

## **RIBA Statement on Design for Fire Safety**

<https://www.architecture.com/knowledge-and-resources/knowledge-landing-page/riba-statement-on-design-for-fire-safety>

**Update - 5 July 2017**

Following the devastating and tragic fire at Grenfell Tower, the RIBA called for the immediate commencement of the delayed formal review of Building Regulations Approved Document B; a review recommended by the Coroner after the inquest into the deaths resulting from the 2009 fire at Lakanal House.

The results emerging from the current DCLG testing programme, prompted by the Grenfell Tower fire, demonstrate more than ever an urgent need to investigate the efficacy and usability of the current version of Approved Document B and related standards, as well as the building control compliance and enforcement regimes. The RIBA believes that the review of Approved Document B must be a comprehensive, transparent and fundamental reappraisal, rather than amendment or clarification, and should begin without delay to remove uncertainty, provide clarity and protect public safety.

### **RIBA Statement on Design for Fire Safety**

Originally published 22 June 2017.

Starting in the early hours of 14 June 2017 a devastating fire at Grenfell Tower in Kensington, London caused a significant number of fatalities. This document supplements statements made by the RIBA in the immediate aftermath of the tragedy and provides three new contributions:

- Commentary on the regulatory and procurement context
- Guidance for members on fire safety
- Recommendations for government.

#### **Commentary on the regulatory and procurement context**

Understandably there has been a lot of media speculation about the causes of the Grenfell Tower fire and the reasons for the huge loss of life, and a desire to seek answers as quickly as possible. The relevant authorities, including the police, will inevitably require some time to complete their investigations and the public inquiry will provide an opportunity for the fullest possible examination. This should be a full public inquiry, with evidence taken under oath and the inquiry able to order witnesses to attend by summons.

However, for a number of years concerns have been raised by RIBA members and other experts about aspects of the regulatory and procurement regime for buildings in the UK. These include:

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- Delays to the review of Approved Document B, particularly with regard to the relationship of the Building Regulations to changing approaches in the design and construction of the external envelopes of buildings.
- An Approved Document which together with related British Standards provides a very comprehensive but highly complicated regulatory framework.
- The impact of the Regulatory Reform (Fire Safety) Order 2005, in particular the introduction of a regime of fire risk self-assessment and the repeal of fire certificate legislation with oversight by the local fire authority.
- Developments in building procurement approaches which mean that the Lead Designer (architect or engineer) is no longer responsible for oversight of the design and the specification of materials and products from inception to completion of the project, with design responsibility often transferred to the contractor and sub-contractors, and no single point of responsibility.
- The virtual disappearance of the role of the clerk of works or site architect and the loss of independent oversight of construction and workmanship on behalf of the client.

The RIBA believes that future proposals for the fire safety regulatory regime should be informed by the specialist fire safety expertise of relevant professional organisations and groups, such as the Building Research Establishment, the Fire Protection Association, the Fire Safety Federation, the Institute of Fire Engineers, the Association of Specialist Fire Protection and the All Party Parliamentary Fire and Rescue Group, and also take full account of this wider set of construction industry regulatory, practice and process issues.

### **Guidance to RIBA members on fire safety following the fire at Grenfell Tower**

Requirements for fire safety are set out in Approved Documents B Vol.1 (Dwellinghouses) and B Vol.2 (Buildings other than Dwellinghouses) of the Building Regulations as appropriate, including means of warning and escape, internal fire spread and compartmentation, external fire spread and access for fire and rescue equipment. For larger, more complex buildings, designs may alternatively conform to BS 9991 Code of Practice for Fire Safety in the Design, Management and Use of Residential Buildings and BS 9999 Code of Practice for Fire Safety in the Design, Management and Use of Buildings. The fire safety options set out in the Approved Documents for compliance with Part B requirements are minimum acceptable solutions.

Section 12 of Approved Document B Vol. 2 covers the design of external walls for fire safety, and includes specific requirements for tall buildings, above 18m. External walls are elements of structure and must meet the relevant period of fire resistance. Section 12 also includes requirements to ensure that the external envelope of the building does not provide a medium for fire spread that is likely to be a risk to health or safety. It sets out requirements for external surfaces, insulation and cavity barriers and the test standards that products and components must meet, as well as the alternative method of demonstrating that the complete proposed external cladding system has been assessed according to the acceptance criteria in BRE report BR 135 "Fire performance of external thermal insulation for walls of multi storey buildings" for cladding systems using full scale test data from BS 8418-1:2002 or BS 8414-2:2005.

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In blocks of flats, effective fire compartmentation is crucial to overall fire safety. Requirements for compartment floors, compartment walls and protected shafts (for stairs, lifts, chutes, ducts and pipes) are set out in Section 8 of Approved Document B Vol. 2. Particular care is needed when undertaking works to existing blocks of flats to ensure that compartmentation is maintained.

The role of sprinkler systems in reducing the risk to life is recognised in Approved Document B Vol 2. Even when sprinkler systems are not required in the Approved Document, we recommend that clients consider the benefits of installing sprinkler systems as an additional means of providing life safety. This may be particularly relevant in projects which involve material alterations to existing buildings, where the overall building as whole may not comply fully with all aspects of the current Approved Document B Vol. 2.

The Department for Communities and Local Government (DCLG) issued letters, to all local authority chief executives and housing association chief executives, on 18 June 2017, and to owners, landlords and managers of private residential blocks in England, on 20 June 2017, communicating that in the aftermath of the tragic events at Grenfell Tower, owners and managers of residential tower blocks need to urgently carry out fire safety checks to ensure that appropriate safety and response measures are in place. In particular, it is important to identify whether any high-rise buildings incorporate panels of Aluminium Composite Material (ACM) and if so that the right type of ACM cladding has been used.

Annex A to this letter states that "On buildings with a floor over 18m above ground level, where ACM panels are identified, it is necessary to establish whether the panels are of a type that complies with the Building Regulations guidance, i.e. the core material should be a material of **limited combustibility or class A2**. A footnote clarifies: 'Material of limited combustibility as described in Table A7 of Approved Document B (Vol 2); Class A2-s3, d2 or better in accordance with BS EN 13501-1'.

Local authorities and housing associations have been asked to check residential blocks over 18m in height to identify whether they have ACM panels and to submit small samples of the panels for laboratory testing to ensure that they are of limited combustibility.

The letter from DCLG to local authorities and housing associations is available from: <https://www.gov.uk/government/publications/safety-checks-following-the-grenfell-tower-fire>

DCLG is also offering private owners of residential buildings an opportunity to test cladding on blocks over 18 metres high through arrangements put in place with the Building Research Establishment (BRE). These checks will be paid for by DCLG, and the information will be available to DCLG from BRE.

Where building owners and managers consider they may have concerns about cladding on buildings over 18 metres high, they should follow the process defined in the letter from DCLG available from: <https://www.gov.uk/government/publications/safety-checks-on-private-residential-blocks>

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### **Recommendations to the Government**

The RIBA called for a public inquiry in the immediate aftermath of this tragedy and will be calling on our members to provide technical and expert evidence to it. We wish to stress that this should be a full public inquiry, with evidence taken under oath and the inquiry able to order witnesses to attend by summons.

The public inquiry is likely to take some significant time. It would be irresponsible for the RIBA to speculate at this stage about the cause and spread of the Grenfell Tower fire and the reasons for the shocking and distressing level of loss of life.

However, the RIBA believes that certain actions should be commenced in parallel with the public inquiry process. In particular we urge the Government to:

- Commence immediately the delayed formal review of Approved Document B, which was first proposed by the Secretary of State for Communities and Local Government in 2013 in response to the Coroner's rule 43 letter following the inquest into the deaths resulting from the 2009 fire at Lakanal House.
- Re-visit the recent review of Building Bulletin (BB) 100, and in particular to consider the mandating of sprinkler systems in all new schools, in parallel with the overall review of Approved Document B.

(The design of fire safety in schools is covered by BB 100. Approved Document B states that schools will typically satisfy Part B of the Building Regulations where the life safety guidance in BB 100 is followed. A final draft consultation document for a new version of BB 100 proposed that it will no longer include an expectation that all new schools will have sprinkler systems fitted. We note that the All Party Parliamentary Fire and Rescue Group raised serious concern about both this proposed change and also the inclusion in the current version of BB 100 of alternative approaches that avoid the need for sprinkler systems.)

### **Further information**

The RIBA is actively monitoring the issues raised by the tragic fire at Grenfell Tower, and will update members on any important developments.

RIBA members with information or concerns should contact our members' information line on 020 7307 3600 or [their RIBA regional team](#).

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**Sent:** 03 July 2017 13:10  
**To:** Matthew Hutfield  
**Subject:** Aluminium composite cladding – understanding the role of BBA Certificates

Understanding the role of BBA Certificates

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## **To all Local Authorities and Housing Associations**

Dear

### **Aluminium composite cladding – understanding the role of BBA Certificates**

In the aftermath of the tragic events at Grenfell Tower, there has been much discussion in the media of the fire performance of aluminium composite cladding.

As we have provided BBA Certificates for a number of such products, including the Reynobond product used at Grenfell Tower, we felt it would be helpful to clarify the content of such Certificates with respect to fire performance.

#### **Q. What are the technical requirements for fire safety?**

The technical requirements for the fire safety of a building are set out in the national Building Regulations. For Grenfell Tower, the controlling regulations were the Building Regulations 2010 (England and Wales) (as amended).

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Building Regulations are complex and cover all aspects of construction, but for the purposes of this letter we will just focus on the regulations relating to cladding materials and fire.

### **Q. How do construction professionals demonstrate their compliance with Building Regulations?**

Ultimately, it is the responsibility of the relevant construction professionals (such as designers, contractors, installers etc.) to prove that they are complying with the Building Regulations.

Compliance is monitored by Building Control. That Building Control function can be carried out by the local authority or by an Approved Inspector. Both have very similar legal responsibilities.

A series of 'Approved Documents' set out the suggested means of showing compliance with Building Regulations. For fire safety, the relevant guidance is in Approved Document B.

The guidance contained in Approved Documents is not mandatory though. While compliance with that guidance is obviously one way of ensuring that the requirements of the Building Regulations are met, Building Control may also accept other means of demonstrating satisfactory performance.

### **Q. What does Approved Document B say about cladding on high rise buildings, and what fire tests are carried out?**

Approved Document B deals with Fire Safety and is published in two

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volumes. Volume 2 deals with the requirements for high rise buildings.

Within Volume 2, requirement B4 on 'External Fire Spread' says:

*'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'.*

In the specific case of cladding materials, the Approved Document places two requirements on claddings intended for use above 18m in height:

1. First, when tested for reaction to fire, the product as a whole must achieve either a national Class 0 rating as defined in Section 13 of Appendix A of the Approved Document, or a European equivalent (specifically, a minimum European Class of B-s3 d2 when classified according to European Standard EN 13501-1).

These two rating systems are based on different tests, which are not interchangeable, but the Regulations accept the use of either system. To achieve these ratings, the whole cladding panel is fire tested.

As a consequence of the testing carried out, the Reynobond cladding product used at Grenfell Tower was deemed to achieve a Class 0 rating.

2. In addition, the Approved Document says that *'In a building with a storey 18m or more above ground level any insulation product, filler material (not including gaskets, sealants and*

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*similar) etc. used in the external wall construction should be of limited combustibility'.*

The definition of 'limited combustibility' is set out in the Approved Document, but it is complex, including a variety of possible ways of achieving this designation (one of which is a result of A2-s3 d2 or better when classified to European Standard EN 13501-1).

The requirements 1 and 2 above are well known to building professionals.

### **Q. What about the fire tests being carried out now by BRE?**

We understand that the screening fire tests currently being carried out by BRE on samples of cladding are different to those tests described above. BRE is focusing on determining the calorific value of the cores of various types of aluminium composite claddings, after the external aluminium skin has been removed from the panel.

These tests do not relate to the requirements of the Building Regulations, but rather they are being used to indicate whether additional investigation is required by local authorities or housing associations on a case-by-case basis.

### **Q. What does a BBA Certificate say about fire safety?**

A BBA Certificate describes a product's technical performance in such a way as to give a potential specifier (such as an architect or contractor) the information they need to decide whether or not a



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product is suitable for a particular installation.

BBA Certificates for aluminium composite panels list the results of various tests, including independent fire tests. They also describe the composition of the products, and from a combination of this information, a judgement can be made about whether the requirements of the Building Regulations are met for a specific building.

Obviously, not all products are suitable for every situation, and not all products work well in combination.

It is also worth noting that a BBA Certificate is not mandatory, it is not a 'guarantee', and it does not, and cannot, relate to individual buildings.

### **Q. What is the BBA's advice now?**

The BBA recommends that you should comply with any guidance issued by DCLG or other competent authority with regards to fire testing.

If you have queries or questions about the BRE testing, please contact the BRE.

In addition, if you have any doubts concerning the conformity of an aluminium composite cladding with the requirements of the Building Regulations, please in the first instance contact the system designer or contractor who installed it.

We remain committed to providing expert and independent advice to

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Certificate holders and to you, as the users of Certificates, particularly during these early stages of understanding the causes of the tragedy. We will be supporting the relevant authorities to examine to what extent a fire risk may exist for aluminium composite cladding in situ, and what can be done to prevent a recurrence of this dreadful event.

If you wish the BBA to provide you with additional guidance as to the content of a Certificate, please contact us at

[clientservices@bbacerts.co.uk](mailto:clientservices@bbacerts.co.uk)

Yours sincerely

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Report to the Secretary of State by the Chief Fire and Rescue Adviser on the emerging issues arising from the fatal fire at Lakanal House, Camberwell on 3 July 2009



Report to the Secretary of State by the Chief Fire and Rescue Adviser on the emerging issues arising from the fatal fire at Lakanal House, Camberwell on 3 July 2009

Sir Ken Knight CBE QFSM DL  
Chief Fire and Rescue Adviser  
30 July 2009

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## Executive summary

The fire at 16.19 hrs on 3 July 2009 at Lakanal House, Sceaux Estate, Camberwell, London was by any measure a tragic event. The fire resulted in the loss of six lives, 15 residents and a firefighter were injured and London Fire Brigade were required to assist a further 40 residents to safety. Along with loss of life and injuries, over 90 families had to vacate their homes as a result of the fire.

On 6 July, the Secretary of State for Communities and Local Government, John Denham MP, requested that as the Chief Fire and Rescue Adviser, I undertook an immediate review of circumstances surrounding the fire to provide an independent overview of the investigations relating to the fire and to report back on emerging findings urgently within four weeks.

It was agreed from the outset that my review would maintain close liaison with the respective investigations to identify some early areas for consideration or further review. However, it is also important to recognise that the full investigation, leading to a Coroner's Inquest may take many months to complete and is likely to establish additional information to my early review.

It is also important that my review should not prejudice the formal investigation process. The terms of reference for my review did not extend to the operational performance of London Fire Brigade nor look at wider local authority issues such as contingency planning and therefore my comments are restricted accordingly.

The details that surround the incident, including the development and spread of fire, the firefighting operations and the management of the building remain the subject of further investigation, led by the Metropolitan Police Service. As a result of the ongoing investigations and based on legal opinion it may be prejudicial to the formal investigation process for any significant detail to be published at this time.

However, it is seen as important that the emerging findings and areas for consideration identified during the early stages of my review are published at the earliest opportunity to ensure that the appropriate authorities are able to learn from this incident and thereby reduce the risk of future fires in high rise buildings ending in such tragic circumstances.

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Fortunately a fire of this type and with such tragic outcomes is a very rare event in England or the within the United Kingdom. The vast majority of fires in homes are contained within the compartment where the fire first starts in accordance with the design requirements of the building. This fire was unusual in many ways and it is important that lessons learnt from a full investigation into this incident should be used to improve fire safety and firefighting operations in this type of building, to ensure the safety of its occupants.

I wish to record my appreciation for the cooperation of key investigators and stakeholders along with the exceptional work of my team.

A handwritten signature in black ink that reads "Ken Knight". The signature is written in a cursive style and is positioned above a horizontal line.

**Sir Ken Knight**  
**Chief Fire and Rescue Adviser**



## 1. Introduction

- 1.1 The fire at 16.19 hrs on 3 July 2009 at Lakanal House, Sceaux Estate, Camberwell, London was by any measure a tragic event. The fire resulted in the loss of six lives; 15 residents and a firefighter were injured and London Fire Brigade were required to assist a further 40 residents to safety. Along with loss of life and injuries, over 90 families had to vacate their homes as a result of the fire.

## 2. Terms of reference

- 2.1 In the immediate aftermath of the fire the Secretary of State for Communities and Local Government, John Denham MP asked the Chief Fire and Rescue Adviser, Sir Ken Knight to undertake an independent overview of the investigations into the fire, to report back on progress and emerging findings as a matter of urgency.
- 2.2 The terms of reference for the review included the fire safety matters applicable to this type of building and operational procedures and practices for this type of incident.

## 3. Scope

- 3.1 The following scope of the review was agreed:
- 3.1.1 To consider the emerging fire safety issues arising from this incident including:
- The application of the Building Regulations
  - The maintenance of the building including any upgrades and changes
  - The maintenance of the fire safety arrangements in the building
  - The advice given to the residents
  - The application of the Regulatory Reform (Fire Safety) Order
  - And the effect of the above on firefighting operations.
- 3.1.2 Whether the official investigations being undertaken relating to this incident provide all the information needed to inform future policy and procedures.
- 3.1.3 To consider the operational procedures at this incident in relation to the appropriateness of current national guidance, training and procedures.
- 3.1.4 To identify early lessons learned so they can be shared with stakeholders.

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- 3.1.5 To identify potential wider implications for government or for the fire and rescue service for example, legislation or operational guidance
- 3.1.6 It is important to recognise that the terms of reference did not extend to the review of the operational performance of London Fire Brigade
- 3.2 It should also be recognised that the full investigations will lead to a judicial process including a Coroner's Inquest and therefore this review is not intended to prejudice the outstanding investigations.

### **4. Review methodology**

- 4.1 The Chief Fire and Rescue Adviser (CFRA) and the CFRA review team arranged and attended meetings with a range of internal and external stakeholders including:
  - London Fire Brigade
  - Southwark Council
  - Harriet Harman MP – Constituency MP for Southwark
  - Metropolitan Police Service
  - Health and Safety Executive
  - Local councillors and London Assembly members.
  - Residents and tenants' representatives
- 4.2 The review team examined a range of documents including:
  - Current national operational guidance relating to high-rise, incident command and breathing apparatus
  - Legislation relevant to this incident
  - Media reports
  - Initial investigation reports
  - Reports relating to similar fires in the UK and overseas
  - Select Committee reports
- 4.3 To assist the Chief Fire and Rescue Adviser in producing his report a small technical panel was assembled to review the fire safety considerations following the fire at Lakanal House.

## 5. Emerging issues and areas for consideration

### 5.1 Investigations

#### 5.1.1 Emerging issues

It is understood that the Metropolitan Police Service, Health and Safety Executive and LFEPA are considering areas of investigation and whether potential conflict arises where the body responsible for the enforcement of legislation may also be also subject to investigation.

In the case of the Fire Safety Order it is recognised that the London Fire and Emergency Planning Authority (LFEPA) is able to transfer its responsibility for the investigation and enforcement of the Fire Safety Order to the Health and Safety Executive under Article 26(3) of the Order.

The scope of the ongoing investigation currently appears to embrace the wider issues arising from this incident.

#### **5.1.2 Areas for consideration**

- *That the Chief Fire and Rescue Adviser will maintain strategic contact with the key investigators regarding the progress and emerging findings, which may have implications for policy and/or national guidance.*
- *That the Coroners' Inquest should be sufficiently wide in its scope to enable lessons learnt from this incident to be used to improve fire safety and firefighting operations to ensure the safety of the occupants of this type of building.*

### 5.2 Advice to occupants

#### 5.2.1 Emerging issues

There is a long and established principle that the design and construction of high rise buildings enable the occupants adjacent to the immediate fire area to make their way to a place of safety, while other occupants can remain safely within their homes. However, these principles do require that a satisfactory level of passive and active fire safety systems are installed and maintained and the occupants are fully conversant with the fire safety arrangements of the building.

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While including the fire safety arrangements in tenancy agreements may fulfil the legal obligations regarding advice to tenants/residents, it is unlikely to be the most effective way to ensure that all the occupants are conversant both with actions to be taken and the fire safety strategy behind these arrangements. Ensuring that the tenants are aware of the importance of issues such as fire-resisting doors, self-closing devices, escape routes and that common areas are maintained and kept clear, is as important as their actions if a fire occurs.

There is a need for more innovative ways of ensuring tenants are aware of the fire precautions in social housing. Engagement through the tenants/residents association has the potential to form an important bridge between the housing authority and the tenants/residents themselves. This is recognised by the London Borough of Southwark which is actively considering different ways of improving tenant awareness and their engagement in fire safety matters.

It is apparent that the fire safety advice available to occupants in some high-rise residential buildings is not consistent.

### **5.2.2 Area for consideration**

- *Consideration should be given to undertaking a review of information available nationally for occupants of high-rise residential premises to ensure that there is a consistency of guidance in terms of what actions should be taken when a fire occurs within their building. Any review should be undertaken with key stakeholders including the fire and rescue service, housing associations, landlords and tenants' representatives.*

## **5.3 Internal and external fire spread**

### **5.3.1 Emerging issues**

Although the cause of the fire at Lakanal House has been identified, the fire development and fire spread is unusual. The initial investigations have not as yet been able to identify the mechanisms that caused the fire development or spread.

The principles of fire safety and firefighting in the UK are based on containment of the fire within a compartment. It is therefore important that there is a full understanding of how and why the fire developed and spread to ensure that this principle remains sound.

It is anticipated that the outcome of the investigations will inform the question of the internal passive fire protection and external fire spread and will be used to provide appropriate guidance on modification and refurbishment of premises and to improve operational guidance to fire and rescue services.

**5.3.2 Area for consideration**

- *Depending on the outcome of the full investigation, if the information proves to be inconclusive or insufficient it may be necessary to commission further specific research.*

**5.4 Passive fire protection****5.4.1 Emerging issues**

The protection incorporated into the design and fabric of the building is the fundamental basis for reducing the spread of fire and loss of life.

In undertaking major changes and refurbishment work in such buildings, the significance of the passive fire protection is required to be clearly specified and understood by the main contractor for the work, as well as those installing or altering the protection.

It remains important that products used in fire safety protection meet recognised industry specifications and that they are installed by suitably competent people who fully recognise the significance of the fire safety measures being installed.

**5.4.2 Area for consideration**

- *The passive fire protection industry produces a comprehensive range of guidance and technical information on passive fire protection products, installation and standards. Consideration should be given to reminding specifiers, main contractors and installers and those responsible for building safety management of the need to use the available information when undertaking works where measures that form passive fire protection are removed, altered or replaced.*

**5.5 Active fire protection****5.5.1 Emerging issues**

Active fire protection measures offer a valuable part of the holistic fire safety measures in the building to prevent loss of life and spread of fire.

Early detection and warning of fire is essential to ensure that occupants at immediate risk are able to safely leave their home.

There is significant evidence of the effectiveness of fire suppression systems in controlling fire and fire spread in buildings. It has been a requirement since 2006 that all new

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residential buildings over 30m in height must be fitted with a fire suppression system, therefore if a building such as Lakanal House were built against today's standards a fire suppression system would be required.

It is not considered as practical or economically viable to make a requirement for the retrospective fitting of fire suppression systems to all current high-rise residential buildings. However it is a matter for individual housing owners and landlords to decide if automatic fire suppression is required as part of their fire safety strategy based on their fire risk assessment.

If the fire at Lakanal House had occurred during the hours of darkness there is a concern that the means of escape within common areas may not be provided with sufficient illumination or directional escape signage for residents. Within current guidance there is an expectation for such provision, however it appears that this may not be fully understood by the responsible person.

Although major works had recently been completed in Lakanal House, including the fitting of fire detection and alarm systems in individual dwellings, evidence suggests that other high-rise residential buildings may not be afforded the same level of protection.

### **5.5.2 Areas for consideration**

- *As an interim measure consideration should be given to fitting battery operated smoke detectors in all existing high-rise social housing occupancies at each level of the dwelling in compliance with current standards.*
- *Consideration should be given at the time of major refurbishment or upgrading of the electrical installation, to ensuring that the active fire protection systems are upgraded as appropriate, in particular:*
- *the installation of hard wired smoke detector(s) at each level within each dwelling in compliance with current standards and,*
- *using the existing knowledge and emerging technology now available, consideration should be given to providing a link between the individual dwelling and an alarm receiving centre ensuring prompt and accurate call to the fire and rescue service. Such systems also allow for a manual, pre-determined delay of the call transmission to prevent unwanted false alarms.*
- *Consideration should be given to reminding local housing authorities of their responsibilities for fire safety management within shared and common parts of a building, with an emphasis on the need for suitable illumination, including provision of emergency lighting and signage to assist occupants to escape safely in case of fire.*

## **5.6 Operational guidance**

### **5.6.1 Emerging issues**

The Chief Fire and Rescue Adviser team has conducted a preliminary review of the national operational guidance relating to high-rise buildings, the incident command system and breathing apparatus procedures.

From this preliminary review there appears to be no urgent or immediate requirements for current national operational guidance to be significantly changed. However, there are some indications that this guidance will need further clarification and additional information particularly in the areas of simultaneous multi-level fires, fire behaviour within high-rise buildings, safe systems of work and systematic search procedures.

The premises information available for effective firefighting is obtained through the gathering of information from visits undertaken by fire and rescue services under the auspices of section 7(2) d of the Fire and Rescue Services Act 2004.

In complex buildings it is appropriate that details of the layout and risk associated with the building are available at the incident for command and control purposes.

### **5.6.2 Areas for consideration**

- *Consideration should be given to revising and refreshing current national Operational Guidance once the full operational findings are available. This may require some additional research to ensure that the most appropriate information is used to inform the revision of the Guidance.*
- *The Chief Fire and Rescue Adviser has a responsibility within the Fire and Rescue National Framework to develop and produce Operational Guidance and it would therefore be appropriate that this revision is undertaken through this arrangement.*
- *Consideration should be given by fire and rescue authorities as to how risk-critical information on complex and high rise buildings is made readily available to operational firefighters at an incident, e.g. on site in secure premises information boxes, mobile data systems.*

### 5.7 Regulatory Reform (Fire Safety) Order 2005

#### 5.7.1 Emerging issues

There is a requirement in the Fire Safety Order (FSO) to appoint one or more competent persons to assist the responsible person in undertaking the preventable and protective fire safety measures within premises. However, there is no similar requirement for a competent person to be appointed to assist in making a suitable and sufficient risk assessment.

It is important that assurance be given to both the responsible person for the premises and the enforcing authority that a risk assessment has been undertaken by a competent person, particularly in relation to high risk premises.

#### 5.7.2 Areas for consideration

- *Consideration should be given to conducting a review as to how the responsible person under the Regulatory Reform (Fire Safety) Order 2005, can be assured that their assessment of risk is suitable and sufficient, particularly where the premises is of a higher risk. This assurance is particularly important where the responsible person may be relying on using someone else to undertake the risk assessment*
- *Where appropriate, the current Fire Safety Order guidance would need to be amended accordingly.*

### 5.8 Decent Homes programme

#### 5.8.1 Emerging issues

Lakanal House was subject to a major refurbishment under the Communities and Local Government Decent Homes programme.

The Decent Homes programme does not cover all aspects of the building nor is it funded to do so. However, in carrying out improvements under the Decent Homes programme, local authorities can use the opportunity to do additional work.

The guidance on Decent Homes states that all dwellings should be free from category one hazards as assessed under the Housing Health and Safety Rating System. This system is a tool to assess the potential health and safety risks in homes, and includes an assessment of the risk from fire. Category 1 hazards include the most significant risks that can result in death or major injury and health issues.



Decent Homes focuses on the dwelling itself – it is not concerned with the common parts of buildings and so these aspects of fire safety would not be included. While the Housing Health and Safety Rating System does take into account the whole building, the current guidance for this process does not appear to provide adequate advice on the fire safety protective measures required in dwellings nor is there reference to fire safety guidance or the requirements under the Regulatory Reform (Fire Safety) Order 2005.

Guidance on fire safety in certain types of housing was made available to enforcers and landlords in July 2008 by the Local Authority Coordinators of Regulatory Services (LACORS), the Chartered Institute of Environmental Health (CIEH) and the Chief Fire Officers Association (CFOA), following initial guidance on the Housing Health and Safety Rating System issued by the Office of the Deputy Prime Minister in February 2006.

The reforms to the council housing finance system set out in the consultation document *Reform of Council Housing Finance* issued by the Housing Minister John Healey MP, on 21 July, includes the commitment to improve the common areas of estates and will ensure that there is sufficient funding in the new system to do so. The aim in setting up the self-financing system is to ensure that it delivers in the future the investment needed to sustain and maintain the existing stock of council homes.

### 5.8.2 Areas for consideration

- *Consideration should be given to reviewing criteria requirements within the Housing Health and Safety Rating System to ensure that the safety critical elements of passive and active fire safety measures are included as well as the need to include an assessment of the fire protection measures necessary in the common parts of the building.*
- *It is considered beneficial to undertake a review of the relationship between the Decent Homes programme and the Housing Health and Safety Rating System to ensure that the requirements under the Regulatory Reform (Fire Safety) Order 2005, to carry out a suitable and sufficient risk assessment, are consistent and refer to the availability of guidance on fire safety in certain types of housing issued by Local Authority Coordinators of Regulatory Services, the Chartered Institute of Environmental Health and the Chief Fire Officers Association.*
- *Consideration should be given to reminding local housing authorities and fire and rescue authorities of the expectations for strategic, tactical and individual joint consultation on fire safety issues as contained within Local Authority Coordinators of Regulatory Services guidance.*
- *Consideration should be given to reviewing the weighting that fire safety is given under the Decent Homes programme to include fire safety matters such as:*
  - *The installation of hard wired smoke detector(s) at each level within each dwelling in compliance with current standards.*
  - *Consideration given to providing a link between the individual dwellings and an alarm receiving centre.*
  - *Maintaining the inherent passive fire safety principles of the building e.g. fire resisting doors, fire stopping provision, smoke ventilation.*
- *Consideration should be given to including the fire safety features required in the common areas of high rise blocks of flats residential dwellings in the outcomes of the Reform of Council Housing Finance consultation.*

## 6. Conclusions

- 6.1 Fortunately a fire of this type and with such tragic outcomes is a very rare event in England or the UK. The vast majority of fires in homes are contained within the compartment where the fire first starts. This fire was unusual in many ways and lessons learnt from further investigation into this incident must be used to improve fire safety and firefighting operations in this type of building to ensure the safety of its occupants.
- 6.2 At the outset of the review it was recognised that the outcome would be limited to emerging findings rather than an anticipated outcome of the full investigation.
- 6.3 Nevertheless I am confident that within the time available the significant early issues have been identified together with associated areas for consideration arising from the findings.
- 6.4 I hope that the scope of the subsequent Coroners' Inquest will be wide enough to cover all aspects of this tragic incident to satisfy both the concerns of the local community and to ensure that lessons can be learnt for the future.
- 6.5 I am content that the request made by the Secretary of State is discharged by this report.

## APPENDIX 9 - LITERATURE REVIEW

### Inner Southern District of Greater London

The Coroner's Court  
1 Tennis Street  
London SE1 1YD

Her Honour Frances Kirkham CBE  
Assistant Deputy Coroner

28 March 2013

The Rt Hon Eric Pickles MP  
Secretary of State for Communities and Local Government  
Department of Communities & Local Government  
Zone G9, 4<sup>th</sup> floor  
Eland House  
Bressenden Place  
London  
SW1E 5DU

Dear Secretary of State

#### **Lakanal House fire 3 July 2009**

I write concerning the inquests into the tragic deaths of Catherine Hickman, Dayana Francisquini, Thais Francisquini, Felipe Francisquini Cervi, Helen Udoaka and Michelle Udoaka, who all died in a fire at Lakanal House, Camberwell, London, on 3 July 2009.

The jury brought in Narrative Verdicts in respect of each of the deceased.

I write to you pursuant to Rule 43 of the Coroners Rules (as amended) which provides:

“(1) Where

- (a) a coroner is holding an inquest into a person's death,
- (b) the evidence gives rise to a concern that circumstances creating a risk of other deaths will occur, or will continue to exist, in the future; and
- (c) in the coroner's opinion, action should be taken to prevent the occurrence or continuation of such circumstances, or to eliminate or reduce the risk of death created by such circumstances,

the coroner may report the circumstances to a person who the coroner believes may have power to take such action.”

I announced at the end of the inquests that I would be sending a report to you, as evidence adduced at the inquests gave rise to concern of the type identified in Rule 43. I believe that your Department has power to take action as set out in this report.

Different sections of this report will be relevant to different sections of your Department. I ask you, please, to ensure that the report is drawn to the attention of all relevant sections.

## **APPENDIX 9 - LITERATURE REVIEW**

### **Fire safety, fire fighting and search and rescue**

Evidence adduced at these inquests indicates that there is insufficient clarity about advice to be given to residents of high rise residential buildings in case of fire within the building. It is recommended that your Department publish consolidated national guidance in relation to the “stay put” principle and its interaction with the “get out and stay out” policy, including how such guidance is disseminated to residents.

It is recommended that consideration be given to review of Generic Risk Assessment 3.2 “High Rise Firefighting” to provide consolidated national guidance as to the following:

- matters which should be noted by fire brigade crews making familiarisation visits and visits pursuant to section 7(2)(d) Fire and Rescue Services Act 2004, including the gathering of information regarding high rise residential buildings with unusual layouts, and access for aerial ladder platforms and other specialist vehicles at an incident
- awareness that fire can spread downwards and laterally in a building
- awareness of the risk of spread of fire above and adjacent to a fire flat
- awareness that insecure compartmentation can permit transfer of smoke and fire between a flat or maisonette and common parts of high rise residential buildings, which has the potential to put at risk the lives of residents or others.

It is further recommended that Government give consideration to requiring high rise residential building owners or occupiers to provide relevant information on or near the premises, such as premises information boxes or plates. Such information must be accessible by and tailored to the requirements of the fire and rescue service and kept up to date by the premises owner or occupier.

### **Fire risk assessments pursuant to Regulatory Reform (Fire Safety) Order 2005**

The evidence adduced indicated that, notwithstanding publication of your Department’s 2006 guide (Fire safety Risk, sleeping accommodation) and of the Local Government Association’s August 2011 guide, there remains uncertainty about the scope of inspection for fire risk assessment purposes which should be undertaken in high rise residential buildings. Evidence was adduced which indicated that inspection of the interior of flats or maisonettes in high rise buildings was necessary to enable an assessor to identify possible breaches of the compartment which have the potential to impact on the fire safety of the resident or others.

It is recommended that Government provide clear guidance on

- the definition of “common parts” of buildings containing multiple domestic premises
- inspection of a maisonette or flat which has been modified internally to determine whether compartmentation has been breached
- inspection of a sample of flats or maisonettes to identify possible breaches of the compartment.

## **APPENDIX 9 - LITERATURE REVIEW**

### **Retro fit of sprinklers in high rise residential buildings**

Evidence adduced at the inquests indicated that retro fitting of sprinkler systems in high rise residential buildings might now be possible at lower cost than had previously been thought to be the case, and with modest disruption to residents.

It is recommended that your Department encourage providers of housing in high rise residential buildings containing multiple domestic premises to consider the retro fitting of sprinkler systems.

### **Building Regulations and Approved Document B**

During these inquests we examined Approved Document B (2000 edition incorporating 2000 and 2002 amendments) ("AD B"). I am aware that AD B has subsequently been amended, and believe that a further amendment is due to be published soon. The introduction to AD B states that it is "... intended to provide guidance for some of the more common building situations". However, AD B is a most difficult document to use. Further, it is necessary to refer to additional documents in order to find an answer to relatively straightforward questions concerning the fire protection properties of materials to be incorporated into the fabric of a building.

It is recommended that your Department review AD B to ensure that it

- provides clear guidance in relation to Regulation B4 of the Building Regulations, with particular regard to the spread of fire over the external envelope of the building and the circumstances in which attention should be paid to whether proposed work might reduce existing fire protection
- is expressed in words and adopts a format which are intelligible to the wide range of people and bodies engaged in construction, maintenance and refurbishment of buildings, and not just to professionals who may already have a depth of knowledge of building regulations and building control matters
- provides guidance which is of assistance to those involved in maintenance or refurbishment of older housing stock, and not only those engaged in design and construction of new buildings.

### **Response**

Rule 43A of the Coroners Rules requires that you give a written response within 56 days beginning with the day on which the report is sent. If you are unable to respond within that time, you may apply to me for an extension. The response is to contain details of any action that has been taken or which it is proposed will be taken whether in response to this report or otherwise, or an explanation as to why no action has been taken.

As required by rule 43, I shall send a copy of this report to the Lord Chancellor.

Yours sincerely



Frances M Kirkham

## APPENDIX 9 - LITERATURE REVIEW



### Department for Communities and Local Government

Her Honour Frances Kirkham CBE  
Assistant Deputy Coroner  
Inner Southern District of Greater London  
The Coroner's Court  
1 Tennis Street  
London SE1 1YD

The Rt Hon Eric Pickles MP  
*Secretary of State for Communities and Local  
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20 MAY 2013

*Dear Madam*

Thank you for your letter of 28 March 2013, written under Rule 43 of the Coroners Rules (as amended), concerning the inquests into the deaths of Catherine Hickman, Dayana Francisquini, Thais Francisquini, Felipe Francisquini Cervi, Helen Udoaka and Michelle Udoaka who all died tragically in the fire at Lakanal House on 3 July 2009.

First, I think it only right that, on behalf of myself and my Department, I take this opportunity to express my sincere condolences to those who so sadly lost loved ones in this incident. I very much appreciate your efforts to ensure that the inquests were conducted in such a way that allowed the circumstances surrounding the fire to be rigorously and independently examined, and those of the members of the jury, who were so diligent in framing their narrative verdicts.

I have considered carefully your recommendations and offer the following in response to the detailed issues you have raised.

The first point I would make is that, following the fire, officials from my Department worked closely with the Local Government Association to identify the concerns of housing providers across all tenures about delivering and ensuring the safety of their residential buildings. We provided the Local Government Association with grant funding to develop, in partnership with the housing sector and the enforcing authorities, detailed national guidance on the risk assessment process and the range of issues to be considered if the risk of fire to residents of purpose built blocks of flats, including high rise, is to be assessed and managed adequately.

The guidance, published in summer 2011, takes a practical approach to ensuring that those responsible for the safety of residents and others in purpose built blocks can take a comprehensive and pragmatic approach to managing risk effectively within the context of the Housing Act 2004 and the Regulatory Reform (Fire Safety) Order 2005.

The guidance is available on both the Local Government Association's website and on the fire safety pages of the Government's website. This fulfils my duty (under article 50 of the

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Fire Safety Order) to ensure that such guidance as I consider appropriate is available to assist responsible persons to discharge their duties under the Fire Safety Order. Of course, in this instance, the scope of the guidance has been drawn more widely to include the requirements of the Housing Act. It addresses in some detail the rationale for the stay-put principle 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 accessing individual flats for the purpose of inspecting the effectiveness of compartmentation and other fire safety measures should be considered.

The housing sector's feedback on the impact of this guidance has been very positive, and I consider that it addresses sufficiently those issues which have been highlighted in your Rule 43 reports. However, we are not complacent. I fully support the Local Government Association's proposal to consider, with my Department and other partners, whether there are any implications for the guidance arising from your Rule 43 recommendations which may need to be addressed in a revised document. My officials are engaged with the Local Government Association on this matter.

On your other recommendations, I can confirm that my Department's Generic Risk Assessment guidance on High Rise Firefighting is under review at present and will be informed by all of the recommendations you have made in your Rule 43 recommendations. It will also include advice to Incident Commanders to inform decisions on evacuation, should it become clear during an incident that the 'stay put' principle is no longer tenable.

We have considered your recommendation that those responsible for residential high rise buildings be required to provide relevant information for operational purposes in premises information boxes. However, on balance we consider that a regulatory requirement is unnecessary and disproportionate. A range of options are available to ensure relevant data from inspections under s7(2)(d) of the Fire and Rescue Services Act is captured and made available to firefighting crews, including through mobile data terminals in fire appliances.

Where additional or specific information is considered necessary to assist firefighting crews, fire and rescue authorities should work closely with individual building owners to ensure the provision and maintenance of readily accessible, on-site information.

You have suggested that my Department encourages providers of housing in high rise multi-occupied residential buildings to consider the retrofitting of sprinklers. My officials have recently written to all social housing providers about this following the Rule 43 recommendation from the Coroner of the recent inquests into the firefighter deaths which occurred at Shirley Towers in Southampton in April 2010, and I attach a copy of that letter for information.

Finally, in relation to Building Regulations, I have noted your concerns about the difficulties that some of those involved in the Inquests had with the interpretation of Approved Document B. I can assure you that my Department is committed to a programme of simplification. However, the design of fire protection in buildings is a complex subject and should remain, to some extent, in the realm of professionals.

We have commissioned research which will feed into a future review of this part of the Building Regulations. We expect this work to form the basis of a formal review leading to the publication of a new edition of the Approved Document in 2016/17. The revision would be drafted in accordance with a new 'style guide' for Approved Documents, aimed at



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ensuring the guidance is capable of being more easily understood, and that the need to cross-reference is reduced.

In the meantime, however, I have commissioned my officials to review the current guidance issued by providers of Competent Person Schemes for window installers. The review is intended to ensure that members of these schemes are fully aware of the scope of these schemes and the fire safety measures which should be addressed, and is I believe, an appropriate response to the problems that came to light during the Inquests.

I am grateful for your recommendations and can assure you of my commitment to ensuring that the safety of residents in high rise building continues to be a priority.

*Jocelyn*  
*Eric Pickles*

**RT HON ERIC PICKLES MP**

## APPENDIX 9 - LITERATURE REVIEW



Her Honour Frances Kirkham CBE  
Assistant Deputy Coroner  
The Coroner's Court  
1 Tennis Street  
London  
SE1 1YD

Chief Executive's Office  
Direct Dial : 020 7525 7171

23 May 2013

Dear Ms Kirkham

**Re: Lakanal House fire 3 July 2009 – response to Rule 43 letter**

Thank you for your letter of 28 March 2013 pursuant to Rule 43 of the Coroner's Rules (as amended), concerning the inquests into the tragic deaths of Catherine Hickman, Dayana Francisquini, Thais Francisquini, Felipe Francisquini Cervi, Helen Udoaka and Michelle Udoaka at Lakanal House on 3 July 2009.

I would like to take this opportunity to thank you for your thorough review of the events relating to the Lakanal fire and also the jury for their patience and diligence in reviewing the evidence from over 100 witnesses and technical experts.

We welcome your recommendations, and while some have already been completed or are already progressing, I have set out below the council's responses to each of them. Your recommendations are in bold and the council's responses are in italics:

### **Information and guidance to occupiers of flats and maisonettes in high rise buildings**

*There is no set definition of 'high rise' so we will apply your recommendations to blocks above 30m, equating to those of 10 storey and above. This is supported by the guidance set out in BS 9991:2011 relating to the installation of sprinklers in new buildings, where it says "All buildings with a floor higher than 30m above ground should be fitted with sprinklers".*

*We will also apply your recommendations to any lower height but complex blocks, i.e. those with more than one means of escape, along with the council's sheltered housing schemes and temporary accommodation hostels which house our most vulnerable residents. In our responses below, references to "high rise" blocks will include these further types of accommodation.*

Chief Executive's Office, Southwark Council, PO Box 64529, London SE1P 5LX  
Switchboard – 020 7525 5000 Website – [www.southwark.gov.uk](http://www.southwark.gov.uk)  
Chief Executive – Eleanor Kelly

## **APPENDIX 9 - LITERATURE REVIEW**

**It is recommended that, in relation to residents of high rise residential buildings, your authority:**

**Demonstrate to those who are about to enter into occupation of a flat or maisonette the fire safety features of their dwelling and of the building generally; this should include walking residents through relevant features such as escape balconies and demonstrating how to open fire exit doors and where these lead.**

*Initially the in-house fire safety team will undertake an assessment of all high rise and complex blocks to develop information and guidance packs in relation to escape routes. This will be undertaken on an area basis. Upon completion packs will be passed to the lettings teams in Operations (training will be provided by the fire safety team at the point of handover). The lettings team will incorporate this information into the 'welcome pack' and will go through the guidance and walk through the relevant features with new tenants at the point of sign up. Tenants will be asked to sign to confirm they have had and understand the advice. The signed sheet will be stored on the council's electronic document management system, Info@Work, to ensure we have a record.*

*In particularly complex buildings, we will consider making referrals to the fire safety team to provide demonstrations to residents.*

*The resident officer for the building visits each new tenant within the first 6 weeks after they take occupation. At this visit the resident officer will ask the new tenant to confirm they have had information and guidance in relation to fire and again a signature will confirm this. This record will also be stored on Info@Work.*

*Throughout this programme the fire safety team will provide fire safety support to the current lettings process by participating in the works carried out in empty properties prior to re-letting, viewings and sign-ups where appropriate.*

*We will also share these block specific literature/packs with all existing residents in the blocks and consider how best to provide demonstrations to existing residents where appropriate.*

**Give residents clear guidance as to how to react if there is a fire in the building, namely to explain whether they should attempt to get out of their flat or maisonette and leave the building, or whether they should remain in their flat; that guidance should explain clearly how to react if circumstances change, for example, if smoke or fire enter their flat or maisonette.**

*Fire action notices (FANs) that advise residents and visitors what to do in a fire event are being installed in common areas as part of the current fire safety works (which take in all buildings of 5 storeys or above).*

*The council will revisit fire safety works done prior to the approval of the current FANs to bring these up to date, and we will increase the number of FANs installed to three per floor, where appropriate.*

*FAN information will also form part of the block's specific literature/pack referred to in recommendation 1.*

## **APPENDIX 9 - LITERATURE REVIEW**

*Resident officers will also ensure as part of the annual tenancy check that residents understand the council's fire safety guidance and information and will make referrals to the fire safety team for further information or demonstration as required.*

**Consider additional ways in which information might be disseminated to residents, for example, by fixing inside each flat and maisonette a notice about what to do in case of fire.**

*The fixing of FANs to the inside of flats is not considered to be appropriate, particularly in light of actions to be undertaken in response to recommendation no. 2, and considering we cannot do so in dwellings sold under the right to buy (referred to by the council as "leasehold" dwellings) without the owner's consent. It is therefore intended to issue all residents in high rise blocks with an expanded version of the fire action notices and stay put principles in booklet form.*

*FAN information will also form part of the block's specific literature/pack referred to in the response to recommendation 1.*

### **Signage in high rise residential buildings**

**It is recommended that your authority reviews signs in common parts of high rise residential buildings to ensure that these are sufficiently prominent and provide useful information. It is recommended that signage:**

**In common areas explain whether residents should normally remain in their flats or maisonettes or whether they should evacuate the building, in which case evacuation procedures should be explained.**

*Please see the response to recommendation no. 2.*

**Provide clear information to residents to enable them to find escape routes.**

*Directional signage was installed in the common areas of all high rise blocks during 2010 and is being checked and replaced where necessary as part of the current fire safety works.*

**Use pictograms to assist those for whom English is not their first language.**

*The directional signage referred to above is already in pictogram form as the Regulations require. Any new signage will meet the same requirements.*

**Provide information to those in the emergency services which would assist them to understand a building's layout and enable them quickly to find a particular flat or maisonette once inside the building.**

*We will carry out a review of all existing high rise block signage and undertake to ensure that it all complies with this recommendation, and will include the location of each flat on its floor. The signage will be placed at a level low enough to ensure visibility in smoke conditions.*

*In addition to this, we have also set up a project team to progress the distribution of plans of our blocks to the London Fire Brigade (LFB). While some plans have already been issued it is intended to follow these up in three tranches:*

## **APPENDIX 9 - LITERATURE REVIEW**

1. 22 LFB priority blocks
2. Blocks of 10 storey and above
3. Blocks of 5 storey and above

*Although LFB have been issued with the council's special key suite that is used on areas not accessible to the general public, such as secondary escape routes, plant rooms and intake cupboards, we will also carry out a review of these areas and liaise with LFB to ensure they are easily accessible by LFB.*

*We will also ensure staff availability at times of LFB familiarisation visits, when requested, to ensure that all parts of the buildings are accessible during such visits.*

**It is also recommended that your authority liaise with London Fire Brigade regarding use of premises information plates and boxes.**

*We have liaised with the London Fire Brigade regarding premises information plates and boxes and will be installing premises information plates at prioritised blocks once the LFB have provided their format requirements. The council also has premises information boxes in its 20 sheltered housing schemes.*

### **Policies and procedures concerning fire risk assessment**

**It is recommended that your authority review its policies and procedures concerning high rise residential buildings.**

*The council completely reviewed its approach to fire risk assessments across its stock in the months following the tragedy at Lakanal. This resulted in the creation of a highly skilled and experienced in-house fire safety team, whose sole task relates to the fire safety and associated management of the stock. Officers will carry out a further review and will programme this to take place on an annual basis.*

### **Prioritising such buildings for regular rigorous review.**

*This recommendation has already been completed and as part of the ongoing fire risk assessment process a suitable review is always specified and rigorously undertaken. All of the council's housing stock has been fire risk assessed and a programme has been put in place which defines the timescale of review for each block. The cycle of review for blocks is determined by the initial assessment of its risk. This can vary from 6 months to 2 years, dependant on the risk of the building.*

**Considering the skills and experience needed to undertake an assessment of higher risk residential buildings.**

*This recommendation has already been completed because the council has already centralised the responsibility to a specialist in-house fire safety team that is considered highly skilled and experienced, also offering a high degree of building design and construction knowledge.*

**Considering the training required for members of staff considered to be competent to carry out assessments.**

*The in-house fire safety team has undergone a wide range of specialist training across many disciplines, and we also provide for continuous professional*

## **APPENDIX 9 - LITERATURE REVIEW**

*development. Further training is provided for any change in law, regulation, guidance or practice.*

*In addition we have also considered the "Competency Criteria for Fire Risk Assessors" published by the Fire Risk Assessment Competency Council, and consider that our in house assessors meet the requirements set out.*

### **Identifying when individual flats or maisonettes should be inspected and how these should be selected for inspection.**

*Our current fire risk assessment process already identifies areas where further internal in-dwelling investigation might be required.*

*This is generally considered outside the scope of the current legislation, the Regulatory Reform (Fire Safety) Order 2005 (FSO), which applies to common areas up to and including the front entrance doors to dwellings.*

*However the council is already rolling out an annual property check process, which as well as carrying out a tenancy check of the occupancy of the dwelling, includes the annual gas check for properties with gas appliances, and a check on the condition of the property, including whether any modifications have been made to the layout of the property. This would also identify any lifestyle issues that would impact on the fire safety of the individual property and the block.*

*This check however only applies to the council's tenanted properties and the council does not currently have a right of access to check the internal layout of leasehold properties without the owner's consent. This access issue is particularly important when the council is seeking to ensure the safety of all of its properties.*

*We note that the Secretary of State for Communities and Local Government has also been sent a letter pursuant to Rule 43 of the Coroners Rules (as amended), where it is recommended that Government provide clear guidance on*

- The definition of "common parts" of buildings containing multiple domestic premises*
- Inspection of a maisonette or flat which has been modified internally to determine whether compartmentation has been breached*
- Inspection of a sample of flats or maisonettes to identify possible breaches of the compartment.*

*Clearly this issue is of national significance and subject to further exploration of the legal basis for inspection of all council properties and the response from the Department for Communities and Local Government, the council will continue with its current strategy.*

**Ensuring that assessors have access to relevant information about the design and construction of high rise residential buildings and refurbishment work carried out to enable an assessor to consider whether compartmentation is sufficient or might have been breached.**

## **APPENDIX 9 - LITERATURE REVIEW**

*Prior to every fire risk assessment being undertaken, the surveyor will be provided with a comprehensive brief on the layout of the building, records of any recent major works and any other design features or characteristics relevant to the building and its fire safety.*

*Pursuant to the Construction Design Management Regulations, Health and Safety files arising out of major work projects will be electronically stored on the council's electronic document management system, Info@Work, at the end of May 2013. These will be accessible to all Housing and Community Services staff including the in-house fire risk assessors, and will provide them with the necessary information relating to the building's design, construction and any recent refurbishment or replacement.*

*In addition, as noted above the council also undertakes annual property checks to all tenanted dwellings whereby information can be obtained regarding any authorised and unauthorised changes to the internal construction and/or layout. This information will be shared with the in-house fire risk assessors.*

### **Training of staff engaged in maintenance and refurbishment work on existing building**

*This recommendation has been completed but is also an ongoing training issue. Maintenance (officers and relevant trades in the repairs service) and operational staff have had fire safety awareness and technical training, and regular refresher training is to be made available.*

*In addition, a number of officers, both in the Maintenance and Compliance and Major Works Divisions, have been trained to a nationally accredited (NEBOSH - National Examination Board in Occupational Safety and Health) standard in relation to construction and fire safety.*

*In addition, the council has identified the need for its contractors, including consultants, engaged in major works to be suitably experienced and qualified in fire safety requirements. All of the council's lead designers and consultants will be required to attain NEBOSH accreditation, and all of the council's contractors engaged in major works and day to day maintenance will be required to regularly demonstrate sufficient knowledge, experience and qualification in fire safety issues and requirements in construction.*

*We also have an internal process by which the in-house fire safety team signs off major works and other works with fire safety implications.*

*In terms of Building Regulations and Building Control, we will review the current process to ensure that there is liaison with the council's Building Control team in all major work proposals and completions, and that all necessary consents and sign-offs are obtained.*

*We will also carry out a retrospective review of major works to ensure that the necessary consents are in place.*

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### **Access for emergency vehicles**

*Access for fire and other emergency vehicles is already a consideration within the fire risk assessment, to ensure that there is dedicated access space for emergency vehicles and that parking bays do not encroach on this space.*

*There is also a process by which the vehicles that may be causing access difficulties can be removed through the council's parking enforcement contract.*

*LBS has liaised with LFB and agreed a reporting and resolution process.*

### **Retro fitting of sprinklers**

**It is recommended that your authority consider the question of retro fitting of sprinkler systems in high rise residential buildings.**

*The council has given this topic much consideration since receiving your recommendations. Since the inquest concluded, we have commissioned a survey of three of the council's typical high rise blocks. This initial research identified a number of issues for consideration which are set out below.*

#### **No right of access to leasehold properties**

*The council does not have an automatic right to access any leasehold dwelling to carry out retrofitting of sprinkler systems, and it is only with leaseholders' permission that they could be. This is an important issue because the effectiveness of a sprinkler system would be undermined if it was not installed to all individual properties in a block as it would leave parts of blocks unprotected, in some cases up to 50% of the block.*

*Any project to retrofit sprinklers would have to have the full cooperation and consent of all of the leaseholders in that block to enable the full application and continuity of works. The council would expect leaseholders to fund works benefiting their properties.*

*Fire safety precautions have hitherto been focused on communal areas, including front entrance doors, and we did not access flats and maisonettes to carry out internal surveys unless there was a clear need to. We are aware that there may be some instances where residents have made some modifications to the layout of the property which have not been notified to the council. We would require access to each property to ensure a comprehensive knowledge and understanding of the current room layouts and size of individual properties. A full internal stock condition survey would be required prior to retrofitting to ascertain if any of the original walls have been moved by residents. However because the council has no right of access to leasehold dwellings for this purpose, a full survey of all the dwellings in the blocks may not be possible. We therefore need to consider how to effectively carry out full stock condition surveys to all dwellings, including those sold leasehold.*

#### **Effect on amenity**

*Careful consideration would need to be given to the general routing of any pipework both within the communal areas and dwellings themselves ensuring that the piping is hidden behind fire proof coving or fire board partitions. In addition all residents would*



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need to be made aware that the painting of the sprinkler heads will render them ineffectual if a fire should occur. The industry standard CPVC IPS Blazemaster piping is coloured bright orange and is not particularly aesthetically pleasing but it is not recommended that it should be painted as some acrylic based paints will have a serious deleterious effect on the plastics causing them to fail.

The builders' works and electrical works required in support of any retrofit sprinkler programme would be disruptive as there would be a need for the coring/boring of holes through both ceilings and walls to facilitate the routing of both piping and fire signal cabling and the need for provision of a bespoke addressable fire alarm and pump power supplies by electrical contractors. There would also be required certified fire stopping, after all piping/cabling is complete, to all holes through the existing fire walls and floors.

It is also considered that asbestos would likely be disturbed and therefore would have to be carefully considered and managed. This could be costly and potentially disruptive to residents.

### Need for full cost / benefit analysis

Based on the surveys carried out on the three blocks, the following works would be required:

- Initial design/drawings for the sprinkler system
- Structural Engineering report and recommendations for water storage tank, diamond/core drilling for services
- The initial structural works that are required to install services, physical core drilling and destructive/exposure works to accommodate the sprinkler system
- The supply and installation of sprinkler services (pipe work) to all areas required
- The supply and installation of electrical services to pumps and dwelling monitoring units
- The supply and installation of water tank and pumps
- The supply and installation of sprinkler monitoring panel
- The supply and installation of plaster boarding/boxing/profiles to all new sprinkler services, communal and residential areas
- Certificated fire stopping for all breaches formed in construction during works
- The supply of materials and labour to decorate all areas affected, residential and communal
- The supply and installation of a 60 minute fire rated service hatch to each and every dwelling for service/monitoring and isolation purposes

The social housing sector has looked to government for guidance on the retrofitting of sprinklers, but the response from the Department of Communities and Local Government (DCLG), to the Southampton Rule 43 letter suggests that, instead of taking a view on behalf of all social housing landlords, DCLG considers that decisions regarding the retrofitting or not of sprinkler systems to high rise building is for landlords to consider themselves.

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*There are differing opinions within the social housing sector and the fire industry as to whether compartmentation and other appropriate fire stopping (passive measures) and early warning systems (active measures), such as heat and smoke detection, are in themselves sufficient risk mitigation for high rise dwellings.*

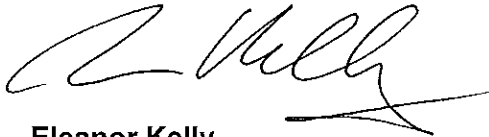
*We are therefore of the view that the scale of the task and its full implications mean that further detailed consideration is required. The council will therefore undertake a full feasibility study which looks at the requirements for each of the blocks concerned, 145 in number, taking into account the complexities of the blocks, their design intent, and existing fire safety features and arrangements, as well as thorough research into best practice and guidance from the government and fire authorities.*

*We consider that a full feasibility study will be concluded within six months.*

I trust that you find this response helpful and are assured that the council takes its fire safety responsibilities very seriously indeed.

Should you need any clarification or further information regarding this response please do not hesitate to contact me.

Yours sincerely



**Eleanor Kelly**  
**CHIEF EXECUTIVE**

<http://www.probyn-miers.com/>  
« [Quiz! HGCRA 1996/LDEDCA 2009 – Answers](#)  
[Winter 2016 – Special Issue](#) »

## **Fire Risks From External Cladding Panels – A Perspective From The UK**

### **1. Introduction**

### **2. What are the risks?**

The mechanisms of external fire spread

### **3. Fire History in the UK**

Development of composite panels

Fires in composite panels

Fires in external cladding

### **4. Fire History in the UAE**

Development of composite panels

Exterior Cladding Fires in the UAE

### **5. Fire History in China**

### **6. Building Regulations in the UK**

Revisions to Building Regulations and Advisory Documents

The View of the Court

Insurers

Firefighters

The Regulatory Reform (Fire Safety) Order 2005

### **7. Fire Safety Regulation in the UAE**

Revisions to UAE Fire Code regarding Exterior Cladding

### **8. The Conundrum of Existing Buildings with higher risk cladding**

#### **1. Introduction**

New Year's Eve celebrations in Dubai were marred by the fire in The Address Downtown Hotel and residential building, opposite the Burj Khalifa, the world's highest skyscraper. The exterior of the supertall (302m) The Address was consumed in flames and thick black smoke, with more than 40 storeys burning simultaneously at one stage. Investigations are in hand, but the fire in Dubai's 18th tallest tower appears to be similar to the fires in the external cladding of the 352m Marina Torch residence (21 February 2015) and of the Tamweel Tower (18 November 2012). Fire spread in external cladding has been the primary issue not only in these three major Dubai fires, but in others in the Middle East and China.

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It is widely suspected that the presence of combustible aluminium composite panels was responsible for the fire spreading alarmingly rapidly up the exterior of The Address. Composite panels are made of a thin outer metal skin of steel or aluminium and cores of insulating material, which historically have included combustible materials such as expanded polystyrene (EPS) or polyurethane (PUR), but the Dubai fires involved polyethylene (LDPE) cores.

To date there has not been a fatality of a building occupant in the UK associated with composite panels, [1] although 2 firefighters have died. Neither has there been any fatality in the major cladding fires in Dubai. Up to now the occupants have had time to escape, albeit with firefighter assistance in several instances, and escape procedures appear to have operated successfully. This should not be any cause for complacency. All of the major fires have had the potential for loss of life.

### **2. What are the risks?**

#### **The mechanisms of external fire spread**

Ignition of composite panels, even those with combustible cores, is not usually instantaneous, but there are various core materials used and they have very different ignition properties. The early stages of fire development are relatively slow. It is only in well-developed fires that the combustible cores burn with savage intensity. However, polymeric core materials such as EPS and PUR will burn at temperatures well below that of a fully developed fire and thus contribute to fire spread.

There is a risk in fire conditions that composite panels are attacked at the joints, or the panels suddenly delaminate and the metal facing falls away, thus exposing the combustible core which then intensifies and spreads the fire. The sudden increase in fire severity can accelerate the failure of the adjacent panels, so that if a fire does take hold, it can race up or through an entire facade of a building, causing a major hazard to occupants and a major property loss. Foam cores exposed through damage, fixings or penetrations will ignite sooner than intact panels. Aluminium has a much lower melting temperature than steel and aluminium facings will fail earlier.

Delaminated panels can fall off the building, raining down hot metal and burning foam insulation on the surrounding area, with risk of personal injury and of starting secondary fires. In The Address fire, a strong wind blew some of the fiercest flames away from the building, but burning panels drifted up to a street block away and ignited secondary fires on adjacent roofs, despite the fire service's rapid attendance and their hosing down rooftops from tall aerial platforms.

The mechanisms of external fire spread are succinctly summarised by the author of UK Building Research Establishment (BRE) report BR 135 (see below):

*“ The mechanisms by which fire can spread externally include combustible materials and cavities – either as part of a system, or those created by delamination of the system or material loss during the fire. Once flames enter a cavity they have the potential to travel significant distances, giving rise to the risk of unseen fire spread within the cladding systems.” [2]*

BRE report *Fire performance of external thermal insulation for walls of multi-storey buildings* (2013) explains the mechanisms of fire spread more fully. [3]

#### *“ 3.1 Initiation of the fire event*

*This type of fire event can be initiated from a fire occurring inside the building, or by an external fire in close proximity to the building envelope, such as fires involving general waste, or resulting from malicious firesetting.*

#### *3.2 Fire breakout*

*Following the initiation of a fire inside the building, if no intervention occurs, the fire may develop to flashover and break out from the room of origin through a window opening or doorway ... Flames breaking out of a building from a post-flashover fire will typically extend 2m above the top of the opening prior to any*

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*involvement of the external face, and this is therefore independent of the material used to construct the outer face of the building envelope ...*

### *3.3 Interaction with the external envelope*

*It is at this stage of the fire scenario that the fire performance of the complete external cladding system, including any fire barriers, is critically important. Once flames begin to impinge upon the external fabric of the building, from either an internal or an external source, there is the potential for the external cladding system to become involved, and to contribute to the external fire spread up the building by the following routes.*

#### *3.3.1 Surface propagation*

*The reaction to fire characteristics of the materials used within the external cladding system will influence the rate of fire spread up the building envelope by way of the surface of the external cladding system.*

#### *3.3.2 Cavities*

*Cavities may be incorporated within an external cladding system, or may be formed by the delamination or differential movement of the system in a fire. If flames become confined or restricted by entering cavities within the external cladding system, they will become elongated as they seek oxygen and fuel to support the combustion process. This process can lead to flame extension of five to ten times that of the original flame lengths, regardless of the materials used to line the cavities. This may enable fire to spread rapidly, unseen, through the external cladding system, if appropriate fire barriers have not been provided (Figure 6).*

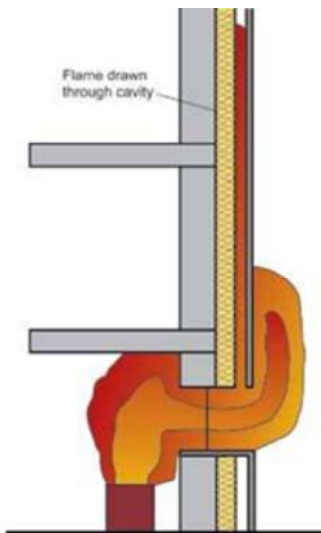


Figure 6: Fire spread through cavities

### *3.4 Fire re-entry*

*Window openings or other unprotected areas within the flame envelope provide a potential route for fire spread back into the building. This creates the potential for fire to bypass any compartment floors that may be present, leading to a secondary fire on the floor above. If secondary fires are allowed to develop without intervention before flashover occurs, then flames may break out again, thus extending the flame envelope and threatening other openings further up the building, irrespective of the materials used on the building envelope.*

### *3.5 Fire service intervention*

*Where the external cladding system is not contributing significantly to the spread of fire from one storey to the next, then intervention by the emergency services should prevent continued fire propagation by way of the building envelope. However, where the external cladding system is contributing to the fire propagation*

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*rate, the potential exists for the fire to affect multiple storeys simultaneously, thus making firefighting more difficult.”*

### **3. Fire History in the UK**

#### **Development of Composite Panels**

Composite panels were developed as a means of providing a cheap, lightweight, weathertight, insulated building envelope, rapidly erected over the interior structure. Composite panels generally consist of internal and external metal facing sheets, bonded to a core of various alternative insulation materials. The facings are typically aluminium or steel, with coatings for weather-resistance externally and decoration and hygiene internally.

The most common forms of insulation cores for composite panels in use in the UK at the end of the 20th century, in order of decreasing probability of fire propagation, [4] were:

- polystyrene (EPS),
- polyurethane (PUR),
- polyisocyanurate (PIR),
- phenolic,
- mineral fibre.

EPS will initially soften and shrink away from a small flame, but will then melt and burn. The voids created by melting admit oxygen, which intensifies the fire. Molten flaming droplets can spread the fire. All the material between the metal facings is likely to be consumed, leading to loss of structural stability. At the outset of the fire, development is fairly slow and contained. In a well-established fire, the material will contribute to the fire development. Delamination and collapse may be sudden. EPS was recognised as the worst of the plastic foams in fire conditions.

Extruded polystyrene (XPS) is a thermoplastic product equivalent to the flame retardant grade of EPS, but behaves similarly to EPS in fire conditions.

PUR is combustible. However, it forms a char layer which tends to inhibit further combustion. The char layer is relatively fragile. It may break off to expose fresh combustible foam. PUR also contributes to fire growth in a fully-developed fire, giving off black smoke and toxic fumes, including hydrogen cyanide above 850°C.

PIR, a variant of PUR having improved fire properties, is difficult to ignite and exhibits a pronounced charring which enables it to withstand fire for longer, but is ultimately combustible.

Phenolic foam is difficult to ignite. It chars, gives off fumes and burns with black smoke, but flame spread, smoke and toxic fume generation are moderate.

Rockwool mineral fibre, inorganic rock fibres bonded together with small amount of combustible binder, is non-combustible.

In the UK, influence from insurers and technical development within the composite panel industry has led to cores of polymer-cored external cladding panels changing from PUR to PIR to phenolic foam, decreasing the fire hazard.

The fire performance of external cladding panels is not always understood, even by architects and specifiers, and the issues are not straightforward. The architect / specifier may have difficulty interpreting a composite panel manufacturer's specification.

Class 1 to British Standard (BS) 476-7 is often cited. This is a small scale test, which limits the allowable spread of flame over the surface of a construction product after ignition by a pilot flame after 1½ and 10 minutes. The metal face of a composite panel may resist the application of a pilot flame in such surface testing.

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UK Class 0, also often cited, is the recommended classification for external surfaces of buildings over 18m from the ground, or within 1m of the site boundary at any height. Class 0 is not a classification identified in any BS test. Class 0 is achieved if a material or the surface of a composite product is either:

- a. composed throughout of materials of 'limited combustibility', when tested to BS 476-11 or classified as Class A2-s3, d2 in accordance with EN 13501-1; or
- b. a Class 1 material which has a fire propagation index (I) of not more than 12 and sub-index (i1) of not more than 6 when tested to BS 476-6: I is overall performance and i1 is performance after 3 minutes.

(To restrict the use of materials which ignite easily, which have a high rate of heat release and/ or which reduce the time to flashover, maximum acceptable 'fire propagation' indices are specified.)

Neither Class 1 nor Class 0 materials are necessarily fire resistant to BS 476-22 or non-combustible to BS 476-4 (or Class A1 to EN 13501-1).

### **Fires in composite panels**

During the 1990s there were at least 30 fires in the UK involving composite panels, [5] both internal and external. External fires were a minority and arson was the principal cause. [6]

Composite panels had come under increasing scrutiny in the UK since the late 1980s. There were some well-publicised fire disasters, particularly the 1993 fire at Sun Valley Poultry, Herefordshire, in which two firefighters died. The large factory had ceilings of composite panels with cores of EPS and PUR, and walls of composite panels with EPS, PUR and Rockwool cores. Some of the PUR-cored panels had fire-resistant board linings. However, the primary cause of the devastation was considered to be the EPS-insulated steel ceiling panels, which were secured in place with polypropylene fixings, and which collapsed on the firefighters. The fatal fire was also one of the most expensive ever fires in the UK: total losses amounted to £70 million.

The concern was that polystyrene-cored composite panels had become widely used for internal partitioning in within the food industry, particularly cold storage, including applications to which they were not appropriate, like cooking operations. External panels were predominantly polyurethane-cored.

### **Fires in external cladding**

At the same time as concern was developing regarding composite panels, another hazard emerged in connection with external rainscreen cladding:

#### **Knowsley Heights fire 5 April 1991**

An apartment block in Knowsley Heights, Liverpool, was the subject of an overcladding system in 1989-90. The scheme comprised overcladding panels fixed to vertical sheeting rails, all of which extended to ground floor level. [7]

*"A fire was started deliberately in the rubbish compound outside the 11-storey apartment block. The fire spread rapidly through a 90 mm gap between the building's rubberised, paint-covered concrete outer wall and a recently installed rain screen cladding (with limited combustibility). The fire spread all the way to the highest floor and seriously damaged the outer walls and windows of all the upper floors. ..."* [8]

The remedial works involved the introduction of horizontal cavity barriers at each floor level.

#### **Garnock Court fire 11 June 1999**

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There was a fatal fire in Garnock Court, a 14-storey residential housing block in Scotland in 1999.

*“ Windows at the corners of a 13-storey apartment tower in Irvine, Scotland, had been letting in cold and/or moisture. In order to eliminate these problems and also to improve visual appearance, new window frames of unplasticized polyvinyl chloride (uPVC) were fixed. The exterior wall around the window was covered with glass reinforced polyester plastic sheet. This gave a picture frame effect around the window. The glass reinforced polyester sheet was also extended below the window. [9]*

On 11 June 1999, a fire started in a flat on the 5th floor.

*“ ... Within minutes, it burst through the window of the flat. Seconds later, onlookers reported that a vertical ribbon of cladding on one corner of the block was ablaze.*

*Ten minutes after that, the flames had reached the 12th floor. As the fire took hold on the outside of the building, it began to break into the flats above. By the time the fire brigade arrived, the nine upper floors of the building were engulfed in flames. A wheelchair-bound pensioner died in the blaze.*

*The cladding on the outside of the building was suspected of contributing to the fire’s severity, and concerns were raised that housing blocks around the country could be at risk.*

*... At Garnock Court, the “ribbon of cladding” that transmitted the fire was a strip of floor-to-ceiling PVCu window unit, which was divided into a glazed upper half and a grp lower half.” [10]*

### **4. Fire History in the Gulf**

#### **Development of Composite Panels**

In the Gulf, although the climate is very different from the UK, composite panels became widely used for the same reasons as in the UK: as a means of providing a cheap, lightweight, weathertight, insulated building envelope, rapidly erected over the interior structure. However, the developments within the UK and USA to restrict the use of combustible materials as composite panel cores were not universally followed elsewhere around the world. In terms of fire safety, the manufacture of the composite panels in many countries was at the beginning of the learning curve, composed of combustible thermoplastic cores.

#### **Exterior Cladding Fires in the UAE**

##### **Saif Belhasa Building, Dubai**

On 6 October 2012 a fire started on the 4th floor of this 13-storey apartment building and spread rapidly to roof level. The building was clad with metal composite panels consisting of aluminium facing with a polyethylene core. Nine flats were destroyed and there were two injuries. A considerable quantity of burning debris fell to the street, damaging five vehicles. Charred aluminium cladding panels were piled on the ground. [11]

##### **Tamweel Tower, Dubai**

The 35-storey, 160m high Tamweel Tower apartment and office building in Dubai was completed in 2009. On 18 November 2012, a fire ignited which burned two separate broad vertical bands of exterior cladding from ground to roof level. Early opinion included a high-level source, [12] but the Dubai Police forensic department concluded that a discarded cigarette from a balcony had ignited construction rubbish at the base of the tower. [13]

The cladding was aluminium-faced, with a polyethylene core, according to one report. [14]



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Witness reports were contradictory as to direction of fire spread, with downward spread from the fall of burning cladding materials reported:

*“ The fire then spread down the exterior of the building. Based on photos and video it appears that the downward fire spread was at least partially due to molten flaming debris from the cladding falling onto lower level balconies and igniting the façade at lower levels.” [15]*

This description is consistent with melting of thermoplastic core material, such as polyethylene (LDPE).

Two years later, remedial work had not yet begun and there were ever-increasing estimates of repair costs. [16] Reconstruction was apparently delayed by negotiations over the extent of cladding replacement and whether or not total replacement was covered by the insurance policy. [17] Civil Defence insisted that cladding on all four sides be replaced, rather than just the fire-damaged section. [18] Repair works have recently begun, 3 years after the fire. [19]

The Saif Belhasa and Tamweel fires closely followed two major fires involving rapid vertical fire spread in Sharjah: the Al Baker Tower on 18 January and the Al Tayer Tower on 27 April 2012. These fires were among the motivators for the 2012 revision of the UAE Civil Defence Fire Code.

### **The Torch, Dubai**

On 21 Feb 2015, a fire started on the 51st floor of the of the 86-storey 352m supertall Marina Torch tower, the 9th tallest in Dubai and just 1 km from the Tamweel Tower, thought to have been started by a cigarette or Shisha coal left on a balcony. [20] *“The blaze rose up one side of the building and down the opposite side, after burning material falling from the initial fire set a lower part of the building ablaze.” [21]*

Eyewitness video shows large quantities of burning material falling from a high-level fire starting a secondary fire at a lower level. Debris was also carried on the wind: in the morning the surrounding streets were littered with debris. [22]

Photographs taken in November 2015 show two distinct columns of fire damage on two different corners of the building: one in the top third of the building on the north corner, presumably directly above the ignition point, and another at mid-height on the east corner, presumably the result of burning debris landing on a broad podium deck and igniting a secondary cladding fire.

### **The Address, Dubai**

The 63-storey Address, another supertall (302m) building, is the latest skyscraper to be ravaged by an external cladding fire. A short circuit in external architectural floodlight wiring, mounted on a ledge formed of horizontal cladding panels between the 14th and 15th floors, is said to have started a fire which spread rapidly up the exterior of the building. [23]

Video recordings of the fire show up to 40 storeys of the building burning simultaneously, with hot metal and flaming core materials from disintegrated cladding panels falling and being carried by the wind, not only to the hotel's periphery, but further to neighbouring streets and buildings, starting fires on adjacent roofs, despite the Civil Defence fire crews hosing down those roofs from aerial platforms. The following morning there was fire damage visible from top to bottom of the building exterior. Delaminated aluminium facings lay all around the Address. Residual fires were still burning in inaccessible places behind cladding panels. Fortunately all occupants were evacuated alive thanks to the swift actions and determined efforts of the fire and rescue teams. It needed a hazardous room-by-room search by police and fire crews before a sleeping guest and a photographer trapped in window-cleaning cables were rescued.

There was at least one sleeping survivor of The Torch fire also. External fires may not trigger the building's fire detection / alarm or extinguishing systems. There has been speculation about possible late alarm (and sprinkler) activation in the Tamweel, Torch and Address fires, but the likely reason is that smoke did not reach the smoke detectors, and heat did not reach the sprinkler heads, until the external fires had become

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sufficiently developed to break into the interior of the buildings. When the wind is blowing away from the building, as it was on 31 December 2015, this may initially protect the interior while the fire develops in and behind the cladding.

The cladding on The Address is described by Alumco, the supplier / installer as: [24]

*“ Aluminium plastic composite panel is compounded with top and bottom layers of aluminium sheet, Anti-toxic polyethylene core material.*

*Standard: According to ASTM, EN or BS Standards as per Client Requirement.”*

Polyethylene is a thermoplastic material, which (like EPS) melts and drips as it burns, spreading the fire downwards as well as upwards. Fire retardant additives can improve fire performance. Polyethylene has no early history as a composite panel core in the UK. Early UK composite panel experience was with much thicker (typically 50 – 100mm) foamed plastic cores, but there are now similar thin aluminium / polyethylene (LDPE) core rainscreen panels available in the UK. Class 1 to BS 476-7, Building Regulations Class 0 and EN 13501-1 Class B can be achieved.

The Alumco panel aluminium facing thickness ranges from 0.15mm – 0.5mm and the standard size is 1220mm x 2440mm x 3 or 4mm thick, so the polyethylene core is only 2 or 3mm thick. The thin panel provides little insulation in comparison with a thick polymeric foam panel, so it is possible that insulation of some sort was installed within the Alumco panel: insulation could also be part of the mechanism of fire spread.

Alumco provided 35,000m<sup>2</sup> of composite panels for The Address. [25] Although the composite panels are branded Alubond U.S.A., the panels are said to be of UAE origin, manufactured in a plant established in Sharjah in 2000, with an annual capacity of 7 or 8 million square metres. [26]

Alumco’s website also states:

*“ Excellent Fireproof Property*

*It’s core layer is manufactured with Anti-toxic polyethylene core materials, having the combustion resistance property. Two surface layers are made of aluminium, which is difficult to be burnt. Therefore, this is a kind of safe fireproofing materials, which complies with the fireproof demand in building code.”*

As the construction of the Address began in 2005 and finished in 2008, there was no obligation for the aluminium composite panels to comply with the *UAE Fire and Life Safety Code of Practice* (2011), or Annexure A.1.21.Rev 2 regarding fire performance of exterior materials, published in 2012.

Investigations by Dubai’s *The National* into the testing of the aluminium composite panels suggest that that the American-manufactured Alubond predecessor panel was tested in 2007, not in the suitable NFPA 285 *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components*, cited in the 2012 Annexure A.1.21.Rev 2 to the Civil Defence Code, but in an inappropriate and incomplete test to ASTM (American Society for Testing and Materials) E-119 *Standard Test Methods for Fire Tests of Building Construction and Materials*, in combination with gypsum board which provided the fire resistance. [27]

### **5. Fire History in China**

2015 was a global milestone for 200m high buildings (1000 total overall) and for “supertall” 300m skyscrapers (100 total). China was pre-eminent in 2015 with 58% of completions, bringing its skyscraper stock up to approximately 40% of the global total. [28] China has suffered fatal fire incidents involving combustible cladding and insulation. Two savage fires which engulfed whole buildings demonstrate the potential dangers of combustible cladding and external insulation.

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### **Television Cultural Centre, Beijing**

Construction was started in 2004 and was expected to be completed in May 2009. The Beijing Mandarin Oriental hotel was to be the main tenant. On 9 February 2009, stray fireworks from Chinese New Year Celebrations landed on the roof of the building, 31 storeys up, starting a fire which spread rapidly down to the lower floors, causing the death of a firefighter from toxic smoke inhalation and seven injuries. The whole 159m high building, topped out but still under construction, was ablaze at the height of the fire. Hard facts are difficult to find after a news curfew, but insulating foam panels [29] and polystyrene insulation [30] have been implicated.

### **Apartment Building, Shanghai**

On 15 November 2010 this 28-storey apartment building, which was under renovation, was consumed by fire. The 85m high building was fully scaffolded for the installation of energy-saving insulation when the fire occurred. [31] Sparks from welding operations ignited construction materials and the nylon safety mesh on the outside of the building. Fire then spread rapidly along the scaffolding and through the interior of the block. [32] 58 people lost their lives and 70 were hospitalised, including 17 who were seriously injured. Firefighters rescued more than 100 residents and others climbed down the scaffolding.

The fire was believed to have spread on polyurethane insulation to external walls. [33] *“The fire may have been caused by the accidental ignition of polyurethane foam insulation, commonly used in China without the addition of flame retardants.”* [34]

## **6. Building Regulations in the UK**

In the UK, buildings must be designed and constructed in compliance with the Building Regulations, which are drafted as succinct “functional requirements”. The requirements of Building Regulations Part B *Fire Safety* are intended to secure reasonable standards of health and safety for persons in and about buildings.

Building Regulations Requirement B4 (1), which has particular relevance to external cladding systems, states:

*” 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.”*

Under UK Building Regulations, external walls require fire resistance, although a proportion of openings are permitted. The fire resistance is generally required to resist an internal fire, but fire resistance from both sides is necessary if within 1m of the site boundary. The fire resistance does not have to be provided by the external cladding. External cladding systems are not required to be non-combustible.

In addition, ‘Approved Documents’ are published by the Government for the purpose of providing practical guidance on compliance with the Building Regulations for some of the more common building situations. The Approved Documents offer alternative means of compliance with the Building Regulations, refer to other published guidance, and permit the designer flexibility to introduce other designs, provided that they meet the functional requirements of the Building Regulations. There are no provisions for property protection, but Approved Document B *Fire Safety* advises early consultation with all stakeholders, particularly insurers, who will often require additional fire safety measures before accepting the insurance risk. The UK insurance industry has produced a number of publications intended to prevent large losses caused by fires.

### **Revisions to Building Regulations and Advisory Documents**

## **APPENDIX 9 - LITERATURE REVIEW**

As a result of the fire at Knowsley Heights, Approved Document B *Fire Safety* (ADB) 1992 was changed so that fire performance 'Class 0' applied to the inside (cavity) face as well as the outside of rainscreen cladding systems on 'tall' (>20m) buildings:

*“ 12.6 In the case of the outer cladding of a wall of 'rainscreen' construction (with a drained and ventilated cavity) the surface of the outer cladding which faces the cavity should also meet the provisions of Diagram 36.”* (i.e. Class 0 rainscreen cladding recommended above 20m height and/or within 1m of site boundary) (ADB 1992)

There has also been advice regarding combustibility of insulation materials in cladding in ADB ever since 1992:

*“ 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 overcladding or in ventilated cavities, may present such a risk in tall buildings, even though the provisions for external surfaces ... may have been satisfied.*

*In a building with a storey at more than 20m above ground level, insulation material used in the external wall construction should be of limited combustibility ...”* (ADB 1992)

ADB 1992 also recommended that the voids within rainscreen cladding be closed by cavity barriers. The definition of a cavity barrier in 1992 was *“ A 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.”* UK guidance makes a distinction between a cavity barrier and a fire stop, which is defined as *“ A seal provided to close an imperfection of fit or design tolerance between elements or components, to restrict the passage of fire and smoke.”*

ADB 1992, Table 13 *Provision of cavity barriers*, recommended that for flats, other residential (including hotels) and institutional buildings, i.e. places where people sleep, 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 have a floor more than 20m above ground level. (ADB 1992) In the complete re-drafting of the 1985 edition of ADB, the earlier advice to close the perimeter of cavities, including around door and window openings, was omitted in 1992. The recommendation was re-introduced in ADB 2000, for all building types.

Building Regulation requirements are not retrospective, so there was a legacy of buildings that did not comply with the new guidance.

The Knowsley Heights fire also motivated research at the Building Research Establishment (BRE), carried out in 1994. BRE developed a large-scale fire test method, known as *'A test for assessing the fire performance of external cladding systems'*, submitted to the government in 1996.

Subsequently, as a response to the Sun Valley fire, Appendix F: *Fire behaviour of insulating core panels used for internal structures*, concerning composite panels, was included in the 2000 edition of ADB, largely as a result of pressure from the fire service. Although subsequently revised, the advice was and still is directed at internal structures, but explains the fire behaviour of composite core materials and fixing systems which is common to external cladding also: [35]

*“ 2. The degradation of polymeric materials can be expected when exposed to radiated / conducted heat from a fire, with the resulting production of large quantities of smoke.*

*It is recognised that the potential for problems in fires involving mineral fibre cores is generally less than those for polymeric core materials.*

*In addition, irrespective of the type of core material, the panel, when exposed to the high temperatures of a developed fire, will tend to delaminate between the facing and core material, due to a combination of expansion of the membrane [i.e. metal facing] and softening of the bond line.*

## **APPENDIX 9 - LITERATURE REVIEW**

*Therefore once it is involved, either directly or indirectly in a fire, the panel will have lost most of its structural integrity. The stability of the system will then depend on the residual structural strength of the non-exposed facing, the interlocking joint between panels and the fixing system.*

*Most jointing or fixing systems for these systems have an extremely limited structural integrity performance in developed fire conditions. If the fire starts to heat up the support fixings or structure to which they are attached, then there is a real chance of total collapse of the panel system.*

*The insulating nature of these panels, together with their sealed joints, means that fire can spread behind the panels, hidden from the occupants of occupied rooms/spaces. This can prove to be a particular problem to firefighters as, due to the insulating properties of the cores, it may not be possible to track the spread of fire, even using infra-red detection equipment. This difficulty, together with that of controlling the fire spread within and behind the panels, is likely to have a detrimental effect on the performance of the fixing systems, potentially leading to their complete and unexpected collapse, together with any associated equipment.*

### *Firefighting*

*3. When compared with other types of construction techniques, these panel systems therefore provide a unique combination of problems for firefighters, including:*

- *hidden fire spread within the panels;*
- *production of large quantities of black toxic smoke; and*
- *rapid fire spread leading to flashover.*

*These three characteristics are common to both polyurethane and polystyrene cored panels, although the rate of fire spread in polyurethane cores is significantly less than that of polystyrene cores, especially when any external heat source is removed.*

*In addition, irrespective of the type of panel core, all systems are susceptible to:*

- *delamination of the steel facing;*
- *collapse of the system; and*
- *hidden fire spread behind the system.” [36]*

Following the Garnock Court fire, a parliamentary inquiry was undertaken to investigate the potential risk of fire spread in buildings by way of external cladding systems. The report was published early in 2000. [37]

Witnesses to the inquiry (including the Fire Brigades Union, Loss Prevention Council [technical advisers to the insurance industry], manufacturers of external cladding systems and independent fire safety consultants) suggested that the guidance given in Approved Document B might not be adequate for the purposes of ensuring the safety of external cladding systems in a fire. [38]

The committee concluded:

***“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. ...***

***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. 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***

## **APPENDIX 9 - LITERATURE REVIEW**

*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.”*

The BRE full-scale fire tests were developed to become:

BS 8414-1: 2002 – *Fire performance of external cladding systems.*

*Test method for non-loadbearing external cladding systems applied to the face of a building.*

BS 8414-2: 2005 – *Fire performance of external cladding systems.*

*Test method for non-loadbearing external cladding systems fixed to and supported by a structural steel frame.*

The test applies to whole cladding systems with all components, which may include fire barriers of non-combustible material to close any cavity and may also form a continuous band through the insulation, which in practice would be installed at each floor level. The test method simulates a fully developed fire in a room abutting the external face of a building and venting through a window aperture. If fire spread away from the initial fire source occurs, the rate of progress of fire spread or tendency for collapse should not unduly hinder intervention by the emergency services. [39]

The specimens of cladding systems tested must have a minimum extent of 1.2m x 2.4m, in an internal corner, and 6m high above the top of the combustion chamber opening: [40] a much more realistic test of the fire performance of a cladding system than the previous small-scale surface spread of flame tests. The extent of damage caused to the external cladding system is evaluated, specifically the ability of the external cladding system to resist the propagation of the fire 2.5m upwards for at least 15 minutes. [41] Any falling debris and fire penetration from the external to internal face should also be assessed. [42]

BRE report (BR 135) *Fire performance of external thermal insulation for walls of multi-storey buildings* was revised in 2003 to incorporate the knowledge gained. BR 135 was revised again in 2013 to address new technologies in cladding and external wall systems and the publication of BS 8414-2.

### **The View of the Court**

Following a fire at Sahib Foods production factory, Southall, in January 1998 with a loss of £17million, and despite the court finding considerable negligence by the occupant, there was a civil court judgment against the architect for specifying internal EPS-cored composite panels, for the total loss, physical and consequential trading loss, beyond the room of origin. (On appeal the award was reduced by two-thirds, because of the contributory negligence.)

There was no loss of life or personal injury in the fire. The building was provided with adequate means of escape. The premises had a Fire Certificate. There was no question of a breach of the Building Regulations or any other statutory requirement.

However, the Judge “...was not the slightest impressed by the submission that since the defendants had complied with their statutory requirements and as a result no one was killed or injured they had fully performed their duties. Nor was I impressed by repeated submissions that warnings about this sort of fire were ‘insurance led’. That submission seems to me to be close to the frequent thief’s submission that the only people to suffer from his activities are insurers.” [43]

UK Building Regulations generally only require that reasonable standards of health and safety are secured for persons in or around buildings. The Sahib -v- PKS judgment made it clear that protection of property from fire is also an obligation for the architect / specifier, in the view of the High Court in England & Wales. The view that the building is sacrificial in fire incidents, provided there is no threat to persons, became no longer sustainable.

## **APPENDIX 9 - LITERATURE REVIEW**

### **Insurers**

Insurers had huge exposure to claims involved with the use of composite panels, because there was risk of total loss in the event of these panels becoming involved even in any small fire.

Insurers' attitudes to composite panels began to change in the mid-1990s. Building cover became more difficult to obtain and premiums rose. The insurance industry began to take the lead in the protection of property from fire, in the absence of a lead from designers or legislators. The desired outcome was improved building standards at modest additional cost, leading to fewer and less-serious fire losses for businesses and fewer construction disputes, with a consequential slowing of the increases in property (and professional indemnity) insurance premiums.

Insurers devised their own standards, Loss Prevention Standards (LPS) for both internal and external composite panels, in excess of Building Regulations requirements. LPS 1181 set the required performance for sandwich panels that will not make a significant contribution to fire growth. LPS 1208 is a standard for fire-resistant panels, applicable to internal compartment walls, but also to external walls close to the property boundary and external walls at risk from arson attack.

### **Firefighters**

From the time of the Sun Valley fire in 1993, where two firefighters died, fire crews became less likely to enter buildings containing composite panels. Previously, the fire service was naturally reluctant to abandon any building to destruction, but then became less prepared to risk the lives of crews to protect unoccupied property. If a fire had developed to life-threatening proportions, fire fighters would withdraw and tackle the blaze 'defensively', i.e. from outside of the building only. The brigade's primary concern was often to prevent the fire spreading to neighbouring buildings.

### **The Regulatory Reform (Fire Safety) Order 2005**

In the UK since 2006, under the *Regulatory Reform (Fire Safety) Order 2005* ("FSO"), building owners, employers and occupiers have been legally obliged to evaluate fire risk in all buildings other than private dwelling houses. The FSO is applicable to apartment blocks with common entries, staircases and landings.

The main duty holder in relation to the premises is the "Responsible Person", defined in Article 3 of the FSO: the employer, or occupier, or owner, who has duties imposed in relation to fire safety on the premises. There is a general duty to ensure, so far as reasonably practicable, the safety of employees; a general duty, in relation to non-employees to take such fire precautions as may reasonably be required in the circumstances to ensure that premises are safe; and a duty to carry out fire risk assessments. The duties are ongoing: an obligation to regularly review, maintain and manage the fire safety strategy of the building.

Article 4 of the FSO requires fire precautions to be taken including measures to reduce the risk of fire on the premises and the risk of the spread of fire on the premises.

Article 9 of the FSO requires that the Risk Assessment must take account of all the risks to which building occupants, and persons in the immediate vicinity of the premises, may be exposed.

The Risk Assessment must be reviewed on a regular basis to keep it up to date and particularly if:

- there is reason to suspect that it is not longer valid; or
- there has been a significant change to the building, or its operation.

Article 18 of the FSO requires the Responsible Person to appoint one or more competent persons to assist him in undertaking the fire prevention and fire protection measures, unless he or an employee has sufficient training and experience or knowledge.

## **APPENDIX 9 - LITERATURE REVIEW**

### **7. Fire Safety Regulation in the UAE**

Fire safety regulation in Dubai is described in the UAE *Fire and Life Safety Code of Practice* (2011), also known as the Civil Defence Fire Code, which is effective in all the Emirates. Its intention is to minimise the risk of fire and to ensure the safety of life and property, unlike UK Building Regulations, which are almost exclusively concerned with life safety, rather than property protection.

The code is substantially based on NFPA standards (USA), adapted for local purposes. However, elements of the Gulf Cooperation Council (GCC) Code of Practice, the International Code Council (also USA), British Standards, European Standards and the Singapore Fire Code are also incorporated. One commentator has said “... *the context and enforcement mechanisms in which those codes developed are often missing or lacking in comprehensive application.*” [in Gulf building regulation] [44]

In the Civil Defence Fire Code there are 22 classifications of buildings: six definitions based on height, 14 based on function and two on multi-purpose use. The provisions of the code apply to “Lowrise, Midrise and Highrise buildings”, defined as:

|          |        |                                     |
|----------|--------|-------------------------------------|
| Lowrise  | <15m   | above level of fire service access; |
| Midrise  | 15-23m | above level of fire service access; |
| Highrise | > 23m  | above level of fire service access. |

#### **Revisions to UAE Fire Code regarding Exterior Cladding**

Following the major fires in Sharjah in early 2012, an appendix was introduced to the Civil Defence Fire Code specifically regulating fire stopping, curtain walling, exterior cladding, exterior insulation and finish systems (EIFS) and roofing of new buildings. Annexure A.1.21. Revision 2 came into effect in September 2012 (for new approvals) and April 2013 (for installation of cladding), superseding the earlier requirements of the Civil Defence Fire Code regarding the external building envelope. The Annexure is clearly intended to exclude the insulation and cladding materials most prone to external fire spread.

Annexure A.1.21. Rev 2 specifies mandatory requirements, rather than ‘informative’ advice as in British Standards, or UK Building Regulations ‘Approved Documents’.

Annexure A.1.21. Rev 2 prescribes the required fire performance of exterior materials whilst keeping options open for procurement sources. It cites US, German, British and EU classifications and testing regimes, with some variation of options between them:

Paragraphs 4.2.4 (Exterior cladding for Highrise, Midrise and <3m from a boundary) and 4.3.4 (Exterior cladding for Lowrise and > 3m from a boundary), when referring to the fire performance of cladding panel cores, allows both British Class 0 tested to BS 476 Parts 6 and 7 and Euroclass A1 to EN 13501-1, which is effectively non-combustible and a significantly superior fire performance standard to British Class 0. Class 0 limits the rates of surface spread of flame and of fire propagation, but can be achieved by materials which are combustible in a fully developed fire.

Similarly, paragraph 4.5.4 regarding exterior insulation and finish systems (EIFS) and external thermal insulation composite systems (ETICS) allows both British Class 1 as per BS 476 Part 7 and Euroclass B, which is a more demanding standard.

Sub-paragraph 4.5.4.1 refers to “Non-flammable polystyrene” which is not attainable: polystyrene may have a limited rate of flame spread, but all organic materials are combustible.

Sub-paragraph 4.5.6.2.a.ii refers to Euroclass B1, which does not exist.

Consequently the required fire safety standards in Annexure A.1.21. Rev 2 are not uniform. A table of equivalence of the various standards cited would be a helpful addition, and it would allow for a reference to be added to the UK “materials of limited combustibility” to BS 476 Part 11.



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Section 3 deals with Fire Stopping Systems. Annexure A.1.21. Rev 2 does not include the UK concept of “cavity barriers”, so the requirements for cavity barriers and for fire stopping are effectively the same. The standard required for fire stopping is equivalent to the “barrier” in which, or adjacent to which, it is located: “barrier” meaning the compartment wall or floor in UK terms. The firestop system must have a fire resistance of at least 1 hour in integrity, and 15 minutes in insulation, determined by testing to established standards. The recommendations of UK Approved Document B are similar for fire stopping, but advise only 30 minutes integrity for cavity barriers.

The fire stopping requirements include penetrations of compartment floors and walls and the junctions of compartment floors and curtain walling. There does not appear to be a general requirement to provide cavity barriers / fire stops to seal and sub-divide concealed voids to inhibit the unseen spread of fire, as in the UK Building Regulations. There does not appear to be a specific requirement to close cavities around door and window openings.

Section 4 deals with Exterior Wall Cladding Systems. Paragraph 4.1 makes it clear that the system has to include insulation, silicone or fillers between panel joints and fire stops, tested as an assembly. Paragraph 4.2 concerns cladding on midrise (15-23m), highrise, mall, assembly, hospital and educational buildings within 3m of the site boundary. The requirements apply to the entire cladding of the building, whatever the proportion of cladding in the building envelope.

Sub-paragraph 4.2.2 prohibits foamed plastic cores absolutely.

Sub-paragraph 4.2.4 however permits plastic (density  $> 320 \text{ Kg/m}^3$ ), rather than foamed plastic (density  $< 320 \text{ Kg/m}^3$ ) cores, provided that they meet of any one of 8 listed US, UK, German or European standards, which are not all equivalent: see above.

The corresponding guidance in UK Approved Document B, paragraph 12.7, is that 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. “Limited combustibility” is a standard superior to Class 0, approximately the equivalent of EN 13501-1 Class A2, but inferior to UK “non-combustible” and Class A1 to EN 13501-1.

Sub-paragraph 4.2.5 has stringent requirements for the cladding panels. The European Class A1 to EN 13501-1 is acceptable, but the UK equivalent “non-combustible material” is not mentioned, although BS 476 part 4: 1970 *Non-Combustibility test for materials* is listed as a test for non-combustible material in paragraph 2.27.

Sub-paragraph 4.2.6 requires the whole cladding system assembly, with intended cladding panel, core, insulation, joints, seams, fasteners and wall arrangement to be tested in large scale tests to US Factory Mutual or BS 8414 standards. BS 8414 testing would tend to compensate for the absence of a prescriptive requirement for cavity barriers.

For an external cladding system the UAE Code is much more demanding than the recommendations of the UK Approved Document B which accept BS 8414 testing, but also the inferior Class 0 standard, for buildings over 18m high and within one metre of the boundary. In the UK, buildings over 1m from the site boundary may have EN 13501-1 Class C cladding below 18m above ground, and timber cladding is acceptable. UK experience would suggest that the incidence of external envelope fires in the UAE, in buildings constructed from 2013 onwards, should be hugely reduced or eliminated by Annexure A.1.21. Rev 2, provided that the Code is followed in both the design and construction.

### **8. The Conundrum of Existing Buildings with higher risk cladding**

The remaining problem is the legacy of buildings with combustible cladding constructed before standards were changed. The problem is greatest where the 21st century development boom has been most vigorous, particularly in China and the Gulf countries.

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Regarding tall buildings, since the World Trade Center was completed in 1979, Dubai achieved such extraordinary growth that 134 skyscrapers exceeded its 149m height prior to the change of standards in 2013, [45] and there are countless other tall buildings. A proportion of these have aluminium panels with a thermoplastic core: the proportion estimated as high as 70% in the press, but estimated as only 10 – 20% by the Director of the preventive safety department for Dubai Civil Defence. [46] Even so, there is a huge number of occupied buildings at risk. Almost certainly there will also be combustible insulation present, open voids behind cladding and absence of fire stopping at floor levels, compounding the risk.

Annexure A.1.21 to the Civil Defence Fire Code states:

*“ 1.5. For the buildings that are existing and have Cladding/Curtainwall systems on the building envelope, it is highly recommended to the Building Owner to have the perimeter wall evaluated through Civil Defence approved House of Expertise and resolve non-compliances through alternative solutions.”*

This sub-section appears to be informative/advisory, unlike all the rest of the Annexure which is mandatory (“shall be”). At present, there is no equivalent legislation to the UK *Regulatory Reform (Fire Safety) Order 2005*, but Dubai’s *The National* news service has reported that a proposed update to the UAE Fire Code anticipated in March 2016 will include a new section about liabilities. [47] Matters to be included would be the building’s operations, the building’s maintenance and systems, tenant responsibilities, and the requirement for a consultant appointed by the Building Owner to monitor the building process. The extent to which this awaited revision to the Fire Code will, or will not, apply retrospectively to existing buildings is not yet clear.

Can anything be done about the worldwide legacy of buildings with combustible cored composite panels? Unless something radical is done, such as national retro-fitting subsidy schemes, it seems inevitable that there will be further fires involving aluminium-faced polyethylene core panels. Nightmare scenarios include multiple-fatality building-engulfing fires as in China, or given the proximity of towers in some districts, the ignition of neighbouring buildings’ cladding from an external cladding fire, or disintegrated burning panels igniting the roofs of lower buildings adjacent.

It is difficult to envisage owners voluntarily stripping off entire existing aluminium composite panel facades and replacing them with Fire Code-compliant cladding panels, as the cost would be prohibitive. Partial replacement with barrier bands of fire resistant panels has been suggested to stop fires spreading, [48] but given the flame heights at the Tamweel, Torch and The Address, such barrier bands would have to be substantially large. The works necessary to provide these barriers would involve much of the scaffolding and associated costs of full replacement.

It seems inevitable that insurers will differentiate between buildings with and without combustible aluminium composite panels and will charge higher premiums for higher risks. One or two more fires, or a fatal fire, could lead to insurance cover being refused if the risk is considered excessive. Insurance issues, bad publicity and loss of property value might then make retro-fitting external cladding a viable option in commercial, as well as fire safety terms.

.....  
[1] *Fire Safety of Sandwich Panels*, FRDG 1997.

[2] [\*External Fire Spread – The testing of building cladding systems\*, Sarah Colwell, BRE](#)

[3] BR 135 *Fire performance of external thermal insulation for walls of multistorey buildings*. 3rd edition BRE (2013)

[4] *General Insurance Research Report No. 6*, ABI 2000 or 2001.

[5] *Firefighting Options for Fires involving Composite Panels*, FRDG 1999, Table 1.

[6] *Fire performance of sandwich panel systems*, Association of British Insurers (ABI) 2003, 4 *External Claddings*, Table 1.

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- [7] *Potential risk of fire spread in buildings via external cladding systems* House of Commons Environment, Transport and Regional Affairs Committee, 14 December 1999 (HC109), Appendix 6. Knowsley Metropolitan Borough (ROF 02).
- [8] *Burning issues*, Architects Journal 31 May 2001.
- [9] *Fire Hazards of Exterior Wall Assemblies Containing Combustible Components*, Fire Protection Research Foundation (NFPA) 2014.
- [10] *Cladding: the new rules*, *Building*, 2000 issue 06.
- [11] *Fire in Tecom building leaves seven families homeless*, Gulf News 6 October 2012.
- [12] *Fire breaks out at Tamweel Tower in Jumeirah Lake Towers*, Gulf News 18 November 2012.
- [13] *Tamweel Tower fire started by cigarette butt, say Dubai Police*, The National 4 December 2012.
- [14] *Fire Hazards of Exterior Wall Assemblies Containing Combustible Components*, Fire Protection Research Foundation 2014.
- [15] *Fire Hazards of Exterior Wall Assemblies Containing Combustible Components*, Fire Protection Research Foundation 2014.
- [16] *Two Years Later, Cost to Repair Fire-Damaged Dubai Tower Soars to \$21M*, Council on Tall Buildings and Urban Habitat Global News 17 November 2014
- [17] *Insurance company agrees to repair fire damaged Tamweel Tower in Dubai*, The National 14 January 2013.
- [18] *Cladding used on The Address Downtown 'did not meet fire safety standards'*, The National 12 January 2016.
- [19] [ArabianBusiness.com 17 December 2015](#)
- [20] *Dubai Inferno: 5 of History's Worst Skyscraper Fires*, IFSEC Global 24 February 2015.
- [21] *Dubai Marina Torch Tower fire: Londoner tells of how he slept through a towering inferno*, The Telegraph, 22 Feb 2015.
- [22] *British flight attendant questioned over Dubai blaze* Mailonline 4 March 2015
- [23] *Dubai police chief, quoted in 7 Days and The National* 20 January 2016.
- [24] [According to the supplier's website](#)
- [25] [According to the supplier's website](#)
- [26] [According to the manufacturer's website](#)
- [27] *Revealed – how The Address Downtown Dubai hotel fire test was 'meaningless'*, The National 12 January 2016.
- [28] Source: [Skyscraper Center](#)
- [29] *China TV Network Apologizes for Fire*, New York Times, 10 February 2009.
- [30] *Fire Hazards of Exterior Wall Assemblies Containing Combustible Components*, Fire Protection Research Foundation 2014.
- [31] New York Times November 15, 2010.

## **APPENDIX 9 - LITERATURE REVIEW**

[32] Guardian 15 November 2010.

[33] *Fire Hazards of Exterior Wall Assemblies Containing Combustible Components*, Fire Protection Research Foundation 2014.

[34] *Dubai Inferno: 5 of History's Worst Skyscraper Fires*, IFSEC Global.com 24 February 2015.

[35] Appendix F: *Fire behaviour of the core materials and fixing systems*, to Approved Document B (ADB) 2000

[36] Appendix F: *Fire behaviour of insulating core panels used for internal structures* to Approved Document B (ADB) 2000/2006

[37] *Potential risk of fire spread in buildings via external cladding systems* House of Commons Environment, Transport and Regional Affairs Committee, 14 December 1999 (HC109).

[38] Architects Journal 31 May 2001.

[39] BR 135 (2013) Annex B: *Performance Criteria and Classification for BS 8414-2, B2 Performance Criteria and Classification Method*.

[40] BS 8414-2: 2005 *Fire performance of external cladding systems*, 4. Principle and 6. Test specimen. All (you are

[41] BR 135 (2013) Annex B: *Performance Criteria and Classification for BS 8414-2, B2 Performance Criteria and Classification Method, B2.2 External fire spread*.

[42] BS 8414-2: 2005 *Fire performance of external cladding systems*, 4. Principle and 6. Test specimen.

[43] Sahib -v- PKS Judgment 03/03/03, 43.

[44] [Thom Bohlen, Middle East Centre for Sustainable Development, in 'Towering inferno' fears for Gulf's high-rise blocks, BBC News 2 May 2013](#)

[45] The Skyscraper Center, Council on Tall Buildings and Urban Habitat

[46] *Cladding used on The Address Downtown 'did not meet fire safety standards'*, The National 12 January 2016

[47] *Updated UAE fire security code will ensure buildings' safety*, The National 13 January 2016.

[48] *The Torch blaze reignites concerns over cladding used for Dubai towers*, The National 9 March 2015.

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## **APPENDIX 9 - LITERATURE REVIEW**

### **Tom Woolley submission to the Independent Reference Group regarding Fire Safety In Housing Executive Tower Blocks**

**Dr. Tom Woolley written submission to the NIHE Independent Reference Group following the Grenfell Tragedy August 8 2017**

I am a semi-retired architect based in Crossgar, County Down. I was Professor of Architecture at Queens University Belfast from 1991-2007. Subsequently I have been a visiting professor at University of Central Lancashire, Centre for Alternative Technology and other institutions. I have written 6 books on sustainable construction, mainly focussing on materials. I have visited Grenfell tower and talked to relatives of victims, survivors and members of the local campaign groups and have also held discussions with a number of independent experts who are collating information prior to the public inquiry. I also made a submission to the public inquiry terms of reference consultation.

I have accumulated a considerable amount of research material and data relevant to the issues at Grenfell.

In terms of the NIHE reference group I will limit myself to a small number of issues that I feel would be helpful and relevant at this stage in relation to your terms of reference (particularly 4) . As there is still a great deal of uncertainty about what occurred at Grenfell these observations are based on the best available information and expert comment.

Shortly following the Grenfell disaster, I submitted FOI requests to the NIHE, Belfast City Council and the DFPNI (building regulations). The only helpful response was from NIHE. Belfast city council have clearly not been pro-active in the same ways as English local authorities. I am still waiting for nearly two months for the reply from DFPNI!

1. It is important that the implications of Grenfell are not seen purely in terms of cladding to tower blocks over 18 metres. The dangers and risks associated with synthetic foam insulation materials need to be considered in terms of **all building and house types**.
2. **Review of building regulations and standards**. A clear outcome of the Grenfell disaster is that the current regulations, technical booklets and other standards leave much to be desired and will need significant revision. Technical Booklet E refers to **materials of limited combustibility** (1.9) but this needs to be reviewed in light of Grenfell and the following fire tests. Many fire experts I have spoken to suggest that **the concept of limited combustibility is highly questionable**. For instance escape stair construction (2.93) is allowed with materials of limited combustibility.
3. It is increasingly common for insulation materials to be used in buildings in situations where they may present a fire and health hazard because they are in Euroclass B, C, D, E and F. Discussion with a number of professionals has indicated to me that many specifiers are unaware that materials in these classifications, particularly E and F are not safe in fires. It has been suggested by some experts that regulations should simply refer only to materials that are combustible or non-combustible, or that the tests for limited combustibility need to be considerably tighter.
4. Fire testing carried out by the BRE and others have shown that a range of materials and construction methods have failed, even some that were meant to be non-combustible. This leads to the conclusion that the majority of synthetic insulation materials, both fibrous and foam, should only be used in buildings where they are entirely encapsulated in non-combustible materials or forms of construction. This raises serious question about the acceptability of some forms of timber construction, SIPS (Structural Insulated Panels), rain-screen cladding systems, internal dry lining and external insulated cladding (EWIC). Since Grenfell there has been a fire in London in a low-rise timber frame block with brick cladding where the fire was in the cavity and took some time to extinguish. Testing of a wide range of construction systems using synthetic insulations is urgently required as so many approvals and classifications have been based on highly questionable desk top studies.

## APPENDIX 9 - LITERATURE REVIEW

### **Tom Woolley submission to the Independent Reference Group regarding Fire Safety in Housing Executive Tower Blocks**

5. Risks from cementitious cladding systems? It might be assumed that the cladding of high rise buildings with stone wool insulation and polymer and cementitious render rain screens should be safe in fires. However it has been impossible to find evidence that such systems have been properly tested in real fire tests. Most claims about fire safety are based on either desk top studies or fire classifications for individual materials, not the whole system. The NIHE should consider having such tests carried out rather than desk top studies. Many of the materials and products used in composite systems come from different manufacturers, which may have individual fire certification, but the whole composite system has not been tested.
6. Health risks associated with synthetic insulation products  
In research carried out for my latest book Building Materials, Health and Indoor Air Quality (Routledge 2017) it became apparent that synthetic insulation materials pose significant health risks to the occupants of buildings as a result of hazardous emissions (not just in fires). Many of the fire-retardant chemicals used are particularly toxic and research published by colleagues at University of Central Lancashire some years ago indicated that many deaths in fires were caused by the release of a range of toxic chemicals, particularly cyanide and from the fire retardants in particular. (some Grenfell survivors were treated for cyanide inhalation)  
Further concerns have led to research currently under way with the fire service in England about health risks, particularly cancer, from fire residue, dust and particulates and gases. The hazardous chemicals used in synthetic insulations include iso-cyanates, (MDI) phenol formaldehyde and styrenes have been recognised as having a serious impact on health as these chemicals are endocrine disruptors, asthmagens and carcinogens. This adds to the argument that such materials can only safely be used in buildings when they are fully encapsulated in fire safe and impermeable materials. Research published by Ian Mawditt, a highly-respected Building Physicist, has shown that high levels of hazardous indoor air pollution could be found inside a house emanating only from externally installed foam insulation.

There is a danger that these wider implications of synthetic insulations will not be considered by inquiries such as the NIHE reference group as they are seen as outside the scope of considering tower block cladding. However, it is essential to take a holistic view of the risks posed by such materials. This should also take account of the recent announcement by some manufacturers of synthetic foam products of a supply problem. This is due to increased restrictions on MDI product because of the toxic pollution effects of such materials. There is an urgent need to find materials that are both non-hazardous and fire safe. Such materials exist but are not widely available or manufactured in the UK and many are not covered by current regulations.

7. Energy Saving Trust. I understand that the NIHE has some kind of relationship with the Energy Saving Trust to give energy advice. The Energy Saving Trust claims to give impartial advice about insulation and other products on its web site. In reality the EST only endorses products where the manufacturers or suppliers have paid for an entry on the web site and this includes a wide range of synthetic foam insulation materials. When asked whether they intended to provide any kind of warning about the fire risks associated with these materials, the following response was received from Julian Roberts, Head of Communications at EST. It is clear from this (set out below) that the EST relies on BBA certificates in terms of behaviour in relation to fire. I examined a number of BBA certificates of products listed by the EST and in several cases these products were classified "F." The way this is sometimes written on BBA certificates, would make it easy for someone unfamiliar with the Euroclass fire classification to assume that these materials were safe in fire, whereas of course with Class F, no testing has been done on such materials. Some BBA certificates do make it clear that Class F means that it is not non-combustible. Other products are

## **APPENDIX 9 - LITERATURE REVIEW**

### **Tom Woolley submission to the Independent Reference Group regarding Fire Safety in Housing Executive Tower Blocks**

referred to as Class "O" but this raises a problem about the relationship between spread of flame classification and combustibility standards.

8. It seems clear that the NIHE, EST and many other bodies providing advice and standards in relation to synthetic insulations have a duty of care to warn the public about the possible dangers and risks associated with such materials. By referring to BBA certificates as widely accepted, with the implication that this means that products are fire safe (even if this was not what was intended) is an example of the many problems highlighted by Grenfell.

***Does EST plan to issue any sort of warning on its web site about the fire risks from the use of synthetic foam insulations?***

***With regards to fire risk we ensure that we only refer to synthetic foam insulations that carry the widely accepted industry certification of product performance from BBA or UKAS accredited or equivalent certification bodies. This includes details on a product's properties in relation to fire, behaviours in relation to fire or performance in relation to fire.***

***As EST includes "approved products" on its web site, can you tell me if you have carried out any fire tests before approving such products?***

***Energy Saving Trust approves products that meet strict requirements. One of the requirements for synthetic foam insulation products we endorse is that they hold the widely accepted industry certification of product performance from BBA or UKAS accredited or equivalent certification bodies. This includes details on a product's properties in relation to fire, behaviours in relation to fire or performance in relation to fire.***

***Does EST intend to continue endorsing synthetic foam insulations given the information that has emerged about their flammability?***

***We will endorse products that hold the widely accepted industry certification from BBA or UKAS accredited or equivalent certification bodies to provide product performance information, notably product performance in relation to fire.***

#### ***Purpose***

***The Housing Executive has decided to set up an independent Reference Group to explore and analyse the precautionary measures they have undertaken on their 33 tower blocks following the Grenfell tragedy.***

***The principal aim of the Reference Group will be to review the Housing Executive's cladding systems used on four tower blocks and identify any potential fire risks associated with these in light of the Grenfell tragedy. It will also review the recent Fire Risk Assessments of the blocks generally and ensure all the issues identified are documented and actioned as a priority in line with our statutory and landlord obligations.***

***The aim of the review is to offer confidence and assurance to the residents living in these blocks and to demonstrate our ongoing commitment to their health and safety requirements.***

***The Housing Executive has asked its contractors to put a temporary hold on the work they are carrying out to the Whincroft and Camel tower blocks in order to examine anything further that needs addressing before completing the schemes.***

## **APPENDIX 9 - LITERATURE REVIEW**

### **Tom Woolley submission to the Independent Reference Group regarding Fire Safety In Housing Executive Tower Blocks**

#### **Objectives of the Reference Group**

*There are four main objectives of the Reference Group are as follows:*

- 1. To explore in detail with colleagues in Building Control(BC) and the Northern Ireland Fire and Rescue Service (NIFRS), the make-up of the cladding systems, along with the robust and stringent testing of these systems.*
- 2. To undertake joint detailed site appraisal visits with Building Control and the Northern Ireland Fire and Rescue Service to all four tower blocks, to provide assurance that the systems have been installed in accordance with British Standards and Building Regulations.*
- 3. To identify any early learning outcomes from Grenfell and identify any appropriate action required.*

*This will include:*

- a. A desk top review of methods used to indicate compliance in the UK;*
  - b. Correspondence with BRE, to identify if the NIHE is required to undertake any further tests;*
  - c. Liaise with colleagues in Department for Communities to gauge what actions are required from DCLG;*
  - d. Literature review from other sources i.e. BRE, BBA, RIBA, RICS etc.;*
  - e. The maintenance and condition of fire safety measures in Tower Blocks;*
  - f. Role of communication with tenants and measures for safe evacuation of tenants in the event of a fire outbreak.*
- 4. To discuss any potential consequences which may arise from the findings of Grenfell in terms of legislation changes or amended regulations which may apply retrospectively?*

**Frequency:** *To be determined by the Chair and as required based on project activity/need. The first meeting to be scheduled for early July with a target to submit a report to the Board by August 2017.*

**Chaired by:** *Professor Alastair Adair - Deputy Vice-Chancellor, Ulster University*

**Administrative Support:** *Secretariat*

#### **Limitation of Scope**

*The Reference Group may wish to widen its scope to include other issues as information becomes available.*

#### **Potential Conflicts of Interest**

*Declaration of Interests will be a standing item on the agenda at the start of each meeting and will be recorded in the minutes together with details of any action taken where appropriate.*



WEEK

YEAR

HOUSE

**SECURITY and RECEPTION DUTIES.**

**WEEK COMMENCING MONDAY**

**DATE:**

**UNTIL**

**WEEK ENDING SUNDAY**

**DATE:**

**CONCIERGE ON DUTY.**

|                  | SHIFT        | CONCIERGE | SIGNATURE |
|------------------|--------------|-----------|-----------|
| <b>MONDAY</b>    | <b>DAY</b>   |           |           |
|                  | <b>NIGHT</b> |           |           |
| <b>TUESDAY</b>   | <b>DAY</b>   |           |           |
|                  | <b>NIGHT</b> |           |           |
| <b>WEDNESDAY</b> | <b>DAY</b>   |           |           |
|                  | <b>NIGHT</b> |           |           |
| <b>THURSDAY</b>  | <b>DAY</b>   |           |           |
|                  | <b>NIGHT</b> |           |           |
| <b>FRIDAY</b>    | <b>DAY</b>   |           |           |
|                  | <b>NIGHT</b> |           |           |
| <b>SATURDAY</b>  | <b>DAY</b>   |           |           |
|                  | <b>NIGHT</b> |           |           |
| <b>SUNDAY</b>    | <b>DAY</b>   |           |           |
|                  | <b>NIGHT</b> |           |           |

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# HANDOVER AND FOLLOWUP INFORMATION BETWEEN SHIFTS

**MONDAY**

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**TUESDAY**

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# KEY LOG

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|------------|------|-----|---------|-----------|-----------------|-----------|-----------|----------|
| DATE       | TIME | KEY | COMPANY | SIGNATURE | TIME            | SIGNATURE | CONCIERGE | COMMENTS |
|            |      |     |         |           |                 |           |           |          |
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**PLEASE CHECK KEYBOARD AND YOUR POCKETS AT THE END OF EACH SHIFT**

# NIHE Multi Storey Daily Safety Check (Fire Log) For 12 Storey Blocks

Name of Block \_\_\_\_\_ House

Date: \_\_\_\_\_

√ Tick if fine, X and comment if there is a problem at the end of the exercise (All boxes to be filled).

| Floor                  | Exits | Emergency Lights / Lighting | Chutes | Dry Riser | Back Stair | Signage | Smoke Detectors |
|------------------------|-------|-----------------------------|--------|-----------|------------|---------|-----------------|
| <b>Ground</b>          |       |                             |        |           |            |         |                 |
| <b>1<sup>st</sup></b>  |       |                             |        |           |            |         |                 |
| <b>2<sup>nd</sup></b>  |       |                             |        |           |            |         |                 |
| <b>3<sup>rd</sup></b>  |       |                             |        |           |            |         |                 |
| <b>4<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>5<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>6<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>7<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>8<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>9<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>10<sup>th</sup></b> |       |                             |        |           |            |         |                 |
| <b>11<sup>th</sup></b> |       |                             |        |           |            |         |                 |
| <b>12<sup>th</sup></b> |       |                             |        |           |            |         |                 |

Fire Extinguisher \_\_\_\_\_

CO2 \_\_\_\_\_

Fault

Description \_\_\_\_\_  
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 \_\_\_\_\_

Signed:

Date:

Time:

# NIHE Multi Storey Daily Safety Check (Fire Log) For 12 Storey Blocks

Name of Block \_\_\_\_\_ House

Date: \_\_\_\_\_

√Tick if fine, X and comment if there is a problem at the end of the exercise (All boxes to be filled).

| Floor                  | Exits | Emergency Lights / Lighting | Chutes | Dry Riser | Back Stair | Signage | Smoke Detectors |
|------------------------|-------|-----------------------------|--------|-----------|------------|---------|-----------------|
| <b>Ground</b>          |       |                             |        |           |            |         |                 |
| <b>1<sup>st</sup></b>  |       |                             |        |           |            |         |                 |
| <b>2<sup>nd</sup></b>  |       |                             |        |           |            |         |                 |
| <b>3<sup>rd</sup></b>  |       |                             |        |           |            |         |                 |
| <b>4<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>5<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>6<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
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| <b>8<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>9<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
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| <b>11<sup>th</sup></b> |       |                             |        |           |            |         |                 |
| <b>12<sup>th</sup></b> |       |                             |        |           |            |         |                 |

Fire Extinguisher \_\_\_\_\_

CO2 \_\_\_\_\_

Fault

Description \_\_\_\_\_  
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Signed:

Date:

Time:

# NIHE Multi Storey Daily Safety Check (Fire Log) For 12 Storey Blocks

Name of Block \_\_\_\_\_ House

Date: \_\_\_\_\_

√Tick if fine, X and comment if there is a problem at the end of the exercise (All boxes to be filled).

| Floor                  | Exits | Emergency Lights / Lighting | Chutes | Dry Riser | Back Stair | Signage | Smoke Detectors |
|------------------------|-------|-----------------------------|--------|-----------|------------|---------|-----------------|
| <b>Ground</b>          |       |                             |        |           |            |         |                 |
| <b>1<sup>st</sup></b>  |       |                             |        |           |            |         |                 |
| <b>2<sup>nd</sup></b>  |       |                             |        |           |            |         |                 |
| <b>3<sup>rd</sup></b>  |       |                             |        |           |            |         |                 |
| <b>4<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>5<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>6<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>7<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>8<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>9<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
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| <b>12<sup>th</sup></b> |       |                             |        |           |            |         |                 |

Fire Extinguisher \_\_\_\_\_

CO2 \_\_\_\_\_

Fault

Description \_\_\_\_\_  
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Signed:

Date:

Time:



**FIRE SAFETY CHECKLIST**  
**For Concierge/Caretakers**

| <b><u>ITEM (if<br/>Applicable)</u></b> | <b><u>FREQ. (min)</u></b> | <b><u>WHAT TO LOOK FOR</u></b>                     | <b>(TICK BOX)</b> |          | <b>COMMENTS</b> |
|--|---------------------------|--|-------------------|----------|-----------------|
|  |                           |  | <b>Y</b>          | <b>N</b> |                 |
| <b>Means of<br/>Escape</b>             | Mid Week                  | Stairwells – Rubbish etc,<br>Passageways - Blocked |                   |          |                 |
| <b>Fire Exits</b>                      | Mid Week                  | Easily opened. Signed. Clear<br>Externally.        |                   |          |                 |
| <b>House keeping</b>                   | Mid Week                  | Rubbish etc. Vandalism                             |                   |          |                 |
| <b>Call Points</b>                     | Mid Week                  | Check on Rotational basis                          |                   |          |                 |
| <b>Fire Alarm<br/>Panel</b>            | Mid Week                  | All zones lighting                                 |                   |          |                 |

The above items may not all be applicable

**Location:**

**(N.B.) Please retain for future inspection and notify appropriate office  
of any action required.**

**Signed:**

**Date:**

**Time:**

**Snr Concierge**

**Signature:**

**Date:**

**Time:**

# NIHE Multi Storey Daily Safety Check (Fire Log) For 12 Storey Blocks

Name of Block \_\_\_\_\_ House

Date: \_\_\_\_\_

√Tick if fine, X and comment if there is a problem at the end of the exercise (All boxes to be filled).

| Floor            | Exits | Emergency Lights / Lighting | Chutes | Dry Riser | Back Stair | Signage | Smoke Detectors |
|------------------|-------|-----------------------------|--------|-----------|------------|---------|-----------------|
| Ground           |       |                             |        |           |            |         |                 |
| 1 <sup>st</sup>  |       |                             |        |           |            |         |                 |
| 2 <sup>nd</sup>  |       |                             |        |           |            |         |                 |
| 3 <sup>rd</sup>  |       |                             |        |           |            |         |                 |
| 4 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 5 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 6 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 7 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 8 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 9 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 10 <sup>th</sup> |       |                             |        |           |            |         |                 |
| 11 <sup>th</sup> |       |                             |        |           |            |         |                 |
| 12 <sup>th</sup> |       |                             |        |           |            |         |                 |

Fire Extinguisher \_\_\_\_\_

CO2 \_\_\_\_\_

Fault Description \_\_\_\_\_  
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Signed:

Date:

Time:

# NIHE Multi Storey Daily Safety Check (Fire Log) For 12 Storey Blocks

Name of Block \_\_\_\_\_ House

Date: \_\_\_\_\_

√Tick if fine, X and comment if there is a problem at the end of the exercise (All boxes to be filled).

| Floor            | Exits | Emergency Lights / Lighting | Chutes | Dry Riser | Back Stair | Signage | Smoke Detectors |
|------------------|-------|-----------------------------|--------|-----------|------------|---------|-----------------|
| Ground           |       |                             |        |           |            |         |                 |
| 1 <sup>st</sup>  |       |                             |        |           |            |         |                 |
| 2 <sup>nd</sup>  |       |                             |        |           |            |         |                 |
| 3 <sup>rd</sup>  |       |                             |        |           |            |         |                 |
| 4 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 5 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 6 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 7 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 8 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 9 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 10 <sup>th</sup> |       |                             |        |           |            |         |                 |
| 11 <sup>th</sup> |       |                             |        |           |            |         |                 |
| 12 <sup>th</sup> |       |                             |        |           |            |         |                 |

Fire Extinguisher \_\_\_\_\_

CO2 \_\_\_\_\_

Fault  
Description \_\_\_\_\_  
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Signed:

Date:

Time:

# NIHE Multi Storey Daily Safety Check (Fire Log) For 12 Storey Blocks

Name of Block \_\_\_\_\_ House

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|------------------|-------|-----------------------------|--------|-----------|------------|---------|-----------------|
| Ground           |       |                             |        |           |            |         |                 |
| 1 <sup>st</sup>  |       |                             |        |           |            |         |                 |
| 2 <sup>nd</sup>  |       |                             |        |           |            |         |                 |
| 3 <sup>rd</sup>  |       |                             |        |           |            |         |                 |
| 4 <sup>th</sup>  |       |                             |        |           |            |         |                 |
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| 6 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 7 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 8 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 9 <sup>th</sup>  |       |                             |        |           |            |         |                 |
| 10 <sup>th</sup> |       |                             |        |           |            |         |                 |
| 11 <sup>th</sup> |       |                             |        |           |            |         |                 |
| 12 <sup>th</sup> |       |                             |        |           |            |         |                 |

Fire Extinguisher \_\_\_\_\_

CO2 \_\_\_\_\_

Fault Description \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Signed:

Date:

Time:

**Appendix G  
PART 2**

**FIRE SAFETY CHECKLIST**  
**For Concierge/Caretakers**

**Weekends  
Saturday**

| <b><u>ITEM (if<br/>Applicable)</u></b> | <b><u>FREQ.<br/>(min)</u></b> | <b><u>WHAT TO LOOK FOR</u></b>   | <b>(TICK BOX)</b> |          | <b>COMMENTS</b> |
|--|-------------------------------|--|-------------------|----------|-----------------|
|  |                               |  | <b>Y</b>          | <b>N</b> |                 |
| <b>Means of<br/>Escape</b>             | Weekend                       | Stairwells – Rubbish etc,<br>Passageways - Blocked                     |                   |          |                 |
| <b>Fire Exits</b>                      | Weekend                       | Easily opened. Signed. Clear<br>Externally.                            |                   |          |                 |
| <b>House keeping</b>                   | Weekend                       | Rubbish etc. Vandalism   |                   |          |                 |
| <b>Call Points</b>                     | Weekend                       | Check on Rotational basis  |                   |          |                 |
| <b>Fire Alarm<br/>Panel</b>            | Weekend                       | All zones lighting   |                   |          |                 |
| <b>Fire<br/>Extinguishers</b>          | Weekend                       | Extinguisher Missing. Tags Missing.<br>Pins Missing. Brackets Missing. |                   |          |                 |
| <b>Fire Doors</b>                      | Weekend                       | Damaged. Closing Properly.<br>Propped. Warped.                         |                   |          |                 |
| <b>Emergency<br/>Lighting</b>          | Weekend                       | Diodes Working.  |                   |          |                 |
| <b>Smoke / Heat<br/>Detectors</b>      | Weekend                       | Vandalised   |                   |          |                 |
| <b>Portable<br/>Applications</b>       | Weekend                       | Plugs. Frayed Leads.   |                   |          |                 |
| <b>Signage</b>                         | Weekend                       | Missing.   |                   |          |                 |

The above items may not all be applicable

(N.B.) Please retain for future inspection and notify appropriate office of any action required.

Location:

Signed:

Date:

Time:

# NIHE Multi Storey Daily Safety Check (Fire Log) For 12 Storey Blocks

Name of Block \_\_\_\_\_ House

Date: \_\_\_\_\_

√Tick if fine, X and comment if there is a problem at the end of the exercise (All boxes to be filled).

| Floor                  | Exits | Emergency Lights / Lighting | Chutes | Dry Riser | Back Stair | Signage | Smoke Detectors |
|------------------------|-------|-----------------------------|--------|-----------|------------|---------|-----------------|
| <b>Ground</b>          |       |                             |        |           |            |         |                 |
| <b>1<sup>st</sup></b>  |       |                             |        |           |            |         |                 |
| <b>2<sup>nd</sup></b>  |       |                             |        |           |            |         |                 |
| <b>3<sup>rd</sup></b>  |       |                             |        |           |            |         |                 |
| <b>4<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>5<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>6<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>7<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>8<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>9<sup>th</sup></b>  |       |                             |        |           |            |         |                 |
| <b>10<sup>th</sup></b> |       |                             |        |           |            |         |                 |
| <b>11<sup>th</sup></b> |       |                             |        |           |            |         |                 |
| <b>12<sup>th</sup></b> |       |                             |        |           |            |         |                 |

Fire Extinguisher \_\_\_\_\_

CO2 \_\_\_\_\_

Fault

Description \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Signed:

Date:

Time:

SECURITY CALLS TO HEADQUARTERS:

MONTH:

YEAR:

The Concierge must ensure that they contact the NIHE monitor room on telephone number 90240087 at each of the times listed on the table below. The date should be inserted below each day and the block attendant/ caretaker must sign each box when they have contacted the monitor room. Security staff in the monitor will allow 15minutes after these times and if a call is not received they will make contact with the workstation at Ross/Mount Vernon/Grainne House.

| DATE    |        |         |           |          |        |          |        |
|---------|--------|---------|-----------|----------|--------|----------|--------|
| TIME    | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY | SATURDAY | SUNDAY |
| 5.00PM  |        |         |           |          |        |          |        |
| 7.00PM  |        |         |           |          |        |          |        |
| 9.00PM  |        |         |           |          |        |          |        |
| 11.00PM |        |         |           |          |        |          |        |
| 1.00 AM |        |         |           |          |        |          |        |
| 3:00 AM |        |         |           |          |        |          |        |
| 5:00 AM |        |         |           |          |        |          |        |
| 7:00 AM |        |         |           |          |        |          |        |

# SITE CONDITION REPORT

| Gate/Door            | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Reported/Comments |
|----------------------|-----|-----|-----|-----|-----|-----|-----|-------------------|
| Lowwood Ped gate     |     |     |     |     |     |     |     |                   |
| Shore Rd Ped gate    |     |     |     |     |     |     |     |                   |
| Vehicle Access gates |     |     |     |     |     |     |     |                   |
| Foyer front door     |     |     |     |     |     |     |     |                   |
| Foyer Internal door  |     |     |     |     |     |     |     |                   |
| Rear door            |     |     |     |     |     |     |     |                   |
| Even Lift            |     |     |     |     |     |     |     |                   |
| Odd Lift             |     |     |     |     |     |     |     |                   |
|                      |     |     |     |     |     |     |     |                   |

**All gates/doors to be checked working correctly and all faults reported**



# **Appendix 11 - Building a Safer Future - Independent Review of Building Regulations and Fire Safety: Interim Report**

## **Foreword**



## A personal view from Dame Judith Hackitt

In the early hours of 14 June 2017, a fire spread through Grenfell Tower. Seventy-one people died, many homes were destroyed and countless lives have been affected. The fire appeared to be accelerated by the building's exterior cladding system, leading to a national programme of extensive testing of the cladding on other high-rise buildings. This revealed widespread use of aluminium composite materials which did not meet the limited combustibility requirements of building regulations guidance, and raised concerns for the safety of others.

Further concerns soon came to light about the adequacy of the structural design of cladding systems when materials fell from a building in Glasgow. A subsequent series of fire and rescue service audits of tower blocks led to the temporary evacuation in London of the Chalcots Estate, Camden, and resulted in the discovery of structural safety issues with four buildings at the Ledbury Estate, Southwark.

With these events unfolding, I was asked by the Secretary of State for the Department for Communities and Local Government (DCLG) and the Home Secretary to conduct an Independent Review of Building Regulations and Fire Safety with a particular focus on their application to high-rise residential buildings.

I have been asked to present timely recommendations to provide assurance to everyone, and in particular to residents of high-rise buildings, that urgent steps are being taken to improve the safety of buildings and to address what could be seen as evidence of systemic failings in the regulatory system and deeper problems in the industry.

This tragic incident should not have happened in our country in the 21st century. We now all have the opportunity to respond in a way that will lead to lasting change that makes people safer in the

future. I have seen the improvements in safety in the oil and gas industry that followed the Piper Alpha oil production platform disaster in 1988 and I hope this review can have a similar impact.

This review is work in progress and a final report will follow in spring 2018. The review is future-focused and has not been charged with investigating the specific circumstances at Grenfell – these are matters for the ongoing police investigation and the Grenfell Tower Inquiry. It is key that we share what we have learned to date and outline the direction of travel over the next few months. There has been an outstanding response from stakeholders through meetings, written responses to our call for evidence and subsequent roundtable discussions. From the very earliest stages of the process, the people we have spoken to have indicated that the current regulatory system falls short of what is required to be effective. While some have argued for specific short-term measures, most have recognised that the current overall system is not working effectively and needs to be overhauled.

As the review has progressed, it has become clear that the whole system of regulation, covering what is written down and the way in which it is enacted in practice, is not fit for purpose, leaving room for those who want to take shortcuts to do so.

This should not be interpreted as meaning that buildings are unsafe. Major building failures, including large-scale fires, are very rare and there are many construction firms, building owners, landlords and others in the system who do the right thing and recognise their responsibilities. The unprecedented verification, interim mitigation and remediation work undertaken by fire and rescue services, local authorities and building owners since the summer have ensured that measures are in place to assure residents of high-rise buildings of their safety. My focus is to create a better system for the future which will be easier to work with, deliver better solutions everywhere and rebuild confidence.

I have set out to look at the whole system, including the people working within it, and how the various parts interact to deliver outcomes on the ground. This includes the roles and responsibilities of people designing, planning and constructing buildings; the roles and responsibilities of different enforcing bodies and those who set standards; and the roles and responsibilities of all those who interact with the system during the use of a building, which often involves highly complex ownership models. The regulatory system comprises all of these elements, not just what is written in statute.

One of the major outputs at this stage of the review is a map, which shows how the current regulatory system should work in practice. Carrying out this system mapping has been fundamental to understanding where the current weaknesses are and in providing the basis for developing a simpler and more effective framework for the future. This approach could have more widespread application across other regulatory frameworks, with the potential to deliver better overall results than other regulatory reviews conducted to date.

As an engineer, much of my career has been spent working in the chemicals industry where any project undertaken has to be specified, designed to that specification and properly reviewed; any changes have to be properly managed, reviewed and recorded. At the end of the project, a full record of what has been built must be handed over to those who will operate the project. This same philosophy continues throughout the life cycle of the entity that has been built, when any further changes or improvements are made.

After some four months leading this review, it is clear that this same systematic, controlled approach to construction, refurbishment and management of occupied buildings is not by any means universal. There is plenty of good practice but it is not difficult to see how those who are inclined to take shortcuts can do so. Change control and quality assurance are poor throughout the process. What is initially designed is not what is being built, and quality assurance of materials and people is seriously lacking.

I have been shocked by some of the practices I have heard about and I am convinced of the need for a new intelligent system of regulation and enforcement for high-rise and complex buildings which will encourage everyone to do the right thing and will hold to account those who try to cut corners.

During close to a decade as Chair of the Health and Safety Executive, I saw the construction industry respond to the challenge of improving its performance in managing the safety of its workforce on projects of all sizes. With an effective regulatory framework in place, the industry was willing and able to show leadership, to take responsibility for delivering a culture change and to move away from simply accepting that construction is a dangerous sector to work in. A cultural and behavioural change of similar magnitude is now required across the whole sector to deliver an effective system that ensures complex buildings are built and maintained so that they are safe for people to live in for many years after the original construction. The mindset of doing things as cheaply as possible and passing on responsibility for problems and shortcomings to others must stop. Everyone's focus must be on doing the right things because it is their responsibility as part of a system which provides buildings that are safe and sustainable for those who will live in and use them for many decades.

Changes to the regulatory regime will help, but on their own will not be sufficient unless we can change the culture away from one of doing the minimum required for compliance, to one of taking ownership and responsibility for delivering a safe system throughout the life cycle of a building.

At the heart of this required change is a shift of ownership. Despite being advised at the outset that the regulatory system for building was outcomes and performance-based, I have encountered masses of prescription which is complex and in some cases inconsistent. The prescription is largely owned by government, with industry – those who should be the experts in best practice – waiting to be told what to do and some looking for ways to work around it.

We know that many owners and landlords are taking responsibility and initiating remedial work where required. But even now I am aware that some building owners and landlords are waiting for direction from this review on what materials should be used to replace cladding that has been identified as inadequate. I would urge them not to wait but to consider what materials have already been identified and tested as safe. They must also take steps to ensure that those whom they commission to carry out any remedial works are competent to do the work and that the work is quality assured.

A systemic review of the regulations by a non-expert in construction was never going to recommend detailed changes to the technical requirements – this is beyond my area of competence. Any attempt to modify details of the regulation without addressing the clear systemic failings would be akin to adding a paint job and decorations to a fundamentally non-roadworthy vehicle. My goal is to ensure that we create, within a much more robust overall system, a process that ensures there is effective oversight of materials, people and installation.

I have been deeply affected by the residents of high-rise buildings I have met and I have learned so much from them. These buildings are their homes and their communities. They are proud of where they live, but their trust in the system has been badly shaken by the events of the last few months. We need to rebuild that trust.

I have also met some stakeholders during this process who think that there is one 'fix' typified by the 'if we just do this one thing, it will all be better' response. Some of this is driven by vested interest, but also by a desire to 'do something' quickly. I believe we must be very wary of this type of thinking, and the evidence tells me that this is not what residents want.

I have been impressed by the reasonableness and pragmatism of the residents I have met despite what has happened. If we are to regain their trust and create a better system for the future, we must do so by engaging them in deciding what solution is right for them in their particular situations, all of which are different given the histories of the many different buildings. There is no doubt that residents want timely resolution of issues but they are also realists and know that things must be prioritised – that means listening to them, involving them and respecting their views.

This interim report provides a summary of what has been learned so far, the proposed direction of travel for the next phase of work and the rationale for that. It also identifies some early actions which can and should be taken to support the future direction of travel; these will help to ensure delivery in an appropriately timely manner. There is a strong desire among all of those with whom I have engaged thus far to learn the lessons of the tragic event which took place at Grenfell Tower and to build a better system for the future. Our challenge now is to turn that into a reality and not to allow ourselves to move on without achieving lasting change.

Your comments and feedback on this interim report would be very welcome and we are planning to build in ways to gather those views as we move on to the next stage of the review. Most immediately, I intend to hold a summit of key stakeholders early in 2018. Many of the interim findings in this report already identify areas of work which it is appropriate to ask others to lead on in parallel with phase two of the review itself.

I would also like to thank the team of staff in DCLG and the Home Office who are providing outstanding support in this review. Despite the circumstances which led to this team being brought together, there is a strong sense that we can make a difference if we are bold enough to make the changes which are needed.

*"Any intelligent fool can make things bigger, more complex, and more violent. It takes a touch of genius – and a lot of courage – to move in the opposite direction." E.F. Schumacher*



**DAME JUDITH HACKITT**

# Summary

## Summary of the report

### Aim

The Independent Review of Building Regulations and Fire Safety aims to make recommendations that will ensure there is a sufficiently robust regulatory system for the future and provide further assurance to residents that the buildings they live in are safe and will remain so.

This interim report sets out the findings to date and the direction of travel for the final report.

### Interim report key findings

The work of the review to date has found that **the current regulatory system for ensuring fire safety in high-rise and complex buildings is not fit for purpose**. This applies throughout the life cycle of a building, both during construction and occupation, and is a problem connected both to the culture of the construction industry and the effectiveness of the regulators.

The key reasons for this are:

- Current regulations and guidance are too complex and unclear. This can lead to confusion and misinterpretation in their application to high-rise and complex buildings.
- Clarity of roles and responsibilities is poor. Even where there are requirements for key activities to take place across design, construction and maintenance, it is not always clear who has responsibility for making it happen.
- Despite many who demonstrate good practice, the means of assessing and ensuring the competency of key people throughout the system is inadequate. There is often no differentiation in competency requirements for those working on high-rise and complex buildings.
- Compliance, enforcement and sanctions processes are too weak. What is being designed is not what is being built and there is a lack of robust change control. The lack of meaningful sanctions does not drive the right behaviours.
- The route for residents to escalate concerns is unclear and inadequate.

- The system of product testing, marketing and quality assurance is not clear.

### Direction of travel

The Independent Review will now undertake its second phase of work and publish a final report in spring 2018. This will include targeted work in partnership with the sector and other stakeholders. This interim report sets the direction for change that will underpin that report and covers six broad areas.

#### *Regulation and guidance*

- The rules for ensuring high-rise and other complex buildings are built safe and remain safe should be more risk-based and proportionate. Those responsible for high-risk and complex buildings should be held to account to a higher degree.
- There should be a shift away from government solely holding the burden for updating and maintaining guidance, towards greater responsibility for the sector to specify solutions which meet the government's functional standards.
- Regulations and guidance must be simplified and unambiguous.

#### *Roles and responsibilities*

- Primary responsibility for ensuring that buildings are fit for purpose must rest with those who commission, design and build the project. Responsibility and accountability must rest with clearly identifiable senior individuals and not be wholly dispersed through the supply chain.
- Roles and responsibilities across the whole life cycle of a building must be clearer.

#### *Competence*

- There is a need to raise levels of competence and establish formal accreditation of those engaged in the fire prevention aspects of the design, construction, inspection and maintenance of high-rise residential and complex buildings.

### *Process, compliance and enforcement*

- There needs to be a golden thread for high-rise residential and complex buildings so that the original design intent, and any subsequent changes or refurbishment, are recorded and properly reviewed, along with regular reviews of overall building integrity.
- There is a need for stronger and more effective enforcement activity, backed up with sufficiently powerful sanctions for the few who do not follow the rules.

### *Residents' voice and raising concerns*

- Residents need to be reassured that an effective system is in place to maintain safety in their homes.
- There must be a clear, quick and effective route for residents' concerns to be addressed.

### *Quality assurance and products*

- Products must be properly tested and certified and there is a need to ensure oversight of the quality of installation work.
- Marketing of products must be clear and easy to interpret.

## **Conclusion**

In summary, this is a call to action for an entire industry and those parts of government that oversee it. True and lasting change will require a universal shift in culture. The industry has shown this is possible in the way the health and safety of construction workers has seen a positive transformation in culture and practice over the last decade. This change needs to start now. A summit will be called in early 2018 with key stakeholders to discuss taking this work forward.





# Chapter 1 Findings and direction of travel

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## Background

### 1.1

The government announced an independent forward-looking review of building regulations and fire safety on 28 July 2017. This review was commissioned by the Secretary of State for the Department for Communities and Local Government (DCLG) and the Home Secretary as part of the ongoing response to the Grenfell Tower disaster.

### 1.2

As set out in the review's terms of reference,<sup>1</sup> published on 30 August, this review is running in parallel with the work of the Grenfell Tower Inquiry. The review is independent and covers the system of regulation for all high-rise residential buildings. It will, however, provide useful background and input into the Inquiry.

### 1.3

The review team was formed in August 2017, led by Dame Judith Hackitt DBE FREng, and charged with providing an interim report in 2017 and a final report by spring 2018. The production of this interim report marks the first key milestone in the review. It is an important opportunity to share the findings so far and to indicate the proposed direction of travel for the final report.

<sup>1</sup> Independent Review terms of reference available at: [www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/640790/Hackitt\\_Review\\_terms\\_of\\_reference.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/640790/Hackitt_Review_terms_of_reference.pdf)

## Review methodology

### 1.4

From the outset, the work of the review has taken a systemic view of fire safety, focused on the overall regulatory system and not on the detail of specific requirements. In order to do this, the review has used a range of techniques:

- Research into the history of the regulatory system. A short summary is included at Chapter 2.
- An in-depth mapping exercise, developed through a series of workshops, covering the regulatory system throughout the life cycle of a building. This sets out how the current system is supposed to work, and how it actually works in practice, from initial planning and design through to construction, completion, handover, ongoing use and improvement/modification. The map includes other relevant areas of legislation which overlap with building regulations and fire safety regulations, including the Housing Act 2004, the Health and Safety at Work etc. Act 1974 and Construction (Design and Management) Regulations 2015. This is included at Chapter 3.
- A call for evidence was issued in September and received more than 250 responses. These responses are well considered and offer hundreds of suggestions for improvements to the system. A summary and analysis are included at Chapter 4.
- The review has engaged with a large number of stakeholders (see Appendix C for details).

In addition, the themes arising from the call for evidence have been explored at a series of roundtable events which took place during November. An overview is included at Chapter 4.

- A series of meetings and visits have taken place to gather information on other international regulatory regimes for fire safety and to gain a better understanding of regulatory systems in other sectors with comparable levels of safety risk. More detail is set out in Chapter 5.

### 1.5

The terms of reference of the review<sup>2</sup> set out that it should have a ‘particular focus’ on high-rise residential buildings, while recognising that it will cover the regulatory system for all buildings. It became clear, when thinking about a proportionate approach for different types of building, that it would not always make sense to separate high-rise residential buildings from other large or complex buildings where many people live or stay. This report therefore refers to either high-rise residential buildings or to ‘complex and high-risk’ buildings. This latter category includes other buildings for which exceptional events could lead to the risk of large-scale fatalities; for example, other purpose-built flats, student accommodation and sheltered housing. The review will provide a more precise definition of ‘complex and high-risk’ categories for future government use in its final report.

<sup>2</sup> Independent Review terms of reference available at: [www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/640790/Hackitt\\_Review\\_terms\\_of\\_reference.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/640790/Hackitt_Review_terms_of_reference.pdf)

## Findings to date

- 1.6**  
The overall conclusion is that the current regulatory system is not fit for purpose in relation to high-rise and complex buildings. The following sections highlight the major concerns based on the evidence gathered to date.
- 1.7**  
It became clear quite early in the review that there is a need for significant improvement in the current system in a number of areas. These relate to matters of:
- regulation and guidance;
  - roles and responsibilities;
  - competence;
  - process, compliance and enforcement;
  - residents' voice and raising concerns; and
  - quality assurance and products.
- 1.8**  
The Building Regulations 2010 are clear about the outcomes to be achieved but not about where responsibilities lie.
- 1.9**  
There is widespread confusion about what constitutes the regulations and what is guidance. The guidance on ways to meet the Building Regulations, set out in the Approved Documents, are frequently referred to as 'the regulations'.
- 1.10**  
The Approved Documents are not produced in a user-friendly format. The current format of covering each requirement (fire safety, thermal insulation, noise abatement, etc.) in separate sections leads to multiple, separate specifications for overlapping or common elements of a building, with no easy means for these to be integrated into a single, compliant specification.
- 1.11**  
Key definitions are unclear; for example, 'high rise', 'persons carrying out the work', 'limited combustibility' and 'material alteration', leaving too much open to interpretation.
- 1.12**  
The Building Regulations Advisory Committee (BRAC) for England has a statutory role to advise government on the Building Regulations. Its focus over recent years has been mainly on energy efficiency and the deregulatory agenda and less on fire safety and other aspects of the regulations. While this has been in line with prevailing government policy and the trend in the evidence base of a declining number of fire deaths year on year, it is not clear whether BRAC's role is to proactively advise on initiatives and priorities or purely to take direction from government.
- 1.13**  
There is a general lack of clarity around, or statement of, roles and responsibilities throughout the system.
- 1.14**  
Even where there are requirements for key activities to take place it is not always clear who has responsibility for making these happen.
- 1.15**  
There is no requirement for identifiable, named dutyholders responsible for ensuring and proving compliance with the Building Regulations.
- 1.16**  
'Responsible persons' under the Regulatory Reform (Fire Safety) Order 2005 are frequently not identified when the building is due to be handed over following construction and therefore people are not aware of their responsibilities and often assume they are for someone else to do.

**1.17**

There is a widespread culture in relation to building and fire standards of waiting to be told what to do by regulators rather than taking responsibility for building to correct standards. The approach is very much driven by aiming for minimum compliance, not ensuring safety for the lifetime of the building.

**1.18**

Even where regulations or guidance call upon people to consult with others in the system as part of meeting the requirements of the legislation, there is no clear understanding of the need to do that at an appropriate time or to take account of views expressed.

**Competence**

**The means of assessing and ensuring appropriate levels of competence throughout the system are unclear and inadequate**

**1.19**

The competence of those involved in the design, construction, ongoing operational management and maintenance of complex and high-risk buildings has been called into question. While there are many instances of competent people planning, building and maintaining buildings in a conscientious way, there is no consistent way to assess or verify their competence. Numerous examples have been quoted, demonstrating lack of competence among designers, builders, fire engineers, fire consultants, fire risk assessors, building control inspectors and others, which compromises the fire safety of buildings.

**1.20**

In particular, for fire risk assessors undertaking risk assessments on complex and high-risk buildings there are no statutory registration or accreditation requirements.

**1.21**

Private sector Approved Inspectors are required under legislation and their code of conduct to demonstrate and maintain relevant qualifications and experience and are subject to audit by an independent body, whereas there is no such statutory competence framework for Local Authority Building Control inspectors (LABCs).

**1.22**

Some safety-critical tradespeople, for example gas engineers, must be registered for different types of work, but others do not have such requirements.

**1.23**

This is one area where England and Wales appears to be lagging behind many other parts of the world that require key personnel throughout the system to be properly trained, assessed and in many cases licensed to carry out specific roles.

**Process, compliance and enforcement**

**Enforcement and sanction measures are poor and do not provide adequate means of compliance assurance, deterrence or redress for non-compliance**

**1.24**

There is widespread deviation from what is originally designed to what is actually built, without clear and consistent requirements to seek authorisation or review, or to document changes made. The current trend for 'design and build' contracts (where a main contractor is appointed to design and build the project rather than the client appointing separate designers and contractors) has been identified as being particularly problematic in facilitating evolutionary design, which fails to be properly documented or reviewed.

**1.25**

There is no requirement in the Building Regulations for existing buildings to be brought up to the latest fire safety standards, as long as during any refurbishment the existing provisions are not made worse.

**1.26**

Across the life cycle of a complex and high-risk building, the different regulations that apply can overlap, and have varying approaches to responsibility and demonstrating compliance.

**1.27**

There is evidence of a number of key control stages of the process not being followed as intended; for example, the handover of fire safety information and the issuing of Completion Certificates.

**1.28**

There are wide differences of view regarding the benefits of the partial privatisation model introduced into building control which offers a choice between LABCs and private sector Approved Inspectors. The latter are perceived to be less independent of the clients and have no means of enforcement action available to them other than to refer cases to LABCs. This referral process is rarely used.

**1.29**

While informal enforcement activity by building control bodies generally leads to compliance, where non-compliance is identified, LABCs are deterred from taking formal enforcement actions by the cost of pursuing cases through the courts, and the historical failure of the courts to impose robust sanctions.

**1.30**

Some instances of non-compliance are not picked up at all because key work is encapsulated within the fabric of the building before being inspected. The review has heard repeatedly that construction often begins before the full plans have been approved by building control.

**1.31**

The information flow and documented evidence provided by developers to building control bodies does not provide an adequate public record to ensure building safety throughout the life of the building.

**1.32**

Information provided to residents of complex and high-risk buildings on the key fire safety measures, their importance and residents' responsibilities is highly variable and too often non-existent.

**1.33**

Fire and rescue service<sup>3</sup> personnel may raise concerns about compliance with the Fire Safety Order which are not acted upon because of cost, because the building work is too far advanced to make changes or because their advice is ignored.

**1.34**

Once a building is occupied there is a requirement for a fire risk assessment to be carried out regularly by a 'responsible person', but no requirement for this to be reported to a regulator or for this to be shared with residents.

## Residents' voice and raising concerns

### The route for residents' concerns to be raised and addressed is unclear and inadequate

**1.35**

Multiple occupancy residential buildings often have complex ownership and management models involving managing agents, varying leasehold contracts, residents' associations

and so on, making it difficult to identify who to contact to raise concerns or to get responses to concerns when raised.

**1.36**

Roundtable discussions with residents have shown wide variation in practice by landlords from the very good to non-existent. We have heard from residents who are afraid to raise concerns for fear of eviction, and about the particular difficulties of reporting on things which involve the activities of other residents – their neighbours.

**1.37**

Many of the problems which are reported and fixed, for example propping open of fire doors or obstructions in access ways, very quickly revert to being a problem and there is no effective means of ensuring that residents meet their responsibilities to their fellow residents.

**1.38**

Regulators often face similar problems in getting concerns and defects addressed following investigation.

## Quality assurance and products

### Current methods for testing, certification and marketing of construction products and systems are not clear

**1.39**

DCLG's Building Safety Programme identified more than 200 high-rise residential buildings across England fitted with aluminium composite materials cladding systems that are likely to present a fire hazard. There does not appear to be a single, simple reason to explain why so many buildings are affected.

**1.40**

Products are marketed with specification data presented in ways which can easily be misinterpreted.

**1.41**

Individual elements are being used as part of compound systems that are not being fully tested as systems.

**1.42**

The widespread use of desktop studies to assess equivalence of products and systems

<sup>3</sup> Fire and rescue services are the delivery body of fire and rescue authorities (the statutory enforcing authority for the Regulatory Reform (Fire Safety) Order 2005). In this report we use the term fire and rescue services.

is not properly managed or controlled in terms of both the circumstances in which they can be used and the qualifications and experience of those undertaking them.

#### 1.43

Test results, desktop studies, and the details of those who produce them, are not made public.

#### 1.44

A number of people engaged in the system have said that the test conditions used do not adequately reflect real-life conditions.

#### 1.45

The integrity and efficacy of product and system classifications are highly dependent on correct installation by competent and knowledgeable persons.

### International regulatory regimes

#### **There are some lessons to be learned and applied from other international regulatory regimes**

#### 1.46

Fires in high-rise buildings have occurred elsewhere in the world and a number of corrective measures have been put in place or are under consideration. The review will use examples of what has worked well in other countries to support the work during phase two.

#### 1.47

A number of other regulatory regimes have more stringent standards for fire protection and require key roles within the system to be formally licensed.

#### 1.48

Other countries have been more proactive in requiring formal accreditation of those engaged in all aspects of high-risk buildings.

#### 1.49

Some countries have been more proactive in calling for the retrospective upgrade of existing buildings.

### Other regulatory systems

#### **There could be greater alignment of the regulatory regime for building and fire safety with other regulatory systems**

#### 1.50

A number of respondents have cited the greater clarity and effectiveness of UK health and safety legislation in relation to construction and, in particular, the Construction (Design and Management) Regulations 2015 which is due to the clearer assignment of roles and responsibilities.

#### 1.51

There has been a widespread call for greater consistency of use of terms to identify key responsibilities within the system.

#### 1.52

There is also significant scope for greater collaboration, intelligence sharing and combined inspections by regulators.



## Direction of travel for phase two of the review

### 1.53

The review's findings to date indicate that there is a clear need for a full overhaul of the regulatory system to address the wide-ranging issues outlined. This includes roles and responsibilities, competence and the lack of a joined up, effective system to deliver and sustain complex and high-risk buildings which are fit for purpose.

### 1.54

Phase two of this review will focus on defining a revised regulatory system which will be simpler, clearer to all involved and deliver better overall outcomes. It will be important for this revised system to continue to allow innovation in building design and construction and not introduce disproportionate delays or cost into building processes. Any additional time spent at the front end of designing and specifying a building is likely to yield significant benefits in time, cost and safety in construction and throughout the building's life cycle.

### 1.55

The revised system must be risk-based and proportionate and therefore not burden low-risk, small-scale or simple projects with requirements which are intended for complex and high-risk buildings where both the risk and consequences of catastrophic events are intrinsically considerably higher.

### 1.56

Many of the findings to date clearly identify the need for a major cultural shift across all of those who are part of the system within the construction, operation and maintenance of complex and high-risk buildings. The focus must shift from achieving lowest cost to providing buildings which are safe and fit for people to live in for years to come. Work on developing some elements which will be required within a new system can be started now and can be delivered by a range of organisations. This is not simply a task for central government through revised legislation.

### 1.57

The following section sets out the direction of travel in more detail. The challenge for phase two of the review will be to establish how the aspirations set out below can best be delivered and to bring forward recommendations to support this delivery. Stakeholders should prepare themselves for an early call to action to create a more effective regulatory system. The review is keen to work with residents and other stakeholders on shaping these recommendations.

### Direction of travel – Regulation and guidance

#### 1.58

The regulatory system needs to become more risk-based. Simple guidance which covers all elements of what is required to build simple residential dwellings would be much more accessible and user-friendly than the current detailed, tram-lined system of guidance. These simple types of dwellings are also handed over at the end of the process to a single owner.

#### 1.59

In the case of complex and high-risk buildings with complex ownership and occupancy models, a more rigorous risk-based process must be put in place to ensure that building integrity is maintained throughout the life cycle. It is important that the construction and maintenance of these buildings is treated proportionately and that those responsible for such buildings are held to account to a higher degree.

#### 1.60

To implement a risk-based system it will be necessary to define what we consider to be 'complex and high-risk buildings'. It is envisaged that this would include buildings where multiple people live or stay and for which exceptional events could lead to the risk of large-scale fatalities.

**1.61**

The current system of building regulation relies heavily on central government to keep all regulations and supporting documents up to date, advised by BRAC, a statutory body with wide representation. It is inappropriate for the burden of keeping up to date with technology to rest solely with government in this way. It is clearly the role of government to set the basic framework of standards which must be achieved and to make it clear who has responsibility for delivering those standards of performance throughout the life cycle. However, it should not be for government to lead on the specification of the detailed solutions as to how those standards will be met. The scope of BRAC's role in the future should be considered in this context.

**1.62**

Most responses to the call for evidence have indicated that there is a need for Approved Document B to be simplified and brought up to date. The usability of all of the Approved Documents could be significantly improved by more fundamental changes to their structure which would also close a number of the current gaps which are left open to interpretation and confusion.

**1.63**

**Recommendation:** The government should consider how the suite of Approved Documents could be structured and ordered to provide a more streamlined, holistic view while retaining the right level of relevant technical detail, with input from the Building Regulations Advisory Committee. Given that reframing the suite of guidance may take some time, in the meantime I would ask the government to consider any presentational changes that will improve the clarity of Approved Document B as an interim measure.

## Direction of travel – Roles and responsibilities

**1.64**

Primary responsibility for ensuring that buildings are built to the correct standards and are fit for purpose must rest with those who commission the work and those who design and build the project. Those commissioning must ensure that those they commission to do the work have the right levels of competence and are appropriately supervised.

**1.65**

Responsibilities must not be dispersed through the chain as they are now. Even in an environment where there are multiple layers of sub-contracting

there must be a clear, responsible dutyholder who is held to account for the performance or non-performance of all of those to whom sub-contracts are let at all stages in the life of a building.

**1.66**

It has also been observed that the use of 'value engineering' is almost always about cutting cost out of a project, at times without due reference to key specification requirements. Such processes must be undertaken by those with the responsibility and the competence to ensure the integrity of the building design and function, especially when considering the equivalence of substituted materials.

**1.67**

Given the extent of innovation which is taking place in industry there should be greater industry responsibility for demonstrating that all buildings are designed and built to be fit for purpose, including the introduction of new techniques and materials into construction.

**1.68**

The role of regulators should be to seek assurance that standards are being adhered to throughout all stages of construction and use. It is for industry to demonstrate to the regulators that compliance with those standards is being achieved, including through innovation. Where there is failure to comply there must be a more effective means of ensuring not only that the deficiencies are put right but that those who were responsible for compliance with the standards are held accountable for their failure.

**1.69**

After completion and handover of a building there must be clear responsibility assigned to a known person or persons for ensuring that the building remains fit for purpose throughout its life cycle. Where and when ownership changes, responsibilities must also be formally handed over.

**1.70**

The assignment of responsibilities in blocks of flats, where there are boundaries between areas which are the responsibility of residents and those which fall to landlords or owners, must be clarified. The definition of the 'common parts' of such buildings, and clarification of who is qualified and able to properly inspect both common areas and individual properties, are critical elements of maintaining overall building integrity but are currently unclear due to the confusing overlap between the Housing Health and Safety Rating System Regulations 2005 and the Fire Safety Order.

## Direction of travel – Competence

### 1.71

Those working on complex and high-risk buildings need to have the appropriate qualifications and experience and be able to evidence that qualification and experience. The design, construction, inspection and maintenance of complex buildings would normally require a higher degree of competence and expertise than that of small-scale or simple buildings.

### 1.72

The task of raising levels of competence and establishing formal accreditation of those engaged at every stage of design, construction, inspection and maintenance of complex and high-risk buildings can and should be led by those professional bodies which cover the sector. The system needs to be designed to ensure that competence is measured, is made transparent to those engaging the individuals and has a means of recourse in the event that work delivered is substandard. This is a challenge to the current less rigorous and disjointed approach to registration or certification which allows many individuals to practice with questionable qualifications or without a requirement for competence to be assessed and accredited.

### 1.73

**Recommendation:** There is a need to be certain that those working on the design, construction, inspection and maintenance of complex and high-risk buildings are suitably qualified.

The professional and accreditation bodies have an opportunity to demonstrate that they are capable of establishing a robust, comprehensive and coherent system covering all disciplines for work on such buildings. If they are able to come together and develop a joined up system covering all levels of qualification in relevant disciplines, this will provide the framework for regulation to mandate the use of suitable, qualified professionals who can demonstrate that their skills are up to date. This should cover as a minimum:

- engineers;
- those installing and maintaining fire safety systems and other safety-critical systems;
- fire engineers;
- fire risk assessors;
- fire safety enforcing officers; and
- building control inspectors.

I would ask these bodies to work together now to propose such a system as soon as practicable. I will launch this work at a summit in early 2018.

## Direction of travel – Process, compliance and enforcement

### 1.74

The current interaction of different regulatory regimes leads to a complex system with different bodies responsible for enforcement and a varied approach to assurance and demonstrating compliance. The whole process needs to be streamlined and made consistent.

### 1.75

There is a need to ensure that the right people are engaged and consulted at the earliest stages of complex projects and that their views are taken into account at the design stage. This is particularly important in relation to fire safety.

### 1.76

**Recommendation:** Consultation with the fire and rescue services is required on plans for buildings that are covered by the Fire Safety Order, but does not work as intended. Consultation by building control bodies and by those commissioning or designing buildings should take place early in the process and fire and rescue service advice should be fully taken into account. The aim should be to secure their input and support at the earliest stage possible so that fire safety can be fully designed in.

### 1.77

There needs to be a golden thread for all complex and high-risk building projects so that the original design intent is preserved and recorded, and any changes go through a formal review process involving people who are competent and who understand the key features of the design.

### 1.78

When a building or part of a building is completed, there is a need for the project as built to be documented. A thorough, independent review needs to take place and a handover process completed before the building, or part of the building, can be occupied. Phased occupation of buildings does occur and, where it does, this must be handled rigorously with a clear handover process. During the next phase of work the review will conduct further research into the potential for Building Information Modelling (BIM) to transfer the documentation process onto a digital platform.

### 1.79

**Recommendation:** Building developers need to ensure that there is a formal review and handover process ahead of occupation of any part of a new high-rise residential building.

While there are legitimate reasons to allow

occupation in a phased way, the practice of allowing occupancy of buildings without proper review and handover presents barriers to the implementation of any remedial measures identified as part of the completion process.

#### 1.80

**Recommendation:** There is a need for building control bodies to do more to assure that fire safety information for a building is provided by the person completing the building work to the responsible person for the building in occupation. Given the importance of such information for ongoing maintenance and fire risk assessment, proof should be sought that it has been transferred.

#### 1.81

Once a complex and high-risk building is occupied and in use, there must be a clearly identified responsible person who continues to monitor the condition of the building and is responsible for all changes and maintenance work carried out within it. It must be clear to occupants and anyone who works in the building who that responsible person is, and they must be held to account. Residents must be provided with clear guidance on how to proceed if they choose to carry out work themselves or bring in contractors to their own flats.

#### 1.82

Future modification and upgrade to complex and high-risk buildings must be subject to the same rigorous processes as during original construction and must be undertaken with reference to the original design criteria. Changes must be formally reviewed by competent professionals, documented after completion and formally handed over.

#### 1.83

Complex and high-risk buildings must also be subject to regular and thorough reviews of their overall integrity, even if they are not subject to major change. The integrity of such buildings can be compromised by a series of minor changes which lead to a cumulative degradation of protection. It is envisaged that these reviews would be the responsibility of the building owner but must be reported to the regulator and accessible information about them made available to residents. It may also be of interest to those who underwrite the risk for such buildings.

#### 1.84

**Recommendation:** It is currently the case under the Fire Safety Order that fire risk assessments for high-rise residential buildings must be carried out 'regularly'. It is recommended that the

responsible person ensures these are undertaken at least annually and when any significant alterations are made to the building. These risk assessments should be shared in an accessible way with the residents who live within that building and notified to the fire and rescue service.

#### 1.85

The lifetime of a building in use is orders of magnitude more than the time spent on its construction. Integrity must be maintained throughout the life cycle. Technology does not stand still and as new methods of improving the safety of buildings become available it is not sufficient for regulation only to make these a requirement for buildings of the future. There is a responsibility to give due consideration to what it is reasonable and practicable to do to upgrade and improve the fire safety of existing facilities throughout their lifespan, not merely to ensure that they do not deteriorate beyond how they were originally designed and built.

#### 1.86

There needs to be a demonstration that there are sufficient layers of protection to ensure that building safety does not rely heavily on compartmentation. There is a high risk of compartmentation being breached during building use, whether as the result of residents' own actions or of maintenance work carried out in the whole building. There are a range of fire protection measures that can be retrofitted to or amended in existing buildings; for example, extra staircases and smoke ventilation or sprinkler systems. Rather than prescribe one measure over others, it should be for building owners and landlords, with the right expert advice and the involvement of residents, to demonstrate that appropriate risk mitigation measures are in place.

#### 1.87

There is a need for stronger and more effective enforcement within the system but this requires the necessary resources to be available and demonstrably independent. Those charged with enforcing must have appropriate enforcement powers accompanied by sanctions and penalties which are suitably severe.

#### 1.88

The cost of achieving compliance must be significantly less than the sanctions which may be imposed on those who do not follow the rules and fail to achieve the standards set, in order to create the right incentive to comply and a deterrent to seeking to circumnavigate requirements.

### 1.89

The current model of partial privatisation with clients being able to decide whether to choose between the use of LABCs or Approved Inspectors does not resolve the enforcement issue, raises concerns about independence and adds pressure on the resources within local authorities. While there may be scope to continue with a partial privatisation of the market, it is essential that effective enforcement is ensured and the work of Approved Inspectors is demonstrably independent.

## Direction of travel – Residents’ voice and raising concerns

### 1.90

Residents need to be reassured that an effective system is in place to maintain safety in the buildings which are their homes. Their trust in the current system has been shaken and needs to be rebuilt by a more transparent system in which residents feel included, not ‘done to’ by others without consultation.

### 1.91

Many residents have told us that they have good systems in place and good relations with their landlords. However, where this is not the case, there should be a clear, quick and effective route established for residents’ concerns on fire safety to be raised and addressed with an external enforcement body. Many have expressed the wish for this to include the fire and rescue services.

### 1.92

The results of regular surveys of building integrity must be shared with the residents and they should be consulted about plans to modify buildings. It is also important for residents to understand the various layers of protection which are fundamental to fire safety.

## Direction of travel – Quality assurance and products

### 1.93

It is important that products are properly tested, certified and marketed clearly, and that desktop studies are only used when appropriate, to ensure that suitable materials are used on different types of buildings, delivering the multiple different standards required. During phase two of this review, the case must be examined for a requirement for product testing data to be made transparent and publicly available and for a much clearer system of product classification and labelling.

### 1.94

**Recommendation:** The government should significantly restrict the use of desktop studies to approve changes to cladding and other systems to ensure that they are only used where appropriate and with sufficient, relevant test evidence. Those undertaking desktop studies must be able to demonstrate suitable competence. The industry should ensure that their use of desktop studies is responsible and in line with this aim.

### 1.95

A number of respondents have called for a reinstatement of the former role of Clerk of Works or similar to act as the primary gatekeeper of quality assurance on significant projects. There is a need to ensure oversight of the quality of installation work carried out as well as of the materials delivered to site and used.

## Interim recommendations and challenges

### 1.96

While there is more work to be done to develop some of the ideas highlighted here and turn them into final recommendations, there are already some clear actions and initiatives which can and should be taken now, which would be entirely consistent with the likely future direction of travel. These are brought together below.

### 1.97

By way of underpinning all of these interim recommendations, the industry must recognise the need for significant cultural and behavioural change, where the sector demonstrates similar responsibility for the buildings they create as they have shown they can take for the safety of people working on construction projects under the Construction (Design and Management) Regulations 2015. There is no reason why this culture change cannot begin voluntarily now ahead of the final recommendations and any legislative changes. There is already evidence of good practice despite the shortcomings in the system itself.

A. **The government** should consider how the suite of Approved Documents could be structured and ordered to provide a more streamlined, holistic view while retaining the right level of relevant technical detail, with input from the Building Regulations Advisory Committee. Given that reframing the suite of guidance may take some time, in the meantime I would ask the government to consider any presentational changes that will improve the clarity of Approved Document B as an interim measure. (Paragraph 1.63)

B. There is a need to be certain that those working on the design, construction, inspection and maintenance of complex and high-risk buildings are suitably qualified. **The professional and accreditation bodies** have an opportunity to demonstrate that they are capable of establishing a robust, comprehensive and coherent system covering all disciplines for work on such buildings. If they are able to come together and develop a joined up system covering all levels of qualification in relevant disciplines, this will provide the framework for regulation to mandate the use of suitable, qualified professionals who can demonstrate that their skills are up to date. This should cover as a minimum:

- engineers;
- those installing and maintaining fire safety systems and other safety-critical systems;
- fire engineers;
- fire risk assessors;
- fire safety enforcing officers; and
- building control inspectors.

I would ask these bodies to work together now to propose such a system as soon as practicable. I will launch this work at a summit in early 2018. (Paragraph 1.73)

C. Consultation with the fire and rescue services is required on plans for buildings that are covered by the Fire Safety Order, but does not work as intended. Consultation by **building control bodies** and by **those commissioning or designing buildings** should take place early in the process and fire and rescue service advice should be fully taken into account. The aim should be to secure their input and support at the earliest stage possible so that fire safety can be fully designed in. (Paragraph 1.76)

F. It is currently the case under the Fire Safety Order that fire risk assessments for high-rise residential buildings must be carried out 'regularly'. It is recommended that **the responsible person** ensures these are undertaken at least annually and when any significant alterations are made to the building. These risk assessments should be shared in an accessible way with the residents who live within that building and notified to the fire and rescue service. (Paragraph 1.84)

D. **Building developers** need to ensure that there is a formal review and handover process ahead of occupation of any part of a new high-rise residential building. While there are legitimate reasons to allow occupation in a phased way, the practice of allowing occupancy of buildings without proper review and handover presents barriers to the implementation of any remedial measures identified as part of the completion process. (Paragraph 1.79)

G. **The government** should significantly restrict the use of desktop studies to approve changes to cladding and other systems to ensure that they are only used where appropriate and with sufficient, relevant test evidence. Those undertaking desktop studies must be able to demonstrate suitable competence. **The industry** should ensure that their use of desktop studies is responsible and in line with this aim. (Paragraph 1.94)

E. There is a need for **building control bodies** to do more to assure that fire safety information for a building is provided by the person completing the building work to the responsible person for the building in occupation. Given the importance of such information for ongoing maintenance and fire risk assessment, proof should be sought that it has been transferred. (Paragraph 1.80)

## Next phase of the review

### 1.98

The review intends to focus on developing recommendations that will deliver the direction of travel set out above ahead of the final report.

### 1.99

The review has heard a range of views from the call for evidence and from our stakeholder engagement to date. As well as continuing to draw upon this evidence, the next phase will involve targeted work in partnership with the sector and other stakeholders in order to make rapid progress towards recommendations for the system in the final report.

### 1.100

The next milestone will be a summit in early 2018. Key stakeholders will be invited to attend this event which will set the direction and ensure co-ordination of the work we need a number of them to engage in during the spring in support of the development of the review's final recommendations.

### 1.101

We would welcome feedback on this report which can be sent to [BuildingRegulationsandFireSafetyReview@communities.gsi.gov.uk](mailto:BuildingRegulationsandFireSafetyReview@communities.gsi.gov.uk) or in writing to:

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For Housing Executive fire safety advice please visit:

[www.nihe.gov.uk/index/advice/advice\\_for\\_housing\\_executive\\_tenants/advice\\_safety/fire\\_safety.htm](http://www.nihe.gov.uk/index/advice/advice_for_housing_executive_tenants/advice_safety/fire_safety.htm)