important because it represents the contribution of the material to early fire growth.

5.2.12 For the purpose of ADB, a Class 0 material (other than a material that has already been defined as a material of limited combustibility) must achieve a Class 1 rating in the BS 476-7 test **and,** in addition**,** achieve a specified performance in the BS 476-6 test, such that, *I* must be less than 12, while i_1, must be less than 6. (An example would be woodwool slabs or timber treated with special fire retardants.) It should be noted that, because Classes 1-4 (under BS 476-7) relate purely to surface spread of flame, there is sometimes a misconception that Class 0 is simply an even higher standard of performance in respect of surface spread of flame; in fact, Class 0 is not solely related to surface spread of flame, but also to the amount of heat energy that will be released in a fire to further develop the fire.

5.2.13 It follows from the above explanation (the complexity of which, for the lay reader, is acknowledged) that any material of limited combustibility will satisfy the definition of Class 0, but any Class 0 material will not necessarily satisfy the definition of limited combustibility, the latter of which is more onerous.

Approved Document B 1992

5.2.14 The 1992 edition of Approved Document B, which applied from 1 June 1992, replaced the 1985 version, and was produced (by the Department of the Environment and Welsh Office) in support of the then new Building Regulations 1991. The main changes that might be considered relevant by the Inquiry were as follows:

i.) Fire engineering was now given greater recognition, in the sense that it was the subject of greater guidance, as an alternative approach to compliance with the functional requirements of the Regulations (see paragraph 0.10). (Indeed, fire engineering might, by definition, be regarded simply as a means for devising a package of fire safety measures that satisfies a defined objective, such as compliance with a functional requirement, while departing significantly from prescriptive guidance in codes of practice, but, instead, using the principles of science and engineering).

ii.) Guidance in ADB on compliance with Requirement B1 now replaced the Mandatory Rules for Means of Escape.

iii.) Guidance was given on the new requirement for early warning of fire. It was made clear that provisions for early warning were not intended to be applied to the common parts of blocks of flats, nor was there to be any interconnection between smoke alarms in separate flats (see paragraph 2.7).

iv.) For flats with only a single means of escape from the flat, the layout of flats at a height greater than 4.5m above ground level should be such that either no point in the flat was further than 9m from the flat entrance door or there was to be a protected entrance hall, into which all rooms opened, so that the travel distance from the flat entrance door to the door of a habitable room was not more than 9m. In the latter case, the doors in the protected entrance hall were to afford a fire resistance of 20 minutes ("FD20 doors") (see paragraph 2.12).

v.) The maximum distance from a flat entrance door to the single stairway in a tower block was to be no greater than 7.5m (see Diagram 10).

vi.) Smoke dispersal by cross ventilation was not now advocated. In single stairway buildings, an automatically-opening vent (AOV), operated by smoke detectors, was to be installed in the circulation space that separated flat entrance doors from the stairway door. Where the stairway was not located on an external wall, a vent was to be provided at the top of the stairway. The AOV was to have a manual override control. The stated purpose of the AOV was to disperse smoke from the circulation space (see paragraph 2.23).

vii.) Flat entrance doors and stairway doors were to be self-closing and afford 30 minutes' fire resistance and be fitted with smoke seals ("FD30S doors") (see Diagram 10) .

viii.) Gas service pipes or associated meters were not to be incorporated within a protected stairway unless the gas installation satisfied the Gas Safety Regulations 1972 and the Gas Safety (Installation and Use) Regulations 1984 (as amended) (see paragraph 2.39).

ix.) Emergency lighting was to be provided in all common escape routes. Normal lighting on escape stairways was to be on a separate circuit from lighting on any other part of the escape route (see Table 9 and paragraph 5.33).

x.) The minimum fire resistance for elements of structure in a block of flats more than 30m in height was to be 120 minutes (see Table A2).

xi.) Any wall separating a flat from any other part of the building was to be constructed as a compartment wall (see paragraph 8.13).

xii.) Detailed advice was given on fire stopping (see Section 10). (Fire stopping is a means of sealing an imperfection of fit, a design tolerance between elements of construction or an aperture through which services (e.g. cables, pipes, etc.) pass, to restrict the passage of fire for the purpose of maintaining the fire resistance of a fire-resisting barrier, such as a compartment wall or floor.)

xiii.) For compliance with Requirement B4(1), (in relation to external walls), external walls were to be constructed so that the risk of ignition from an external source, and the spread of fire over their surfaces, was to be restricted by making provision for them to have low rates of heat release. The guidance makes specific reference to the objective of reducing the danger from fire spread up the external face of the building (see introductory paragraphs of Part B4 and paragraph 12.2).

xiv.) A diagram (Diagram 36) made provisions relating to the external surfaces of walls, which, in the case of the outer cladding of a wall of rainscreen construction (with a drained and ventilated cavity) were also to apply to the internal surface of the outer cladding which faced the cavity. In the case of buildings of height 20m or more (with no other buildings in close proximity), the surfaces of external walls up to a height of 20m were to have an Index *I* of not more than 20, though timber cladding at least 9mm thick was also acceptable. Wall surfaces above 20m were to be Class 0. However, to some extent, Diagram 36 related to the potential for fire spread from one building to another and not simply fire spread from one storey to the next (see Diagram 36).

xv.) In view of the above, there was further guidance on external wall construction. Given the relevance of external wall construction to the Grenfell Tower fire, I reproduce that guidance (including the paragraph number in ADB 1992) in full in the two paragraphs that follow.

> *"12.7 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 for cladding framework, or of combustible thermal insulation as an over-cladding or in ventilated cavities, may present such a risk in tall buildings even though the provisions for external surfaces in Diagram 36 may have been satisfied.*
>
> *In a building with a storey at more than 15m above ground level, insulation material 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 28 in Section 9."*

xvi) Combustible insulation was, therefore, virtually precluded from external wall construction in buildings with a storey at over 15m above ground (typically a building of seven storeys or more). The figure of 15m was later changed to 20m by an amendment in 1992 (as a correction or a revision). The definition of limited combustibility remained as defined in the 1985 version of ADB. An amendment incorporated further information, namely that advice on the use of thermal insulation material is given in the BRE report "Fire Performance of External Thermal Insulation For Walls of Multi-Storey Buildings" (BR 135) (see amended paragraph 12.7).

xvii) For compliance with Requirement B3 (as opposed to Requirement B4), cavity barriers were to be provided within the void behind the external face of rainscreen cladding at every floor level, and on the line of compartment walls abutting the external wall, of buildings which had a floor of more than 15m above ground level (see Table 13). The figure of 15m was later changed to 20m. My understanding is that this recommendation arose from a well-known fire at Knowsley Heights, an

11 storey block of flats in Huyton, Merseyside on 5 April 1991 [C17]. The fire was the result of deliberate ignition of rubbish, and it spread to all floors of the building via a cavity behind recently installed, Class 0 rainscreen cladding, though there were no injuries and no general fire spread within the building. (A cavity barrier is a form of construction provided to close a concealed space against penetration of smoke or flame, or provided to restrict the movement of smoke or flame within such a space. This should not be confused with fire stopping at, for example, the junction between a compartment floor and the external wall of the building, the purpose of which is to ensure that the imperfection of fit between the two elements maintains the fire resistance of the compartment floor.)

xviii) There were relaxations for the provision of cavity barriers behind rainscreen cladding in other situations provided that the cavity did not contain combustible insulation (see paragraph 9.11e).

xix) It should be noted that, in relation to the fire safety of overcladding of existing buildings, ADB concentrated on the combustibility of insulation material and "cladding framework" (rather than the actual cladding materials supported on a framework, perhaps because, for example, in the case of a rainscreen, a single sheet of material was envisaged, rather than a composite material) and cavity barriers behind rainscreen cladding in tall buildings. The outermost cladding material was restricted primarily in relation to performance, such as the potential for flame spread on the surface, in small scale fire tests originally developed for wall and ceiling linings on escape routes within buildings, rather than entire external wall surfaces.

xx) New guidance was given on access and facilities for the fire service to support the then new Requirement B5 (see paragraph 5.1.27 of this current report). The guidance related to, *inter alia*, provision of vehicle and personnel access, fire mains, and fire-fighting lifts (the then modern term for what were previously known as "firemen's lifts") (see Part B5).

Approved Document B 2000

5.2.15 In 2000, a new edition of ADB was produced in support of the Building Regulations 1991 by the then Department of the Environment, Transport and the Regions (DETR) and replaced the 1992 edition of Approved Document B. The 2000 edition of ADB came into effect on 1 July 2000.

5.2.16 For the purpose of this report, the main changes were that:

i.) The new approved document reflected an amendment to Requirement B1 of the Building Regulations 1991, which now required that there be appropriate provisions for early warning of fire (see Section 1).

ii.) Arrangements for smoke control within the common circulation spaces remained as advocated in the 1992 version of ADB. The objective of the ventilation described in the stairway lobby (between the flat entrance door and the stairway door) continued to be the dispersal of smoke from

the lobby. However, the 2000 version of ADB acknowledged that this ventilation would also afford protection to the common stairway (which was, arguably, the original primary objective of the smoke dispersal arrangements described in CP3: Chapter IV : Part 1 : 1971) (see paragraph 3.23).

iii.) The condition under which gas service and installation pipes or associated meters could be incorporated within a protected stairway was updated to refer to compliance with the Pipelines Safety Regulations 1996 and the Gas Safety (Installation and Use) Regulations 1998. In addition, pipes were to be of screwed steel or all welded steel construction (see paragraph 3.39).

iv.) The height of buildings above which cavity barriers were to be provided behind the rainscreen cladding was changed from 20m to 18m (see Table 13).

v.) The recommendations in Diagram 36 (which had become Diagram 40) of the 1992 version of ADB continued to apply, except that the figure of 20m was changed to 18m; this diagram was concerned with fire performance of the outer face of an external wall (see Diagram 40).

vi.) A new alternative to compliance with the above Diagram was offered, namely following the guidance in a Building Research Establishment note (BRE Fire Note 9 [C18]), which had been published in 1999. Fire Note 9 contained a large-scale test method for external cladding systems (see Note to paragraph 13.5). Such is the significance of the new reference to Fire Note 9 that I discuss the background to it in further paragraphs below.

vii.) Advice on external wall construction, previously given in paragraph 12.7, was largely unchanged (but was now included in paragraph 13.7). Therefore, the focus was on the fire risk of thermal insulation, which, in ventilated cavities, was to be of limited combustibility in buildings over 18m in height, and "cladding framework", and on the performance of the outermost face of cladding in small-scale fire tests, without a recommendation that the outermost material should be of limited combustibility (see paragraph 13.7). However, this advice was strengthened in the 2006 version of ADB (see below).

viii.) A new Appendix F was added, giving advice on use of insulating core panels ("sandwich panels"). This followed a fire in 1993, in which two fire-fighters died in a building in which these panels were used internally. For avoidance of doubt, ACM is not a sandwich panel. There are numerous differences between the two products; for example, sandwich panels contain a layer of thermal insulation, whereas the core of ACM is not a form of thermal insulation but merely binds two layers of aluminium together for rigidity (see Appendix F).

5.2.17 I now turn to what might appear, at first sight, to be a small change incorporated within the 2000 version of ADB, but which, in my opinion, might be of great significance to the Inquiry, namely the reference to BRE Fire Note 9. This guidance note had been produced by BRE because the

Knowsley Heights fire in 1991 had resulted in suggestions that small-scale fire tests were inadequate properly to address the performance of modern complete cladding systems in a real fire.

5.2.18 My understanding is that the amendment of ADB in 2000, to include a reference to Fire Note 9, was the result of considerable attention given to the matter of external wall construction, in particular, cladding, following a high-profile, fatal fire at Garnock Court, Irvine, Ayrshire in 1999, including further research.

5.2.19 An elderly, disabled male resident died in the flat of fire origin, though another resident of the flat escaped safely. The fire spread externally from its origin on the fifth floor to the 13th floor of this 14-storey block of flats. The means of fire spread, which was largely limited in horizontal extent to a single strip of an external wall, comprised what might be described as spandrel panels located between windows on each floor (though, some reports refer to these as "cladding").

5.2.20 It is generally considered that, in Scotland, the fire was taken into account in new primary legislation (the Building (Scotland) Act 2003) and new building regulations (the Building (Scotland) Regulations 2004). The Inquiry may be aware that, following the Grenfell Tower fire, various parties have stated publicly that Scotland learned from the Garnock Court fire (the manifestation of the lessons learned supposedly comprising the changes to legislation in Scotland), while England did not. While it is for those who have made such allegations to justify them if necessary, I feel bound to note in this report that this is not a view with which I can concur.

5.2.21 In this connection, the Inquiry may wish to be aware that, as a result of the Garnock Court fire, at Westminster, as a result of concerns regarding the potential risk which could be posed by fire spread involving external cladding systems, there was a Select Committee inquiry with the following terms of reference [C19]:

i.) whether a risk is posed by such cladding;

ii.) the extent of the use of external cladding systems;

iii.) the adequacy of the regulations pertaining to their use;

iv.) what action may be necessary to counter any risks posed in existing buildings and to avoid any risks in new buildings or alterations to existing buildings;

v.) other matters which may arise in the course of questioning.

5.2.22 In relation to compliance with Requirement B4(1), the Select Committee noted the recommendations of ADB 1992 in relation to limited combustibility of insulation, surface spread of flame on cladding and the provision of cavity barriers. The Select Committee took evidence from the Fire Brigades Union, technical advisers to the insurance industry, the cladding industry and independent fire consultants, who suggested that the guidance given in

Approved Document B may not be adequate for the purposes of ensuring the safety of external cladding systems in a fire. A representative of BRE also gave oral evidence to the effect that existing guidance "*is far from being totally adequate*".

5.2.23 Concerns expressed related to the risk of unexpectedly rapid fire spread involving these systems, which, it was suggested, may have a number of adverse consequences, of which ADB 1992 was said not necessarily to take full account. These included:

i.) shorter period available for escape from the building, thus potentially endangering life;

ii.) disproportionate difficulties in fire-fighting;

iii.) disproportionate damage to the building.

5.2.24 Concern was also expressed to the Select Committee regarding potential problems, in respect of which the then existing tests might not take proper account. These included:

i.) the fixtures which attach the cladding to the building may not withstand the fire, risking the detachment of the system from the building and endangering persons in and around the building, including fire-fighters;

ii.) if plastic materials are used for the cladding, they could melt and form burning droplets which again endanger people below.

5.2.25 Witnesses also complained regarding the small-scale tests used to define "limited combustibility" and "Class 0" (see paragraphs 5.2.6-5.2.13 of this report), which, it was suggested, did not properly evaluate the performance of large, complete, cladding systems in a real fire.

5.2.26 In view of the possible relevance of the Select Committee Inquiry to this current Inquiry, I commend the report of the Select Committee to the Inquiry, which the Inquiry may wish to read in full. However, I reproduce below the conclusions of the First Report of the Select Committee Inquiry:

> "***Conclusions***
>
> *Whether a risk is posed by such cladding*
>
> *18.* ***The evidence we have received during this inquiry does not suggest that the majority of the external cladding systems currently in use in the UK poses a serious threat to life or property in the event of fire*** (original emboldening). *There have been few recorded incidents of serious fire spread involving external cladding, and, although in our view any loss of life in incidents such as these should be prevented if at all possible, neither have there been many deaths (indeed, it is uncertain whether any of the deaths in the fires of which we have been informed can be directly attributed to excessive fire spread via the external cladding). Furthermore, the responsible attitude taken by the major cladding manufacturers towards minimising the risks of excessive fire spread has been impressed upon us throughout this inquiry.*
>
> *The adequacy of the regulations pertaining to their use*

19. ***Notwithstanding what we have said in paragraph 18 above, we do not believe that it should take a serious fire in which many people are killed before all reasonable steps are taken towards minimising the risks*** *(original emboldening). The evidence we have received strongly suggests that the small-scale tests which are currently used to determine the fire safety of external cladding systems are not fully effective in evaluating their performance in a 'live' fire situation. As a more appropriate test for external cladding systems now exists, we see no reason why it should not be used.*

20. *We believe that all external cladding systems should be required either to be entirely non-combustible, or to be proven through full-scale testing not to pose an unacceptable level of risk in terms of fire spread.* ***We therefore recommend that compliance with the standards set in the 'Test for assessing the fire performance of external cladding systems', which has been submitted to the British Standards Institution for adoption as a British Standard, be substituted in Approved Document B for previous requirements relating to the fire safety of external cladding systems*** (original emboldening)."

5.2.27 The Government responded to the report of the Select Committee on 23 March 2000 [C20]. The Department of Environment, Transport and Regional Affairs agreed that there was no evidence to suggest that the majority of cladding systems then currently in use posed a serious threat to life or property in the event of fire.

5.2.28 The Department also endorsed the view that it should not take a serious, multiple fatality fire before taking steps to minimize the risks. Accordingly, Part B of Schedule 1 to the Building Regulations and ADB had been reviewed by the Working Group of the Building Regulations Advisory Committee (BRAC); members of the Working Group were said to be experts with a particular interest in fire safety. This led to ADB 2000. The review of ADB had not suggested that ADB was insufficient or, if followed, would tend to create an unsafe scenario in a fire situation with respect to the external cladding.

5.2.29 However, the Department had asked the then Fire Research Station (part of the then recently privatized Building Research Establishment) to review guidance given in the paper BR 135 (*Fire Performance of External Thermal Insulation for Walls of Multi-Storey Buildings)*, to which ADB referred. This was to be followed by large-scale fire tests to assess the fire performance of a range of existing and new cladding systems, to assist in determining the most appropriate method for specifying fire performance.

5.2.30 In addition, as well as Fire Note 9 now being offered as an alternative method of satisfying the fire performance of the Building Regulations in relation to the fire performance of the surface of cladding, Fire Note 9 had been submitted to the British Standards Institution (BSI) for adoption as a British Standard. (Fire Note 9 ultimately, following amendment, became the BSI publication BS 8414 [C21]).

5.2.31 As discussed later in this sub-section, a further amendment in 2006 offered BS 8414 as a means of demonstrating compliance with Requirement B4(1), while no longer warning of the risk only of "*cladding framework*", but the cladding itself.

Approved Document B 2000 (as amended in 2000 and 2002)

5.2.32 The previous 2000 version of Approved Document B, to which I referred above, was produced in support of the Building Regulations 1991. That version of Approved Document B was amended later in 2000 for the purpose of supporting the Building Regulations 2000 (which replaced the Building Regulations 1991, and came into force on 1 January 2001, at which time the amended Approved Document B came into effect). My understanding is that the amendments were primarily editorial for the purpose of replacing references to the Building Regulations 1991 with references to the Building Regulations 2000.

5.2.33 The 2000 edition was further amended in 2002. In this case, the purpose of the amendments was to give recognition to new European technical specifications and supporting fire test methods, which had been produced in support of the European Union Construction Products Directive (CPD). The purpose of the CPD was to remove technical barriers to trade within the European Economic Area (EEA) as part of the move towards the Single Market. In the UK, the CPD was implemented by the Construction Products Regulations, which came into effect on 27 December 1991 and were amended on 1 January 1995.

5.2.34 In order to accommodate the European test standards, the amended ADB 2000 accepted classification under a harmonized European Standard, published in the UK as BS EN 13501-1 [C22] as an alternative to the UK definitions (as set out in ADB) for *non-combustible materials, materials of limited combustibility and Class 0.* Classification under BS EN 13501-1 is based on performance in certain other European/International fire tests. (Under BS EN 13501-1, seven classes of reaction to fire are defined, namely Classes A1, A2, B, C, D, E, F. Class A1 is the highest performance, while Class F is the lowest performance. In view of this descending level of performance of the classes, products classified in any given class are deemed to satisfy all the requirements of any lower class.)

5.2.35 Where ADB specified the use of non-combustible materials, use of materials classified as Class A1 in accordance with the harmonized European Standard was now regarded as acceptable (as were products made from one or more of the materials considered as Class A1 without the need for testing, as set out in a list of products produced by the European Commission, subject to limitation of constituents comprising organic materials).

5.2.36 Where ADB specified materials of limited combustibility, it was acceptable to use any non-combustible material (or a Class A1 material), but, in addition, it was acceptable to use any material or product classified as Class A2-s3, d2 or better. The designations s3 and d2 simply mean that no requirements are imposed in relation to smoke production and falling droplets or particles (so I do not refer to them further in this report).

5.2.37 It should be stressed that it is not suggested that the fire performance of Class A1 or Class A2 materials is identical to the performance of non-

combustible materials and materials of limited combustibility respectively, as previously defined in ADB. While there may well be some correlation in performance, the "Euroclasses" were adopted in pursuance of the Single Market and acceptable standards of fire performance in situations defined in ADB, rather than equivalence of performance in real fires.

5.2.38 Accordingly, while, for the purpose of ADB, either a material meeting the original UK definition, or a material meeting the relevant Euroclass, is acceptable, it cannot be assumed that, for example, a Class A2 material will satisfy the original UK definition for a material of limited combustibility or vice versa. (For classification as Class A2, the product must be tested in accordance with either an international non-combustibility test or an international test in which the gross heat of combustion (calorific value) is determined; in addition, it must be tested in accordance with a European standard in which the product is exposed to heat from a gas burner and both the heat release rate and total heat release from the product are measured.)

5.2.39 Similarly, in the case of external surfaces of walls, where ADB previously specified a fire performance of *I* of not more than 20 by reference to British Standards, Class C-s3, d2 under BS EN 13501-1 was now also acceptable. In addition, where ADB previously specified Class 0 by reference to British Standards, Class B-s3, d2 under BS EN 13501-1 was now acceptable. However, these are simply acceptable alternatives, rather than exact equivalents in relation to fire performance.

5.2.40 A new version of ADB 2000, incorporating the 2000 and 2002 amendments, was produced by the Office of the Deputy Prime Minister, which, by then, had assumed responsibility for both building regulations and fire safety legislation. This amended version of ADB came into effect on 1 March 2003, the date at which the 2002 amendments came into effect.

Approved Document B 2006

5.2.41 The 2006 edition of ADB, produced by the Department for Communities and Local Government (DCLG), replaced the 2000 version with effect from 1 April 2007. The most visible change in the revision was that the 2006 edition was now split into two volumes; Volume 1 provided guidance on dwellinghouses, while Volume 2 provided guidance on buildings other than dwellinghouses. Blocks of flats came within the scope of Volume 2.

5.2.42 For the purpose of this report, the main changes were that:

i.) Guidance was produced on the fire safety information that should be handed over to assist the owner of a building to meet their duties under the Fire Safety Order, the latter of which came into force on 1 October 2006 (see Appendix G). As discussed in paragraph 5.1.45 of this report, the provision of this package of information was required by a new Regulation 16B, which had been inserted into the Building Regulations 2000 by virtue of an amendment in 2006. (Regulation 16B later became Regulation 38.)

ii.) The use of sprinkler systems in accordance with the then new British Standard for domestic sprinkler systems, BS 9251 [C23], which had been published in 2005, was now recognized (see paragraph 0.17).

iii.) For compliance with Requirement B3, it was now advocated that sprinkler systems should be provided in blocks of flats exceeding 30m in height (though, obviously, this recommendation was not retrospective) (see paragraph 8.14).

a) The scope of BS 9251 was actually limited to blocks of flats of not more than 20m in height, above which the relevant standards for commercial buildings were intended to apply (though, in my opinion, the figure of 20m is entirely arbitrary), but ADB advised that this limitation could be ignored. ADB recommended only that the individual flats should be sprinklered, and that there was no need to provide sprinkler protection in common areas, such as stairways, corridors or landings.

b) It should be noted that the purpose of the sprinkler system was to limit the spread of fire (beyond the flat of fire origin), rather than specifically to support the means of escape from fire. However, in practice, in a block of flats, for protection of the communal escape routes, it is necessary to ensure that smoke and fire do not spread beyond the flat of fire origin.

iv.) Guidance on the provisions for smoke control in the common parts of blocks of flats was changed within the 2006 edition of ADB (see paragraph 2.26). The previous philosophy in relation to this matter was reversed. Previously, the objective of smoke control in the common lobbies of a tower block was deemed to be dispersal of smoke within the lobbies, while, as something of a "bonus", the smoke control would also afford protection to the common stairway. The philosophy described in the 2006 edition of ADB was that the means of ventilating the common lobbies was to protect the common stairway, so supplementing the protection provided by the fire doors to the stairway. It was now noted, as something of an aside, that the ventilation also afforded some protection to the lobbies.

a) The means of smoke ventilation could either be by natural means or by mechanical ventilation. In the former case, on each storey, the lobby adjoining the stairway was to be provided with a vent. There was also to be a vent on the top storey of the stairway. In a single stairway building, the smoke vents on the fire floor and at the head of the stairway were to be actuated by smoke detectors in the lobby. The vents were to either be located on an external wall or discharge into a vertical smoke shaft.

b) Where a smoke shaft was adopted, on detection of smoke within a lobby, the vent into the smoke shaft on the fire floor, the vent at the top of the smoke shaft and the vent at the top of the stairway were all to open simultaneously; the vents within lobbies on all other storeys were to remain closed.

c) As an alternative to natural ventilation, it was acceptable to use mechanical ventilation of the stairway and/or the lobbies, but ADB advised that the objective was to protect the stairway from smoke. ADB gave no specific guidance as to the design of such mechanical ventilation systems.

d) The Inquiry may wish to be aware that "tailor-made" fire engineering solutions are sometimes adopted in relation to the design of smoke control in the common parts of modern blocks of flats. It is also, in my experience, the case that manual controls for use by the fire and rescue service are commonly incorporated within smoke control systems of single stairway blocks of flats, albeit that ADB is silent on the provision of manual controls in these circumstances.

e) Smoke control systems, designed on the principles of fire engineering, are not uncommonly proposed as justification for long corridors in single stairway blocks of flats. In these and other situations, such systems are generally limited in their effectiveness to a scenario in which there is a fire on a single floor of the building, but cannot deal with fires on multiple floors (which is a scenario that is not normally addressed in fire safety design). However, this does mean that prevention of successive fire spread from one floor to another is absolutely essential.

v.) A new principle was incorporated in relation to window frames. These were only to be regarded as performing the role of cavity barriers if they were constructed of steel or timber of an appropriate thickness; otherwise cavity barriers were to be installed around window frames (see Note to paragraph 9.13).

vi.) The section of ADB dealing with concealed spaces and cavity barriers was completely restructured. The contents of a table, which had previously set out specific locations at which cavity barriers should be provided, was deleted, and the information incorporated within the text of the document, along with diagrams, supposedly to avoid confusion (though whether this was achieved is a moot point). As a result of this change, there was no longer the previous specific reference to cavity barriers behind rainscreen cladding, though I do not suggest that the intent was necessarily different (see Section 9).

vii.) There was a major change in relation to advice on external wall construction (see Section 12); this change may be relevant in the deliberations of the Inquiry. Accordingly, I consider this change in paragraphs 5.2.43-5.2.46 of this report.

viii.) The height of high-rise buildings at which a wet rising main was to be provided instead of a dry rising main was reduced from 60m to 50m. This was consistent with the recommendations of the relevant British Standard dealing with fire mains, and followed research on the effect of reduced pressures on performance of fire-fighting branches in tall buildings.

ix.) A new philosophy was espoused in relation to management of premises. It was noted that ADB was written on the assumption that the building concerned would be properly managed. While the Building Regulations do not impose requirements on management of a building, ADB now advised that, in developing an appropriate fire safety design for a building, it may be necessary to consider the way in which it will be managed (see paragraph 0.13).

a) Specifically, a design that relies on an unrealistic or unsustainable management regime could not be considered to have met the requirements of the Regulations. ADB advised that, once the building is in use, the management regime should be maintained, and any variation in that regime should be the subject of a suitable risk assessment.

x.) Of a much more trivial nature, standby power supplies were now to be incorporated within mains-operated smoke alarms within flats (normally in the form of internal batteries within the smoke alarms) (see paragraph 1.5).

5.2.43 I now turn to the revised advice on external wall construction contained within ADB 2006. In the 2000 edition of ADB, there was a warning that cladding framework, or combustible thermal insulation used as an overcladding or in ventilated cavities, may present a fire risk in tall buildings; thermal insulation was to be of limited combustibility.

5.2.44 In ADB 2006, there was a reminder that 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. There was a warning that the use of combustible materials in the "*cladding system and extensive cavities may present such a risk in tall buildings*".

5.2.45 Two alternatives were given in relation to external wall construction. The first was that the external walls could meet a form of prescriptive guidance given in ADB. In this case, in buildings of over 18m in height, "*any insulation product, filler material (not including gaskets, sealants and similar) etc. used in the external wall construction*" was to be of limited combustibility. It should be noted that this is more stringent than the recommendations in ADB 2000. In addition, the term "filler" was introduced, perhaps to take account of newer forms of cladding (see paragraphs 12.5-12.7).

5.2.46 Alternatively, the entire wall build-up (comprising the insulation, cavity, cladding, etc) could be subject to the large-scale test of the relevant part of BS 8414, in which case the performance was to meet criteria set out in the BRE report, BR 135; this would enable combustible insulation to be used, but only if the wall construction incorporating the insulation satisfied the performance specified in BR 135 in a large-scale test.

5.2.47 Generally, other guidance given in the 2006 version of ADB was very similar to that given in the 2000 edition (as amended).

5.2.48 The 2006 edition of ADB was amended in 2007, 2010 and 2013. The 2007 amendments simply implemented typographical and proofing corrections, and were incorporated within a second impression of the 2006 edition. My understanding of these corrections is that they did not impact on the key recommendations that I have already described. The 2010 amendments simply changed references to the Building Regulations from the Building Regulations 2000 to the Building Regulations 2010, which, as discussed in paragraph 5.1.52, were not materially different to the Building Regulations 2000 in respect of requirements relating to fire safety.

5.2.49 The 2013 amendments made only minor amendments to recommendations regarding fire safety. None of these affected the recommendations previously discussed in this report, nor materially affected provisions for fire safety in blocks of flats.

Current version of ADB

5.2.50 The current version of ADB is published as the "2006 edition incorporating 2007, 2010 and 2013 amendments". For the purpose of the Inquiry, this current version may be regarded as not materially different from the 2006 version, as described previously in this section of my report.

5.2.51 Without pre-empting findings that might arise in relation to fire safety measures at Grenfell Tower at the time of the fire or the determinations of the Inquiry, it would appear to me that, at Grenfell Tower, taking into account the guidance of ADB, with regard to building work (as defined for the purpose of the Building Regulations) approved after 1 April 2007 (but, in respect of some measures, even earlier):

i.) It would, in my opinion, be reasonable to expect that any replacement flat entrance doors should, typically, have satisfied the requirements for classification as FD30S doorsets (necessitating incorporation of intumescent strips and smoke seals). Even though original doors would not satisfy this standard, it would, in my opinion, be perverse to replace the doors with doors of the original standard, and not to fit intumescent strips and smoke seals to the new doors, not least because it would be very difficult to source a third party certificated door that was designed to achieve less than 30 minutes' fire resistance when fitted with intumescent strips.

ii.) Ideally, any replacement stairway doors should have satisfied the requirements for classification as FD60S doorsets because the stairway was a fire-fighting stairway. However, on the basis of risk, I would not be unduly concerned if these doors were replaced with FD30S doorsets (whether on the basis that this was not of a lesser standard than the original doors or simply because the current standard for doors to fire-fighting stairways had not been considered);

iii.) Alterations to smoke control provisions within the common parts should have followed the recommendations of the 2006 edition of ADB, as described above;

iv.) It could not, in my opinion, be reasonably suggested that a sprinkler system should have been installed retrospectively, albeit that this would have been necessary for a new block of flats of the same height;

v.) There would be no need for any communal fire alarm system, nor would such a system be necessary for compliance with the current Building Regulations in a new block of flats. Smoke detectors would be necessary within the common lobbies to operate the smoke control provisions, but these need not (and, in my opinion, should not) have operated any communal fire alarm sounders;

vi.) Cavity barriers would be needed around replacement windows, unless the window frames could perform the same function, in that frames were made of steel of at least 0.5mm thickness, or were made of timber of at least 38mm thickness;

vii.) Cavity barriers would also be necessary in cavities behind rainscreen cladding in line with compartment walls and floors;

viii.) Gas pipework could be installed within the stairway, provided the installation met relevant regulations in relation to gas installations;

ix.) It would, in my opinion, be reasonable to expect that, in any refurbished flat, means of early warning of fire within the flat should have comprised at least one mains-operated smoke alarm (incorporating a standby battery) within the hallway, as would be necessary for any new flat;

x.) External wall construction, and any overcladding (including any insulation and rainscreen) should have satisfied the recommendations of ADB in relation to compliance with Requirement B4(1) of Part B Schedule 1 of the Building Regulations 2006 (or the Building Regulations 2010, which contained the same requirement). In view of the likelihood of some focus on this matter in the course of the Inquiry, I discuss these recommendations later in this section of my report.

5.2.52 It should be noted that the above measures are based on compliance with the Building Regulations by adopting the recommendations in ADB. However, as stressed previously in this report, there is no obligation to adopt the recommendations of ADB if the designer or building owner prefers to meet the functional requirement(s) of the Regulations in some other way. As previously noted, this is not uncommon in the case of smoke control in the common parts of blocks of flats.

5.2.53 I now return to the matter of external wall construction and the relevant recommendations of Approved Document B. These can be found in section 12 of the current version of ADB. Introductory text in paragraph 12.2 of ADB sets out the intent of the recommendations, which includes an explanation that that there are provisions within section 12 to restrict the combustibility of, *inter alia*, the external walls of high buildings. ADB advises that this is "*…in order to reduce the surface's susceptibility to ignition from an external source and to reduce the danger from fire spread up the external face of the building*.".

5.2.54 The relevant, more specific advice is set out in paragraphs 12.5-12.9, which are concerned with external wall construction, external surfaces, insulation materials/products and cavity barriers. Such is the relevance of this advice, in my opinion, to the circumstances of the fire at Grenfell Tower, that I set out the advice in full in the paragraphs below:

"*External wall construction*

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.

The total amount of combustible material may also be limited in practice by the provisions for space separation in Section 13 (see paragraph 13.7 onwards).

External surfaces

12.6 The external surfaces of walls should meet the provisions in Diagram 40. Where a mixed use building includes Assembly and Recreation Purpose Group(s) accommodation, the external surfaces of walls should meet the provisions in Diagram 40c.

Insulation Materials/ Products

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.

Cavity barriers

12.8 Cavity barriers should be provided in accordance with Section 9.

12.9 In the case of a an (sic) *external wall construction, of a building which, by virtue of paragraph 9.10d (external cladding system with a masonry or concrete inner leaf), is not subject to provisions of Table 13 maximum dimensions of cavities in non-domestic buildings, the surfaces which face into cavities should also meet the provisions of Diagram 40."*

5.2.55 In my opinion, the first sentence of 12.5 simply explains, in lay language, the functional requirement contained within the first part of Requirement B4(1); this might be regarded as something of a reminder as to what must be achieved for compliance with the functional requirement. Regardless of how the advice in ADB is interpreted (which may prove a matter of contention following the Grenfell Tower fire), the obligation of the designer is to comply with the functional requirement, rather than guidance on one means of compliance.

5.2.56 In my opinion, the second sentence is something of a "health warning" to designers and specifiers; they are warned of the fire risk of combustible materials in the cladding system in the case of a tall building. This is something of a preamble to the specific recommendations given in the subsequent two paragraphs.

5.2.57 It follows from the above that, in the course of overcladding Grenfell Tower during the most recent refurbishment project, it would seem uncontentious that, for compliance with the recommendations of ADB, there were only two choices in relation to the overcladding, namely either:

i.) Adopt a prescriptive approach whereby "*Insulation, filler material, etc*" (with the exception of components specified in ADB) should have comprised material of limited combustibility, as defined in ADB, such as materials classified as Class A2 under BS EN 13501-1; or

ii.) Adopt a performance-based approach whereby it should have been demonstrated that the original external wall, in combination with the overcladding, would satisfy the performance criteria of BR 135 if tested in accordance with BS 8414-1.

5.2.58 The Inquiry may be aware that it has been stated publicly by some parties that the meaning of the word "*filler*" is ambiguous; it has been said publicly that the term had not, previously, been interpreted as applicable to the core of the aluminium composite material (ACM) used for the rainscreen cladding at Grenfell Tower, while others (including the DCLG) have, equally publicly, stated the reverse.

5.2.59 In my opinion, the publications by the BCA and NHBC, to which I refer later in this section, support the view that the prescriptive approach applies not only to thermal insulation, but other key components, including cladding material. In my view, it is logical that this is the case, so that the fire performance of the entire wall system is controlled, rather than a single component in isolation.

5.2.60 In any case, I am not aware of any alleged ambiguity as to the meaning of "*insulation*". Accordingly, if the thermal insulation was not a material of limited combustibility (which is for others to determine), the only route to compliance with ADB would be that involving demonstration of performance of the wall construction in the BS 8414-1 test.

5.2.61 As stressed in this report, designers are not obliged to follow the recommendations of ADB. An alternative fire engineering solution may be adopted for compliance with functional Requirement B4(1), namely that the construction of external walls of the building shall adequately resist the spread of fire over the walls. However, I have difficulty in envisaging a viable and reasonably practicable fire engineering solution by which compliance with this functional requirement could be demonstrated.

5.2.62 To carry out a BS 8414 test necessitates construction (normally by a contractor) of a large section of the wall proposed for the building within the test facility. The test rig, incorporating the wall sample, is 8m in height and at least 2.6m wide. A further section of wall, perpendicular to the main section of wall, is of the same height as the main section of wall and is at least 1.5m wide. A combustion chamber is positioned at the base of the main wall, such that the fire can project from the combustion chamber through an opening at the base of the main vertical test wall (see Figure 1, which is reproduced from BS 8414-1).

5.2.63 In the BS 8414 test rig, the combustion chamber, containing a large timber crib that is ignited at the start of the test, may be regarded as simulating a window opening in a compartment in which a fire has reached flashover (a

stage in a fire in which all room contents are alight), at which stage, any non-fire-resisting glazing will fracture, enabling flames to project from the window and up the façade of a building. This is an aggressive fire test; the peak heat output during the test is 3 Megawatts. To assist the Inquiry to further visualise the test, a short video of a test can be found on YouTube [C24].

5.2.64 Thermocouples are located on the face of the cladding, within the cavity behind the cladding and in the thermal insulation between the cladding and the masonry or steel frame wall. One row of thermocouples (devices that measure temperature) is located at 2.5m above the top of the combustion chamber ("Level 1 thermocouples"), while a second row is located at 5m above the level of the combustion chamber ("Level 2 thermocouples").

5.2.65 The duration of the test is 60 minutes, but the crib fire is extinguished after 30 minutes. The BR 135 performance ("pass") criterion is that the Level 2 thermocouples have not reached a temperature of 600°C within 15 minutes of the Level 1 thermocouples reaching 200°C above ambient temperature. However, the test is terminated by extinguishment of the fire if flame extends above the test apparatus at any time or there is a risk to personnel or equipment; in this case, the wall construction cannot be classified under BR 135 (i.e.in effect, the construction has "failed" the test).

5.2.66 To further assist the Inquiry, the sequence of photographs 1-5 shows a privately sponsored BS 8414-2 test of construction that replicates the external wall and cladding of an existing building. The external cladding system comprised combustible insulation, a ventilated cavity (with appropriately located cavity barriers) and outer cladding comprising ACM with a polyethylene core. The test was terminated when flames extended above the top of the test rig in under nine minutes (representing a failure). (These photographs are reproduced with the permission of the test sponsor, who wishes to remain anonymous.)

Figure 1: BS 8414 Test Rig (Reproduced from BS 8414-1)

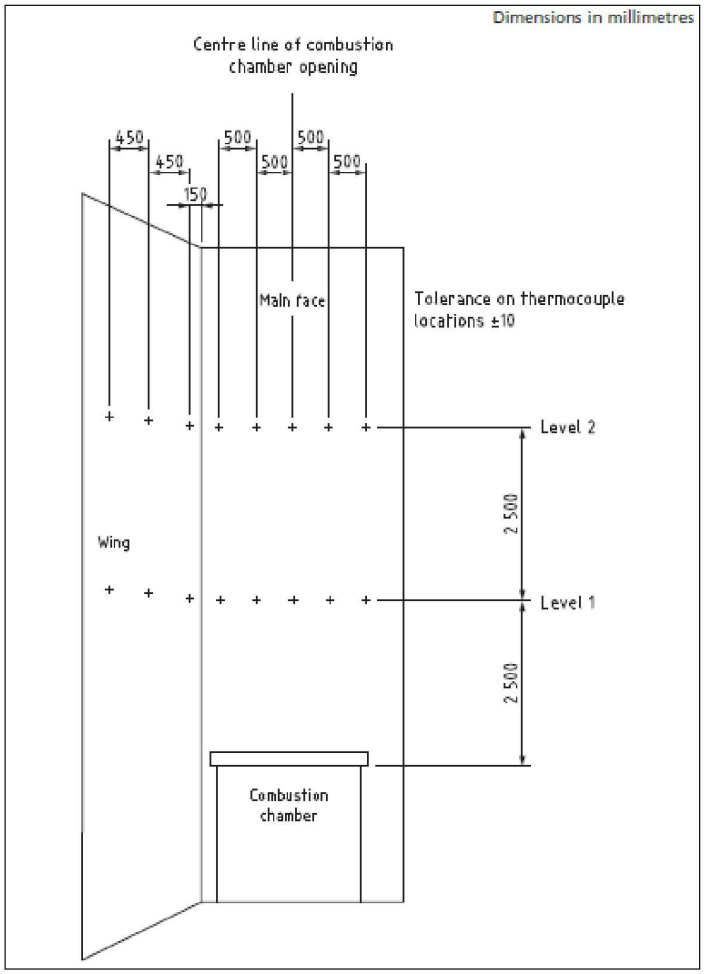
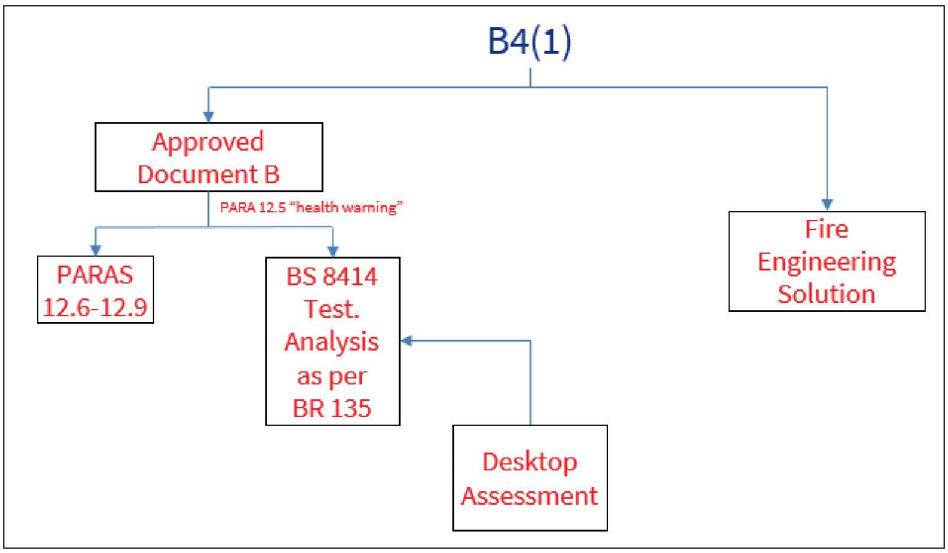
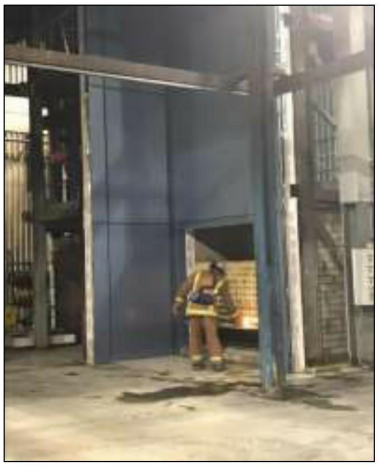


Figure 2: Requirement B4(1). Methods of Compliance

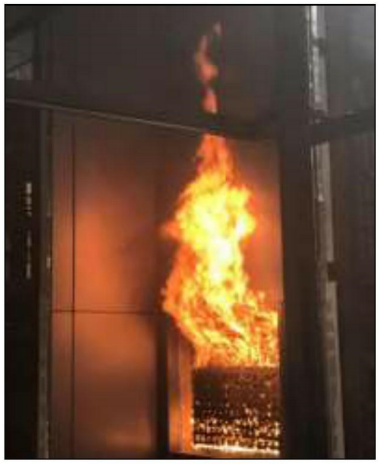


BS 8414-2 Test
(Privately produced photographs reproduced with the permission of BRE and test sponsor)

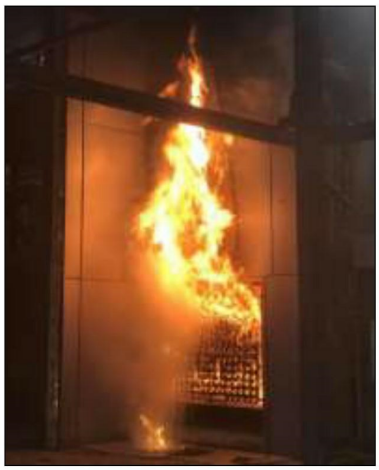


Start of test

2 minutes into test



4 minutes into test



8 minutes into test

End of test in under 9 minutes: flames extend above the level of the rig

5.2.67 The Inquiry will, no doubt, appreciate that, to carry out a BS 8414 test is an expensive and time-consuming exercise, which, at the time of writing, can only be carried out at one test laboratory in the UK. Accordingly, I am aware that test laboratories and consultants have carried out what are known as "*desktop studies*", which provide an opinion as to whether a particular wall build up, comprising a detailed specification of the external wall construction, would, if tested in accordance with the relevant part of BS 8414, satisfy the performance criteria specified in BR 135. I am aware that approval of external wall construction as meeting the functional Requirement B4(1) has been granted by building control bodies on the basis of these desktop assessments.

5.2.68 In principle, desktop assessments are a perfectly legitimate means for demonstrating compliance with the Building Regulations. They tend to be used for various building elements and systems (e.g. fire-resisting doors) in circumstances where the proposed element or system is sufficiently similar to another element or system for which there is test data. Recognized practice in relation to undertaking assessments in lieu of fire tests is that the assessment should be based on relevant test data or data published in codes and standards.

5.2.69 As far as I am aware, prior to the Grenfell Tower fire, no BS 8414 tests of wall construction comprising combustible insulation, in combination with ACM rainscreen cladding, had been carried out in the UK. However, I am aware that desktop assessments had been carried out for external cladding comprising combustible insulation and ACM with a fire-retardant core, based on BS 8414 (and other) test data for wall construction that incorporates combustible insulation in combination with products other than ACM.

5.2.70 I make no comment or criticism of the validity of these desktop assessments, which is a matter for others to consider. Equally, I am not, personally, aware of a desktop assessment of wall construction comprising combustible insulation and ACM incorporating a polyethylene core, which has been stated publicly to have been used as rainscreen cladding at Grenfell Tower. I merely include this information for completeness and possible assistance to the Inquiry in its understanding of relevant legislation and routes to compliance.

5.2.71 I am cognisant of the complexity of the different methods of compliance with Requirement B4(1) for the lay reader. Accordingly, in Figure 2, I show the methods of compliance discussed in the paragraphs above in diagrammatic form.

5.2.72 Given that it has been suggested publicly that, in respect of external wall construction and cladding, building regulations in Scotland are more stringent than those in England, for reference, I now briefly discuss the guidance in Scotland that corresponds to the guidance given by ADB in England described above; my advice in that respect is based on the guidance contained in the "Technical Handbooks", produced by the Building Standards Division of Scottish Government.

5.2.73 Given that the history of the Scottish guidance would appear to be of little relevance, I discuss only the guidance in the current Technical Handbooks. There are two Technical Handbooks; one deals with domestic buildings, including blocks of flats, while the other deals with non-domestic buildings.

5.2.74 I would suggest that, in respect of external walls, both the "Mandatory Standards" (which are equivalent in nature to the functional requirements in England) and the associated Government guidance in Scotland may be clearer than the functional requirements and Government guidance in England; this is because separate Mandatory Standards (and, hence, separate guidance) apply to spread of fire to neighbouring buildings and spread of fire on external walls.

5.2.75 For the purpose of this sub-section of my report, the relevant Mandatory Standard is Mandatory Standard 2.7, which requires that every building must be designed and constructed in such a way that, in the event of an outbreak of fire within the building, or from an external source, the spread of fire on the external walls of the building is inhibited.

5.2.76 In the Domestic Technical Handbook specific guidance is given on external wall cladding used on the external walls of high-rise blocks of flats. This Technical Handbook recommends that such external wall cladding should be constructed of non-combustible products. Ostensibly, this recommendation is more stringent than the equivalent guidance in ADB, which recommends that any insulation product, filler material, etc used in external wall construction of high-rise buildings should be of "*limited combustibility*".

5.2.77 However, in fact, in any situation in which the Technical Handbooks recommend the use of non-combustible materials, while the performance required in British Standards would be marginally higher than specified for limited combustibility materials in ADB, materials that achieve Class A2 in the relevant European Standards are deemed by the Technical Handbooks to be acceptable. The Inquiry will note that this is exactly the same performance specified in ADB for materials of limited combustibility.

5.2.78 As in the case of ADB, the Scottish Domestic Technical Handbook accepts the use of combustible external cladding systems on high-rise blocks of flats, provided that, if the external wall construction is tested in accordance with the relevant part of BS 8414, the performance criterion specified in BR 135 is achieved. As in England, the Government guidance on compliance with building regulations also acknowledges that alternative solutions may be adopted (e.g. a fire engineering solution).

5.2.79 It follows, therefore, that while, arguably, there might be greater clarity in the Scottish guidance, in terms of fire performance of external wall construction, such as to limit the potential for spread of fire from one floor to another over the surface of the wall, there is little or no material difference between Scotland and England in the means by which this should be achieved in high rise blocks of flats.

5.2.80 Moreover, as an aside, I would note that, for non-domestic high-rise buildings (including hotels, student accommodation, offices, etc), the fire performance of external cladding recommended in the Non-Domestic Technical Handbook is of a lower standard than recommended in ADB, in that it may be either Class 0 or Euroclass B.

Other Guidance

Building Control Alliance (BCA)

5.2.81 In view, again, of the likely relevance of cladding to the fire at Grenfell Tower, the Inquiry may be assisted by reference to two guidance documents produced by bodies other than Government.

5.2.82 The first of these was published by the Building Control Alliance (BCA) in June 2014 and revised in June 2015. The BCA styles itself as a unique industry group made up of representatives from clients, stakeholders and all the organizations directly involved in building control in England and Wales. Its members comprise the Chartered Institute of Building, the Chartered Association of Building Engineers, the Royal Institution of Chartered Surveyors, Local Authority Building Control and the Association of Consultant Approved Inspectors.

5.2.83 BCA Technical Guidance Note 18 [C25] gives advice on use of combustible cladding materials on buildings exceeding 18m in height. The Guidance notes that thermosetting insulating materials, such as polyisocyanurate foam boards, do not usually meet the definition of limited combustibility set out in ADB but may prove acceptable if tested, as part of a cladding system, in accordance with BS 8414 and classified in accordance with BR 135.

5.2.84 The BCA Technical Guidance Note recognizes four options for demonstrating compliance of external wall construction with the Building Regulations for buildings of over 18m in height. These are the four options described earlier in this section of my report, and are designated options 1-4 by BCA, as follows:

Option 1: The use of materials of limited combustibility for all elements of the cladding system both above and below 18m. The BCA advise that this includes the insulation, internal lining board and the external facing material.

Option 2: The BS 8414 test and classification in accordance with BR 135.

Option 3: A desktop study report by a suitably qualified fire specialist stating whether, in their opinion, BR 135 criteria would be met with the proposed system. The BCA advise that the report should be supported by test data from a suitable independent UKAS accredited testing body. The BCA observe that this option may not be of benefit if the products have not already been tested in multiple situations/arrangements.

Option 4: A holistic fire engineered approach. (This option was not included in the first (2014) edition of Technical Guidance Note 18.)

5.2.85 On 19 July 2017, the BCA placed guidance on their website regarding a perceived lessening of standards associated with Technical Guidance Note 18. The BCA advise that Technical Guidance Note 18 does not suggest any avoidance of Requirement B4(1) of the Building Regulations. It also emphasises that, in options 3 and 4, the Technical Guidance Note 18 clearly advises that any conclusions resulting from studies are supported by hard test data and not purely opinion. The BCA does not support or encourage any avoidance of the minimum standards laid down in the Regulations.

NHBC Technical Guidance Note

5.2.86 In July 2016, the NHBC produced a Technical Guidance Note [C26] that addressed the acceptability of common wall constructions containing combustible materials in high-rise buildings. The NHBC guidance refers to the BCA Technical Guidance Note 18 and the four options defined therein. The background to the NHBC guidance is set out in the guidance document itself, and I reproduce below two relevant paragraphs within the guidance as follows:

> "*This guidance document has been produced to provide advice to builders on some of the most common wall and façade types encountered on tall buildings where NHBC would no longer require a desktop assessment in accordance with BCA GN 18 Option 3 to demonstrate compliance.*
>
> *This NHBC guidance document takes into account the significant quantity of data obtained to date from a range of BS 8414 tests and subsequent desktop assessments of different combinations of combustible insulation and claddings and recommends a minimum specification which, if met or exceeded would be sufficient to meet NHBC Standards and Building Regulation requirements."*

5.2.87 An appendix gives specific guidance on use of ACM panels. That appendix advises that it is considered that the 15 minute performance criterion specified by BR 135 for fire spread in the BS 8414 test will be met, subject to appropriate measures.

5.2.88 The guidance states that these appropriate measures include:

- *The use of minimum Class B (in accordance with BS EN 13501:1) aluminium composite panels which provide a Class 0 surface spread of flame.*
- *The use of a cement particle board behind the insulation (minimum Class B) and a thickness no less than 12mm.*
- *The use of reputable and robust cavity barriers – both mineral wool filled and intumescent products to compartment lines and around all openings."*

5.2.89 The guidance continues as follows:

> *"**Restrictions on use***
> *The use of polythene (sic) or polythene / mineral cored (sic) aluminium composite panels which do not achieve a minimum Class B combustibility classification fall outside of the scope of this guidance note. Such products are unsuitable for use in high rise situations.*
>
> *It is also imperative that substitution with a less fire resistant product doesn't take place on site.*

Guidance
Where a building has a floor level exceeding 18m from outside ground level, a Class B aluminium composite panel finish is specified and the builder can demonstrate that the following precautions are incorporated into the specification, design and installation of the façade, NHBC will accept the build-up as meeting Requirement B4(1).

From inside to out:
- *Double layer of 12.5mm plasterboard*
- *Minimum 100mm lightweight steel frame internal leaf (which may incorporate combustible or non-combustible insulation)*
- *No less than 12mm thick cement particle board of minimum combustibility Class B (when assessed to BS EN 13501:1)*
- *Insulation (maximum 140mm thick) comprising one of:*
  - *Kingspan K15*
  - *Celotex RS5000*
  - *Xtratherm SR/RS*
- *Drained and vented cavity*
- *Aluminium support rails*
- *Minimum Class B (when assessed to BS EN 13501:1) aluminium composite material boards with a Class 0 surface spread of flame classification.*

The use of reputable and robust cavity barriers to compartment lines and around all openings is imperative. These should be formed from one of the following materials:
- *Steel at least 0.5mm thick*
- *Timber at least 38mm thick*
- *Polythene-sleeved mineral wool, or mineral wool slab, under compression*
- *Calcium silicate, cement-based or gypsum based boards at least 12mm thick*
- *Proprietary products which have shown to achieve the requirements for closing cavity without needing to be covered by a plasterboard lining."*

5.2.90 In my opinion, the syntax of the first paragraph under the heading "Restrictions on use" creates ambiguity. It is not clear to me as to whether the intent of the wording is to assert that polyethylene core ACM does not achieve a Class B classification, or whether the wording is intended to accept polyethylene core ACM, provided it does achieve a Class B classification if such a product exists. The latter interpretation would be consistent with other paragraphs which indicate that a Class B ACM is acceptable, subject to other caveats.

5.2.91 In connection with the latter interpretation, I am aware that the British Board of Agrément (BBA) has confirmed that standard Reynobond (which has been said publicly to be the rainscreen product installed at Grenfell Tower, and has a polyethylene core) is certificated as Class B–s2, d0 in accordance with BS EN 13501-1 [C27]. (See also Annex D to this report for information on the BBA.)

British Standards for Design of Blocks of Flats

5.2.92 Guidance on design of blocks of flats has, for some decades, been given in a series of British Standards. For example, earlier in this section of my report, I made extensive reference to British Standard CP3: Chapter IV : Part 1. That code of practice was superseded by BS 5588-1 in 1990 [C10]. ADB 1992 and

ADB 2000 acknowledged the existence BS 5588-1, but recommended its use only for certain designs of flats that did not apply to Grenfell Tower. ADB 2000 referred to BS 5588-1 for guidance on lifts and installation of electricity meters, but these references were removed from the 2006 (and subsequent) versions of ADB.

5.2.93 BS 5588-1 was superseded by BS 9991 in 2011 [C40], which, in turn, was superseded by a new version of BS 9991 in 2015 [C41]. In that some recommendations in BS 9991 differ from those in ADB, it could be said that BS 9991 constitutes an alternative design solution to that given in ADB. However, many of the recommendations are common to both documents. Accordingly, I do not further complicate this current report by reviewing the detailed recommendations of these British Standards; I merely draw the attention of the Inquiry to their existence.

5.2.94 However, the Inquiry may consider that guidance in BS 9991 on external wall construction and cladding is relevant. Both the 2011 and 2015 versions of BS 9991 recommended that flame spread over or within an external wall construction should be controlled to avoid creating a route for rapid fire spread bypassing compartment floors or walls. Both versions of the Standard noted that this is particularly important where a "stay put" strategy is in place.

5.2.95 The 2011 version of BS 9991 recommended that combustible materials should not be used in cladding systems, though, somewhat in contradiction of this recommendation, the 2011 Standard made a further similar recommendation to ADB, namely that, in a building with a storey 18m or more above ground level, any insulation product, filler material (with the same exceptions as contained in ADB), etc used in the external wall construction should be of limited combustibility; alternatively, the external walls could meet the performance criteria in BR 135 using full scale test data from BS 8414.

5.2.96 The above guidance was changed slightly in the 2015 version of BS 9991. That version (which remains current) no longer recommends that combustible material should not be used for cladding. However, (unless the external wall construction meets the performance criteria of BR 135), the recommended means of controlling external fire spread over the external faces of buildings with a storey 18m or more above ground level is that any **cladding material** (my emboldening), insulation product, filler material (not including gaskets, sealants and similar), etc, used in the external wall construction should be of limited combustibility.

5.3 Approval/Enforcing Authorities

5.3.1 Prior to the demise of the GLC on 1 April 1986, approval of any building work at Grenfell Tower under the London Building Acts 1930-1939, and by-laws made thereunder, (including the original construction of the building) would have been the responsibility of the GLC; they were the only body from whom approval of plans could be obtained.

5.3.2 From 1 April 1986, the building control function in London transferred from the GLC to the London Boroughs, and building work would have been controlled under the Building Regulations 1985 (other than in relation to alterations to means of escape, which would not have been controlled under the Building Regulations until 1992).

5.3.3 However, from 1986, approval of building work in Inner London could, alternatively, be obtained from a private Approved Inspector (AI). (The term "building control body" is adopted as generic term that encompasses local authority building control and private sector AIs.) This alternative did not apply to approval under section 20 of the London Building Acts (Amendment) Act 1939, which could only be granted by the Borough; as discussed earlier in this report, section 20 was repealed on 9 January 2013.

5.3.4 I make the assumption that, after 1 April 1986, any application for approval of building work at Grenfell Tower would have been submitted to the building control department of Kensington and Chelsea London Borough Council, quite simply because there would be no reason for a local authority with a building control department to use the services of a private sector AI.

5.3.5 Accordingly, further detailed comment on the building control regime in England and Wales, whereby there exist the alternatives of approval by local authority building control or a private sector AI (which do not exist in Scotland or Northern Ireland) may not be relevant to the Inquiry.

5.3.6 However, I am aware that, following the Grenfell Tower fire, various parties have publicly suggested that competition amongst AIs, and between AIs and local authority building control, have resulted in a lowering of standards in fire safety. I am also aware that opinions on this matter vary within the fire safety profession. Accordingly, it may be relevant, for the purpose of this report, to express an opinion on this matter based on the experience of my consulting practice.

5.3.7 In this connection, in my experience, the competition between local authority building control and AIs has had the positive effect of making local authority building control more "customer focussed". However, I have no personal experience of a diminution of the standards of fire safety acceptable to local authority building control as a result of this competition.

5.3.8 I do have experience of building control bodies (whether local authorities or AIs) accepting fire engineering solutions that, in my opinion, were not of an equivalent standard of fire safety to that of afforded by ADB, simply because

the building control body felt unable to challenge the fire engineering solution proposed by a qualified fire engineer. However, that is a different matter.

5.3.9 I also have experience of acceptance by AIs of designs that did not, in my opinion, satisfy the functional requirements of the Building Regulations. In this connection, my experience is that some AIs have a tendency to "bend" excessively to the will of their client, perhaps as a result of commercial pressures. Concern has also been expressed (e.g. by the Fire Industry Association, of which I am a Board member) that there might be an unduly close relationship between the consultancy arm of certain organizations and the AI arm of the same organisation. Further comment on these matters is outside the scope of this report.

5.3.10 When alterations were carried out over the life of Grenfell Tower, work requiring approval under building regulations would have been subject to consultation between the building control body and the fire authority. For example, such consultation would have occurred in view of the status of the building as a "section 20" building under the London Building Acts (Amendments) Act 1939.

5.3.11 From 1 October 2006, a requirement was imposed under the Regulatory Reform (Fire Safety) Order 2005 (see Section 9 of this report) for consultation with London Fire Brigade before passing plans for extension or structural alteration to buildings, or parts of buildings, in London, to which the Order applies. Arguably, such consultation was previously necessary under the Fire Precautions (Workplace) Regulations 1997 (as amended) (see Section 8 of this report). (Accordingly, work would have necessitated a "full plans" submission for approval, rather than the simpler "building notice").

5.3.12 It might be something of a moot point as to whether the duty to consult would have applied to work solely involving cladding at Grenfell Tower; not only would this depend on whether the work could be regarded as a "*structural alteration*", but on whether the external wall of the building was a part of premises to which the Workplace Fire Precautions Legislation and/or the Fire Safety Order applied.

5.3.13 It is for London Fire Brigade to advise the Inquiry as to their focus in relation to such consultation. However, I would expect there to have been close focus on compliance of plans with Requirement B1 (means of escape and fire warning) and Requirement B5 (access and facilities for the fire service) of the Building Regulations, with, possibly, some attention to Requirement B3 (internal fire spread- structure).

5.3.14 By definition, alterations in relation to internal linings, which are addressed by Requirement B2 are not material alterations. I would not expect London Fire Brigade to have given any (or any detailed) consideration to Requirement B4 (external fire spread) which, in my experience, fire and rescue authorities would regard as purely a matter for the building control body.

5.3.15 It should be noted that, while London Fire Brigade might comment to the building control body, the building control body is not obliged to adopt any recommendations of a fire and rescue service, but only to give them consideration. My understanding is also that there is no statutory obligation of the building control body to further consult the fire and rescue service before agreeing to modifications to plans after the plans are first passed.

5.3.16 Guidance on building control procedures in respect to fire safety, including the consultation process, has been given, and revised from time to time, by the Government Department responsible for the Building Regulations at the time in question [C39].

5.3.17 On completion of building work that is subject to approval by local authority building control, the building control body issues a *completion certificate*. Under both Schedule 1 Paragraph 4(b) of the Building Act 1984 and Regulation 17.4 of the Building Regulations 2010 (and earlier Building Regulations), a completion certificate "*shall be evidence (but not conclusive evidence) that the requirements specified in the certificate have been complied with*". Relevant requirements specified in the certificate include the applicable requirements of Part B of Schedule 1 to the Regulations.

5.3.18 This reflects the legal situation, whereby responsibility to ensure compliance with the Buildings Regulations rests with the owner of the building and not the building control body, the latter of whom can only make reasonable enquiries (e.g. by means of sampling) to verify that the completed building complies with the Regulations.

PART 2: FIRE SAFETY AND HOUSING LEGISLATION

6. THE FIRE PRECAUTIONS ACT 1971

6.1 The Legislation

6.1.1 The Fire Precautions Act was enacted with the intent of consolidating disparate fire safety legislation into a single Act. At the time of enactment, it was envisaged that different classes of premises would be brought within the scope of the Act in stages.

6.1.2 The mechanism enshrined in the Act, whereby premises were brought within the scope of the Act, was a designation order, under which the Secretary of State was empowered to designate particular uses of premises. These uses (with exceptions that could be included within the designation order) would then require a fire certificate (a lengthy document that included plans setting out the required fire precautions) issued under the Act by the fire authority.

6.1.3 The occupier of the building (or owner in the case of premises in multiple occupation) was required to apply to the fire authority for a fire certificate. A certificate could only be issued if the fire authority was satisfied in relation to the adequacy of means of escape from fire, measures to assist in use of the escape routes, the fire warning system and the fire extinguishing appliances.

6.1.4 No duties in relation to fire safety were originally imposed on the occupier or owner of the building until these were imposed by the fire authority in the form of a notice, setting out the measures required for the purpose of certification. This changed when the Act was amended by the Fire Safety and Safety of Places of Sport Act 1987 ("the 1987 Act"), after which certain interim duties, of a quite minimal nature, were imposed pending inspection of the premises and issue of any notice by the fire authority.

6.1.5 The premises that the Secretary of State was empowered to designate included premises used as sleeping accommodation; this included blocks of flats. However, only two designation orders were ever produced. The first designation order brought hotels and boarding houses (other than certain small premises) within the scope of certification. The second designation order applied to offices, shops, railway premises and factories (other than certain small premises). Accordingly, a plethora of different uses of premises remained outside the scope of certification, including blocks of flats, care homes, hospitals, schools, etc.

6.1.6 The Inquiry will be aware that, since the Grenfell Tower fire, various parties have publicly called for certification to be re-introduced, with an implication that, at some time, inspection and certification of blocks of flats was carried out by fire authorities. However, on a point of accuracy as will be clear from the above paragraphs, there never was any system of certification of blocks of flats.

6.1.7 Only one section of the Fire Precautions Act had any material bearing on fire safety in blocks of flats. This was section 10, which gave powers for a

prohibition notice prohibiting or restricting the use of any premises that could be designated under the Act (whether or not they actually had been designated), so including blocks of flats, if the fire authority was satisfied that the risk to persons in case of fire was so serious that, until steps had been taken to reduce the risk to a reasonable level, the use of the premises ought to be reduced or restricted. Originally, the issue of a prohibition notice required a complaint to the Court, but, after amendment of the Fire Precautions Act by the 1987 Act, the notice could be issued directly by the fire authority.

6.1.8 Prohibition notices were rarely, if ever, issued in respect of blocks of flats; indeed, I am not, personally, aware of any occasion when this occurred, though I can recall an occasion when this was seriously considered by London Fire Brigade as a result of serious building defects in a relatively new, occupied block of flats.

6.1.9 A review of the Fire Precautions Act was carried out by the Home Office in 1993 [C28]. The review concluded that the Fire Precautions Act had been successful in driving down deaths from fire in hotels, but that it did not provide the most suitable legislative means of ensuring fire safety in the future. It could be said that the Act implied to owners and occupiers of buildings that they could abdicate responsibility for fire safety in their buildings, which was the responsibility of the fire authority to resolve in their certification activities. This was inconsistent with the approach under health and safety legislation, whereby those creating a risk (e.g. in this case by operating a building) should be responsible for assessing and managing the risk.

6.1.10 The above review was closely followed, in 1994, by an interdepartmental scrutiny on fire safety legislation and enforcement in England and Wales, ordered by the Government in pursuance of deregulation initiatives [C29]. The "Interdepartmental Scrutiny", as it became known, concluded that fire safety legislation (which was incorporated within around 150 acts and regulations) and its enforcement was uncoordinated, conflicting and confusing, such as to impose an unnecessary burden on business. The Interdepartmental Scrutiny recommended rationalisation and simplification of the legislation.

6.1.11 This was only possible after the Regulatory Reform Act 2001 came in to force. This enabled the production of the Regulatory Reform (Fire Safety) Order 2005, which came in to force on 1 October 2006, at which time the Fire Precautions Act 1971 was repealed (see Section 9 of this report).

6.2 Guidance

6.2.1 As (with the exception of section 10), the Fire Precautions Act did not apply to blocks of flats, no guidance produced in support of the Act applied to block of flats.

6.3 Enforcing Authority

6.3.1 As discussed above, the enforcing authority under the Fire Precautions Act was the fire authority.

7. SECTION 72 OF THE BUILDING ACT 1984

7.1 I make reference to Section 72 of the Building Act 1984 purely for completeness, as it did not apply to Grenfell Tower.

7.2 Outside Inner London, between the Building Act coming into force and amendment of the Act in 2004, local authorities could impose requirements on the owner of a block of flats if there was inadequate means of escape from any storey located at more than 20 feet above ground level.

7.3 Section 72 did not apply to Inner London. In Inner London, adequate means of escape for new buildings was, until Inner London came within the scope of the Building Regulations 1985, required by section 34 of the London Building Acts (Amendment Act) 1939. Section 133 of the 1939 Act required that means of escape be maintained and kept in good order.

7.4 As discussed in Section 4 of this report, section 133 of the 1939 Act was repealed when the Fire Safety Order came into force in 2006, after which time maintenance of means of escape was required under the Fire Safety Order.

8. THE WORKPLACE FIRE PRECAUTIONS LEGISLATION

8.1 The Legislation

8.1.1 The Workplace Fire Precautions Legislation ("the WFPL") was the formal term for a combination of the Fire Precautions (Workplace) Regulations 1997 and certain specified clauses of the Management of Health and Safety at Work Regulations 1992, the latter of which was amended by the former.

8.1.2 This legislation was brought into force on 1 December 1997 and was produced primarily under powers granted by the European Communities Act 1972, but also by the Fire Precautions Act 1971. The legislation was to be treated as if its requirements were regulations made under section 12 of the Fire Precautions Act.

8.1.3 The purpose of the WFPL was to give effect in Great Britain to the fire safety requirements of two European Directives; these were the Framework Directive, which required measures to encourage improvements in the safety and health of workers at work, and the Workplace Directive, which set minimum requirements for health and safety in workplaces.

8.1.4 It subsequently transpired that the WFPL failed adequately to satisfy the requirements of these Directives. Firstly, the WFPL excluded from its scope an estimated $^{2}/_{3}$ million workplaces that were certificated under the Fire Precautions Act. Secondly, the duties imposed by employers were restricted to matters within the employer's control, whereas the Directives required that these duties were imposed absolutely.

8.1.5 As a result, the European Commission gave notice to the Government, under Article 169 of the Treaty of Rome, that Great Britain had failed to fulfil their obligations under the Treaty. This led to amendment of the WFPL by the Fire Precautions (Workplace) (Amendment) Regulations 1999. In addition, the amendments to the Management of Health and Safety at Work Regulations 1992 were incorporated within the new Management of Health and Safety at Work Regulations 1999.

8.1.6 The potential relevance of the WFPL to Grenfell Tower relates to the meaning of "w*orkplace*". Regulation 2 of the Fire Precautions (Workplace) Regulations 1997 defined the term *workplace* as:

> *"any premises or part of premises, not being domestic premises, used for the purposes of an employer's undertaking and which are made available to an employee of the employer as a place of work and includes –*
> *(a) any place within the premises to which such employee has access while at work; and*
> *(b) any room, lobby, corridor, staircase, road or other place –*
> *(i) used as a means of access to or egress from that place of work; or*
> *(ii) where facilities are provided for use in connection with that place of work;*
> *other than a public road;"*

8.1.7 "*Domestic premises*" had the meaning given to it by section 53(1) of the Health and Safety at Work, etc Act 1974, namely:

> *"premises occupied as a private dwelling (including any garden, yard, garage, outhouse or other appurtenance of such premises which is not used in common by the occupants of more than one such dwelling)..."*

8.1.8 It is a moot point as to whether the WFPL applied to the common parts of Grenfell Tower. On the face of it, it should have done so, as the common parts were, by definition, used by the occupants of more than one flat. However, whether the WFPL did apply to the common parts may turn on whether they were made available to an employee of RBKC as a place of work.

8.1.9 In this connection, my understanding is that, at least at some point in time, a caretaker was employed, so it might be said that the entire common parts were his workplace; I would tend to concur with such a view. I am aware that some fire safety experts would even take the view that, at some time or other, persons would be employed to clean, paint, or otherwise carry out work in, the common parts, so bringing them within the scope of the WFPL, though my view is that such interpretation might be regarded as *de minimis*.

8.1.10 In practice, my opinion is that the potential application of this legislation to the common parts at Grenfell Tower was largely academic and inconsequential for the following reasons:

i.) If fire safety measures were even remotely adequate for the safety of residents, they would be more than adequate to protect an employee within the common parts.

ii.) Government guidance to fire authorities (see below) was to adopt "*the lighter touch*" in enforcement of this legislation. My understanding of Government policy was that there was no concern regarding deaths from fire in workplaces; the number of such deaths each year was small, and those fatally injured were not all employees, which was the only group of persons whose safety was to be addressed for compliance with the European Directives. Accordingly, Government introduced the WFPL (nearly 5 years after the date required by the Directives) reluctantly and purely for compliance with the Directives, rather than to address a concern over fire safety in workplaces, which was already adequately controlled in most workplaces by other legislation, particularly the Fire Precautions Act.

iii.) Government guidance to both employers and fire authorities (see below) did not draw any attention to the application of the WFPL to blocks of flats; indeed, the guidance was completely silent on such possible application, while drawing attention to the possible application of the Legislation to, for example, houses in multiple occupation.

iv.) Certainly, in my experience, fire authorities did not (or did not to any material extent) take action to inspect or take enforcement action under the WFPL in blocks of flats.

8.1.11 Where the WFPL did apply, Regulation 3 of the Management of Health and Safety at Work Regulations (as amended in 1997 and revised in 1999) required that the employer carry out a suitable and sufficient assessment of the risks to the health and safety of his employees to which they are exposed whilst they are at work and the risks to the health and safety of persons not in his employment arising out of or in connection with the conduct by him of his undertaking.

8.1.12 This assessment was universally described within the fire safety profession as a "*fire risk assessment*", which is the term I adopt throughout the remainder of the report for this assessment and the similar assessment subsequently required by the Fire Safety Order.

8.1.13 In my experience, it was extremely uncommon for fire risk assessments to be carried out in purpose-built blocks of flats for the purpose of compliance with the WFPL. Moreover, as discussed above, it would have been equally uncommon for a fire and rescue authority to enforce any requirement for such a fire risk assessment.

8.1.14 The European Directives, to which I referred above, had required that the health and safety requirements of the Directives (including those relating to fire safety) should be brought into force by means of domestic legislation by 1 January 1993. The health and safety requirements were brought into force in Great Britain on the due date by means of the Management of Health and Safety at Work Regulations 1992. However, there was a long delay (until 1 October 1997) in bringing the fire safety requirements of the Directives into force.

8.1.15 Various attempts had been made by Government to draft suitable fire safety regulations, but, on each occasion, there had been extremely adverse reaction from the business community, who argued that the draft regulations were unduly onerous and went beyond the measures strictly required by Directives.

8.1.16 In the penultimate draft regulations, the fire safety measures required were not greatly different from those in the final draft regulations that were brought into force. However, there was still adverse criticism because, for example, the penultimate draft regulations made requirement for fire drills, while critics argued that there was no explicit requirement for fire drills in the Directives.

8.1.17 As a result, the Government chose to adopt a "minimalist" approach to the requirements of the WFPL; the intention was that the WFPL should require absolutely nothing more than necessary to satisfy the Directives. This was achieved by a process described by Government as "*copying out*"; the relevant requirements of the Directives were largely copied out verbatim into the new legislation.

8.1.18 In my opinion, this approach was extremely detrimental to the clarity of the WFPL. Regulations within the Fire Precautions (Workplace) Regulations were convoluted in wording and used wording that was either vague or unfamiliar

to the fire safety profession. For example, the familiar term "means of escape" did not appear in the WFPL, simply because it was not used in the Directives. Instead, under the heading "emergency routes and exits", there were nine separate requirements, containing specific technical details more appropriate to a code of practice than legislation, which could, otherwise, have simply been written as a requirement for means of escape from fire, which should not be obstructed, and measures to assist in use of the escape routes.

8.1.19 One of the nine requirements read, at first sight, as an absolute requirement that "*emergency doors*" (i.e. fire exits) shall open in the direction of escape. I have experience of clients proposing unnecessarily to turn inward opening fire exits to open outwards in premises with a small number of occupants when, in fact, the requirement in question simply appeared in a list of requirements that were to be implemented "*where necessary*".

8.1.20 Similarly, wording in relation to "fire detectors and alarms" was sometimes interpreted as meaning that all workplaces now needed automatic fire detection and alarm systems, but, in fact, the intent of the Regulations was simply to continue a long-recognized requirement that premises should have an adequate means of warning occupants in the event of fire (which in very small premises, could simply be an arrangement to give a shouted warning in the event of fire).

8.1.21 A requirement that employers "*shall, where necessary to safeguard his employees in case of fire, arrange any necessary contacts with external emergency services, particularly as regards rescue work and fire-fighting*" was deemed to mean simply that there should be a facility to telephone the fire and rescue service in the event of fire (though it could be interpreted as meaning liaison with the fire and rescue service on a more routine basis).

8.1.22 Indeed, the thrust of the WFPL was that, in relation to all physical fire safety measures to which the WFPL referred, they were to be implemented where necessary. While the necessity was to be determined by the fire risk assessment, there is no doubt that the caveat "*where necessary*" resulted in uncertainty and confusion as well as great inconsistency amongst enforcing authorities, employers and those carrying out fire risk assessments.

8.1.23 This situation was not assisted by the fact that the fire safety requirements of the European Directives were dispersed across two sets of regulations, namely the Fire Precautions (Workplace) Regulations and the Management of Health and Safety at Work Regulations. Accordingly, some parts of the latter Regulations were enforced by the fire authority rather than the health and safety enforcing authority, a situation that, for some considerable time, was not clear even to some fire authorities.

8.1.24 In simple terms, the WFPL required the following, measures in relation to existing workplaces, but only "*where necessary*";

i.) Adequate means of escape from fire, which were to be kept clear at all times;

ii.) Fire escape route signage;

iii.) Emergency lighting on escape routes and at exits;

iv.) To the extent appropriate, appropriate fire-fighting equipment and fire detectors and alarms. In fact, there has always been a consensus of opinion that, in the common parts of blocks of flats, there is no need for the provision of a fire alarm system or fire extinguishers, nor should these be provided;

v.) Suitable maintenance and repair of the above measures.

8.1.25 In addition, there were broad requirements in relation to management of fire safety. In particular, there was a requirement for employers to appoint one or more competent persons to assist them in undertaking the measures they needed to take to comply with the Fire Precautions (Workplace) Regulations 1997 (as amended). There was also a requirement for the establishment of procedures for serious and imminent danger (i.e. fire procedures) and for relevant information to be provided to employees

8.1.26 To the extent that the WFPL did apply to blocks of flats, any proposal to carry out structural alterations of those parts of the premises within the scope of the WFPL would require a "full plans" application to a building control body, and for there to be consultation between the building control body and the fire authority. At the end of the work, a completion certificate would be issued.

8.1.27 The WFPL was revoked by the Fire Safety Order on 1 October 2006. However, I have discussed issues arising from the WFPL because the vast majority of the fire safety measures required by the Fire Safety Order, which replaced the WFPL, were simply copied out again from the WFPL. Accordingly, in my experience, the issues of interpretation first encountered in the latter legislation continued, to a considerable extent, under the Fire Safety Order.

8.2 Guidance

Fire Safety. An employer's guide

8.2.1 This guidance for employers on the WFPL was produced by Government (primarily the Home Office) in 1999 (and replaced much shorter and simpler guidance produced when the WFPL first came into force). [C30]. There is no evidence in this guidance to suggest that the Home Office anticipated any material application of the WFPL to, or enforcement of its requirements in, the common parts of blocks of flats. Indeed, much of the guidance therein would be inapplicable to, and even inappropriate for, blocks of flats. Moreover, within a very rare reference within the guidance to workplaces with residential accommodation, the examples of such premises given in the guidance are care homes and houses in multiple occupation.

Fire Precautions Act Circulars No. 27 and 28

8.2.2 These (somewhat inaptly named) circulars were issued to fire authorities by the Home Office. Circular No. 27 provided guidance on the Fire Precautions (Workplace) Regulations 1997, arranging enforcement and information available to employers. The Circular does make a brief reference to application of the Regulations to those parts of residential premises that are used in common by the occupants of more than one private dwelling where caretakers and similar persons work. Equally, the Circular does note that measures required of employers were for safeguarding employees in case of fire, though not overriding the requirement to give proper consideration to safety of other people in case of fire at the workplace.

8.2.3 Fire Precautions Act Circular 28 updated guidance to take account of the Fire Precautions (Workplace) (Amendment) Regulations 1999. As such, Circular 28 does not materially affect the previous content of this section of my report.

8.3 Enforcing Authority

8.3.1 To the extent that the WFPL applied to common areas (and, for example, plant rooms) at Grenfell Tower, the enforcing authority was the fire authority (until 2000, the London Fire and Civil Defence Authority, which was then replaced by the London Fire and Emergency Planning Authority).

9. REGULATORY REFORM (FIRE SAFETY) ORDER 2005

9.1 The Legislation

9.1.1 The Regulatory Reform (Fire Safety) Order 2005 was produced under the powers granted by the Regulatory Reform Act 2001. (For this reason, the correct abbreviated nomenclature for this legislation is the Fire Safety Order, or FSO, rather than the Regulatory Reform Order, or RRO, as many Regulatory Reform Orders have been produced under the Act.)

9.1.2 The purpose of the Fire Safety Order was to rationalize and simplify fire safety legislation, as previously recommended by a 1994 Government scrutiny (see paragraph 6.1.10), such that control of fire safety in virtually all existing non-domestic premises is now addressed by the single legislative instrument.

9.1.3 In the case of the Fire Safety Order, the common parts of blocks of flats were intentionally and explicitly included within the scope of the Order. This was not as a result of any material, or valid, concern regarding deaths from fire as a result of inadequate fire precautions within the common parts of purpose-built blocks of flats. Notwithstanding the tragic fire at Grenfell Tower, in blocks of flats, deaths from fire beyond the flat in which fire occurs are extremely rare, to the extent that such fires are given a somewhat high profile within the fire safety profession.

9.1.4 The reason that blocks of flats were included within the scope of the Fire Safety Order was a concern that, as in 1998, the European Commission might otherwise consider that, in England and Wales, the requirements of the Framework Directive and the Workplace Directive might not be properly implemented. In this connection, the Workplace Fire Precautions Legislation, which had been brought into force to implement the Directives, was revoked by the Fire Safety Order. It was considered by the Government Department in England and Wales that the European Commission might regard the common parts of blocks of flats as a workplace, which, therefore, would need to be included within the scope of UK fire safety legislation.

9.1.5 As an aside, I would note that a different view was taken by the corresponding Government Department in Scotland, which took the view that, not least in view of the different property law in Scotland, incorporation of purpose-built blocks of flats within the scope of the equivalent Scottish legislation (the Fire (Scotland) Act 2005) was unnecessary and impractical.

9.1.6 Accordingly, in Scotland, no fire risk assessments are required for the common parts of blocks of flats, nor are the fire safety measures imposed by the Fire Safety Order in England and Wales imposed under the Scottish legislation, other than in respect of a requirement for maintenance of facilities, provided under building regulations, for the use by, and the safety of, fire-fighters.

9.1.7 It may be relevant to note that this omission of the common parts of blocks of flats from the Scottish legislation does not appear to result in any (or any significant number of) deaths from fire, though, on occasions, as a result of poor compartmentation, rescue of residents from windows in old tenement buildings by fire and rescue service high reach appliances has proved necessary.

9.1.8 In Northern Ireland, the equivalent legislation to the Fire Safety Order (the Fire and Rescue Services (Northern Ireland) Order 2006) was produced by copying the Fire (Scotland) Act 2005. Accordingly, blocks of flats in Northern Ireland also fall outside the scope of the reformed fire safety legislation (though, possibly, inadvertently, rather than as the result of a positive decision to do so).

9.1.9 The mechanism by which the Fire Safety Order brings common parts of blocks of flats into its scope is almost identical to the equivalent mechanism within the Workplace Fire Precautions Legislation (see Section 8 of this report). The scope of the Fire Safety Order excludes domestic premises (so the individual flats are outside the scope of the Order.)

9.1.10 However, the definition of domestic premises is equivalent to that given in the Health and Safety at Work, etc Act 1974, namely "*premises occupied as a private dwelling (including any garden, yard, garage, outhouse, or other appurtenance of such premises* ***which is not used in common by the occupants of more than one such dwelling****)*" (my emboldening).

9.1.11 Accordingly, in the case of blocks of flats, the scope of the Fire Safety Order includes common lobbies, the common stairway(s), plant rooms, workplaces within the block, etc. There is a consensus of opinion that the scope includes the flat entrance doors, which, in effect, are an integral component of the common parts. Accordingly, there is a need for the flat entrance doors to be fire-resisting and self-closing.

9.1.12 However, recognized guidance (see below) is that doors that satisfied the standard for fire resistance at the time of construction of the building will normally continue to be adequate for compliance with the Fire Safety Order, albeit that the doors would not achieve the standard of fire resistance advocated by ADB for new blocks of flats.

9.1.13 It is a moot point as to what other parts of the building might be regarded as being used in common by the occupants of more than one flat and so fall within the scope of the Fire Safety Order. More specifically, the question arises as to whether external walls of the building, and, hence any cladding fixed to the walls, fall within the scope of the Fire Safety Order. There is a body of opinion that the external walls fall outside the scope of the Order [e.g. see C45 and C46]. (After the fire at Grenfell Tower, the DCLG advised housing authorities of their powers to take action under the Housing Act 2004, which I discuss in Section 10, if cladding is found to constitute a fire hazard.)

9.1.14 In my opinion, it would be somewhat perverse to consider that the external walls are used in common by residents, though I can conceive of arguments to the contrary. Certainly, in my experience, it has never been custom and practice for fire risk assessments (including those carried out by fire safety specialists) to consider external wall construction, the nature of which would, in any case, be difficult, or impossible, to identify without undue destructive exposure, such as removing a sample for laboratory test. Notwithstanding the above, prior to the Grenfell Tower fire, I had an informal agreement with the Fire Safety Department of London Fire Brigade to promote, within relevant guidance on fire risk assessment, some consideration of cladding (see below).

9.1.15 The fire safety duties required by the Fire Safety Order are imposed on the "*Responsible Person*". By virtue of Article 3 of the Order, in the case of a workplace, the Responsible Person is the employer (i.e. normally a body corporate, rather than an individual person). In relation to other premises, the Responsible Person is the person who has control of the premises in connection with his trade, business or other undertaking (whether for profit or not). In my experience, in the case of a block of flats, the freeholder is commonly regarded as the Responsible Person.

9.1.16 Under Article 5(3) of the Fire Safety Order, the fire safety duties imposed on the Responsible Person are also imposed on every person, other than the Responsible Person, who has, to any extent, control of the premises.

9.1.17 Article 5(4) of the Fire Safety Order assists with interpretation of Article 5(3). Under Article 5(4), where a person has, by virtue of any contract or tenancy, an obligation of any extent in relation to the maintenance or repair of any premises, including anything in or on premises, or the safety of any premises, that person is to be treated as a person who has control of the premises.

9.1.18 It is universally accepted that the "Article 5(3) Person" includes a broad tranche of persons, which includes contractors who carry out maintenance of fire safety measures, fire risk assessors, and even individual employees of the Responsible Person who have duties in relation to fire safety incorporated within their contract of employment; prosecution proceedings have been brought against all these categories of persons.

9.1.19 It is a matter of interpretation as to whether managing agents of a block of flats are a Responsible Person or an Article 5(3) Person. However, the distinction is, arguably, academic, since, in effect, the same duties are imposed in either case. Moreover, in premises other than workplaces, the duties imposed on the Responsible Person and the Article 5(3) person are both imposed only to the extent of that person's control; in a workplace, the duties imposed on the Responsible Person are more of an absolute nature, as is required by the European Directives.

9.1.20 Not all breaches of the Fire Safety Order are offences in criminal law. (This has been described as "decriminalisation of minor breaches".) The reform of fire safety legislation in 2006 may be regarded as bringing about a transfer of responsibility for ensuring fire safety in workplaces from enforcing authorities

to employers and others with responsibility for control of premises. There is an acceptance that non-specialists may inadvertently breach certain requirements of the Fire Safety Order without any significant risk to occupants of the building. Accordingly, an offence is committed only if the breach places one or more "*relevant persons*" (see below) at risk of death or serious injury in case of fire.

9.1.21 With further regard to prosecution proceedings, it is not only the Responsible Person and the Article 5(3) Person who may be open to prosecution if offences are committed. Where an offence committed by a body corporate is proved to have been committed with the consent or connivance of, or to be attributable to any neglect on the part of, any Director, Manager, Secretary or other similar officer of the body corporate, or any person purporting to act in any such capacity, he as well as the body corporate is guilty of the offence and is liable to prosecution proceedings.

9.1.22 In contrast with the Workplace Fire Precautions Legislation, the intent of which was focused on safety of employees, the Fire Safety Order requires measures for the protection of "*relevant persons*". By virtue of Article 2 of the Order, relevant persons mean not just employees, but any person who is or may be lawfully on the premises and any person in the immediate vicinity of the premises who is at risk from a fire on the premises. Relevant persons do not include fire-fighters carrying out operational fire-fighting at the building.

9.1.23 Accordingly, although the flats at Grenfell Tower, as domestic premises, were outside the scope of the Fire Safety Order, the residents in the flats were in the immediate vicinity of the common parts and were at risk from a fire within the common parts. Therefore, the residents at Grenfell Tower fell within the meaning of relevant persons.

9.1.24 The fire safety duties imposed on the Responsible Person are set out in 15 articles (Articles 8-22) within Part 2 of the Fire Safety Order. I set out below, in short summary form, the requirements of each of these articles and my brief interpretation of them, omitting Articles 12 and 16, which are concerned with dangerous substances and so are unlikely to be greatly relevant to the Inquiry. For full details of these articles, reference should be made to the Order itself.

9.1.25 The requirements, and my interpretation, of the remaining 13 articles are as follows:

Article 8: Requires such general fire precautions as will ensure, so far as is reasonably practicable, the safety of employees, and as may reasonably be required in the circumstances to ensure the premises are safe for persons who are not employees. This article imposes a duty of fire safety care (somewhat analogous to the general duty of care imposed by section 2 of the Health and Safety at Work, etc Act 1974). I turn to the meaning of *general fire precautions* later in this section of my report.

However, at this stage I would note that *general fire precautions* include measures required by other articles, with which article 8 consequently overlaps. Equally, article 8 may be considered to address a miscellanea of matters, such as compartmentation or fire hazards within escape routes, that are not addressed within other articles.

Article 9: Requires the Responsible Person to carry out a suitable and sufficient fire risk assessment, the significant findings of which must be recorded (other than in some cases that are not relevant to this report). The risk assessment must be reviewed regularly to keep it up to date. It must also be reviewed if there is a reason to suspect that it is no longer valid or if there have been significant changes in the matters to which it relates, including when the premises undergo significant changes or extensions.

The term "*regularly*" is not defined. However, guidance (to which I return below) recommends that, for a building such as Grenfell Tower, an annual review might be appropriate. Review of a fire risk assessment does not equate to carrying out a completely new fire risk assessment. The guidance to which I referred above [C33] suggests that, in the case of a building such as Grenfell Tower, a completely new fire risk assessment should be carried out every 1-3 years.

Article 10: Requires that, where the Responsible Person implements "*preventive and protective measures*", he must do so on the basis of principles set out in a schedule to the Fire Safety Order. These principles are known as the principles of prevention and are taken from the European Directives. The principles include avoiding risks, combatting risks at source, adapting to technical progress, developing a coherent overall prevention policy and giving appropriate instructions to employees.

Article 11: Requires that the Responsible Person must make, and give effect to, appropriate arrangements for the effective planning, organisation, control, monitoring and review of the *preventive and protective* measures.

The *preventive and protective* measures are the general fire precautions identified as necessary by a fire risk assessment. This article is generally considered to make broad requirements for management of fire safety, including implementing actions specified in the findings of the fire risk assessment.

Article 13: Requires, where necessary, appropriate fire alarm systems and fire extinguishers, along with, where necessary, measures for fire-fighting, nomination of competent persons to implement the fire-fighting measures and arrangements for necessary contacts with external emergency services, particularly as regards fire-fighting.

This article is largely irrelevant to a block of flats. A communal fire alarm system is not appropriate in view of the "stay put" strategy and the absence of staff to manage the system, while the provision of fire extinguishers within the common parts is inappropriate; the provision should be restricted to plant rooms etc. There is no expectation that anyone in a block of flats should be nominated to take fire-fighting action.

However, contacts with external emergency services can, in my opinion, reasonably be interpreted as including arrangements with the fire and rescue service for the provision of relevant information regarding, and familiarization with, fire safety measures, particularly any of a complex nature of which fire-fighters would need to be aware at the time of a fire.

Article 14: Requires that, where necessary, escape routes are kept clear at all times and that, in the event of fire, persons can evacuate the premises as quickly and as safely as possible; the latter requirements may be regarded as simply a requirement for adequate means of escape from fire.

Article 14 also requires that, where necessary, escape routes and exits be indicated by signs and have adequate emergency lighting.

Article 15: In effect, requires adequate fire procedures.

Article 17: Requires that fire safety measures required under the Fire Safety Order, or under other legislation, are suitably maintained, are kept in efficient working order and are kept in good repair. (This article does not apply to maintenance of facilities provided for use by, or the safety of, fire-fighters, such as dry rising mains and fire-fighting lifts, but maintenance of these facilities is required by Article 38.)

Article 18: Requires that the Responsible Person must appoint one or more competent persons to assist him in undertaking the preventive and protective measures. In my opinion, this would include appointment of an in-house adviser (where such advice is available in-house) to ensure compliance with fire safety legislation.

Article 19: Requires provision of relevant fire safety information to employees.

Article 20: Requires provision of relevant fire safety information to employers of employees from an outside undertaking who are working on the premises, and to these employees themselves.

Article 21: Requires adequate fire safety training for employees when they are first employed and periodically thereafter.

Article 22: Requires co-operation and co-ordination between two or more Responsible Persons who share, or have duties in respect of, the same premises.

9.1.26 The meaning of *general fire precautions,* given in Article 4 of the Fire Safety Order, is as follows (setting out Article 4 text in italics, with, where relevant, my comments in Roman text):

(a) measures to reduce the risk of fire on the premises and the risk of the spread of fire on the premises;

In my opinion, in the context of Article 4, *measures to reduce the risk of fire* should be regarded as including measures to prevent the occurrence of fire. *Measures to reduce the risk of spread of fire* include compartmentation.

(b) measures in relation to the means of escape from the premises;

(c) measures for securing that, at all material times, the means of escape can be safely and effectively used;

This includes emergency escape lighting and, where escape routes or exits are not obvious, fire escape route and fire exit signs.

(d) measures in relation to the means for fighting fires on the premises;

This relates to the provision of fire extinguishers, which should not be provided in the common parts of a block of flats.

(e) measures in relation to the means for detecting fire on the premises and giving warning in case of fire on the premises;

This relates to fire detection and fire alarm systems, which are not necessary, or appropriate, in the common parts of blocks of flats, though smoke detectors may be necessary as part of any smoke control system.

(f) measures in relation to the arrangements for action to be taken in the event of fire on the premises, including—

(i) measures relating to the instruction and training of employees; and

(ii) measures to mitigate the effects of the fire.

9.1.27 Under Article 31 of the Fire Safety Order, if the enforcing authority is of the opinion that use of premises involves, or will involve, a risk to relevant persons so serious that use of the premises ought to be prohibited or restricted, the authority may serve on the Responsible Person, or an Article 5(3) person, a prohibition notice. This prohibition notice can be served on domestic premises

other than single private dwelling houses, so can be issued for a flat or a block of flats.

9.2 Guidance

Government Guidance

CLG Fire Safety Risk Assessment Guides

9.2.1 Prior to the Fire Safety Order coming into force, the Secretary of State was required by Article 50 of the Fire Safety Order to produce guidance for the Responsible Person. The guidance took the form of a number of "sector-specific" guides, each dealing with a different occupancy or group of occupancies. Each guide provides the same general information on the Fire Safety Order, followed by specific technical guidance on the means for compliance with the fire safety duties set out in the Fire Safety Order.

9.2.2 Blocks of flats came within the scope of Guide Number 3, which provides guidance on the relevant fire safety measures in any premises in which people sleep (other than hospitals and care homes, which are the subject of separate guides). The scope of this guide (commonly described as the "Sleeping Accommodation Guide") extends to a very wide range of disparate premises, ranging from hotels, boarding houses, student halls of residence, residential spas, etc to a miscellanea of premises, including houses in multiple occupation, refuges, blocks of flats, blocks of sheltered housing, park homes and narrow boats.

9.2.3 The Sleeping Accommodation Guide gives only scant consideration to blocks of flats. The Guide was clearly written with premises such as hotels in mind. This reflects the expectation that the focus of application and enforcement of the Fire Safety Order would concentrate on premises that would have been deemed as high-risk under previous legislation and, accordingly, would have been subject to enforcement, along with a possible new focus on houses in multiple occupation; it has long been recognized that the fire risk for occupants of HMOs is significantly higher than the risk to occupants of single family dwellings.

9.2.4 Indeed, following introduction of the Fire Safety Order in 2006, blocks of flats were not high on the "radar" of fire and rescue authorities. As discussed earlier in this section, the overwhelming majority of deaths from fire in blocks of flats occur within the flat in which the fire started, but the flats themselves are, of course, outside the scope of the Order. There was a tendency to the view that fire and rescue authorities had not previously been empowered to enforce general fire precautions on a routine basis in blocks of flats, so there was no obvious need for proactive enforcement under the Fire Safety Order.

9.2.5 This situation changed dramatically after the fire at Lakanal House, a high-rise block of flats in London, in 2009. Six people died in the fire, but they had not originally been in the flat in which the fire started; they died in two other flats. (Southwark Council were subsequently fined £270,000 (with £300,000 costs) for four breaches of the Fire Safety Order.)

9.2.6 Following the fire, it might be said that enforcement of the Fire Safety Order in blocks of flats veered from one extreme to another. Across the country, there were urgent efforts by fire and rescue authorities to carry out inspections ("audits") of fire safety in blocks of flats and enforce the Fire Safety Order.

9.2.7 Given this urgency, in my experience, insufficient time was made available to train inspecting officers as to the fire safety measures they should expect to find within the common parts of blocks of flats for compliance with the Fire Safety Order, bearing in mind that, generally, the officers would have had little or no previous experience of examining fire safety measures in existing blocks of flats. The CLG Sleeping Accommodation Guide was not of great assistance in this respect.

9.2.8 The result was sometimes enforcement of measures that were unnecessary and, even inappropriate. It was not unknown for the alleged breaches to lead to unfounded prosecution proceedings for alleged offences. This included, for example, requirements for communal fire alarm systems (sometimes even in recently constructed blocks of flats, for which, quite correctly, no communal fire alarm system had been required by the building control body).

9.2.9 Similarly, requirements were sometimes imposed for the provision of fire extinguishers in the common parts, when, in fact, extinguishers were unnecessary and undesirable. These issues commonly arose from a failure to understand that fire protection measures to which the Fire Safety Order referred were not intended to constitute requirements of an absolute nature, but were only to be provided *where necessary.*

9.2.10 Inappropriate application of the Fire Safety Order did not only arise from the actions of fire and rescue authorities. As a result of the Lakanal House fire and the enforcement activities of fire and rescue services, Responsible Persons, such as freeholders and managing agents, commissioned fire risk assessments from consultants, which were, often, no more appropriate in their recommendations than the requirements of fire and rescue authorities.

9.2.11 Consequently, it was recognized that there was an urgent need for new guidance that would provide recommendations specifically for fire safety measures in existing purpose-built blocks of flats. I discuss that guidance, which was produced in 2011, under a further sub-heading below.

9.2.12 None of the original CLG guides have been revised since the time of their original publication in 2006. The policy of the relevant Government Departments was, and remains, that guidance on fire safety measures should no longer be produced by Central Government, but, as in the case of the 2011 guidance discussed above, any new guidance should be produced by the broad church of the fire sector, working in conjunction with relevant business sectors.

CLG Fire Safety Order Guidance Note 1

9.2.13 This Guidance Note was produced by the DCLG in October 2007 for the purpose of providing guidance to fire and rescue authorities on enforcement of the Fire Safety Order [C31]. It explains the powers granted to fire and rescue authorities by the Fire Safety Order and examines each of the articles of the Order in turn. However, the guidance largely reiterates, in summary form, the contents of each article, without a great deal of interpretation in relation to the technical measures required for compliance with the fire safety duties imposed by the Order.

9.2.14 Guidance Note 1 makes little reference to blocks of flats, other than to note that their common parts fall within the scope of the Order. The guide observes that this is a complex area that would be addressed in more detail in separate guidance.

9.2.15 The Guidance Note also encourages enforcing authorities to adopt a protocol, published by the then Chief Fire Officers Association (CFOA) and the Chartered Institute of Environmental Health, which sets out an understanding of the manner in which local housing authorities and fire and rescue authorities should coordinate their enforcement activities in relation to fire safety in housing.

Other Guidance

Chief Fire Officers Association Guidance

9.2.16 This guide bears the somewhat verbose title "*Collected Perceived Insights Into and Application of The Regulatory Reform (Fire Safety) Order 2005 For the Benefit of Enforcing Authorities".* It is commonly described as "*The Enforcers' Guide"* [C32].

9.2.17 It was first produced by CFOA (subsequently, the National Fire Chiefs Council or NFCC from 1 April 2017) in 2011 and was revised in 2015. Its intention was to supplement CLG Guidance Note 1. As in the case of the CLG Guidance Note, the Enforcers' Guide examines each article of the Fire Safety Order in turn, but also offers quite extensive guidance on interpretation of the articles, and practical examples of their application, along with "frequently asked questions" on each article.

9.2.18 The Enforcers' Guide includes considerable discussion on the application of the Fire Safety Order to blocks of flats. While the discussion does not constitute technical guidance on the fire safety measures required, there is useful discussion on, for example, the issue of flat entrance doors.

9.2.19 The Enforcers' Guide notes that, where a resident in a block of flats owns the flat entrance door, or, under their lease has control of the door, the resident may be regarded as an Article 5(3) person, against whom action could be taken (though I have experience, in London, of a refusal by LFEPA to take

such action, necessitating, ultimately, action by the housing authority under the Housing Act 2004 (see Section 10 of this report)).

9.2.20 The Enforcers' Guide also notes the power of fire and rescue authorities to issue a prohibition notice for a block of flats if, in their opinion, the use of the premises would result in serious risk from fire to relevant persons.

Local Government Association Guidance

9.2.21 This guide, entitled "*Fire safety in purpose-built blocks of flats*" was drafted by my consulting practice under a contract with the then Local Government Improvement and Development (LGID), a part of the Local Government Group that no longer exists; responsibility for the Guide was taken over by the Local Government Association (LGA) [C33].

9.2.22 As discussed above, the need for the Guide arose from issues relating to enforcement and fire risk assessments in purpose-built blocks of flats, following the fire at Lakanal House in 2009. It was funded by the DCLG (with a contribution from the Electrical Safety Council).

9.2.23 The Guide is intended for:

i.) Private sector housing providers
ii.) Social housing providers
iii.) Residents' management companies
iv.) "Right to Manage" companies
v.) Managing agents or facility managers
vi.) Enforcement officers in local housing authorities
vii.) Enforcement officers in fire and rescue authorities
viii.) Advice agencies
ix.) Consultants and contractors carrying our fire risk assessments.

9.2.24 In view of the potential significance of the Guide as a "benchmark" for the appropriate fire precautions at Grenfell Tower at the time of the fire, I outline, in the paragraphs below, relevant information on the parentage of the Guide, the status of the Guide, the scope of the Guide and its key recommendations.

9.2.25 Although the Guide was drafted by my consulting practice, the work was overseen by a group of stakeholders ("the Reference Group"), comprising:

- Accreditation Network UK (ANUK)
- Association of Residential Managing Agents (ARMA)
- Association of Retained Council Housing (ARCH)
- Chartered Institute of Environmental Health (CIEH)

- Chartered Institute of Housing (CIH)
- Chief Fire Officers' Association (CFOA)
- Department for Communities and Local Government (DCLG)
- Electrical Safety Council (ESC)
- Federation of Private Residents Associations (FPRA)
- Homes and Communities Agency (HCA)
- Leasehold Advisory Service (LEASE)
- London Councils
- National Federation of ALMOs (NFA)
- National Housing Federation (NHF)
- National Housing Maintenance Forum (NHMF)
- National Landlords Association (NLA)
- Office of the Chief Fire and Rescue Adviser (CFRA)
- Residential Landlords Associations (RLA)
- Royal Institution of Chartered Surveyors (RICS)
- Tenant Services Authority (TSA)
- Universities UK

In addition, during the drafting process, draft copies were sent for comment to other bodies, such as the Fire Brigades Union, who had declared an interest in consultation in respect of the Guide.

9.2.26 Successive drafts were produced in response to input from consultees and working groups ("the Project Board") drawn from the steering group. For the purpose of further consultation, three free "roadshows" were arranged to present a finished draft, which was also advertised and made available to the public. All comments received from the roadshows and public consultation were subject to consideration under the supervision of LGID for the purpose of creating the final draft for "sign off" by the Reference Group.

9.2.27 In general, the public consultation draft was welcomed by a number of fire and rescue authorities; for example, comments from the fire and rescue community described it as "*easy to read, offering common sense advice, and of use to officers of the authority*", "*correct in legal and technical advice*", "*a welcome addition to existing guidance*".

9.2.28 While the Guide is intended to be fit for purpose in support of the Fire Safety Order in relation to existing purpose-built blocks of flats, the scope of the guidance goes beyond this. Consideration is given to the safety of residents within their own flats, and recommendations are given for best practice, regardless of whether this is enforceable under legislation. Equally, a

distinction is made within the guidance between measures required for compliance with the Fire Safety Order and measures that simply constitute good practice.

9.2.29 Following the Inquests into the deaths at Lakanal House, the Coroner wrote a Rule 43 letter to the Secretary of State advocating that the Guide should be reviewed in light of the Coroner's findings. While neither I, nor my practice, was involved in that review, I am aware that it was concluded that no changes to the guidance were required.

9.2.30 In 2013, there was a challenge to the status of the Guide by one fire and rescue authority in a prosecution case in which I acted as an expert witness for the Defence. The fire and rescue authority challenged the status of the Guide on the basis that it had not been "approved" by the Secretary of State for the purpose of Article 50 of the Fire Safety Order. This matter was raised, on behalf of the Defence, with the DCLG.

9.2.31 In a letter dated 19 November 2013, the DCLG advised that there is no express statutory provision under which guidance intended for Responsible Persons is approved. The DCLG further advised that the policy position was as set out in the Secretary of State's response to the Coroner in the Lakanal House Inquest, namely that the DCLG considered that the LGA Guide is the most appropriate guidance document to use for the purposes of compliance with the Fire Safety Order in these types of buildings (i.e. purpose-built blocks of flats).

9.2.32 For the purpose of the above case, following a request for an opinion from the Chair of the Technical Guidance Workstream of the Fire Sector Federation, the Chair drew attention to a written answer by the then Secretary of State for Communities and Local Government, Brandon Lewis, to a question from Ms Harman MP. I reproduce this below:

> "*The Local Government Association's guidance 'Fire Safety in Purpose Built Blocks of Flats' published in July 2011 addresses the rationale for the stay-put principle in residential buildings, including high rise blocks of flats, and provides detailed advice on the fire safety information that should be made available to residents in the light of the findings of a risk assessment. It also provides advice on when building owners should consider accessing individual flats for the purpose of inspecting the effectiveness of compartmentation and other fire safety measures.*
>
> *Following the conclusion of the inquests, relevant partners have assured the Local Government Association that there is a high level of confidence in the existing guidance. My Department therefore continues to make it available on the fire safety pages of the Government's website, to help the owners of purpose built blocks of flats to understand and discharge their fire safety responsibilities under both the Housing Act 2004 and the Regulatory Reform (Fire Safety) Order 2005."*

9.2.33 With regard to the relationship with the Sleeping Accommodation Guide, the LGA Guide advises that the LGA Guide is the more appropriate guide to use for purpose-built blocks of flats. The LGA Guide also advises that:

> *"This guide is intended to meet the needs of housing providers and enforcing authorities for guidance tailored to purpose-built blocks of flats. These buildings are*

only a small part of the scope of other guidance documents. This document is intended to assist responsible persons to comply with the FSO and the Housing Act 2004. Accordingly, it is expected that enforcing authorities will have regard to this guide."

9.2.34 My understanding is that the position set out above also reflected the views of the Chief Fire Officers Association (CFOA), who were, in any case, represented on the Project Board. In this connection, following enquiries with CFOA in relation to the prosecution case to which I referred above, the Technical Officer Representative of CFOA on the Project Board for the LGA Guide advised, in December 2013, that:

"The hierarchy of the new guidance over the existing CLG guide for sleeping accommodation was set out by the CFOA Circular 2011 – 038, issued by the Chief Fire Officer's Association on 31st October 2011 which compels enforcing authorities to use the new guide in the circumstances of such premises."

9.2.35 In the bullet points below, I set out key points in the LGA Guide that might be considered relevant by the Inquiry:

i.) People living in flats experience more fires than people living in houses. However, a fire in a flat is no more dangerous than a fire in a house. In particular, high rise does not mean high risk. After fire breaks out, there is no greater likelihood of a fatality in a high-rise block than in a low-rise block. In fact, statistically, a fire in a bungalow is more likely to result in a fatality than a fire in a high-rise block of flats (see paragraphs 11.1-11.3 and Key Points in Part A).

ii.) Very few people die as a result of a fire in a neighbour's flat or the common parts. Nearly all fire deaths in blocks of flats occur in the flat in which fire starts (see Key Points in Part A).

iii.) In blocks of flats, each flat is designed to be a fire-resisting "box". It is important to maintain the integrity of this compartment, particularly when building work and alterations take place (see Key Points in Part A).

iv.) It is important to ensure that fires cannot start in the common parts or common facilities (see Key Points in Part A).

v.) The "stay put" principle is undoubtedly successful in an overwhelming number of fires in blocks of flats. In 2009-2010, of over 8,000 fires in blocks of flats, only 22 fires necessitated evacuation of more than five people by the fire and rescue service (see paragraph 12.1).

vi.) Fires that require total evacuation of a block of flats are rare (see paragraph 18.4).

vii.) The "stay put" principle should be adopted wherever possible (see paragraph 69.1).

viii.) Communal fire alarm systems should not be installed unless it can be demonstrated that there is no other practicable way of ensuring an adequate level of safety. If such a system is provided, it must be possible to manage it, which, in the case of high-rise blocks, would

necessitate staffing at all times (e.g. by a concierge or caretaker) (see Key Points in Part A and paragraphs 20.4-20.10).

ix.) Application of current standards to an existing block of flats is not normally appropriate (see Key Points and paragraphs 26.6 and A1.2). (Upgrading to current standards may not be reasonably practicable, in that the cost and effort would be disproportionate to the risk, or may even be limited by the physical constraints of the building.)

x.) Front doors of flats need to be fire resisting and self-closing; self-closing devices are particularly important. Corridors and stairways need to be enclosed in fire-resisting construction. Stairway doors need to be fire resisting and self-closing. Original doors may not meet current standards, but upgrading or replacement of doors may not be necessary. The Guide advises that good practice is to inspect timber fire-resisting doorsets on a six-monthly basis. While this includes flat entrance doors, the Guide notes the potential difficulty of access to leasehold flats (see paragraph 29.2, Key Points in Part F and paragraph 82.4, Key Points that follow paragraph 16.10 and Key Points that follow paragraph 17.3).

xi.) Where there is only a single stairway available for escape, smoke control is necessary in lobbies (see paragraphs 58.9-58.16).

xii.) It should be ensured that compartmentation is not undermined by openings in walls and floors for services, such as water, gas, electricity, or communal heating systems, or by shared extract ducts from bathrooms or kitchens (see Key Points that follow paragraph 17.3 and paragraph 54.8).

xiii.) Escape routes should be provided with emergency escape lighting, but, in a single stairway building, there is rarely a need for 'FIRE EXIT' signs (see paragraphs 21.1, 28.8, Key Points in Part F, and Section 64).

xiv.) It is unlikely that retrofitting sprinklers or watermist systems would normally be reasonably practicable for existing blocks, taking into account cost, practicality and benefit. However, retrofitting is not precluded where there is clear justification and appropriate considerations of the practicalities of their installation and maintenance. The future benefits of the sprinkler protection in new blocks of flats of over 30m in height is noted, in that it makes a death from fire in these flats unlikely (see paragraphs 24.4-24.7 and paragraph A1.74).

xv.) All residents need to be aware of the importance of maintaining in place the fire safety measures required by legislation at the time of construction of the block. A particularly serious, but common, contravention of legislation is the replacement of a self-closing, fire-resisting flat entrance door with a non-fire resisting door or by a door that is not self-closing (see paragraph 26.5 and Key Points in Part C).

xvi.) Fire extinguishers are not normally necessary within common parts, but might be necessary within a plant room, caretaker's office or other non-domestic parts of the block (see paragraphs 21.3-21.4).

xvii.) Detailed advice is given on fire risk assessments (see Part D). A new concept introduced in the Guide is that of four different types of fire risk assessment, as follows:

a) A Type 1 fire risk assessment, which the Guide advises is the basic fire risk assessment required for the purpose of satisfying the Fire Safety Order, involves non-destructive inspection of the common parts (i.e. does not involve any opening up of construction). However, even this basic fire risk assessment should include examination of at least a sample of flat entrance doors, consideration, so far as is reasonably practicable, of separating construction between flats and common parts, and examination of a sample of service risers, provided access is practicable at the time of inspection.

b) A Type 2 fire risk assessment is similar to a Type 1 fire risk assessment, except that there is a degree of destructive inspection, carried out on a sampling basis and necessitating use of a contractor to open up and make good. Although a type 2 fire risk assessment is still only concerned with the common parts, the destructive inspection might sometimes include opening up of construction within a sample of flats, which can often only be carried out in vacant flats. This is a one-off exercise carried out only if there is good reason to suspect serious structural deficiencies that could lead to spread of fire beyond the flat of fire origin.

c) A Type 3 fire risk assessment includes the work involved in a Type 1 fire risk assessment, but goes beyond the scope of the Fire Safety Order (though not the scope of the Housing Act). This risk assessment considers fire safety measures within at least a sample of flats, in which means of escape, smoke alarms and the fire resistance of flat entrance doors is considered. The inspection is non-destructive. This type of risk assessment may sometimes be appropriate for rented flats (but not leasehold flats) if there is a reason to suspect serious risk to residents in the event of a fire in their flats.

d) A Type 4 fire risk assessment has the same scope of work as a Type 3 fire risk assessment, except that there is a degree of destructive inspection, in both the common parts and the flats, carried out on a sampling basis. This is the most comprehensive type of fire risk assessment, but the Guide suggests that it will only be appropriate in limited circumstances, such as when a new landlord takes over a block of flats for which the history of works carried out is unknown and there is reason to suspect serious risk to residents from both a fire in their own flats and a fire in neighbours' flats.

xviii.) Intrusive fire risk assessments (involving destructive exposure) will only be necessary where there is justifiable concern regarding structural fire precautions (see Key Points in Part D).

xix.) Guidance to landlords and other Responsible Persons is that, when commissioning a fire risk assessment from external specialists, the type of fire risk assessment should be specified, the fire risk assessor should be provided with relevant information on the building, the occupants, and the arrangements for the management of fire safety, and that assistance should be given in arranging access to a sample of flats. It is also recommended that it be ensured that the fire risk assessor is competent (see Key Points that follow paragraph 40.7).

xx.) An appendix to the Guide gives advice on selecting a competent fire risk assessor, while noting that the Fire Safety Order does not require that fire risk assessments are carried out by competent specialists; moreover the appendix notes that competence does not necessarily arise from specific qualifications, but will be the result of a suitable blend of education, training and experience, knowledge and other qualities (see Appendix 3).

xxi.) For compliance with the Fire Safety Order, fire risk assessments need to be reviewed (see Section 40):

a) regularly;

b) when material alterations take place;

c) where there is a significant change in the matters that were taken into account when the risk assessment was carried out;

d) when there is a reason to suspect that the original fire risk assessment is no longer valid;

e) after completion of significant works carried out to address shortcomings identified in the fire risk assessment.

xxii.) Poor housekeeping in the common parts is a significant fire hazard. There should be a clear policy on whether common parts must remain completely sterile ("zero tolerance") or may be subject to "managed use". The policy should be made clear to residents (see paragraphs 44.10-44.19).

xxiii.) Fixed electrical installations in the common parts should be inspected and tested every five years. The fixed electrical installations in the flats should be inspected and tested every 10 years, but five years might be more appropriate where tenancies are shorter. A visual inspection is recommended in flats where tenant turnover is high (see paragraphs 46.3-46.7).

xxiv.) Guidance is given on smoke control arrangements (see paragraphs 58.9-58.16).

xxv.) The build-up of paint layers can give rise to rapid fire spread in common parts, necessitating action where the risk is considered to be significant (see paragraphs 58.20-58.21).

xxvi.) Restrictions apply to the nature and construction of external cladding systems and to the materials used for façades. This is in order to limit the potential for external fire spread, particularly in high-rise blocks. The Guide advises that the external façades should not provide

potential for extensive fire spread. The Guide advises that, when assessing existing blocks of flats (though, in this context, the Guide is not referring to a routine fire risk assessment of the type required by the Fire Safety Order), particular attention should be given to any rainscreen or other external cladding system that has been applied and to façades that have been replaced (see paragraphs 72.1-72.2, Key Points that follow paragraph 85.3 and Key Points in Part F)..

xxvii.) The Guide further advises that the use of combustible cladding materials and extensive cavities can present a risk, particularly in high-rise blocks. It is stated in the Guide that restrictions are normally applied to the nature of such materials and, in particular, their surface spread of flame characteristics, while cavity barriers are also required in some circumstances. It is noted in the Guide that assistance from specialists may be required to determine if the external surfaces of walls are satisfactory and whether there is adequate provision of cavity barriers (see paragraphs 72.1-72.2, Key Points that follow paragraph 85.3 and Key Points in Part F).

xxviii.) A section of the Guide discusses the control of alterations so that they are not detrimental to fire safety, observing that problems can arise not only when large-scale refurbishment programmes are carried out, but also during minor work by residents. In this connection, examples given include a landlord undertaking a project to fix rainscreen cladding to an existing block of flats without considering the potential for a fire from a flat to travel upwards through the cavity behind the cladding and to spread into the flats above (see Section 85).

xxix.) The Responsible Person should develop a fire policy and appoint someone in their organization to take overall responsibility for fire safety, supported with help from specialists where necessary (see Key Points in Part G).

xxx.) Residents' handbooks, website and other media should be used to engage with residents and communicate vital fire safety messages. Such messages include advice to residents on fire prevention in their own flat and in the common parts, action to take on discovery of a fire and what "stay put" means if there is a fire elsewhere in the building. It is also advised that residents be given information on how they can report essential repairs required for fire safety measures in their flat and elsewhere in the block. Information can be reinforced by notices displayed in the building. An appendix contains a sample fire action notice for a building with a "stay put" strategy. Targeted campaigns of leafletting and other initiatives to promote fire safety may be necessary to keep the message fresh in people's minds (see Key Points in Part G, paragraphs 77.2-77.5 and Appendix 5).

xxxi.) It is important that the needs of non-English speaking residents are taken into account in the provision of information. In this connection, it was, in my opinion, a retrograde step when, a few years ago, fire safety information leaflets in 17 different languages were removed from the Government website to which there was a link in the Guide. These were archived in 2012, and there is a link to them on the

National Archives website, but, when I attempted to access these for the purpose of this report, the links to most of the languages would not work.

Leaflets for non-English speakers can be found on the website of some fire and rescue services, though, as far as I am aware, not that of London Fire Brigade. When, a few years ago, my practice wished to obtain a bulk supply of fire safety leaflets for a large number of Arabic speakers in a high-rise block of flats in London, it was necessary for us to obtain these from Scottish Government. In my opinion, written fire safety guidance in the appropriate language for those whose first language is not English can be an important fire safety measure.

xxxii.) Everyone should be made aware of the fire procedures (see Key Points in Part G and paragraph 28.8).

xxxiii.) There should be arrangements for monitoring the common parts through formal inspections and as part of the day-to-day activities by staff (see Key Points in Part G and Section 83).

xxxiv.) Residents should be encouraged to take up the offer of home fire safety checks by the fire and rescue service (see Key Points in Part G, paragraphs 77.3 and 88.3).

9.2.36 The Inquiry may be aware that, following the Grenfell Tower fire, a Minister, Alok Sharma, advised the House that the LGA Guide remains current [C34].

BSI Publication PAS 79

9.2.37 PAS 79 is a guidance document published by the British Standards Institution (BSI) on the subject of fire risk assessment. A PAS ("Publicly Available Specification") is a privately authored standard. PAS 79 is authored by my consulting practice. I carried out the original drafting, along with all subsequent revision work.

9.2.38 The history of PAS 79 goes back to the first version in 2005, when the Workplace Fire Precautions Legislation was still in force. When the Legislation came into force, and particularly after its amendment in December 1999 (see paragraph 8.1.5), there was considerable uncertainty, on the part of Responsible Persons, enforcing authorities and fire risk assessors as to what constituted a suitable and sufficient fire risk assessment and the manner in which it should be documented.

9.2.39 C.S. Todd & Associates Ltd were contracted by BSI to draft a guidance document, setting out guidance on the process of fire risk assessment and incorporating a sample template for documenting the significant findings of the fire risk assessment. As in the case of any PAS, a steering group of sector experts was formed to liaise with my practice, and to review with us comments received when the draft guidance was circulated for wider comment within the sector. The steering group included representatives from the Institution of Fire

Engineers, the Chief Fire Officers Association, the Fire Protection Association and representatives of the business sector.

9.2.40 The original 2005 version of PAS 79 was revised in 2007 to take account of the Fire Safety Order, and a further revision was produced in 2012. Prior to the Grenfell Tower fire, BSI and ourselves agreed that a new revised version should be produced. As an aside, I would note that we had, prior to the fire, informed BSI that one topic on which we intended to draft new guidance was external cladding, though, initially, we had no particular intentions as to what specific recommendations might be made on the subject; our intention to address cladding arose from an informal request to do so from the Fire Safety Department of London Fire Brigade.

9.2.41 Subsequently, in December 2016, we had informal correspondence with LFB as to the wording that might be adopted, which related to situations in which, in buildings over 18m in height, there were good reasons to suspect that cladding might support rapid vertical fire spread or was damaged such as to expose combustible insulation.

9.2.42 PAS 79 is a very commonly used guidance document. In particular, many business organizations and other Responsible Persons, as well as fire risk assessment companies, use the template contained within PAS 79, albeit that, as PAS 79 actually sets out a process, compliance with its recommendations does not necessitate use of the sample template.

9.2.43 PAS 79 is generic, rather than specific in relation to any particular building type or occupancy. It can be, and very frequently is, therefore, used in relation to fire risk assessments for blocks of flats, though some points for consideration in the sample template are not applicable to these buildings. Following the fire at Grenfell Tower, we have received informal requests, including one request from the Fire Safety Department of London Fire Brigade, for more specific guidance to be included on fire risk assessments for housing in any future revision of PAS 79.

9.2.44 In response to these requests, our proposal is to produce a further, separate part of PAS 79, which would be specific to housing. At the time of writing this report, this matter is under consideration by BSI, with whom there have been preliminary discussions on the matter.

9.3 Enforcing Authority

9.3.1 As previously indicated, in most premises, including blocks of flats, the Fire Safety Order is enforced by the fire and rescue authority who, in London, delegate the task to London Fire Brigade. The Inquiry will note the change in philosophy towards legislation that has occurred since the Order first came into force; originally, there would have been little enforcement of the Fire Safety Order in purpose-built blocks of flats, but this changed after the Lakanal House fire in 2009.

10. HOUSING ACT 2004

10.1 The Legislation

10.1.1 I do not hold myself out as an expert on housing legislation, or the series of Housing Acts that preceded the current Housing Act 2004. Prior to the Housing Act 2004 coming into force, my experience in relation to housing legislation related mainly to section 352 of the Housing Act 1985, under which certain fire precautions could be required in houses in multiple occupation. Since the Act came into force, I have given expert advice to either local authorities or housing providers on fire safety issues arising under the Act.

10.1.2 The Housing Act 2004 brought about the current Housing Health & Safety Rating System (HHSRS) [C35]. The HHSRS is a risk-based evaluation tool to help local authorities deal with deficiencies in health and safety in dwellings, including flats within a block of flats. The HHSRS involves assessment of 29 hazards, one of which is fire. The assessment is carried out on individual dwelling units, such as individual flats, rather than the entire premises as a single building. However, the common parts are addressed in the HHSRS, since consideration is given to escape of residents through the common parts to the open air outside the block.

10.1.3 The rating system incorporated in the HHSRS comprises a quite complex point scoring system, which enables hazards to be categorized as Category 1 or Category 2. Category 1 hazards result in greater risk than Category 2 hazards. If a local housing authority becomes aware that a Category 1 or Category 2 hazard may exist, they are obliged to carry out an inspection. If it is confirmed that a Category 1 hazard exists, the housing authority has a duty to take enforcement action; in the case of Category 2 hazards, the authority has power to take enforcement action. However, the local authority cannot take enforcement action against itself (but could take action against leaseholders). Nevertheless, local authorities are expected to use the HHSRS to assess the condition of their stock and to ensure that their housing meets the Government's Decent Home Standard.

10.1.4 The guidance produced by DCLG for use by local authorities in application of the HHSRS [C35], while discussing fire risk factors, causes of fire and some key points to consider in the course of inspections, does not attempt to set standards for design of fire precautions; instead, reliance is placed on other authoritative guidance, such as ADB, albeit that it can reasonably be used only as a benchmark, since it is intended to apply only to new building work.

10.1.5 Enforcement of the Housing Act differs greatly from enforcement of the Fire Safety Order, in that proactive, routine audits or inspections are not carried out by local authorities under the Housing Act in the same way as audits are carried out by the fire and rescue service under the Fire Safety Order. Generally, enforcement is reactive in response to complaints or breaches that are brought to the attention of the local authority.

10.2 Guidance

LACoRS Guide

10.2.1 This guide was published in 2008 by the then Local Authority Co-ordinators of Regulatory Services (LACoRS). Its scope was primarily related to traditional HMOs and properties converted into blocks of flats prior to the Building Regulations 1991 coming into force, unless, fortuitously, the standards required under those Regulations were already satisfied. The guidance would not be suitable for a purpose-built tower block, but its principles could, arguably, be applied if a flat constituted an HMO, rather than be occupied by a single household.

LGA Purpose-Built Flats Guide

10.2.2 As discussed in the previous section of this report, the LGA Guide was designed to be suitable for support of not only the Fire Safety Order, but the Housing Act 2004 in relation to fire safety measures required under that Act.

10.2.3 As I discussed the LGA Guide extensively in the last section of this report, I do not further rehearse that discussion in this section.

10.3 Enforcing Authority

10.3.1 The Housing Act 2004 is enforced by the local authority, though, as noted above, the local authority cannot take enforcement action against itself. Since the Grenfell Tower fire, the DCLG advised housing authorities that they have powers on enforcement, using the HHSRS, if external cladding is found to constitute a fire hazard, apparently reflecting the opinion of the Department that such powers do not exist under the Fire Safety Order [C47, C48 and C49].

11. THE SMOKE & CARBON MONOXIDE ALARM (ENGLAND) REGULATIONS 2015

11.1 The Legislation

11.1.1 These Regulations, which came into force on 1 October 2015, have only the most minimal relevance to Grenfell Tower and are included in this report purely for completeness.

11.1.2 The Regulations require, *inter alia*, that, from 1 October 2015, private sector rented flats have at least one smoke alarm installed and that, thereafter, the landlord ensures that the smoke alarms are in working order at the start of each new tenancy. Tenants are then expected to test their own smoke alarms regularly.

11.1.3 The Regulations do not apply to RBKC because they do not impose requirements on social housing landlords, nor would the Regulations have any impact on long leasehold flats at Grenfell Tower. This is because of a perception that private sector rented properties have fewer working smoke alarms than other types of housing. Accordingly, the Regulations would only have applied to flats at Grenfell Tower that were privately rented out by a leaseholder.

11.1.4 The Regulations have been subject to criticism (in my opinion, validly), because the smoke alarm need only be of a battery-operated type, rather than having the more reliable mains power supply with a standby battery.

11.1.5 The Regulations were also criticised because they do not require a heat alarm in the kitchen and a smoke alarm in the lounge (as would normally be required under the equivalent legislation in Scotland and as recommended for all rented flats in BS 5839-6 [C36]). However, in England, these additional smoke alarms are not even required under the Building Regulations for new dwellings, even though this has been a recommendation of BS 5839-6 since 2004 and has been required for new dwellings in Scotland and Northern Ireland for some years.

11.2 Guidance

11.2.1 A short guidance note on the Regulations was published by the DCLG in September 2015 [C37]

11.3 Enforcing Authority

11.3.1 Enforcement of the Regulations is the responsibility of the local authority.

PART 3: VULNERABLE PEOPLE

12. EVACUATION OR RESCUE OF VULNERABLE PEOPLE

12.1 My instructions require that my report considers how the needs of vulnerable persons must be considered and met in accordance with the 15 duties imposed by Articles 8-22 of the Fire Safety Order. My interpretation of the term "vulnerable people" is that it should include people who, as a result of age, frailty, illness or any other factors, have reduced mobility, or lessened ability to react and respond as necessary in the event of fire, compared with the general population. Accordingly, the term does not only include older people and people with mobility problems, but also those with cognitive difficulties and those living with dementia.

12.2 This is a matter in respect of which there has been, over the last few years, a degree of controversy. However, in my opinion, the views expressed in this section of my report are consistent with the views of the vast majority of stakeholders within both the housing sector and the fire sector, including the relevant Government Departments and the fire and rescue service, as represented by the NFCC (previously CFOA). The views are also consistent with guidance given in the LGA Guide, to which I referred in Section 9.

12.3 With regard to the Articles that might have relevance to my instructions, these could, arguably, comprise Articles 8-11 and 13-15 inclusive, in conjunction with Article 17. For ease of reference, I repeat, in this section of my report (in my own words), a short summary of the requirements of each of the above Articles, along with, where appropriate, some comment on the potential relevance of each Article:

i.) Article 8 requires such general fire precautions as may be reasonably required in the circumstances of the case to ensure that the premises are safe for relevant persons who are not employees.

a) While residents' flats are outside the scope of the Fire Safety Order, the residents are relevant persons within the meaning of the Fire Safety Order. However, their inclusion within the scope of the Fire Safety Order arises from their proximity to common parts, which are within the scope of the Fire Safety Order.

b) Accordingly, for the purpose of the Fire Safety Order, consideration of the residents relates to the potential for them to be affected by a fire outside the curtilage of their own flat, rather than a fire within their own flat, which is a matter for multi-agency support, including community fire safety activities by the fire and rescue service, rather than enforcement of legislation.

c) General fire precautions include measures to reduce the risk of fire, means of escape from fire and measures to assist in use of the escape routes, means of detecting and giving warning of fire, fire procedures and measures to mitigate the effects of fire.

ii.) Article 9 requires that a fire risk assessment be carried out. The fire risk assessment is required to consider risks to relevant persons for the purpose of determining the general fire precautions that are required.

iii.) Article 10 requires that, where the Responsible Person takes fire safety measures, he does so in accordance with the "principles of prevention" (which, in relation to workplaces, are set out in the European Directives on health and safety). The principles of prevention include avoidance of risk, adapting to technical progress, developing a coherent overall prevention policy, but also giving collective protective measures priority over individual protective measures.

iv.) Article 11, broadly speaking, requires adequate management of fire safety.

v.) Article 13 requires that, where necessary, there are appropriate fire detection and fire alarm systems.

vi.) Article 14 requires adequate means of escape from fire.

vii.) Article 15 requires an adequate emergency plan, incorporating fire procedures.

viii.) Article 17 requires that fire safety measures required by the Fire Safety Order (or required by Building Regulations at the time of construction) are maintained regularly, so that they are kept in an efficient state, efficient working order and in good repair.

12.4 The risk to vulnerable people from fire is primarily related to their incentive and ability to evacuate when it is necessary to do so as a result of a fire, normally a fire within their own accommodation, but, on rare but possible occasions, a fire elsewhere in the building; the need to evacuate as a result of a fire that is not within their own flat should normally only occur if there are significant failures in measures such as compartmentation. (Risk to vulnerable people can also arise from their propensity to start a fire, such as, for example, because of smoking or forgetfulness during cooking.)

12.5 There are, therefore, two scenarios to consider, namely:

i.) A fire within a vulnerable resident's own flat (whether or not caused by the resident);

ii.) The much rarer circumstance of a threat to a vulnerable resident from a fire elsewhere in the building.

12.6 Prevention of fire within a resident's own flat, and arrangements for evacuation of a vulnerable resident when fire occurs in their flat, are not matters addressed by the Fire Safety Order. Moreover, it is difficult to envisage how this could be otherwise. The Responsible Person (e.g. freeholder or, possibly, a managing agent) is not in a position to identify the vulnerabilities of every resident, which may change, slowly or acutely, with time.

12.7 Furthermore, in a general needs block of flats, it is not practicable to nominate persons to implement fire procedures in so far as they relate to the evacuation

of a resident when a fire occurs in their flat. In effect, this would entail the provision of a sufficient number of suitably equipped staff within the building, on a 24-hour basis, to force entry into a flat and effect a rescue.

12.8 If rescue of a resident from their own dwelling is required, this is the role of the fire and rescue service. This simple truism is applicable, regardless of whether the dwelling comprises a flat in a high-rise block or a bungalow.

12.9 This does not imply that nothing can, or should, be done to address the risk to vulnerable residents from a fire within their own flat; on the contrary, this is important, since a significant number of deaths from fire occur because of fires in the dwellings of vulnerable persons. It is simply that such action is beyond the scope of the Fire Safety Order.

12.10 As I noted above, this is a matter for multi-agency co-operation to identify vulnerable persons, assess their risk and provide appropriate support, including measures to prevent the occurrence of fire, consider measures to reduce the risk in the event of fire and, in some extreme cases, install systems for suppression of fire.

12.11 Discussion of these matters is outside the scope of this current report. However, there is extensive discussion of this person-centred approach for protection of vulnerable persons from fire in guidance published by the NFCC, and drafted by my consulting practice, in the early part of 2017 [C38].

12.12 That guidance relates to "specialized housing" and is specifically related to housing for vulnerable people. However, the guidance does acknowledge that the principles of the person-centred approach recommended for specialized housing can be adopted for the protection of a vulnerable person in general needs housing, so, for example, creating an "island of sheltered housing" within a general needs block of flats.

12.13 I now turn to the scenario of the need for evacuation of a vulnerable person from their own flat as a result of a fire elsewhere in the building. In fact, compliance with the Building Regulations at the time of construction of a block of flats, and compliance with the Fire Safety Order thereafter, should ensure that this is rarely necessary as a result of the compartmentation required within blocks of flats.

12.14 As discussed in earlier sections of this report, the compartmentation (and associated design of means of escape) underpins the "stay put" strategy adopted in blocks of flats. Given that, in a general needs block of flats, there are no staff to assist with evacuation, fire safety measures that support a "stay put" strategy are actually favourable to vulnerable people.

12.15 The obvious corollary is that abandonment of a "stay put" strategy is prejudicial to vulnerable people; it implies that the building is not sufficiently safe for people to remain in their own flats whenever fire occurs in the building, so residents with the capability and capacity of the general population will be safe

if they evacuate immediately, while vulnerable people will be placed at risk, which is not conducive to the principles of equality.

12.16 From this perspective, the relevance of Article 8 is that it requires measures to reduce the risk of spread of fire (and measures to mitigate the effects of fire). Article 17 requires that such measures are maintained and kept in good repair. Arrangements for this to occur are an integral part of fire safety management, which is addressed in Article 11.

12.17 Confirmation that suitable managerial arrangements are in place and that there are no obvious concerns regarding compartmentation fall within the scope of the fire risk assessment required by Article 9 of the Fire Safety Order. In carrying out that fire risk assessment, there should be cognisance of the principles of prevention set out in Article 10.

12.18 If there is full compliance with the above Articles, the requirements of Article 13 regarding fire detection and fire alarm systems are, effectively, redundant, as not only is there no need for a communal fire alarm system, but such a system is generally undesirable.

12.19 In a block of flats with a "stay put" policy, it has always been recognized that a decision might be taken by the fire and rescue service to evacuate residents beyond the flat of fire origin. As discussed in paragraph 9.2.35, in over 99% of fires in blocks of flats in 2009-2010, no more than five persons were evacuated with the assistance of the fire and rescue service.

12.20 It is the role of the fire and rescue service to make the decision as to whether such evacuation is necessary. (Any evacuation of further residents is promoted by direct contact between fire-fighters and these residents, by knocking on flat entrance doors. However, in some unusual circumstances, my consulting practice has specified controls for the fire and rescue service to operate sounders within residents' flats for this purpose.)

12.21 When such further evacuation of residents is necessary (or when residents simply choose to leave their flat during a fire elsewhere in the building), by virtue of compliance with Article 14 of the Fire Safety Order, there will be suitably protected means of escape (which would have been required under Building Regulations) for them to do so. No special facilities are provided specifically for residents who cannot walk down a staircase. The maintenance of the means of escape is addressed by Article 17, while consideration of their adequacy is necessary in the fire risk assessment required by Article 9.

12.22 It is sometimes suggested that this reliance on the fire and rescue service is contrary to the principle in fire safety whereby occupants of buildings should be safe in the event of fire without fire and rescue service intervention; basically, buildings should "stand alone", without the involvement of the fire and rescue service in evacuation. It is correct to say that the Service is not a "fire and *evacuation* service", nor would it be acceptable for them to be regarded as such in a building with a simultaneous (or phased) evacuation strategy.

12.23 However, a block of flats is somewhat different from, for example, an hotel, in which, from the perspective of life safety, fire and rescue service attendance (and attendance time) should be irrelevant if fire safety measures are adequate. Nevertheless, in the case of a block of flats, there is no suggestion that the fire and rescue service are involved in routine evacuation in the event of a fire, quite simply because evacuation is limited to the flat in which fire occurs. If a resident cannot escape from that flat, or if a vulnerable resident cannot evacuate a flat beyond the flat of fire origin when required to do so by the fire and rescue service, the circumstances become a scenario of *rescue* (which is the role of the fire and rescue service), not routine *evacuation*.

12.24 Indeed, given that Part B of Schedule 1 to the Building Regulations cannot make requirements other than those necessary for the health and safety of people in and about buildings, it might be said that the facilities required for compliance with Requirement B5 are designed to assist the fire and rescue service efficiently to carry out any rescue required. Article 38 of the Fire Safety Order requires that such measures are properly maintained and kept in good repair. Again, verification that arrangements for this are in place is within the scope of the fire risk assessment required by Article 9 of the Fire Safety Order.

12.25 Finally, I turn to Article 15 of the Fire Safety Order, which requires that the Responsible Person formulate procedures for imminent danger and give effect to them. This is, in effect, the emergency plan, incorporating fire procedures. In a block of flats, a "stay put" strategy would form an integral part of the emergency plan.

12.26 As was clearly demonstratedin the tragic circumstances of the Lakanal House fire in 2009, it is absolutely vital that the concept of "stay put" is properly explained to residents (particularly as, for some residents, it may be non-intuitive and, of course, contrasts with the fire procedures they will experience in their place of work). In particular, it is important that residents understand that the "stay put" strategy does not apply if they consider themselves threatened by the fire (e.g. as the result of entry of smoke or fire to their flats).

ANNEX A

RELEVANT CHRONOLOGY OF GRENFELL TOWER

RBKC3 – The Chronology below is provided by The Royal Borough of Kensington & Chelsea Council to the Grenfell Tower Public Inquiry in response to Point 3 of the request for Initial Information dated 23rd August 2017

THE ROYAL BOROUGH OF KENSINGTON & CHELSEA ('RBKC')

CHRONOLOGY OF GRENFELL TOWER

Date	Event
1967	Grenfell Tower designed
1972	Construction of Grenfell Tower began
1974	Construction of Grenfell Tower completed
1 October 1979	Building Regulations application **AR/BR/W/150917** for improvements to ground floor community rooms
23 April 1980	Building Regulations application **542/80** for alterations, repairs and decorations
3 July 1980	Building Regulations application **AR/BR/2/150917** for alterations to plans previously approved, concerning the ground storey and mezzanine level play centre and community areas.
29 January 1985	Building Regulations application **AR/BR/2/150917** for the provision of three security screens and doors; the redecoration of the lobbies (incl. new self-closing fire resisting flat entrance doors); the provision of escape lighting system.
28 May 1985	Building Regulations application **16/847/85** for security improvements.
6 October 1986	Building Regulations application **B/1643/86** for alterations to decks 1 & 2, new floor staircase, toilets and general upgrading of existing structure.
18 March 1987	Building Regulations application **JS/BM** for the means of escape in case of fire after phase 2 alterations to the existing playcentre in deck level 2, including the erection of a mezzanine storey office
7 May 1987	Building Regulations application **JS/BM** for Phase 1 alterations to the existing layout of Deck-1 and Deck-2 of Playcentre
18 November 1988	Fire at Apartment 154 Grenfell Tower
18 December 1990	Building Regulations application **B/2257/90** for the refurbishment of first floor, formerly a medical centre.
14 January 1991	Building Regulations application **S/20/67** for refurbishment and alteration of the medical care centre on the first floor of Grenfell Tower
15 January 1991	Building Regulations application **S/20/67** – a Section 20 application under the London Building Acts for alterations to existing office on 1st floor level

1993	RBKC enter into Modular Management Agreement with the Lancaster West Estate Management Board
1996	RBKC enter into Modular Management Agreement with the Kensington and Chelsea Tenant Management Organisation
5 January 1997	Fire at Grenfell Tower
5 August 2009	**Planning Application PP/99/01237** Application by Mercury Personal Communications Ltd submitted for the provision of pole mounted antennae around plant room roof with the equipment located inside the plant room itself. *This Planning Application was subsequently withdrawn*
10 August 2000	**Planning Application PP/00/01959** Application for planning permission submitted for the installation of new air conditioning system on external wall to walkway
10 August 2000	Building Regulations Application **FP/00/01569** for office refurbishment and internal alterations on 1st floor.
9 October 2000	Application granted for **Planning Application PP/00/01959** - installation of new air conditioning system on external wall to walkway
26 April 2004	**Planning Application PP/00/00924** Application for planning permission submitted for the 'erection of a bricked enclosure at ground level to contain a pump for a hydraulic lift'
10 May 2004	Building Regulations Application **FP/04/00796** to erect brick-clad pump room with concrete roof.
10 June 2004	Application granted for **Planning Application PP/00/00924** - 'erection of a bricked enclosure at ground level to contain a pump for a hydraulic lift' 8 conditions imposed.
30 September 2008	Building Regulations application **BN/08/04452** to replace flat roof coverings.
30 April 2010	Fire on the 6th floor of Grenfell Tower. The fire was started deliberately in the lift lobby. No injuries were sustained.
December 2011	TMO asked to carry out an exercise to identify where major investment was needed on the housing estate which would help to regenerate the area. The TMO were also asked to provide indicative costings for the works to be carried out to Grenfell Tower.
March 2012	TMO carried out a consultation at Grenfell Tower to establish whether the items identified for investment at Grenfell Tower matched the residents' priorities.
2 May 2012	RBKC's Cabinet approve use of capital receipts from the sale of vacant basement spaces at Elm Park Gardens for investment in major improvements to affordable homes (including Grenfell Tower)
28 August 2012	**Planning Application PP/12/03163** Application submitted for planning permission for 'the refurbishment of existing Grenfell Tower including new external cladding and fenestration, reconfiguration of lower 4 levels to

	provide 7 new residential units, replacement nursery and boxing club facilities, replacement canopy, external public realm works, redevelopment and change of use of existing garages to refuse collection area and office accommodation *This Planning application was subsequently withdrawn*
18 October 2012	**Planning Application PP/12/03163** withdrawn by Applicant
19 October 2012	**Planning Application PP/12/04097** Application for planning permission re-submitted for the refurbishment of existing Grenfell Tower
May 2013	Power surges at Grenfell Tower reported by residents
July 2013	Cabinet agree a revised budget for the whole Grenfell Tower project
23 August 2013	Publication of OJEU notice
19 September 2013	Pre-Qualification Questionnaire completed by Mulalley &Co Ltd and Keepmoat Regeneration Ltd
20 September 2013	Pre-Qualification Questionnaire completed by Durkan Ltd, Rydon Maintenance Ltd and Wates Construction Ltd
29 October 2013	Executive Decision Report - Grenfell Tower Planning Application - Permission to enter into a Unilateral Undertaking
7 November 2013	RBKC's Grenfell Tower Planning Application - Permission to enter into a Unilateral Undertaking is approved by the Housing Policy Board
29 November 2013	Tenders invited for the refurbishment works in relation to the Enhancements and Improvements of Grenfell Tower
5 December 2013	Bidders conference held The following contractors were in attendance: Durkan Ltd, Rydon Maintenance Ltd, Wates Construction Limited, Mulalley & Co Ltd and Keepmoat Regeneration Ltd.
18 December 2013	Wates Construction Ltd provide notification that they cannot return a tender due to problem with resources
2014	RBKC terminates Modular Management Agreement with the Lancaster West Estate Management Board
10 January 2014	Application granted with 11 conditions for **Planning Application PP/12/04097** - refurbishment of Grenfell Tower, subject to S 106.
15 January 2014	Keepmoat Regeneration Ltd provide notification that they cannot return a tender as they would not be able to achieve a tender adjudication with sufficient confidence to address the time limitation issues from their specialist supply chain members
14 February 2014	Tenders return date for Enhancements and Improvements of Grenfell Tower
17 February 2014 – 3 March 2014	Assessment of the written and commercial submissions completed
7 March 2014	Interviews held with bidding contractors
24 March 2014	TMO Board approve Rydon Maintenance Limited as the preferred contractor
27 March 2014	Rydon Maintenance Limited's appointment receives sign off from the RBKC Board

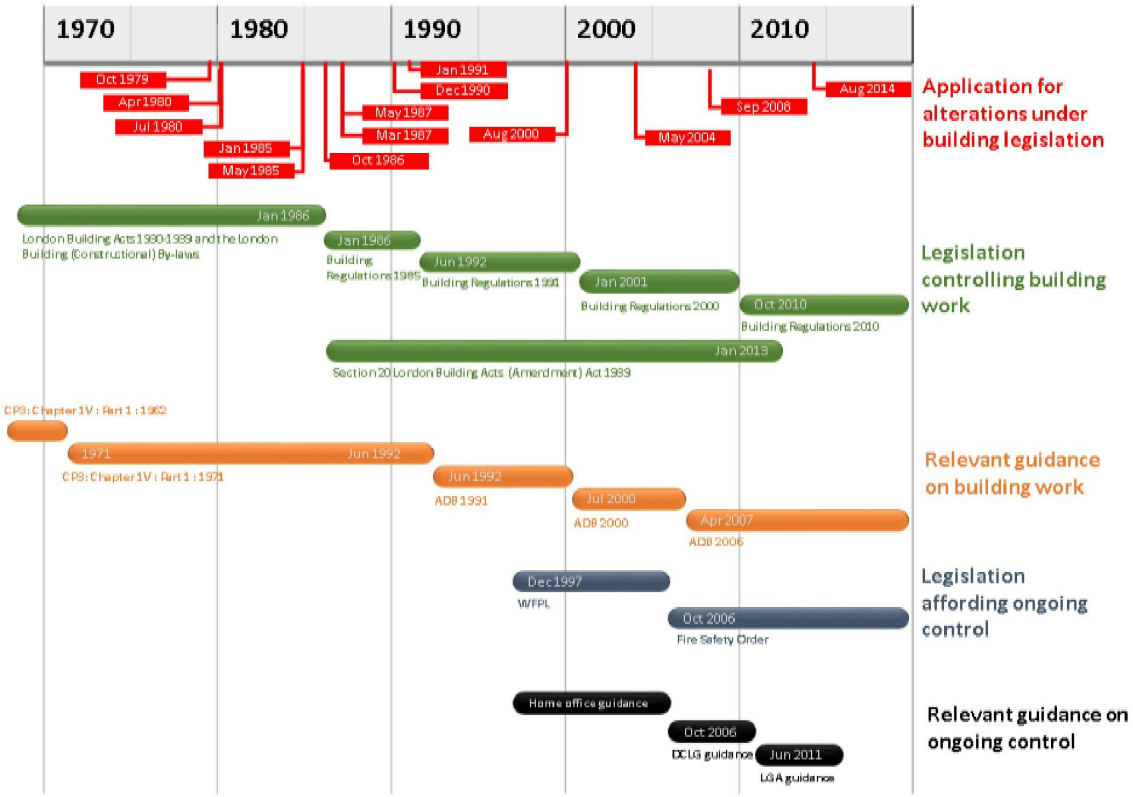
31 March 2014	Rydon Maintenance Limited advised they are the successful contractor Advised unsuccessful contractors subject to the standstill period
9 April 2014	RBKC press release regarding Grenfell Tower refurbishment contract agreed
10 April 2014	Standstill period
April 2014	TMO release a newsletter on the 'Regeneration of GT' for residents
21 May 2014	Demolition Notice **(reference DEM/14/02401)** submitted. This application was in relation to parts of the building which were removed as enabling works to facilitate the building works under **FP/14/03563.**
22 May 2014	Pre-Construction Agreement between TMO and Rydon Maintenance Ltd
2 June 2014	Refurbishment works begin at Grenfell Tower
2 June 2014	Rydon place package with CSS Recruitment for General Labour
12 June 2014	**Planning Application PP/14/03655** Application for planning permission for the change of use, nursery to residential accommodation, creating two residential units.
1 July 2014	**CON/14/04204 (2)** application made re conditions. Details required by conditions 3 (samples and materials-external faces of building) and 4 (samples and materials-windows and doors) of planning permission **PP/12/04097.**
2 July 2014	Rydon place package with Access Solutions for Scaffolding
4 July 2014	**CON/14/04204** application made re conditions. Details required by condition 11 (Construction Traffic Management Plan) of planning permission **PP/12/04097**.
25 July 2014	Rydon place package for the façade (cladding and window) with Curtain Walling Ltd Rydon place packages for the AOV System and Mechanical & Electrical with J S Wright
29 July 2014	JCT Design and Build Contract (2011 edition) as amended relating to enhancements and developments to Grenfell Tower is issued
July 2014	Mock-up of cladding available to view above south elevation walkway of Grenfell Tower
4 August 2014	**CON/14/04204** – decision made – discharged of conditions grant.
5 August 2014	**FP/14/03563** - TMO submitted a Building Regulations 'Full Plans application' reference. Description: New floor areas, new overcladding & windows, new heating system, reconfigured podium and entrance.
29 August 2014	First check carried out by RBKC Building Control on Grenfell Tower.
5 September 2014	RBKC Building Control site visit
29 September 2014	RBKC Building Control site visit

30 September 2014	**CON/14/04204 (2)** – Discharge of conditions granted
30 October 2014	JCT Design and Build Contract (2011 edition) as amended relating to enhancements and developments to Grenfell Tower is signed and dated
24 November 2014	RBKC Building Control site visit
27 November 2014	RBKC Building Control site visit
9 December 2014	**NMA/14/08597** – Non material amendment to planning permission **PP/12/04097**.
23 December 2014	**PP/14/03655** – permission granted subject to s106 agreement. There are 2 conditions and 2 informative(s).
2 January 2015	**NMA/14/08597** – decision to accept non-material amendment(s).
12 February 2015	Rydon place package for lift work with Apex Lifts
27 February 2015	**CON/15/01274** – conditions application. Details required by condition 3 (materials) of **PP/12/04097**.
19 March 2015	Rydon place package for ventilation and duct cleaning with Swiftclean Ltd
7 April 2015	Works to lift at Grenfell Tower commenced
28 April 2015	**CON/15/01274** – discharge of conditions granted in relation to **PP/12/04097.**
15 May 2015	RBKC Building Control site visit
20 May 2015	Works to lift at Grenfell Tower completed
May / June 2015	First cladding infill panels fitted
July 2015	Commencement of installation of windows
29 July 2015	New boilers delivered to basement. Boilers Installed and gas live.
17 August 2015	RBKC Building Control site visit
10 September 2015	Commissioning of new boilers serving Grenfell Tower
14 September 2015	Commencement of hall HIU (Heat Interface Units)
2 November 2015	RBKC Building Control site visit
11 November 2015	RBKC Building Control site visit
18 November 2015	RBKC Building Control site visit
22 December 2015	HIU (Heat Interface Units) installation completed
8 February 2016	RBKC Building Control site visit
24 March 2016	RBKC Building Control site visit
25 April 2016	Collateral Warranty Sub-Contractor relating to Grenfell Tower between (1) Harley Facades (Design Sub-Contractor), (2) TMO (Beneficiary) and (3) Rydon Maintenance Ltd (Contractor)
25 April 2016	Deed of Novation signed between (1) TMO, (2) Rydon Maintenance and (3) Curtins Consulting Ltd

25 April 2016	Consultancy Warranty signed between (1) Curtins Consulting Ltd, (2) TMO and (3) Rydon Maintenance Ltd
3 May 2016	Completion Certificate for smoke ventilation systems signed by PSB UK
9 May 2016	**CON/16/02854** – conditions application. Details required by condition 5 (cycle parking and storage) of planning permission **PP/12/04097.** *This application was withdrawn by the Applicant.*
9 May 2016	**CON/16/02850** – conditions application. Details required by condition 6 (hard and soft landscaping and external lighting) of planning permission **PP/12/04097.** *This application was withdrawn by the Applicant.*
9 May 2016	**CON/16/02852** – conditions application. Details required by condition 7 (landscaping and tree/shrub planting scheme) of planning permission **PP/12/04097.**
1 June 2016	RBKC Building Control site inspection
14 June 2016	Application **CON/16/02854** in relation to condition 5 of **PP/12/04097** withdrawn by Applicant.
14 June 2016	**CON/16/03802** – conditions application. Details required by condition 5 (cycle parking) of planning permission **PP/12/04907.**
1 July 2016	Application **CON/16/02850** in relation to condition 6 of **PP/12/04097** withdrawn by Applicant.
4 July 2016	**CON/16/02852** – discharge of conditions granted in relation to condition 7 of **PP/12/04097**. 1 informative re unique text.
7 July 2016	Final inspection of works carried out at Grenfell Tower. Building certificate for FP/14/03563 signed off by RBKC.
12 July 2016	**CON/16/04468** – conditions application. Details required by condition 6 (details of hard surfaces and lighting) of planning permission **PP/12/04097**.
18 July 2016	Certificate of Practical Completion
8 August 2016	**CON/16/03802 –** discharged of conditions granted. 1 informative.
23 August 2016	**CON/16/04468** – discharge of conditions granted in relation to condition 6 of **PP/12/04097.** 2 informative.
September 2016	Gas leak at Grenfell Tower
30 September 2016	National Grid cut off gas supply to parts of Grenfell Tower
9 December 2016	Cadent Gas Limited (on behalf of National Grid) commence gas main works at Grenfell Tower
14 June 2017	Fire at Grenfell Tower

ANNEX B

TIMELINE SUMMARY


1970
1980
1990
2000
2010
Oct 1979
Apr 1980
Jul 1980
Jan 1985
May 1985
Oct 1986
May 1987
Mar 1987
Jan 1991
Dec 1990
Aug 2000
May 2004
Sep 2008
Aug 2014
Application for alterations under building legislation
Jan 1986
London Building Acts 1930-1939 and the London Building (Constructional) By-laws
Jan 1986
Building Regulations 1985
Jun 1992
Building Regulations 1991
Jan 2001
Building Regulations 2000
Oct 2010
Building Regulations 2010
Legislation controlling building work
Jan 2013
Section 20 London Building Acts (Amendment) Act 1939
CP3: Chapter 1V : Part 1 : 1952
1971
Jun 1992
CP3: Chapter 1V : Part 1 : 1971
Jun 1992
AD8 1991
Jul 2000
AD8 2000
Apr 2007
AD8 2006
Relevant guidance on building work
Dec 1997
WFPL
Oct 2006
Fire Safety Order
Legislation affording ongoing control
Home office guidance
Oct 2006
DCLG guidance
Jun 2011
LGA guidance
Relevant guidance on ongoing control

ANNEX C

REFERENCES AND BIBLIOGRAPHY

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C8	BS 476-1: 1953. Fire tests on building materials and structures.
C9	BS 476-31.1: 1983. Fire tests on building materials and structures. Methods for measuring smoke penetration through doorsets and shutter assemblies. Method of measurement under ambient temperature conditions.
C10	BS 5588-1: 1990. Fire precautions in the design, construction and use of buildings. Code of practice for residential buildings.
C11	London District Surveyors' Association Fire Safety Guide No. 1: Fire Safety in Section 20 Buildings. London District Surveyors Association Publications June 1990.
C12	The Building Regulations 1985. Mandatory rules for means of escape in case of fire. Department of the Environment and the Welsh Office. HMSO 1985.
C13	BS 476-4: 1970. Fire tests on building materials and structures. Non-combustibility test for materials.
C14	BS 476-11: 1982. Fire tests on building materials and structures. Method for assessing the heat emission from building materials.
C15	BS 476-6: 1989+A1:2009. Fire tests on building materials and structures. Method of test for fire propagation for products.
C16	BS 476-7: 1997. Fire tests on building materials and structures. Method of test to determine the classification of the surface spread of flame of products.

C17	Investigation of the Fire at Knowsley Heights, Huyton, Liverpool, 5 April 1991. BRE publication 180/2/89. Building Research Establishment.
C18	Fire Note 9. Test method to assess the fire performance of external cladding systems. Published by Building Research Establishment. 1999.
C19	Select Committee on Environment, Transport and Regional Affairs First Report. Potential risk of fire spread in buildings via external cladding systems. 14 December 1999.
C20	Select Committee on Environment, Transport and Regional Affairs Second Special Report. Appendix: Government Response to the First Report of the Environment, Transport and Regional Affairs Committee on Potential Risk of Fire Spread in Buildings via External Cladding Systems. 23 March 2000.
C21	BS 8414-1: 2002. Fire performance of external cladding systems. Test methods for non-load bearing external cladding systems applied to the face of a building (superseded by BS 8414-1: 2015+A1: 2017): and BS 8414-2: 2005. Fire performance of external cladding systems. Test methods for non-load bearing external cladding systems fixed to and supported by a structural steel frame (superseded by BS 8414-2: 2015+A1: 2017)
C22	BS EN 13501: 2002. Fire classification of construction products and building elements. Classification using test data from reaction to fire tests. (Superseded by BS EN 13501-1: 2007+A1:2009)
C23	BS 9251: 2005. Sprinkler systems for residential and domestic occupancies - Code of practice. (Superseded by BS 9251: 2014)
C24	https//:*www youtube*.com/watch?v=V4KA8S4yLoI
C25	Technical Guidance Note 18. Use of Combustible Cladding Materials on Residential Buildings. Issue 0. June 2014. (Revised as BCA Technical Guidance Note 18. Use of Combustible Cladding Materials on Buildings exceeding 18m in height. Issue 1. June 2015.)
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C30	Fire Safety. An Employers' Guide. Home Office, Scottish Executive, DoE, Northern Ireland.
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C33	Fire Safety in Purpose-Built Blocks of Flats. Local Government Association. June 2011.
C34	Hansard, 26 June 2017. Volume 626. Column 435.
C35	Housing Health & Safety Rating System. Operating guidance. Office of the Deputy Prime Minister. February 2006.
C36	BS 5839-6: 2013. Fire detection and fire alarm systems for buildings - Code of practice for the design, installation, commissioning and maintenance of fire detection and fire alarm systems in domestic premises.
C37	Guidance Note. The Smoke & Carbon Monoxide Alarm (England) Regulations 2015.
C38	Fire Safety in Specialised Housing. National Fire Chiefs Council. May 2017.
C39	Building Regulations and Fire Safety Procedural Guidance. Various Editions. Currently published by DCLG.
C40	BS 9991: 2011. Fire safety in the design, management and use of residential buildings – Code of practice.
C41	BS 9991: 2015. Fire safety in the design, management and use of residential buildings – Code of practice.
C42	London Building Acts (Amendment) Act 1939 Section 20. Code of Practice. Greater London Council.
C43	Frequently asked questions relating to Grenfell. British Board of Agrément. V 0.3 22 September 2017
C44	Smoke ventilation of common access areas fo blocks of flats and maisonettes (BD2410). Final factual report. Appendix A (Review). BRE. 2005
C45	Letter from DCLG to chief executives of local authorities and housing associations, dated 18 June 2017 and signed by Melanie Dawes, Permanent Secretary
C46	Letter from DCLG to London Fire Brigade, dated 13 December 2013 and signed by Louise Upton
C47	Letter from DCLG to Local Authority Chief Executives, dated 11 August 2017, in the name of The Rt Hon Sajid Javid MP, Secretary of State for Communities and Local Government
C48	Letter from DCLG to Local Authority Chief Executives, dated 5 September 2017 and signed by Tamara Finkelstein, Director General – Building Safety Programme
C49	Letter from DCLG to Local Authority Chief Executives, dated 8 October 2017, in the name of Neil O'Connor, Director, Building Safety Programme

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ANNEX D

BODIES TO WHICH THIS REPORT REFERS

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In this annex, for the assistance of the Inquiry, I provide information on various bodies to which I refer in this report.

British Board of Agrément (BBA)

The British Board of Agrément was formed in 1966 (when it was known simply as the Agrément Board), initially to assess new building products, but subsequently to assess construction products that were not new to assist manufacturers' export potential. Its activities today comprise product approvals and certification, installer approval and inspection, and test services, all related primarily to the construction industry.

For the purpose of product certification, the BBA will accept test evidence from other accredited laboratories. In this connection, BBA do not carry out fire tests themselves, so their certificates are based on data from other accredited laboratories.

In setting out fire performance of construction products, the certificates include information on the relevant requirements of national building regulations, so that restrictions on the use of the product for the purpose of building regulations are set out in the certificate.

Further information on the status of BBA certificates with particular reference to the Reynobond product said to have been used as rainscreen cladding at Grenfell Tower can be found on the BBA website [C43].

Building Control Alliance (BCA)

The BCA styles itself as a unique non-profit making industry group made up of representatives from clients, stakeholders and all the organizations directly involved in building control in England and Wales. Its members comprise the Chartered Institute of Building, the Chartered Association of Building Engineers, the Royal Institution of Chartered Surveyors, Local Authority Building Control and the Association of Consultant Approved Inspectors.

The BCA acts as the voice of building control in consultation with Government and other bodies. Its Terms of Reference also include acting as an informed adviser, setting standards, providing information to member organizations, collaborating on research projects and communicating with member organizations for dissemination of information to the building control industry.

Building Research Establishment

In 1921, a central, Government-funded laboratory known as the Building Research Station was formed to carry out research work for the then recently formed Building Research Board, the raison d'être of which was to investigate various building materials and methods of construction suitable to use in new housing following the First World War. In 1972, following merger with the Forest Products Research Laboratory, the organization was re-named the Building Research Establishment (BRE).

In 1946, the Government's Department of Scientific and Industrial Research (DSIR) and the then Fire Offices' Committee (FOC), which represented the majority of UK insurance companies that transacted fire insurance, established the Joint Fire Research Organisation (JFRO) to carry out research on all aspects of fire prevention and fire protection. The JFRO also carried out testing of fire protection products and systems for the purpose of approval by the FOC.

In 1975, following a Government decision that, in effect, Government laboratories should not carry out work for private sector organizations, the JFRO was split up into the Fire Research Station (which was Government owned) and the Fire Insurers Research and Testing Organisation (FIRTO). Both organizations remained on the original site in Elstree.

In consequence of a Monopolies Commission report on the supply of fire insurance in 1972 (which deprecated a system of "tariffs" adopted by all FOC member insurance companies to calculate insurance premiums), the FOC was, in effect, disbanded in 1985. The provision of technical advice to the insurance industry was transferred to the newly formed Loss Prevention Council (LPC), of which FIRTO became part. The role of approval and certification of fire protection products and services was transferred to the newly formed Loss Prevention Certification Board (LPCB).

In 1994, the research and testing facilities at Elstree moved to the BRE site in Watford. At this time, BRE was still Government-funded and operated as an Executive Agency of the parent Government Department. However, BRE was privatized in 1997. Responsibility for BRE then rested with the Foundation for the Built Environment (FBE), members of which came from all aspects of industries with which BRE worked. In 2005 the FBE was re-named the BRE Trust. The BRE Trust is a registered charity with a mission to support built environment research for the public benefit.

In 1999, BRE Certification was created to certify and approve products that it tested. In 2000, BRE Certification took over the LPCB, though the LPCB "mark" is still used because of its worldwide recognition as independent verification of compliance of products and services with relevant standards.

BRE Certification was later re-named BRE Global, at which time other aspects of environment certification and rating were brought within its scope.

The profits from the BRE Group businesses are gift-aided to the BRE Trust, who in turn invest in research projects for the public's benefit, carried out by the BRE Group, other research partners and a number of universities across the UK, where the Trust fund PhD studentships.

British Standards Institution (BSI)

The British Standards Institution (BSI) is the National Standards Body of the UK. It is also a third party certification body, which undertakes certification (using the "Kitemark") of products and services. However, for the purpose of this report, the significant role of BSI is in the production of standards (typically specifications, test methods, codes of practice and guides).

British Standards are produced by technical committees, of which there are approximately 1,200. Committee members, of which there are approximately 10,900, give their time and expertise on a voluntary basis, normally acting as representatives of trade associations, professional bodies, etc., though some committees include individual experts. It is a requirement of BSI's bye-laws that all national committees are representative of the interests of users, manufacturers, Government departments and other bodies concerned with the work of the committee.

BSI also represents the UK on committees of the European Committee for Standardization (CEN) and the International Standards Organization (ISO).

With a small number of exceptions, compliance with a British Standard is not a legal requirement, though compliance can be made the requirement of a contract. In addition, compliance with British Standards is a common route to demonstrate compliance with legislative functional requirements.

In the case of many building products, compliance with a "harmonized" European Standard (published in the UK as a BS EN) is a legal requirement, by virtue of the Construction Products Regulations 2013, for placing the products on the UK market.

Local Government Association

The Local Government Association (LGA) is a politically-led, cross-party organization that works on behalf of the Local Authorities that form its members to ensure that local Government has a voice with National Government. The stated intent of the LGA is to act as its voice, working with councils to support, promote and improve local government.

London District Surveyors Association (LDSA)

The London District Surveyors Association was formed in 1987 by merger of the District Surveyors Association, which represented building control in Inner London, and the Greater London Building Surveyors Association, which comprised Chief Building Surveyors in Outer London. The LDSA published a number of fire safety guides for the benefit of building control in London, most notably, (for the purpose of this report) recommendations for measures that should be required under the (now repealed) section 20 of the London Building Acts (Amendment) Act 1939, superseding guidance produced by the Greater London Council (which was dissolved in 1986) on the same subject.

National Fire Chiefs Council (formally the Chief Fire Officers Association)

The Chief and Assistant Chiefs Fire Officers Association was formed in 1974, but later changed its name to the Chief Fire Officers Association (CFOA).

The stated aim of CFOA was to act as "*the professional voice of the UK Fire Service, assisting and supporting our members to fulfil their leadership role in improving the wellbeing of local communities in all matters relating to the Fire Services' activities*".

In effect, it represented the fire and rescue service on matters of policy, fire safety issues and engagement with Government and external bodies.

On 1 April 2017, CFOA changed its name to the National Fire Chiefs Council (NFCC). The stated aim of the NFCC is to drive improvement and development throughout the UK fire and rescue service, whilst supporting strong leadership of the UK fire and rescue service. Its activities are facilitated through various committees, such as the Protection and Business Safety Committee, which seeks to improve the provision of a standardized approach to fire protection policy, training and development to support fire and rescue services and the business community.

NHBC

NHBC began as the National House Builders Registration Council (NHBC) in 1936. NHBRC was created to tackle sub-standard building practices in house building and later established a house builder register. In 1965, the 10 year warranty scheme, for which NHBC is known today, was introduced. The organization was re-named NHBC in 1973.

In 1985, NHBC became the first private Approved Inspector to offer a building control service as an alternative to local authority building control.

NHBC produce various guidance documents and NHBC standards, the latter of which set out technical requirements, performance standards and guidance for the construction of new homes acceptable to NHBC.

ANNEX E

RELEVANT QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

C.S. TODD MSc, FIFireE, MIRM, MSFPE, CPhys, FInstP, C.Build E, FCABE, CEng, FIET

Academic Qualifications

BSc (Hons) Physics. Edinburgh University. 1974.
MSc Fire Safety Engineering. Edinburgh University. 1975.

Professional Body Qualifications

Fellow of the Institution of Fire Engineers.
Fellow of the Institute of Physics.
Chartered Physicist.
Fellow of the Chartered Association of Building Engineers.
Fellow of the Institution of Engineering and Technology (formerly Institution of Electrical Engineers).
Chartered Building Engineer
Chartered Engineer.
Member of the Institute of Risk Management.
Member of the Society of Fire Protection Engineers.

Expert Witness Experience

Colin Todd has substantial experience, over many years, as an expert witness in both civil litigation cases and in criminal prosecutions under fire safety legislation, in which he has experience in acting as an expert witness for the Defence or the Prosecution. He has prepared expert reports for over 70 cases involving prosecution, determinations by the Secretary of State or appeals against Notices, many of these within the last 11 years, following the reform of fire safety legislation in 2006. He has also prepared expert reports for numerous civil cases.

He was an expert witness for the Defence in the high profile prosecutions of Shell UK and New Look. He was a Prosecution expert witness in the landmark prosecution of Alan Foster, who received the then longest custodial sentence in the history of current fire safety legislation, following a fire at a block of flats in North Yorkshire, in which two people died. Colin also provided advice to Cornwall Fire and Rescue Service for the purpose of their prosecution case, following a fire at the Penhallow Hotel at Newquay, in which three people died, in 2007.

Following a fire at Rosepark Care Home in Lanarkshire in 2004, which resulted in the largest number of fatalities (14) in any fire since the Kings Cross disaster in 1987, Colin was appointed as a Prosecution expert witness in the prosecution of the owners of the home. Subsequently, in 2011, Colin was a Crown expert witness in the Fatal Accident Inquiry into the 14 deaths. The Sheriff Principal commended his recommendations, prepared for the Inquiry, to Scottish Ministers for careful consideration. The recommendations led to changes in building regulations and certain enforcement issues in Scotland, as well as changes to the British Standard on fire alarm systems.

Textbooks

- A Comprehensive Guide to Fire Safety. British Standards Institution. January 2008 (Previously Fire Precautions. A Guide for Management. Gower Publishing. Prior to that, Croner's Guide to Fire Safety.)

- The Design, Installation, Commissioning and Maintenance of Fire Detection and Fire Alarm Systems. A Guide to BS Code 5839-1. Current edition published by British Standards Institution in 2013. (Previous editions published in 2008, 2006 and 2003.)

- The Design of Fire Detection Installations for Dwellings.
  A Guide to BS 5839-6: 2013. Published by British Standards Institution in 2013. (Previous editions published in 2004 and 1996.)

- Publicly Available Specification (PAS) 79. Fire Risk Assessment. Guidance and a recommended methodology. British Standards Institution. 2012. (Previous editions published in 2007 and 2005.)

- Co-author Fire Protection Measures in Scottish Historic Buildings.

Professional Body Activities

- Standards Associate of the British Standards Society.

- Previous President of the UK Chapter of the Society of Fire Protection Engineers, and of the Institute of Fire Safety. (These organizations were subsequently incorporated within the Institution of Fire Engineers as the Engineering Council Division of the Institution.)

- Previous Chairman of the Membership Committee of the Engineering Council Division of the Institution of Fire Engineers, and Board Member of the Division.

- Previous Board Member of Institution of Fire Engineers (Director responsible for technical matters).

- Current member of the Technical Strategy and Advisory Group of the Institution of Fire Engineers.

- Board Member of the Fire Industry Association.

- Current Chairman of the Fire Risk Assessment Council of the Fire Industry Association.

- Fire Industry Association representative on profession-wide working group that is responsible for the competence standard for fire risk assessors.

- Current Chairman of the Institution of Fire Engineers Register of Fire Risk Assessors and Auditors Panel.

Committee Work

- Institution of Fire Engineers' representative on BSI committees FSH/12, FSH/12/1 and FSH/12/3, which are concerned with fire detection matters, and EL/1/1, which is concerned with emergency lighting standards.

- Co-opted independent expert on BSI committee FSH/12/4.

- Fire Industry Association representative on Scottish Business Engagement Forum.

- Fire Industry Association representative or co-opted expert on various working groups concerned with research or standards development in fire safety matters.

External Body Activities

For fifteen years, until 2017, Industry Sector Expert for United Kingdom Accreditation Service (UKAS), which involves providing sector expertise to UKAS in their accreditation of certification bodies (such as British Standards Institution and National Security Inspectorate) that operate third party certification schemes for fire detection and fire extinguishing products and services for design, installation, commissioning and maintenance of fire detection and fire extinguishing equipment and systems.

Awards

- National Association of Hospital Fire Officers' Certificate of Merit. Awarded on 9th May 1995 in recognition of service to the Association by promoting and encouraging the furtherance of the highest standards of fire safety in Health Service Premises.
- Association of Building Engineers. Fire Safety Award 1998. Presented in recognition of significant and valuable contribution to the fire engineering profession through education, training and standards development.
- British Standards Institution Distinguished Service Certificate. Awarded in 2014 for valuable contributions to the development of British, European and International Standards.
- IFSEC Global. Voted as one of the top 50 most influential people in security and fire for 2015 and 2016.
- IFSEC Global. In 2017, judged by a panel of experts as number one in the top ten influential people in fire safety. Those who nominated Colin for this award are quoted by IFSEC Global as providing the following bases for their nomination:

  > *"Worked on recent standards and commercially on a new sheltered housing guide. His expert witness work does help with setting of industry-accepted norms"*
  > *"Found him to be the most knowledgeable, approachable and – most importantly – jargon-free specialist who I have ever worked with"*
  > *"Knowledge spans every corner of fire safety regulation and has undoubtedly improved the safety of the British workplace"*
  > *"Massively influential with the BSI and codes of practice over a number of years."*

Training work

Presents the following training courses:

- 1 day training course on fire safety in purpose built blocks of flats.

- IFE-approved 4.5-day examinable course on fire risk assessment (now delivered on over 200 occasions, including to representatives of around 50% of fire and rescue services in the UK and all fire and rescue services in Scotland).

- 3.5-day foundation course on fire safety.

- 1 day course on fire risk assessment.
- 1 day training course on fire safety in specialized housing.
- 1 and 2 day courses on fire safety for facilities managers.
- 1 day course on fire safety legislation.
- 1 and 2 day courses on BS 9999, the code of practice for fire safety in the design, management and use of buildings.
- 1 day course on means of escape and other fire safety requirements of legislation.
- 1 and 2 day courses on fire detection and alarm system codes.
- ½ day course on BS 7273-4.
- 1 day course on the Regulatory Reform (Fire Safety) Order and the Fire (Scotland) Act

In addition, for eight years, C.S. Todd and Associates has been contracted by Scottish Government (and, subsequently, directly by the Scottish Fire and Rescue Service) to carry out the training of fire and rescue services inspecting officers of the Scottish Fire and Rescue Service. Colin is project manager for this training and delivers part of the training.

Standards Development

Responsible for drafting the following British Standards:

- BS 5839-1: 2002
- BS 5839-6: 1995
- BS 5839-6: 2004
- BS 7273-4: 2007

Led the team within C.S. Todd & Associates that drafted national guidance in 2011 on fire safety in purpose-built blocks of flats under contract to the Local Government Association, with funding from the Government's Department for Communities and Local Government. Led the team that drafted national guidance, published in 2017 by the National Fire Chiefs Council, on fire safety in specialised housing, comprising sheltered housing, extra care housing and supported housing for vulnerable people.

Professional Profile

Colin Todd graduated from Edinburgh University with an honours degree in Physics. He then undertook a one year Masters degree in Fire Safety Engineering, developing a specific interest in quantitative assessment of risk, mathematical modelling and systems engineering.

In 1975, he joined the captive insurance company of Unilever Ltd. As a member of the risk management section, he carried out regular fire surveys of Unilever premises and was responsible for providing in-house advice on loss prevention matters. He later joined the technical department of the Fire Offices' Committee (FOC), which dealt with the preparation of codes and standards on fire protection and approvals of fire protection equipment. With the

FOC, he specialized in electrical matters, and was responsible for assessing the suitability of fire alarm equipment for FOC approval. During this time, he represented the FOC on national committees including those of the BSI. (The FOC was later incorporated into the Loss Prevention Council.)

Subsequently, he joined Bowring Risk Management Ltd as an engineering consultant specialising in risk management and fire prevention surveys, and fire protection engineering projects. He left them early in 1982 to establish the independent consulting practice, C.S. Todd & Associates. This specialist practice provides consultancy services in all aspects of fire prevention fire protection and fire safety engineering.

He has undertaken project work for a number of major organizations. Examples of projects include:

- Drafting the BSI publication PAS 79 (Fire risk assessment - Guidance and a recommended methodology), which is now virtually an industry standard for those carrying out fire risk assessments.

- Drafting guidance and detailed documentation for the Ministry of Defence Fire and Rescue Service to enable the MoD to carry out and document fire risk assessments in compliance with current legislation.

- Drafting various British Standards under consultancy drafting contracts let by the British Standards Institution.

- Detailed review of fire safety measures in major computer installations and preparation of a worldwide company standard.

- Preparation of detailed proposals for means of escape in one of the largest department stores in London.

Colin has served continuously on a number of British Standards Committees, including those concerned with fire detection and alarm systems, since 1976, other than for a short period between 1978 and 1982. For over two years, the practice was sub-contracted by the Loss Prevention Certification Board to carry out assessments of applicants for approval under the LPCB certification scheme for fire alarm contractors and also surveillance of existing certificated firms; this work involved inspection of contractors' installations, and Colin was one of two consultants in the practice who undertook this work.

Colin served for two years as a member of the Board of the Institution of Fire Engineers (IFE), and he was the Director responsible for technical matters. During this time, he instituted the Technical Strategy and Advisory Group (TSAG) of the Institution, which is responsible for the Institution's policies and input to national guidance, codes of practice and fire safety legislation. Colin continues to serve on TSAG. Until 2006, Colin was also Chairman of the relevant IFE Membership Committee responsible for registering qualified engineers with the Engineering Council, having held that position since the licensing of the IFE by the Engineering Council in 1997.

Colin is greatly involved in setting standards for fire risk assessment and those who carry out such assessments. As well as drafting PAS 79, the BSI publication on this subject, he is Chairman of the IFE Panel that registers both assessors and auditors (officers of enforcing authorities, such as fire and rescue authorities), the competence of whom has been objectively assessed by the Panel. Colin is also Chairman of the Fire Risk Assessment Council of the Fire Industry Association (FIA).

C.S. Todd & Associates are well established in the training of the officers of enforcing authorities, particularly those of fire and rescue services. For eight years, the practice has had responsibility for training all fire safety inspecting officers of the Scottish Fire and Rescue Service.

Colin also is responsible for the delivery of a highly acclaimed IFE-approved 4½ day course on fire risk assessment. Many of these courses have been delivered as in-house courses for fire and rescue authorities throughout the UK. Colin has also lectured to fire service communications officers at the Fire Service College at Moreton-in-Marsh.

Colin is the author of a number of text books on fire safety, several of which are published by the British Standards Institution. He has also written numerous articles for publication in fire safety technical journals.

Published material includes the following:

The use of Radio Signals to Connect Detectors to Control Equipment.
Fire Surveyor, October 1982.

Risk Management and Insurance. Theory vs. Practice.
Fire Surveyor, August 1983.

Fire Protection Equipment.
Architects' Journal: Supplement Oct 1983.

Intelligent Fire Alarm Systems.
Fire Surveyor, April 1985.

Fire Safety: Reconciling Hardware & People.
Facilities, May 1985 (D. Tong, co-author).

Fire Precautions Legislation.
Facilities, December 1985 (D. Tong, co-author).

The Use and Selection of an Intelligent Fire Alarm System.
Published paper presented at the 1986 Ifsec International Fire Conference.

The Need for a Fire Engineering Inspectorate.
Fire Surveyor, June 1986.

New Generation Fire Alarm Systems: 1.
Facilities, June 1986 (D. Tong, co-author).

New Generation Fire Alarm Systems: 2.
Facilities, July 1986 (D. Tong, co-author).

Automatic Fire Extinguishing Systems for Computer Protection.
Facilities, September 1986.

Fire & The Bus Operator Part 1.
Fire Surveyor, October 1986.

Fire & The Bus Operator Part 2: The Loss Experience.
Fire Surveyor, December 1986.

What the Intelligent System Can Offer.
Published Paper presented at the 1987 Firex Midlands Conference.

Fire Detection Systems: The State of the Art.
Published Paper presented at 2-day course on recent developments in fire detection and suppression held under the auspices of Edinburgh University at Imperial College, London, in July 1987.

Remote Monitoring of Alarm Signals: an Overview.
Fire Surveyor, October 1987.

The Role of Sprinklers in the Fire Protection of Office Buildings.
Facilities, November 1987.

Methods of Transmitting Signals to Fire Controls.
Fire Surveyor, December 1987.

Remote Monitoring of Alarm Signals by Central Stations.
Fire Surveyor, February 1988.

Central Station Operations and Communications with Fire Controls.
Fire Surveyor, April 1988.

Fire Risk.
Paper presented at conference on Risk & Buildings: The Public Sector at Barbican Conference Centre in April 1988.

Communicating Fire.
Paper presented to AGM of National Association of Hospital Fire Officers on 13th May 1988.

Remote Monitoring of Fire Signals: The Future.
Fire Surveyor, June 1988.

In-House Central Stations: The NHS Experience.
Paper presented at FIREX South '88 in October 1988.

Raising the Fire Alarm: The case against telephones.
Fire Surveyor, October 1988.

Fire Safety in Health Care Premises – Pushing back the frontiers.
Fire Surveyor, February 1989.

Aesthetic Fire Protection: Active Fire Protection – It can be achieved.
Published paper presented at FIREX North in June 1989.

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Fire, February 1991.

Managing the Leisure Risk.
Fire Prevention 241, 1991.

Protecting Historic Buildings.
Fire Prevention 246, 1992.

Safeguarding Computer Installations from Fire.
Fire Prevention 256, 1993.

Croner's Guide to Fire Safety.
Croner Publications. (ISBN 1-85524-088-2).

Detecting Fires in Dwellings.
Fire Safety Engineering, June 1994.

Voice Alarms and Evacuation.
Fire Prevention 274, 1994.

Alarm Bells Ringing.
BSI News, September 1995.

Automatic Fire Detection in the Home.
Building Control, Issue No. 74, November 1995.

Domestic Fire Detection: The New Code BS 5839 : Part 6.
Fire Safety Engineering, December 1995.

Commissioning and Certification of Systems.
Fire Safety Engineering, August 1997.

Fire Protection Measures in Scottish Historic Buildings.
Published by Historic Scotland (Allwinkle, Bell, Franklin, Hibbard, McQue, Marchant, Marshall, Newsom and Wren, co-authors). (ISBN 1 900168 41 3).

The New British Standard for Voice Alarm Systems.
Fire Safety Engineering, April 1998.

Fire Detection – Overcoming the False Alarm Problem.
International Fire and Security Product News, June 1998.

The Design and Installation of Voice Alarm Systems.
CMP Information Limited. D. Mason, co-author. (ISBN 086213 1685).

Fire Precautions. A Guide for Management.
Gower Publishing. (ISBN 0 566 08182 2).

Probable Cause - How to logically review the hazards and risks of fire in the workplace.
Premises and Facilities Management, April 2000.

Fire Detection Codes and Standards - Current Status and the Future.
Fire Safety Engineering, July 2001.

Fire Detection and Fire Alarm Systems: The New BS Code.
Fire Safety Engineering, November 2002.

Cables for Fire Detection and Alarm Systems.
NICEIC Journal, Issue 148, Winter 2003/2004.

IFE Register of Fire Risk Assessors.
Fire Prevention 249, 2004.

The Design of Fire Detection Installations for Dwellings. A Guide to BS 5839-6: 2004.
BSI. (ISBN 0 580 44016 8).

Out of Your Depth - A question of competency.
Fire Safety Engineering, May 2006.

The Design, Installation, Commissioning and Maintenance of Fire Detection and Fire Alarm Systems. A Guide to BS Code 5839-1.
BSI. (ISBN 0 580 47626 X).

Tough Ordeal - Requirements for Competence of Fire Risk Assessors.
Fire Safety Engineering, November 2006.

PAS 79: 2007 - The Latest Guidance for Fire Risk Assessors. *Fire Safety Professional,* Summer 2007.

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