



33 - 41 Cheetham Hill Road Fire Strategy Report

RIBA Stage 2

Issuing consultant: **Dr Mark Jones** Issue: **04** Date: **01/12/23**
Project No: **230373** Document No: **MZ-230373-002-FSS-01-ISS04**

Executive Summary

No.	Fire Safety Measure	Performance Standard
1	Evacuation Philosophy	As the building in question is a residential apartment building, a 'stay put' evacuation protocol will be operated. For ancillary areas such as plant rooms, cycle store, residential amenity rooms / roof terrace and waste rooms the protocol will be 'simultaneous' evacuation in response to a fire in those areas.
2	Fire Detection system	Typically, a category LD2 system is the minimum requirement for a building with a risk profile Cii1. However, this has been raised to a category LD1 and shall be provided throughout the flats in this building in accordance with the guidance in BS 5839-6 to provide early notification of a fire to occupants. The category LD1 also addresses the open-plan flat design risk. The non-residential aspects of the development will be provided with a Category L2 fire detection and alarm system designed and installed in accordance with BS 5839-1. Residential common corridors will require only an L5 system which will not include manual call points or sounders (for this aspect of the system).
3	Audible Alarm system	Audible warning will be provided to the development using sounders in accordance with BS 5839-6 for the residential areas and BS 5839-1 for non-residential areas. In blocks of flats with a top storey over 18m above ground level an evacuation alert system should be provided in accordance with BS 8629.
4	Back-up Power Supply	Where such systems are required, power and control cables should be installed in accordance with BS 8519:2020.
5	Internal Fire Spread (Linings)	All internal linings shall limit the surface spread of flame when tested under the European classifications in accordance with BS EN 13501: Part 1.
6	Sprinkler System	Sprinkler protection will be provided in accordance with BS 9251 and will be designed to meet the sprinkler hazard classification requirements of a Category 4 system. In addition, ancillary accommodation will also be provided with sprinklers to the required standard (which is to be BS 9251 provided that the rooms are in scope of this document as described in this strategy).
7	Loadbearing Elements of Structure	In accordance with Table 4 of BS 9991 it will require 120 minutes fire resistance applied to the structure.
8	External Fire Spread	The external walls of the building will meet the requirements of Regulation 7. Unprotected areas on each façade shall not exceed the maximum calculated area permissible.
9	Fire Service Access	Fire mains are required to be included as part of the works (wet rising fire main) which means fire access should be provided to within sight of the wet riser inlet to replenish the suction tank for the fire main in an emergency.
10	Fire-fighting Shaft	A fire-fighting shafts is to be provided and located so that every part of every storey is no more than 60m from the fire main. Where the internal layout is unknow the distance should be measured at two-thirds of the direct distance (40m).
11	Fire Mains	The wet riser outlets should be placed within the stair core, accessible at each floor. Further guidance on the design and construction of fire mains is given in BS 9990. The maximum hose laying length from the fire main outlet to the furthest point inside must be less than 60m. However, where the internal layout of the building is unknown, the distance should be measured at two-thirds of the direct distance (40m).

No.	Fire Safety Measure	Performance Standard
12	Private Fire Hydrants	A building requires additional fire hydrants if both of the following apply: It has a compartment with an area more than 280m², and it is being erected more than 100m from an existing fire hydrant. The existing hydrant provision looks to be suitable.
13	Emergency Lighting and Exit Signage	Emergency lighting should be in accordance with BS 5266-1. Emergency lighting must be automatic and provide a minimum of 3-hour illumination. Exit signage should be located and operated in accordance with BS 5499-4. The signs designated as E001 and E002 in BS EN ISO 7010:2012+A5 should be used with the appropriate directional arrow in accordance with BS 5499-4.
14	Emergency Control Room	Due to the size of the building, it is recommended to provide a space within the Concierge areas (Concierge Back-of-House) which can function as an Emergency Command Centre in the event of a fire.
15	Portable Fire Extinguishers	Portable fire extinguishers should be provided as per the recommendations of BS 5306-8 and may be dependent upon a fire risk assessment of the building.
16	Smoke Management Systems	Various smoke management/control systems are required as follows: - Design requirements for protected stairways to prevent spread of smoke and fire to protected stairway - Smoke and heat ventilation from Fire-fighting shafts - Protection of evacuation lift lobby and fire-fighting lift lobby - Division of corridors - Lobby ventilation where stair serves a place of special fire hazard - Lobby ventilation where stair serves a refuse area - Ventilation of protected shafts conveying gas (if to be present in the design)



The development is considered to comply with the Codes and Standards as listed within this document, provided that the recommendations within this report are adopted and the additional noted items as listed below are accepted by the Authority having Jurisdiction (AHJ) and/or further developed as the design progresses.

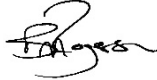
Note: Several of the additional noted items have been discussed with Building Control as part of the initial QDR design process (see Section 1.10 for further detail). These are pending formal review and acceptance in principle as part of that process.

Risk No.	Project Component	Description	Proposed Solution	Design	Status	Comments inc if AHJ have approved
1	Ground floor ancillary areas over 100m ² in area	(see Section 3.15) Certain ground floor ancillary areas if taken together (e.g. Concierge facilities) would be in total over 100m ² in area. This would put them outside the scope of BS 9251 which is the intended sprinkler system standard to apply to the building as a whole. If retained as >100m ² and not fire-compartmented from one another these areas (and potentially the whole building) would require sprinkler system designed to BS EN 12845	Separate these areas from one another with fire-resisting construction) such that no non-residential area is >100m ² in area		Open	Principle of BS 9251 application discussed as part of initial design QDR process (see Section 1.10). Pending formal review and closure.
2	Non-enclosed kitchens in open-plan apartments	(see Section 3.7.2) Current BS 9991 recommends kitchens be enclosed; this requirement is anticipated to be removed from the updated BS 9991 but with more specific guidance on escape past cooker hob positions	Design to spatial limits set out in Section 3.7.2 ensuring sufficient escape path past cooker hobs together with other measures (sprinkler and alarm requirements)		Open	Discussed with Building Control as part of initial design QDR process (see Section 1.10). Pending formal review and closure.
3	Provision of evacuation lifts	(see Section 3.14.1) Evacuation lifts are proposed (including use of the fire-fighting lift)	Use of lifts for evacuation in accordance with anticipated updates to BS 9991		Open	Discussed with Building Control as part of initial design QDR process (see Section 1.10). Pending formal review and closure.
4	Ventilation of protected lobbies	(see Section 3.7.1) Per the provision of fire-fighting shaft and evacuation lift lobbies the lobbies will require smoke control. The adjacent corridors are proposed not to have smoke ventilation.	Provide mechanical smoke ventilation to protected evacuation lift lobbies, adjacent to non-ventilated common corridors.		Open	Discussed with Building Control as part of initial design QDR process (see Section 1.10). Pending formal review and closure. See also Item 8 below.

Risk No.	Project Component	Description	Proposed Solution	Design	Status	Comments inc if AHJ have approved
5	Occupancy levels of Level 17 amenity areas	(see Section 3.7.4, notes to Table 7) Use of amenity spaces not yet determined (anticipated to be homeworking/communal lounge type use) however there is more than sufficient storey and stair exit capacity to cover the anticipated whole building residential occupancy	Confirm as design progresses that potential intended occupancy of space is suitable.		Open	Open subject to final check as design progresses
6	Single direction near façade, Level 17 Terrace	A single direction portion of travel is within 18m of the façade. The continued single direction escape route must then pass within 1.8m of the façade at the point the terrace access door is reached	(see Section 3.11) The initial single direction of travel is considered acceptable in view of the evacuation strategy at this level. At the access/escape door from the terrace the façade either side of the door should be rated to REI 30 mins from inside only for a distance of 1.8m		Open	Open pending Building Control review and comment
7	Fire suppression to substation and switch room	(see Section 3.15) Water suppression would not be suitable for these small areas at ground floor given the room content.	Consultation with Building Control and MEP team concerning whether suppression is required or whether the risk can be mitigated by robust fire separation and protection of structural elements.		Open	Open pending Building Control and Design Team review and comment
8	Smoke control to protected evacuation lift lobby and fire-fighting shaft	(see Section 7.6) Mechanical shaft smoke control is proposed for these areas.	The ventilation proposal will require justification via engineering analysis at subsequent stages of design (outside scope of present RIBA 2 fire strategy)		Open	As noted in Items 3 and 4 above, this has been discussed with Building Control as part of initial design QDR process (see Section 1.10). Pending formal review of acceptance in principle. Item would remain open until such time that appropriate engineering validation has been carried out.
9	'Storage Space' introduced off residential corridor at upper levels	(see Section 7.6.4) Content and access control of this space will require review at RIBA Stage 3. It may be necessary to include vented lobby to this space.	For review at RIBA Stage 3 (as it is a late addition to RIBA Stage 2). Pending review may require to be removed or provided with ventilated lobby.		Open	Open – requires review



Quality Management

Issue No.	Date		
01	19/06/2023	Reason for issue:	1 st Issue at RIBA Stage 2 for Design Team Appraisal
		Prepared by:	Dr Mark Jones Associate
		Reviewed by	Ben Rogerson Associate
02	06/07/2023	Reason for issue:	2 nd Issue at RIBA Stage 2 to reflect design changes and project site address updated
		Prepared by:	Dr Mark Jones Associate
		Reviewed by	Ben Rogerson Associate
03	24/11/2023	Reason for issue:	3 rd Issue at RIBA Stage 2 to reflect minor design updates prior to planning submission
		Prepared by:	Dr Mark Jones Associate
		Reviewed by	Ben Rogerson Associate
04	01/02/2023	Reason for issue:	Minor edit to reflect external wall description advised by architect
		Prepared by:	Dr Mark Jones Associate 
		Reviewed by	Ben Rogerson Associate 

Validity

This report is formulated on the basis of the information and experience available at the time of preparation. It is applicable to the above-mentioned project only in accordance with the client’s instructions. It is only valid provided no other modifications are made other than those for which a formal opinion has been sought and given by Maze Fire Consulting Limited.

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1. Introduction

1.1 Client and Project

Maze Fire Consulting Limited (referenced throughout This Report as 'Maze Fire') has been originally appointed by Urban Village Group (now ZX Cheetham Hill Developments Limited) as a specialist fire and life safety consultant for the design of the 33 - 41 Cheetham Hill Road in Manchester, UK (note: address in previous issue of fire strategy was 31-44 Cheetham Hill Road, now clarified and updated in the present report).

The ultimate client is now ZX Cheetham Hill Developments Limited (previously) Urban Village Group.

1.2 Project Address

33 - 41 Cheetham Hill Road, Manchester, UK.

1.3 Project Description

The project is understood to entail building work constituting a 'new build' development.

The 33 - 41 Cheetham Hill Road project comprises a 23 storey (including Ground) Residential (dwellings) building with no basement.

An indicative site layout of the scheme is shown in Figure 1 below.

The Ground to 1st floor height is proposed at 5m, with typical floors thereafter at 3m heights. Thus, the total height (to roof) of the building will be ~74m, with a height of ~69m from Ground to uppermost occupied floor level.

At Ground level additional uses are proposed, to include two Commercial units, Concierge office and facilities, cycle storage, sprinkler, and wet riser plant rooms, refuse room and other plant (substation and switchroom).

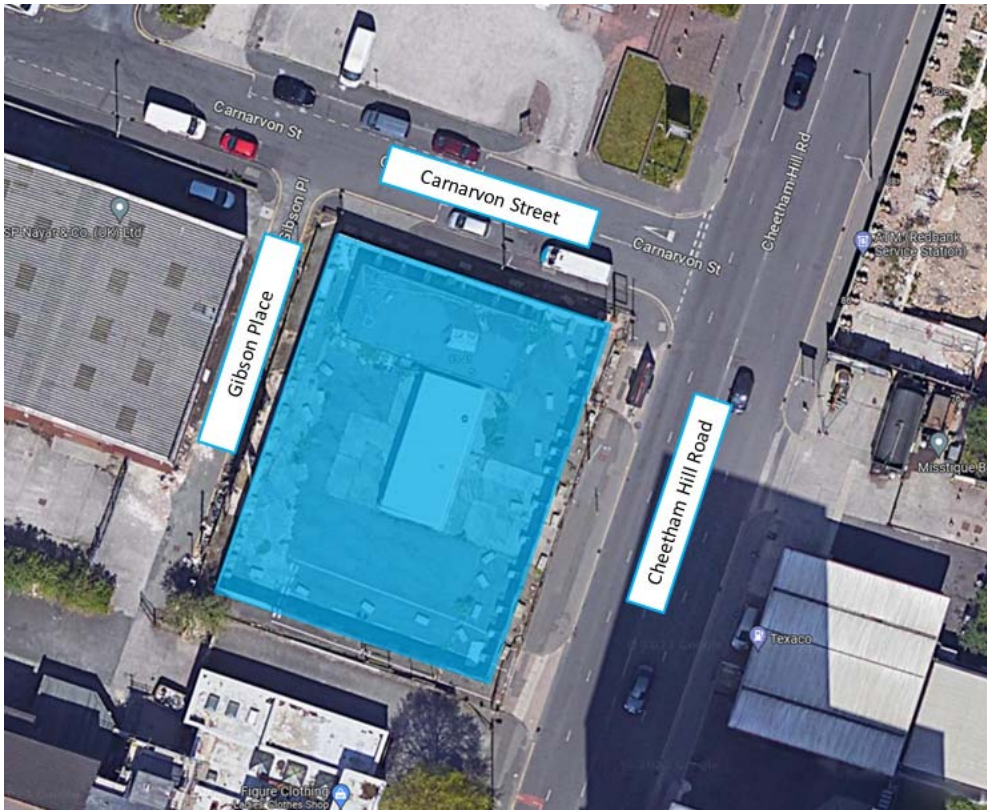


Figure 1: Site location

1.4 Description of Work

This fire safety strategy (hereby referenced as 'This Report') covers the fire safety design of the entirety of the scheme described herein.

Services during RIBA Stage 2 will focus on identifying and addressing the fire safety measures relating to means of warning and escape, external fire spread in relation to boundary conditions, access, and facilities for the fire service with the key fire safety design decisions being recorded in the Stage 2 report. The Services at this stage would focus on key issues relevant to fire safety pertinent to the concept design but would not address detailed design issues.

This Report presents a performance specification of the fire safety measures provided in the design in order to satisfy the fire regulations. For the purposes of This Report, the fire safety objectives are for the design to meet the regulatory requirements described in Section 1.8.

1.5 Authority Having Jurisdiction

The authority having jurisdiction for the project will be C3 Design.

In addition, it is expected that the Health and Safety Executive (HSE) must be consulted as part of the process of completing the associated Panning Gateway 1 fire statement (which will be a separate document to this fire strategy).

1.6 Stage of Project

The project follows the RIBA Plan of Work to coordinate the overall brief, design, construction, and operation of the building.

This Report has been based on the design information provided by others, as described in Section 1.9. The project is currently at RIBA Stage 2 and This Report represents a fire safety strategy to a 'Concept Design' stage of works.

1.7 Limits of Report

It is important to note that This Report does not represent a detailed design or specification of all aspects of a building; it is a series of recommendations that others may consider and relate to the design of the scheme. The information contained herein constitutes a performance specification and therefore does not address detailed aspects of design, such as system design (active or passive) nor construction details.

This Report has been developed with reference to statutory guidance documents and their impact on the strategic aims of the Fire Strategy. This Report will reference relevant design standards however it is not practical to reproduce all details contained within those documents.

Where a detailed design has to be developed by others, on the basis of this performance specification, it would be appropriate for the reader to refer to, and read in conjunction with, those documents referenced in This Report.

Any diagrams incorporated into This Report are illustrative and intended to further convey specific aspects of the fire safety strategy only. Diagrams are not a substitute for the architectural general arrangement, fire strategy drawings or the detailed systems drawings and specifications, which should be referred to in conjunction with This Report.

This Report is primarily concerned with life safety. Property protection is not specifically considered although the fire safety provisions described herein will offer some inherent degree of property protection by nature. Unless otherwise specified, the information herein does not specifically address:

- Insurance requirements
- Property protection or loss of operation
- Fire safety during construction
- Detailed management procedures or duties under the Regulatory Reform (Fire Safety) Order (RRO).

It is noted that This Report addresses so far as necessary, the evacuation of persons with restricted mobility. This Report however does not address the requirements of any specific accessibility issues (outside of those directly related to means of escape) and separate advice should be sought from others on this topic accordingly.

While arson as a single point of ignition will be incorporated in the analysis, simultaneously multiple ignition sources, use of accelerants, sabotage of fire protection systems or terrorism are not included as part of This Report scope.

It should however be noted, as is advised, that when requested to develop alternative fire safety design solutions for the project, fire and smoke damage may vary when compared to a building design that wholly complies with the prescriptive guidance.

It is recommended that the building owners or occupiers liaise with their relevant insurers as to the fire safety design contained herein.

This Report has been developed for RIBA Stage 2 and represents a fire safety strategy to a 'Concept Design' stage of works. It is limited to the scope of works as defined for RIBA Stage 2 in our fee proposal dated 17 March 2023.

1.8 Regulatory Framework

1.8.1 General

The following legislation has been considered in the preparation of this fire safety strategy.

1. The Building Regulations 2010
2. The Building (Amendment) Regulations 2018
3. The Regulatory Reform (Fire Safety Order) 2005
4. The Construction (Design and Management) Regulations 2015

1.8.2 The Building Regulations

The building will be subject to the operation of the Building Regulations 2010 (as amended) and will therefore need to comply with the requirements of Schedule 1 Part B of The Regulations relating to, the following areas.

- B1 – Means of Warning and Escape
- B2 – Internal Fire Spread (Linings)
- B3 – Internal Fire Spread (Structure)
- B4 – External Fire Spread
- B5 – Access and Facilities for the Fire Service.

The Ministry of Housing, Communities and Local Government (MHCLG) has produced a number of guidance documents to assist designers in meeting the relevant requirements of the Building Regulations; these 'Approved Documents' provide guidance on different aspects of the Regulations.

Approved Document B – Volumes 1 and 2 (ADB) provide design guidance on ways in which the functional fire safety requirements can be satisfied. However, the document is intended to provide guidance on the more common building situations and there is no obligation to adopt any particular solution contained in an Approved Document if the relevant requirement can be met in some other way for example by using the following, as applicable:

- the guidance contained within British Standard 9999 Fire Safety in the design management and use of buildings – Code of practice (BS 9999) and / or
- British Standard 9991 Fire safety in the design, management, and use of residential buildings. Code of practice (BS 9991).

External Wall Construction - Regulation 7

Changes to Regulation 7 were introduced by the Building (Amendment) Regulations 2018 and make prescriptive requirements for the external wall materials such that where relevant buildings are greater than 18m these materials shall be of European Classification A2-s1, d0 or A1, classified in accordance with BS EN 13501-1:2007+A1:2009. The regulations also note specific material exceptions. Where relevant, the requirement of Regulation 7 is detailed further in the External Fire Spread section of This Report.

Regulation 38

Regulation 38 of the Building Regulations states that, where building work involves the erection or extension of a relevant building or relevant change of use of a building which affects fire safety, it is necessary that the fire safety information for the building shall be given to the Responsible Person at the completion of the project or when the building or extension is first occupied. This is to be provided to the Responsible Person by the person carrying out the work.

This information will facilitate the production of the fire risk assessment which is a requirement of the Regulatory Reform (Fire Safety) Order, outlined below. The list of information considered in the preparation of This Report should be provided with This Report as detailed in Section 1.9.

The fire safety information in this fire safety strategy may be used to supplement the information required to be given to the responsible person. As a minimum it will be necessary for the occupier of the building to be given this fire safety strategy and all 'as built' fire strategy plans.

1.8.3 Applied Guidance to the Building Regulations

This fire safety strategy adopts the following guidance as the basis of design for the project, noting the scope and limits of This Report outlined in this chapter.

Approved Document B

ADB Volume 1 gives guidance on each of the technical parts of the regulations and on Regulation 7 with respect to dwellings including blocks of flats.

ADB Volume 2 similarly gives guidance on each of the technical parts of the regulations and on Regulation 7 with respect to buildings other than dwellings.

The Approved Documents provide guidance for common building situations. In addition to guidance, some approved documents include or refer to provisions that must be followed exactly, as required by regulations or where methods of test or calculation have been prescribed by the Secretary of State. See notes on Regulation 7 and 38 above as examples. Each approved document relates only to the particular requirements of the Building Regulations 2010 (as amended) that the document addresses. However, building work must also comply with all other applicable requirements of the Building Regulations 2010 and all other applicable legislation.

BS 9991: 2015

BS 9991:2015 Fire safety in the design, management and use of residential buildings' provides recommendations and guidance for:

- Dwellings (single-family dwelling houses, self-contained flats, or maisonettes).
- Residential accommodation blocks (e.g. for students or hospital staff), with individual bedrooms and the provision of kitchen/sanitary facilities constructed within a fire compartment, accommodating not more than six persons.
- Sheltered housing and extra care housing.

BS 9991 is not applicable to hotels, caravans/mobile homes, hospitals, residential care/nursing homes, places of lawful detention, hostels, or houses of multiple occupancies.

This fire safety strategy has adopted the guidance of BS 9991 as the basis of the residential design but with due reference to current Building Regulation requirements where these have been updated since the most recent issue of BS 9991.

BS 9991 Draft Amendments (2021)

It is acknowledged at the time of this report issue that BS 9991 is expected to be updated and reissued in October 2023. Based on the hitherto issued draft 2021 consultation version of the standard, it is expected that several key amendments to the document will be made which will be relevant to features of this building as follows:

- Requirements for evacuation lifts, number of stairs, smoke ventilation to protect evacuation lift lobbies and stairs.
- Updates to guidance in relation to open-plan flats and escape past cooker hobs.

It is acknowledged that the guidance points set out in this strategy, as initially summarised in the Fire Engineering Brief (FEB) (from the current draft BS 9991) may be subject to further modification in the final published version. Notwithstanding this, it is our considered opinion that where referenced in this strategy, the anticipated draft guidance represents a more definitive, robust and coherent set of design criteria than is present in the current iteration of BS 9991 and therefore in those referenced areas it is proposed to follow this guidance in the proposed design.

Furthermore, various standards have been updated since the most recent BS 9991, notably BS 9251 (2021) which includes recommendations for category of sprinkler system based on building use and height which exceed (and therefore are taken to supersede) statements in BS 9991 relating to category of system. Where such standards are identified as relevant to features of this building, they are referenced in this fire strategy.

Performance Based Design

Where aspects of the design deviate from the above design guidance, fire safety engineering analyses are carried out to demonstrate compliance with the functional requirements of the building regulations or equivalence to the prescriptive guidance.

1.8.4 The Regulatory Reform (Fire Safety) Order 2005

The operation of the building will be subject to The Regulatory Reform (Fire Safety) Order 2005, (FSO).

Responsibility for complying with the FSO rests with the “responsible person” as defined by Article 3, reproduced as follows:

- (1)

in relation to a workplace, the employer, if the workplace is to any extent under his control;
- (2)

in relation to any premises not falling within paragraph (a)—

a.

the person who has control of the premises (as occupier or otherwise) in connection with the carrying on by him of a trade, business, or other undertaking (for profit or not); or

b.

the owner, where the person in control of the premises does not have control in connection with the carrying on by that person of a trade, business, or other undertaking.

If there is more than one responsible person in any type of premises, all must take reasonable steps to work with each other.

Under the FSO, the Responsible Person must carry out an assessment of the risks stemming from the possibility of fire in the premises and must implement fire precautions where necessary to the extent that is reasonable and practicable to control those risks.

On occupation of the building, or part thereof, the ‘responsible person’ as defined in the FSO is required by law to undertake a ‘suitable and sufficient’ fire risk assessment.

This fire safety strategy will not satisfy this obligation; instead, it should be used as a basis for understanding the fire safety provisions provided in the building in order to undertake the risk assessment. The fire risk assessment will help identify risks that can be removed or reduced and to decide the nature and extent of the general fire precautions that need to be taken to protect people against the fire risks that remain. It should pay particular attention to those at special risk, such as the disabled and those with special needs, and must include consideration of any dangerous substance likely to be on the premises.

1.8.5 Construction (Design and Management) Regulations 2015

The Construction (Design and Management) Regulations 2015 (CDM) are applicable for the design and construction stages of this project. The CDM aims to integrate health and safety into the management of the project and to encourage everyone involved to work together to

- Improve the planning and management of projects from the very start.
- Identify hazards early on, so they can be eliminated or reduced at the design or planning stage and the remaining risks can be properly managed.
- Target effort where it can provide the most benefit in terms of health and safety.
- Discourage unnecessary bureaucracy.

These Regulations are intended to focus attention on planning and management throughout construction projects, from design stage and onwards. The aim is for health and safety considerations to be treated as an essential, but normal part of a project’s development - not an afterthought or bolt-on extra.

Guidance on fire safety for construction sites is given in the HSE publication HSG 168 however does not form part of this fire safety strategy. Where our role on the project involves the preparation or modification of designs, this will be undertaken in conjunction with the project’s principal designer and CDM Coordinator to ensure that any foreseeable risks during construction and the maintenance and use of the building are sufficiently controlled. These risks will typically be summarised in the principal designer’s or principal contractor’s risk register.

1.9 Information Considered

The following information has been considered in the preparation of this fire safety strategy.

- Architectural layout and elevation drawings prepared by Hawkins Brown as listed in the table below

Table 1: Referenced Architectural Drawings

No.	Title	Revision	Date
CHR-HBA-ZZ-00-DR-A-00-0100	Proposed Ground Floor Plan	P08	21/11/2023
CHR-HBA-ZZ-ZZ-DR-A-00-0101	Proposed Level 1 (Typical to Level 16) Plan	P09	21/11/2023
CHR-HBA-ZZ-ZZ-DR-A-00-0117	Proposed Level 17 Plan	P09	21/11/2023
CHR-HBA-ZZ-ZZ-DR-A-00-0118	Proposed Level 18 Plan	P09	21/11/2023
CHR-HBA-ZZ-XX-DR-A-00-0201	Proposed GA Elevation – Carnarvon Street	P07	21/11/2023
CHR-HBA-ZZ-XX-DR-A-00-0202	Proposed GA Elevation – Cheetham Hill Road	P07	21/11/2023
CHR-HBA-ZZ-XX-DR-A-00-0203	Proposed GA Elevation - South	P07	21/11/2023
CHR-HBA-ZZ-XX-DR-A-00-0204	Proposed GA Elevation – Gibson Street	P07	21/11/2023

Any change in the information listed above to suit future re-organisation will require further assessment to confirm compliance with the intent of the design objectives, and a potential revision of This Report or a subsequent Fire Strategy may be required.

Should fire strategy drawings be produced by the architect based on the recommendations in this strategy they will be referenced as follows (none produced to date):



Table 2: Referenced Fire Safety Strategy Drawings

No.	Title	Revision	Date
...	...	...	...
...	...	...	...

1.10 Record of Statutory Consultation

At the date of issue of this document, consultation has taken place with C3 Design with respect to the overarching fire strategy design principles. This has taken the form of an initial qualitative design review (QDR) process as follows.

As the building exceeds 50m in height, it is appropriate – per the Introductory Section 0.7 of BS 9991 – to carry out a qualitative design review (QDR) of the proposed design against BS 9991 to establish and agree design principles and to provide assurance that BS 9991 remains appropriate guidance to follow. The QDR should also establish where any enhanced measures of fire safety provision may be appropriate for application to the building design.

The proposed design comprises corridor layouts which do not have an exact exemplar in BS 9991 (or Approved Document B Vol. 1) due to the provision of evacuation lift lobbies and it is therefore appropriate to consult on these proposals with the Approvals Authority to establish and agree in principle the design approach which will be taken forward and documented in this RIBA Stage 2 Fire Strategy and associated Planning Gateway 1 statement. The design principles agreed would then be taken forward for further development at RIBA Stages 3 and 4, with the requisite level of confidence of the Design Team and Approvals Authority that the relevant fire safety design features have been appropriately addressed and understood.

In support of this process a fire engineering brief (FEB) was developed (ref. MZ-230373-002-FEB-01-ISS01 and discussed with C3 Design on 08/06/23) to provide a framework for developing an ‘agreement in principle’ approach to support the fire safety strategy for the project; the FEB takes into account the current proposed layouts and proposes how BS 9991, the Building Regulations and key anticipated updates to BS 9991 will be applied to ensure the subsequent development of a robust overall fire safety package which will subsequently demonstrate that regulatory requirements are satisfied.

The framework for the QDR is in line with BS 7974: 2019 which comprise of the following main stages:

- Qualitative Design Review (QDR): This is the initial stage of the design process where the basic parameters of the project are established, this includes defining the scope and objectives of the fire safety design, establishing performance criteria and one or more potential design solutions are proposed as well as information gathering to enable detailed evaluation of the design solutions in the quantitative analysis. The aforementioned FEB primarily focuses on the QDR process.
- Quantitative Analysis: A quantified analysis may be necessary to evaluate the solutions identified in the QDR. Such analysis is outside the scope of the present FEB and this fire strategy, but potential analysis requirements are highlighted in the FEB and further noted in this fire strategy for ‘agreement in principle’ subject to development and detailed discussion of the parameters at a later date (which in the case of engineered analysis may necessitate a subsequent analysis-specific QDR process to be undertaken)
- Assessment against Criteria: In the context of the FEB the intent was to benchmark key aspects of the proposals against the relevant fire safety design guidance to enable consultation and ‘agreement in principle’ with the Approvals Authority. Where possible at the current RIBA 2 stage the assessment against code of the proposed designs is detailed in later sections of this strategy.

(As noted above, in future stages of work related to specific engineering analysis the assessment stage of a QDR would test the output of the quantitative analysis and will be compared to the acceptance criteria identified in the analysis-specific QDR to confirm the acceptability of the proposals)

- Reporting of Results: This stage would be relevant to any subsequent analysis-specific QDRs and would comprise the results of the fire engineering study being documented alongside, and referenced within, the developed design fire strategy report at that stage so that they can be readily assessed by a third party e.g. Approvals Authorities. This stage is not relevant for the purposes of the present FEB as it represented the benchmarking study. Where possible at the current RIBA 2 stage the assessment against code of the proposed designs is detailed in later sections of this strategy.

As with the FEB, this fire strategy will refer primarily to BS 9991 (2015) with due regard to the functional requirements set out in current Building Regulations Part B. Cognisance is also made, where referenced, of expected updates to BS 9991 which are anticipated to be published formally in October 2023 and which have hitherto been published in draft form dated 06/08/21.

It is acknowledged that the guidance points set out in this strategy, as initially summarised in the FEB (from the current draft BS 9991) may be subject to further modification in the final published version. Notwithstanding this, it is our considered opinion that where referenced in this strategy, the anticipated draft guidance represents a more definitive, robust and coherent set of design criteria than is present in the current iteration of BS 9991 and therefore in those referenced areas it is proposed to follow this guidance in the proposed design.

It is common practice for the building control body to consult with the relevant fire authority, being the Fire Service, noting formal consultation has not been advised to have taken place. A key part of the purpose of statutory consultation with the fire authority is to allow observations to be made in regard to the proposals for the scheme with respect to the functional requirements of the Building Regulations and provide for an opportunity to make the applicant aware of actions that may have to be taken to meet the subsequent requirements of the FSO.

The consultation period should allow for agreement that the functional requirements of the Building Regulations are being met, and where possible via a collaborative process with all stakeholders involved where possible.

The following consultation feedback has been received at present (or will be documented in future revisions of this fire safety strategy).

Table 3: Summary of Statutory Consultation Feedback Received

Ref.	Feedback Type	Authority	Date
MZ-230373-002-FEB-01-ISS01	Initial meeting with C3 Design on FEB. Pending formal comment and agreement in principle	C3 Design	08/06/2023
...	...	...	...
...	...	...	...



1.11 Reference Documents

Figure 2 outlines the key codes and standards that will be used as a basis of design. This list is not exhaustive. Where referenced in this report, codes and standards will follow the guidance of the editions outlined.

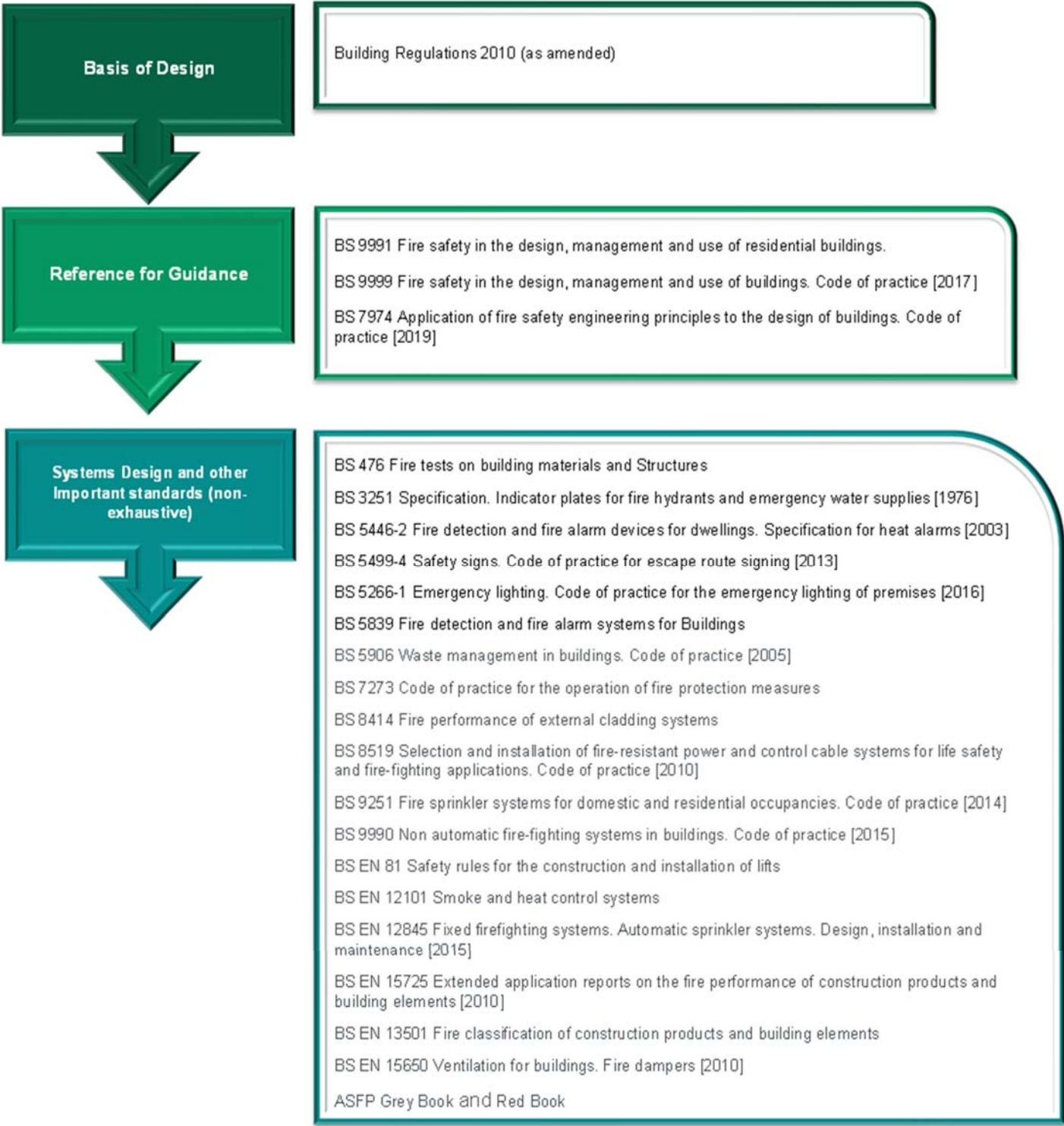


Figure 2: Design basis

1.12 Project Stakeholders

This Report has been developed with the relevant project stakeholders as identified in the table below:

Table 4: Project Stakeholders

Organisation	Role
C3 Design	Authority Having Jurisdiction
Hawkins Brown	Architecture and Planning
Futureserv	MEP Engineer
Renaissance	Structural Engineer
Maze Fire Consulting Ltd.	Fire and Life Safety Engineer
ZX Cheetham Hill Developments Limited	Client



2. Building Characteristics

2.1 General Site Description

The project site is located at 33 - 41 Cheetham Hill Road, Manchester, UK.

The project comprises a 23 storey (including Ground) Residential (dwellings) building with no basement.

The Ground to 1st floor height is proposed at 5m, with typical floors thereafter at 3m heights. Thus, the total height (to roof) of the building will be ~71m, with a height of ~68m from Ground to uppermost occupied floor level.

At Ground level additional uses are proposed, to include two Commercial units, Concierge office and facilities, cycle storage, sprinkler, and wet riser plant rooms, refuse room and other plant (substation and switchroom).

2.2 Building Particulars

The following building particulars have been used in the development of this fire safety strategy:

- Number of Storeys: 0 basement and 23 above grade (inc ground)
- Height of the building: 74m
- Height of floor of top storey above ground level: 69m
- Approximate Floor Area: 875m² (typical floor)

The current building floor layouts as referenced in Table 1, are depicted in the following figures:



Figure 4: Levels 1 – 16 (typical)



Figure 3: Ground floor layout



Figure 5: Level 17 (including communal terrace)



Figure 6: Level 18 – 22

2.4 Materials of Construction and Structural Characteristics

We have been advised by Hawkins Brown and the Design Team that the general building construction materials are as set out below:

Table 5: Primary Materials of Construction

Element	Materials
Floor	Concrete Slab (and concrete structural frame)
Internal Walls	TBC but anticipated to be a mixture of concrete / blockwork walls to stair and lift / riser shafts and plasterboard walls elsewhere.
External Walls	TBC, either traditional brick or mechanically fixed brick slip rainscreen system with perforated aluminium rainscreen panels and aluminium window systems
Roof	TBC

2.5 Fire Hazards

2.5.1 General Layout

The internal layout as indicated on the architectural drawings developed at the time of This Report, is considered to meet the functional requirements the Building Regulations as interpreted against BS 9991 guidance (with due reference to other standards as set out in this strategy) and is satisfactory in respect of signing and wayfinding of emergency routes for escape and fire-fighting equipment and access. Therefore, it does not result in any apparent way finding difficulties within the public or private areas of the 33 - 41 Cheetham Hill Road.

2.5.2 Activities

Activities are considered to be consistent with a building containing mainly Residential (dwellings) occupancies. No processes or activities have been identified that indicate excessive fire risks.

BS 9991 specifies in Section 37 that all ancillary accommodation, with the exception of communal lounges, common amenity areas and transformer, switchgear and battery rooms for low voltage or extra low voltage equipment, should be treated as places of special fire hazard.

The cycle store and refuse store would be considered as common amenities. Requirements for fire separation and considerations for ancillary spaces more generally are summarised in this report.

Typical ignition sources comprise the following:

- Smoking related materials - lighters etc
- Matches and Candles
- Cooking appliances - Cooker incl. oven, Grill/Toaster, Microwave oven, Ring/hot plate etc
- Space heating appliances
- Central and water heating appliances
- Electrical distribution - batteries, generators, Wiring, cabling, plugs, Heating equipment etc
- Electric lighting - Fairy lights, Fluorescent lights, Spotlights etc
- Other domestic style appliances - Audio equipment, Battery charger, Dishwasher, Electric blanket, Kettle, TV, Hoover, Washing Machine, Personal Computer etc.

- Oil/Incense burners
- Food warming equipment (not cooking)

The potential ignition sources are expected to be consistent with well managed Residential (dwelling) building types.

2.5.3 Unusual or High Hazard Factors

At present no unusual or high hazard processes have been identified in relation to the proposed design.



3. B1 – Means of Warning and Escape

3.1 Functional Requirement of the Building Regulations

The functional requirement contained within Schedule 1 Part B1 of The Building Regulations states that:

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

3.2 General Philosophy

The general principle to be followed when designing for means of escape is that when occupants are confronted by fire within a building they can turn away and walk to a place of safety in a different direction by their own unaided efforts. Escape in a single direction is only allowed when the distances are short, and people could be expected to escape before the fire becomes large enough as to block the escape route.

3.3 Evacuation Policy

As the building in question is a residential apartment building, a 'stay put' evacuation protocol will be operated. The National Fire Chief's Council has provided clarification into the meaning of 'stay put' which is as follows:

'If there is a fire inside a flat or maisonette the advice is to alert all the people in the flat and leave the property and close all doors. They should follow a pre-determined escape plan and if there is a lot of smoke within the flat, people should crawl along the floor where the air should be clearer and the temperature cooler. They should always use the stairs rather than the lift and call 999 as soon as they are in a safe place.

If there is a fire elsewhere in the building then the structure of the flat – walls, floors, and doors – are designed to give appropriate protection. It is important for responsible owners to ensure that high-rise buildings are properly constructed, and any refurbishment or maintenance is carried out to compliant standards of fire safety.

If there is a fire in your building but not inside your own home, then you are usually safer to stay in your flat unless the heat or smoke from the fire is affecting you. If you 'stay put' you should still immediately call 999 for advice and to ensure that the fire and rescue service along with attending emergency crews have been notified.

The advice provided to tenants can and does change depending on the circumstances that present themselves at what are very dynamic incidents. The advice in this statement is part of a preventative approach to ensure a consistent approach is taken by fire and rescue services to assist tenants in developing an initial and safe escape plan.

Once a 999 call is made, and firefighters arrive at the fire, then the advice may be reinforced or change depending on the nature and development of the fire, the building, and its tenants'.

All non-residential areas will operate an independent simultaneous evacuation strategy. Occupants in these areas will evacuate on activation of the fire alarm in the non-residential areas.

On the subject of evacuation and mobility impaired persons. In current guidance residential buildings require neither evacuation lifts nor refuge areas. Refuge areas with a communication system would be of little use in the case of non-managed buildings. The safety of all the occupants including disabled people will be achieved by the fact that the building is designed for a stay-put policy and therefore with a high level of compartmentation. However, it is noted that in some areas of the country (i.e. London area), an evacuation lift is mandatory for every building provided with a lift, regardless of the type and size of the building.

Furthermore, as noted in Section 1.10 it is anticipated that upcoming amendments to BS 9991 will modify this requirement in favour of ensuring evacuation lifts are provided (at least one per stair core) in buildings of this typology. This is the approach taken in this fire strategy.

An evacuation lift will certainly improve the possibility of disabled or elderly people leaving the building in case of a fire incident. It is also noted a secondary power supply will be already provided to the shaft which has a fire-fighting lift. A similar secondary power supply could be also used for an evacuation lift.

Therefore, the provision of evacuation lifts (including the ability to use the fire-fighting lift as an evacuation lift) is the basis of the provision set out in this strategy.

For ancillary areas such as plant rooms and residential amenity rooms (and the Commercial Unit) the protocol will be 'simultaneous' evacuation in response to a fire in those areas.

3.4 Classification of Occupancy

The building is considered to be primarily of Flat (Risk Profile Ci1 / Cii1). It will also contain ancillary occupancies as outlined below:

- Office: Concierge Office i.e. small standalone (A1)
- Assembly: Residential amenity spaces at Level 17 (A1)
- Shop and Commercial: typical examples may include Barbershop/Hairdressers/Salon (B2), Pharmacy (B2), Restaurant (Fast Food) (B2), Shop/retail/trade (B2)
- Assembly and Recreation: Restaurant (Not Fast Food) (B1), public Gymnasium (B1)
- Industrial: Plant Rooms (A2 / B2)
- Storage and other non-residential: Cleaners' room (A2), Cycle Store / Other Store (A2), Waste Room (A2)

3.5 Means of Warning

In accordance with BS 9991 the minimum standard of fire alarm should be based on the type of dwelling and the means of escape strategy for the building. BS 5839-1 Fire detection and fire alarm systems for buildings, and BS 5839-6 Fire detection and fire alarm systems for buildings Part 6: Code of practice for the design, installation, commissioning and maintenance of fire detection and fire alarm systems in domestic premises) are to be consulted to provide guidance on the system to be used.

Typically, a category LD2 system is the minimum requirement for a building with a risk profile Ci1 / Cii1. However, this has been raised to a category LD1 and shall be provided throughout this building in accordance with the guidance in BS 5839-6 to provide early notification of a fire to occupants. The provision of LD1 is also required to support justification of the open-plan flat design.

An LD1 category is specified as a system installed throughout the premises (each flat), incorporating detectors in all circulation areas that form part of the escape routes from the premises (flats), and in all rooms and areas, other than those with negligible sources of ignition, such as toilets, bathrooms, and shower rooms.

A Grade D1 category is specified as a system of one or more mains-powered detectors, each with a tamper-proof standby supply consisting of a battery or batteries.

In the case of Grade D systems, where more than one smoke alarm is installed, the smoke alarms normally need to be interlinked. Any heat alarms also need to be interlinked with the smoke alarms.

These grades are defined in such a way that a requirement for one grade of system can be satisfied by the installation of a higher grade of system; for example, if the fire risk justified the installation of a Grade D system, it would be acceptable to install a Grade A or Grade C system.

The non-residential aspects of the development will be provided with a Category L2 fire detection and alarm system designed and installed in accordance with BS 5839-1:2017. Residential common corridors will require only an L5 system which will not include manual call points or sounders (for this aspect of the system).

As noted in Section 7.5.2 in blocks of flats with a top storey over 18m above ground level an evacuation alert system should be provided in accordance with BS 8629.

Fire alarm control / repeater panels should be provided both in the Concierge Office (see Section 7.5) and at the entrance point to the Fire Service access corridor from Gibson Place (see Section 7.2.2).

It is recommended that sounders/beacons are provided on the roof to alert anyone on the residential amenity terrace and roof (in the latter case who may be providing periodic inspection or maintenance) to a fire in common areas below within the building.

3.6 Audible Warning

Audible warning will be provided to the development using sounders in accordance with BS 5839-6 or BS 5839-1 as appropriate to the residential / non-residential locations.

3.7 Horizontal Means of Escape

The horizontal means of escape considers the escape from any point on a level to a storey exit on that level. Protected escape routes (residential corridors, stairs) are designed to function as a sterile space where a fire should not be able to break out to from a flat. Were a fire to break out there should be virtually no combustible material to provide fuel to the fire.

The means of escape design depends on the occupancy, occupancy numbers, number of escape routes, escape route widths and travel distances.

Within the development the access to the residential apartments is detailed in the following sections:

3.7.1 Corridor Access to Flats with Ventilated Lobby

Based on the provision of ventilated protected lobbies to each stair, sprinkler protection, and limited travel distance in the communal residential corridors, it is proposed that the residential corridors will not be provided with smoke ventilation. The draft BS 9991 is not referred to in this instance as the range of ventilation proposals set out in that document do not appear to have a precise exemplar to the proposed design which differs in any way from the exemplars in the current BS 9991 due to the provision of evacuation lift lobbies.

Therefore, the current BS 9991 guidance is proposed to be interpreted as follows with reference to the following Figure 7(a) of BS 9991.

With regard to this figure, it is noted that the current BS 9991 does not set out mandated requirements for evacuation lifts and lobbies, whereas these are to be implemented in the proposed fire safety design (see Section 3.14.1 and 3.14.6). The exemplar also permits the ventilated areas to be provided with natural AOVs. Finally, the implied permitted single direction travel in a non-ventilated portion of corridor is 15m but could also be considered to be potentially greater than this depending on the location in the corridor of the apartment where the fire is located).

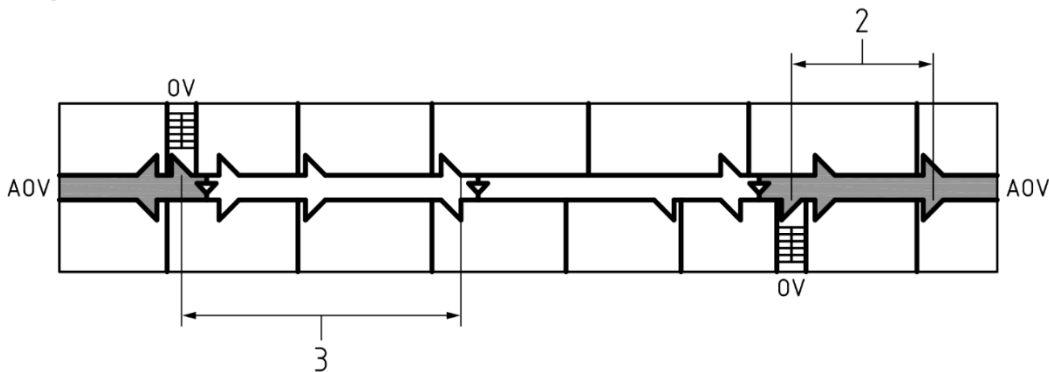


Figure 7: Exemplar Figure 7(a) of BS 9991 (2015) – Note: '2' = 15m max. distance if sprinklers installed, '3' = max. distance of 30m

The proposed design approach is as set out in the following figure:

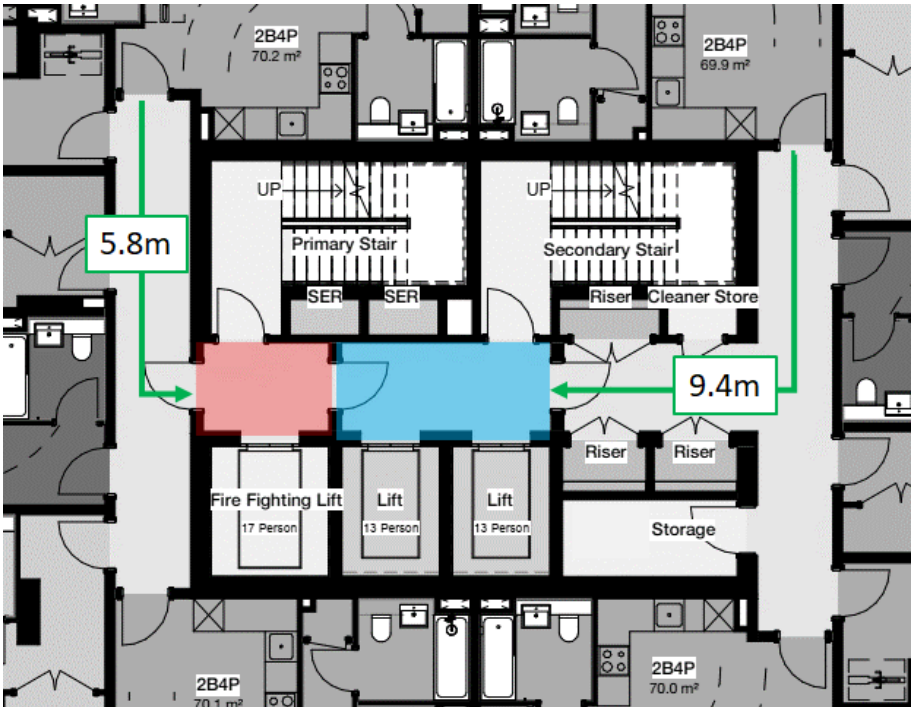


Figure 8: Proposed core and communal corridor (typical) layout. Blue-shaded = ventilated protected stair evacuation lift lobby, Red-shaded = ventilated fire-fighting/evacuation lift lobby

Each stair is therefore to be accessed via a ventilated section of corridor/lobby which is the key objective of the BS 9991 guidance. Due to the new requirement for evacuation lift lobbies an extra door has effectively been added into the corridor adjoining each stair, providing a lobby and a corridor for each stair. The draft BS 9991 guidance is unclear which of the two sections should remain as ventilated. It has therefore been considered most appropriate to ventilate the section adjoining the stair (i.e. the lobby) and this seems to align best with Figure 6 and Figure 7 of the current BS 9991. It does not seem necessary to provide a separate ventilation shaft serving the corridor as well as the lobby, or only ventilating the corridor and not the lobby. However as this is not outlined in the draft BS 9991 this approach is for discussion and approval in principle with Building Control, as included in the FEB forming the initial QDR discussions.

Therefore, when evaluating the proposed arrangements as summarised above, it may be noted that:

- The travel distance in non-ventilated communal corridors is much less than the 15m implied in the nearest exemplar.
- The stairs are protected by ventilated lobbies, consistent with the protection set out in the exemplar.
- From those protected lobbies access is available into the adjacent stair or, if need be, to the adjacent protected lobby, enabling additional escape and evacuation lift capacity to be utilised. This is in a similar fashion to the BS 9991 exemplar but with a much shorter travel distance than implied as acceptable by that exemplar.
- The standard of sprinkler system will be Category 4 to BS 9251, which exceeds the Category 2 which was the basis of the current BS 9991 exemplar (for extending corridor travel distance from 7.5m to 15m)
- The current BS 9991 also permits travel distances of up to 15m in non-ventilated corridors for buildings over 11m in height which are single stair (Figure 6 of that document). The current design is strengthened over that layout type as two stairs are provided (each with a protected ventilated evacuation lift lobby) meaning that if for any reason one stair was affected by smoke from a lower level an alternative escape is likely to remain available – as noted above the potential for a stair to be so-impacted is proposed to be mitigated by appropriate validation of the associated smoke ventilation systems protecting the stair.

On the other levels only Level 17 includes a significant variation in the provision of amenity spaces which are also accessed from the common corridors.

Section 37c(2) of the current BS 9991 requires the provision of protected lobbies between such spaces and communal residential corridors in cases where the corridor forms part of a single direction route of travel from the apartments (as noted in Section 7.6.4 of this strategy), and as such lobbies have been provided between the amenity spaces and the corridors which also serve flats.

The smoke control system will in each case require justification with engineering analysis at subsequent stages of design (outside the scope of the present RIBA 2 strategy). This is further detailed in Section 7.6.

3.7.2 Open Plan Apartments (single storey)

Open-plan apartments are proposed. The current BS 9991 (2015) sets out a series of requirements for such apartment types as follows:

- The apartment size should not exceed 16m x 12m (192m²)
- Such apartments should be single-level only
- Ceilings within the flats should be at least 2.25m height
- In flats exceeding 8m x 4m (32m²) kitchens should be enclosed. Cooking appliances in smaller flats should not be adjacent to the entrance of the flat

The anticipated updates to BS 9991 (As set out in the current draft) modify the above slightly, as detailed below, and it is proposed that these anticipated forthcoming recommendations will be followed for this building as they also include more detailed specification in relation to kitchen design in open-plan flats.

In respect of open-plan apartment design, these are presently as follows:

- Open-plan flat layouts should not be provided for accommodation where the occupants are not capable of independent evacuation.
- Open-plan flats that do not have protected corridors or hallways but have bedrooms that are inner rooms without having an alternative means of escape, and that are accessed directly from a lounge or similar type accommodation, should be fitted throughout with a Grade D, Category LD1 fire detection and fire alarm system in accordance with BS 5839-6:2019+A1, and an Automatic Water Fire Suppression System.
- Open-plan flats should meet the following specific recommendations.
 - o The size of the open-plan flat should not exceed 16m × 12m
 - o Open-plan flats should be situated on a single level onlyNote: Single level flats exclude flats with galleries.
 - o The ceilings within the open-plan flat should have a height of not less than 2.25m

All of the above are proposed to be adhered to within the fire strategy design.

Furthermore, the draft guidance contains the following specific guidance in relation to kitchen layouts in open-plan apartments:

- *‘Where habitable rooms are permitted to escape though a living area containing a kitchen, which is not located within a separate enclosure, the following recommendations should be met.*
 - o *All rooms in the dwelling, except for any exclusions as described in BS 9251:2021, should be provided with a sprinkler system conforming to BS 9251:2021.*

Note: The use of water mist or other types of AWFSS to protect dwellings with open plan kitchens are outside the scope of this standard.

 - o *The dwelling should be provided with a Category LD1 fire detection and fire alarm system in accordance with BS 5839-6:2019+A1.*
 - o *All cooking apparatus, with a fixed connection to the dwelling’s electricity or gas supply, should be located such that the edge of the cooking apparatus is 1.8 m away from an escape door, door to an adjoining habitable room or means of escape route to an escape door.*

- o *All egress routes from habitable rooms to the escape door(s) from the apartment should be not less than 0.9m in width. No fixed obstructions (such as radiators or cupboards) should be located within the 0.9m escape route.*
- o *A gap of 0.3m should be provided between the leading edge of the door and the 1.8 m zone from the cooking apparatus, to allow people with mobility impairments to access the door hardware.’*

The following figure is provided to inform the above bullet points. Based on the quoted text it would be considered appropriate to measure the 1.8m distance from the edge of the nearest hob ring in each case.

It is proposed that each of the above points will be communicated to the Design Team for adoption in the proposed fire strategy design. Based on current plans the spatial separation requirements look to be feasible.

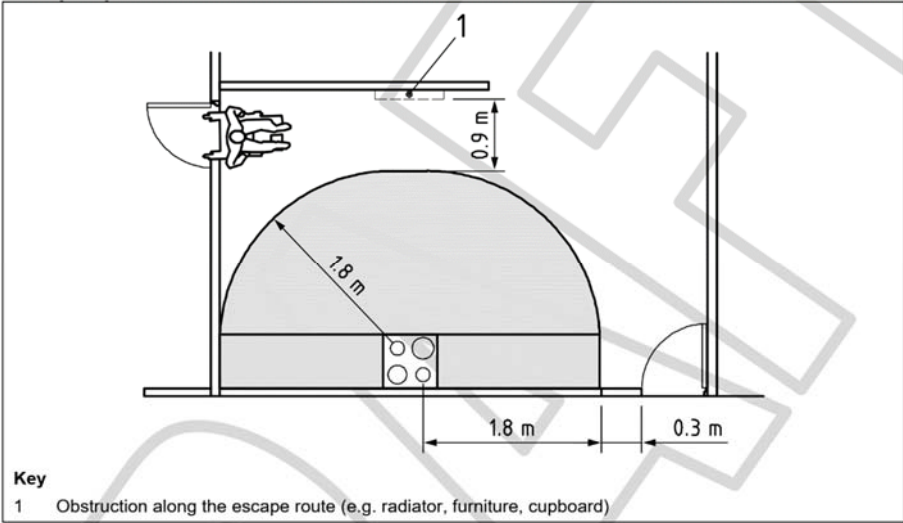


Figure 9: Cooker hob escape route clearance (Draft BS 9991 2021)

3.7.3 Occupancy Load Factors

For Residential buildings, occupant numbers for ancillary occupancies will be based on a floor space factor as given in Table 9 of BS 99999 or if occupancy numbers are known then the designed occupancy number will be used and as summarised in the table below. All load factor figures should be verified at fit out stage.

Table 6: Occupant Load Factors

Occupancy	Occupant Floor Space Factor (m ² /person)
Restaurant (Not Fast Food)	1
Barbershop/Hairdressers/Salon	2
Pharmacy	4
Restaurant (Fast Food)	2
Shop/retail/trade	2
Gymnasium	1
Office i.e. small standalone	10
Cleaners' room	30
Other storeroom	30
Waste Room	30

3.7.4 Occupancy Calculations

The total occupant load has been calculated and represented in the table below, for each floor. See Appendix A for full representation of the calculated capacities for each individual area of the building.

Table 7: Occupancy numbers

Floor	Area (m²)	Occupancy
Ground – Concierge inc. B.O.H*	87.7 (main) 12.0 (parcel store) 7.7 (Staff Room) 8.2 (Comms)	10 – 14 (based on floor space factor but anticipated to be minimal in day-to-day use)
Ground – Commercial	84	100 (based on restaurant floor space factor)
Ground – Refuse (four areas)	56.6 49.3 33.5 13.5 (to commercial unit)	4
Ground – Cycle Store	88.8	3 – 4
Ground – Plant	Wet riser Room: 66.8 Water / Sprinkler Room: 61.7 Switchroom: 18.1 Substation: 21.8	0 – transient occupancy assumed for maintenance, inspection, and repair only. Each space has at least one exit door.
Upper Floors - Residential	N/A	236 occupants in total (based on flat types)
Level 17 – internal amenity	Amenity 1: 43.7 Amenity 2: 65 Amenity 3: 53.6 Amenity 4: 50.5	TBC dependent on use of space (to be advised)**
Level 17 – External Terrace	240	TBC dependent on use of space (to be advised) but limited to 60 persons based on single exit route**

*Note: on current plans these areas in total slightly exceed 100m² but will be less than 100m² if fire-compartmented from one another. As noted in Section 3.15 it will be necessary to restrict ancillary areas (or individual subdivisions of same) to not more than 100m² for the adoption of BS 9251 sprinkler system coverage to remain suitable.

**The use of these spaces is yet to be advised, however on the basis that they are to be accessible by residents only a consideration based on building occupancy and exit capacity can be set out for context. Based on each of these Level 17 amenity rooms evacuating together, as well as the external terrace space, the two storey exits into the stair would in total have an escape capacity of 302 persons (based on 900mm door widths and A1 risk profile).

The calculation is based on the exit width per person as set out in Table 9 and the methodology set out in BS 9999 for where doors are less than 1050mm in width.

Therefore, in this case each storey exit into the stair has a capacity of 500 / 3.3 = 151 persons. The total storey exit capacity at this level exceeds the anticipated number of residential occupants (302 persons vs 236 persons) and with the further restriction of only 60 persons on the terrace based on a single escape route it is considered that the occupancy levels of the internal amenity spaces will be acceptable, provided they adhere to any other the limits set out elsewhere in this strategy.

3.8 Number of Escape Routes (Common/non-residential areas)

The minimum number of exits permitted per room or storey is described in the table below in accordance with the requirements of BS 9999. Travel distance requirements (see Sections 3.7.1 and 3.10) also look to be met on the proposed plans.

Table 8: Required number of escape routes and exits – BS 9999 Table 10

Maximum number of persons	Minimum number of escape routes/exits
60	1
600	2

3.9 Minimum Width of Escape Routes / Storey Exits (Common/non-residential areas)

BS 9991 does not give minimum widths for doors or common escape routes for residential buildings (other than in respect of fire-fighting stairs) therefore BS 9999 will be necessary to be followed in this regard for the ancillary areas.

For non-residential ancillary areas the following table will apply.

Table 9: Minimum Width of Escape Routes

Risk Profile	Minimum exit width per person (with reductions applied) mm/person
Ancillary Risk Profile - A1: Office i.e. small standalone, external terrace	3.3
Ancillary Risk Profile - A2: Cycle storeroom, Refuse Room, Store Rooms	3.6
Ancillary Risk Profile - B1: Restaurant (Not Fast Food), Gymnasium	3.6
Ancillary Risk Profile - B2: Barbershop/Hairdressers/Salon, Pharmacy, Restaurant (Fast Food), Shop/retail/trade, Plant rooms	4.1

3.10 Travel Distance and Escape Routes

Travel distance requirements in relation to the apartments and residential common corridors are described in Sections 3.7.1 and 3.7.2.

Residential amenity areas (the areas at Level 17) would be permitted (per Table 14 of BS 9991) to have a single direction travel distance of 18m, rising to a total of 45m where more than one escape route is available.

The external terrace at Level 17 has a single exit route. As this is in the open air it is considered reasonable to apply a travel distance limit of 45m to this space, per BS 9991 Section D.4. It will be necessary to ensure that any landscaping or obstructions on the terrace are located so as not to exceed this total travel distance to the exit from the furthest point on the terrace (see also Section 3.11).



It is proposed that the arrangement depicted below is acceptable given the protection to the stairs of the ventilated lift lobbies and also that the terrace door (when open for means of escape) can provide ventilation to the short section of corridor leading to the nearest protected lobby.

[illegible]

Figure 10: External terrace at Level 17. Terrace exit indicated by large orange arrow; storey exits indicated by large green arrows. Travel distance for narrow portion indicated by small green arrow

		One directiononly (m)		More than onedirection (m)	
Occupancy	Risk Profile	Direct (Unknown)	Actual	Direct (Unknown)	Actual
Restaurant (Not Fast Food)	B1	16	24	40	60
Barbershop/Hairdressers/Salon	B2	13	20	33	50
Pharmacy	B2	13	20	33	50
Restaurant (Fast Food)	B2	13	20	33	50
Shop/retail/trade	B2	13	20	33	50
Gymnasium (public)	B1	16	24	40	60
Office i.e. small standalone	A1	17	26	44	65
Plant Rooms - (Not High Risk)	A1	17	26	44	65
Cleaners' room	A2	15	22	37	55
Other store room (includes cycle store)	A2	15	22	37	55
Waste Room	A2	15	22	37	55

3.12 Final Exits

Discharge from common stairs and final exits should meet the following recommendations:

- Every protected stairway should lead to a final exit, either.
 - o directly.
 - o via a protected exit passageway.
- Any protected exit corridor or stair should have the same standard of fire resistance and lobby protection as the stair it serves.
- People should be able to rapidly leave the area around the building. Direct access to a street, passageway, walkway, or open space should be available. The route away from the building should comply with the following:
 - o be well defined.
 - o if necessary, have suitable guarding.
- Final exits should not present a barrier for disabled people. Where the route to a final exit does not include stairs, a level threshold and, where necessary, a ramp should be provided.
- Final exit locations should be clearly visible and recognisable.
- Final exits should avoid outlets of basement smoke vents and openings to transformer chambers, refuse chambers, boiler rooms and similar risks.

BS 9991 is silent on the width of the final exit from residential accommodation.

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This is because residential accommodation typically employs a 'stay put' policy and has a relatively low number of occupants for the size of the premises. BS 9991 does prescribe that the final exits should not be narrower than the stair and/or corridor that serves them in order to avoid 'pinch points'.

For this building the requirements for the final exit corridor and width will be governed by those for Fire Service access, as described in Section 7. The final exit from each stair core is to be to outside via a 120-minute protected corridor which will also function as the Fire Service access route to the fire-fighting shaft. This corridor exits directly on to Gibson Place.

The following figure indicates the primary escape route from each stair and evacuation lift which is to be via the 120-minute Fire Service access corridor leading to Gibson Place. As indicated a secondary escape route will also be possible via the 24-hour staffed Concierge office, lending resilience to the design.

The fire service access corridor is to be at least 1200mm + 500mm in width following BS 9999 guidance as described in Section 7.2.2. This is to accommodate the potential maximum number of persons from Level 17 evacuating simultaneously at the same time as fire service arrival.

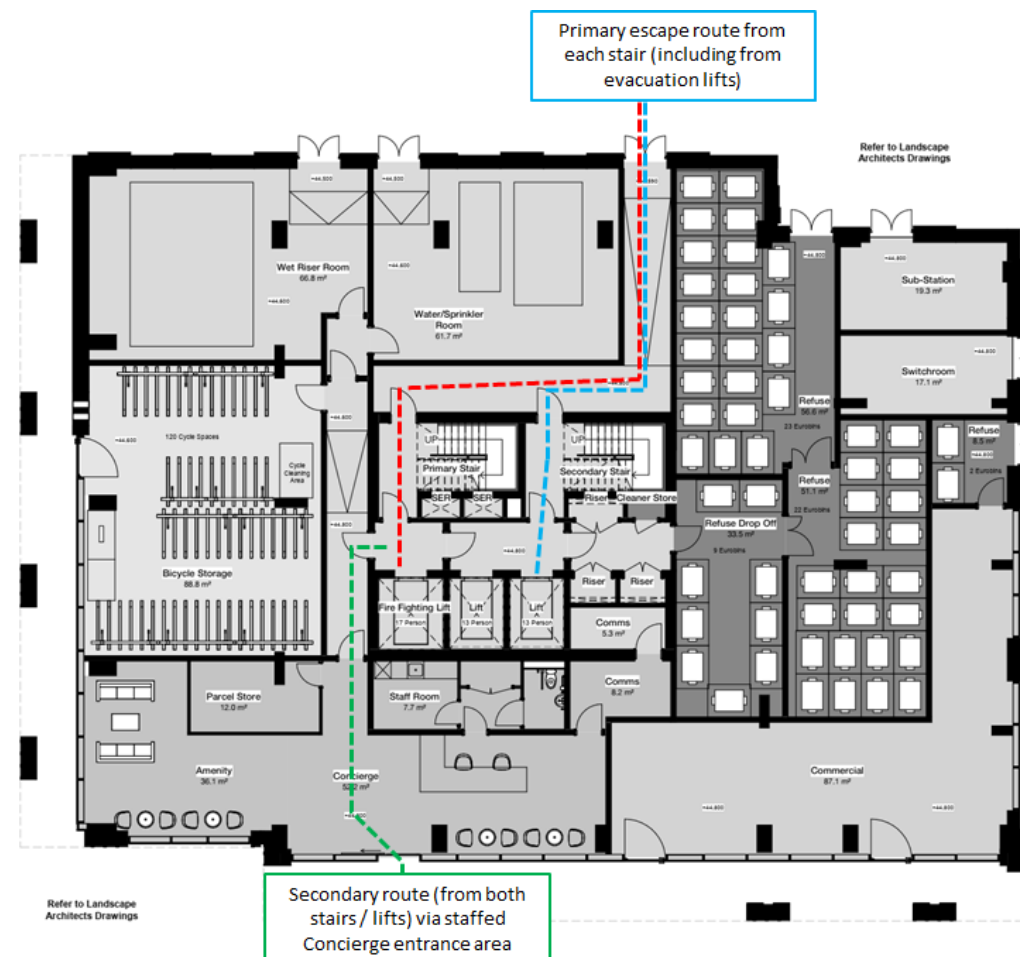


Figure 11: Primary and secondary escape routes at Ground floor level

3.12.1 Corridors

A corridor providing access to alternative escape routes should be divided by fire doorsets fitted with a self-closing device (and associated screens) where both of the following apply.

- it is more than 12m long
- it connects two or more storey exits

The fire doorsets (including any screens) should be approximately mid-way between the two storey exits. They should safeguard the route from smoke, while considering the layout of the corridor and any adjacent fire risks.

If a cavity exists above the enclosures to a corridor as described above (because the enclosures are not carried to full storey height or the underside of the roof covering at the top storey), the potential for smoke to bypass the enclosure should be restricted by one of the following methods:

- Method 1 – Fitting cavity barriers on the line of the enclosure(s) to and across the corridor.
- Method 2 – Dividing the storey using fire resisting construction that passes through the line of the division of the corridor (Diagram 2.9 of Approved Document B). Any cavity above this division should be fitted with cavity barriers on the line of division of the storey and the corridor.
- Method 3 – Enclosing the cavity on the lower side by a fire resisting ceiling that extends throughout the building, compartment, or separated part. Any door that could provide a path for smoke to bypass the division should be fitted with a self-closing device (but need not necessarily be fire resisting).

The protected common corridor arrangements for this building are described in Sections 3.7.1 and 5.

3.13 Inner Rooms

A room from which the only escape route is through another room is called an inner room. The following arrangements should be provided (based on BS 9999 for such rooms in non-residential areas of the building):

- total occupancy of the inner rooms should not exceed 60 people
- the inner room cannot be a bedroom (note: open-plan flats are acceptable as set out in Section 3.7.2)
- the inner room should be entered directly from the access room
- means of escape should not pass through more than one access room
- travel distances should not exceed the limits specified in This Report
- the access room should not be a place of special fire hazard and should be in control of the same occupier as the inner room.
- One of the following arrangements should be made:
 - o the enclosures (walls or partitions) of the inner room stop at least 500 mm below the ceiling; or
 - o a suitably sited vision panel not less than 0.1 m² is located in the door or walls of the inner room, to enable occupants of the inner room to see if a fire has started in the outer room; or
 - o the access room is protected by an automatic smoke detector that either operates an alarm that is immediately audible in the inner room, to a sound pressure level in accordance with the minimum recommended in BS 5839-1 or gives an immediate visual alarm conforming to BS EN 54-23 in the inner room if the ambient noise levels are so great as to make an alarm inaudible.

On the referenced plans the only inner rooms present are the Comms Room and Concierge Back-of-House room, both accessed from the main entrance foyer. It is considered that these rooms meet the above requirements subject to one of the three methods set out in the final bullet point being adopted.

3.14 Vertical Means of Escape

The stairs should be protected stairs, enclosed in fire resisting construction. One of the stairs will be a protected stair and the other a fire-fighting stair (see also Sections 3.14.3, 5 and 7).

3.14.1 Facilities for Mobility Impaired Persons and Evacuation Lifts

There is no prescriptive requirement for refuges to be provided on the residential levels due to the high level of compartmentation. However, guidance such as Approved Document B, Volume 1 states that the fire safety aspects of the Building Regulations aim to achieve reasonable standards of health and safety for people in and around buildings.

People, regardless of ability, age, or gender, should be able to access buildings and use their facilities. The fire safety measures incorporated into a building should take account of the needs of everyone who may access the building, both as visitors and as people who live or work in it. It is not appropriate, except in exceptional circumstances, to assume that certain groups of people will be excluded from a building because of its use.

The provisions in this approved document and in the current BS 9991 are considered to be of a reasonable standard for most buildings. However, some people's specific needs might not be addressed.

Evacuation Lift Provision

BS 9991 (2015) does not presently mandate the inclusion of evacuation lifts and associated lobbies and tends to reference BS 9999 in respect of their design, if adopted. It is understood that the forthcoming update to BS 9991 (currently scheduled for publication in October 2023) contains stronger and more definitive guidance on this provision. Based on the current draft document the measures stated broadly comprise the following:

- A statement that where passenger lifts are provided at least one lift should be an evacuation lift.
- A statement that buildings of more than 18m in height should be provided with more than one evacuation lift.
- Where more than one escape stair serves a single storey the number and positioning of evacuation lifts should be such that if a fire affects access to any one evacuation lift, alternative evacuation lifts will remain available for use.
- The enclosure to the lift is to be constructed as a protected shaft.
- Power supply, voice communication, lighting and signage requirements are set out.
- Detail is set out for operational modes, including driver-assisted evacuation operation.
- Detail is set out in respect of the lift lobby dimensional requirements and separation from adjacent areas.
- The protected lobby is expected to be treated as part of the staircase enclosure and thus protected by the same smoke ventilation system which is provided to protect the associated stair.
- Fire-fighting lifts may also be used as evacuation lifts subject to meeting the criteria set out in the standard.
- Evacuation lifts should be designed in accordance with BS EN 82-20 (2020) and with the following recommendations:
 - o The minimum lift car size should be type 2 in accordance with BS EN 81-70:2021, Table 3. Where the evacuation lift is part of a lift group, the car size should be at least the same size as the lift cars in the same group.
 - o Any ambient temperature sensor should not stop, or prevent the start of, the evacuation operation.
 - o An evacuation lift should be provided with a means to suspend evacuation operation.
 - o NOTE The suspend service signal allows a BMS to suspend evacuation operation e.g. if smoke or fire is detected in the lift spaces, lobbies etc.
 - o No electrical fault on any other lift located in the same group as the evacuation lift should affect the operation of the evacuation lift.
 - o When on evacuation operation, the evacuation lift door should open only where there is a protected lobby in front of the landing door.
 - o In the case of lifts with more than one car door, no more than one car should open at a time during evacuation operation.
 - o The landing and car doors should be automatic power operated horizontally sliding doors.
 - o The lift lobby should be provided with an emergency voice communication system in accordance with BS 5839-9.

It is acknowledged that the above guidance points (and further associated detail in the draft BS 9991) may be subject to further modification in the final published version. Notwithstanding this, it is our considered opinion that the above represents a more definitive, robust, and coherent set of design criteria than is present in the current iteration of BS 9991 and therefore it is proposed to follow this guidance in the proposed design.

There is a statement in the draft BS 9991 update to the effect that ‘...where an evacuation lift is one of a group of lifts served by a protected lobby or protected enclosure, all the lifts in the group should be designed as evacuation lifts, with the exception of lifts dedicated solely to firefighting’.

In the proposed design there is a bank of two lifts outside the protected (non-firefighting) stair, only one of which is proposed to be an evacuation lift. It is proposed that this remain the case, as the fire-fighting lift will also be an evacuation lift, thus fulfilling the wider design objectives of always having an alternative evacuation lift available (if one is affected by fire) and that there will be more than one evacuation lift, and at least one associated with each stair core.

It is proposed to adhere to the lift lobby dimensions represented in the following figure from the draft BS 9991 (2021):

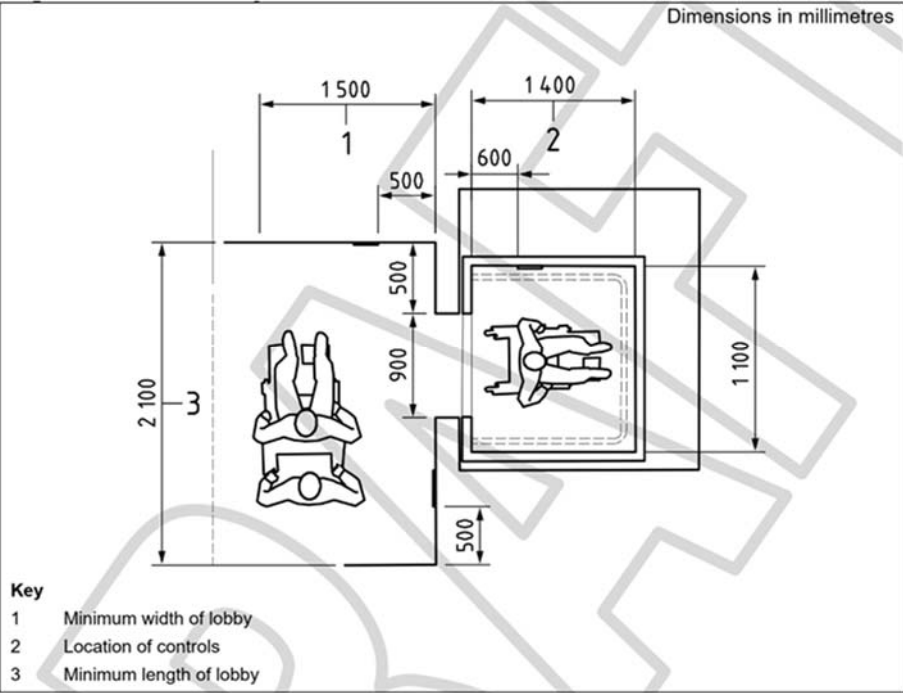


Figure 12: Lift and Lobby Dimensions (draft BS 9991 2021)

Evacuation Lift Controls and Operation

Detailed guidance is present in the draft BS 9991 for the control and operation of evacuation lifts and will be reviewed and documented in subsequent stages of the fire strategy design, however general principles are as follows (taken from the draft BS 9991 2021).

‘The design and operation of evacuation lifts should be in accordance with BS EN 81-20 and Annex G of the present standard [references to Annex G are in relation to the draft BS 9991 as to be amended].

NOTE 1 Annex G includes recommendations for “driver-assisted evacuation operation” and “automatic evacuation operation”. Driver-assisted evacuation is the default method of lift operation for evacuation lifts.

Where the residential building is not provided with 24 h staffing and there might be significant delays in personnel trained to drive the evacuation lift attending site, then driver-assisted evacuation operation should be included and may be supplemented with the recommendations given in Annex G for automatic evacuation operation.

The use of automatic evacuation operation given in Annex G should be limited to sprinkler protected buildings incorporating a stay put strategy, as the population likely to be using the lifts and the number of floors affected is likely to be low. Buildings without sprinklers and/or incorporating evacuation strategies should be restricted to driver-assisted evacuation only.

Where automatic operation is provided, the means by which the evacuation lifts enter evacuation operation mode (see Annex G) should be determined taking into account the specific configurations of all floors served by the evacuation lifts.

Automatic operation should not be used unless there is a building management system (BMS) in place to:

- a) recall the lift (see G.2.2 and G.3.2);*
- b) provide the automatic evacuation signal (see G.2.2); and*
- c) where landing calls are to be accepted only from priority floor(s) [see G.3.3.2b)], signal the priority floor(s) to the lift controller.*

The prioritization of landing call in automatic evacuation operation and the interface between the BMS and lift controls should be discussed and agreed between the building designer and lift provider.

A fire detection and fire alarm system covering the lift spaces and lift lobbies should provide the suspend service signal (G.2.2 and G.4).

NOTE 2 The recall of lifts other than firefighters lifts and evacuation lifts to an exit floor and their removal from service is described in BS EN 81-73 and BS 7273-6.'

Use of Fire-fighting Lift for Evacuation

The draft BS 9991 (2021) guidance provides additional detail on the use of fire-fighting lifts as evacuation lifts as follows. It is the intent to use the fire-fighting lift in this building for such purposes.

'The use of firefighters lifts as evacuation lifts should be determined according to the building's evacuation strategy, as follows (references quoted below are in relation to the draft BS 9991 content):

- a) For buildings designed with a stay put strategy, firefighter's lifts meeting the recommendations in Annex G may be used as evacuation lifts until the lift is recalled using the firefighters lift switch (see G.2).*
- b) For buildings designed with an evacuation strategy other than stay put, firefighter's lifts should not be used as evacuation lifts, as they might be in operational use by the attending firefighters. In these circumstances, separate dedicated evacuation lifts should be provided.*

Where dedicated evacuation lifts are located within lobbies containing firefighter's lifts, there should be a means to minimize the effect of water penetration into the evacuation lift wells in addition to the firefighters lift wells'

3.14.2 Width of Escape Stairs

The absolute minimum for escape stairs should no less than 1000mm for downward travel. For fire-fighting stairs the requirement is increased to 1100mm.

Note: It should be noted that Approved Document K requires a minimum stair width of 1200mm between enclosing walls, strings or upstands, and a minimum width of 1000mm between handrails.

The development has been designed to operate a “stay put” evacuation strategy for the residential accommodation. However, it is considered prudent to ensure that in the event that the Fire and Rescue Service should require an evacuation of all residential apartments, that the staircases provide sufficient capacity.

The total occupancy of the building (at upper levels) is anticipated to be 236 persons (on the basis that the amenity spaces are for residents-only). Both stairs would remain available for escape as they are lobbied at each level. Serving 22 upper levels the stairs each (for a width of 1200mm) have capacity for 800 persons (1600 persons total across both stairs) based on Table 13 of BS 9999 for a C1 risk profile if there was ever a need to evacuate the whole building simultaneously.

3.14.3 Enclosure of Stairs

One stair will be a fire-fighting stair within a fire-fighting shaft and will require enclosure are described in Sections 5 and 7.

The second stair will be a protected stair, enclosed in fire resisting construction (120 minutes to each side separately), leading to a final exit corridor (also 120 minutes per Section 7 of this report).

3.14.4 Construction of Escape Stairs

The flights and landings of the escape stair should be constructed of materials achieving Euroclass A2-s3,d2 or better (limited combustibility).

3.14.5 Protected Lobbies/Corridors

The requirements for protected lobbies and corridors on the residential levels of the building are described in preceding sections of this report.

A protected lobby should be provided between an escape stair and a place of special fire hazard to protect from the ingress of smoke. This lobby should have a minimum 0.4m² of permanent ventilation or be protected by a mechanical smoke control system.

It is considered that the provision of mechanical extract (as described in the preceding sections – see also Section 7.6) would fulfil this requirement to protect either stair in response to fires in adjacent ground floor areas such as the cycle store, refuse store or concierge spaces.

All ancillary accommodation, with the exception of communal lounges, common amenity areas and transformer, switchgear and battery rooms for low voltage or extra low voltage equipment, should be treated as places of special fire hazard. The cycle store and refuse store would be considered as common amenities and are not considered to be areas of special fire hazard. Requirements for fire separation and considerations for ancillary spaces more generally are summarised in this report.

3.14.6 Lift Installations

Within the building both stairs will each have a protected lobby at all levels which will afford access to an evacuation lift (see Section 3.14.1). The other lift present in the building (in the central portion of corridor) must not be used for evacuation in a fire.

3.15 Sprinklers

Sprinkler protection will be provided in accordance with BS 9251 and will be designed to meet the sprinkler hazard classification requirements of a Category 4 system in accordance with Table 1 of that standard.

For the non-residential amenity areas (at Level 17, but also applicable to the Concierge space, Commercial unit, plant rooms and cycle store) the scope of BS 9251 will remain applicable provided no such area exceeds 100m² on plan. Where this is achieved, BS 9251 will apply with modifications to the system as set out in that document depending on the use of any such space (which may include different sprinkler head types and density of water coverage).

If such areas exceed 100m² then it would be necessary to apply a BS EN 12845 system in full (including to apartments).

Therefore, it is proposed that non-residential areas will be fire-compartmented such that the 100m² limit is not exceeded (and that if this is achieved it will be appropriate to design the entirety of the sprinkler system to the BS 9251 (2021) standard (subject to MEP design confirming that this can be implemented for the proposed building)).

Such a standard will also be appropriate to partly address the requirements in BS 9991 for automatic water suppression in respect of open-plan apartments (of which additional detail is set out Section 3.7.2).

The final design and validation of the sprinkler system would be subject to the appointed 3rd party specialist sprinkler contractor in due course.



Sprinkler protection should be provided in all parts of the premises. However, unless required by a fire strategy or risk assessment, the following may be excluded:

- Bathrooms/WCs with a floor area of less than 5m² (provided that linings conform to the standards referenced in Section 5.4 of BS 9251 (2021))
- cupboards and pantries with a floor area of less than 2m² or where the least dimension does not exceed 1m
- crawl spaces
- staircases – provided that the staircases contain only materials conforming to BS EN 13501-1:2018, Class B-s3 or better for construction materials and B(fl) or better for flooring, including sub-categories such as d0, d1, d2 for construction materials and s1 and s2 for flooring, surface spread of flame and constructed as a fire-resistant separation. See also Section 3.14.4 in relation to stair construction material requirements
- lift or service shafts – provided that these contain only materials conforming to BS EN 13501-1:2018, Class B-s3 or better for construction materials and B(fl) or better for flooring (including sub-categories such as d0, d1, d2 for construction materials and s1 and s2 for flooring), surface spread of flame and constructed as a fire-resistant separation. See also Section 7.6.1 for constructional requirements in relation to smoke extract shafts
- ceiling voids (except if > 800mm)
- external balconies/terraces permanently open to the outside

For the two electrical plant rooms at ground floor level where water suppression is not appropriate it is recommended that clarity is sought with Building Control as to the provision or otherwise of automatic suppression to these areas (both of which are accessed direct from outside and do not interface internally with the building).

Sprinkler system alarm functionality should be integrated into the MEP design per BS 9251 consistent with the detection and alarm principles expressed in Section 3.5 of this fire strategy.

3.16 Protected escape routes and BS 7671:2008 + A2:2022

Electrical services should generally be installed and maintained in accordance with BS 7671:2018+A2:2022. It should be noted that Amendment 2 to the guidance, current as of 28th September 2022 and published more recently than BS 9991, places in Section 422.2 additional restrictions on the presence of cables and other electrical equipment within ‘protected escape routes’ (routes which are designed to be enclosed in fire-resistant construction for a specified time).

The recent May 2023 Corrigendum to the standard provides further clarification to Section 422.2 to the effect that ‘*cables or other electrical equipment shall not be installed in a firefighting lobby, shaft, or staircase of a protected escape route*’ unless they are part of one of the following:

- An essential fire safety or related safety system
- General needs lighting
- Socket outlets provided for cleaning or maintenance.

The building contains a firefighting shaft and firefighting lobby as well as a second protected stair and protected lobby, each of which function as escape routes and which look to fall within the above definition.

It is therefore recommended that the electrical engineer for the project be made aware by the design team of this fire strategy in order that their detailed design can be appropriately harmonised, taking into account the relevant protected enclosures and the restrictions which will apply.

3.17 General Provisions

The following general provisions should be provided to all escape routes:

3.17.1 Headroom in Escape Routes

All escape routes should have clear headroom of not less than 2m (it is understood that for the proposed design the ceilings in apartments will be at 2.4m and in corridors at 2.2m).

3.17.2 Doors on Escape Routes

All doors on escape routes should not be fitted with lock, latch or bolt fastening, and are to be provided with simple fastenings i.e. thumb turns or push pads to allow them to be open. Any security devices should be provided with an over-ride that allows them to release without a key/fob.

All security locks and/or devices fitted to a dwelling entrance or alternative exit door should be openable from the inside by a single manual operation not requiring the use of a key. Integrated elements such as locks, letter plates and security viewers should not reduce the fire resistance of the door.

Doors forming part of the means of escape from, and within, the building should:

- be fitted only with simple fastenings that can be operated from the escape side of the door without the use of a key;
- be hung clear of any change of floor level;
- be hung so that they do not reduce the effective width of any escape route across a landing;
- if opening into a corridor, be recessed to the full width of the door;
- where hung to swing both ways (double swing), or subdividing corridors, be provided with a minimum of a vision panel;

Not: For further information, see BS 8300.
- open to an angle not less than 90°.

The door of any doorway or exit should always be hung to open in the direction of escape if the number of persons that might be expected to use the door at the time of a fire is more than 60.

Where doors are hung to swing both ways (on escape routes in common areas), they should be fitted with vision panels. Vision panels are also required if the door is dividing a corridor on an escape route.

3.17.3 Emergency Lighting

Emergency escape lighting will be installed to provide temporary illumination in the event of failure of the primary power supplies to the normal lighting system. As part of the emergency lighting system, escape lighting will be provided to ensure the escape routes are sufficiently illuminated to enable occupants to escape. Additionally, emergency escape lighting will be provided as follows:

Table 11: Provisions for Emergency Lighting

Use of the building or part of the building	Areas requiring escape lighting
Residential	All common escape routes*
Office / Industrial / Storage and other non-residential	Underground or windowless accommodation
	Stairs either:
	in a central core
	that serve storey(s) more than 18m above ground level
	Internal corridors more than 30m long
	Open-plan areas of more than 60m ²

Use of the building or part of the building	Areas requiring escape lighting
Shop and Commercial	Underground or windowless accommodation
	Stairs either:
	in a central core
	that serve storey(s) more than 18m above ground level
	Internal corridors more than 30m long
	Open-plan areas of more than 60m
	All escape routes (other than the following exception) to which the public are admitted*. The exception is shops that meet all of the following:
	have a maximum of three storeys
	have no sales floor of more than 280m2
	are not a restaurant or bar
Assembly and recreation	All escape routes*
Any purpose groups	All toilet accommodation (in non-residential areas) with a minimum floor area of 8m²
	Electricity and generator rooms
	Switch room/battery room for emergency lighting system
	Emergency control rooms

* Including external escape routes.

Typical mounting height of luminaires is at least 2m as specified in BS EN 1838. This may need adjusting based on effects of glare or specific smoke control strategies.

Emergency lighting should be in accordance with BS 5266-1. Emergency lighting must be automatic and provide a minimum of 3-hour illumination.

3.17.4 Exit Signage on Common Escape Routes

Every doorway or other exit providing access to a means of escape, other than exits in ordinary use (e.g. main entrances), should be distinctively and conspicuously marked by an exit sign in accordance with BS ISO 3864-1 and BS 5499-4.

Exit signage should be located and operated in accordance with BS 5499-4. The signs designated as E001 and E002 in BS EN ISO 7010:2012+A5 should be used with the appropriate directional arrow in accordance with BS 5499-4.

Colorimetric and Photometric Requirements

Powered - internally illuminated escape route signs should be as follows:

- Colorimetric and photometric requirements specified in BS ISO 3864-4 Table 2 and the luminance contrast requirements specified in BS ISO 3864-4 Table 3 should be met.

- The minimum luminance of the safety colour green should be at least 2 cd/m² and the luminance of the contrast colour white 5 to 15 times that.
- The ratio of maximum to minimum luminance within either green or white should not exceed 10:1.
- Response times should conform to BS EN 1838.
- Durations should be the same as the Emergency Lighting.

Externally illuminated escape signs and unpowered internally illuminated escape route signs (i.e. normal lighting conditions) should meet the colorimetric and photometric requirements specified in BS ISO 3864-4 Table 1. The illuminance on any part of the face should not be less than 5 lx.

Sign Height and Viewing Distances

The maximum viewing distance normal to escape route signs should be determined from the sign height and distance factors using the recommendations given in BS 5499-4. The angle of viewing should also be considered when calculating these factors.

3.18 Primary and Secondary Power Supplies

All power supplies, electrical wiring and control equipment should be protected against fire for an appropriate period of time where the effects of fire are likely to result in the failure or incorrect operation of the life safety system.

Power and control cables should be installed in accordance with BS 8519:2020.

Where dual power supplies are recommended by the relevant British Standard or industry guide to any life safety system, the primary power source should generally be taken from the public electricity supply, with secondary power being supplied from an alternative utility supply from another substation, a generator, an uninterruptable power supply (UPS) or batteries.

The output of each power supply should be sufficient to satisfy the maximum demands of the system.

Where practicable, power supplies should be provided via two separate intakes into the building from the same external substation or via a single intake and a standby generator. Where neither of these options is technically viable, e.g. a risk assessment has been undertaken which concludes that a life safety generator would not be suitable, a single intake from the external substation may be provided as the only alternative option remaining, provided that the following recommendations are met (following guidance from BS 9991 Section 15).

- The life safety system should be connected to an independent distribution board used exclusively for that system.
- The life safety distribution board should be clearly marked at the point of isolation with a warning explaining that isolation would switch off the life safety system.
- The life safety distribution board should be located in a separate fire-resisting enclosure (with a minimum of 60 min fire-resisting construction) to the primary main electrical distribution board and should not be accessible directly from the communal areas of the building or from a part of the building where dual supply is required (such as a shaft serving an evacuation lift).
- The enclosure surrounding the primary main electrical distribution board should be provided with a minimum of 60 min fire-resisting construction.
- The substation or transformer room should be either located outside the building or separated by 120 min fire-resisting construction and directly accessible from the outside. The diverse (primary and secondary) power cables should only come together in the fire compartment housing the control panel by means of an automatic change-over switch, unless the cable route is via a fire compartment which does not open onto areas requiring protection via the relevant life safety system.

NOTE 1: Where the secondary power source is not taken from a generator, alternative utility supply or primary main electrical distribution board, and is contained within the fire compartment housing the control panel (e.g. a control panel containing battery back-up providing secondary power and control for an extra low voltage system), then secondary power cables are not required.



NOTE 2: Particular attention is drawn to the requirement in BS 7671 for suitable support of cabling to avoid obstruction of escape routes and fire-fighting access due to the failure of fixings.

If the primary power source fails, then the power supply should be automatically switched over to a secondary power source. Failure of or damage to one of the power sources should not cause the failure of the other power source or the failure of the supply of power to the system.

The electrical distribution system should conform to BS 7671, the relevant parts of BS EN 60947 and BS 7346-8.

It is understood from the present MEP design that the secondary power will be facilitated by a generator. Secondary power supplies (other than for provisions where batteries are suitable as a back-up source) will be required for the following fire safety provisions:

- Fire-fighting lift
- Evacuation lift
- Fire-fighting shaft lighting
- Sprinkler pumps / controls
- Wet riser pumps controls
- Smoke extract fans

It is expected that the fire alarm system and emergency lighting will have battery backup for the required duration, but this is to be confirmed by the MEP design.



4. B2 – Internal Fire Spread (Linings)

4.1 Functional Requirement of the Building Regulations

The functional requirement contained within Schedule 1 Part B2 of The Building Regulations states that:

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

a. Adequately resist the spread of flame over their surfaces; and

b. Have, if ignited, a rate of heat release which is reasonable in the circumstances.
- (2) In this paragraph “internal linings” mean material lining any partition, wall, ceiling, or other internal structure.

4.2 Surface Linings

The interior wall and ceiling surfaces in a building can have a significant influence on how fast a fire may develop. It is particularly important that, in circulation spaces including staircases, where the rapid spread of fire is most likely to prevent occupants from escaping, surface linings are restricted by making provision for them to have low rates of heat release and surface spread of flame.

The wall and/or ceiling linings must satisfy the classifications given in Section 20.1 of BS 9991 and Table 33 of BS 9999 when tested under the European classifications in accordance with BS EN 13501: Part 1.

Table 12: Classification of wall and ceiling linings

Area	European Class	National Class
Small rooms in residential accommodation not exceeding 4m²	D-s3, d2	3
Small rooms in non-residential accommodation not exceeding 30m²	D-s3, d2	3
Other rooms	C-s3, d2	1
Other circulation spaces	B-s3, d2*	0

*Wall coverings which conform to BS EN 15102, achieving at least class C-s3, d2 and bonded to a class A2-s3, d2 substrate, will also be acceptable.

Note 1: when a classification includes ‘s3, d2’ this means that there is no limit on the production of smoke or flaming droplets/particles.

Note 2: a product achieving a classification ‘A’ achieves a higher standard than the minimum classifications set out in the table above.

Parts of walls in rooms (not circulation spaces) may be of lower performance than stated in the table above, but no worse than class D-s3, d2. In any one room, the total area of lower performance wall lining should be less than an area equivalent to half of the room’s floor area, up to a maximum of 20m² in residential accommodation and 60m² in non-residential accommodation.

For the purposes of this requirement, a wall includes the internal surface of internal and external glazing (except glazing in doors) and any part of a ceiling which slopes at an angle greater than 70° to the horizontal.

A 'wall' does not include:

- Doors and door frames.
- Window frames and frames in which glazing is fitted.
- Architraves, cover moulds, picture rails, skirtings, and similar narrow members.
- Fireplace surrounds, mantle shelves and fitted furniture.

For the purposes of this requirement, a ceiling includes glazed surfaces, any part of a wall at 70° or less to the horizontal, the underside of a gallery or the underside of a roof exposed to the room below.

A 'ceiling' does not include

- Trap doors and their frames.
- The frames of windows or rooflights and frames in which glazing is fitted.
- Architraves, cover moulds, picture rails, exposed beams, and similar narrow members.

4.3 Light Diffusers and Roof Lights

Where thermoplastic light diffusers in suspended ceilings or roof lights are used, these should meet the guidance detailed in BS 9999 Section 34.1.2 and 34.1.3.

Lighting diffusers which form part of a ceiling which are constructed of thermoplastic material may be incorporated in ceilings to rooms and circulation spaces, but not to protected stairways, if both of the following conditions are met:

- Except for the upper surfaces of the thermoplastic panels, wall and ceiling surfaces exposed in the space above the suspended ceiling should comply with the table above.
- Diffusers should be classified as one of the following:
 - TP(a) rigid - no restrictions on their extent.
 - TP(b) - limited in their extent (refer to Table 34 and Figure 39 of BS 9999).



5. B3 – Internal Fire Spread (Structure)

5.1 Functional Requirement of the Building Regulations

The functional requirement contained within Schedule 1 Part B3 of The Building Regulations states that:

- (1) The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period.
- (2) A wall common to two or more buildings shall be designed and constructed so that it adequately resists the spread of fire between those buildings.
- (3) To inhibit the spread of fire within the building, it shall be sub-divided with fire-resisting construction to an extent appropriate to the size and intended use of the building comprising either or both of the following –

a. Sub-division of the building with fire-resisting construction.

b. Installation of suitable automatic fire suppression systems.
- (4) The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.

5.2 Loadbearing Elements of Structure

The period of fire resistance required is linked to the risk profile for the building taking into account the height of the top floor, depth of any basement and whether the building is sprinklered or not.

Where any element supports another the supporting element should possess at least the resistance of the other which it is supporting.

In accordance with Table 4 of BS 9991 it will require **120 minutes fire resistance applied to the structure.**

Structure that only supports the roof may be excluded from the definition of element of structure (and therefore not fire rated) unless:

- The structure is essential to maintain the stability of the building.
- The roof serves as a floor (i.e. supporting plant) or
- Its failure leads to unreasonable or disproportionate damage that could render the building inoperative for a prolonged period.

5.3 Compartmentation

Compartment walls and floors should form a complete barrier to fire between the compartments they separate. Where a compartment wall or floor meets another compartment wall or external wall the junction should maintain the fire resistance of the compartmentation. Key requirements are as follows:

- In accordance with Table 28 in BS 9999, the maximum floor area of any one storey in the building or any one storey in a compartment for a multi storey Cii1 building is unlimited, so long as the requirements of 'Typical Compartmentation Provisions' (below) are also met.
- As the building is greater than 30m, every floor will be a compartment floor.

5.3.1 Typical Compartmentation Provisions

Compartmentation in residential buildings is of fundamental importance to the safety of the occupants. The development has been designed to operate a 'stay put' evacuation strategy. Such a strategy relies on the compartmentation between units and occupancies protecting those occupants for a sufficient period of time for the Fire and Rescue Service to arrive and to commence fire-fighting operations.

Compartment walls should be able to accommodate the predicted deflection of the floor. This should be achieved in one of the two following ways:

- a head detail should be provided between the compartment wall and the floor, which is capable of deforming while maintaining its integrity when exposed to a fire; or
- the design of the compartment wall should be such that it maintains its integrity by resisting the additional vertical load from the floor above when forced to sag under fire conditions.

The table below sets down typical compartmentation provisions for the scheme. Where walls are shared between fire separating elements, the higher standard of fire rating should be applied to the shared wall.

Table 13: Fire resistance requirements

Area	Above Ground Storeys	
	Fire resistance of construction	Fire resistance of any doors (Integrity only)*
Structural frame, beam, or column	R 120 to exposed faces	N/A
Loadbearing wall	R 120 to each side separately	Based on location
Floors between a shop and flat above	REI 120 from the underside	FD120
Floors (not mentioned above) – including compartment floors	REI 120 from the underside	FD120
Any part of an external wall a maximum of 1000mm from any point on the relevant boundary	REI 120 to each side separately	FD120
Any part of an external wall a minimum of 1000mm from the relevant boundary	RE 120 and REI 15 from inside the building (if required to fulfil protected area limits – See Section 6)	FD120 (If required to fulfil protected area limits – See Section 6)
Any part of an external wall beside an external escape route	RE 30 from inside the building	FD30
Compartment walls separating occupancies	REI 120 to each side separately	FD 120S
Between flats / apartments on same floor	REI 60 to each side separately	FD30S (Doors separating flats from common spaces)
Compartment walls	REI 120 to each side separately	FD120S
Any glazing in a protected shaft (excluding any fire-fighting shaft) which separates the shaft from a protected lobby or corridor	E 30 to each side separately	FD30
Any other part between a protected shaft and a protected lobby/corridor	REI 30 to each side separately	FD30
Any part of a protected shaft not previously described	REI 120 to each side separately	FD120
Enclosure to a protected stairway	REI 120 to each side separately	FD60S
Enclosure to a lift shaft	REI 120 to each side separately	FD60



Area	Above Ground Storeys	
Fire-fighting shafts	REI 120 from the side remote from the shaft	FD60S
Construction that separates fire-fighting shaft from rest of building	REI 60 from the shaft side	FD60S
Construction that separates fire-fighting stair, fire-fighting lift shaft and fire-fighting lobby	REI 60 to each side separately	FD60S
Fire-fighting shaft access corridor	REI 120 to each side separately	FD60S
Enclosure to a protected lobby	REI 30 to each side separately	FD30S
Enclosure to a protected corridor	REI 30 to each side separately	FD20S
Sub-division of a corridor	REI 30 to each side separately	FD20S
Construction that encloses places of special fire hazard**	REI 30 to each side separately	FD30
Fire resisting sub-division	REI 30 to each side separately	FD20S
Enclosure in a flat to a protected entrance hall, or to a protected landing	REI 30 to each side separately	FD20
Cavity barriers	E 30 and EI 15 to each side separately	FD30
Ceilings	EI 30 from the underside	FD30
Ducts passing through cavity barriers	E 30 from the outside	FD30
Casing around a drainage system	EI 30 from the outside	FD30

* S = Smoke resisting door, R = Loadbearing, E = Integrity, I = Insulation

**but see Table 14 below

Rooms of special fire hazard and ancillary areas not itemised in Table 13 will be protected as follows (noting Table 15 of the current BS 9991, the draft BS 9991 (2021) guidance contains additional detail on specific items which are proposed to be followed per the table below where these are enhanced over the current BS 9991):

Table 14: Fire resistance requirements for rooms of special fire hazard and ancillary areas

Type	Requirement	Fire Door Resistance
Communal Amenity Lounges – between lounges	REI 60	FD30S
Communal Amenity Lounges – between lounge and common residential corridors	REI60	FD30S
Staff / Comms rooms	REI 30	FD30S

Type	Requirement	Fire Door Resistance
Transformer, switchgear and battery rooms for low voltage or extra low voltage equipment	REI 30	FD30S
Engineering services other than those in following table row:	REI 60	FD60S
Engineering services installation rooms housing fixed internal combustion engines Boiler rooms and fuel storage spaces Transformer and switchgear rooms for equipment above low voltage	REI 120	FD120S
Refuse Storage areas	REI 120	FD120S
Cycle Store	REI 30	FD30S
Sprinkler / Wet Riser Rooms (to be enclosed in masonry construction)	REI 60	FD60S
Rooms housing life safety services	REI 120	FD60S

5.3.2 Fire Doors

Fire doors should normally be self-closing unless they give access to cupboards or service risers, in which case they should be kept locked. Fire doors should meet the specified level of integrity but do not usually need to be insulated as there is no fire load immediately adjacent to a door.

Doors installed on site should conform, in dimensions and workmanship, to the manufacturer’s specification for the appropriate fire resistance test report/assessment. Doors should be hung to ensure a good fit to the frame when closed, and the junction between door assembly and surrounding structure should be adequately sealed.

Security requirements should not override the need to provide adequate means of escape.

Integrated elements such as locks, letter plates and security viewers should not reduce the fire resistance of the door.

5.3.3 Refuse Chutes and Storage Chambers

The refuse storage chamber should be sited and constructed in accordance with BS 5906. It should not be situated within a protected stairway or protected lobby and will be approached as per one of the following conditions:

- be directly from the open air.
- be through a protected lobby with a minimum 0.2m² of permanent ventilation.
- not sited next to escape routes or final exits.

Each of the above is adhered to in the design. With regard to the second bullet point it is considered that each internal lobby immediately outside the refuse storage rooms should be provided with a minimum of 0.2m² of permanent ventilation routed to outside.

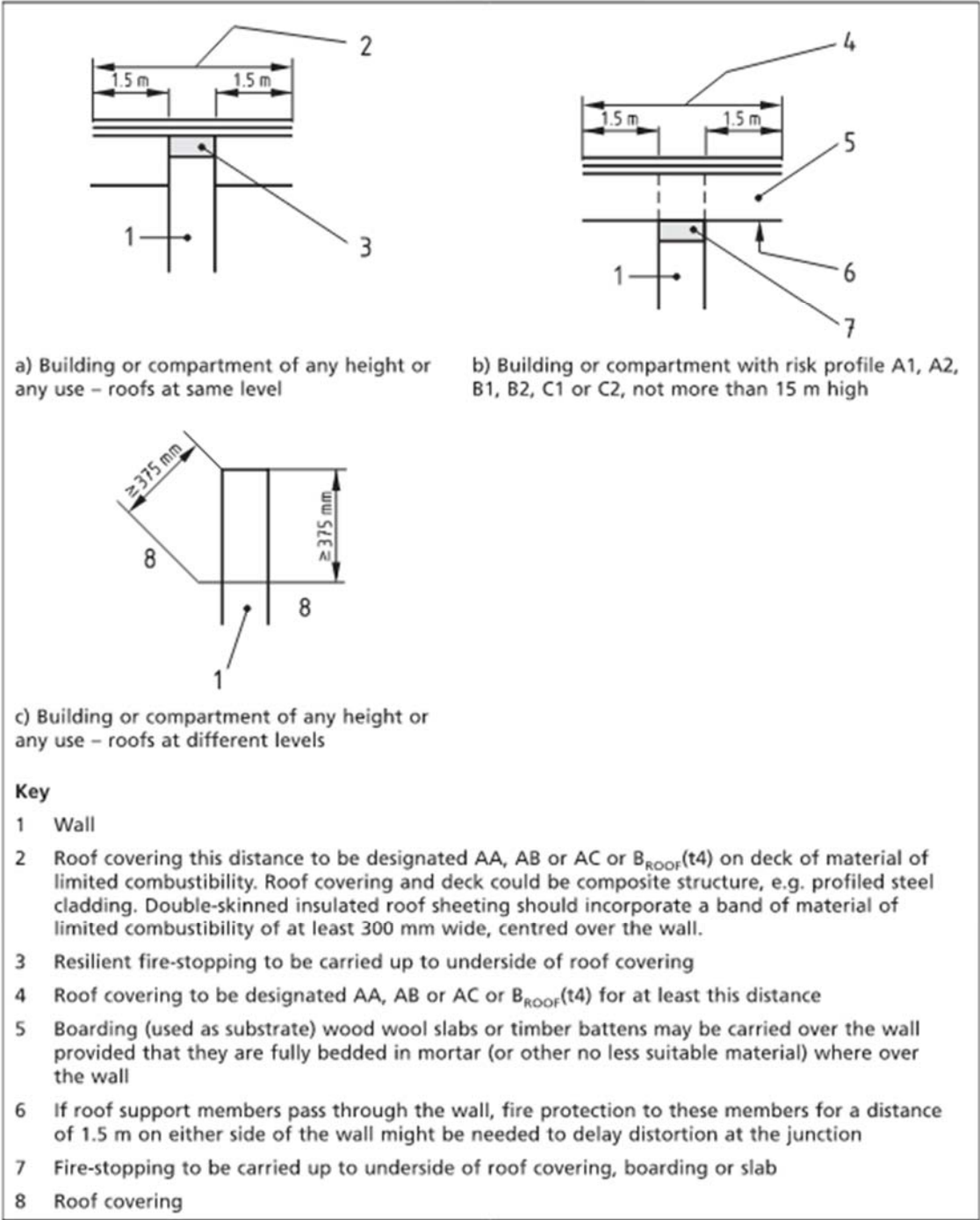


5.3.4 Securing of External Wall Cladding

Maze Fire is not aware of the external wall construction detail and have not been engaged to review this detail. If external cladding is used, this should be restrained at the junction of compartment walls and floors to resist movement in the event of fire.

5.3.5 Junction of Compartment Wall with Roof

The detail at the head of a compartment wall must not permit fire spread via materials from a compartment on fire to an adjacent compartment. Fire stopping at the head of the wall must also be appropriate. Figure 30 in BS 9999 shows the requirements for typical construction at the head of a compartment wall where it junctions with the roof. This diagram is reproduced in the Figure below.



5.3.6 Risers / Service Ducts / Shafts

Where any service risers pass through compartment floors, they should either be treated as protected shafts and enclosed in fire resisting construction equal to the compartment floor through which they are passing, or they should be fire stopped in line with the compartment floors.

5.3.7 Cavity Barriers

There are limits to the extent to which any cavities can exist, for example between walls and cladding and between ceilings and roofs. Cavity barriers should close gaps around windows and separate cavities on compartment lines.

Cavity barriers shall be provided in floor and ceiling voids (where these are present) to sub-divide the concealed space and reduce the potential for fire or smoke to spread over large areas of the building unchecked. They shall be located not more than 20m apart in the large open plan spaces and they shall be aligned with partition walls wherever practicable. In areas where there are smaller rooms cavity barriers shall be provided such that no undivided void is greater than 20m in any one direction. The maximum distance between cavity barriers must be reduced to 10m if the surfaces of the cavity do not have a Class 0 or Class 1 surface spread of flame rating.

Cavity barriers shall also be provided at the junction of compartment walls and other construction where there is a void and in other construction where there are large, concealed voids and around openings.

Cavity barriers shall be constructed to achieve at least 30 minutes fire resistance for integrity and 15 minutes fire resistance for insulation.

Where combustible insulations or other materials are in close proximity to the cavity barrier, the fire resistance of the cavity barriers will be increased to 30 minutes integrity and 30 minutes insulation (although note that no combustible materials are permitted in the external walls to meet Regulation 7 as detailed in the following B4 section).

Cavity barriers should generally be provided in accordance with Figure 24 of BS 9991 (reproduced in the following figure).

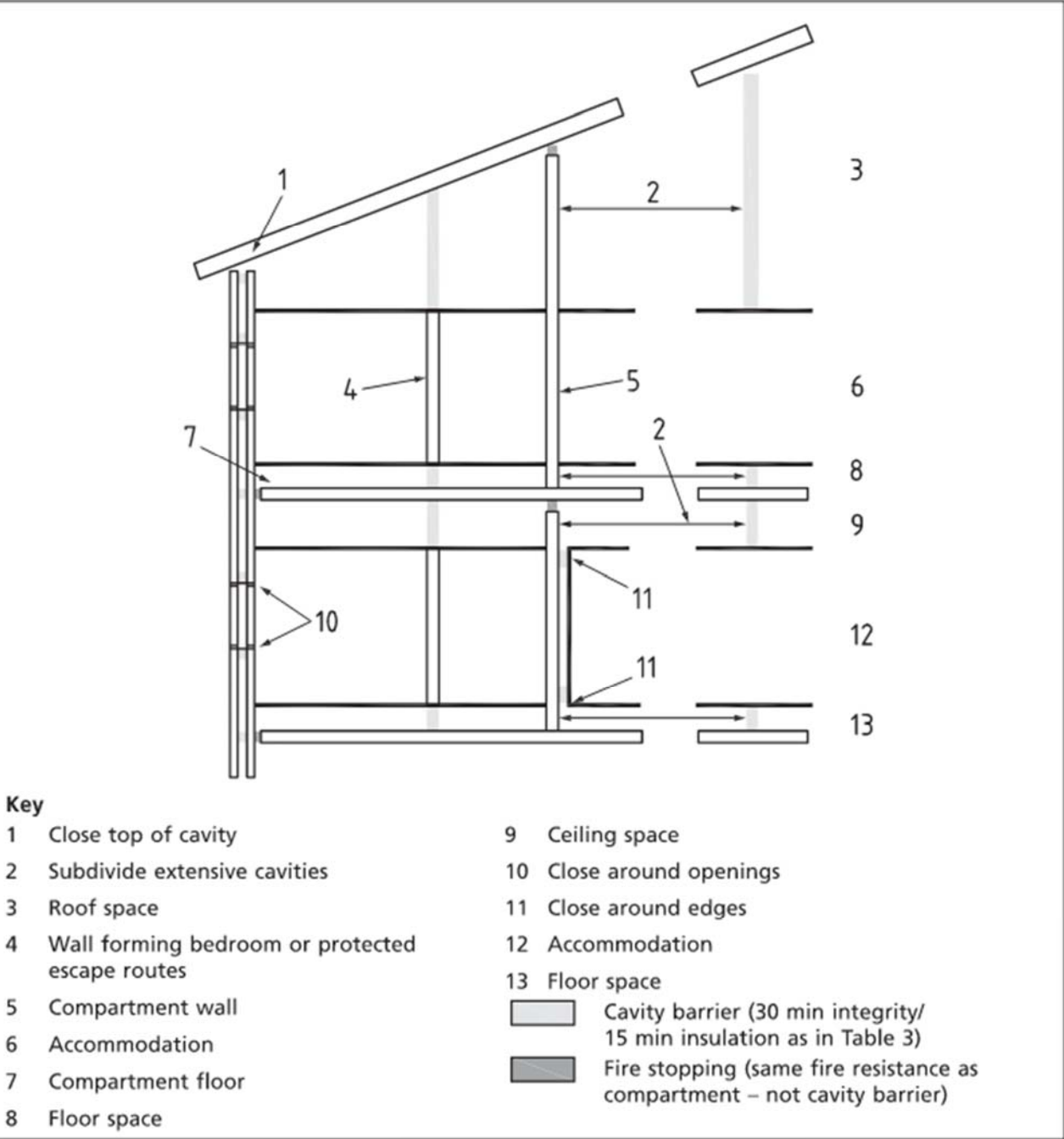


Figure 13: Cavity barrier and fire-stopping provision (Figure 24 of BS 9991)

Cavity barriers should be provided to close the edges of any cavities, including around openings* (but see also note below: Figure 25 of BS 9991). As set out in BS 9991, cavity barriers are also required:

- at the junction between an external cavity wall* and every compartment floor and compartment wall and
- at the junction between an internal cavity wall* and every compartment floor, compartment wall or other wall or door assembly which forms a fire resisting barrier.

*This provision is not required where the cavity wall conforms with Figure 25 of BS 9991. This figure is reproduced below.

Every cavity barrier should be constructed to provide at least 30 min fire resistance. It may be formed by any construction provided for another purpose if it meets the provisions for cavity barriers. Cavity barriers in a stud wall or partition, or provided around openings, may be formed of:

- steel at least 0.5 mm thick or
- timber at least 38 mm thick or
- polythene-sleeved mineral wool, or mineral wool slab, in either case under compression when installed in the cavity or
- calcium silicate, cement-based or gypsum-based boards at least 12 mm thick.

Further information regarding the requirements for construction and fixing of cavity barriers is set out in Section 19 of BS 9999, including requirements to specific configurations and reaction to fire requirements for surfaces within or adjacent to cavities.

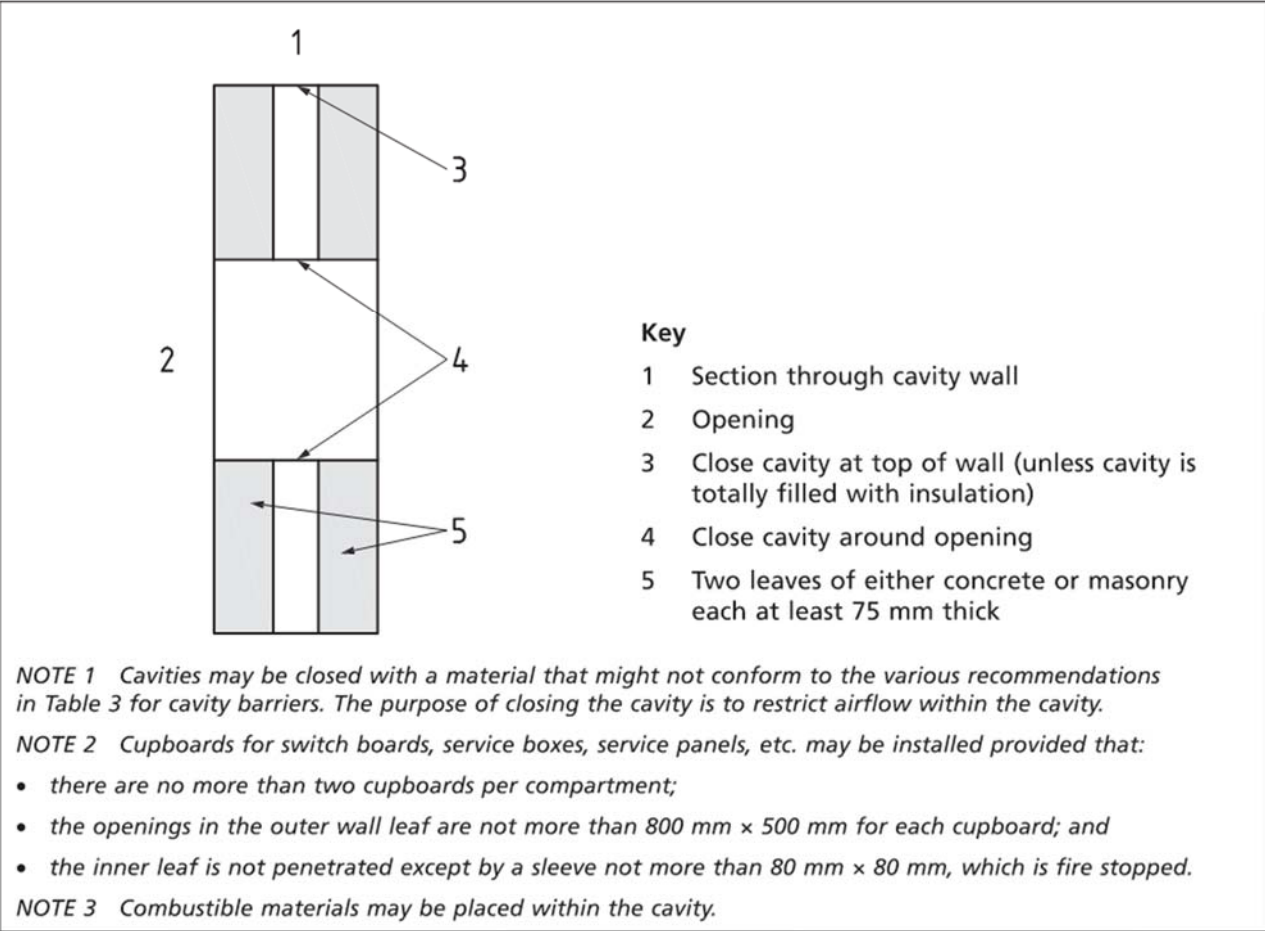


Figure 14: Cavity wall excluded from provisions for cavity barriers (Figure 25 of BS 9991)

5.3.8 Installation of Ductwork Systems

Ductwork that passes through escape routes or breaches compartmentation will be fire rated in line with the methods outlined in Section 32.5.2 of BS 9999 (in the absence of specific guidance in BS 9991) as follows:

- Method 1 – thermally actuated fire dampers.
- Method 2 – fire-resisting enclosures.
- Method 3 – protection using fire-resisting ductwork.
- Method 4 – automatically actuated fire and some dampers triggered by smoke detectors.



In such cases, both fire dampers and fire and smoke dampers shall be tested to BS EN 1366-2:1999 and be classified to BS EN 13501-3: 2005. They require an E (fire dampers) or ES (smoke and fire dampers) classification to be the same fire resistance standard as the wall/floor through which the duct passes.

Method 1 should not be used where ductwork passes through or serves an escape route, as large volumes of smoke can pass through without activation of the thermal devices and E-rated fire dampers have no performance rating in terms of smoke resistance.

Methods 2 and 3 should be used only where ductwork does not serve the escape route it passes through.

Method 4 may be used for extract ductwork passing through the enclosures of protected escape routes, both where the ductwork does and does not serve the escape route.

5.3.9 Protection of Openings

Where services penetrate compartment walls, floors and between the junction with the walls or façade; suitable fire stopping should be provided.

Pipes which pass through a fire separating element (unless within a protected shaft) will meet the following provisions:

Option 1 - proprietary seals (any pipe diameter)

Provide a proprietary sealing system which has been shown through test evidence to maintain the fire resistance of the compartmentation.

Option 2 – pipes with a restricted diameter

When a proprietary sealing system is not used, fire stopping may be used around the pipe, where every effort is made to keep the opening as small as possible. Any mastic used for the protection of pipe penetrations should be compatible with the pipework material and size to maintain the prescribed standard of fire resistance, tested and installed in accordance with the manufacturer’s instructions.

The nominal internal diameter of the pipe should not be greater than that detailed in Table 10 of BS 9991 (see also Figure 16 below).

Table 10 Maximum nominal interior diameter of pipes passing through a compartment wall/floor			
Situation	Dimensions in millimetres		
	Maximum nominal internal diameter		
	a) Non-combustible material ^{A)}	b) Lead, aluminium, aluminium alloy, PVC ^{B)} , fibre-cement	c) Any other material
1) Structure (but not a wall separating buildings) enclosing a protected shaft which is not a stairway or a lift well	160	110	40
2) Compartment wall or compartment floor between flats	160	160 (stack pipe) ^{C)} 110 (branch pipe) ^{C)}	40
3) Any other situation	160	40	40
^{A)} A non-combustible material (such as cast iron or steel) which, if exposed to a temperature of 800 °C, does not soften or fracture to the extent that flame or hot gas passes through the wall of the pipe.			
^{B)} uPVC pipes conforming to BS 4514 and uPVC pipes conforming to BS 5255.			
^{C)} These diameters are only in relation to pipes forming part of an above-ground drainage system and enclosed as shown in Figure 29. In other cases the maximum diameters against situation 3) apply.			

Figure 15: Table 10 of BS 9991

Option 3 – sleeving

A pipe of lead, aluminium, aluminium alloy, fibre-cement, or uPVC, with a maximum nominal internal diameter of 160mm, may be used with a sleeving of non-combustible pipe as per Figure 30 of BS 9991.

5.3.10 Above Ground Drainage Systems

Where a compartment floor is carried through the enclosure to an above-ground drainage system (e.g., SVP stack) then the pipe diameters and materials noted in Item 2b of Table 10 of BS 9991 will be permissible subject to footnote C of the table being observed. This requires enclosure and fire-stopping to the degree set out in Figure 29 of BS 9991 (excerpted below).

With respect to the casing construction the more recent ADB Vol.1 Diagram 9.1 gives further guidance as follows:

- The enclosure should meet all of the following conditions:
 - Be bounded by a compartment wall or floor, an outside wall, an intermediate floor or a casing
 - Have internal surfaces (except framing members) of class B-s3, d2 or better.
- Note: when a classification includes ‘s3, d2’, this means that there is no limit set for smoke production and/or flaming droplets/particles).
 - Not have an access panel which opens into a circulation space or bedroom.
 - Be used only for drainage or water supply or vent pipes for a drainage system.
- The casing should meet all the following conditions.
 - Be imperforate except for an opening for a pipe or an access panel.
 - Not be of sheet metal.
 - Not have fire resistance less than E 30 (including any access panel).
- The opening for a pipe, in either the element of structure or the casing, should be as small as possible and fire-stopped around the pipe

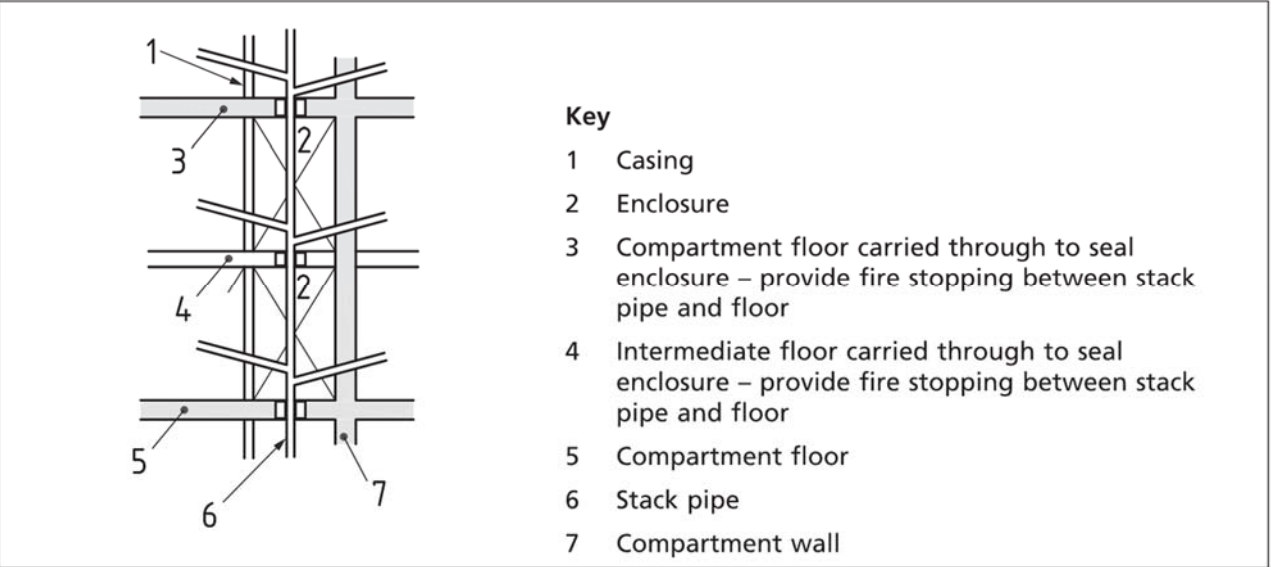


Figure 16: Enclosure for drainage or water supply pipes (Figure 29 of BS 9991)

5.3.11 Fire Stopping

Penetrations through lines of fire-resisting separation will be fire-stopped to achieve the same fire resistance as the separation.

All pipes, ductwork and services passing through fire-resisting separations will be either enclosed in fire-resisting construction (i.e. shafts) of matching fire resistance or provided with fire dampers of matching fire resistance. Certain small-diameter pipes require only fire-stopping around the pipe, dependent on pipe material and the type of fire-resisting barrier penetrated.

The ASFP Red Book provides information on fire stopping and penetration seals, the following figure is recreated from the Red Book and gives examples of where fire stopping is typically required.

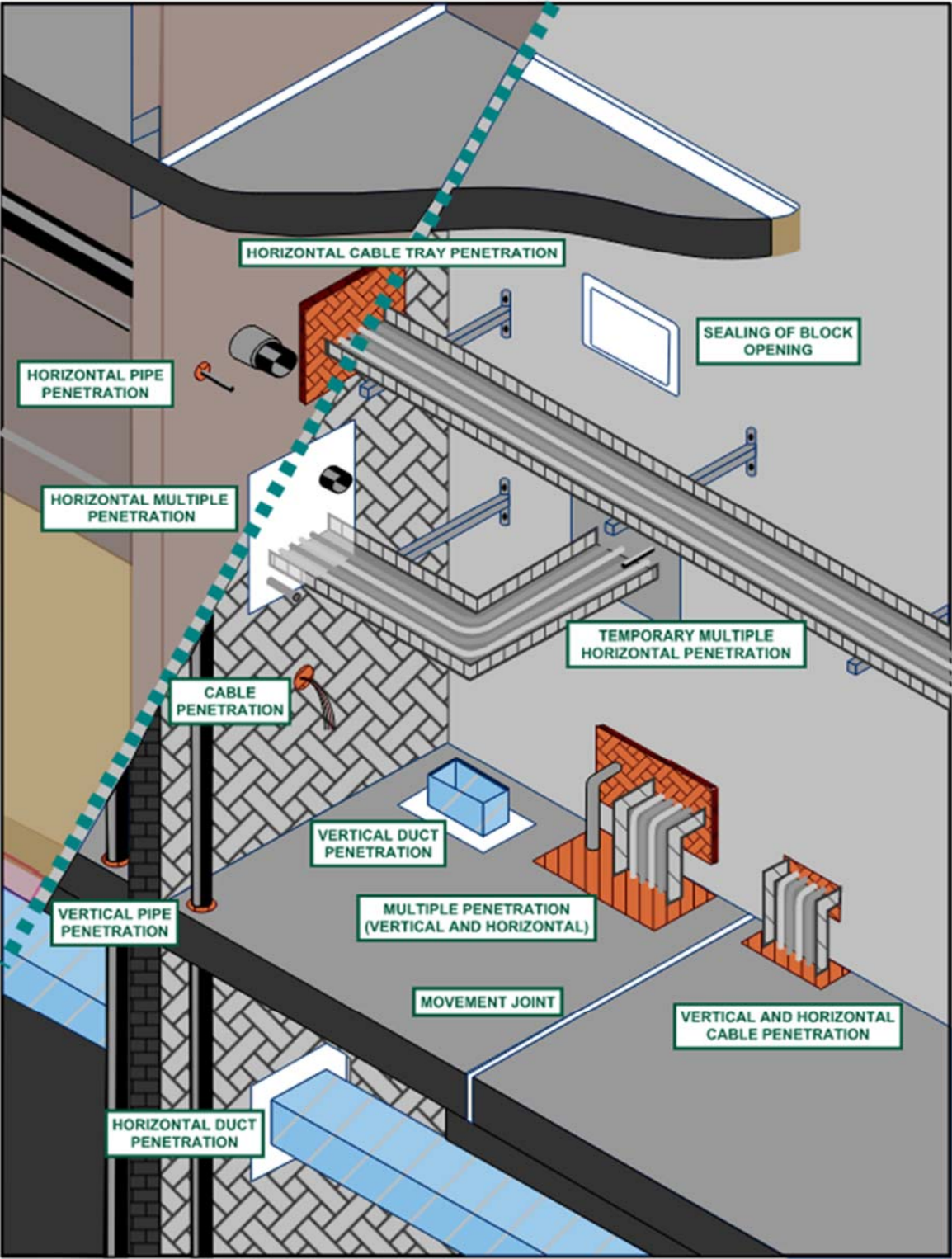


Figure 17: Examples of locations where fire stopping should be provided (Recreated from ASFP Red Book)

6. B4 – External Fire Spread

The functional requirements of Part B4 to the Building Regulations 2010 (as amended) are set down for clarity below.

Some of the supporting content herein is with regard to recent changes in the regulations (December 2018) in relation to Residential (dwellings) buildings over 18m in height.

References to applicable guidance within this section are made with regard to the amended Approved Document B Volume 1 - 2019 (ADB V2 2019 with 2022 amendments).

The building is classed as a ‘relevant building’ for the purposes of the application of Regulation 7 as set out below.

6.1 Functional Requirement of the Building Regulations

The functional requirement contained within Schedule 1 Part B4 of The Building Regulations states that:

- (1)

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

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

6.1.1 Regulation 7 – Relevant Buildings Over 18 Metres

Regulation 7 introduced by The Building (Amendment) Regulations states that:

- (1)

Building work shall be carried out—

a.

with adequate and proper materials which—

i.

are appropriate for the circumstances in which they are used,

ii.

are adequately mixed or prepared, and

iii.

are applied, used, or fixed so as adequately to perform the functions for which they are designed; and

b.

in a workmanlike manner.
- (1A)

Building work shall be carried out so that relevant metal composite material does not become part of an external wall, or specified attachment, of any building.
- (2)

Subject to paragraph (3), building work shall be carried out so that materials which become part of an external wall, or specified attachment, of a relevant building are of European Classification A2-s1, d0 or Class A1 (classified in accordance with the reaction to fire classification).
- (3)

Paragraph (2) does not apply to—

a.

cavity trays when used between two leaves of masonry;

b.

any part of a roof (other than any part of a roof which falls within paragraph (iv) of regulation 2(6)) if that part is connected to an external wall;

c.

door frames and doors;

d.

electrical installations;
- da.
- fibre optic cables

e.

insulation and water proofing materials used below ground level or up to 300mm above that level;

f.

intumescent and fire stopping materials where the inclusion of the materials is necessary to meet the requirements of Part B of Schedule 1;

g.

membranes;

- h.

seals, gaskets, fixings, sealants and backer rods;
- (ha)

components associated with a solar shading device, excluding components whose primary function is to provide shade or deflect sunlight, such as the awning, curtain or slats
- i.

thermal break materials where the inclusion of the materials is necessary to meet the thermal bridging requirements of Part L of Schedule 1; or
- j.

window frames and glass*; or
- k.

materials which form the top horizontal floor layer of a balcony which are of European Classification A1fl or A2fl-sl (classified in accordance with the reaction to fire classification provided that the entire layer has an imperforate substrate under it
- (4)

In this regulation—

a.

a “relevant building” means a building with a storey (not including roof-top plant areas or any storey consisting exclusively of plant rooms) at least 18 metres above ground level and which—

i.

contains one or more dwellings;

ii.

contains an institution; or

iii.

contains a room for residential purposes (excluding any room in a hostel, hotel, or boarding house); and

b.

“above ground level” in relation to a storey means above ground level when measured from the lowest ground level adjoining the outside of a building to the top of the floor surface of the storey.

*Note: Section 10.21d of Approved Document B Volume 1 (2019 as amended 2022) also notes that laminated glass in windows is exempt from Regulation 7(2).

6.2 External Wall Construction

6.2.1 General

The guidance in this section is designed to reduce the risk of vertical fire spread as well as the risk of ignition from flames coming from adjacent buildings. To review fire resistance requirements for external walls, see Section 5.3.1.

6.2.2 Combustibility of External Walls

External walls should be constructed using a material that does not support fire spread and therefore endanger people in or around the building. Flame spread over or within an external wall construction should be controlled to avoid creating a route for rapid fire spread bypassing compartment floors or walls. This is particularly important where a stay put strategy is in place.

External wall surfaces near to other buildings should not be readily ignitable, to avoid fire spread between buildings.

The external walls should meet the prescribed requirements described in Regulation 7(2) of the Building Regulations.

6.2.3 External Surfaces

The external surfaces of walls should meet the provisions in Figure 17 of BS 9991, but where Regulation 7(2) applies, that regulation prevails over these provisions. The requirements are summarised below:

Table 15: Reaction to fire performance of external surface of walls

Less than 1000mm from the relevant boundary	1000mm or more from the relevant boundary
Class A2-s1, d0 or better	Class A2-s1, d0 or better



6.2.4 Materials / Products

In a building with a storey 18m or more in height, any insulation product, filler material (such as the core materials of metal composite panels, sandwich panels and window spandrel panels but not including gaskets, sealants and similar) etc. used in the construction of an external wall should be of Class A2-s1,d0 or A1, as Regulation 7(2) prevails.

Note 1: Whilst the guidance above applies to any insulation product, filler material (not including gaskets, sealants and similar) etc. used in the construction of an external wall, consideration should be given to the choice of material used for any other parts of an external wall or attachments to the wall which could impact on the risk of fire spread over the wall.

6.2.5 Cavities and Barriers

Cavity barriers should have sufficient fire test evidence that they will operate in the proposed façade system. They should be provided in accordance with Section 5.3.7 of This Report. Surfaces which face into cavities should also meet the provisions of Table 10.1 of ADB, and provisions in Section 5.3.7, but where Regulation 7(2) applies, that regulation prevails.

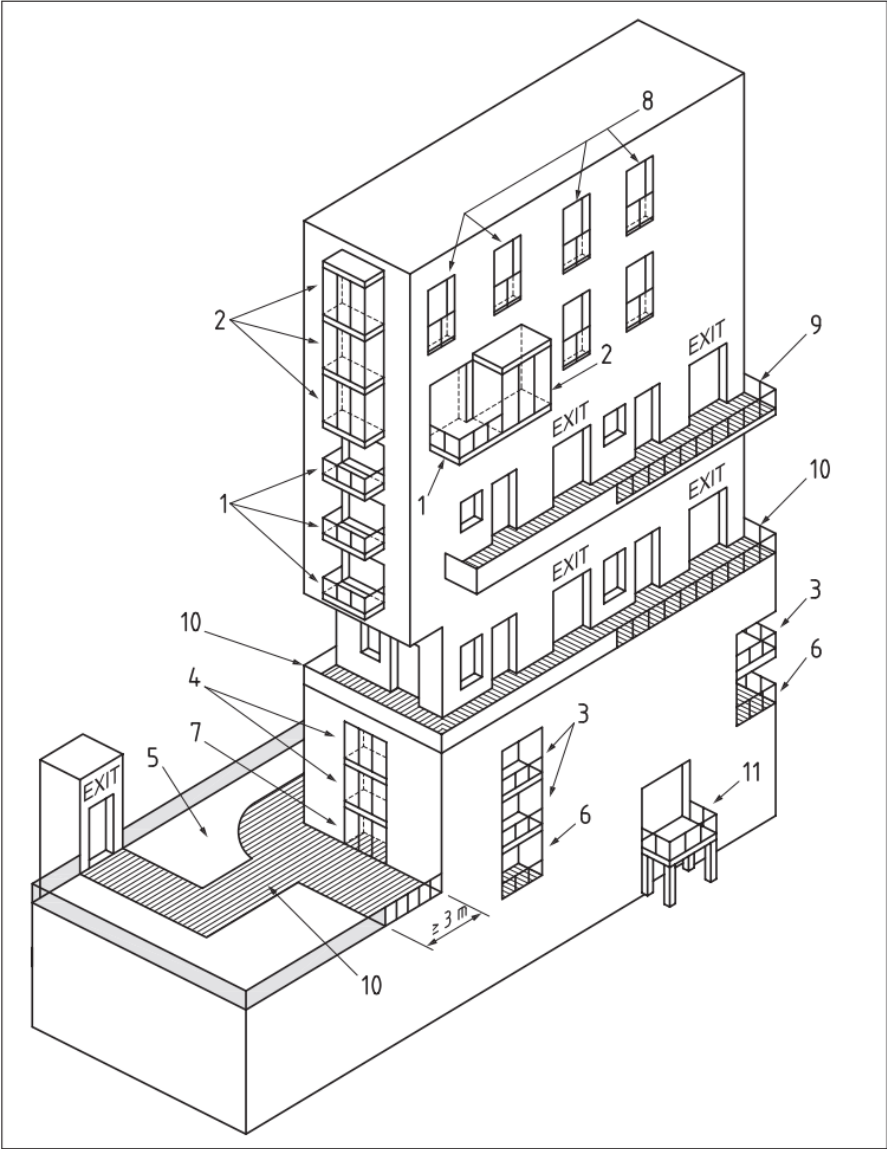
Materials which are stated as exempt per Regulation 7 do not need to meet this requirement, but attention should be paid to ADB V1 Section 10.21 where further criteria is outlined such as for membranes which when used as part of the external wall construction above ground level should achieve a minimum of class B-s3, d0.

6.2.6 Maze Fire Testing Recommendation

It is recommended that on top of strict compliance with Regulation 7, full fire test evidence of the proposed façade system be carried out to demonstrate that compliance with BR135 (currently via a BS 8414 Part 1 or Part 2 fire test) is met along with compliance with the requirements of Regulation 7.

6.2.7 Balconies and Roof Terraces

The proposed scheme does not include balconies. However, a roof terrace for the use of residents is proposed at Level 17. BS 8579 (2020) provides suitable best practice guidance in respect of fire performance of terrace materials where these are in proximity to an extensive vertical façade (on residential buildings). Figure 1 of that document, reproduced as Figure 18 below, notes that where terrace coverings are within 3m of the adjacent vertical façade (item 10 on the figure) they should meet a performance requirement of B_{ROOF}(t4) or better (note also that per Section 6.5 of this strategy it will be necessary also to meet performance requirements in relation to proximity to adjacent site boundaries).



Key		
1	Projecting open balcony	9 Access balcony [can be referred to as “access deck” (see 3.1) or “walkway”]
2	Projecting enclosed balcony	10 Access terrace [can be referred to as “access deck” (see 3.1) or “walkway”]
3	Recessed open balcony	11 Free-standing balcony
4	Recessed enclosed balcony	Terrace, access terrace and access balcony surfaces with fire performance B _{ROOF} (t4) or better (see Clause 12).
5	Terrace	Imperforate (as BS 9991) guarding materials reaction to fire class as in Clause 12
6	Recessed open terrace	Other guarding materials reaction to fire class as in Clause 12
7	Recessed enclosed terrace	Other guarding
8	Juliet guarding	
NOTE National regulations might cover roof performance in relation to relevant boundaries.		

Figure 18: BS 8579 Figure 1 ‘balconies and terraces’

Designation of covering of roof or part of roof ^{A)}	Distance of roof from any point on relevant boundary			
	Less than 6 m	At least 6 m	At least 12 m	At least 20 m
AA, AB or AC	Acceptable	Acceptable	Acceptable	Acceptable
BA, BB or BC	Not acceptable	Acceptable	Acceptable	Acceptable
CA, CB or CC	Not acceptable	Acceptable ^{B), C)}	Acceptable ^{B)}	Acceptable
AD, BD (or CD ^{B)})	Not acceptable	Acceptable ^{C)}	Acceptable	Acceptable
DA, DB, DC (or DD ^{B)})	Not acceptable	Not acceptable	Not acceptable	Acceptable ^{C)}

NOTE 1 Unwired glass at least 4 mm in thickness has an AA designation.

NOTE 2 See Table 9 for limitations on plastic roof lights.

^{A)} The performance of roof coverings is designated by reference to the test methods given in BS 476-3 (or DD ENV 1187).

^{B)} Not acceptable on buildings with a volume of more than 1 500 m³.

^{C)} Acceptable on buildings not listed in Footnote B, if part of the roof is no more than 3 m² in area and is at least 1.5 m from any similar part, with the roof between the parts covered with a material of limited combustibility.

Figure 19: Limitations on roof coverings (Table 8 BS 9991)

In addition, roof covering products (and/or materials) defined in Commission Decision 2000/553/EC of 6 September 2000, implementing Council Directive 89/106/EEC, can be considered to fulfil all of the requirements for the performance characteristic ‘external fire performance’ without the need for testing, provided that any national provisions on the design and execution of works are fulfilled, and can be used without restriction.



7. B5 – Access and Facilities for the Fire Service

7.1 Functional Requirement of the Building Regulations

The functional requirement contained within Schedule 1 Part B5 of The Building Regulations states that:

- (1) *The building shall be designed and constructed so as to provide reasonable facilities to assist firefighters in the protection of life.*
- (2) *Reasonable provision shall be made within the site of the building to enable fire appliances to gain access to the building.*

7.2 Provision of Fire-Fighting Shafts

7.2.1 General Provisions

Relevant requirements, as specified in BS 9991, for the provision of fire-fighting shafts are as follows:

- Buildings with floor levels more than 18m above fire and rescue service vehicle access level should be provided with fire-fighting shafts containing fire-fighting lifts. The net internal area of any given floor does not exceed 900m² (max. of 730m² based on referenced plans) therefore only one of the two stairs is constructed as a fire-fighting shaft with fire-fighting lift and lobby*
- The fire-fighting shaft should serve all floors through which it passes.
- The fire-fighting shaft should be located to meet the maximum hose distances. As the development will be sprinklered, sufficient fire-fighting shafts are required such that every part of every storey is no more than 60m from a fire main.

It is recognised that the internal layouts on the referenced drawings are indicative at present for the apartments and are not yet detailed for the non-residential spaces. Where this is the case, the distance should be measured at two-thirds of the direct distance (40m).

Based on the current plans and measured on a direct line through the indicative layouts, the maximum hose distance from the fire-fighting stair to the furthest point of an apartment is ~30 – 35m. Therefore, the hose distances are well within the 60m limit based on the provision of one fire-fighting shaft.

- Per BS 9990 a wet rising main is required as there are floors higher than 50m above ground level.
- Outlets from the wet fire main should be located in the fire-fighting stairway.
- Smoke control should be provided as per Section 14.2.1 of BS 9991 (see also Section 7.6 of this report).
- Doors of a fire-fighting lift landing should be a maximum of 7.5m from the door to the fire-fighting stair.
- Only services associated with the fire-fighting shaft, such as ventilation systems and lighting for the fire-fighting shafts, should pass through or be contained within the fire-fighting shaft.

*It is anticipated (based on the draft 2021 content) that the upcoming revision of BS 9991 will retain the same principles in relation to requirements governing number of fire-fighting shafts. In support of the proposed arrangements, it may be noted that the second stair will be enclosed to a similar standard as the fire-fighting stair (120 minutes) with similar lobby and smoke ventilation protection together with an evacuation lift.

Each of the above provisions is to be met in the design by the designation of the southern stair core as a fire-fighting shaft.

Whilst typical components of a fire-fighting shaft are shown in Figure 20 it should be noted that per earlier sections of this strategy report, a fire-fighting lobby is to be provided to the fire-fighting shaft in this building which will also function as an evacuation lift lobby, with the fire-fighting lift also accessed from this lobby and able to function as an evacuation lift (see Section 3.14.1). In this case therefore the 120-minute fire-fighting shaft enclosure will encompass both the lift and the associated lobby, with 60 minutes fire separation required between the lobby and the adjacent stair and lift respectively.

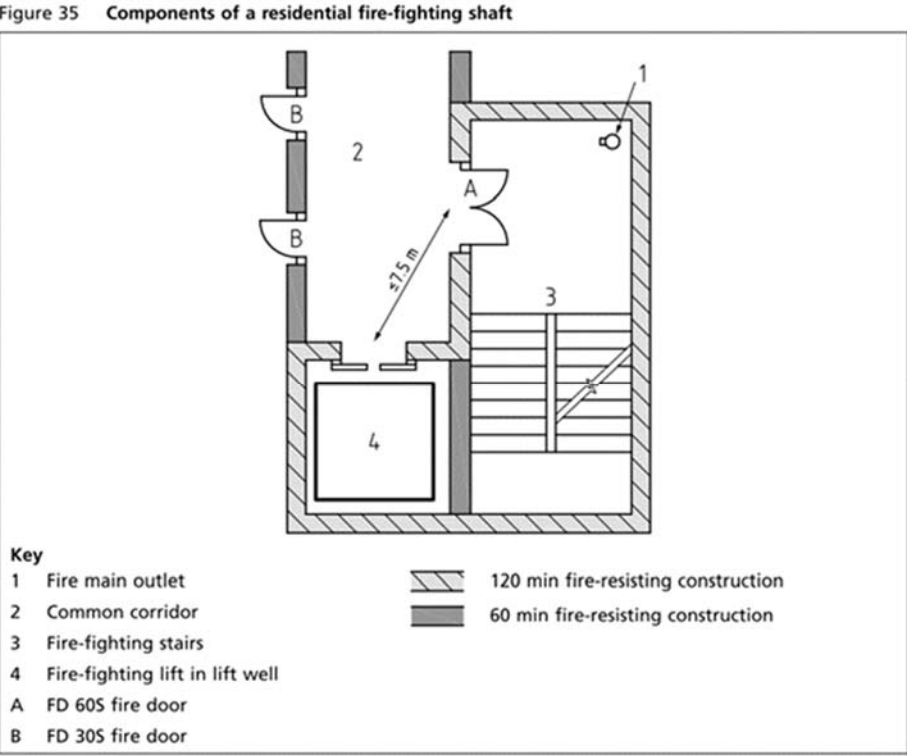


Figure 20: Typical Components of Fire-Fighting Shafts

7.2.2 Fire-Fighting Shaft Layout and Ground Floor Access

The fire-fighting shaft layout at the upper floors (typical) and ground floor is respectively as follows:

Upper floors

At the upper floors the southern stair core is designated as the fire-fighting shaft. As noted in preceding sections this shaft is to encompass the fire-fighting stair and a fire-fighting lift either side of a mechanically ventilated fire-fighting lobby. The key components on a typical upper floor are shown in the figure below.

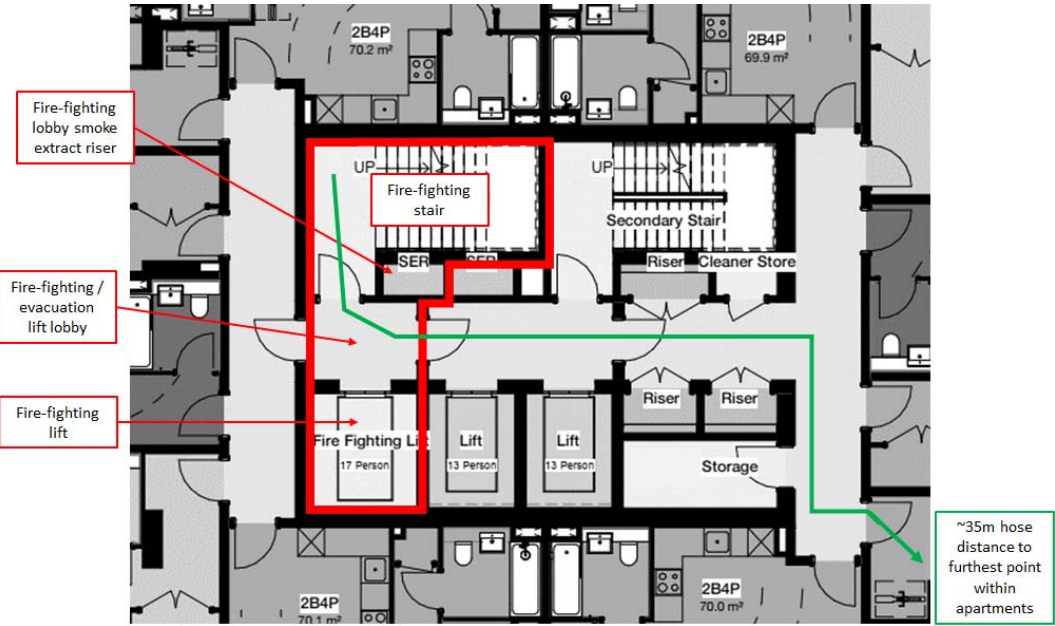


Figure 21: Extent of fire-fighting shaft components at upper floors (typical)

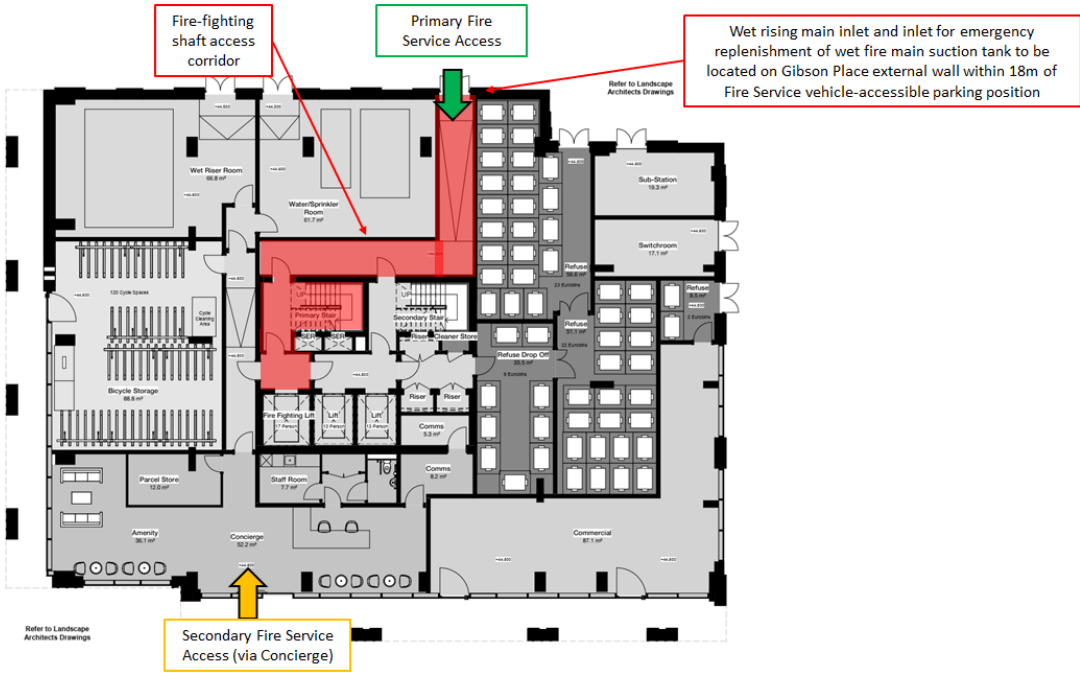


Figure 22: Fire Service access to fire-fighting shaft at Ground Floor

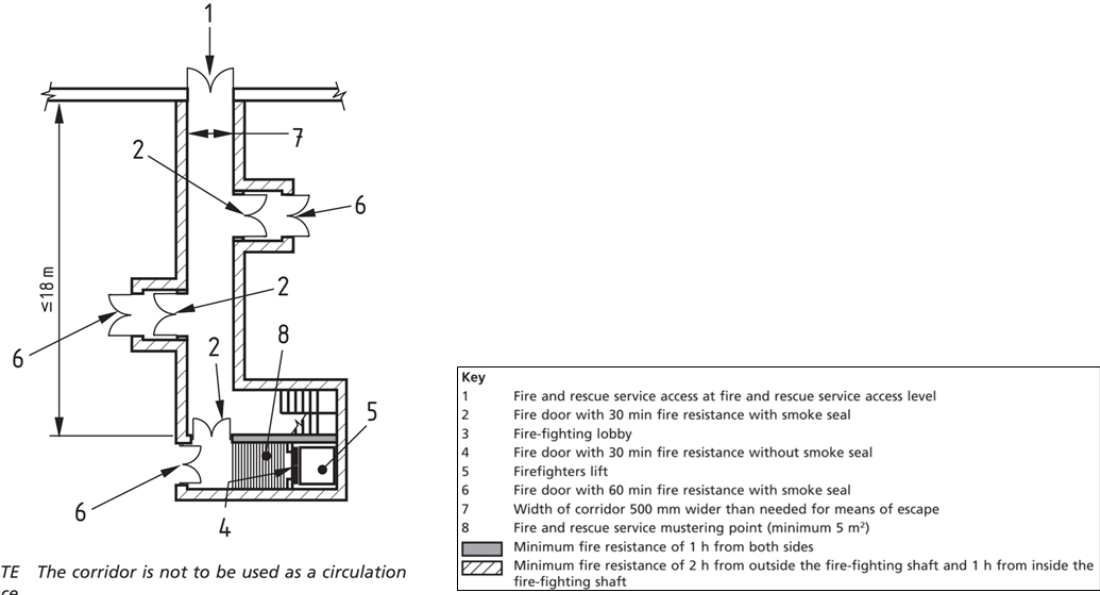


Figure 23: Fire-fighting shaft corridor access exemplar (BS 9999 Fig 21b)

7.2.3 Fire-Fighting Stairs

A fire-fighting stair should have an unobstructed width (measured between the walls and/or balustrades) of minimum 1.1m. The width should be kept clear for a vertical distance of 2m.

The handrails and strings that do not intrude more than 100mm into these widths may be discounted when calculating.

Clear signage should be provided on the landing in the stair to identify the storey level.

Fire-fighting stairs should be designed in accordance with BS 5395-1.

Emergency escape lighting in fire-fighting stair enclosures should be in accordance with BS 5266-1.

7.2.4 Fire-Fighting Lifts

A fire-fighting lift installation includes all of the following:

- lift car
- lift well
- lift machinery space
- lift control system
- lift communications system.

The lift shaft should be constructed in accordance with Section 6 of BS 9999 and lift installations should conform to BS EN 81-72 and BS EN 81-20.

See also Section 3.14.1 for requirements in relation to evacuation lifts which will impact on the use and design of the fire-fighting lift.

7.3 Access for Vehicles

Fire mains are required to be included as part of the works which means fire access should be provided to within sight of the wet riser inlet to replenish the suction tank for the fire main in an emergency.

The site context is indicated in the following figure. Vehicle access is available to the site from the main Cheetham Hill Road and Carnarvon Street. As noted in preceding sections it will be necessary to ensure that Fire Service vehicles can access Gibson Place to the extent necessary to access the wet riser-related inlets (see Section 7.2.2 and Section 7.4) to within 18m of such inlets.

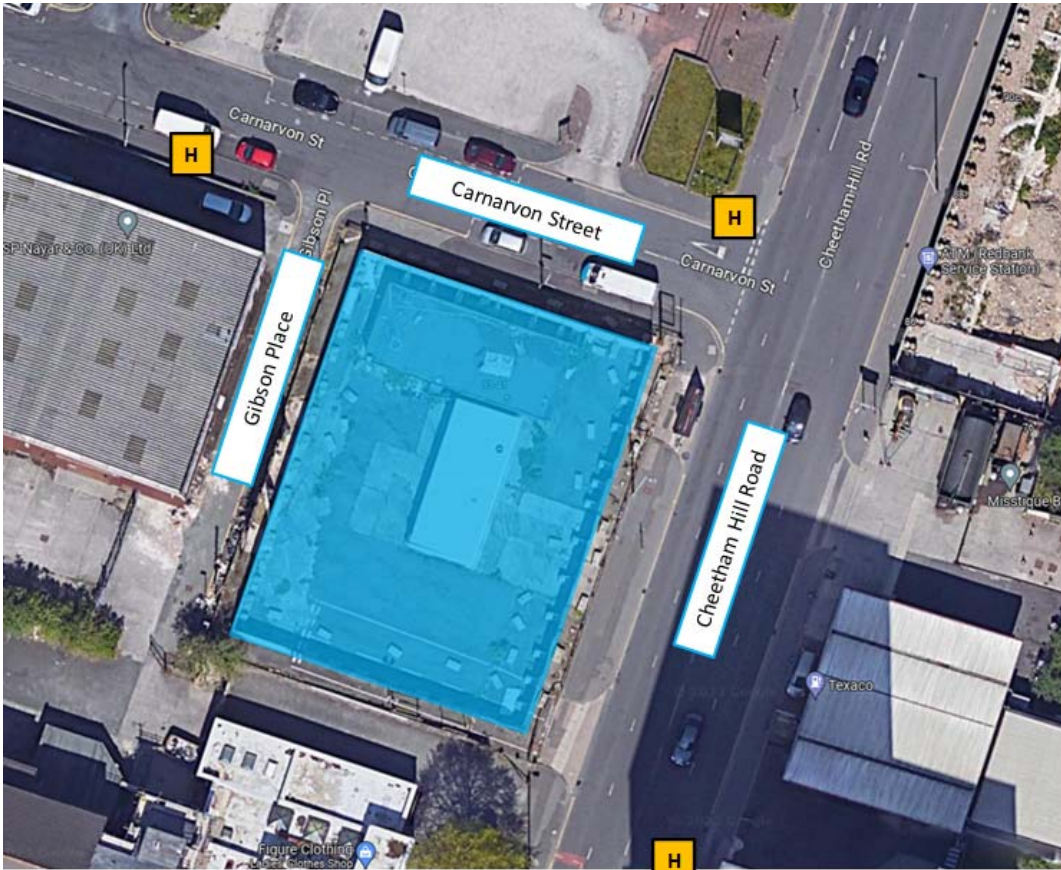


Figure 24: Site and road access context (Google Maps). Hydrant locations (observed and approximate) indicated by ‘H’

The required dimensions of access routes and hard-standings vary according to the fire appliances that are used, typical access route requirements are provided in Table 20 of BS 9999. As the developments highest occupiable floor requires the provision of wet rising mains, a pump appliance will be referenced. Requirements are detailed in the below table:

Table 17: Measurements for pump appliance vehicle access route (Table 20 of BS 9999)

Minimum width of road between kerbs (m)	Minimum width of gateways (m)	Minimum turning circle between kerbs (m)	Minimum turning circle between walls (m)	Minimum clearance height (m)	Minimum carrying capacity (tonnes)
3.7	3.1	16.8	19.2	3.7	12.5

Should any security features be added to the access route (e.g. gates), it will be necessary to ensure these do not prevent the fire service gaining access to this route (none are anticipated in the present design).

7.4 Fire Mains and Hydrants

The wet riser outlets should be placed within the stair core, accessible at each floor. Further guidance on the design and construction of fire mains is given in BS 9990. The maximum hose laying length from the fire main outlet to the furthest point inside must be less than 60m. However, where the internal layout of the building is unknown, the distance should be measured at two-thirds of the direct distance (40m). As noted in preceding sections, these distances will not be exceeded for the proposed design.

For buildings fitted with wet fire mains, access for a pumping appliance should comply with both of the following:

- Within 18m, and within sight of, an entrance giving access to the fire main.
- Within sight of the inlet to replenish the suction tank for the fire main in an emergency.

A building requires additional fire hydrants if both of the following apply:

- It has a compartment with an area more than 280m²,
- It is being erected more than 100m from an existing fire hydrant.

If additional hydrants are required, these should be provided in accordance with the following:

- For buildings provided with fire mains – within 90m of dry fire main inlets.
- For buildings not provided with fire mains – hydrants should be both of the following.
 - Within 90m of an entrance to the building.
 - A maximum of 90m apart.

Each fire hydrant should be clearly indicated by a plate, fixed nearby in a conspicuous position, in accordance with BS 3251.

Guidance on aspects of provision and siting of private fire hydrants is given in BS 9990.

The full extent of existing hydrant locations is to be determined, however as a minimum it is noted that at least three existing hydrant locations have been observed in the locations indicated by ‘H’ on the above Figure 24 and therefore existing provision looks to be satisfactory.

7.5 Emergency Command Centre and Additional Provisions

7.5.1 Emergency Control Room

Providing a space which can function as an Emergency Control Room enables the fire and rescue service to assist the premises management in an incident immediately on arrival. The control room can be dedicated or combined with a management control room. It should be readily accessible and adjacent to a fire and rescue service access point, or other location agreed with the fire and rescue service.



For this particular premises, given the presence of a staffed Concierge area and Concierge Back-of-House room, it would be appropriate to locate all premises information and communication/control equipment for the Fire Service within the Concierge Back-of-House space.

Because of the possible need for the Emergency Control Room to be operational over an extended period of time, it should be separated from the remainder of the building by 2-hour fire-resisting construction and incorporate facilities to enable it to function as normal during an emergency. It is proposed that separation of the wider Concierge space from the adjacent areas would achieve this objective, noting that if there was a fire within the Concierge space itself it is readily accessible for the Fire Service to fight a fire.

It should be provided with a 3-hour non-maintained system of emergency lighting supplied from a source independent of the normal lighting.

Throughout the building, a reliable means of communication with the control room should be provided in the form of a fire telephone system or a radio telecommunication system which is acceptable to the fire authority.

The fire control centre should contain:

- All control and indicating equipment for the fire alarm and other fire safety systems for the building. This should include a facility to sound the evacuation signal throughout the building, with the ability to signal a total evacuation per BS 8629. A facility to cancel any automatic sequencing of phases of an evacuation procedure except for the initial phase should be provided.
- Control systems showing the location of the incident and status of all automatic fire protection installations and facilities.
- Override provision associated with all automatic fire protection installations and facilities (other than those that have to be located either adjacent to their equipment or elsewhere where local control is needed, e.g. overrides for gaseous fire extinguishing systems or sprinkler system main or floor isolating valves).
- Override provision for air conditioning systems or ventilation systems involving recirculation.
- A communication system, conforming to BS 5839-9, providing a direct link between the control room and all fire-fighting lobbies, fire and rescue service access points and refuges for disabled people.
- An exchange telephone with direct dialling for external calls.
- A facility to sound the alert signal throughout the building.
- Facilities to be able to give information via public address system to occupiers of the building.
- Controls and monitor screens for closed circuit television (CCTV) if it is if provided for the control of evacuation. The use of CCTV can greatly assist in the management of emergency situation.
- The fire emergency plan for the building.
- Keys or other devices required to facilitate access throughout the building and to operate any mechanical and electrical systems.
- Floor plans of the building.
- Facilities to contact principal staff/building services engineers.
- A clock to time phases of evacuation.
- A visual indication which can show the status of evacuation in parts of the building where an evacuation signal has been given.
- Wall-mounted writing board with suitable writing implements for displaying important information.

The control room / concierge space should be staffed by a competent person, familiar with the use and operation of the installed equipment, while the building is occupied. Particular attention should be paid to the human factors involved in running a control centre in an emergency. The design should support the interface with the operators so that they are able to take control of the emergency efficiently and effectively.

Clear differentiation should be provided where possible between fire, security and building management systems within the control centre.

7.5.2 Additional Provisions

As noted in the current ADB Vol 1 (2019 with 2022 amendments) which post-dates the current BS 9991 the following additional Fire Service provisions should be provided in buildings of this height:

Evacuation alert systems

In blocks of flats with a top storey over 18m above ground level an evacuation alert system should be provided in accordance with BS 8629.

Secure information boxes

A secure information box provides a secure facility to store information about a building for use by the fire service during an incident.

Blocks of flats with a top storey more than 11m above ground level should be provided with a secure information box.

The box should meet all of the following conditions:

- Sized to accommodate all necessary information.
- Easily located and identified by firefighters.
- Secured to resist unauthorised access but readily accessible by firefighters.
- Protected from the weather.

Best practice guidance can be found in Sections 2 to 4 of the Code of Practice for the Provision of Premises Information Boxes in Residential Buildings published by the Fire Industry Association (FIA).

7.6 Smoke Control

The following section provides details of the requirements and provisions for smoke control in the development. Refer also to Section 3.7.1 in relation to the smoke ventilation provisions in the common areas.

7.6.1 Fire-fighting Shaft

Both the stair and lobby/common corridor of the fire-fighting shaft should be provided with a means of venting smoke and heat (see clause 27.1 of BS 9999 or 14.2.1 of BS 9991 where stair only serves flats). Only services associated with the fire-fighting shaft, such as ventilation systems and lighting for the fire-fighting shaft, should pass through or be contained within the firefighting shaft.

Fire-fighting shafts can be provided with smoke control systems as follows. The second option (mechanical smoke ventilation shaft) is proposed for this building and two such systems are proposed to be provided, each protecting a lobby outside the stairs.

- A pressure differential system designed and installed in accordance with BS EN 12101-6:2022 and BS EN 12101-13 (2022).
- A mechanical smoke ventilation system which demonstrates equivalent or better conditions in the lobby and stairs than would be provided by a natural shaft conforming to 14.2.3 of BS 9991 and as described in BRE Project Report 79204.
- It is also noted that the present BS 9991 (2015) permits a natural shaft system in accordance with 14.2.3.2 of that guidance. However, it is anticipated that this option will be removed from the forthcoming BS 9991 guidance with regard to buildings with a floor height over 30m from ground level.

Mechanical ventilation systems

The following sets out the key components and objectives of this type of system, which is proposed to be adopted in the building. It would be necessary for any engineering justification and analysis to be agreed in advance with the Approvals Authorities and carried out to their satisfaction at subsequent stages of design (typically at RIBA Stage 3). Such an analysis is outside the scope of the present report.



The design of the mechanical smoke ventilation system should limit pressure differentials so that door opening forces do not exceed 100 N at the door handle when the system is in operation, taking door closer forces into account where applicable. The primary objective of the system should be to maintain smoke-free conditions in the staircase during both means of escape and fire-fighting operations. The route of the exhaust air and the air flow should be determined within the space being ventilated, ensuring that replacement inlet air is provided. The ventilation rate should be decided through an assessment of any specific risks within the building and should be validated through CFD analysis or mathematical calculation.

Within the modelling process, the following criteria should be taken into account:

- fire locations (both close to and far from the point of extract).
- pressure differences across the lobby door with a variety of extraction rates if variable extract rates are used.
- fire pressure and increasing fire growth (to a justified design fire size).
- glazing failure temperatures (if appropriate based on design fire).
- a variety of door opening sizes for the stair or lobby door (when closed and fully open).

The design and installation of the system should be in accordance with BS 7346-8. A power supply in accordance with BS 8519 should be provided to the fans and all actuators and controls. The system should be provided with a standby fan that operates automatically upon failure of the duty fan. Both fans should be in accordance with BS EN 12101-3.

The stair should be provided with an automatic natural vent of 1m² free area.

Where mechanical systems are used, replacement air should be provided to prevent damage to the system and to ensure that excessive depressurization of the ventilated area does not occur. The design of the system should ensure that the source of inlet air does not compromise normal passive fire separation. Any such inlets should be automatic in operation and should not be temperature controlled. Mechanical extract may be designed such that the system provides a steady extraction rate, or alternatively the system may be provided with a variable rate of extraction, to reflect the different door opening and closing events that occur during a fire. The decision regarding the variation in ventilation rates should reflect the specific risks present within the building (e.g. excessive depressurization of the lobby when all the doors are closed). Where a mechanical smoke ventilation system uses a shaft, it should meet the following recommendations:

- The top of the lobby vent should be located as close to the ceiling of the lobby as is practicable and should be at least as high as the top of the door connecting the lobby to the stairwell.
- The lobby vents, in the closed position, should either:
 - o have a minimum fire and smoke resistance performance of 60 min and a leakage rate no greater than 200 m³/h/m² when tested in accordance with BS EN 1366-2 or
 - o be in accordance with BS EN 12101-8.
- The smoke shaft should be constructed of materials classified as A1 in accordance with BS EN 13501-1:2007+A1, or of materials determined to be non-combustible when tested in accordance with BS 476-4, or of any material which when tested in accordance with BS 476-11 does not flame or cause any rise in the temperature on either the centre of the specimen or the furnace thermocouples.
- Any smoke shaft which penetrates fire compartments should, as a minimum, maintain the same level of fire compartmentation as that which has been breached.
- No services other than those relating to the smoke shaft should be contained within the smoke shaft.
- Fans should be capable of handling gas temperatures of 300 °C for a continuous period of not less than 60 min and tested in accordance with BS EN 12101-3.
- It should operate automatically either on activation of the sprinkler system or by an automatic fire detection system in accordance with BS 5839-1:2017.
- The system should have a power supply in accordance with BS 8519.

- Any ductwork should be fire-resisting (Method 2 or Method 3; see 32.5.2) maintaining at least 75% of the cross-sectional area of the duct. The fire resistance should be not less than 60 min or equivalent to the fire resistance rating of any compartment boundary through which it passes, whichever is the greater.
- Where only a single mechanical extract is provided the fans should be duty/standby fans, as fan failure would result in failure of the system.

7.6.2 Protected Stair Lobby

The protected lobby to the secondary stair provides the function of an evacuation lift lobby (as described in earlier sections of this report).

It is proposed to provide the protected stair lobby to the secondary stair with a mechanical ventilation system of the same standard as that to be provided to the lobby of the fire-fighting shaft, with similar cause and effects and operation.

Thus, the system would adequately protect from, and remove, smoke egress into the lobby and well as preventing smoke from entering the stair, thus contributing to the resilience of the means of escape provision in the building as a whole.

It is anticipated that the same basis of calculation and approvals which is required for the fire-fighting system could be reasonably extended to also provide the justification for the system provided to the protected stair lobby. An AOV will also be required at the head of the stair.

7.6.3 Common Escape Routes

Common corridors connecting two or more storey exits will be divided with a fire doorset fitted with a self-closing device (minimum E 30 S). Associated screens should be fire resisting. Doors are sited so that smoke does not affect access to more than one stair.

Where AOVs are provided to the head of the stair and mechanical ventilation is provided within the common lobbies), the vent locations should comply with both the following:

- be as high as practicable.
- be positioned so the top edge is at least as high as the top of the door to the stair.

Smoke vents should discharge into a vertical smoke shaft, closed at the base and fully open to the external air at the top, that meets all of the following criteria:

- o the lobby vents, in the closed position, should have a minimum fire and smoke resistance performance of 30 min and integrity (leakage) no greater than 360 m³/h/m² when tested in accordance with BS EN 1366-2 **note: see below.
- o *The smoke shaft should be constructed from a class A1 material**
- o *Cross-sectional area (free area) of the smoke shaft should be sizes according to the requirements of the mechanical smoke ventilation system, with a minimum dimension of 0.85m in any direction (the cross-section area can vary between 0.6m² and 1.0m² depending on the height of the shaft and the potential resistance to flow)**
- o No services other than those relating to the smoke shaft should be contained within the smoke shaft.
- o The design of the system should limit pressure differentials such that the door opening forces do not exceed 100N at the door handle while the system is in operation.
- o Secondary power supply should be provided to the fans and all actuators and controls.
- o Fan sets should be provided with a standby fan that operates automatically upon failure of the duty fan.
- o An automatic vent to the outside with a minimum free area of 1m² should be provided from the top storey of the stair.
- o If smoke is detected in any of the common corridors or lobbies, both of the following should occur:

- Simultaneous opening of vents on the storey where the fire is located, into the smoke shaft and at the head of the stair.
- Vents from the lobbies on all other storeys should remain closed, even if smoke is subsequently detected on storeys other than where the fire is located.

***Note:** items indicated with ‘*’ are those which are present in the draft BS 9991 (2021) guidance document in addition to those other measures set out in the current BS 9991 (2015). It is considered prudent for the design team to be aware of these additional items and it is recommended that they are incorporated.

****Note:** For this item, the draft BS 9991 (2021) guidance notes the following (italicised text). It is the recommendation of Maze Fire that these measures are followed in the design for this building.

Any smoke shaft that penetrates a fire compartment should, as a minimum, maintain the same level of fire compartmentation as that which has been breached.

...

Smoke control shafts should be one of the following:

- a) *concrete shafts.*
- b) *brick or blockwork shafts.*
- c) *dry wall shafts in which the construction and all joints have the same fire resistance as the walls/floors in which they are installed.*

NOTE It can be desirable to fully render brick or blockwork shafts, or to line brick, blockwork, or dry wall shafts with a DW144 steel duct.

All shafts/ducts should leak not more than 3.8 m³/h/m² of the surface area of the shaft/duct at 50 Pa negative pressure and should be smooth and flush internally.

If smoke control ducting is used as an alternative to a smoke control shaft, it should conform to BS EN 1366-8.

...

AOVs opening into shafts or ducts should be smoke control dampers. Where they enter vertical shafts, they should be multi-compartment and should achieve at least the same level of fire resistance as the compartment barrier in which they are fitted.

...

Smoke control dampers should conform to BS EN 12101-8. They should be tested in accordance with BS EN 1366-10 from both sides in the application proposed and classified in accordance with BS EN 13501-4 to achieve the same level of fire resistance as the compartment barriers and associated smoke control ducts. In addition, they should be classified for reduced leakage S.

Smoke control dampers should be either AA or MA depending on the override functionality of the control panel. If override of the dampers is allowed during a smoke incident, then the smoke control dampers should be MA.

NOTE 1 As firefighters are unlikely to want to interfere with an automatic system, then AA smoke control dampers are acceptable as long as any manual testing override functionality of the panel is immobilized during a smoke incident. When alarms are cleared, or overridden, functionality will be returned for “smoke clearance” depending on new alarms or alarm isolation.

Smoke control dampers should have a minimum operations classification of C10 000. They are under the control of a system and should be tested/operated weekly.

NOTE 2 A classification of C300 therefore only covers 6 years which is not adequate for smoke control systems All duct-mounted smoke control dampers should be provided with an access door both sides unless readily accessible from the end of a duct. All access doors should be suitable for the duct to which they are to be fitted.

7.6.4 Ancillary Room Approaches

Stairs serving ancillary accommodation

Per section 37c(2) of BS 9991, where the escape route from apartments along a common corridor is in a single direction and ancillary accommodation is also accessed from the same corridor it is necessary to provide protected lobbies to separate the ancillary accommodation from the common corridor.

This will be required for the two ancillary spaces at Level 17 which are accessed from the common corridor which also serves apartments. The referenced plans include the required lobbies.

There is a further situation on the current referenced drawings whereby a ‘storage space’ is included of one of the residential corridors on each upper level. This arrangement will require review at RIBA Stage 3 as to the access and content control of the space, and dependent on further review may not be suitable without a ventilated lobby access, given the single access route to the stair from this corridor.

Access lobby between an escape stair and a place of special fire hazard

A protected lobby should be provided between an escape stair and a place of special fire hazard to protect from the ingress of smoke. The lobby should have a minimum 0.4m² of permanent ventilation or be protected by a mechanical smoke control system. It is considered that the provision of mechanical extract (as described in the preceding sections) would fulfil this requirement to protect either stair in response to fires in adjacent ground floor areas such as the cycle store, refuse store or concierge spaces.

Refuse chutes and storage

The approach to rooms containing refuse chutes or for storing refuse should either be directly from the open air or through a protected lobby with a minimum of 0.2m² of permanent ventilation. For the present design it is understood that refuse chutes are not provided. Each internal lobby immediately outside the refuse store at Ground level should be provided with 0.2m² of permanent ventilation routed to outside.

