

# **PAS 9980:2022, *Fire risk appraisal of external wall construction and cladding of existing blocks of flats – Code of practice***

**THIS PAGE DOES NOT FORM PART OF PAS 9980**

## **What is PAS 9980?**

PAS 9980 provides guidance on the risk of fire spread via external wall construction. It sets out a methodology to conduct and record fire risk appraisals of external walls, which can be scaled up or down depending upon the complexity of individual buildings; not all buildings will require an appraisal, and of those that do, not all will require intrusive inspection. It also gives recommendations for the competence of professionals completing such appraisals, with the aim of assisting with the ongoing effort to increase the number of competent professionals by providing the current state of the art knowledge on fire risk arising from various aspects of external wall construction.

PAS 9980 does not alter the obligations placed upon those carrying out building work on external wall construction, nor does it affect the compliance of past building work, whether measured against Building Regulations or contractual obligations. Given the complexity and range of different external wall systems that exist, it does not contain “off the peg” solutions for specific wall types and materials, but may enable a consistent approach to evaluating the risk when considering the external walls of actual buildings. Where homeowners and building owners are faced with external wall construction which does not meet the expected standards, PAS 9980 provides a voluntary methodology for assessing the level of safety. It also identifies the proportionate steps that could be taken to better safeguard residents while seeking not to expose them to undue financial burdens.

## **What do I need to know about PAS 9980?**

- Having an external wall system that undergoes an assessment using this methodology does not mean that the building is unsafe.
- PAS 9980 is intended for use by competent professionals. It is not intended to be used by lay people.
- It is for use in situations where external wall constructions of existing blocks of flats have not been shown to resist fire spread adequately or where required to inform the fire risk assessment. Where it is obvious to the fire risk assessor that the walls don't pose a risk of fire spread (such as buildings of traditional brick and masonry construction), there may be no need for a PAS 9980 assessment.
- The PAS uses a five-step risk assessment process. It provides a methodology to assist in the identification of risk factors influencing the overall risk rating of a building, as well as mitigation steps that might improve the risk rating.
- The fire risk posed by external wall construction and cladding is considered to be influenced most by factors falling under the following three broad headings:
  - fire performance;
  - façade configuration; and
  - fire strategy/fire hazards.
- The height of the building is included as a risk factor. The extent to which a building's external walls pose a risk is inherently lower if the number of storeys is limited.
- PAS 9980 emphasizes the importance of proportionality in relation to risk and associated mitigation measures, including considerations of benefit gained, practicality and cost.

## **Do I need to read PAS 9980?**

PAS 9980 has been specifically developed for competent fire engineers and other competent building professionals undertaking a fire risk appraisal of external walls (FRAEW).

# PAS 9980:2022

## Fire risk appraisal of external wall construction and cladding of existing blocks of flats – Code of practice



Department for Levelling Up,  
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# Foreword

This PAS was sponsored jointly by DLUHC (previously MHCLG) and the Home Office. Its development was facilitated by BSI Standards Limited and it was published under licence from The British Standards Institution. It came into effect on 31 January 2022.

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- Design Fire Consultants
- Probyn Miers (HKA Global Ltd)
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- Building Research Establishment
- Construction Products Association
- Consumer and Public Interest Network
- Fire Industry Association
- Institution of Fire Engineers
- Local Authority Building Control
- London Fire Brigade
- Department for Levelling Up, Housing and Communities (previously Ministry of Housing, Communities and Local Government)
- National Fire Chiefs Council
- National Social Housing Fire Safety Group
- Royal Institution of Chartered Surveyors
- Scottish Government
- Society of Façade Engineering

Acknowledgement is also given to the members of a wider review panel who were consulted in the development of this PAS.

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## Relationship with other publications

This PAS supplements the recommendations given in PAS 79-2, although the two documents can be used independently and a knowledge of PAS 79-2 is not a prerequisite for using PAS 9980.

This PAS is not intended to constitute a textbook on construction of external walls and cladding systems, and it is not to be regarded as a substitute for relevant knowledge of fire safety principles in the design of such construction. In carrying out a fire risk appraisal of external wall construction and cladding, there is likely to be a need for reference to other codes of practice and guidance documents, a number of which are listed in the Bibliography.

## Information about this document

This PAS is particularly intended for use by competent fire engineers and other competent building professionals tasked with advising on the fire risk of external wall construction of existing blocks of flats. However, it is expected that the key outputs of this appraisal will also be useful to those for whom such appraisals are carried out and those who make decisions based upon the outcome of the appraisal. Typically, this will include:

- advice agencies;
- architects;
- architectural technologists;
- building owners/landlords (and others with legal or functional responsibilities for management of external walls and cladding);
- building surveyors;
- contractors;
- façade engineers;

- fire and rescue authorities;
- fire risk assessors;
- insurers;
- local housing authorities;
- managing agents or facility managers;
- project managers; and
- valuers and mortgage lenders.

This PAS makes extensive reference to Government guidance on the fire safety requirements of various versions of the Building Regulations ([1], [2], [3], [4], [5], [6], [7]) in England and Wales, namely Approved Document B (ADB). In the current version of ADB ([8], [9]), which is split into two volumes, blocks of flats fall within the scope of Volume 1 [8]. However, given that this PAS relates to existing blocks of flats, where there is reference to ADB, it often relates to the guidance in previous versions of ADB. From 2006, ADB was divided into two volumes ([10], [11]); prior to the 2019 edition, blocks of flats fell within the scope of Volume 2 [11], while from 2019, they were transferred to Volume 1 [8]. Prior to 2006, there was only a single volume of ADB ([12], [13], [14]), which therefore addressed blocks of flats within its scope.

Reference to classification to BR 135 [15] based on data from a BS 8414 test as a benchmark in ADB ([8], [9]) in relation to external fire spread (for combustible external wall construction and cladding) appeared in many earlier versions of ADB as a means of satisfying the functional Requirement B4(1) of the Building Regulations 2010 [7]. It is no longer accepted for “relevant buildings” in the current version of ADB ([8], [9]) due to changes to Regulation 7 of the Building Regulations 2010 [7]. Nevertheless, classification to BR 135 [15] remains an applicable benchmark for blocks of flats with a storey over 18 m built prior to 2019.

Technical guidance in the devolved administrations can be found on the relevant Government websites.

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- Figure A.9, Figure A.10 and Figure B.7: BRE Global, Bucknalls Lane, Watford, Herts, WD25 9XX;
- Figure B.3: Scottish Fire and Rescue Service, Westburn Drive, Cambuslang, G72 7NA;

- Figure B.4: London Borough of Hammersmith and Fulham, Town Hall, King Street, Hammersmith, London, W6 9JU;
- Figure B.5: London Fire Brigade, 169 Union Street, London, SE1 0LL;
- Figure B.6: Greater Manchester Fire and Rescue Service, 146 Bolton Road, Swinton, Manchester, M27 8US.

While future revisions of this PAS might include a broader range of residential buildings, the scope of this first version is limited, as described in Clause 1, primarily to multistorey blocks of flats. Nevertheless, the principles of the methodology set out in this PAS can be applied to a broader range of building types, including non-residential buildings, subject to appropriate use of the guidance and cognizance of the differences between such other buildings and multistorey, multi-occupied residential buildings.

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## Use of this document

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Users may substitute any of the recommendations in this PAS with practices of equivalent or better outcome. Any user claiming compliance with this PAS is expected to be able to justify any course of action that deviates from its recommendations.

It has been assumed in the preparation of this PAS that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

This PAS includes case studies based on commonly found types of external wall construction and its configuration on existing multistorey, multi-occupied residential buildings. However, these are only intended as worked examples for the purpose of illustrating the process followed in an assessment conducted in accordance with this PAS. They are not intended to be relied upon as “off the peg” generic solutions in the particular forms of external wall construction to which they refer.

### Presentational conventions

The provisions of this PAS are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is “should”.

*Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.*

The word “should” is used to express recommendations of this PAS. The word “may” is used in the text to express permissibility, e.g. as an alternative to the primary recommendation of the clause. The word “can” is used to express possibility, e.g. a consequence of an action or an event.

Notes and commentaries are provided throughout the text of this PAS. Notes give references and additional information that are important but do not form part of the recommendations. Commentaries give background information.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. “organization” rather than “organisation”).

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Particular attention is drawn to the legislation described in the Introduction to this PAS and to guidance available from the Home Office, the Department for Levelling Up, Housing and Communities, and the devolved administrations.

# 0 Introduction

## 0.1 Background

The loss of 72 lives in the tragic fire at Grenfell Tower on 14 June 2017 brought the risk of fire spread over external walls into sharp focus. It was not the first time that combustible cladding had been a significant contributory factor in rapid fire spread over the external façades of a high-rise building; indeed, since June 2017, there have been a number of notable fires where this has occurred, both in the UK and overseas. However, the Grenfell Tower fire is exceptional in relation to the combination of rapid fire spread and loss of life. It is now known how this fire (which was unprecedented in the UK) occurred and gave rise to such a tragic outcome; much is being done to make sure that such an event never happens again.

While the combustible cladding panels on the outside of Grenfell Tower were a significant factor in the fire, they were not the only reason for the rapid spread of fire. From the Public Inquiry into the fire [Grenfell Tower Inquiry ([www.grenfelltowerinquiry.org.uk](http://www.grenfelltowerinquiry.org.uk))], it has become evident that other elements of the design and construction of the external walls were also contributory, most notably, the presence of combustible insulation, other combustible elements around window openings, and the absence of suitably located and properly installed cavity barriers. It is also relevant that some flat entrance doors were not self-closing.

The initial focus after the Grenfell Tower fire was on the type of cladding panel used, an aluminium composite material (ACM) with an unmodified polyethylene core. Considerable efforts were made to establish where it was present on other buildings and to arrange for its removal and replacement. However, the focus has broadened since then to encompass other combustible cladding materials. Other high-profile fires since the Grenfell Tower fire have prompted this, for example, a fire in student accommodation in Bolton on 15 November 2019, which involved a high pressure laminate (HPL) cladding system, and fires in Manchester (2017) and Barking (2019), which highlighted issues around the use of timber in cladding and on balconies. In addition, there has been a growing realization as to the extent of poor practice in the design and construction of external walls.

In England, the Ministry of Housing, Communities and Local Government (MHCLG) responded to the growing concern regarding external wall construction and fittings on tall residential buildings by issuing a series of Advice Notes, containing guidance on relevant fire safety considerations for those with responsibility for fire safety in these buildings.

Advice Note 11 [16] was aimed at conveying the findings and recommendations of the Government's programme of large-scale fire tests (in accordance with BS 8414) of ACM cladding panels, combined with different forms of insulation. This was the first MHCLG "Consolidated Advice Note", drawing together the information and recommendations set out in earlier Advice Notes.

This was followed by Advice Notes addressing:

- external wall insulation systems with a render or brick slip finish;
- external wall systems with cladding panels other than ACM;
- balconies;
- partial ACM cladding;
- spandrel panels; and
- HPL.

MHCLG (now DLUHC) revised and reissued the Consolidated Advice Note in January 2020 [17]. This version contained the content from all previous Advice Notes, updated and expanded in scope to also address buildings below 18 m in height. A supplementary note relating to this Consolidated Advice Note was issued in November 2020 [18]. Further information on the status of the advice notes can be found on the Government website at <https://www.gov.uk/government/publications/building-safety-advice-for-building-owners-including-fire-doors>.

Common to all of these Advice Notes was the recommendation that building owners seek professional advice on what further steps to take with respect to their external wall system. In particular, this applied when the external wall construction did not conform to the benchmark of classification to BR 135 [15] underpinning the advice. Benchmarks based on classification to BR 135 and others, based on compliance with guidance in Approved Document B (ADB) ([8], [9]) for new buildings, have created problems for owners of existing buildings, as external walls on these buildings cannot necessarily be expected to conform to such benchmarks. Nor can conformity be expected where the guidance has changed. However, there would have been an expectation at the time of build that construction of the external wall system would meet the relevant requirements current at that time.

In the past, the external wall construction of blocks of flats was not routinely included in the fire risk assessments (FRAs) required under the Regulatory Reform (Fire Safety) Order 2005 (the “Fire Safety Order”) [19]. The Fire Safety Act 2021 [20] has now established that external walls fall within the scope of the Fire Safety Order [19]. It follows, therefore, that any FRA of a multistorey, multi-occupied residential building needs to include consideration of the potential for fire spread via the external walls of the building.

However, despite the availability of wide-ranging Government guidance, the assessment of the fire risk associated with external walls has proved problematic. There has been a dearth of publicly available information on the fire performance of materials and systems used on the outside of buildings and there have been very few professionals with the necessary skills and experience. This has led to inconsistent outcomes. In some buildings, significant work to remediate “unsafe” cladding and other aspects of external wall construction has been undertaken to satisfy Government advice. In others, with similar cladding, some fire specialists have considered that no such work is necessary.

The above history is relevant to England. Different legislation and guidance applies in the devolved administrations of the United Kingdom. In Scotland and Northern Ireland, blocks of flats fall outside the legislation that is equivalent to the Fire Safety Order (other than in relation to maintenance of systems and equipment for use by, or the safety of, firefighters).

## 0.2 Fire risk assessments

It is against the background detailed in 0.1 that the need for specific guidance relating to fire risk appraisal of external wall construction on existing buildings (the “FRAEW”) has arisen.

It is recognized that the FRAEW to which this PAS refers is not necessarily within the competence of the typical fire risk assessor who carries out a typical FRA for a block of flats (e.g. an FRA carried out in accordance with PAS 79-2).

Equally, it is not implied that an FRAEW will be required for all high-rise (or low-rise) blocks of flats. In many cases, it will be manifestly obvious to a competent fire risk assessor that the risk to life from fire spread over external walls is not such as to warrant an FRAEW by a specialist; in these cases, the fire risk assessor will normally address compliance of external wall construction with the Fire Safety Order [19] as part of the FRA.

Examples of this are buildings in which the external wall construction can readily be confirmed as being of traditional masonry construction (i.e. external walls which comprise either two leaves of masonry or a solid masonry leaf), or cases in which it can, otherwise, readily be determined by a typical fire risk assessor (e.g. from the age of the building if it predates the mid-1960s, from an operation and maintenance manual, or an existing report by a competent person, based on a relevant BS 8414 test) that no FRAEW is necessary. However, although the age of a building can be a factor, care is needed in case combustible materials have been added to the external walls over time.

It is, therefore, expected that fire risk assessors will be judicious in their recommendations for an FRAEW by a specialist within the action plan of an FRA. Unnecessary recommendations by fire risk assessors for FRAEWs would make significant demand on the scarce resources available for FRAEWs, thereby diverting attention from buildings in which the public might be at serious risk and that actually do warrant an FRAEW.

For avoidance of doubt, it is not suggested that the fire risk assessor will ignore unusual, but visually obvious, material deficiencies, or design features that place residents or other occupants at undue risk. On the other hand, in determining that the risk to life from fire spread over external walls is not such as to warrant an FRAEW by a specialist, the fire risk assessor is not deemed to be confirming conformity of external wall construction to building regulations (past or present) or the Fire Safety Order [19].

In these circumstances, therefore, deficiencies in construction might well continue to be unrevealed. In the low-risk circumstances described above, experience has shown, over many years and in numerous traditionally constructed buildings, that the risk of loss of life from deficiencies in external wall construction is low. Consultations with the National Fire Chiefs Council (NFCC) at the time of drafting this PAS have confirmed that this is still the case. It is, therefore, not unreasonable in these cases for the fire risk assessor to assume conformity to the building regulations and applicable guidance that were current at the time of construction, unless there is evidence to the contrary.

### 0.3 Risk-based approach

Where an FRAEW is considered necessary, this PAS is intended to provide recommendations and guidance tailored to the particular risk posed by fire spread over external walls, and to provide tools for a competent person to carry out the FRAEW.

While this PAS includes criteria for determining the level of fire risk to life safety presented by particular types of external wall construction, the methodology outlined is intended only to assist in making comparisons and in assessing the relative risk of different types of materials, components, systems and configurations of external wall construction. Determination of absolute levels of safety is simply not possible at the time of publication of this PAS.

Building design varies considerably and no code of practice such as this PAS can ever provide guidance for all possible circumstances. Accordingly, although this PAS refers to specific materials, systems and configurations used in external wall construction, it cannot address all possible circumstances, and the general principles set out herein need to be applied carefully when considering other types of external wall construction that are not specifically addressed in this PAS.

While it is anticipated that this PAS will be of interest to a broad readership, its use in the fire risk appraisal of external wall construction and cladding requires particular skills, knowledge and experience, such that this is a matter for specialists. While, as noted above, it is not expected that the necessary skills will be possessed by typical fire risk assessors, equally, they will not be possessed by all fire engineers. Users of this PAS who carry out external wall FRAEWs are advised to consider whether they have the necessary competence before applying the recommendations of this PAS to a particular building.

However, the objective of this PAS is broader than simply providing recommendations and a recognized methodology for those who carry out the FRAEW. It is also intended to assist those receiving an FRAEW, and their other advisers, to understand the meaning of the risk rating determined by the methodology contained in this PAS, how the risk rating was derived, where it fits in the context of the building's FRA and the limitations that apply to it.

Although the methodology in this PAS seeks to apply a degree of quantitative, as well as qualitative, judgement, given the state of readily available knowledge and performance data, it follows that any FRAEW will inevitably be, to a large degree, subjective, requiring professional judgement from competent persons. Definitive fire performance of an actual external wall build-up can only be determined by large-scale test. This can lead, and has led, to some difficulties for organizations, their advisers and enforcing authorities, in accepting the outcomes of risk-based approaches.

There has been a distinct move in recent years towards "risk-proportionate" fire safety measures in buildings, rather than the more traditional "prescriptive" approach. However, concern arising from the Grenfell Tower fire has led some stakeholders to seek a more rigid application of the guidance that supports building regulations, without full consideration of risk. Indeed, this has sometimes led to the practice of judging existing buildings against strict compliance with the guidance in the current version of ADB ([8], [9]) and, indeed, the requirements in Regulation 7 of the Building Regulations 2010 (as amended) [7], which is clearly inappropriate as these are concerned with new buildings/building work.

For some stakeholders, there is no appetite to consider a risk-based approach and, for these stakeholders, the only satisfactory outcome is certainty in the performance of external walls in fire, with zero risk to life as the principal objective. The methodology in this PAS cannot be applied when such a view prevails. It is, therefore, assumed that this PAS will only be used in circumstances where a risk-based approach, implemented by competent professionals, is deemed acceptable to relevant interested parties, including those in devolved administrations.

## 0.4 Objectives of this PAS

The objectives of this PAS are:

- a) to provide competent fire engineers and other competent building professionals with a methodology for appraising and assessing the scope for, and risk from, fire spread via external wall construction and cladding, such that the outcome can be used to inform a building's FRA;
- b) to assist external wall assessors in communicating clearly the results of an FRAEW, such that recipients can understand the process and methodology applied, and to understand the findings;
- c) to assist other professionals in reviewing an FRAEW and in understanding the risk of external fire spread in the context of the building's fire strategy and fire safety arrangements;
- d) to promote better understanding of fire risks associated with external walls and the limitations of what can, and cannot, be achieved in any FRAEW, in contrast with ensuring conformity of new construction to the standards for new buildings;
- e) to enable common relevant terminology to be adopted by those who carry out FRAEWs;
- f) to promote consistency in FRAEWs, and to provide a pragmatic and risk-proportionate approach in an FRAEW;
- g) to establish a satisfactory basis for documentation of FRAEWs;
- h) to enable consistent training in carrying out an FRAEW and thus facilitate more entrants into the profession of carrying out FRAEWs; and
- i) to satisfy professional indemnity (PI) insurers that there is a national standard that underpins consistency in carrying out FRAEWs.

This PAS takes into account the rationale originally set out in the 2020 version of the MHCLG Consolidated Advice Note [17]<sup>1)</sup>. However, it expands on that advice by providing a tool for appraisal of the likely fire performance of external walls and assessment of the risk associated with external fire spread in the context of the use, occupancy and fire safety arrangements of the building.

The risk-based methodology outlined in this PAS is intended to provide a structured approach to the FRAEW. The outcome of the FRAEW is a determination of whether the external wall construction is acceptable or whether remedial action is necessary to replace some or all of the components of the external wall build-up, or to address shortcomings, such as the absence of cavity barriers.

<sup>1)</sup> In Scotland, guidance similar to that provided in the Consolidated Advice Note was published in August 2021 as the Scottish Advice Note [21], and this remains current.

## 0.5 Structure of this PAS

The PAS is structured so as to address the background to, and thinking behind, FRAEWs, as well as presenting guidance on a methodology to conduct such appraisals. It is consistent with the FRA methodology set out in PAS 79-2.

Each clause contains informative text in italics, giving commentary relating to the recommendations that then follow. Further informative text supporting the commentary and recommendations is contained in annexes. These provide further explanation on the subject or additional guidance.

The scope is set out in Clause 1 of the PAS, and this provides important information on those buildings to which the PAS applies and those it does not. References and terms, definitions and abbreviated terms are given in Clause 2 and Clause 3 respectively.

General issues for consideration before undertaking an FRAEW are set out in Clause 4.

In Clause 5, background information on the nature of fires involving external walls and the mechanisms of fire spread is discussed. This is followed in Clause 6 by discussion of the legislative context for FRAEWs. The principles and scope of FRAEWs are described in Clause 7, in which consideration is given to the benchmark for considering the risk posed by fires involving external walls.

The competence of those carrying out FRAEWs is discussed in Clause 8.

Clause 9 and Clause 10 relate to the information needed to conduct an FRAEW, including from surveys and inspections of the building. In Clause 11, the matter of how materials, systems and configurations of external walls perform in fire is considered, and in Clause 12, considerations relating to fully or partially clad buildings are discussed.

Clause 13 describes a methodology for basic assessments of the suitability of external walls. The circumstances in which a more in-depth assessment might be needed are set out in Clause 14.

Finally, in Clause 15 consideration is given to the content of FRAEW reports.

# 1 Scope

This PAS gives recommendations and guidance on undertaking a fire risk appraisal of external wall construction and cladding of an existing multistorey, multi-occupied residential building.

**NOTE 1** For ease of reading, a fire risk appraisal of external wall construction and cladding is described in this PAS as a fire risk appraisal of external walls (FRAEW).

The purpose of a fire risk appraisal of external walls (FRAEW) is to assess the risk to occupants from a fire spreading over or within the external walls of the building, and to make a decision as to whether, in the specific circumstances of the building, remediation or other mitigating measures to address the risk are considered necessary. It is applicable where the risk is known, or suspected, to arise from the form of construction used for the external wall build-up, such as the presence of combustible materials. The outcome of an FRAEW is intended to inform fire risk assessments (FRAs) of multistorey, multi-occupied residential buildings.

**NOTE 2** FRAEWs are particularly applicable to FRAs carried out in accordance with PAS 79-2, but they can be carried out independently of the PAS 79-2 FRA process.

**NOTE 3** External walls of existing buildings that comprise only masonry or concrete construction, or in which combustible materials are limited to insulation within the cavity of double skin masonry walls, are usually considered to present an acceptable risk in terms of life safety, and an FRAEW is not considered necessary for these buildings.

**NOTE 4** The reference to combustible materials does not include small quantities of combustible material that are likely to be present in most external wall build-ups, e.g. membranes, seals and gaskets, and that represent a negligible or inconsequential fire load.

This PAS also gives recommendations and guidance in relation to the competence of those completing FRAEWs.

This PAS relates to blocks of flats throughout the United Kingdom. It was developed primarily for those in England and, therefore, contains references to the legislation pertinent to buildings in England. However, it can also be applied in the devolved nations of the United Kingdom, subject to care being taken to apply its recommendations within the context of the appropriate regulatory regime and supporting guidance.

**NOTE 5** The risk to occupants of new buildings from a fire spreading externally is controlled by building regulations. However, it cannot be assumed that external walls of newly constructed buildings present no risk, unless the external walls contain no, or negligible, combustible material. In England, buildings pre-dating the 2018 amendment to the Building Regulations 2010 [7] are deemed to be existing buildings within the scope of this PAS; in Wales, the equivalent change to the Building Regulations [22] in relation to the combustibility of external walls on relevant buildings was introduced in January 2020.

This PAS applies predominantly to multistorey blocks of flats, but also includes the following types of buildings if, from the perspective of general fire strategy and means of escape design, and specifically evacuation strategy, they are similar in nature to a purpose-built block of flats:

- a) student accommodation;
- b) sheltered and other specialized housing; and
- c) buildings converted into flats.

**NOTE 6** Within this PAS, the term “flat” is used to describe a self-contained domestic dwelling within a building. Other terms, such as “apartment”, are commonly used to describe such accommodation. The term “flats” is intended to include those arranged on more than one storey, such as maisonettes or duplex apartments.

**NOTE 7** This is also intended to include blocks of flats which are part of a mixed-use building with, for example, shops or offices below.

The approach set out in this PAS is intended to determine the need for any risk-proportionate actions in relation to external wall construction required to protect occupants of blocks of flats, including residents and their visitors, anyone working in the building and people in the immediate vicinity of the building.

This PAS addresses the risk from fire spread over the external walls of multistorey blocks of flats of any height.

It addresses situations in which there is a single wall type or a mixture of different wall types. It also addresses buildings that are partially clad, as well as those that are fully clad, in combustible materials.

Wall build-ups within the scope of this PAS include, but are not limited to:

- 1) external walls incorporating a rainscreen cladding system, with or without insulation within any associated cavity;
- 2) external thermal insulation composite systems (ETICS), particularly those comprising rendered insulation;
- 3) composite panels, including insulated core (“sandwich”) panels;
- 4) glazed façades with infill/spandrel panels;
- 5) substrates or backing walls, including concrete blockwork, brick, steel framing systems (SFSS), timber framing and structural insulated panels (SIPs); and
- 6) curtain walling.

It also covers attachments to the external walls of buildings.

This PAS does not address spread of fire from one building to another, the performance of external walls in terms of fire resistance, or the ability of the walls to maintain structural stability. It is not applicable to new buildings.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions of this PAS<sup>2)</sup>. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 4422, *Fire – Vocabulary*

BS EN ISO 13943, *Fire safety – Vocabulary*

<sup>2)</sup> Documents that are referred to solely in an informative manner are listed in the Bibliography.

## 3 Terms, definitions and abbreviated terms

### 3.1 Terms and definitions

For the purposes of this PAS, the terms and definitions given in BS 4422, BS EN ISO 13943 and the following apply.

#### 3.1.1 aluminium composite material (ACM)

two thin aluminium skins bonded together to a polyethylene or polyethylene/mineral core material

**NOTE** This PAS refers to different categories of ACM as follows.

- Category 1 ACM is one in which in screening tests based on BS EN ISO 1716, the calorific value is  $\leq 3$  MJ/kg.
- Category 2 ACM is one in which in screening tests based on BS EN ISO 1716, the calorific value is  $> 3$  MJ/kg and  $\leq 35$  MJ/kg.
- Category 3 ACM is one in which in screening tests based on BS EN ISO 1716, the calorific value is  $> 35$  MJ/kg.

These categories are instigated by DLUHC as part of the Government's building safety programme.

#### 3.1.2 automatic opening vent (AOV)

vent that is part of a smoke control system, which opens automatically when smoke is detected by smoke detectors

#### 3.1.3 cavity barriers

##### 3.1.3.1 cavity barrier

product used to close or separate a concealed space, the purpose of which is to restrict the spread of smoke and/or fire

**NOTE** This includes both closed state (3.1.3.2) and open state (3.1.3.3) cavity barriers.

[SOURCE: BS 9414:2019, 3.10.2]

##### 3.1.3.2 closed state cavity barrier

non-loadbearing element designed to provide fire separation within or at the edges of a concealed space (cavity) by forming a tight seal (possibly under compression) between the inner and outer surfaces of the cavity

[SOURCE: BS 9414:2019, 3.10.3, modified – reference to orientation removed]

##### 3.1.3.3 open state cavity barrier

non-loadbearing element designed to provide fire separation in a concealed space (cavity), which is open to allow ventilation and drainage in the cold state, but which closes when exposed to a developing fire

[SOURCE BS 9414:2019, 3.10.4, modified – reference to orientation removed]

#### 3.1.4 cladding

system of one or more components that are attached to, and might form part of the weatherproof covering of, the exterior of a building

**NOTE** Such systems are normally attached to the primary structure of a building to form non-structural, non-loadbearing external surfaces and can comprise a range of facing materials/cladding panels, including metal composite panels or non-loadbearing masonry, along with insulating materials, rendered insulation systems (ETICS) and insulated core sandwich panels, which are attached to a substrate. Combinations of, for example, cladding panels and insulation form cladding systems and such systems might include cavities, which can be ventilated or non-ventilated. The cladding system also encompasses the supporting rails and bracketry, as applicable, to attach the cladding to the building, and cavity barriers where applicable. Systems that constitute the entire thickness of the external wall, by definition, cease to be cladding systems and are the external wall, e.g. curtain walling.

#### 3.1.5 combustible

not classed as A1 or A2 in accordance with BS EN 13501-1:2018, and not meeting the definitions for material of limited combustibility (3.1.27) or non-combustible (3.1.30)

#### 3.1.6 combustion modified

<of a material> modified or specifically formulated to improve performance in fire

#### 3.1.7 compartmentation

subdivision of a building by fire-resisting walls and/or floors for the purpose of limiting fire spread within the building

#### 3.1.8 competent person

person, suitably trained and qualified by knowledge and practical experience, and provided with the necessary instructions, to enable the required task(s) to be carried out correctly

### 3.1.9 evacuation alert system for use by the fire and rescue service

system intended for installation in a building containing flats or maisonettes to enable the fire and rescue service to initiate an evacuation alert signal by means of evacuation alert devices within the flats or maisonettes, using manual controls incorporated within the control and indicating equipment

### 3.1.10 external wall construction

range of different forms of construction used for the entirety of the external walls of a building, from inside to outside, including both internal and external finishes

**NOTE 1** In the context of this PAS, external wall construction includes any cladding on the external wall (whether installed as a complete system at the time of construction or retrospectively through, for example, renovation) as well as the underlying wall construction, whether loadbearing or not.

**NOTE 2** The current guidance in ADB ([8], [9]) refers to external walls as including all of the following:

- anything located within any space forming part of the wall;
- any decoration or other finish applied to any external (but not internal) surface forming part of the wall;
- any windows and doors in the wall; and
- any part of a roof pitched at an angle of more than 70° to the horizontal if that part of the roof adjoins a space within the building to which persons have access, but not access only for the purpose of carrying out repairs or maintenance.

### 3.1.11 fire barrier

separating element that exhibits fire integrity or fire stability or thermal insulation, or a combination thereof, for a period of time under specified conditions

**NOTE** A cavity barrier (3.1.3.1) is a fire barrier specific to concealed spaces (cavities) within the external wall.

### 3.1.12 fire engineering

application of scientific and engineering principles to the protection of people, property and the environment from fire

**NOTE** This is also known as fire safety engineering.

### 3.1.13 fire hazard

source, situation or act with potential to result in a fire

**NOTE** Examples of fire hazards include ignition sources, accumulation of waste that could be subject to ignition, and disposal of a lit cigarette close to combustible materials.

### 3.1.14 fire load

quantity of heat that could be released by the complete combustion of all the combustible materials in a volume, including the facings of all bounding surfaces

### 3.1.15 fire resistance

ability of an item to fulfil for a stated period of time the required loadbearing capacity and/or integrity and/or thermal insulation, and/or other expected duty specified in a standard fire resistance test

**NOTE** This is not the time that the item can withstand exposure to any specific real fire without loss of its required performance.

### 3.1.16 fire risk

combination of the likelihood of the occurrence of fire and likely consequence(s) of a fire

**NOTE** In the context of this PAS, the relevant consequences of a fire are those involving injury to people (number and severity of injuries), as opposed to damage to property.

### 3.1.17 fire risk assessment (FRA)

process of identifying fire hazards and evaluating the risks to people arising from them, taking into account the adequacy of existing fire precautions, and deciding whether or not the fire risk is acceptable without further fire precautions

**NOTE** Where the fire risk is not acceptable without further fire precautions, an FRA includes an action plan that sets out reasonably practicable measures to reduce the risk.

### 3.1.18 fire stop

seal provided to close an imperfection of fit or design tolerance between elements or components to restrict the spread of fire and smoke

### 3.1.19 fire stopping

provision of a fire stop

**NOTE** In the context of external wall construction, anything that connects compartment floors and walls onto the inside face of the external walls is fire stopping and would be expected to provide the same fire resistance as the floor/wall.

### 3.1.20 fire strategy

set of fire safety objectives and the measures to be taken to meet those objectives

### 3.1.21 general needs

<of housing> intended for occupation by members of the general public and not solely or predominantly for occupation by a specific demographic

### 3.1.22 high-rise building

building with any storey with a floor located at not less than 18 m above ground level, or at least seven storeys (i.e. more than a ground plus five upper storeys), whichever is the lower

**NOTE** In this context, the height of the top storey is measured from the upper floor surface of the top floor (excluding roof-top plant areas and any uppermost storeys consisting exclusively of plant rooms) to ground level on the lowest side of the building.

### 3.1.23 infill panel

panel forming part of a curtain wall or window assembly system, excluding vision glazing

### 3.1.24 insulation

any material or product that is intended as, or capable of, significantly reducing the transfer of heat

**NOTE** Insulants which do not provide this function for the building as a result of the manner in which they have been installed (e.g. discrete sections of insulation which would fail to insulate as heat might pass through gaps between them) still fall within this definition of insulation, as they contribute to fire safety in the manner of an insulant in any event.

### 3.1.25 interim measure

temporary measure that is put in place to address an unacceptable risk to occupants of a building

### 3.1.26 material

substance, or mixture of substances, that is entirely homogenous

**NOTE** For example, aluminium and timber are both materials. For the purpose of reaction to fire testing, where a material forms a surface it is the entire thickness of that material which is the surface.

### 3.1.27 material of limited combustibility

either:

- a) a non-combustible material or product; or
- b) any material or homogenous product of density 300 kg/m<sup>3</sup> or more, which, when tested in accordance with BS 476-11, does not flame and the rise in temperature on the furnace thermocouple is not more than 20 °C; or
- c) any product with a non-combustible core of 8 mm thick or more, having combustible facings (on one or both sides) not more than 0.5 mm thick; or
- d) a material or product classified as Class A2-s3, d2 in accordance with BS EN 13501-1:2018, when tested in accordance with BS EN ISO 1182 or BS EN ISO 1716 and BS EN 13823

**NOTE** This term is included here given its use in relation to materials used in, and standards applicable to, existing buildings. It is derived from guidance in previous versions of ADB ([10], [11], [12], [13], [14]), but this term is no longer in use in the current version of ADB ([8], [9]).

[SOURCE: BS 9991:2015, 3.45, modified]

### 3.1.28 mitigation measures

measures to reduce an identified risk until significant issues relating to the fire risk posed by the external wall construction and cladding are resolved

### 3.1.29 multistorey

<of blocks of flats> comprising at least a ground floor and one upper floor, with one or more separate dwellings on each storey

### 3.1.30 non-combustible

either:

- a) any material classified as Class A1 in accordance with BS EN 13501-1:2018; or
- b) products classified as non-combustible under BS 476-4:1970; or
- c) any material which when tested in accordance with BS 476-11, does not flame nor cause any rise in temperature on either the centre (specimen) or furnace thermocouples; or
- d) totally inorganic materials such as concrete, fired clay, ceramics, metals, plaster and masonry containing not more than 1% by weight or volume of organic material; or
- e) concrete bricks or blocks meeting BS EN 771-3:2003

**NOTE** This term is included here given its use in relation to materials used in, and standards applicable to, existing buildings. It is derived from guidance in previous versions of ADB ([10], [11], [12], [13], [14]), but this term is no longer in use in the current version of ADB ([8], [9]).

### 3.1.31 pre-occupation fire safety assessment

process of identifying fire precautions in a newly constructed or refurbished building, taking into account the approved fire strategy, and deciding whether or not the new or refurbished premises are likely to be fit for occupation

### 3.1.32 product

item that is formed of one or more materials

**NOTE** For example, painted aluminium or timber, ACM and manufactured boards which have a complex internal structure or densities which differ across their thickness, are all non-homogenous products. For the purpose of reaction to fire testing, only the surface material (such as paints/coatings, the aluminium sheet of ACM where this is not painted, or the portion of a product that is essentially the same as what is exposed at the surface) is deemed to be the surface. Some products are homogenous.

### 3.1.33 simultaneous evacuation

system of evacuation in which an entire building is evacuated immediately on receiving an evacuation signal (e.g. from a fire detection and fire alarm system) or an evacuation alert signal from an evacuation alert system for use by the fire and rescue service, or an instruction to evacuate (e.g. given verbally to the residents of each dwelling by firefighters)

### 3.1.34 spandrel panel

infill panel that is located between the sill of a window and the head of the window below, or that spans the floor slab area in a curtain wall system

**NOTE** A spandrel panel commonly spans a compartment floor boundary and, therefore, is significant in terms of the scope for the fire to bypass fire barriers between floors.

### 3.1.35 stay put strategy

strategy normally adopted in blocks of flats and maisonettes whereby, when a fire occurs in a flat or maisonette, the occupants of that dwelling evacuate, but occupants of all other dwellings can safely remain in their dwellings unless directly affected by heat and smoke or otherwise directed to leave by the fire and rescue service

**NOTE 1** In a building with a stay put strategy, residents can leave their flats at any time if they wish and are able to do so (e.g. if they feel unsafe), but to do so might, under some circumstances, place them at greater risk than remaining within their flats.

**NOTE 2** "Stay put" is sometimes referred to as "defend in place" or "stay safe".

### 3.1.36 substrate

construction onto which other materials or products are attached or applied

**NOTE** In the case of a cladding system, its substrates typically include masonry and lightweight framing systems, such as an SFS.

### 3.1.37 surface

outside part or uppermost layer

**NOTE** This definition is particularly important in the context of reaction to fire tests [see definitions for materials (3.1.26) and products (3.1.32), and Annex A].

### 3.1.38 thermoplastic material

polymer that can be melted and recast almost indefinitely

### 3.1.39 waking watch

system whereby suitably trained persons continually patrol all floors and the exterior perimeter of the building in order to detect a fire, raise the alarm, and carry out the role of evacuation management

## 3.2 Abbreviated terms

For the purposes of this PAS, the following abbreviated terms apply.

|       |                                                                                                                                                                         |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACM   | aluminium composite material                                                                                                                                            |
| ADB   | <i>The Building Regulations 2010 – Approved Document B: Fire safety</i>                                                                                                 |
|       | <b>NOTE</b> The abbreviation "ADB" is used for all editions of Approved Document B; the bibliographic references indicate which edition is relevant at any given point. |
| AOV   | automatic opening vent                                                                                                                                                  |
| CCM   | copper composite material                                                                                                                                               |
| CLT   | cross-laminated timber                                                                                                                                                  |
| CP    | cement particle                                                                                                                                                         |
| DPC   | damp-proof course                                                                                                                                                       |
| EPS   | expanded polystyrene                                                                                                                                                    |
| ETICS | external thermal insulation composite system                                                                                                                            |
| FRA   | fire risk assessment                                                                                                                                                    |
| FRAEW | fire risk appraisal of external walls                                                                                                                                   |
| HPL   | high pressure laminate                                                                                                                                                  |
| HRR   | heat release rate                                                                                                                                                       |
| IRMP  | integrated risk management plan                                                                                                                                         |
| MCM   | metal composite material                                                                                                                                                |
| OSB   | oriented strand board                                                                                                                                                   |
| PIR   | polyisocyanurate                                                                                                                                                        |
| PUR   | polyurethane                                                                                                                                                            |
| SIP   | structural insulated panel                                                                                                                                              |
| SFS   | steel framing system                                                                                                                                                    |
| XPS   | extruded polystyrene                                                                                                                                                    |
| ZCM   | zinc composite material                                                                                                                                                 |

## 4 General issues for consideration before undertaking an FRAEW

### COMMENTARY ON CLAUSE 4

The following are general issues for consideration before undertaking an FRAEW.

- a) *This PAS is narrower in scope than the 2020 version of the MHCLG Consolidated Advice Note [17] (and equivalent guidance in Scotland). While the multistorey, multi-occupied residential buildings, to which the MHCLG Consolidated Advice Note [17] referred, were primarily purpose-built<sup>3)</sup> blocks of flats, its scope also included all buildings that include more than one dwelling and all buildings that have a room for residential purposes. The Consolidated Advice Note [17] also applied to overnight patient accommodation (e.g. hospitals).*
- b) *An FRAEW is not specifically intended to address the safety of firefighters in the event of a fire spreading over the external walls, given that there were no express requirements within the relevant building regulations to address this when the buildings were built<sup>4)</sup>, albeit there was the requirement to meet the functional Requirement B4(1), which would have reduced the risk to occupants and firefighters alike. Nor is this within the scope of the Fire Safety Order [19]. However, it would be of significant value and is considered best practice to inform the local fire and rescue service of any findings of an FRAEW where external fire spread is likely to be more rapid than is normally expected. This would allow operational risk information to be reviewed and updated. Means of escape for relevant persons are also often a means of access for firefighters.*
- c) *An FRAEW is not specifically intended to address protection of property (the premises and their contents) or the environment, or to address protection against the consequences of a fire, such as the need for the building to be vacated and the occupants rehoused. However, it is undoubtedly the case that external walls that adequately resist the spread of fire such as to safeguard occupants will also, to a large degree, help to limit fire damage and disruption.*
- d) *This PAS addresses the risk from fire spread over the external walls of multistorey blocks of flats of any height and not just those over 18 m; while, for many years, within the supporting guidance to building regulations, more stringent fire performance has been specified for buildings over 18 m in height, the fundamental requirement for external walls adequately to resist fire spread applies irrespective of height.*
- e) *No specific definition of an external wall was previously included in building regulations or relevant editions of ADB, although a definition was introduced when the Building Regulations 2010 [7] were amended in 2018. The effect of the amendment is that all components from the wallpaper or other finish on the face of the wall internally within the building (but not including the wallpaper or other finish) to the facing of the external wall on the outside of the building are now to be considered part of the external wall construction for the purpose of the Building Regulations. However, such a definition was not applied in any UK guidance before this time, and as a result it is not uncommon to encounter combustible materials within the external wall construction, in particular the inner leaf/backing wall. Given that this PAS applies to existing buildings pre-dating the 2018 amendment to the Building Regulations 2010, use of this PAS assumes that remediation of these inner leaf/backing walls is, in the majority of cases, unlikely to be risk-proportionate.*
- f) *This PAS does not apply to the design of new buildings or to the snagging of newly constructed buildings prior to occupation. Similarly, it is not intended to inform pre-occupation fire safety assessments (see 3.1.31). Accordingly, it is not intended to constitute an alternative solution to meeting the requirements for fire performance of external walls of new buildings.*
- g) *A report prepared in accordance with this PAS is not intended as an alternative to the EWS1 form [23], which is for valuation purposes only, although it might possibly serve as a suitable report to support or inform an EWS1 form.*

<sup>3)</sup> Including buildings originally in use for other purposes but subject to alteration and redesign for use as flats.

<sup>4)</sup> There are no recommendations in ADB relating to the mechanical performance of external wall construction to protect firefighters from falling debris, early collapse of the cladding or fire spread by burning debris. In addition, there are no express criteria within the guidance given in the BRE publication BR 135 [15] to assess these matters.

- h) *Use of this PAS is likely to give rise to the most definitive assessment if the person carrying out the FRAEW works in collaboration with a suitable contractor appointed by the client to carry out opening up works, and with other professionals, such as a building surveyor/architect and/or façade engineer. While the PAS is based on this premise, it can equally be applied where there are different arrangements. However, it is not expected that fire engineers would carry out opening up work, etc., but might subcontract such work.*
- i) *It is inevitable that more, and greater, knowledge relating to the fire performance of materials, components and systems and how they are configured in external wall construction is likely to come to light beyond the publication date of this PAS. Where more definitive information on fire performance data relied upon in an FRAEW becomes available, e.g. results from relevant BS 8414 tests completed subsequent to the FRAEW, it is expected that such information ought to take precedence. This might, in some cases, prompt the need for a review of the findings of an FRAEW.*
- j) *FRAEWs conducted in accordance with this PAS are not intended to be used as a means to audit design or construction of buildings against any applicable regulations or guidance (e.g. with the intention of establishing failure of particular parties to meet contractual obligations at the time of construction), nor to support litigation in relation to compliance with building regulations (as opposed to risk).*

**4.1** Before accepting a commission for an FRAEW, the external wall assessor should inform the person commissioning the FRAEW of its inherent limitations, and, in particular, the following:

- a) it is intended primarily to inform the building's FRA;
  - b) it cannot warrant absolute safety, as it will be risk-based and therefore reliant on professional judgement by competent persons;
  - c) it might not be possible to identify the full scope of work needed as part of the FRAEW from the outset, as the conclusion might be that a further inspection or in-depth technical assessment is needed (which might necessitate the involvement of other professionals);
  - d) it is not specifically intended to address protection of firefighters;
  - e) it is not intended to address property protection; and
- f) it can only be based on available industry knowledge at the time of the FRAEW and, more definitive information on the fire performance of external wall construction might come to light subsequently.

**4.2** Before accepting a commission for an FRAEW, persons engaged to conduct it should establish that:

- a) the building is within the scope of this PAS;
- b) the purpose of the FRAEW is to inform the building's FRA;
- c) a risk-based approach is required, and not one based on:
  - 1) strict compliance with guidance to building regulations (current or otherwise); or
  - 2) an unrealistic attempt to establish zero risk;
- d) the objective of assessing the fire risk is to address the safety of occupants; and
- e) they have the necessary competence to address the risks posed by the particular wall build-ups on the building (see Clause 8).

**4.3** Persons conducting FRAEWs should endeavour to ensure that clients are made aware of the constraints, limitations and caveats that will apply to an FRAEW conducted in accordance with this PAS.

**4.4** Persons conducting FRAEWs should inform the client that, if more definitive information on the fire performance data relied upon in an FRAEW becomes available subsequent to the FRAEW, such information should take precedence. The potential need to carry out a review of the findings of an FRAEW in the light of such new information should be emphasized.

## 5 Principles of external fire spread

### COMMENTARY ON CLAUSE 5

*Although the Grenfell Tower fire has brought back into sharp focus the serious consequences of an uncontrolled fire spreading over the external walls of a building, the risks posed by such fire spread were well understood prior to this. Indeed, lessons learned from previous, notable fires had progressively led to tighter restrictions in relation to the fire performance of the materials that can be used as part of external wall construction and cladding. Why the tragedy at Grenfell Tower occurred despite these restrictions is, at the time of publication of this PAS, still under investigation by the Public Inquiry and a Metropolitan Police Service investigation into the fire.*

*This PAS draws on the lessons learned from previous fires involving unexpected and significant external fire spread. It pays particular attention to the rapid fire spread that can occur in some external wall construction and cladding and, in particular, highlights the potential of cavities within, for example, rainscreen cladding systems to exacerbate vertical fire spread.*

*It is recognized that external fires also result in significant smoke spread. While the effects of such smoke can be considered, to a degree, in terms of the consequences (such as on the propensity to affect escape routes if a cladding fire were in close proximity to staircase smoke vents, for example), the restrictions on fire performance of external wall materials have not previously sought to directly control smoke production.*

*The mechanisms for fire spread on the outside of a building and, in particular, the role of cavities in the wall build-up, are generally well understood. The risks posed by fire spread over the external walls of building are clearly summarized in BR 135 [15], for example. Further discussion on the mechanisms for such fire spread is provided in Annex B.*

*It is important that external wall assessors are cognizant of the mechanisms of fire spread via the external walls of buildings and the implications of fire that have occurred by this route. This is part of possessing the necessary competency to conduct an FRAEW (see Clause 8). It is essential to understanding the basis of risk-based benchmark criteria.*

*For a building to be considered acceptably safe, the time required for fire to spread externally from one compartment to another, or from one storey to another, needs to be sufficiently long so as to allow for safe escape and the intervention of the fire and rescue service; measures needed to support safe escape and intervention from the fire and rescue service vary, depending upon the particular building, and its size, use and location.*

*In general, the time required for a fire to grow to flashover, for flames to emit from windows, reach windows above and ignite the contents of rooms, is usually sufficient for this purpose. The need, therefore, is for the external wall construction of buildings not to accelerate the speed of fire spread to an extent that is unsafe.*

*Utilizing materials that are of limited combustibility or are non-combustible, or have, in combinations reflecting the specific wall build on a building, been subject to BS 8414 large-scale fire tests, and, as a result, been classified in accordance with the criteria in BR 135 [15], have been the ways relied upon to result in this outcome. However, as discussed elsewhere in this PAS, these are not practical benchmarks that can be applied to many existing buildings.*

*The implications from the history of fires involving significant external fire spread, highlighted in this clause, and the mechanisms of such fire spread, suggest that the basis of subjective benchmark criteria to be used when assessing the fire risk posed by external walls of existing blocks of flats needs to be:*

- *that fire spread is likely to result in only limited secondary fires and/or either occur at a rate within expectations for a building of this height, or at a higher but still tolerable rate, given the circumstances at the building in question; and/or*
- *that occupants in places to which fire has spread are not unduly harmed, or prevented from escaping, by the time such secondary fires occur; and/or*
- *that secondary fires do not compromise the communal means of escape before those needing to use the escape routes have left the building; and/or*
- *that fire and rescue service intervention is likely to be effective in avoiding undue secondary fires, or in ensuring that occupants at risk are not prevented from escaping or can be rescued.*

*This is discussed further in Clause 7.*

**5.1** External wall assessors should be knowledgeable in relation to the history of notable fires involving significant external fire spread and the lessons learned.

**5.2** External wall assessors should understand the various mechanisms of fire spread giving rise to fires involving external wall construction and cladding.

**5.3** External wall assessors should have an in-depth understanding of the basis of controls and restrictions contained in standards and guidance relating to external fire spread.

**5.4** External wall assessors should understand what provisions are required within external walls to prevent fire spreading from compartment to compartment, either horizontally or vertically.

**5.5** When adopting a risk-based approach to determining whether an existing block of flats is safe, in terms of external fire spread, external wall assessors should recognize and take account of:

- a) the combustibility and fire performance of external wall construction and cladding;
- b) the likelihood of secondary fires;
- c) whether a secondary fire is likely to result in direct harm to occupants or prevent them escaping;
- d) the role of fire and rescue service intervention, its effectiveness and its limitations;
- e) the time it might take for adverse consequences to occur and whether this can be mitigated by, for example, suitable fire safety design; and
- f) the extent and effectiveness of fire safety management for the building.

## 6 Legislative context

### COMMENTARY ON CLAUSE 6

*In the case of existing buildings, the context in which the fire risk posed by external wall construction is to be considered is the ongoing legislative control applicable to occupied buildings. Cognizance of the requirements of building regulations and the recommendations of supporting guidance, and the differences between what is applicable now to new buildings and what would have been applicable at the time of construction of the building under consideration, is also important. The legislative context to FRAEWs is discussed further in Annex C.*

*The risk-based approach advocated in this PAS meets the fundamental underlying philosophy underpinning the Fire Safety Order [19]. Accordingly, an FRAEW is intended to support the building's FRA in establishing the level of risk and the preventive and protective measures needed to satisfy the Fire Safety Order [19].*

*It is inevitable that there will be an iterative process whereby an FRAEW is commissioned as a consequence of a building's FRA, but the outcome of the FRAEW requires the FRA to be reviewed and revised in the light of the findings of the FRAEW.*

*In providing professional advice on external walls and how to meet an appropriate standard of fire safety for existing blocks of flats, external wall assessors need to understand the legislative context that applies and in particular that of the Fire Safety Order [19]. This is particularly important in relation to the guidance given in Clause 7 and Clause 13 on:*

- underlying criteria for a benchmark when assessing whether external walls present an undue risk of fire spread;*
- a framework and rationale for a risk-based approach to determine whether walls on an existing building meet an appropriate standard of fire safety;*
- determining the circumstances in which the risk is high and there is a need to take remedial action to mitigate an unsafe building;*
- determining the circumstances in which, notwithstanding the presence of combustible material in the external walls and cladding, there is no need to take remedial action as the risk is low; and*

- determining the circumstances in which, notwithstanding a heightened risk of fire spread compared to a low-risk building, the residual risk presented by the presence of combustible material in the external walls and cladding is tolerable and again, there is no need to take any significant remedial action.*

*Where it has been determined that action is necessary to mitigate the risk, the measures that can be taken to reduce the risk are likely to vary. It might, at one extreme, be necessary to remove and replace all combustible elements of the external walls. In some circumstances, partial removal and replacement might suffice to address the life safety risk, e.g. removal of combustible cladding which would allow fire to spread into escape routes. In others, normally limited to low-rise blocks, a more proportionate and cost-effective alternative to replacing existing cladding, or carrying out works to address design shortcomings and deficiencies in workmanship, might be to consider changing the evacuation strategy.*

*In cases where the risk posed by combustible cladding and external wall construction is perceived as severe, interim measures will often involve a waking watch, for which guidance is available [24]. If the cladding cannot be removed within a period of a few months, a more realistic alternative is to provide a fire alarm system with sufficient automatic fire detection that is capable of alerting all residents. This is usually only intended as a temporary solution. Where a permanent change in evacuation strategy is recommended as a long-term solution, it is important that all parties, especially residents, are fully aware of the disadvantages as well as the advantages of this, including the disruption that can result from false alarms and, as a result, the potential for residents to disregard alarm warnings.*

*The need for interim measures, such as those highlighted in sector-specific guidance on temporary changes to a simultaneous evacuation strategy in purpose-built blocks of flats [24], might also need to be considered, depending upon how long it will take to implement more permanent mitigation measures.*

*While this PAS is not a guide to all of the mitigation measures available and the circumstances in which they can be employed, it is important that persons undertaking the FRAEW are capable of advising on the suitability of such measures. Ultimately, it is expected that the responsible person, or person in control of the premises under the Fire Safety Order [19], in conjunction with the fire risk assessor and other professional advisers, will determine the most appropriate measures to mitigate risk in the circumstances. Nevertheless, persons carrying out the FRAEW need to be able to give due consideration to practicality and cost, suitability to the circumstances, and effectiveness and maintainability of any such measures, in order to be able to be satisfied that an appropriate standard of fire safety can be met, given the risk posed by fire spread as determined in the FRAEW.*

*Using tests of proportionality and the benefit gained from the preventive and protective measures taken in response to risk is fundamental to the Fire Safety Order [19]. This, in turn, allows consideration of cost. While cost is unlikely to be a fully determinative factor, it cannot be dismissed in the context of building fire safety. Legal determinations in criminal court cases brought under the Fire Safety Order routinely use cost–benefit considerations to test whether something is proportionate and “reasonably practicable”. Given the high costs incurred in remedial action to remove and replace combustible cladding, it is important to establish that this is a risk-proportionate measure, especially when the fire risk posed by external wall construction and cladding is set in the context of other risk factors and fire safety features of the building.*

*Prior to the amendment of the Fire Safety Order [19] by the Fire Safety Act 2021 [20], it was considered necessary to use the powers under the Housing Act 2004 (as amended) [25] to enforce requirements for remediation of hazardous cladding by use of the housing health and safety rating system (HHSRS). It is anticipated that, following the introduction of the Fire Safety Act 2021 [20], it might now be more appropriate to use the powers granted by the Fire Safety Order [19] for this purpose. Accordingly, in this PAS, the focus is on conformity to the Fire Safety Order [19], and the underlying principles of the Order, rather than the alternative approach adopted under the Housing Act 2004 (as amended) [25].*

**6.1** External wall assessors should understand the relationship between the FRAEW and the building’s FRA, including the fact that an outcome of an FRAEW could require that an FRA be reviewed and revised depending upon the findings in the FRAEW.

**NOTE** *The urgency of this depends on the findings of the FRAEW.*

**6.2** Failure of a building to meet the benchmarks given in regulations and guidance applicable to external wall construction, both currently and at the time when the building was built, should not be used as the sole basis for determining the outcome of the FRAEW.

**6.3** The FRAEW should adopt a risk-based approach. It should include not only the fire behaviour of the materials, components and systems within the external walls, but also other risk factors, such as how the façades are configured on the building, the fire hazards in and around the building and the fire safety features of the building.

**6.4** External wall assessors should take into account the principle of proportionality when formulating an opinion on the risk and the appropriate mitigation measures in response to that risk, including considerations of benefit gained, practicality and cost.

**NOTE** *The requirements of the Fire Safety Order [19] are based on measures that are “reasonably practicable”, i.e. that the cost, time and effort in eliminating a hazard are not grossly disproportionate to the risk created by the hazard.*

**6.5** External wall assessors should be competent to advise on the suitability of any measures they recommend to mitigate the risk, including practicality and cost, suitability to the circumstances, effectiveness and maintainability. This should include any interim measures recommended.

## 7 Principles and scope of the fire risk appraisal of external walls (FRAEW)

### COMMENTARY ON CLAUSE 7

#### a) Background

*The methodology in this PAS is aimed at providing a pragmatic basis for addressing situations in which, in the absence of evidence from large-scale fire testing, the exact fire performance of the particular external wall construction and cladding on an existing building cannot be proven.*

*The fundamental basis of this PAS is that it is risk-based, not compliance-based. It cannot establish absolute safety, but can only categorize risk on a relative basis.*

*Accordingly, the benchmark criteria used in this PAS refer to first principles, based on an analysis of the problem of external wall fires as discussed in Clause 5 and Annex B. This takes into account not only whether the rate at which fire might spread is likely to be unduly rapid, but also the consequences in terms of secondary fires, and the implications for escape by occupants, given the likely mitigation resulting from the fire safety features in the building and the ability of the fire and rescue service to intervene effectively in time. This means the criteria are inevitably subjective and reliant on the use of professional judgement by competent persons.*

*While this is relative to the known performance of external wall construction in real fires, and in the various fire test methods (small, intermediate and large-scale) applied to materials, components and systems with which external walls are constructed, it is also relative to the context in which the combustible material is present. It therefore takes account of the scale and extent to which such combustible cladding panels and other components are present on the building, e.g. whether there is full or only partial coverage of combustible cladding. It also takes into account the consequences of a fire and the fire strategy that underpins the fire safety design of the building.*

*This philosophy fits with the approach to risk assessment in the context of the legislative regime for ongoing control of existing buildings under the Fire Safety Order [19]. The FRAEW is intended to complement the FRA, as, ultimately, it is within the scope of the FRA produced under the Fire Safety Order [19] that the fire risk posed by external wall construction and cladding is to be considered.*

*The findings of an FRAEW are specifically intended to assist the building's fire risk assessor with that consideration. The rationale set out in this clause stipulates that the building's fire strategy and various aspects of the fire safety design are taken into account, in conjunction with fire hazards that could result in façade fires. Accordingly, to assist in the building's FRA or its review, it is imperative that the external wall assessor's understanding of these matters and any assumptions made are explicitly stated in the FRAEW report. This is so that an FRAEW serves to inform the building's fire risk assessment and aids decision-making with regard to any necessary action to mitigate the risk, including interim measures that need to be implemented within defined timescales.*

*The ultimate aim of the FRAEW is, therefore, to position the fire risk posed by the external wall construction and cladding on a scale of relative risk from "low" to "high". From this, it is determined whether action is necessary to address a level of risk that is considered unacceptable. On a relative scale, "low" risk would equate to construction that is considered to be acceptable. The extreme of "low" risk at one end would equate to the likely fire performance of a double skin masonry wall (each leaf at least 75 mm thick), with its excellent level of fire performance. At the other extreme, "high" risk would equate to the fire performance of a cladding system with Category 3 ACM, which is generally regarded as unacceptable. However, to determine risk in the context of this PAS, it is normally necessary to consider more than just fire performance. Factors relating to the consequences of fire spread need to be taken into account; indeed, with the possible exception of fire performance equivalent to Category 3 ACM, these factors might outweigh the concerns regarding fire performance.*

*For avoidance of doubt, while it can be stated that compliance with the BR 135 [15] benchmark in the guidance in ADB ([8], [9]) will usually result in a "low" risk on this relative scale, it is not the case that failure to demonstrate such compliance automatically means the risk level cannot be tolerable, or is always unacceptable. It is the basic premise of this PAS that judgements on risk need to be made in the absence of evidence of compliance with the BR 135 benchmark. Fundamental to this*

is that the specific circumstances of the particular building being assessed need to be considered, holistically, when assessing risk. Even where there is evidence of compliance with the BR 135 benchmark, there might be other factors that influence the risk, such as significant combustible material present on features such as balconies. When considered in context, these might detract from viewing the building as “low” risk.

It is also important to understand that, although this methodology utilizes values for physical properties of materials and fire performance data, any consideration of risk in the context of external wall construction and cladding will be largely subjective, given the state of knowledge of, and ability to predict, how certain materials behave in fire, requiring use of professional judgement by competent persons.

As discussed in Annex D, compliance with the Building Regulations [7] can be achieved by means of a fire-engineered solution, which might be a risk-based approach. Such a solution is likely to contain elements of the risk-based approach described in this PAS. However, new-build projects afford the opportunity to achieve certainty over the fire performance of external wall materials, systems and configurations. Accordingly, in terms of approval under the Building Regulations [7], the test applied by a building control body as to whether a particular fire-engineered solution is acceptable is likely to be more stringent than the methodology set out in this PAS. In summary: acceptable risk, in the context of this PAS, might not be equivalent to acceptable risk in the case of the fire-engineered solution for the design of a new building.

#### **b) Risk-based benchmark criteria**

In the context of a risk-based approach, as outlined in this PAS, the risk in question is the combination of:

- the likelihood of undue speed of fire spread over the external walls of the building; and
- the likely consequences, namely the resultant occurrence and extent of secondary fires on other floor levels; and
- the likely consequences in terms of evacuation before the onset of untenable conditions<sup>5)</sup> in the escape routes, whether evacuation is intended to occur immediately on the warning of fire or, in the case of a stay put strategy, at some point during the course of the fire; and

- the likelihood of effective intervention by the fire and rescue service at a point before all of the above occur.

External fire spread from a flat on one storey to another flat on the storey above, bypassing compartmentation, might cause the occupants of the upper flat to be directly affected by heat and smoke and force them to evacuate their flat. However, this mechanism of fire spread cannot ever be totally precluded even with the use of fire-resisting glazing for windows, which would also need to be permanently fixed shut, as fire resistance can only ever be afforded for a finite period of time. A fundamental premise of controls on external walls under building regulations and supporting guidance has always been that the possibility of such fire spread is accepted, provided that the risk to life safety remains at an acceptable level, but it is not expected to occur at such speed that intervention by the fire and rescue service cannot be effective.

Although this form of fire spread occasionally occurs, it does not generally happen on a large scale or lead to death or serious injury of people beyond the flat of fire origin; even if fire spreads into a flat, there would normally still be a safe means of escape available for occupants to use. As discussed in Annex B, the Grenfell Tower fire was an extreme case, where an external fire did spread into other flats with disastrous results; secondary fires in an unexpectedly large number of flats occurred, with the additional consequence that the means of escape were also compromised (as a result of smoke and fire in staircase lobbies on multiple levels and, ultimately, untenable conditions within the staircase itself). This occurred at such speed that fire and rescue service intervention to fight the fire and rescue the occupants was impeded to the point that it was, ultimately, no longer possible to save lives.

Other cases of notable fires involving external fire spread are also discussed in Annex B. However, these show that, while fires can spread extensively over the external walls, and, in some cases, cause secondary fires, this has rarely resulted in casualties beyond the flat of fire origin.

While, to some degree, secondary fires on at least the floor above that of fire origin are to be anticipated, the extent to which secondary fires occur beyond this is a good indication of whether or not the fire performance of the external walls is adequate.

<sup>5)</sup> Tenability criteria in the context of a fire-engineered solution are usually based on factors such as temperature, visibility, toxicity and levels of radiant heat.

Therefore, the following are all, singly or in combination, indicative of a situation which is demonstrably unsafe:

- extremely rapid external fire spread;
- fire spread that gives rise to widespread secondary fires, resulting in occupants being unduly harmed or prevented from escaping;
- fire that spreads in such a way that the communal means of escape are compromised before occupants can safely use them to escape; and
- the inability of fire and rescue service intervention to prevent the above and avoid undue harm to occupants.

The corollary is that the consequences of an external fire set out below are not unsafe and can form the basis of acceptability criteria for a risk-based approach:

- fire spread that results in only limited secondary fires, and/or either occurs at a rate within expectations for a building of this height, or at a faster but nevertheless tolerable rate, given the circumstances at the building in question; and/or
- occupants in locations to which fire has spread are not unduly harmed or prevented from escaping before such secondary fires occur; and/or
- secondary fires do not compromise the communal means of escape before those needing to use the escape routes have left the building; and/or
- fire and rescue service intervention is likely to be effective in avoiding undue secondary fires, or in ensuring that occupants at risk are able to be rescued.

In this PAS, the above have been adopted as the basis of the benchmark with which to judge an existing building's external wall construction.

However, given the variables that can apply to the ability of the fire and rescue service to respond to a fire and the difficulties of tackling a fire involving external wall construction when operating at ground level using typically available equipment, it is important that external wall assessors are circumspect in relying on fire and rescue service intervention, particularly as a compensation for other adverse risk features. Annex E contains guidance on these and other considerations that can influence effective fire and rescue service intervention.

### c) Rating the risk

As stated in item a) above, the approach of this PAS is to rate fire risk on a relative scale from "low" risk to "high" risk. The methodology is not intended to be prescriptive and other available approaches might be more definitive or quantitative.

Clause 13 contains a methodology for conducting a basic level assessment of the fire risk posed by external wall construction and cladding on existing blocks of flats. It is broad ranging and relatively simplistic in its approach, but is intended to serve the purpose of eliminating from further action, as far as possible, those buildings where it can be readily demonstrated that the risk is low or, even if not low, still tolerable.

One of the outcomes from the approach set out in this PAS can be that, either early in the investigation of the building, even before any site-based inspection has taken place, or later at the conclusion of the basic level assessment described in Clause 13, it is evident that further and more in-depth technical assessment is warranted, to reach a conclusion on whether the fire risk is tolerable.

This might occur because of:

- the complexity of the external wall construction and cladding, or the difficulty in commenting on its fire performance without specialist knowledge of the form of cladding used and its behaviour in fire, e.g. ETICS; and/or
- the presence of deficiencies in the construction of the walls, poor workmanship, deterioration in the components of the wall build-up, or other deficiencies, such as the absence of cavity barriers where expected, whether by design or error; and/or
- an outcome of the basic level of assessment such that it is not possible to conclude anything other than the risk rating is high or, at best, at the upper end of the medium scale, requiring further investigation to refine the assessment of risk.

The in-depth technical assessment required might involve fire engineering analysis as described in Clause 14. Equally, it might involve conducting fire tests as an option, in order to gain a better understanding of how the walls will perform in fire. Given that classification to BR 135 [15] is not a practical benchmark against which to judge existing buildings, and that there would not necessarily be the documentation needed to achieve BR 135 classification, it is not expected that assessments made in accordance with this PAS will routinely recommend that BS 8414 tests be conducted. Nevertheless, that option will always remain and might, in some circumstances, be the only way of resolving the risk posed by particular wall build-ups on an existing building.

The terms “high risk” and “low risk” are largely defined by the consequences that follow, i.e. whether there is a need for remedial action or not (or, in some cases, whether further investigation and in-depth analysis is needed). Further refinement of the risk rating within the risk scale (see Clause 13) is not precluded, but where additional risk outcomes are used, the parameters associated with them need to be given.

For example, very high risk could be equated to the presence of ACM cladding panels with an unmodified polyethylene core. However, it is important that all aspects of the FRAEW, including considerations relating to façade configuration and fire strategy/fire hazards, are included when using additional risk outcomes, and not simply the burning behaviour of the materials, components and systems that make up the external walls.

It is necessary to take into account all the factors that influence the likelihood of fire spread, the rate of spread, the ultimate extent of spread and their consequences. This enables the relative risk posed by external fire spread to be identified.

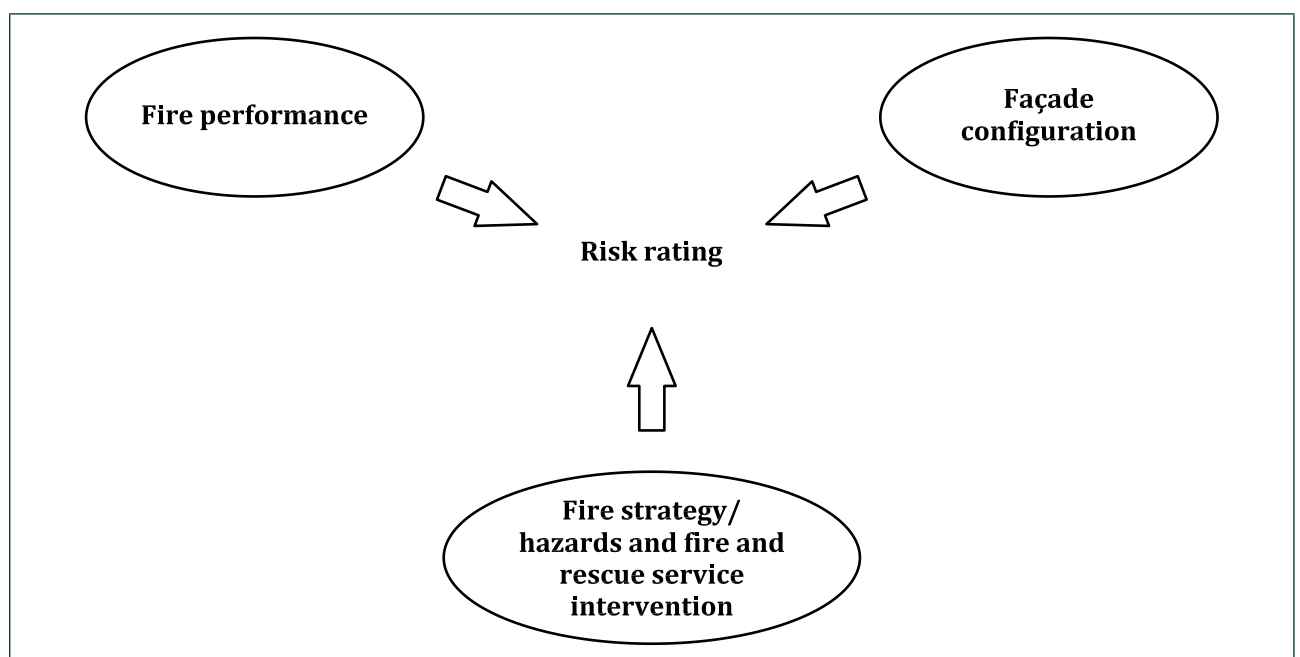
The fire risk posed by external wall construction and cladding is considered to be influenced most by factors falling under three broad headings as follows:

- fire performance;
- façade configuration; and
- fire strategy/fire hazards (including limitations of fire and rescue service intervention).

This is illustrated in Figure 1.

- 1) **Fire performance risk factors** are those influencing the likely speed and extent of fire spread by virtue of the fundamental properties, and fire behaviour, of the materials, components and systems comprising the external wall construction, how they are configured together and the quality of their installation within the wall build-ups on the building. Commentary on fire performance, including the applicable standards relating to the behaviour of construction products in fire and the relative ranking of different materials, components and systems used in external wall construction is provided in Clause 11.
- 2) **Façade configuration risk factors** are those factors influencing the likely speed and extent of fire spread by virtue of, for example:
  - the extent to which the building is covered by combustible cladding and external wall construction (e.g. partially clad or fully clad);
  - the continuity of combustible cladding sections and their orientation (e.g. horizontal or vertical);
  - the presence or otherwise of continuous cavities and how they are protected against undue fire spread via the cavity;
  - the extent of openings in the external building envelope that would allow ignition of the cladding from flaming combustion originating inside the building and entry routes back in; and

**Figure 1** – Key considerations in arriving at a risk rating for external walls



- the location of the cladding in relation to the potential for fires of external origin to ignite the cladding.

Commentary on façade configuration is provided in Clause 12.

**3) Risk factors arising from fire strategy/fire hazards (including limitations of fire and rescue intervention)** are those which influence the ability of occupants to escape once fire occurs and spreads via the external wall construction to other parts of the building. It also includes those that influence the ability of the fire and rescue service to intervene effectively. Such factors relate to elements of the fire safety design of the building, including:

- evacuation strategy, which in most blocks of flats revolves around the “stay put” principle;
- escape route design and the protection afforded to staircases and other parts of the routes used by occupants to leave the building in the event of fire;
- potential challenges for some residents to evacuate independently in the event of fire (e.g. in specialized housing);
- compartmentation, both between flats, and between flats and the common parts;
- smoke control arrangements supporting the means of escape and/or firefighting facilities;
- fire detection and fire alarm systems and arrangements for alerting residents;

**NOTE** In blocks of flats, there is usually no communal fire alarm system to trigger simultaneous evacuation; evacuation alert systems for use by the fire and rescue service are in their infancy at the time of publication of this PAS. Guidance on evacuation alert systems for use by the fire and rescue service is given in BS 8629. An evacuation alert system is not intended to be installed as a risk mitigation measure.

- fire suppression systems;
- the height of the building where it affects the time needed to escape from the building and the ability for firefighters to operate quickly and efficiently; and
- access and facilities for use by the fire and rescue service in fighting a fire.

FRAs (such as those undertaken in accordance with PAS 79-2) are expected to address day-to-day ongoing control of fire hazards in a building. Accordingly, consideration of such matters within PAS 9980 is limited. Nevertheless, the methodology described in Clause 13 includes reference to certain features of a building that can give rise to the potential for fire to ignite combustible material within the external walls. For example, if a fire were to occur on a balcony, especially one which has combustible decking, due to the use of a barbecue, such a fire could give rise to direct flame impingement on the external walls or spread to other balconies. Such hazards need to be considered, albeit the extent to which controls can be applied is outside the scope of this PAS.

This again highlights the iterative nature of the relationship between an FRAEW and the building’s FRA.

Where fire protection systems or equipment, e.g. rising mains, have been taken into account in the FRAEW, it is assumed that they are working correctly; it is further assumed the building’s FRA would have checked the records of testing and maintenance of such systems.

A table of examples of the various risk factors arising from consideration of the fire strategy/ fire hazards that can influence judgement of the fire risk posed by the external wall construction is included in Annex F. This includes those relating to fire and rescue service intervention (see also Annex E).

A simple risk rating is adopted in this PAS, in which the outcome from the assessment will be that the risk is either “low”, “medium” or “high”.

This is not to suggest that the process of determining the outcome is necessarily simple. Rather it is intended to aid decision-making by focusing on those buildings in which the risk is less clear cut and more in-depth assessment might be needed.

In simple terms, positioning the risk level on a scale of “low” to “high” risk is ultimately dependent on addressing the following questions.

- i) Is external spread likely to be within normal expectations based on the methodology in this PAS and taking into account the consequence of such fire spread?
- ii) If external spread is likely to be more rapid than normally expected, is the likely rate of spread clearly unacceptable in terms of life safety based on the methodology in this PAS, again taking into account the consequences?

Normal expectations of tolerable external fire spread, based on the methodology set out in this PAS, are that people will be able to escape or be rescued by the fire and rescue service before being harmed.

An affirmative answer to i) would support the conclusion that the fire risk posed by the external wall construction and cladding is considered sufficiently low not to warrant any action.

An affirmative answer to ii) would support the conclusion that the fire risk posed by the external wall construction and cladding is too high, with the consequence that action is necessary to address this risk. However, it does not follow that the only course of action is to remove and replace the combustible elements of the external wall construction. It might be that, to conclude this, it is necessary and indeed appropriate, first to conduct a more in-depth level of technical assessment. Equally, there might be circumstances where the alternative of commissioning a large-scale fire test in accordance with BS 8414 is the most appropriate way forward.

Some form of remediation works to the external façades might ultimately be necessary, but equally, in some circumstances, a more proportionate response might be improvements or alterations to the fire safety design and fire strategy in the building. For example, in some cases, this could be retrofitting sprinklers into the block, or, in some cases, albeit rarely, changing from a stay put strategy to an immediate, simultaneous evacuation strategy by introducing a fire detection and fire alarm system, although these approaches might have limitations (see also Annex G).

Where neither i) nor ii) can be answered in the affirmative, the risk sits somewhere in between “high” and “low” and, hence, is deemed “medium” risk. Such a “medium” risk outcome poses two further questions.

- iii) If external spread is likely to be more rapid than normally expected, is the heightened risk from external fire spread tolerable in terms of life safety, based on the methodology in this PAS, again taking into account the consequences?
- iv) Is further action needed to determine where the risk level sits?

It is anticipated that, given the limitations in the current state of knowledge and ability to predict fire behaviour, many FRAEWs will need to assume a higher risk than would otherwise be the case. In some cases, this could lead to a recommendation to tolerate, for a period of time, the assumed heightened risk from external fire spread. However, it follows that the risk needs to be kept under review, which will involve periodically revisiting the FRAEW, particularly if new information and knowledge emerge on the fire performance of materials used in the external wall construction and cladding.

The need to refine the appraisal of fire risk to give a more conclusive outcome is likely to be necessary when, for example:

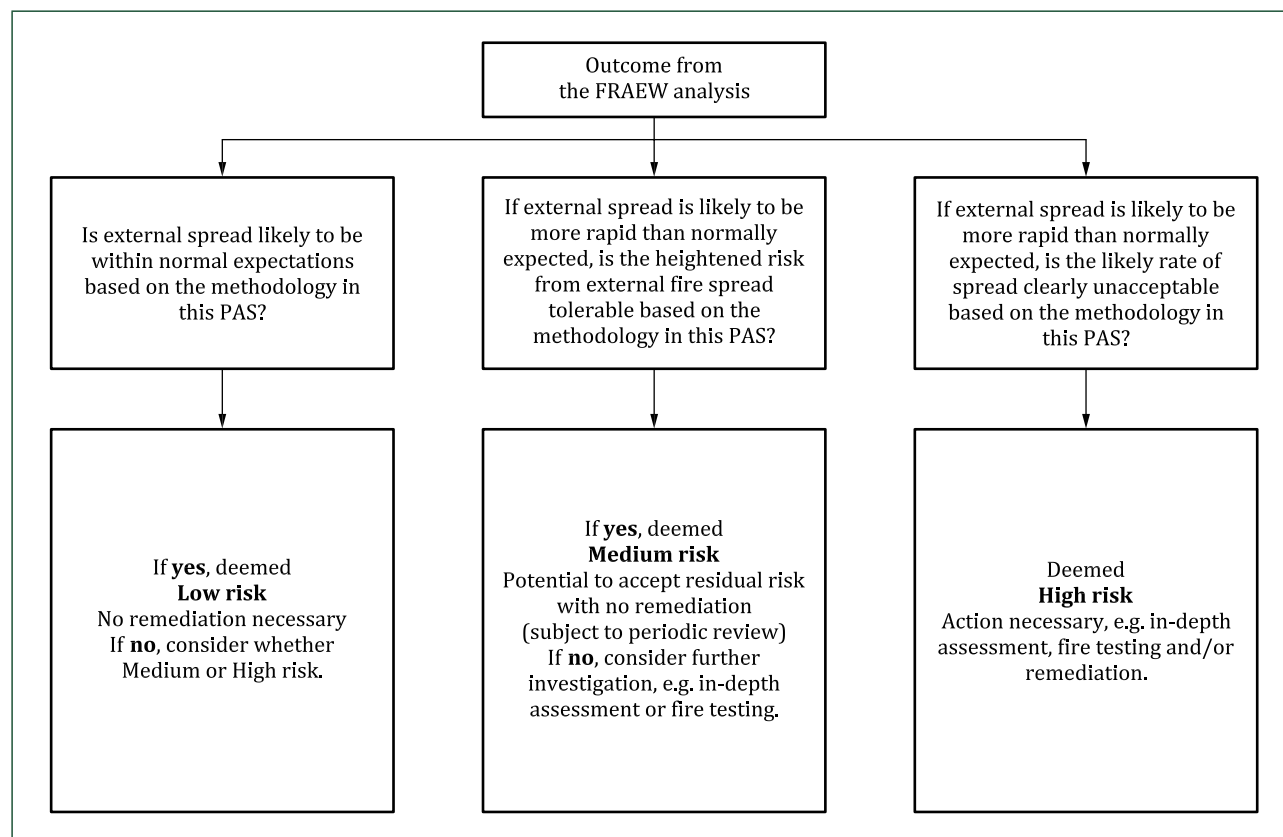
- the conclusion is highly dependent on the fact that the wall build-up is similar, but not an exact match, to one classified to BR 135 [15], based on BS 8414 test data, but meeting the pass criteria in BR 135 for this build-up is known to be particularly susceptible to changes in the parameters of the wall construction; or
- through intrusive inspection, deficiencies in the external wall construction have been found to be present on a scale that is of concern in terms of the potential influence on the outcome of the assessment.

This could warrant either conducting an in-depth level of technical assessment, for example, using fire engineering analysis (Clause 14) or, possibly, some form of ad-hoc fire testing or even, in some cases, a large-scale fire test in accordance with BS 8414.

The potential risk outcomes are summarized in Figure 2.

The fact that an external wall assessor carrying out an FRAEW using the basic level of assessment described in Clause 13 might conclude that a further in-depth technical assessment is needed does not imply failure on the part of the assessor. It is a valid conclusion and might rightly reflect acknowledgement by the assessor of the limits of their competence. That such a potential conclusion could be reached ought to be agreed with the client at the outset of the FRAEW.

**Figure 2** – Risk outcomes in relation to expectations of the rate of fire spread over the external walls



**d) Blocks of flats below 18 m**

As discussed in Clause 6, having an understanding of the requirements and standards applicable at the time of construction, and how these have changed over time, helps to build up a picture of the expectations for the performance of a building's external walls in the event of fire, and how this is influenced by the type, height and use of the building. For buildings with a top storey less than 18 m in height, traditionally, there have been no restrictions on the combustibility of the external wall construction, and only in limited circumstances any requirements relating to the reaction to fire classification of surfaces. It is inherently possible, therefore, that where elements of the external walls are combustible, external fire spread would occur at a much more rapid rate than on buildings over 18 m in height, where restrictions on the classifications of surfaces and combustibility of the walls were in place at the time of construction.

This is still the situation that applies in the case of new buildings with a top storey below 18 m in height constructed in accordance with ADB ([8], [9]), albeit that the imperative in functional Requirement B4(1) to ensure that the external walls of the building adequately resist the spread of fire over the walls is just as applicable to low-rise buildings as it is to those over 18 m in height. At the time of publication of this PAS, ADB ([8], [9]) continues to place no restrictions on combustibility, and again, only very limited controls on reaction to fire classification of surfaces of buildings less than 18 m in height.

This inherent acceptance of much more rapid fire spread over the external walls is, nevertheless, clearly predicated on the understanding that there would not be an unacceptable risk to occupants and that other aspects, such as cavity protection in the wall build-up, where applicable, and adequate access and other facilities for the fire and rescue service are present, to the extent necessary, to enable effective intervention.

*On this basis, it could be argued that an assessment of the fire risk posed by external walls of low-rise blocks of flats (buildings with a top storey below 18 m in height) ought ordinarily to place the building in the “low” risk category. However, with current knowledge of the burning behaviour of certain materials and how the configuration of these on the building can promote rapid fire spread at a rate much greater than previously anticipated for low-rise buildings, it is possible that an external wall assessor might place the risk in the “medium risk” category, albeit still considering the risk tolerable.*

*The likelihood of rapid fire spread (e.g. of the same order experienced in fires where Category 3 ACM is present or there is excessive use of timber or other combustible materials, configured in such a way as to promote unusually rapid and extensive fire spread) was not previously anticipated in the case of low-rise buildings. Accordingly, the potential for such rapid fire spread, even in the case of a low-rise building, would result in the conclusion that the risk is unacceptably high. Issues around deficiencies in the construction of the walls might also lead an external wall assessor to conclude that further and more in-depth technical assessment might be necessary to refine the risk. Concerns regarding effective intervention by the fire and rescue service might also lead to this conclusion.*

**7.1** The findings of the FRA, where available, should be taken into account in carrying out the FRAEW. Similarly, the outcome of the basic level of assessment for an FRAEW, as set out in Clause 13, should be used to inform the building’s FRA. It should be documented accordingly, such that the fire and rescue authority and other stakeholders can see evidence of suitable and sufficient consideration of the fire risk posed by the external walls.

**7.2** Where the FRAEW establishes an immediate risk to life, the external wall assessor should notify the responsible person as soon as possible, giving details of mitigating measures that might be appropriate. It is necessarily the case that, if there is an immediate risk to life, there will be significant findings in the FRAEW, and the external wall assessor should therefore recommend that a review of the building’s FRA be carried out, taking into account the FRAEW’s findings and recommendations on the necessity for, urgency of, and nature of, interim measures that are considered appropriate.

**7.3** Buildings determined to be “low” risk, following a basic level of assessment, should be eliminated from further consideration in relation to the fire risk posed by the external walls of the building.

**7.4** Where a “medium” risk outcome is established but the risk is nevertheless considered to be tolerable, the FRAEW should be kept under review at a frequency determined by the external wall assessor. While it does not follow that, in conducting a review, the FRAEW needs to be repeated, it should, at least, include reviewing any updated or new information and knowledge relating to the fire performance of materials used in the external wall construction and cladding, to determine whether it has any bearing on the outcome of the original FRAEW. The external wall assessor should recommend that the action plan within the building’s FRA identifies the need for such a review.

**7.5** Where a “medium” risk is established in which it is not possible to conclude that the risk can be tolerated, or where there is a “high” risk outcome, the external wall assessor should determine the value of conducting a more in-depth technical assessment, such as one based on fire engineering analysis, as set out in Clause 14, in order to establish a more definitive risk rating. Such an in-depth technical assessment should be recommended to the client where deemed appropriate.

**7.6** The external wall assessor should determine whether fire testing, either in conjunction with, or as an alternative to, a further in-depth technical assessment is likely to be more effective at resolving outstanding uncertainty as to the risk, and the nature and extent of measures appropriate to mitigate the risk or remediate the external walls.

**7.7** External wall assessors should make their clients aware, at the outset, that there will be circumstances, based on the outcome of the FRAEW’s basic level of assessment, in which, in order to be more definitive as to the level of risk, there is a need to extend the assessment by further investigation and in-depth technical assessment.

**7.8** Where fire testing and/or further in-depth technical assessment are considered to be appropriate, external wall assessors should have the necessary competence either to conduct such tests/assessments themselves, or to identify situations where there is a need to involve other professionals and advise the client accordingly (see Clause 8).

**7.9** Where it is concluded, following such further in-depth technical assessment or other means of further investigation, such as fire testing, that the risk is still unacceptable, the external wall assessor should make the client and the fire risk assessor fully aware of the meaning of the outcome, so that an appropriate action plan can be formulated to mitigate the risk or undertake remediation works. This action plan should take into account the need for prompt action in the cases of significant concern, which might mean introduction of interim measures such as a temporary change to a simultaneous evacuation strategy while remediation is carried out.

**7.10** In determining the level of risk, external wall assessors should understand the limitations of fire and rescue service intervention, and avoid over-reliance on such intervention to compensate for adverse features of the external wall construction in relation to its performance in fire. There should be particular cognizance of factors that might be detrimental to intervention being effective, e.g. access restrictions for firefighting vehicles.

**NOTE** *Guidance on matters that influence the effectiveness of fire and rescue service intervention is given in Annex E, and some specific risk factors to be considered are discussed in Annex B.*

## 8 Competence of external wall assessors

### COMMENTARY ON CLAUSE 8

*It is essential that persons conducting FRAEWs are competent, in order to give building owners, occupiers, enforcing authorities and other stakeholders confidence in the use of a risk-based approach and in the outcome of the assessment.*

*Professionally ethical behaviour needs to be at the forefront of implementation of this PAS. The focus of the recommendations and guidance in this PAS is life safety. However, commercial and financial concerns have a significant influence on the attitude of clients and other stakeholders to the FRAEW and to those carrying it out. Consequently, it is likely that professionals carrying out the work will occasionally come under pressure to provide an outcome that suits a client's commercial, financial or legal position. This might manifest itself as pressure to confirm that everything is compliant, usually by reference to Building Regulations [7] and the supporting guidance in ADB ([8], [9]).*

*Conversely, the building owner might have an interest in future-proofing the value of the building asset against new Building Regulations [7] and, where engaged in a claim against another party or applying for funding, a client might pressure the professional to exaggerate risks to bolster the client's position.*

*As set out in Clause 6 and in the methodology in Clause 13, this PAS sets out a risk-based approach. It does not purport to be a means of using compliance with the Building Regulations [7] as the sole basis of determining whether a building is adequately safe with respect to external fire spread.*

*External wall assessors need to avoid influence on their decision-making by such pressures and need to, essentially, regard themselves as making an expert decision based on evidence that they need to be satisfied is sufficiently reliable to support the conclusions they make.*

*As with any professional service, external wall assessors need to be mindful that the standard of behaviour which has been followed could ultimately be tested in a court of law. The user of this PAS is advised to approach FRAEWs with that in mind.*

*Since the Grenfell Tower fire, competence has been a major consideration in changes to the way buildings will be built and maintained in future. Because professionally ethical behaviour is of such importance, this PAS includes recommendations on competence. This reflects the position taken in Issue 2 of the "Setting the Bar" report [26], which makes recommendations on assurance of competence and ethical practice.<sup>6)</sup>*

*Whilst it is recognized that professional body memberships and professional qualifications do not guarantee ethical behaviour and competency, they do provide responsible persons and others with control of buildings with confidence regarding the competence of those engaged to carry out FRAEWs. This does not mean that those without such memberships and qualifications lack competence in carrying out an FRAEW; it is simply that there is no independent verification of their competence.*

*It is not uncommon for external walls to be examined by building surveyors, architects, façade engineers and others in order to establish factual information on the materials, components and systems forming the external walls and to determine the method of construction and standard of workmanship. However, an FRAEW completed in accordance with this PAS goes much further than simply establishing factual information; it requires interpretation of this information to formulate an opinion on the fire risk posed by the external walls. This requires not only an understanding of the fire behaviour and fire performance of materials, components and systems forming the external walls of blocks of flats, but also an understanding of fire hazards and the fire safety features applicable to blocks of flats, including the design principles of compartmentation, means of escape, smoke control systems, fire detection and fire alarm provisions (to the extent relevant), etc.*

*An external wall assessor, therefore, needs to possess knowledge of the fire strategy considerations and regulatory framework underpinning the fire safety design of such buildings.*

<sup>6)</sup> At the time of publication of this PAS, a suite of standards is in preparation relating to competence in the built environment. This includes PAS 8673, which deals with competence requirements for the new role of Building Safety Manager.

*This does not preclude building surveyors, architects, façade engineers and others from conducting the necessary tasks to gather factual information on what the external walls on the building comprise, whether as part of a team in conjunction with a fire engineer or fire safety professional, or separately. However, they need to be able to demonstrate the necessary competence appropriate to carrying out this task.*

*It does not follow that all fire engineers will have the necessary skills, knowledge and experience to undertake FRAEWs, even at the basic level required by the methodology in Clause 13, let alone a more in-depth technical assessment, particularly one involving fire engineering analysis as discussed in Clause 14. It is important that those commissioning FRAEWs seek evidence of competence with respect to those assessing the fire risk posed by external wall construction and cladding. In particular, clients need to establish that the external wall assessor has the necessary competence to match the level of assessment required.*

*Guidance on relevant skills, knowledge and experience for the different roles of external wall assessors, based on the National Qualifications Framework<sup>7)</sup>, is given in Annex H.*

*Clause 13 provides details of the methodology for consideration of the fire risk presented by external wall constructions; the guidance envisages that there might be a need to escalate the process from a basic level of assessment to one requiring more in-depth technical assessment. Initial inspection to identify the form of external wall construction could, to begin with, be approached as a means simply to filter out buildings of negligible risk where the amount of combustible material is inconsequential (e.g. enabling initial assessment activity to be undertaken according to this PAS by a suitable surveyor or other building professional). It would then be that person's responsibility to involve fire safety professionals (see Annex H) if it becomes apparent, from initial investigations, that the cladding is not of a form of construction that can be considered as representing a negligible risk, according to this PAS.*

*It is likely that those carrying out FRAEWs in accordance with this PAS will be required by clients to have an appropriate level of professional indemnity insurance that includes advice on external wall construction within the scope of its cover.*

*It is expected that external wall assessors will consider adopting at least an internal peer review as part of their quality assurance process for producing FRAEWs.*

**8.1** External wall assessors should determine that they have adequate and relevant competence to undertake the FRAEW, and have sufficient knowledge, skills and experience in relation to fire safety of external walls to be able to complete an assessment at the level required.

**NOTE** External wall assessors undertaking the basic assessment methodology, as described in Clause 13, are advised to consider the desirability of holding professional qualifications. Suitable professional qualifications are likely to comprise relevant membership of a professional body that:

- has a field of interest that includes the fire performance of building construction; and
- has policies and procedures that are subject to accreditation and/or audit by a certification body accredited by UKAS, the Engineering Council or equivalent; and
- has a whistleblowing policy, code of professional conduct and disciplinary procedure for its members; and
- requires a person applying for admission to full member grade to have a minimum Level 4 qualification<sup>7)</sup> in a science, engineering or construction-related subject.

**8.2** External wall assessors should be able to demonstrate evidence of competence to the client with respect to assessing the fire risk posed by external wall construction and cladding, including experience in conducting investigations into the fire safety of external wall construction and cladding.

**8.3** External wall assessors should understand how materials used in external walls behave in fire and should have a knowledge of the fire performance standards required for such materials. They should also be able to understand the fire strategy considerations for such buildings and be able to make judgements regarding fire hazards and fire safety features that will influence the outcome of an FRAEW. Companies engaged in conducting FRAEWs should employ people who possess such skills, knowledge and experience, or engage with others who do.

<sup>7)</sup> <https://www.gov.uk/what-different-qualification-levels-mean/list-of-qualification-levels>

**8.4** External wall assessors carrying out information gathering, including intrusive inspection, should, at least, possess relevant skill, knowledge and experience in surveying or façade engineering, to enable an appropriate inspection of the building to be completed. They should be competent to determine the methods of construction and to identify, in sufficient detail, those aspects of the nature of the construction that are relevant to the carrying out of an FRAEW.

**8.5** It is not suggested in this PAS that persons other than fire engineers cannot conduct FRAEWs in accordance with the basic assessment methodology set out in Clause 13; however, such persons should be competent to appraise and assess the nature of the construction of the external walls in terms of their fire performance and provide an opinion on the risk. They should have an adequate level of knowledge, including on the fire performance standards relating to behaviour in fire of external wall materials and cladding systems, and on matters relating to fire strategy and fire safety design. They should have an understanding of, and experience in, applying a risk-based approach, e.g. through knowledge of, or practice in conducting, FRAs of buildings.

**8.6** External wall assessors undertaking an in-depth technical assessment, such as one using fire engineering analysis, as described in Clause 14, should have relevant experience in fire safety and the fire performance of external wall construction and cladding at a level necessary for such analysis.

**NOTE** *External wall assessors undertaking an in-depth technical assessment, such as one using fire engineering analysis, as described in Clause 14, are advised to consider the desirability of holding professional qualifications. Relevant professional qualifications in this case are likely to include those described in the Note to 8.1, together with the person being a chartered engineer registered with the Engineering Council (such as a person achieving that registration through a suitable professional body that ensures that the person has sufficient knowledge of the principles of fire engineering).*

**8.7** External wall assessors should understand the limits of their competence and only undertake assessments at the level appropriate to their ability. They should advise clients when there is a need to involve others as a consequence of the complexity of the external wall construction, concerns regarding particular forms of construction and cladding over which they are unable to make judgements, or where in-depth technical assessment is required and this is outside their level of competence. They should make clear to clients at the outset that an outcome of an FRAEW might be a recommendation to undertake a more in-depth technical assessment of the type described in Clause 14, and whether or not they have the necessary competence to conduct such an assessment.

**8.8** External wall assessors should carry out appropriate continuing professional development in relation to the fire risk posed by external wall construction and cladding, so that they can demonstrate that they are aware of the latest research, test methods and knowledge on fire behaviour of external wall materials, components and systems and how they are configured on buildings.

## 9 Information required for completion of the FRAEW

### COMMENTARY ON CLAUSE 9

*As set out in Clause 13, in order to conduct an FRAEW, it is necessary to obtain as full a picture as possible as to the composition of the external wall construction and cladding, and how the walls have been constructed. This includes details of the materials, components and systems forming the external walls and how they have been configured on the building.*

*Once the facts regarding the construction of the walls and the materials used have been established to the extent possible, further information can be sought as to their known fire performance.*

*Part of the process of establishing the facts is to assess how closely the walls appear to meet, and conform to, the relevant building regulations, guidance and standards that were applicable at the time of construction, and those that currently apply. From this, judgement can then be made as to the significance of any departure from accepted guidelines.*

*However, it is not implied that existing buildings can be expected to meet current building regulations and supporting guidance, nor is this a sole determinant of whether an existing building is safe in terms of the fire risk posed by the external walls. Nor is it implied that a detailed gap analysis needs to be undertaken between the standards that apply now and those that applied at the time the building was constructed. Nevertheless, the extent to which a building conformed to building regulations, guidance and standards at the time of construction is important for context when considering the risk. Only with a clear understanding of what the intention was, in terms of conformity at the time, can the significance of the differences in current expectations be considered.*

*Key aspects of the information gathering needed for an FRAEW are:*

- *conducting a document study;*
- *completing on-site verification;*
- *establishing likely performance; and*
- *reviewing test data.*

*These are discussed further in Annex I.*

*External wall assessors might utilize the resources, skills, expertise and knowledge of others such as contractors, architects, surveyors and façade engineers to assist in undertaking a document study, conducting on-site verification and establishing what is known on the likely performance of materials and components that have been installed on the building, as well as the method of construction.*

*Fire safety specialists undertaking FRAEWs are likely to need such resources or additional expertise where the design of the wall construction and cladding systems is particularly complex, where the scale of the task is beyond their resources, or where the construction techniques involved are highly specialized. In such cases, the external wall assessor would be expected to take responsibility for the input of others to ensure that the tasks required to enable all necessary information needed for the FRAEW are clearly defined and delegated, and that the expectations placed on the output of others are clearly understood by them. The external wall assessor would be expected to ensure that others assisting them in this way are suitably competent (see Clause 8).*

*It is also likely that external wall assessors will be presented with reports of investigations carried out by others prior to the FRAEW being commissioned. Such investigations could be conducted by, for example, the client's own in-house professionals, or an organization commissioned by the building developer, building contractor or other interested party.*

*It is important that, when presented with such reports and information, external wall assessors consider the extent to which these can be relied upon, and what steps might be necessary to establish the veracity of the information provided and how comprehensive it is. It would not be expected that an external wall assessor would simply complete their assessment, based solely on a desktop exercise using a third party's report of this kind and without at least an element of visual inspection of the building. Indeed, it would not be expected that a report such as this on the materials and components used in the construction would identify all of the relevant risk factors to be considered in an assessment when following the methodology set out in Clause 13.*

*Similarly, while the building's FRA is, where available, clearly a relevant source of information on the fire safety design and fire strategy for the building, an external wall assessor would be expected to verify key information from this where it is critical to the FRAEW and its outcome.*

**9.1** External wall assessors should conduct a study, where possible, of all original documents relevant to the building's construction and performance in fire, and of its FRA. On-site verification should be carried out to establish the veracity of the information, the extent of which should be determined by the quality and extent of the documentation available.

**9.2** Where details on the composition of the external walls and the methods of construction used cannot be established from documentation and initial on-site verification work, the extent of site survey and inspection should be increased accordingly (see Clause 10).

**9.3** Manufacturers' technical literature and other readily available sources of fire performance test results and classifications should be scrutinized as part of establishing what is known about the fire performance of individual materials, components and cladding systems forming part of the external walls. The limits of applicability of test results and classifications should be established. Where appropriate depending upon the criticality of this information or the depth of information needed, primary evidence, including fire test laboratory reports and classification reports, should be scrutinized.

**NOTE** *It is also important to understand whether the systems and products have been installed in accordance with the manufacturer's technical literature, albeit that not all deviations from manufacturers' literature might be significant.*

**9.4** Where others, with the necessary resources or specialist knowledge, are engaged to assist an external wall assessor in gathering information, the external wall assessor should retain overall responsibility for verifying that all necessary and relevant information is produced to enable the FRAEW to be completed. When engaging others to assist in this way, the external wall assessor should verify that they are competent to undertake the tasks delegated to them and that the expectations in terms of the output of others are clearly defined.

**9.5** Where presented with reports of investigations carried out by others who have been commissioned separately to, and not as part of, the FRAEW process to provide information, external wall assessors should determine the extent to which the information can be relied upon, and what steps are necessary to establish the accuracy and completeness of the information in such reports. External wall assessors should not absolve themselves of the responsibility to verify, to the extent reasonable and necessary, the veracity of the information from others upon which they rely to complete the FRAEW.

## 10 The FRAEW site survey and inspection

### COMMENTARY ON CLAUSE 10

No matter how comprehensive the original design information for the external walls on a building might be, it can only ever show what was intended to be constructed. What has actually been built can be quite different. Product substitution is not uncommon, and sometimes there are highly significant differences in fire performance between products selected for use in the construction of the buildings and those that have actually been used.

Site survey and inspection is, therefore, a vital part of establishing factual information on the composition of the external wall construction and cladding and how the walls have been constructed.

The extent of site survey and inspection required in order to complete an FRAEW will vary. This is determined by the nature and extent of the information required, which, in turn, is dependent on the outcome of the initial information gathering stage and study of available drawings and other documents (see Clause 9). Site survey and inspection can serve different purposes, and is likely to include some, or all, of the following:

- removal of components to confirm the wall build-up and the exact materials and products used. This would aim to establish the manufacturer and details of which of its products have been used;
- sampling of materials and components for small-scale testing to determine basic fire performance parameters such as combustibility (calorific potential), or the reaction to fire classification of the product in accordance with BS EN 13501-1;
- exposure of walls at key locations to establish the presence of cavity barriers, where appropriate, the methods of construction used, the standard of workmanship, the condition of components and any evidence of deterioration of the cladding system. This would include not only the facings, insulation, etc., but also the fixings and supports; and
- verification that the construction as built matches the design information or any other documents viewed as part of the document study (see Clause 9).

Where limited site investigations show that the installation deviates from the design described in the specification and drawings, it is likely that further, more detailed, analysis of the materials and components used will be needed in order to establish their likely performance.

This might involve testing and analysis of the physical and/or chemical properties of a material or components in order to establish:

- the physical characteristics of materials that are unidentified, or unbranded, and for which there is no reliable technical information, in order to compare performance with that of materials specified but not used; and
- the performance or reaction to fire of a material or component, to enable an assessment of any risk associated with the use of the material or component, in association with other materials and components, either within a system under consideration, or for use in a proposed system.

This requires the removal of material from the building for testing and analysis by a testing establishment. Testing of this type can be time-consuming and expensive.

In many cases, it is expected that relatively limited inspection and opening up (on-site verification) will suffice to establish key factual information on the type of cladding and the method of construction. However, the findings from this limited sampling might dictate that further opening up is undertaken and the sampling increased.

The degree of sampling needed in a site survey and inspection for the purpose of establishing the fire risk posed by the external walls cannot be stipulated in this PAS. The external wall assessor needs to make a judgement as to what is appropriate, in the particular circumstances of the building under assessment. Flexibility to expand upon the sample size needs to be agreed with the client and included in the scope of the FRAEW.

The degree of sampling is likely to be influenced by a number of factors, including:

- the extent of, and quality of, documentary information on the construction of the external walls, such as specifications and drawings, from the time the building was built or overlaid;
- the size of the building;
- the number and complexity of the cladding systems present;
- accessibility to remove cladding components and/or take samples; and
- the findings from the initial site survey and inspection.

*In planning for sampling, it is expected that proposed locations for sampling and other relevant information needed by those conducting the investigation work would be recorded ahead of carrying out the investigation. This is likely to be useful when communicating with clients, residents and others as to the scope of the investigation.*

*Persons undertaking site survey and inspection work would be expected to have the necessary survey skills and knowledge of external wall construction to conduct, or direct others in, the investigations required to ensure that, when components of walls are removed and samples taken, undue damage is avoided and the appropriate repairs can be made.*

*Where external wall assessors are presented with reports of investigations carried out by others prior to the FRAEW being commissioned, these can also influence the degree to which a site survey and inspection needs to be carried out as part of the FRAEW.*

*The external wall assessor needs to make a judgement on the extent to which they will rely on the work of others. This depends upon the external wall assessor's perception of the quality of the work carried out and whether it is likely to be sufficient in terms of what it has addressed and its scope.*

*It is unlikely that an external wall assessor could rely completely on a third party's report without satisfying themselves of the veracity of the information it contains. It is expected that there will be, at least, an element of visual inspection of the building to ensure that the third party's report is comprehensive in its description and treatment of the external walls on the building. Some degree of opening up is reasonable in these circumstances. However, this would be expected to be limited in extent.*

*Further commentary on the FRAEW site survey and inspection can be found in Annex J. This relates specifically to:*

- *considerations of methods of construction and workmanship; and*
- *invasive investigation and sampling.*

**10.1** Site surveys and inspections of external walls for an FRAEW should be planned such as to minimize the need for opening up work and maximize the benefit where such work is required. Plans for opening up might need to be communicated to various parties and this should be taken into account when documenting such plans.

**NOTE** *Any opening up can result in costly repairs, or other negative consequences, hence the need to avoid undue removal of cladding and exposure of the wall construction.*

**10.2** An appropriate number of inspection locations should be established, taking into account the purpose of the opening up work and factors such as:

- a) the extent of, and quality of, documentary information on the construction of the external walls, such as specifications and drawings, from the time the building was built or overclad;
- b) the size of the building;
- c) the number and complexity of the cladding systems present; and
- d) accessibility to remove cladding components and/or take samples.

**10.3** Flexibility to expand upon the number of inspection locations should be agreed with the client and included in the scope of the FRAEW, if the findings from the initial site survey and inspection suggest this is necessary to determine factual information on the cladding system and wall build-up, or to investigate concerns relating to workmanship, deficiencies and deterioration.

**10.4** Where presented with reports of investigations carried out by others prior to the FRAEW being commissioned, external wall assessors should plan the inspection so that it can assist in establishing the veracity of the information they contain to the extent considered necessary.

**NOTE** *Wholesale repetition of opening up work conducted by others is unlikely to be necessary, but expansion on the sample size, as agreed with the client, might be appropriate if limited opening up has identified significant shortfalls in the quality and accuracy of the findings of previous investigations.*

**10.5** Persons undertaking site survey and inspection work should be competent to conduct, or direct others in, the investigations required. They should have appropriate skills, knowledge and experience, when removing components of walls and taking samples, to avoid undue damage and enable appropriate repairs to be made.

**10.6** Persons undertaking site survey and inspections should accurately record their findings in a form suitable for inclusion in an FRAEW report, including plans and photographic evidence where appropriate. The findings should be presented in such a way as to enable persons scrutinizing the report to be able to determine:

- a) the locations in which opening up took place, and from which samples of materials and components have been removed in order to identify the make and manufacturer, etc.;
- b) the identity of samples removed for testing, and locations from where they were taken;
- c) the nature and extent of deficiencies, deterioration of products and workmanship issues identified, and the locations where they were observed; and
- d) differences between what is found in reality and the building's original design.

# 11 Fire performance of different external wall materials, systems and configurations

## COMMENTARY ON CLAUSE 11

*In Clause 7, benchmark criteria are set out that are considered appropriate for use in a methodology aimed at assessing the fire risk posed by the construction and cladding of external walls on existing buildings. These are necessarily subjective, requiring professional judgement by competent persons in their application. However, the aim is to evaluate existing buildings from first principles on the basis of the particular set of facts and conditions that apply.*

*Having identified that the external walls contain combustible material, the external wall assessor needs to refine their understanding of how this material, whether in isolation or in combination, will cause the walls to perform in fire. As part of this, they need to establish the quantity of the material, its location within the wall build-up and, as far as possible, its behaviour in fire.*

*While it is not possible to quantify the performance of the particular form of external wall construction on the building being assessed, the rationale behind the methodology set out in Clause 13 is that all the available information on fire performance can be accumulated, with a view to determining what can be gleaned regarding the possible rate of fire spread and its consequences.*

*The inherent limitations of this approach, and the uncertainty that, inevitably, has to be accepted as part of it, are recognized. However, simply concluding that a material or component is combustible does not enable a measured assessment to be made of the fire risk posed by the external walls on a building, or decisions regarding what is appropriate action in response.*

*It is expected that an external wall assessor will attempt to build up as complete a picture as possible of the known fire performance indicators for the materials, components and systems forming the external walls in order to make, as far as reasonably possible, a judgement on the relative risk the walls pose in terms of external fire spread.*

*Ultimately, the aim of this is to rank the fire performance of the external walls under assessment, even if only broadly, on a relative scale that, at one end, includes the excellent level of fire performance from a double skin masonry wall (each leaf at least 75 mm), to, at the other end, the generally unacceptable level of fire performance of Category 3 ACM. This assists in providing context for considering whether the walls provide an acceptable level of fire performance.*

*The ranking of fire performance needs, to the extent possible, to take into account the outcome of small, intermediate and large-scale fire tests where these give directly relevant results.*

*Basic information on how materials burn and react when exposed to heat sources and flames needs to be taken into account, using properties such as:*

- ease of ignition;
- combustibility;
- heat released (calorific potential);
- rate of heat release;
- propensity to produce smoke; and
- propensity to produce burning droplets.

*Some of this information can be used directly in the basic assessment methodology to determine the suitability of external walls on existing blocks of flats, set out in Clause 13. Examples of factors utilizing test data and performance classifications are included in Annex K, which gives a table of positive, negative and neutral risk factors that form the basis of the assessment methodology. This includes information and classifications based on fire tests; it also includes other factors that are likely to influence fire performance (such as the method of fixing of facings) albeit many such considerations cannot be anything other than subjective in terms of their contribution in a basic assessment approach.*

*When considering the complexity of external wall construction and cladding, there are significant limitations of information and classifications based, in particular, on small-scale tests. Indeed, the necessity for, and development of, the test methods within the BS 8414 series of standards for large-scale fire tests of cladding systems came from recognition of the limitations of small-scale test data and classification, and of the need not to treat materials and components in isolation, but to determine how, in combination, they might perform.*

*Although of direct and particular relevance, even these test methods have important limitations. For example, they are not intended to be applicable to glazed systems, curtain walling or timber-framed construction, although, in principle, the methodology can be used to test some cladding systems that are outside the scope of these standards.*

*Annex A contains a description of many of the applicable fire tests and how the results are used as part of performance classification systems, including large-scale BS 8414 tests and the classification criteria in BR 135 [15].*

*Although current guidance in ADB refers only to European tests in relation to fire performance parameters, existing blocks of flats are likely to have been built either prior to the adoption of these standards, or might have relied on classifications based on national test methods. Accordingly, there is also reference to the previous national classifications in Annex A; these are relevant when considering the performance of materials and products used in external walls of existing buildings.*

*It is particularly important to understand the basis of the Class 0 classification for linings used in relation to surfaces of external walls. This has been used extensively in the past as a fire performance parameter, even though, since the publication of the 2019 edition of ADB ([8], [9]), only the European classification system is featured.*

*Annex L provides information on common components in different types of cladding systems when considering the generic fire properties of external wall materials, systems and configurations. It describes the basis of performance typically obtained from various types of products. However, while these descriptions might be reasonably relied on where no product-specific information is available, where product-specific information enables products to be identified, then their product-specific information takes precedence over the information in this annex.*

*Annex M provides further commentary relating to fire performance considerations of different external wall materials, systems and configurations.*

*The scope for a fire involving the external walls to circumvent the compartmentation in a building is an important consideration and is also discussed in Annex L and Annex N, in which situations in which this can be a factor are highlighted.*

*As stated elsewhere, large-scale testing is not a practical means to establish fire performance of external walls of existing buildings and, therefore, is not part of the methodology of basic assessments described in Clause 13. Nevertheless, there might be circumstances in which conclusions cannot be drawn, using this methodology, on the risk posed by the external walls of a building. Further investigation might be needed to resolve or refine the risk rating and, as well as in-depth technical assessment, this could involve fire testing, including large-scale BS 8414 tests. However, for avoidance of doubt, it is not expected that this would be a routine outcome from an FRAEW conducted in accordance with this PAS.*

**11.1** When an external wall assessor has identified that combustible material is present, they should then establish the significance of that material on the likely rate of fire spread, based on an understanding of the quantity of the material, its location within the wall build-up and its behaviour in fire.

**11.2** The FRAEW should establish, to the extent possible, all available indicators of the fire performance of the materials, components and systems forming the external walls of the building under assessment. Where available, information that enables the performance of external walls to be determined, by comparison to known forms of construction that are considered to give rise to either acceptable risk or unacceptable risk, should be used to place the anticipated performance of the walls in context.

## 12 Considerations for fully and partially clad buildings

### COMMENTARY ON CLAUSE 12

*In the context of a risk-based approach, as outlined in this PAS, appraisal of the fire risk posed by external wall construction and cladding is based on more than simply determining the presence of combustible material and evaluating the likely rate of fire spread.*

*While drawing comparisons to other forms of construction that are known to be acceptable or, equally, that give rise to unacceptably rapid fire spread, which is an important step in the process (as discussed in Clause 11), it is equally as important to consider the consequences of such fire spread.*

*The resultant occurrence of secondary fires, on other floor levels, as a result of such fire spread, is of particular importance. Similarly, the consequences, in terms of occupants being able to evacuate in time in the event of fire spread into other flats, or into the escape routes from the building, as well as the likelihood of effective intervention by the fire and rescue service, are important considerations.*

*The influence of risk factors relating to the building's fire safety design and evacuation strategy is set out in Clause 7. In the present clause, consideration is given to the configuration of combustible external wall construction and cladding on the façades of the building, how this might influence the scope for unduly extensive fire spread over the external walls, and the likelihood of it spreading back into the building. These considerations relate to aspects of façade configuration.*

*Particular considerations include:*

- *the position of the cladding and, especially, the height of the cladding above ground level, and its impact on the scope for ignition of the cladding by an external fire (e.g. a fire involving a parked vehicle or waste skip);*
- *the vertical extent of the cladding (and, therefore, how much of the building would be exposed to vertical fire spread upwards, which is likely to occur at a faster rate than fire spreading horizontally, to window openings or other routes for fire to spread back into the building);*
- *the potential scope for fire to spread downwards (e.g. from falling debris) by ignition of exposed combustible elements of the walls below;*
- *the horizontal extent of the cladding (although horizontal fire spread will be much slower than that in the vertical plane);*
- *the scope for fire to bypass compartment floors and walls (in particular, where cladding extends over a compartment boundary);*
- *the presence and extent of cavities (in particular, where these run continuously over a façade without, for example, being broken by a projecting floor slab, and to what extent there is protection by cavity barriers/stops to limit the scope for fire spread via such cavities);*
- *the presence of combustible infill/spandrel panels (in particular, whether these will give rise to a fire cascading vertically from one panel to another up the building, and whether they are in line with window openings or offset sufficiently to reduce the scope for fire to spread to the window);*
- *the sections of walls set back from the remainder of the walls below, as commonly found with penthouse flats or blocks of flats built on a podium (in particular, by being set back from the building's wall edge, there is limited scope for direct flame impingement on the cladding from a fire breaking out of a window on a projecting lower level);*
- *overhanging cladding, resulting from floor level changes with a larger floor plate, such that the wall of upper levels project out from those of lower levels (in particular, where the soffit of the overhang provides scope for flames from a window to spread horizontally before rising from the edge of the overhang and exacerbating vertical flame spread, especially where the construction of the soffit itself comprises combustible material);*
- *the proximity of the windows of flats to the cladding (and the extent to which this gives rise to scope for secondary fires on other levels, due to fire spreading back into the building);*
- *the proximity of windows in escape routes to the cladding (and the extent to which this gives rise to scope for fire to spread back into the building that could compromise the use of the route for escape);*
- *the proximity to AOVs and other components of smoke control systems protecting the means of escape;*
- *the presence of ventilation openings and other openings for services (and the extent to which these could provide a route for fire spread back into the building); and*

- the presence of balconies and other attachments (and whether these will interrupt and limit cavities, deflect flames away from the cladding or exacerbate flame spread due to being combustible themselves).

Consideration of all of the above can lead to a specific set of risk factors for a building that can be used in the overall assessment of the fire risk. This is set out in Clause 13.

Some of these will positively influence the outcome. This would occur where there are factors capable of, for example, minimizing the likelihood of early ignition of the cladding (e.g. because there are no windows opening onto the cladding, or it starts at a level sufficiently high enough from the ground to avoid being ignited from an external fire, such as from a vehicle parked underneath), how far fire can spread (e.g. because there are no continuous sections of cladding extending vertically to multiple levels above), and whether it can lead to fire spread back into the building (e.g. because the distance of windows from the combustible cladding is sufficient to avoid the potential for the windows to be attacked by flames).

Equally, some might negatively influence the outcome. Examples of negative risk factors include cladding that is close to the ground and, therefore, more exposed to external fires, or cladding that is widespread in coverage with no break in the extent of cavities afforded by, say, changes in the shape or form of the external walls.

How façade configuration factors can influence judgement over the fire risk posed by the external wall construction is discussed in Clause 13, with examples of various such factors included in Annex N. Attaching weight to these factors, whether they are positive or negative in regard to the fire risk, and how significant each one is, is a matter of judgement on the part of the external wall assessor and, often, it is not possible to utilize any quantifiable measure. Nor, indeed, is this PAS able to set quantitative limits for most of these factors. It follows that, inherently, this will lead to subjectivity. Suitable competence to make such judgements is, therefore, paramount (see Clause 8).

The height of the building is also included as a risk factor. The extent to which a building's external walls pose a risk is inherently limited if the number of storeys is limited.

As discussed in Clause 7, for buildings less than 18 m in height, traditionally, there have been no restrictions on the combustibility of the external wall construction and, only in limited circumstances, any requirements relating to the reaction to fire classification of surfaces. It is inherently possible, therefore, that external fire spread would occur in such buildings at a rate that is more rapid, and with more secondary fires, than on buildings over 18 m in height, to which restrictions

on the classifications of surfaces and combustibility of the walls have applied. However, cavity barrier provision has been, and still is, an important measure in restricting the speed and extent of fire spread in these circumstances.

Buildings below 18 m in height typically comprise a ground floor plus up to five upper floors. In the case of a high-rise building with only partial cladding, if only the first six floors of the building were clad with combustible cladding, this is not materially different, in terms of external fire spread, from the same cladding on a low-rise building. On the other hand, if only the top six storeys of a high-rise building were clad with the same cladding, the situation would be different because of the difficulty of fighting a fire involving the cladding at that height. This exemplifies the need for consideration of the potential for firefighting by the fire and rescue service; even in low rise buildings the difficulties of tackling a fire involving external wall construction when operating at ground level using typically available equipment need to be recognized (see Annex E).

It is recognized that the trigger height of 18 m can be considered, to a degree, arbitrary and, to some, is viewed as inappropriate as a determinative factor as to whether buildings with external walls with combustible cladding are adequately safe. Indeed, with changes to ADB ([8], [9]) since the Grenfell Tower fire, such trigger heights have been revisited and different heights applied to various fire safety requirements for new buildings. Nevertheless, 18 m would have been used as the base line for the requirements and standards applied to the construction of many existing blocks of flats. It is unreasonable, in the context of the risk-based approach in this PAS, to disregard the importance this has had in terms of the extent to which external wall construction and cladding are combustible on such buildings, and the underlying acceptance that such requirements and standards were sufficient, and indeed might still be sufficient, to ensure the safety of those occupying such buildings.

**12.1** Risk factors relating to the configuration of façades should be determined, in order to establish the context in which combustible external wall construction and cladding can give rise, not only to an undue rate of fire spread, but also to consequences in terms of the likelihood of secondary fires elsewhere in the building.

**12.2** The influence of these risk factors should be taken into account as part of the structured approach to establishing a relative risk rating for the building, as set out in Clause 13. Appropriate weight should be attached to each one, by virtue of whether it has scope to influence the outcome positively or negatively.

# 13 Methodology for basic assessment of the suitability of existing external wall construction

## COMMENTARY ON CLAUSE 13

### a) Methodology

*The FRAEW needs to follow a structured approach to determine an outcome with respect to the fire risk posed by the external wall construction.*

*This approach needs to seek to demonstrate to those commissioning the FRAEW and those, such as enforcing authorities, also relying upon its findings, that all reasonably practicable efforts have been made to determine and take fully into account:*

- *the likely performance of the external walls in a fire and how rapidly fire might spread, given the state of knowledge of, and ability to predict the fire behaviour of, the materials, components and systems used and how they are configured to form the cladding and external wall build-ups on the building;*
- *how the fire would develop and spread, when considering the actual configuration of the cladding, etc., on the façades of the particular building, taking all factors relevant to this into account, such as the extent of the cladding and its location on the building; and*
- *how such a fire could directly, or indirectly, cause harm to the occupants and impact on their ability to escape in time, given all of the features of the fire safety design of the building, the fire hazards relating to ignition of the cladding and the likely effectiveness of intervention by the fire and rescue service (see Annex E).*

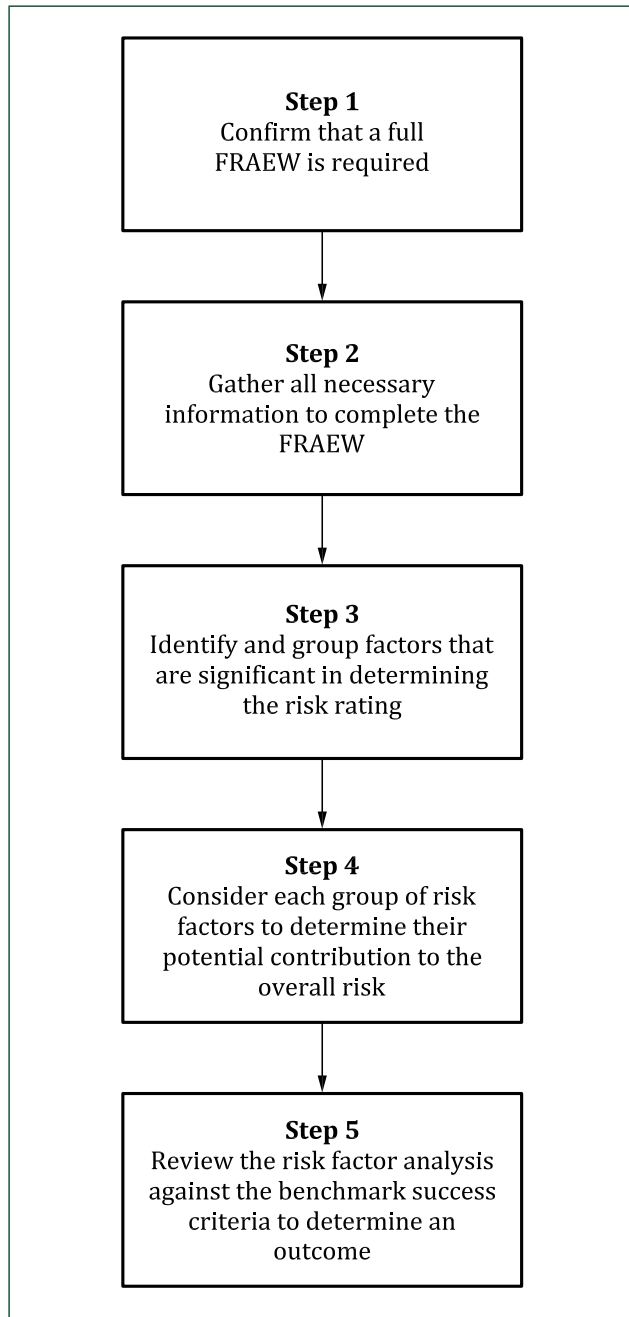
*The principles behind the approach described above, and upon which the methodology set out below is based, are given in Clause 7.*

*The methodology set out below is intended as a basic level of assessment. It is expected that such an assessment would be feasible for a large proportion of existing blocks of flats. However, it is recognized that there will be circumstances in which further investigation, and more in-depth technical assessment, is warranted, in order to reach a conclusion on whether the fire risk posed by the external wall construction on a particular building is tolerable (see Clause 7).*

*The approach to a basic level of assessment, as set out below, comprises five steps, as illustrated in Figure 3. While these are described as discrete stages, this is only to illustrate the principle, and it is recognized that, in reality, one step might not follow the other in sequence. For example, it might not be possible to confirm that the walls require a full FRAEW until Step 2 is conducted, as the information upon which to assess whether, for example, the quantity of combustible material is inconsequential, might not be available until intrusive inspection is carried out. Equally, there might be sufficient information on what the cladding system comprises at the start of the assessment that it is possible to conclude, without formally going through the other steps, that in-depth technical assessment is necessary and that continuing with this basic level of assessment would not be conclusive.*

*The content of each of these steps is described below.*

**Figure 3 – Five step approach to the basic level of assessment**



**b) Step 1**

*FRAEWs are likely to be commissioned at different stages in the overall process by which the fire risk posed by external wall construction on an existing building is evaluated.*

*For example, it might be that the FRAEW is required because investigations, commissioned by a building owner in response to the Government advice, either from documentary evidence or from intrusive inspection or both, have identified that there is combustible material present, but the person carrying out the investigation is not competent to advise on the implications for the safety of occupants.*

*Equally, it might be commissioned due to a concern raised by a fire risk assessor when carrying out the building's FRA or because the assessor made a generic recommendation in the absence of any definitive knowledge of the external wall construction.*

*However, knowledge of the materials, systems and configuration of cladding and external wall construction is likely to vary at this stage. In some cases, combustible material will be known to be present, but, in others, it might only be suspected, and, even where present, it might be so small in quantity for it to be inconsequential. It therefore follows that, where possible, and to avoid unnecessary effort and cost in proceeding further with the FRAEW, a first step is to confirm that an FRAEW conducted in accordance with this PAS is required.*

*In the unlikely scenario that, at this late stage, evidence comes to light that the external walls have been classified to BR 135 [15], this would mean that an FRAEW would not be necessary, unless again there are any other factors that might have a negative bearing on the risk, e.g. where excessive use of timber in balcony construction could lead to significant fire spread or there is concern regarding the adequacy of cavity barrier provision or quality of workmanship (see below).*

*It is inevitable that some combustible components are present in the build-up of any external wall. Typically, these include components such as:*

- seals and gaskets;
- sealants;
- fixings;
- breather membranes;
- vapour control layers, including membranes around windows; and
- backer rods.

These can include intumescent materials and plastic wrapped cavity barriers. They can also include window frames and certain types of glass (e.g. laminated glass, which is not completely non-combustible). In the case of double skin, masonry or concrete cavity walls (at least 75 mm thick), combustible materials can even include polymeric or other insulation.

Traditionally, such combustible components have been seen as inconsequential in terms of their contribution to the heat released and/or the potential for fire development and spread. This is still the case for external walls on new buildings.

It is also inevitable, when considering existing buildings, that other components might also be found to be combustible. The following are relevant examples of common practice in building construction that give rise to this:

- use of timber battens to support facings such as zinc, copper and HPL; and
- use of plywood to provide support to, and a rigid backing for, facings, including aluminium.

Judgement is required as to whether the use of such components results in quantities of combustible material that are significant in terms of the contribution to the heat released and the potential for fire development and spread.

Use of a synthetic rubber membrane around a window is very different to the use of the similar material as a vapour control layer over the entire façade. Plywood backing to a metal facing, when used for infill panels fixed to batons on a concrete substrate, is very different to plywood facing onto a continuous cavity extending over the full height of the façade. Similarly, even use of an ACM or an HPL as a facing for a portico, as part of a window reveal or as a feature band on the building, can often be of such limited extent as to preclude consideration if no other combustible material is present on the façades.

In practice, there are likely to be cases where the quantity of combustible material within the external wall construction, or on the façades, is so small that it can be discounted. In these cases, it is not necessary to conduct an FRAEW.

However, a case might need to be made to justify this conclusion, to satisfy enforcing authorities and others relying upon the outcome of the FRAEW when making decisions as to what, if any, action is needed to mitigate a perceived, or suspected, potential risk to occupants. This is not expected to require a detailed report, but simply an appropriate statement as to why the quantity of combustible material is inconsequential.

Small quantities of combustible material are unlikely to need further consideration if:

- they are not used in conjunction with a polymeric insulation, either as a backing to, or in combination with, the combustible component, or separately as insulation within a cavity; and
- they are only present where other main components, such as the cladding or insulation, are essentially non-combustible; and
- they do not form a complete framing and support system, e.g. timber battens when used in isolation, rather than an extensive support system; and
- they are not present in conjunction with combustible sheathing [other than, for example, Class B cement particle (CP) boards], within the wall build-up.

Even in the case of a building in which the external walls are inherently low risk by virtue of the above, concern that the quality of construction might be poor or that there are insufficient cavity barriers, or that they are missing, might suggest an FRAEW is still warranted or, if not an FRAEW in its entirety, a form of risk-based appraisal following the principles set out in this PAS. However, the extent to which this is investigated in an effort to determine whether such concern is valid would itself be expected to be risk-based, to avoid taking an overly conservative approach, especially in low-rise buildings.

Similarly, there could be features of the building which give rise to the potential for fire spread over the external walls even in the circumstances described above, such as the presence of, and configuration of, significant quantities of combustible material associated with balconies and other attachments. Where there is sufficient concern as to the adverse impact this could have, an FRAEW might still be an appropriate means of addressing the risk this creates.

Step 1 is illustrated in Figure 4.