



Broadwater Farm Fire Strategy Report

Tangmere House RIBA Stage 4

Issuing consultant: **Alex Manning** Issue: 02 Date: 02/03/2026

Project No: **250911** Document No: **MZ-250911-02-FSS-01-ISS02**

Executive Summary

No.	Fire Safety Measure	Performance Standard
1	Evacuation Philosophy	As the buildings in question is a residential apartment building, a 'stay put' evacuation protocol will be operated. For ancillary areas such as plant rooms and waste rooms the protocol will be 'simultaneous' evacuation in response to a fire in those areas.
2	Fire Detection system	In accordance with the requirements in BS 9991 for open-plan flats, a Grade D category LD1 detection system shall be provided to flats in accordance with the guidance in BS 5839-6 to provide early notification of a fire to occupants. A Category L5 system will be provided to activate the stair AOVs only. 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.
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.
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 minimum Category 4 system.
7	Loadbearing Elements of Structure	As the building is classified as Residential (dwellings) - Flat with a height between 18m and 30m, in accordance with Table 6 of BS 9991 it will require 60 minutes fire resistance applied to the structure.
8	External Fire Spread	Given the level of compartmentation for residential units, the provision of sprinklers and the available distance to relevant boundary, the permitted unprotected area is 100%.
9	Fire Service Access	Each block will be provided with two fire-fighting shafts consisting of fire-fighting stairs, fire-fighting lifts and dry rising mains. The open balconies provide the necessary smoke ventilation, as per BS 9991. Vehicle access will be provided to within 18m of the Dry riser inlet
10	Private Fire Hydrants	Existing hydrants are located within 100m of each dry rising main inlet.
11	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-hours 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 7010:2020+A6:2023 should be used with the appropriate directional arrow in accordance with BS 5499-4.
12	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.
13	Smoke Management Systems	Stair ventilation will be provided via openable vent (1.0m² minimum) for fire and rescue service use from the top storey of each of stair.

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 deviations from the prescriptive code requirements as listed below are accepted by the Authority having Jurisdiction (AHJ). Note: The deviations from the prescriptive code requirements have been discussed with the Design Team. However, should the prescriptive code deviations not be accepted by the AHJ, then the proposed design will need to be revised to ensure prescriptive code compliance can be achieved.

Quality Management

Issue	Date	Reason for Issue	Prepared by	Reviewed by
01	12/12/2025	First issue	Alex Manning Associate	Andrew Martyn Associate
02	27/02/2026	Updated in line with comments received.	 Alex Manning Associate	 Mark Jones 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.

Project Office

UK ☒	Ireland ☐
E: info@mazefire.com	E: info@mazefire.com
Registered in England & Wales, Company No: 14141136	Registered in Ireland, Company No: 721698
United Arab Emirates ☐	Kingdom of Saudi Arabia ☐
E: info@mazefire.com	E: info@mazefire.com
Registered in United Arab Emirates, Company No: 2193139	Registered in Saudi Arabia, Company No: 1009155844



Contents

Executive Summary

Quality Management

Contents

1. Introduction

1.1 Client and Project

1.2 Project Address

1.3 Project Description

1.4 Description of Work

1.5 Authority Having Jurisdiction

1.6 Stage of Project

1.7 Limits of Report

1.8 Regulatory Framework

1.9 Record of Statutory Consultation

1.10 Reference Documents

1.11 Project Stakeholders

2. Building Characteristics

2.1 General Site Description

2.2 Building Particulars

2.3 Fire Hazards

3. B1 – Means of Warning and Escape

3.1 Functional Requirement of the Building Regulations

3.2 General Philosophy

3.3 Evacuation Policy

3.4 Means of Warning

3.5 Horizontal Means of Escape

3.6 Final Exits

3.7 Automatic Doors

3.8 Vertical Means of Escape

3.9 Ancillary Spaces – Means of Escape

3.10 Sprinklers

3.11 Protected Escape Routes and BS 7671:2008 + A2:2022

3.12 General Provisions

3.13 Primary and Secondary Power Supplies

4. B2 – Internal Fire Spread (Linings)

4.1 Functional Requirement of the Building Regulations

4.2 Surface Linings

4.3 Specific Products

5. B3 – Internal Fire Spread (Structure)

5.1 Functional Requirement of the Building Regulations

2

2

3

4

4

4

4

4

4

4

4

5

9

9

10

11

11

11

11

13

13

13

13

14

14

16

17

17

20

20

21

21

22

24

24

24

24

25

25

5.2 Loadbearing Elements of Structure

5.3 Compartmentation

6. B4 – External Fire Spread

6.1 Functional Requirement of the Building Regulations

6.2 General

6.3 Space Separation

6.4 Roof Construction

6.5 Solar Panels

7. B5 – Access and Facilities for the Fire Service

7.1 Functional Requirement of the Building Regulations

7.2 Fire-fighting Shafts

7.3 Hydrants

8. Appendix A – Competency Statement

25

25

32

32

32

33

34

34

35

35

35

37

39



1. Introduction

1.1 Client and Project

Maze Fire Consulting Limited (referenced throughout This Report as 'Maze Fire') has been appointed by Formation Design & Build as a specialist fire and life safety consultant for the design of the Broadwater Farm development in London.

The ultimate client is London Borough of Haringey: 5th floor, Alexandra House, 10, Station Road, London N22 7TR.

1.2 Project Address

The development is located in the land adjacent to the junction of Gloucester Road and Willen Road junction, London, N17, UK.

1.3 Project Description

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

The Broadwater Farm development consists of two connected blocks (see Figure 1):

- Block A: Ground to Sixth Floor of residential apartments, with open deck escape to two separate cores (Cores A1 and A2). Ground Floor also consists of ancillary spaces to the residential apartments, and three separate Enterprise Centre units. The uppermost floor is 19.6m high from ground.
- Block B: Ground to Sixth Floor of residential apartments, with open deck escape to two separate cores (Cores B1 and B2). Ground Floor also consists of ancillary spaces to the residential apartments, and two separate Enterprise Centre units. The uppermost floor is 19.6m high from ground.

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.

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 (AHJ) is an organisation, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

The authority having jurisdiction for the project will be Building Safety Regulator.

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 1.9.4. The project is currently at RIBA Stage 4 and This Report represents a fire safety strategy to a 'Technical Design' stage of works.

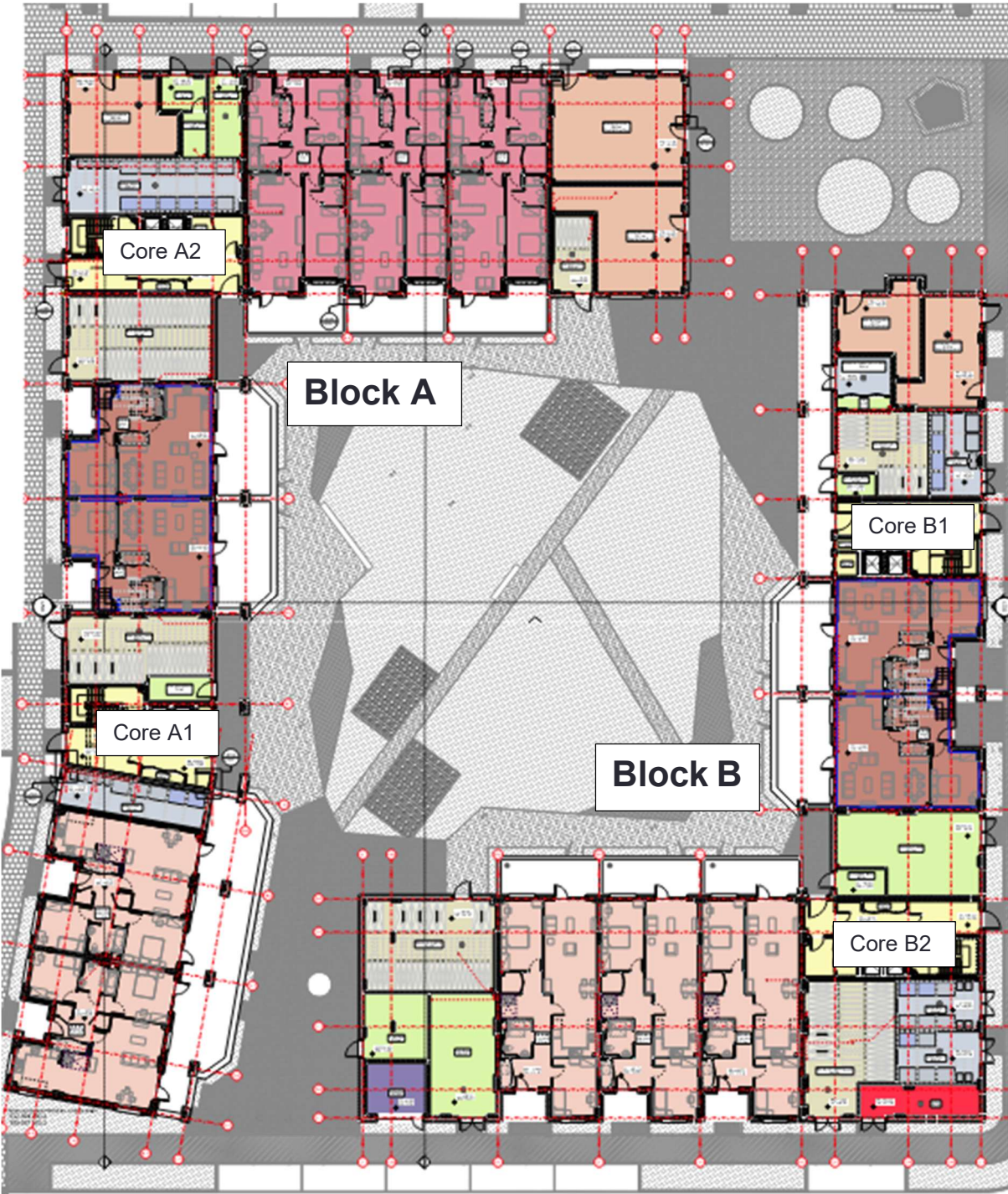


Figure 1: Site Layout

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 4 and represents a fire safety strategy to a 'Technical Design' stage of works. It is limited to the scope of works as defined for RIBA Stage 4 in our fee proposal dated 21/08/2025.

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 (including amendments issued prior to This Report)
2. The Building Safety Act 2022
3. The Regulatory Reform (Fire Safety Order) 2005
4. The Construction (Design and Management) Regulations 2015
5. Fire Safety (Residential Evacuation Plans) (England) Regulations 2025

1.8.2 The Building Safety Act

The Building Safety Act was brought into force on April 28, 2022, with a significant number of pieces of secondary legislation coming into force subsequently.

There are now three gateways which are applicable for 'relevant buildings'.

Planning Gateway 1

As part of the regulatory regime change accompanying the Building Safety Act, The Town, and Country Planning (Development Management Procedure and Section 62A Applications) (England) (Amendment) Order 2021 necessitated that all planning applications for 'relevant buildings' should submit a Fire Statement to the Building Safety Regulator for consultation at Planning Gateway 1.

Relevant buildings are defined as those which:

- contain two or more dwellings or educational accommodation; and
- meet the height condition of 18m or more in height, or 7 or more storeys.

Applications for relevant buildings will require submission of a Fire Statement setting out fire safety considerations specific to the development with a relevant application for planning permission for any development which involves one or more relevant buildings.

Gateway 2 and 3

Gateway 2 and 3 introduces the concept of "Higher Risk Buildings" (HRBs) which are defined in the act as:

"Higher-risk building" means a building in England that—

- (a) is at least 18 metres in height or has at least 7 storeys; and
- (b) is of a description specified in regulations made by the Secretary of State.

The act introduces a large amount of secondary legislation and importantly the Building Safety Regulator (BSR) as the regulator for HRBs.

Gateway 2 creates a 'hold point' where construction cannot begin until BSR is satisfied that the design meets the functional requirements of the building regulations.

Gateway 3 represents an additional hold point at the completion of a project before occupation can occur.

This project will be required to go through the Gateway 2 and 3 process on the basis of the proposed heights and occupations of premises. It is the understanding of Maze Fire that the project was initiated and received planning permission under Planning Gateway 1.

Please note this section is not a detailed explanation or a checklist which can be relied upon to provide sufficient information to negotiate the process.

1.8.3 The Building Regulations

The building will be subject to the Building Regulations 2010 (hereafter stated as 'The Regulations') 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) – formerly called the Department for Levelling Up, Housing and Communities (DLUHC) between September 2021 and 8th July 2024 reverting to MHCLG on that latter date – have produced a number of guidance documents to assist designers in meeting the relevant requirements of The Regulations; these 'Approved Documents' provide guidance on different aspects of The Regulations.

Approved Document B – Volumes 1 and 2 (referred to as ADB) provide design guidance on ways in which the fire safety functional requirements of The Regulations can be satisfied.

However, these documents are intended to provide guidance on the more common building situations and there is no obligation to adopt any particular solution contained within 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).

1.8.4 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 1.9.4.

Please note, the compilation and production of the Regulation 38 submission is outside the scope of Maze Fire's appointment, and the following is guidance only, referencing the principles set out in ADB

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.

The level of detail provided in the fire safety information should also align with the 'Essential Information' outlined in Sections 17.3 and 17.4 of Approved Document B Volume 1 (2019, as amended 2020 and 2022) – as relevant to this building as follows:

- An as-built plan of the building should be provided showing all of the following.
 - Escape routes – this should include exit capacity (i.e. the maximum allowable number of people for each storey and for the building). (note – for this building the primary evacuation policy is 'stay-put' and the exit capacities are more than sufficient for the envisaged occupancy in all areas, as set out elsewhere in this strategy)
 - Location of fire-separating elements (including cavity barriers in walk-in spaces).
 - Fire doorsets, fire doorsets fitted with a self-closing device and other doors equipped with relevant hardware.
 - Locations of fire and/or smoke detector heads, alarm call points, detection/alarm control boxes, alarm sounders, fire safety signage, emergency lighting, fire extinguishers, dry fire mains and other firefighting equipment, and hydrants outside the building.
 - Any sprinkler systems, including isolating valves and control equipment.
 - Any smoke control systems, or ventilation systems with a smoke control function, including mode of operation and control systems.
 - Any high-risk areas
- Details should be provided of all of the following.
 - Specifications of fire safety equipment provided, including routine maintenance schedules.
 - Any assumptions regarding the management of the building in the design of the fire safety arrangements.
 - Any provision enabling the evacuation of disabled people (including the location and mode of operation of evacuation lifts)

Additional information for complex buildings should be provided as per 17.5 and 17.6 of ADB Volume 1 (2019, as amended 2020 and 2022)

See also Section 1.11 of this strategy.

1.8.5 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 functional requirements stated within Part B, schedule 1 of The Regulations with respect to dwellings including blocks of flats.

ADB Volume 2 similarly gives guidance on each of the functional requirements stated within Part B, schedule 1 of The Regulations 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 38 above as an example. Each Approved Document relates only to the particular requirements of The Regulations that the document addresses. However, building work must also comply with all other applicable requirements of The Regulations and all other applicable legislation.

BS 9991 (including Corrigenda 1 and 2)

BS 9991: 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/assisted living design but with due reference to current Building Regulation requirements where these have been updated since the most recent issue of BS 9991.

Where BS 9991 is silent on a particular aspect of fire safety design, Approved Document B will be referred to in this strategy, if appropriate.

The Building Safety Act

The Building Safety Act was brought into force on April 28th, 2022, with a significant number of pieces of secondary legislation coming into force subsequently. The Building Safety Regulator has also been introduced as the regulator, and body with building control function for 'higher-risk buildings' (HRBs).

Performance Based Design

Where aspects of the design deviate from the above design guidance, fire safety engineering analysis may be required to demonstrate compliance with the functional requirements of The Regulations or equivalence to the prescriptive guidance.

1.8.6 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 within and around 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 especially at risk, such as disabled and impaired persons and those with special needs and must include consideration of any dangerous substance likely to be on the premises.

1.8.7 Fire Safety (England) Regulations 2022

The Fire Safety (England) Regulations 2022 (made under article 24 of the Regulatory Reform (Fire Safety) Order 2005) came into effect on 19 January 2023 for the following buildings in England:

- High-rise residential buildings.
- Residential buildings with storeys over 11m in height.
- All multi-occupied residential buildings with two or more sets of domestic premises.

For high-rise residential buildings (a multi-occupied residential building at least 18 metres in height or 7 or more storeys), responsible persons must:

- share electronically with their local fire and rescue service (FRS) information about the building’s external wall system and provide the FRS with electronic copies of floor plans and building plans for the building;
- keep hard copies of the building’s floor plans, in addition to a single page orientation plan of the building, and the name and UK contact details of the responsible person in a secure information box which is accessible by firefighters;
- install wayfinding signage in all high-rise buildings which is visible in low light conditions;
- establish a minimum of monthly checks on lifts which are for the use of firefighters in high-rise residential buildings and on essential pieces of firefighting equipment;
- inform the FRS if a lift used by firefighters or one of the pieces of firefighting equipment is out of order for longer than 24 hours.

For multi-occupied residential buildings over 11 metres in height, responsible persons must:

- undertake quarterly checks on all communal fire doors and annual checks on flat entrance doors.

In all multi-occupied residential buildings, responsible persons must:

- provide residents with relevant fire safety instructions and information about the importance of fire doors.

1.8.8 Fire Safety Management Plan

Upon completion of the building a fire safety management plan should be implemented by the Responsible Person concerning the maintenance of fire and life safety provisions, information to residents and management of the building in relation to routine inspection. This is outside the scope of this fire strategy, but it is recommended that the full detail of any such plan be developed with cognisance of Section 9 of BS 9991 (2024) in addition to Annexes A and H of that standard.

Maintenance, inspection and testing of fire safety provisions should be documented in the fire safety management plan and carried out in accordance with the relevant standard for the installed provision, for example as follows:

- BS 5839-1 and BS 5839-6 for fire detection and alarm systems
- BS EN 12845 and BS 9251 for automatic sprinkler systems
- BS 5266-1 for emergency escape lighting systems
- BS 8214 for fire doors
- BS 7273-4 for fire door automatic release mechanisms
- Relevant parts of BS EN 12101 for smoke ventilation systems (further information regarding testing, inspection and maintenance of mechanical smoke ventilation systems is given in BS 9999)
- BS 5306-3 for portable fire extinguishers (where deemed to be required by fire risk assessment)
- BS 9990 for fire hydrants and fire mains
- Relevant inspection and maintenance requirements required by standards for any other fire and life safety related provision.
- BS EN 81-76 for evacuation lifts and the lift owner’s manual for lifts that can be used for evacuation
- BS EN 81-72 and the lift owner’s manual for lifts that can be used by firefighters

Fire Safety (Residential Evacuation Plans) (England) Regulations 2025

These Regulations are understood to come into effect on April 6, 2026, and introduce Residential Personal Emergency Evacuation Plans (PEEPs) for residents in high-rise and higher-risk residential buildings who may need assistance evacuating during a fire.

These regulations aim to improve fire safety for vulnerable residents by requiring building owners and managers to identify and support those who cannot self-evacuate. As currently understood, the Regulations require (but may not be limited to):

- Identify relevant residents.
- Offer a person-centred fire risk assessment to each relevant resident they identify and, where the resident requests one, ensure the person-centred fire risk assessment is undertaken.
- Discuss with the resident, with a view to identifying reasonable and proportionate measures for the RP to take to mitigate the risks identified through the Person-Centred Fire Risk Assessment.
- Use reasonable endeavours to agree with the relevant resident, at the end of the person-centred fire risk assessment, what the resident should do in the event of a fire, and the Responsible Person is to ensure this is written down as a statement, referred to as the emergency evacuation statement.
- Review the Residential PEEP process (as briefly described above).
- Share the prescribed information on all relevant residents with their local Fire and Rescue Authority, subject to the explicit agreement of each relevant resident to this information being shared.
- Act on the instructions of a person authorised to act on behalf of the relevant resident (their ‘representative’). These instructions can only relate to the prescribed aspects of Residential PEEP.



- To observe requirements of data protection legislation; however, where the processing might otherwise be unauthorised, the powers and duties in the regulations may allow it to fall into one of the authorisations under data protection legislation.
- Prepare (and periodically review) a separate building emergency evacuation plan, share this plan with their local Fire and Rescue Authority and – in the event the building has a secure information box – place a copy of the plan in the box.

This building emergency evacuation plan must include a copy of the instructions to residents (as required under regulation 9(2)(b)(i) of the Fire Safety (England) Regulations 2022), confirmation of whether there are relevant residents in the building, and information relating to any other arrangements for that building, for example if an Evacuation Alert System has been included.

1.8.9 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 CDM 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 Fire Safety Objectives

1.9.1 Client Objectives

The scope of this report considers that the primary client objective is to satisfy their statutory obligations under the regulatory framework set out in this report.

The client has indicated no additional fire safety objectives to that required by the relevant statutory requirements, are to be considered in the fire safety design of the building. Therefore, asset protection and the community impact of a fire are excluded from the scope of this report.

1.9.2 Loss Control Objectives

Consideration of specific issues such as property and asset protection, business interruption, insurance related risks or community impact as a result of fire losses have not been advised by the client, and are therefore beyond the scope of this report, as identified in this report.

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 the report scope. The building has not been identified and advised to Maze Fire Consulting as a likely target for terrorism.

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.

1.9.3 Fire Brigade Objectives

General fire brigade objectives are addressed in the functional requirement of Part B5 to Schedule 1 of the Building Regulations with respect to fire brigade intervention. Any specific fire brigade requirements identified as part of the design and consultation process are described herein and form part of the consultation outlined in this report.

Other Brigade responsibilities that may be contained within their statutory Act or other objectives are beyond the scope of this report.

1.9.4 Information Considered

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

- Architectural drawings prepared by A&Q Partnership architects as listed in the table below

Table 1: Referenced Architectural Drawings

Title	Number
Ground Floor GA Plan - Blocks A & B - 1 of 2	TAN-AQP-ZZ-GF-DR-AR-0220
Ground Floor GA Plan - Blocks A & B - 2 of 2	TAN-AQP-ZZ-GF-DR-AR-0221
First Floor GA Plan - Blocks A & B - 1 of 2	TAN-AQP-ZZ-01-DR-AR-0222
First Floor GA Plan - Blocks A & B - 2 of 2	TAN-AQP-ZZ-01-DR-AR-0223
Second Floor GA Plan - Blocks A & B - 1 of 2	TAN-AQP-ZZ-02-DR-AR-0224
Second Floor GA Plan - Blocks A & B - 2 of 2	TAN-AQP-ZZ-02-DR-AR-0225
Third Floor GA Plan - Blocks A & B - 1 of 2	TAN-AQP-ZZ-03-DR-AR-0226
Third Floor GA Plan - Blocks A & B - 2 of 2	TAN-AQP-ZZ-03-DR-AR-0227
Fourth Floor GA Plan - Blocks A & B - 1 of 2	TAN-AQP-ZZ-04-DR-AR-0228
Fourth Floor GA Plan - Blocks A & B - 2 of 2	TAN-AQP-ZZ-04-DR-AR-0229
Fifth Floor GA Plan - Blocks A & B - 1 of 2	TAN-AQP-ZZ-05-DR-AR-0230
Fifth Floor GA Plan - Blocks A & B - 2 of 2	TAN-AQP-ZZ-05-DR-AR-0231
Sixth Floor GA Plan - Blocks A & B - 1 of 2	TAN-AQP-ZZ-06-DR-AR-0232
Sixth Floor GA Plan - Blocks A & B - 2 of 2	TAN-AQP-ZZ-06-DR-AR-0233
Roof GA Plan - Blocks A & B - 1 of 2	TAN-AQP-ZZ-RF-DR-AR-0234
Roof GA Plan - Blocks A & B - 2 of 2	TAN-AQP-ZZ-RF-DR-AR-0235



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.

1.10 Record of Statutory Consultation

At the date of issue of this document, no formal consultation has taken place with the Building Safety Regulator. The consultation feedback will be documented in future revisions of This Report.

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.

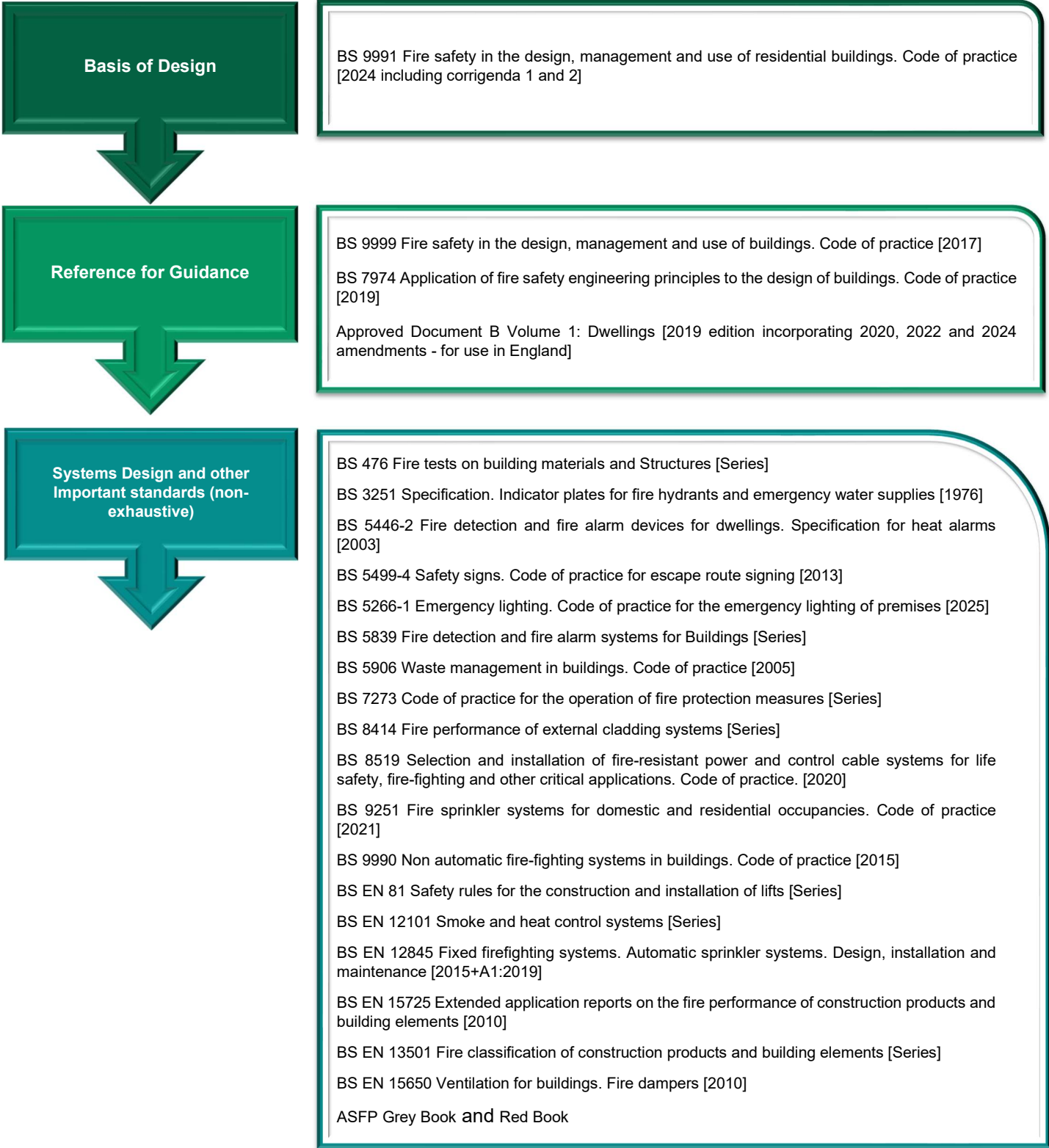


Figure 2: Design Basis



1.12 Project Stakeholders

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

Table 2: Project Stakeholders

Organisation	Role
Building Safety Regulator	Authority Having Jurisdiction
A&Q Partnership Architects	Architecture
NLY Building Services	MEP Engineer
MWP	Structural Engineer
Maze Fire Consulting Ltd.	Fire and Life Safety Engineer
Formation Design & Build	Contractor
London Borough of Haringey	Client



2. Building Characteristics

2.1 General Site Description

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

The Broadwater Farm features two 7-storey (ground + 6 above) Residential (dwellings) buildings with no basements.

Both Block A and Block B are provided with two stair cores, that each include a fire-fighting lift and a separate evacuation lift.

Indicative ground floor plans of the scheme are shown in the figures below.

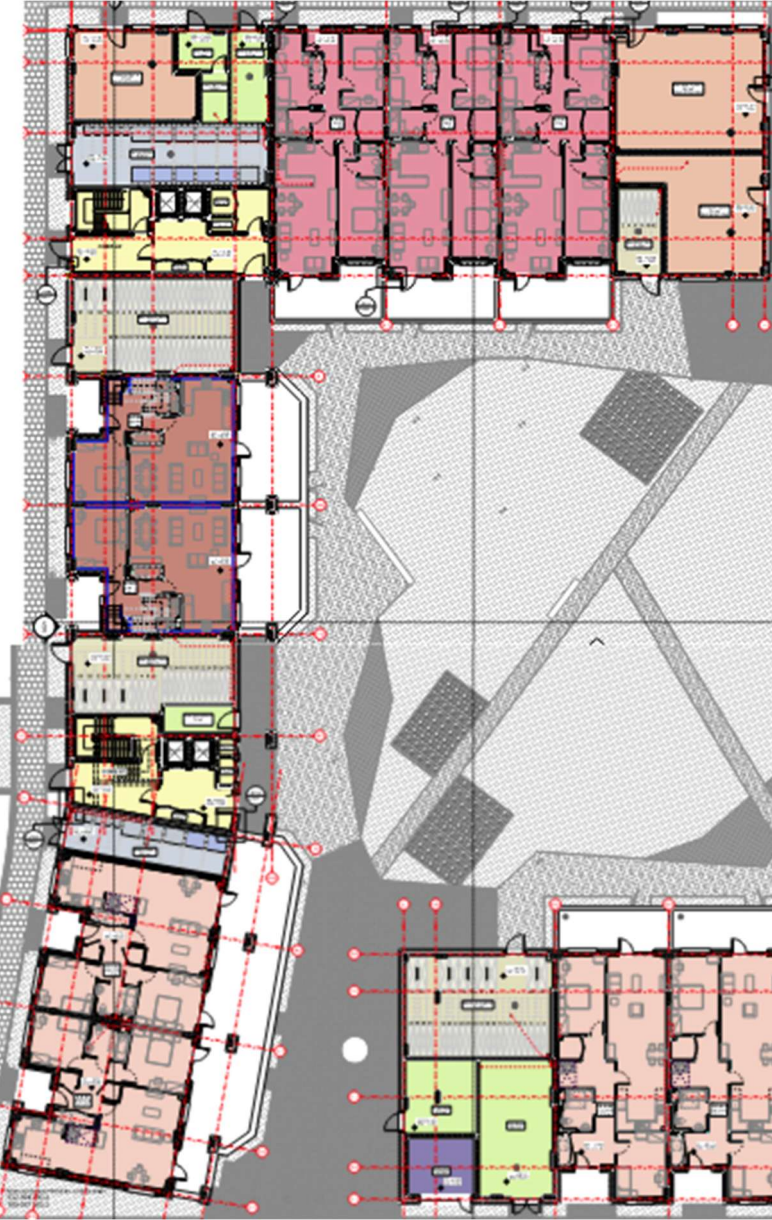


Figure 3: The layout of the ground floor of Block A

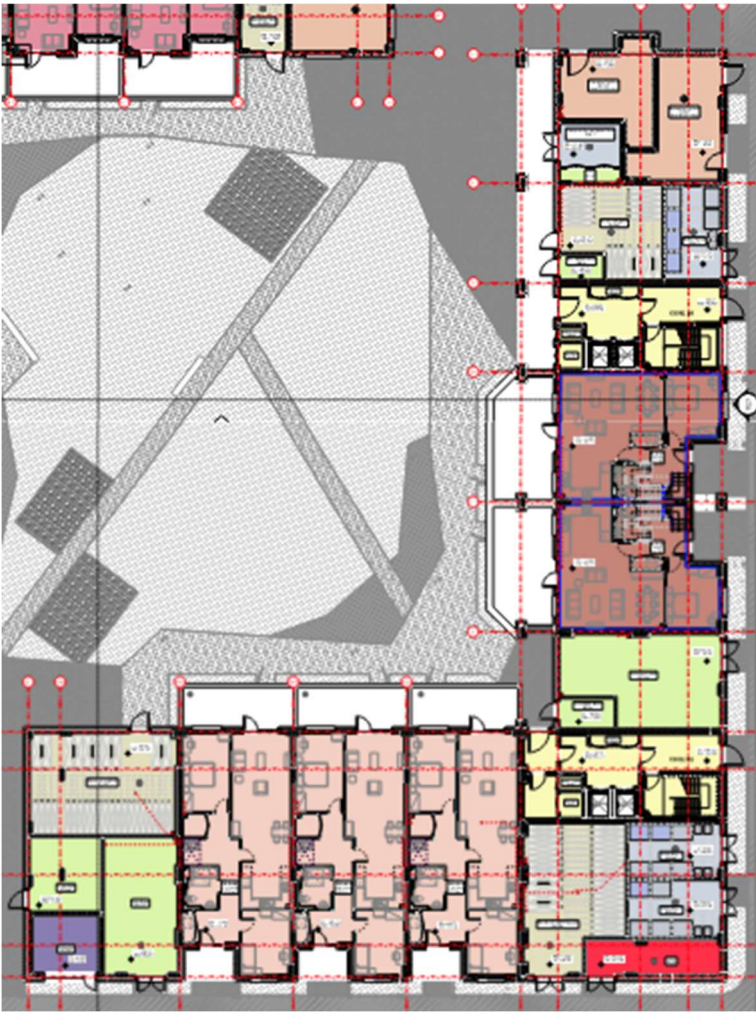


Figure 4: The layout of the ground floor of Block B

2.2 Building Particulars

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

- Number of storeys: 0 basement storeys and 7 above grade (ground + 6)
- Height of the buildings: 25m (both Blocks A and B)
- Height of floor of top storey above ground level: 19.95m (both Blocks A and B)
- Approximate floor area (excluding balconies): Block A, 1365m² and Block B, 1200m²

2.3 Fire Hazards

2.3.1 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.

2.3.2 Ignition Sources

Typical ignition sources comprise the following:

- Smoking related materials - lighters etc
- Matches and Candles
- Cooking appliances - Cooker incl. oven, Deep fat fryer, 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.



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. Residential buildings require neither evacuation lifts nor refugee 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.

For ancillary areas such as plant rooms and waste rooms the protocol will be 'simultaneous' evacuation in response to a fire in those areas.

3.3.1 Full Evacuation Alert System

It is proposed to provide an Evacuation Alert System in each building, for use by the Fire Service in the event of an extreme fire scenario, where the stay-put policy is no longer considered valid and a full evacuation needs to be instigated. Sounders will be provided in each flat hallway.

The system will include two control panels in total, as per below:

- At Ground Floor entrance to Core A2, which controls all the flats associated with Cores A1 and A2
- At Ground Floor entrance to Core B2, which controls all the flats associated with Cores B1 and B2

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 (2019 + A1 2023).

In relation to BS 8629, the full design of such a system is outside the scope of this report and would be a matter for MEP implementation, however strategically the following considerations are relevant.

The standard notes that a 'stay put' policy for residential buildings is a well-established successful strategy with the need for occupants of flats (other than that in which the fire occurs) to evacuate is very uncommon.

The standard therefore notes the following:

'Nothing in this British Standard is intended to imply that the "stay put" strategy normally adopted in new blocks of flats is inappropriate. On the contrary, the Technical Committee responsible for this British Standard acknowledges that "stay put" remains the appropriate strategy for such blocks of flats. The purpose of the systems described in this British Standard is to provide facilities that can, on occasions, support operational fire-fighting and rescue by the fire and rescue service in blocks of flats that are designed on the basis of a "stay put" strategy; these systems enable fire and rescue service operational commanders to initiate an evacuation alert signal in flats, particularly those on a floor(s) other than the floor of fire origin, e.g. a floor(s) above the level of the fire.'

The standard also notes that if on rare occasions the Fire Service consider that other flats do need to evacuate they will alert those occupants by knocking on their doors (thus a process which is readily manageable). It notes that on 'even rarer occasions' when more widespread evacuation is necessary there will tend to be a focus on firefighting. Accordingly... *'an evacuation alert system that enables occupants of flats to be alerted by the incident commander can support the operations of the fire and rescue service; the decision to use the evacuation alert system for this purpose will only be made after consideration of the tenability of escape routes, particularly the stairway(s), for use by occupants of flats.'*

Such evacuation alert systems for use by the fire and rescue service are not to be regarded as a fire detection and fire alarm system; their function is solely to assist the fire and rescue service in the management of a fire incident. Hence, they should be an independent provision designed to BS 8629 and operated only by the Fire Service (not initiated automatically).

The standard notes the need to consult with the Fire Service, as follows:

4.2: b) In other regions of the United Kingdom [outside of Scotland], any proposal to install an evacuation alert system for use by the fire and rescue service should be subject to consultation with the fire and rescue service before proceeding with the design of the system.

It is therefore recommended that such consultation take place as and when the system is to be designed.

In terms of operation across an entire floor or number of floors the standard notes the following:

'It is likely that a fire and rescue service will only use the evacuation alert system if the required evacuation of residents extends to, at least, one entire storey of the building; where a smaller number of flats needs to be evacuated, it is likely that the traditional technique involving fire-fighters knocking on residents' flat entrance doors will be adopted.

Equally, even if a more widespread evacuation is considered necessary, in the vast majority of cases, it is unlikely that the evacuation will comprise a greater number of storeys than those comprising the floor of fire origin, the floor above that floor and the floor below the floor of fire origin.

On this basis, it is likely that the appropriate extent of each evacuation alert zone will comprise an entire storey of the building, within which a simultaneous evacuation alert signal will be given within all flats. However, there might be circumstances in which, in a large, complex, high-rise block of flats, the subdivision of storeys into two or more evacuation alert zones is appropriate.'

On the above basis as the building layouts are simple and repetitive across the majority of levels, it is the recommendation of Maze Fire that system able to cover at least three floors of the relevant building (see also Section 3.8.1 for specific assessment of exit capacities in relation to this).

Note: although at Ground Level there are apartments and maisonettes which do not connect with the main building common escape routes, nonetheless these should be included in the same evacuation zone groupings as the wider floor on which they are situated and also provided with the BS 8629 system coverage.

It is recommended that the MEP system designer consult with Fire Service once a design outline is in place.

3.4 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.

In accordance with the requirements in BS 9991 for open-plan flats, a Grade D category LD1 detection system shall be provided to flats in accordance with the guidance in BS 5839-6 to provide early notification of a fire to occupants.

An LD1 category is specified as a system installed throughout the premises, incorporating detectors in all circulation areas that form part of the escape routes from the premises, and in all rooms and areas, other than those with negligible sources of ignition, such as toilets, bathrooms and shower rooms. Flashing beacons will also be provided to the balconies of the flats.

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.

A Category L5 system will be provided in the common lobbies and stairs, with detection only (no sounders) to activate the stair AOVs.

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.

3.4.1 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.

3.5 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. The general principle is that any person confronted by a fire within a building can turn away from it and escape safely. Protected escape routes (residential corridors, stairs) are designed to function as a sterile space where a fire should not be able to break out. Were a fire to break out there should be virtually no combustible material to provide fuel to the fire.

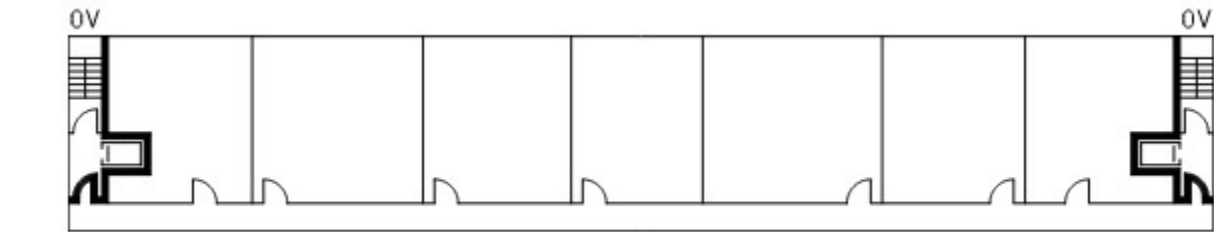
The means of escape design depends on the occupancy, occupancy numbers, number of escape routes, escape route widths and travel distances.

The development features flats with deck access as detailed in the following sections.

3.5.1 Flats With External Deck Access

In general, there is little risk of a deck becoming smoke-logged when the deck width is less than 2m, and there is thus no need to impose a limitation on the travel distance from the dwelling entrance to the stairway, although account should be taken of the needs of the fire and rescue service, such as the distance between the nearest connection to a fire main and the flat or maisonette. Where there is only a single direction of escape, provision should be made for the safety of persons who might have to escape past the flat or maisonette on fire. Therefore, the following recommendations should be observed.

- The structure, including the floor, should be protected by 60 minutes of fire-resisting construction (integrity and insulation). Balconies and decks to be constructed from materials classified as A2-s1,d0 or better.
- Fire-resisting construction up to a height of 1.1 m above deck level is to be provided.
- The walking surface will be imperforate
- The sectional profile should be such that any fire plume breaking out of a flat or maisonette is directed outwards and upwards, and should be arranged such that smoke does not leak laterally along the soffit



a) Multi-stair building

Key	
OV	Openable vent for fire and rescue service use from the top storey (1.0 m² min. free area as given in 20.1)
—	Fire-resisting construction
—	Fire-resisting construction up to a height of 1.1 m above deck level
—	Self-closing E 30 or FD 30 fire door
—	Self-closing E 30 S _{at} or FD 30S fire door
—	Evacuation lift (where included)

Figure 5: Flats with multiple directions to escape stairs on an open deck

- From the areas where there is only a single direction of escape the following recommendations need to be observed too:
 - The face of the building (excluding window openings) up to a height of 1.1m should provide at least 30 minutes of fire resistance (integrity and insulation).
 - Doors opening onto the external walkway should be FD30 self-closing doors.
 - Window openings should not extend below a height of 1.1m above the deck level.
 - The external balustrade will be continuous and imperforate, being provided with a solid panel behind the metal balustrade bars.
 - Surface materials of the facing wall, balcony soffit, and balustrade should be of a A2,s1 d0 or better rating.

This layout is represented in the following image:

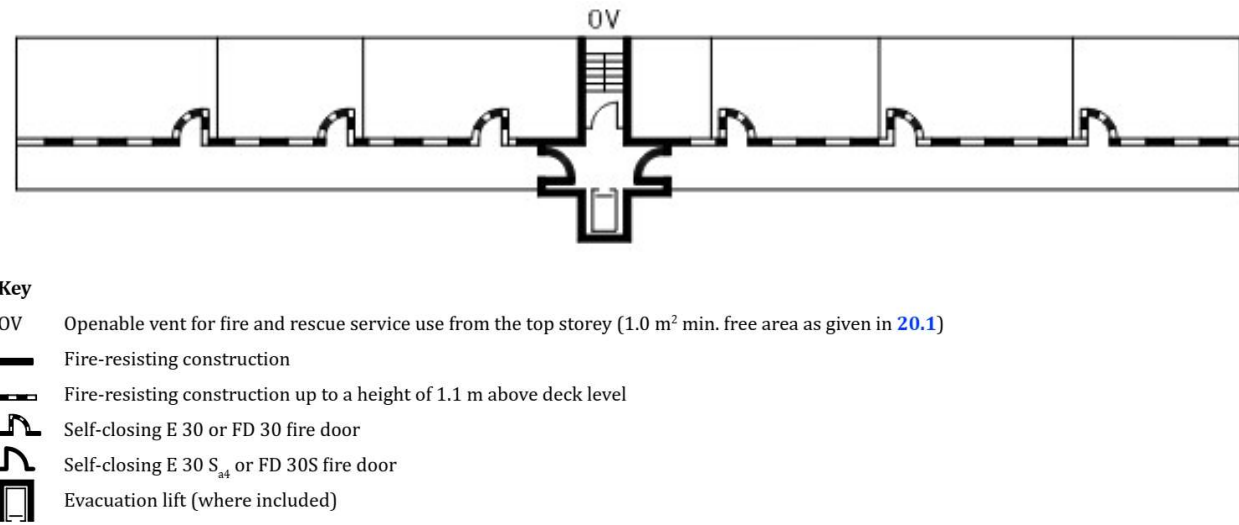


Figure 6: Flats with single direction of escape to a stair on an open deck

3.5.2 Open Plan Apartments (Single Storey)

Some of the flats have an open plan arrangement (Block 1 apartments B1-1-04 on first floor and the four corresponding apartments on the upper floors) with the bedrooms designed as inner rooms that open into the living area, and no internal hall or corridor provided. They also incorporate an open-plan kitchen arrangement, meaning the escape route from the bedrooms passes through the living area, which contains a kitchen that is not enclosed.

In this case, BS 9991 requires the following provisions:

- a) The size of the flat should not be greater than 192m² (16m x 12m is given in the standard as a benchmark).
- b) Ceiling heights should be no less than 2.25m.
- c) Open plan flats should be situated on a single level.
- d) A Category LD1 fire alarm and fire detection system in accordance with BS 5839-6
- e) All rooms in the flats, except for any exclusion as described in BS 9251 or BS EN 12845, should be provided with a sprinkler system conforming to BS 9251 or BS EN 12845, respectively
- f) All cooking appliances that are permanently connected to the dwelling's electrical or gas supply should be positioned as far from the escape route as reasonably practicable. The edge of any cooking appliance should be at least 1.8 m from the escape route, any escape door, any door leading to an adjoining habitable room, or any part of the means of escape leading to an escape door.
- g) All escape routes from habitable rooms to the dwelling's escape door(s) should be at least 0.9 m wide, with no fixed obstructions, such as radiators or cupboards, located within this 0.9 m route.
- h) A 0.3 m clear gap should be maintained between the leading edge of the door serving the space containing the cooking facilities and the start of the 1.8 m zone around the cooking appliance. This ensures that people with mobility impairments can access and operate the door hardware safely.

Provisions f), g) and h) are explained in Figure 2 of BS 9991, also reported below.

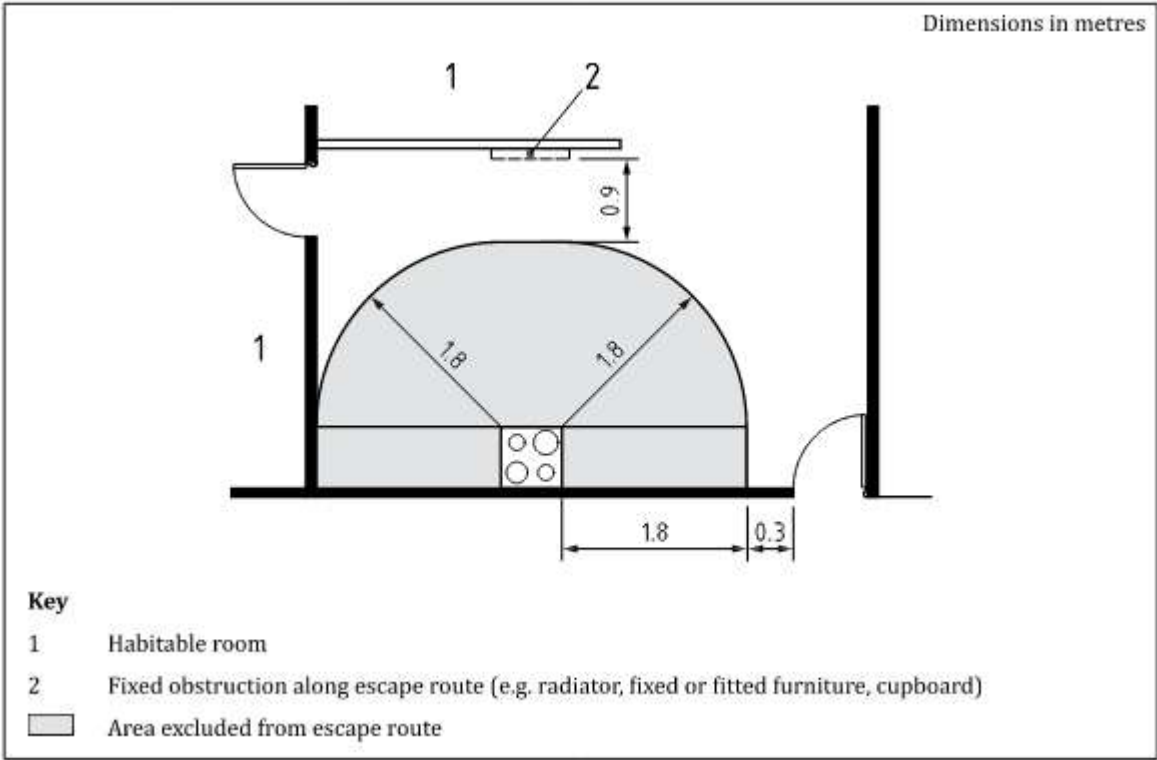


Figure 7: Minimum separation distances of cooking facilities from escape routes in an open-plan flat (Figure 2 of BS 9991)

The open plan apartments layout complies with the relevant BS 9991 recommendations as follows:

- All the apartments in the development are single level as recommended by provision c) above.
- Provisions a) and b) are met.
- A detection system in accordance with provision d) will be provided to all the apartments as detailed in Section 3.4 of This Report.
- A sprinkler system in accordance with provision e) will be provided to all the apartments as detailed in Section 3.10 of This Report.
- Provision f), g) and h) are met in all the apartments with cooking facility area separated from apartment's exit door by a separation wall.

3.5.3 Means of Escape within Single Storey Flats with Hallway

Many apartments in both Block A and Block B will be provided with an entrance hall. It is proposed that these halls will not be designed as protected halls, as the apartments will comply with the requirements for open-plan layouts detailed in the preceding section, with the addition that the kitchens will be enclosed, and the bedrooms will not be inner rooms, thereby providing an enhanced level of safety within each of these flats.

3.5.4 Means of Escape from Multi-Storey Flats

Apartments A.0.03, A.0.04, B.0.01 and B.0.02 will have two levels and with an internal protected stair (30 minutes). The lower level is located on the ground floor and the upper level on the first floor of the building.

Internal planning of multi-storey flats

A multi-storey flat with an independent external entrance at ground level is similar to a dwellinghouse and means of escape should be planned on this basis depending on the height of the top storey above ground level.

Escape From the Ground Storey (Dwellinghouse)

All habitable rooms (excluding kitchens) should have either of the following:

- An emergency escape window or door
- An opening directly onto a hall leading to a final exit

Escape from upper storeys a maximum of 4.5m above ground level (Dwellinghouse)

All habitable rooms (excluding kitchens) should have either of the following:

- Direct access to a protected internal stairway (minimum REI 30) leading to outside
- An emergency escape window or door.

The two-level flats in Block 1 will be provided with a protected (REI 30) hall, which will provide a suitable escape from both levels. It is noted that the kitchen/dining area is also provided with an exit leading to the outside.

3.5.5 Means of Escape from Balconies (Clause E.3 of BS 9991)

The extent of balcony provision on the scheme is to be established but principles for design should be as follows:

It may be noted that Section E.3 of BS 9991 states that where / if balconies are present at heights of more than 4.5m, they should meet the following recommendations:

- The escape route from the balcony should not pass through more than one access room
Each private balcony is accessible via the living room. As the living room leads directly to the exits via an internal hall, the above is considered met
- The interior of the access room should be clearly visible from all parts of the balcony unless provided by a fire detection and alarm system in accordance with BS 5839-6:2019, giving an audible warning with the external door in the closed position.

For some balconies, the access room is not visible from all points. However, a Category LD1 fire detection system, audible from every part of the balcony with the door closed, will be installed in each apartment, complying with the guidance recommendations. Flashing beacons will also be provided.
- Any cooking risk in the access room should be enclosed with fire-resisting construction unless:
 - The open cooking risk is remote from the balcony and is positioned in such a way that it does not prejudice the escape route through the access room; and,
 - A fire detection and alarm system in accordance with BS 5839-6 is provided to the access room with an alarm system on the balconyThe above is met for all the balconies in the development.
- Where the travel distances from the balcony access door to the furthest point on the balcony exceeds 7.5m, it should be provided with an alternative escape route without going via the same access room, or the access room should be provided with automatic fire detection

Travel distances are within 7.5m in all the balconies of the development.

3.5.6 Air circulation systems in flats with a protected stairway or entrance hall enclosure

For systems circulating air only within an individual flat, the following will be met:

- Transfer grilles should not be fitted in any wall, door, floor or ceiling of the stair enclosure.
- Any duct passing through the stair enclosure should be rigid steel. Joints between the ductwork and stair enclosure should be fire-stopped.

- Ventilation ducts supplying or extracting air directly to or from a protected stairway should not serve other areas as well.
- Any system of mechanical ventilation which recirculates air and which serves both the stair and other areas should be designed to shut down on the detection of smoke within the system.
- Thermostats be mounted at a height between 1370mm and 1830mm above the floor. The maximum setting should be 27°C for ducted warm air heating systems. However, the building will not feature a ducted heating system; therefore, no maximum setting for the thermostat is required.

3.6 Final Exits

Discharge from common protected stairs and evacuation lifts towards and through final exits should meet the recommendations from BS 9991, as follows:

- Every protected stairway should lead to a final exit, either
 - directly.
 - via a protected exit passageway leading to a final exit.
- Any protected exit corridor or stair should have the same standard of fire resistance and lobby protection as the stair and/or evacuation lift that it serves.
- Where two stairs (or evacuation lifts) provide alternative means of escape from a dwelling they should not terminate in the same enclosure at final exit level (and if two such routes adjoin then they should be separated by imperforate construction)
- 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:
 - be well defined.
 - 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.
- Ancillary areas should be separated from the exit route using a protected lobby with ventilation in accordance with 13.2 and Table 1 of BS 9991

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

Figure 31 of BS 9991, reproduced below, sets out visual guidance of acceptable provisions for final exit protection:



Figure 31 — Examples of final exit route and protection from stairways and evacuation lifts

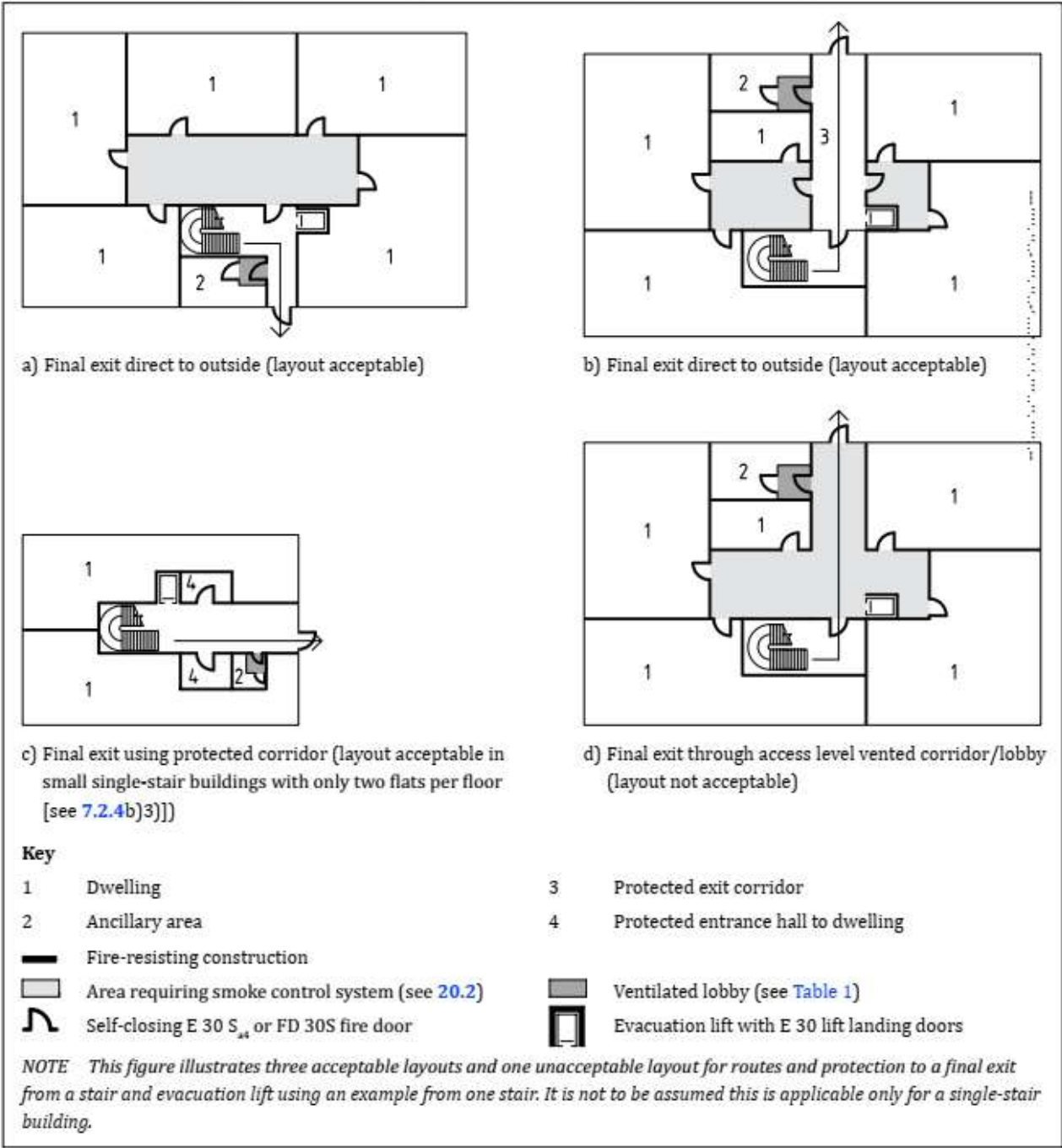


Figure 8: Figure 31 of BS 9991 – examples of final exit route and protection from stairways and evacuation lifts

3.7 Automatic Doors

If automatic doors are placed across escape routes they should comply with one of the following:

- They are of the required width and comply with one of the following conditions:
 - Their failsafe system provides outward opening from any open position.
 - They have a monitored failsafe system to open the doors if the mains electricity supply fails.
 - They failsafe to the open position if the power fails.

- Non-automatic swing doors of the required width are provided immediately adjacent to the automatic doors.

3.8 Vertical Means of Escape

3.8.1 Escape Stairs

There are two escape stairs serving each block, that will be designed as fire-fighting stairs. The stairs will be enclosed in 120min fire resisting construction and provide a clear width of 1100mm. This will be more than sufficient for the expected occupancy escaping at any one time (a single flat). With regard to the initiation of a wider building evacuation by the Fire Service (using the EAS and envisaged to encompass three floors at a time) each stair (over three floors) would have a capacity of 354 persons (under a C1 risk profile and Table 13 of BS 9999). This is envisaged to be more than sufficient for the anticipated occupancy levels of each three-floor group. Stair ventilation will be provided via an automatic openable vent (AOV) located at the head of the stair, providing an aerodynamic free area (Aa certified to BS EN 12101-2) of 0.7m², operated from a remote switch positioned at the final exit from the stair.

3.8.2 Facilities for Mobility Impaired Persons

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 into 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 the 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. The following provision is set out in this fire strategy to address the needs of mobility-impaired persons capable of self-evacuation.

3.8.3 Evacuation Lift Provision

Evacuation lifts are provided within the development. BS 9991 references the requirements of BS EN 81-76 (which should be read in conjunction with BS EN 81-20) with respect to some provision of evacuation lifts. One evacuation lift has been provided to each stair core as required (one per block) from BS 9991. The provisions within BS EN 81-76 rely on the assumption that the following areas will be protected from the effects of fire and smoke for the duration of the evacuation:

- The lift well.
- Machine rooms and machinery spaces.
- Refuges.
- Safe areas including direct access to a safe exit.
- Landing doors which are not in safe areas.
- Hose or piping and cables between the lift well and machinery spaces alongside associated ducts.
- Power supplies and supply cables (including the secondary supply).
- The source of the secondary power supply.
- The lift main switch, emergency and test panel, machine room and access route to those locations.

The enclosure to each evacuation lift should be constructed as a protected shaft. The route from any dwelling to all evacuation lifts should be step-free and there should be no changes in level along the route unless a suitable ramp is provided.

A lift landing with entrance into an evacuation lift should be provided with a temporary waiting space, which should be located within either the escape stair enclosure or a lobby to the stair. The temporary waiting space for an evacuation lift should be provided with an emergency voice communication system in accordance with BS 5839-9. Communication points should be at least 500 mm from any wall.

BS EN 81-76 includes provisions for two different classes of lifts, Class A and Class B, each of which are subject to different design criteria. According to Section B.1.1 of BS EN 81-76, the development will require Class B lifts.

The provisions made in BS 9991 for evacuation lifts (as relevant to this building) are as follows:

- Any lift provided for means of escape should be designed and programmed to function as an evacuation lift in accordance with the recommendations set out below.
- At least one evacuation lift should be provided for each escape stairway, or more if required by capacity assessment (see Note below). Where escape stairways are provided in more than one location, there should be at least one evacuation lift per escape stairway in each location, or more if required by capacity assessment.

NOTE It is not acceptable to provide two lifts in a single location to meet the provision of one lift per stair where the stairs are provided in separate locations.
- The design and operation of evacuation lifts should be in accordance with BS EN 81-20 and this subclause.

BS EN 81-76 includes requirements for evacuation lifts and information about building-related conditions in which the lift is installed. For buildings with a storey at 18 m or more above ground level, only a Class B lift would be appropriate.

BS EN 81-76 includes options for “driver-assisted evacuation operation” and “automatic evacuation operation”. Driver-assisted evacuation is the default method of lift operation for evacuation lifts.

It is assumed by BS 9991 that evacuation lifts will also be used for access, and as such will be adequately sized to accommodate persons requiring level access and/or egress.
- The enclosure to the evacuation lift, or group of lifts, should be constructed as a protected shaft providing a minimum period of fire resistance not less than that recommended in Section 5 of this strategy, as appropriate.
- The temporary waiting space for an evacuation lift should be provided with an emergency voice communication system in accordance with BS 5839-9. Communication points should be at least 500 mm from any wall (see Figure 10 below).

This communication system is separate from the evacuation lift communication system that is described in BS EN 81-76.
- The walls of the lift landing and temporary waiting space and the lift door, and the landing floor and lift floor, should contrast visually. A visually contrasting floor surface measuring at least (1500 × 1500) mm should be provided outside the lift door area. Recommendations and guidance on visual contrast are given in BS 8300-2.
- An evacuation lift, the associated voice communication system and lighting to both the lift car and temporary waiting space should have both primary and secondary power supplies as follows.
 - For buildings with a storey at 18m or more above ground level, there should be an independent secondary power supply in accordance with Clause 21 of BS 9991 (see further sections and appendix B of this strategy).
- Where evacuation lifts are installed, they should be clearly signed at the evacuation exit floor.
- Where evacuation lifts are provided either within or adjacent to a stair containing a firefighting main outlet, there should be a means to minimize the effect of water penetration into the evacuation lift wells, in the same manner as for a firefighter’s lift.

- An evacuation lift should include driver-assisted evacuation operation. Driver-assisted evacuation operation supplemented with automatic evacuation operation should be provided where the building does not have 24h staffing and may also be provided where the building does have 24h staffing. BS EN 81-76 describes driver-assisted evacuation operation and automatic evacuation operation.
- Class B evacuation lifts have a larger minimum car size than that indicated in Figure 10 below and include additional control requirements for automatic evacuation operation.
- Where automatic evacuation operation is provided, the means by which the evacuation lifts enter evacuation operation mode should be determined taking into account the specific configurations of all floors served by the evacuation lifts.
- For automatic evacuation operation, there should be means in place to:
 - 1) recall the lift;
 - 2) provide the automatic evacuation signal; and
 - 3) where landing calls are to be accepted only from priority floor(s), signal the priority floor(s) to the lift controller.

BS EN 81-76 describes evacuation control signals, functions and signal priorities including these signals.

- A fire detection and fire alarm system in accordance with BS 5839-1:2017, covering the lift spaces (lift well, machine and pulley rooms, machinery spaces) and lift lobbies, should provide the suspend service signal. Additionally, before any uninterruptible power supply (UPS) supplying an evacuation lift is fully discharged, a signal from the UPS equipment (see Clause 21) should provide the suspend service signal.

BS EN 81-76 describes the evacuation lift suspend service operation. It also provides requirements for evacuation lift operation from the receipt of the suspend service signal.

The interface between fire detection and fire alarm systems and lifts is covered in BS 7273-6. 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.
- The route from any dwelling to all evacuation lifts should be step-free. There should be no changes in level along the route unless a suitable ramp is provided in accordance with BS 8300-2.
- A lift landing with entrance into an evacuation lift should be provided with a temporary waiting space, which should be located within either an escape stair enclosure or a lobby to the stair.
- Where the temporary waiting space is in the stair lobby there should only be access to the evacuation lift, an escape stairway and any of the following:
 - a) other passenger or firefighting lifts;
 - b) the adjoining corridor (either ventilated or unventilated); and
 - c) service risers (that do not contain motorized equipment or similar with a potential to malfunction and cause fire) and distribution boards.
- Any lobby housing a temporary waiting space should have dimensions not less than the minimum shown in **Error! Reference source not found.**, or as determined by the evacuation strategy for people with mobility impairments (see Clause 50), whichever is larger.
- At the final exit level, the route to reach a final exit should meet the recommendations in BS 9991, as set out elsewhere in this strategy.

3.8.4 Protection of evacuation lifts from smoke

BS 9991 notes that where the stair is expected to be protected by the smoke control provisions in the common corridor, the evacuation lift well and evacuation lift lobby should be afforded the same minimum level of protection as the stairs.



However, since the evacuation lift lobby provides refuge for escaping occupants waiting to use the lift, some means of ventilating the evacuation lift lobby should be provided to minimize the exposure of occupants to smoke and heat whilst also preventing further smoke ingress to the lobby.

This may be an extension of the ventilation provision in the corridor protecting the stair, or as a separate additional ventilation provision that is compatible with those provided in the corridor.

For this development, it is considered that the open deck access would provide sufficient smoke ventilation provision to protect the lobbies and stair (the approach is not an enclosed corridor as envisaged in the BS 9991 exemplars).

3.8.5 Proposed Design in Fulfilment of Requirements

Evacuation Lift Layout Provision

In the proposed design, and in consideration of fulfilling the requirements set out in BS 9991 in the preceding sections of this strategy, the lift layouts are as follows for the upper levels, for each stair core.

- Each stair core will have two lifts – one of which is a dedicated firefighting lift, and the other of which is an evacuation lift.
- Approach to each lift lobby from apartments is via an open deck (as described elsewhere in this strategy).
- The final discharge level for all lifts will be step-free routes to outside at Level 0.

Based on the above provision, for all cores where lifts are required to be provided there is at least one evacuation lift associated with the respective stair cores, and from each residential floor generally there will be access to at least two evacuation lifts which respectively are sited in separate stair core locations.

It is proposed to adhere to the lift lobby dimensions represented in the following Figure 10 (drawn from BS 9991).

However, it must be noted that the minimum lift car dimensions required in the case of this building are larger than the minimum indicated on this figure. Per BS 9991 a Class B lift to BS EN 81-76 is required, and that standard sets out the following spatial requirements:

- For a Class B evacuation lift, the minimum lift car area shall be of type 3 or type 4 according to BS EN 81-70:2021+A1:2022, Table 3, *or other car dimensions providing at least the same floor area*. For Type 3 cars the car area is 2.31m² and for Type 4 cars the car area is 2.24m². Therefore, the minimum required area for alternative configurations is 2.24m².
- The evacuation lift shall have an emergency trap door according to EN 81-20:2020, 5.4.6, except for the size of the emergency trap door for lifts of Class B, which shall be at least 0.50 m × 0.70m
- Permitted spatial requirements from BS EN 81-70 are as the table excerpt below. These are measured between the lift car structural walls. It is necessary to ensure that any decorative finishes that reduce the minimum required car dimensions do not exceed 15mm thickness. There shall be no additional features attached to the car walls below a height of 800 mm which may restrict the accommodation and turning of passengers using wheelchairs or passengers with other walking aids. This would particularly be the case for type 4 cars restricting the smaller minimum dimension.
- The minimum opening width is to be 900mm per the Figure 10 below.

It may be noted that these lift sizes exceed the minimum dimensions required of firefighting lifts. For information, Annex I.3 within BS EN 81-72 requires firefighting lifts to meet the minimum dimensions as follows (which would align with a Type 2 evacuation lift):

- Car width: 1100mm
- Car depth: 1400mm
- Opening width: 800mm

Table 3 — Minimum car dimensions for cars with a single entrance or two entrances

	Minimum car dimensions ^a	Accessibility level	Building types, usage	Remarks
3	Car width: 1 100 mm Car depth: 2 100 mm (1 000 kg)	This car accommodates one user with a wheelchair of class C and some other passengers. It also allows transport of stretchers.	Recommended size for cars in public areas (e.g. outdoor facilities, stations, etc.) and for cars where transport of wheelchairs of class C shall be provided	Type 3 provides accessibility for persons using a manual wheelchair as described in EN 12183:2014 or an electrically powered wheelchair of class A, B or C described in EN 12184:2014. It also provides accessibility for persons using a manual wheelchair with tractor unit (propulsion attachment). When cars of this type are configured with two opposite entrances this can provide straight through circulation from the main entrance to different floor levels.
4	Car width: 1 600 mm Car depth: 1 400 mm or Car width: 1 400 mm Car depth: 1 600 mm (1 000 kg)	This car accommodates one wheelchair user and a few other passengers. It also allows a wheelchair to be rotated within the car.	Shall be the minimum size for cars with doors on adjacent walls ^b .	Type 4 provides accessibility for persons using a manual wheelchair as described in EN 12183:2014 or an electrically powered wheelchair of class A or B as described in EN 12184:2014. Type 4 provides sufficient space for most wheelchairs users and for passengers with walking aids.
^a The car width is defined as the horizontal distance between the inner surface of the structural walls of the car, measured parallel to the front entrance. The car depth is defined as the horizontal distance between the inner surfaces of the structural walls of the car, measured perpendicular to the width. ^b The distances between doors and adjacent car walls as shown in Figure 1 should be as large as possible.				

Figure 9: Excerpted spatial guidance from BS EN 81-70 Table 3 for lift car Types 3 and 4



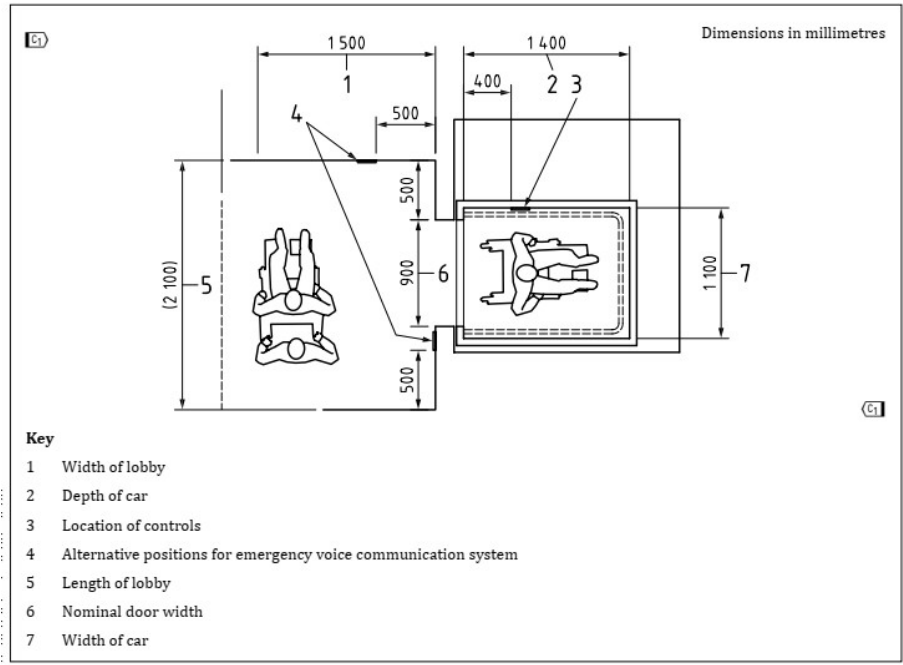


Figure 10: Lift and Lobby Dimensions (BS 9991:2024)

Evacuation Lift Controls

Further detail on the proposed lift controls, consistent with BS 9991 and BS EN 81-76, is set out in this report in Appendix B – Evacuation Lift Operation.

3.8.6 Width of Escape Stairs

The absolute minimum for escape stairs should be no less than 1000mm for downward travel, with the provided stairs having a width of 1100mm.

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 minimum width of an escape stair is calculated as 3.6mm per person as per Table 13 of BS 9999.

3.8.7 Enclosure of Stairs

The stair should be a protected stair, enclosed in fire resisting construction (120min to each side separately), leading to a final exit.

3.8.8 Construction of Escape Stairs

The flights and landings of the escape stair should be constructed of materials of limited combustibility.

3.8.9 Use of Space Within Protected Stairs

Since the stair is the only stair serving the building, cupboards should not be included in the protected stairs even if this is enclosed in fire resisting construction.

If sanitary accommodation opens into the protected stairway, it must not be used as a cloakroom. A gas water heater or sanitary towel incinerator may be installed in the accommodation, but no other gas appliances may be installed.

3.8.10 Lift Installations

Generally, lifts should not be used within a building when there is a fire situation, unless their use forms part of a management plan for evacuating people and the lifts are appropriately sited and protected with safety features to ensure they remain usable during a fire.

Lifts shall be provided with REI 60 to each side separately and FD 30 fire doors.

Guidance on the design and use of evacuation lifts is given in Annex G to BS 9999.

3.9 Ancillary Spaces – Means of Escape

There are a number of ancillary spaces located on Ground Floor in both Blocks, including:

- Five Enterprise Centres – small office spaces for future tenants
- Bin Stores
- Bike Stores
- Plant Rooms

All ancillary spaces are provided with a single entrance/exit and therefore will be limited to 60 people in total. Each exit door will be at least 750mm clear width

Travel distances to ancillary areas will be as follows (based on Table 16 of BS 9991):

Table 3: Travel Distances

Single Direction Only (m)	Multiple Directions (m)
18	45

It should be noted that a majority of the stores and plant rooms are provided with a single exit direct to outside i.e. a storey exit that is actually a final exit. BS 9991 provides two single-direction travel distance limits: one “within the room” of 9m, and one “to the nearest storey exit” of 18m. It is understood that the former is applicable where stores/plant rooms are located within a building and must rely on another area to escape (e.g. a communal area).

On the basis that the stores and plant rooms at the development are only provided with storey exits direct to outside, the longer travel distance limit is applicable, as the occupants do not have to escape through any other areas to reach outside.

The travel distances are therefore assessed to be within the limits of the table above.

3.10 Sprinklers

Sprinkler protection is required to be provided throughout the building in accordance with BS 9251, which recommends that the system be designed to meet the sprinkler hazard classification requirements of a Category 4 system.

BS 9251 provides guidance in relation to non-residential areas which may be adequately protected by a residential sprinkler system (with cognisance of the use of appropriate sprinkler heads i.e. BS EN 12259-1 or BS EN 12259-14)) – this applies only when such areas are not more than 100m² in area (each) which is the case for this building. A hazard review should be carried out to determine the correct classification of occupancy. BS 9251 details areas which may be provided within the proposed development which could (following review) be adequately protected by the BS 9251 sprinkler system (subject to correct sprinkler head selection, BS 9251 category, minimum design density and number of design sprinklers as detailed in Table 3 and Table 4 of BS 9251), as follows:

- Bin Stores
- Resident’s stores (cycle stores, scooter store, caretaker room, bulk store)

- Plant rooms (water tank, secondary power supply room)
- Enterprise Centres

If a BS 9251 system is deemed suitable for an ancillary area, Category 2 System has been identified by the MEP design team as suitable for such areas. Maze Fire recommend that Cat. 4 throughout is considered for consistency of approach.

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

BS 9251:2021 identifies certain areas where sprinkler protection may be omitted as shown below unless required by a fire strategy or risk assessment), which also excludes staircases (with some limitations regarding the construction of the staircase), but not corridors and lobbies:

- bathrooms or water closets with a floor area of less than 5m², with linings conforming to Class A1, A2-s3, d2 and B-s3, d2 (in accordance with BS EN 13501-1 and which are not prepared for white goods;
- enclosed staircasing containing only materials conforming to Class B-s3 (d0, d1 or d2) or better for construction materials and B (fl) (s1 and s2) or better for flooring, surface spread of flame (in accordance with BS EN 13501-1 (2018)) and constructed as a fire-resistant separation;
- enclosed vertical shafts (e.g. service shafts) containing only materials conforming to Class B-s3 (d0, d1 or d2) or better for construction materials and B (fl) (s1 and s2) or better for flooring, surface spread of flame (in accordance with BS EN 13501-1 (2018)) and constructed as a fire-resistant separation;
- cupboards and pantries with a floor area of less than 2m² or where the least dimension does not exceed 1m and are not prepared for consumer units and electrical equipment (excluding a single light)
- attached buildings such as garages and boiler houses without direct access from within the protected building
- crawl spaces
- ceiling voids
- external balconies permanently open to the outside
- uninhabited loft/roof voids.

Sprinkler protection should cover all the areas of the building other than the one listed above), including sterile corridors and lobbies.

As the building is being designed in accordance with BS 9991: 2024, it is important to note that this standard states that, where sprinklers are fitted, protection should be provided throughout the building, including in areas assumed to be fire-sterile (e.g. stair lobbies and common corridors). The guidance also refers to BS 9251:2021 as the benchmark standard for sprinkler system design (as noted above) and notes that the coverage of the sprinkler system should follow the provisions in this guidance.

With respect to the stair cores, it is therefore proposed to follow BS 9251:2021, since BS 9991 references this standard as the basis for sprinkler system design. For sprinklers to be omitted from the stair cores, the stair construction would have to be in accordance with the second item of the list above.

3.10.1 Empty Enterprise Centres

It is understood that the Enterprise Centres will be left as “shell and core” when the overall project reaches Gateway 3, with tenants coming in after completion to fit-out the spaces. As these areas will be completely empty of any combustible materials (which will need to be managed by the end-users) during this shell and core phase, smoke detection and sounders only will be provided, linked to the relevant residential alarm panel (to raise a grey link notification only, not to instigate an evacuation).

The sprinkler system will be capped off during this period, and it will be for the future fit-out to install the remaining pipes/heads to suit the tenant layout with heads, design flow and coverage appropriate to BS 9251 recommendations.

3.11 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 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.

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 relevant protected enclosures and the restrictions which will apply.

Please note that all protected escape routes must be free from risk of ignition (fire sterile). It is understood that the entrance hall to both blocks may contain letterboxes for use by the residents of the building. The letterboxes may contain elements that are flammable (including certain types of packaging), and therefore these must be removed from the protected entrance hall to the building or enclosed in appropriate fire resisting construction.

3.12 General Provisions

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

3.12.1 Headroom in Escape Routes

All escape routes should have clear headroom of not less than 2m.

3.12.2 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.

Electrically powered locks should return to the unlocked position if the fire detection and alarm system operates, there is loss of power/system error, or the security mechanism override is activated.

Security mechanism overrides for electrically powered locks should be a Type A call point as described in BS 7273-4. The call point should be positioned on the side approached by people escaping. If the door provides escape in either direction, a call point should be installed on both sides of the door.

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, they should be fitted with vision panels. Vision panels are also required if the door is dividing a corridor on an escape route.

3.12.3 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 4: Provisions for Emergency Lighting

Use of the building or part of the building	Areas requiring escape lighting
Residential	All common escape routes*
	Open-plan areas of more than 60m²
Other Areas	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-hours illumination.

3.12.4 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 7010:2020+A6:2023 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.

3.13 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. Broadwater Farm building is being provided with a secondary generator.

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 a single intake and a standby generator.

The secondary power supply will be provided by an automatically started standby generator. for the entire development, located in a ground floor room of Block 1.

Particular attention is drawn to the requirement in BS 7671 for suitable support of cabling to avoid obstruction of escape routes and firefighting 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 change-over device should provide the facility to monitor the status of the primary and secondary sources of supply availability, as well as the position of the change-over device, i.e. “On Primary Supply” or “On Secondary Supply”. The ATS should also provide indication of a fault within the ATS device. This indication should be provided to the fire alarm system and should be duplicated to the firefighting lift control switch when the ATS device is serving a firefighters lift installation within a firefighting shaft.

The secondary power supply should be sufficient to run the firefighters lift at the rated load and rated speed for the period equal to the fire resistance of the structure at battery end of life. The car and well lighting should also be supplied by the secondary power supply.

A control signal should be initiated by the UPS equipment to the lift in sufficient time for the lift to be safely taken out of service before the battery becomes fully discharged and the secondary source of supply is de-energized.

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

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:

- Automatic fire alarm and detection systems (internal battery)
- Evacuation Alert System (internal battery)
- Automatic fire suppression systems (generator)
- Firefighting lifts (generator)
- Evacuation lifts (generator)
- Illuminated emergency signage (internal battery)
- Emergency lighting (internal battery)

The power supplies, electrical wiring and control equipment should be protected by a building fabric enclosure that offers protection against fire and water damage for not less than the minimum times given in Table 4 of BS 9991 (reproduced below):



Table 4 — Minimum fire resistance of building electrical switchroom enclosures

Voltage of switchroom/ transformer room	Fire resistance ^{A)} of enclosure, in minutes					
	Depth of basement below ground level		Height of floor of top occupied storey above ground level			
	>10 m	≤10 m	≤5 m	>5 m	>18 m	>30 m
				≤18 m	≤30 m	
LV or ELV switchroom	90	60	30	60	120	120
HV switchroom and transformer room	120	120	120	120	120	120

^{A)} For integrity and insulation, plus stability for load-bearing elements.

Figure 11: Table 4 of BS 9991



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 5: Classification of wall and ceiling linings

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

*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.

Note 3: Maze recommends that regardless of classification achieved, relevant metal composite material should not be used as an internal lining. This includes panels or sheets, having a thickness of no more than 10mm, which is comprised of a number of layers—

- (i)two or more of which are made of metal, alloy or metal compound; and
(ii)one or more of which is substantial (at least 1mm thick or has a mass per unit area of at least 1kg per m²) and is made of a material having a gross calorific value of more than 35 MJ/kg when tested in accordance with BS EN ISO 1716

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 Specific Products

There is specific guidance provided for some internal lining products which may be additional to or an alternative to the requirements detailed in Section 4.2 of This Report. Specific products include:

- Plastic rooflights.
- Flexible membranes.
- PTFE-tension based roofs and structures.
- Insulated core panels.
- Thermoplastic windows.
- Thermoplastic lighting diffusers; and
- Suspended or stretched-skin ceilings.

Thermoplastic lighting diffusers are commonly used in buildings; therefore, further details are provided below. Maze Fire is not aware of any of the other products listed above being specified for Broadwater Farm. If any are to be used Maze Fire must be informed to enable them to provide relevant information.



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 reasonably 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.

As the building is classified as Residential, with a height between 18m and 30m, as is sprinkler protected, in accordance with Table 6 of BS 9991 it will require 60 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.

It is noted that the roof is proposed to have solar panels installation over the whole area of the roof, hence it is proposed that fire rating would be required for the roof structure to avoid any approval risks.

5.3 Compartmentation

Compartment walls and floors will 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:

- Flats will be compartmented from each other using 60 minutes fire rated construction. This includes any separating walls between adjacent covered balconies. Where the balconies are open to the air, fire separation is not considered to be necessary.
- All floors will be compartment floors to 60 minutes.
- Secondary power supply and life safety systems will be enclosed in 120 minutes fire rated construction.

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 firefighting 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 6: Fire resistance requirements

Area	Above Ground Storeys	Fire resistance of any doors (Integrity only)*
	Fire resistance of construction	
Structural frame, beam or column	R 60 to exposed faces	N/A
Loadbearing wall	R 60 to each side separately	Based on location
Floors - including compartment floors	REI 60 from the underside	FD 60
Any part of an external wall a maximum of 1000mm from any point on the relevant boundary	REI 60 to each side separately	FD 60
Any part of an external wall a minimum of 1000mm from the relevant boundary (for loadbearing resistance requirement of loadbearing external walls see above)	E 60 and I 15 from inside the building	FD 60
Any part of an external wall beside an external escape route (for loadbearing external walls see above)	E 30 from inside the building	FD 30
Compartment walls separating a flat from any other part of the building	REI 60 to each side separately	FD 30 S
Compartment walls separating occupancies	REI 60 to each side separately	FD 60 S
Compartment walls	REI 60 to each side separately	FD 60 S
Any glazing in a protected shaft (excluding any firefighting shaft)	E 30 to each side separately	FD 30
Any other part between the protected shaft and a protected lobby/corridor	REI 30 to each side separately	FD 30
Any part of a protected shaft not previously described (including service risers)	REI 60 to each side separately	FD 30S
Enclosure to a protected stairway	60 to each side separately	FD 60 S



Area	Above Ground Storeys	
Enclosure to a lift shaft	REI 60 to each side separately	FD 30
Enclosure to an evacuation lift lobby	REI 30 to each side separately	FD 30 S
Enclosure to a protected lobby	REI 30 to each side separately	FD 30 S
Enclosure to a protected corridor	REI 30 to each side separately	FD 30 S
Sub-division of a corridor	REI 30 to each side separately	FD 30 S
Construction that encloses places of special fire hazard	REI 30 to each side separately	FD 30
Enclosure in a flat to a protected entrance hall, or to a protected landing	REI 30 to each side separately	FD 30
Cavity barriers	E 30 and EI 15 to each side separately	FD 30
Ducts passing through cavity barriers	E 30 from the outside	FD 30
Casing around a drainage system	E 30 from the outside	FD 30
Flue walls	EI 30 from the outside	FD 30
Waste Room	REI 60 to each side separately	FD 30 S

* S = Smoke resisting door

R = Loadbearing

E = Integrity

I = Insulation

Ancillary accommodation will be protected as follows:

- Bin Stores
- Resident’s stores (cycle stores, scooter store, caretaker room, bulk store)
- Plant rooms (water tank, secondary power supply room)

Table 7: Fire resistance requirements for ancillary rooms

BS 9991 Structural fire protection of areas of ancillary accommodation	Requirement	Fire resistance of any doors (Integrity only)*
Bin Stores	REI 60 to each side separately	not required in the development as doors open to outside
Enterprise Centres	REI 60 to each side separately	not required in the development as doors open to outside
Resident’s stores (cycle stores, scooter store, caretaker room, bulk store)	REI 60 to each side separately	not required for external doors FD 30 doors on decks
Life Safety Plant rooms	REI 120 to each side separately	not required in the development as doors open to outside

BS 9991 Structural fire protection of areas of ancillary accommodation	Requirement	Fire resistance of any doors (Integrity only)*
Other Plant rooms	REI 60 to each side separately	not required in the development as doors open to outside

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

Refuse storage chambers, refuse chutes and refuse hoppers will be sited and constructed in accordance with BS 5906. They will 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.

5.3.4 Utility Cupboards

Section 8.1 of BS 9991 requires that utility cupboards within flats or maisonettes be enclosed in fire rated construction in the following circumstances:

- Where the utility cupboard is located within the protected entrance hallway of a flat or maisonette, and where a utility cupboard is located within the protected stair of a maisonette.

The above should be observed where relevant in these buildings.

5.3.5 Internal Angle on external wall between dwellings

Where an internal angle (less than 135°) is created between the external walls of different dwellings (for example as happens on this building where an apartment wall forms the side wall of an adjacent apartment balcony) care should be taken to maintain the required fire separation between the apartments from one side of the wall to the other.

5.3.6 Securing of External Wall Cladding

Aluminium cladding (intended as made of solid single-layer aluminium sheets) fixed on blockwork and covering the ground floor ancillary area walls should be restrained at the junction of compartment walls and floors to resist movement in the event of fire.

5.3.7 Junction of Compartment Wall with Roof

In accordance with ADB, 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. Diagram 5.2 in ADB 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.

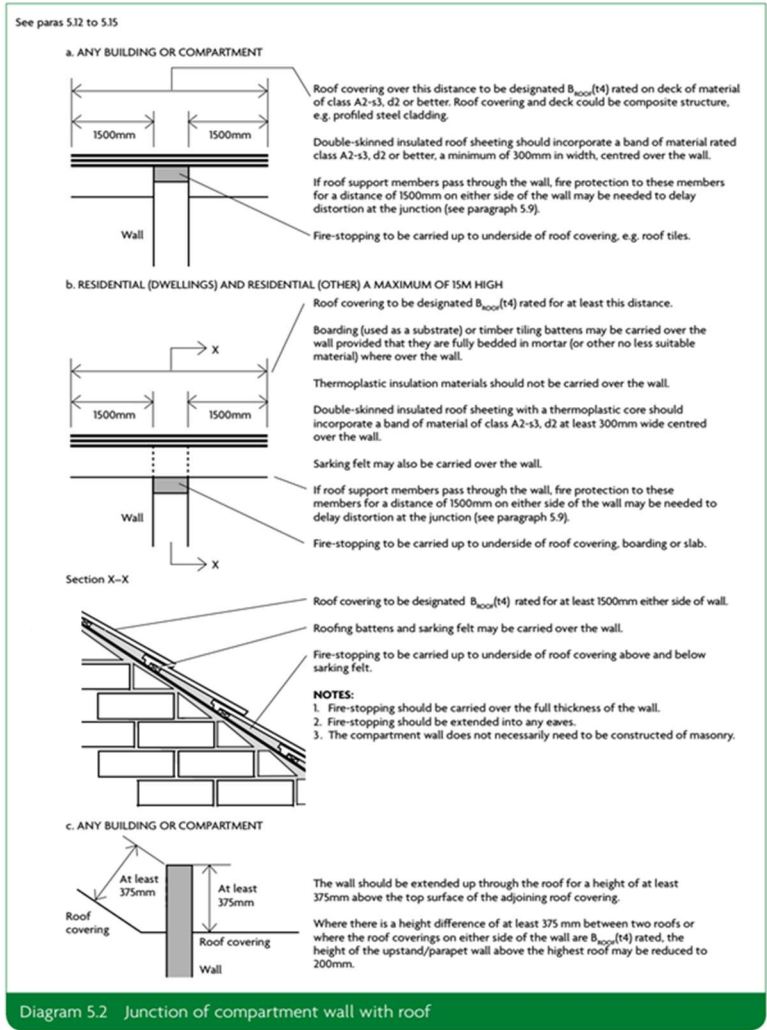


Figure 12: Junction of compartment wall with roof (ADB diagram 5.2)

5.3.8 Risers / Service Ducts / Shafts

Where any service risers pass through compartment floors, they will be treated as protected shafts and enclosed in fire resisting construction equal to the compartment floor through which they are passing (60 minutes).

5.3.9 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 should be provided to close the edges of any cavities, including around openings.

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

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.

Compartment walls should be carried up full storey height to a compartment floor or to the roof, as appropriate, to maintain the standard of fire resistance. A line of compartmentation should not be completed by fitting cavity barriers above the compartment wall.

Non-proprietary cavity barriers are not permitted for blocks of flats under BS 9991 guidance.

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.

Cavity barriers should generally be provided in accordance with Figure 40 of BS 9991 (reproduced in the following figure).

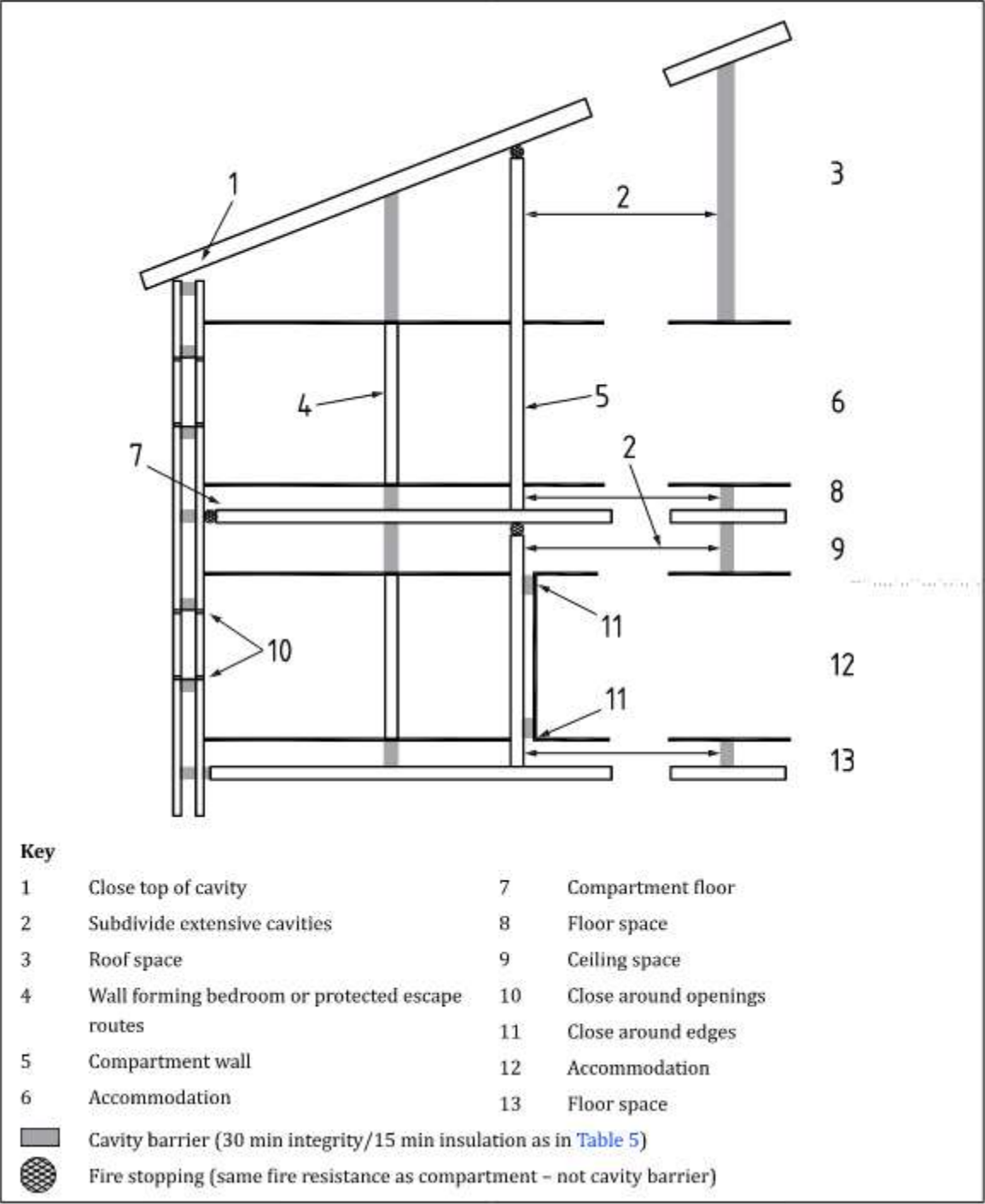


Figure 13: Cavity barrier and fire-stopping provision (Figure 40 of BS 9991)

Openings (such as those in which doors, vents, windows, and other glazing panels are to be installed) that meet cavities should be separated from those cavities with products classified E 30, EI 15 as a linear gap seal in accordance with BS EN 13501-2:2023. It should be verified that the rest of the classification (in respect of orientation, movement capability, substrates and joint width) falls within the evidence of fire performance for the product selected (per BS EN 13501-2:2023, Table 11).

A cavity barrier should, wherever possible, be tightly fitted to a rigid construction and mechanically fixed in position. Where this is not possible (e.g. in the case of a junction with slates, tiles, corrugated sheeting or similar materials), the junction should be provided with fire stopping in accordance with BS 9991.

Cavity barriers should also be fixed such that their performance is unlikely to be made ineffective by:

- 1) movement of the building due to subsidence, shrinkage or temperature change and movement of the external envelope due to wind; or
 - 2) collapse in a fire of any services penetrating them; or
 - 3) failure in a fire of their fixings (but see Note below); or
- NOTE Where cavity barriers are provided in roof spaces, the roof members to which they are fitted are not expected to have any fire resistance for the purpose of supporting the cavity barrier(s).
- 4) failure in a fire of any material or construction that they abut.

NOTE For example, if a suspended ceiling is continued over the top of a fire-resisting wall or partition and direct connection is made between the ceiling and the cavity barrier above the line of the wall or partition, premature failure of the cavity barrier can occur when the ceiling collapses. However, this might not arise if the ceiling is designed to provide fire protection of 30 min or more.

Any openings or penetrations in a cavity barrier should be kept to a minimum and should maintain the same fire performance as the cavity barrier.

On Protected Escape Routes

Cavity barriers should be provided where corridors are to be subdivided, to prevent alternative escape routes being simultaneously affected by fire and/or smoke.

In a protected escape route, a cavity that exists above or below any fire-resisting construction should be either:

- a) fitted with cavity barriers on the line of the enclosure(s) to the protected escape route; or
- b) for cavities above the fire-resisting construction, enclosed on the lower side by a fire-resisting ceiling as shown in BS 9991: Figure 42. The ceiling should:
 - 1) be classified either EI 30 (a↔b) or EI 30 (a→b), as a ceiling with independent fire resistance, in accordance with BS EN 13501-2:2023;
 - 2) be imperforate, except for an opening as described in BS 9991 30.4;
 - 3) extend throughout the building, compartment or separated part; and
 - 4) not be easily demountable.

Further information regarding the requirements for construction and fixing of cavity barriers is set out in Section 5 of 33.1 of BS 9999, including requirements to specific configurations and reaction to fire requirements for surfaces within or adjacent to cavities.

5.3.10 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 as follows:

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

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 or 60 minutes (whichever is greater) as the wall/floor through which the duct passes.

Method 1 should not be used for extract ductwork passing through the enclosures of protected escape routes. An ES classified fire and smoke damper which is activated by a suitable fire detection system (Method 4) may also be used for protected escape routes.

Where ducts pass between fire-separating elements to serve multiple flats or dwellings, fire dampers or fire and smoke dampers should be actuated by both of the following.

- Smoke detector-controlled automatic release mechanisms.
- Thermally actuated devices.

5.3.11 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 13 of BS 9991 and graphically represented in the figure below. The exception is for combustible pipes, Although ADB provides diameter allowances for combustible pipes, ASFP Advisory Note 02 advises against using this option for combustible pipe materials. Research undertaken by the ASFP has identified potential failure modes associated with this approach; consequently, Maze Fire recommends that only Option 1 is used where combustible pipes are present.

Furthermore, accounting for the narrative in the ASFP note, Maze Fire considers where this option is used for non-combustible pipes, it is only applicable to single penetrations. It is not applicable to multiple pipe penetrations in close proximity.

Table 13 — Maximum nominal interior diameter of pipes passing through a compartment wall/floor

Situation	Dimensions in millimetres		
	Maximum nominal internal diameter		
	a) High melting point materials ^{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 that 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 class A1 material (such as cast iron or steel) that, if exposed to a temperature of 800 °C, will not soften or fracture to the extent that flame or hot gas will pass through the wall of the pipe.

^{B)} uPVC pipes conforming to BS 4514 or BS EN 1329-1. Products of any diameter that fall within the scope of BS EN 1366-3 should be provided with fire stopping.

^{C)} These diameters are only in relation to pipes forming part of an above-ground drainage system and enclosed as shown in Figure 44. In other cases, the maximum diameters against situation 3) apply.

Figure 14: Permitted Pipework diameters (Table 13 of BS 9991)

5.3.12 Above Ground Drainage Systems

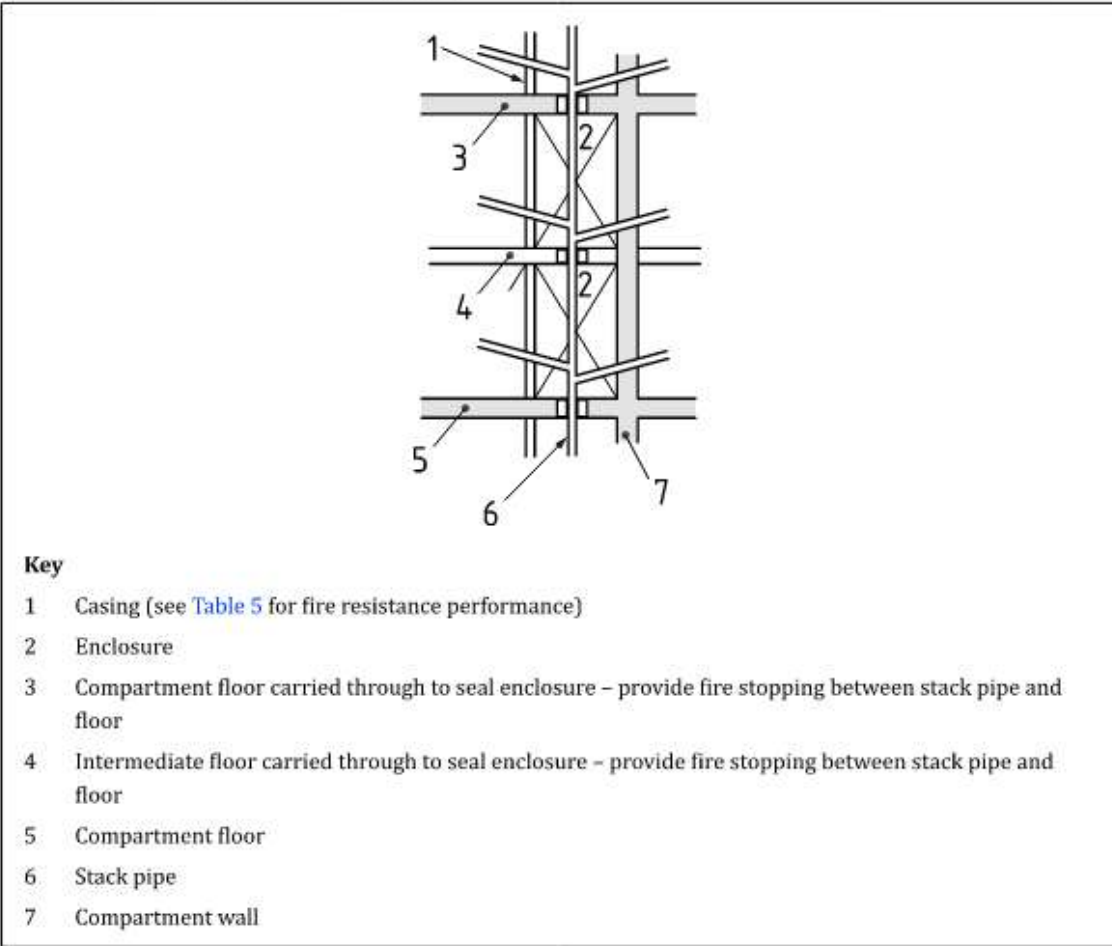
Where a compartment floor is carried through the enclosure to an above-ground drainage system (e.g., SVP stack) then the pipe diameters and materials noted in Item 2b of Table 13 of BS 9991 will be permissible subject to footnote C of the table being observed. This requires enclosure and fire-stopping to the degree set out in Figure 44 of BS 9991 (excerpted below).

With respect to the casing construction the current 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 44 — Enclosure for drainage or water supply pipes



The selection of products and materials used for fire stopping should take account of the size and nature of the gap and any anticipated differential movement.

Where fire-stopping and sealing systems (including those designed for service penetrations) are used, they should have the appropriate level of fire resistance as for the element of structure in which they appear.

In the case where minimum differential movement is anticipated and where the gap does not exceed 25 mm, the following fire-stopping materials may be used without specific test evidence, subject to them having no deleterious effect on the construction:

- cement mortar;
- gypsum-based plaster; and
- cement or gypsum-based vermiculite/perlite mixes.

To maintain the physical integrity of fire stopping, it should be reinforced with (or supported by) materials classified A2-s1, d0 or better in the following circumstances:

- in all cases where the gap between elements that need to be provided with fire stopping is greater than 100 mm; and
- in any other case where non-rigid or flexible materials are used (unless substantiated by fire test evidence).

Figure 15: Enclosure for drainage or water supply pipes (Figure 44 of BS 9991)

5.3.13 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.

Per BS 9991, joints and junctions between elements that serve as a barrier to the passage of fire and smoke should be provided with fire stopping.

All openings for pipes, ducts, conduits or cables to pass through any part of an element that serves as a barrier to the passage of fire should be:

- kept as few in number as possible;
- kept as small as practicable; and
- provided with fire stopping.



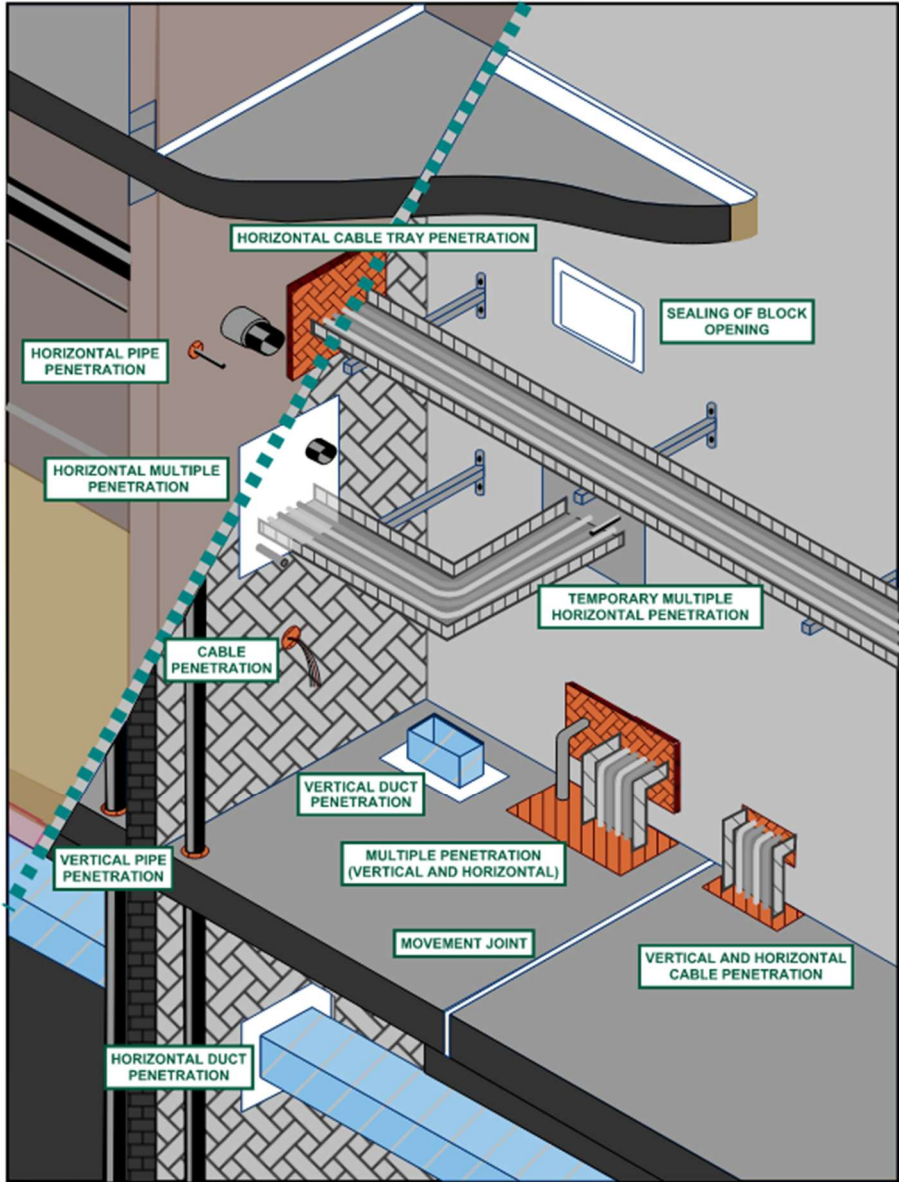


Figure 16: Examples of locations where fire stopping should be provided (Recreated from ASFP Red Book)

6. B4 – External Fire Spread

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.

6.2 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.

Consideration should be given to the choice of materials (including their extent and arrangement) used for the external wall, or attachments to the wall, to reduce the risk of fire spread over the wall. 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.

The external envelope of the building should not provide a medium for undue fire spread to an adjacent building or be readily ignitable by fires in adjacent buildings. In addition to restricting the risk of ignition of the external wall, the amount of thermal radiation that falls on a neighbouring building in the event of a fire is also restricted. Furthermore, the flame spread over and / or fire penetration from an external source through the roof is restricted.

The buildings are ‘relevant buildings’ for the purposes of Regulation 7(2).

6.2.1 Summary of external wall build up for the scheme

The external wall built up for the scheme is to be confirmed for the external wall (from outside to inside).

Maze have not been appointed to review the external wall construction details, but in all instances, these will be required to adhere to the guidance set out below.

6.2.2 Metal Composite Materials

Regulation 7(1A) prohibits the use of relevant metal composite materials in the external walls of all buildings of any height.

Relevant metal composite materials are defined (in regulation 2(6)(c)) as any panel or sheet, having a thickness of no more than 10mm which is composed of a number of layers two or more of which are made of metal, alloy or metal compound and one or more of which is a substantial layer made of a material having a gross calorific value of more than 35MJ/kg when tested in accordance with BS EN ISO 1716. A substantial layer is defined as a layer which is at least 1mm thick or has a mass per unit area of at least 1kg/m².

No composite panel will be installed in the external envelope of the development. Aluminium cladding (intended as made of solid single layer aluminium sheets) fixed on blockwork will be installed in the ground floor ancillary area walls.

6.2.3 External Surfaces

The external surfaces of walls should meet the provisions in Table 9 of BS 9991, but where Regulation 7(2) applies (as it does for this development, that regulation prevails over these provisions. The requirements are summarised below:

Table 8: 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 and Products

In a residential building with a storey 11m or more in height, ADB recommends that 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 limited combustibility (European Classification A2-s3, d2 or A1 classified in accordance with BS EN 13501-1). However, as Regulation 7(2) applies to the buildings then requirement for the performance of such materials is raised to A2-s1,d0 or better (not A2-s3,d2).

There is some ambiguity in the text used within ADB which respect to which materials this recommendation is intending to cover.

- All materials used in the construction of external walls due to the use of ‘etc.’; or
- Only insulation and the array of materials which may fall under the term filler.

It is always necessary to consider how all materials impact on the risk of fire spread over the wall. Noting the ambiguity, Maze recommends that the more stringent interpretation is used. Materials which become part of an external wall, or specified attachment, are to be of European Classification A2-s1, d0 or A1 (classified in accordance with the reaction to fire classification).

The above paragraph does not apply to:

- cavity trays when used between two leaves of masonry (and, until 01 December 2023, in other wall constructions where it isn’t reasonable to use cavity trays achieving European Classification A2-s1,d0 or better);
- 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;
- door frames and doors;
- electrical installations;
- fibre optic cables;
- insulation and water proofing materials used below ground level or up to 300mm above that level;
- intumescent and fire stopping materials where the inclusion of the materials is necessary to meet the requirements of Part B of Schedule 1;
- membranes (they should still achieve Euroclass B-s3,d0. The curtain of solar shading devices are not classified as a membrane);
- seals, gaskets, fixings, sealants and backer rods;
- 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;
- thermal break materials where the inclusion of the materials is necessary to meet the thermal bridging requirements of Part L of Schedule 1 (thermal breaks are small elements used as part of the external wall construction to restrict thermal bridging, combustible thermal breaks should not span two compartments and should be limited in size to the minimum required to restrict the thermal bridging, the principal insulation layer is not to be regarded as a thermal break);
- window frames and glass (this does not include window spandrel panels and infill panels); or



- materials which form the top horizontal floor layer of a balcony which are of European Classification A1fl or A2fl-s1 (classified in accordance with the reaction to fire classification) provided that the entire layer has an imperforate substrate under it.

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 5.3.9 of This Report.

Surfaces which face into cavities should also meet the provisions of Table 10.1 of ADB, and provisions in Section 5.3.9.

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.

Clause 10.21 of ADB v1 states:

10.21 Particular attention is drawn to the following points.

- a. Membranes used as part of the external wall construction above ground level should achieve a minimum of class B-s3, d0. Roofing membranes do not need to achieve a minimum of class A2-s1, d0 when used as part of a roof connecting to an external wall.
- b. Internal linings should comply with the guidance provided in Section 4 [of ADB].
- c. Any part of a roof should achieve the minimum performance as detailed in Section 12. [of ADB].
- d. As per regulation 7(3), window frames and glass (including laminated glass) are exempted from regulation 7(2). Window spandrel panels and infill panels must comply with regulation 7(2).
- e. Thermal breaks are small elements used as part of the external wall construction to restrict thermal bridging. There is no minimum performance for these materials. However, they should not span two compartments and should be limited in size to the minimum required to restrict the thermal bridging (the principal insulation layer is not to be regarded as a thermal break).
- f. Regulation 7(2) only applies to specified attachments. Shop front signs and similar attachments are not covered by the requirements of regulation 7(2), although attention is drawn to paragraph 10.21g.
- g. While regulation 7(2) applies to materials which become part of an external wall or specified attachment, consideration should be given to other attachments to the wall which could impact on the risk of fire spread over the wall.
- h. Any material achieving class A1fl or A2fl-s1 in accordance with BS EN 13501-1 is exempted when it meets both of the following conditions.
 - i. It forms the top horizontal floor layer of a balcony.
 - ii. It is provided with an imperforate substrate under it which extends to the full size of the class A1fl or A2fl-s1 material.

6.2.6 Balconies

Specific advice is provided in BS 8579 in respect to balconies and terraces.

As the development includes a 'residential' purpose and has a storey greater than 11m in height, balconies should either meet the following:

- Only contain materials achieving class A1 or A2-s1, d0, except for any of the following:
 - Cavity trays when used between two leaves of masonry.
 - Intumescent and fire-stopping materials where the inclusion of the materials is necessary to meet the requirements of Part B of Schedule 1 to the Building Regulations.
 - Membranes.

- Seals, gaskets, fixings, sealants and backer rods.
 - Thermal break materials where the inclusion of the materials is necessary to meet the thermal bridging requirements of Part L of Schedule 1 to the Building Regulations.
 - Any material achieving class A1fl or A2fl-s1 when it forms the top horizontal floor layer of a balcony and is provided with an imperforate substrate under it which extends to the full size of the class A1fl or A2fl-s1 material.
 - Electrical installations.
 - Fibre optic cables.
- Achieve both of the following conditions:
 - Have an imperforate soffit which extends to the full area of the balcony, achieves a minimum REI 30 rating and is constructed of materials achieving class A2-s1, d0 or better.
 - Materials achieving class B-s1, d0 or worse extending beyond the boundary of a single compartment should include a band of material rated class A2-s1, d0 or better, a minimum of 300mm in width centred on that boundary line.

Where regulation 7(2) applies, that regulation prevails over all the provisions in this paragraph.

Balconies comprising an open structure and open pedestrian surface should be fitted with a non-combustible imperforate tray or soffit to reduce the risk of fire spreading to balconies below via firebrands or burning droplets and to protect the balcony and adjacent internal areas from the risk of fire spread from below. A tray can act as a water collecting surface and/or a visual soffit to the balcony. Where a drainage pipe penetrates this protective layer, the risk of fire spread via this penetration should be assessed and minimized.

The area where a balcony abuts a wall has numerous components and is likely to have complex detailing. Some balconies are supported by brackets fixed back to the structure of the building, which can pass through the wall cavity. The design should ensure that fire separation is continuous and that no routes for the passage of smoke, flame or hot gases are created within this zone even when adjacent elements distort. Loadbearing and other components of a balcony should not compromise continuity of any cavity barriers or fire stopping. Loadbearing components should also provide insulation criteria to meet the performance in fire of adjacent cavity barriers or fire stopping.

Where slab depths allow, the fire stopping or cavity barrier may be designed to pass over or under the brackets. Where this is not possible, the brackets should incorporate means to ensure the continuity of fire separation by the fire stopping or cavity barrier if interrupted by the bracket. The bracket may incorporate a thermal wrapping which also performs as fire stopping or cavity barrier, thus allowing continuity of fire spread prevention where space is not available to run it past the brackets. Any such brackets should only be used in the design where suitable fire test evidence exists.

The highest occupiable floor of the Broadwater Farm is greater than 18m and features 'Staggered' balconies. Therefore, balcony construction must have a minimum rating of A2-s1,d0 which will also align with the Regulation 7(2) and 7(4) requirements.

6.3 Space Separation

The requirements of B4 of the Building Regulations are considered to be met if the external walls of the building 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. External fire spread calculations were therefore carried out to ensure that the proposed scheme would not create an unacceptable risk to adjacent sites.

A minimum horizontal distance is usually required to prevent fire spread between adjacent buildings. Alternatively, the facade can be fire rated. This horizontal separation is measured at a 90-degree angle to the exterior wall.

The worst-case scenario has been analysed in the table below, using the Enclosing Rectangles (ER) Method from BR 187.



Table 9: External Fire Spread Worst Case Scenario Analysis

ELEVATION	WIDTH (m)	FLOOR HEIGHT (m)	ELEVATION AREA (m²)	DISTANCE TO BOUNDARY (m)	PERMITTED UNPROTECTED AREA	ELEVATION AREA REQUIRING PROTECTION (m²)
Apartment B.2.10, East to Block A	13.8 ER 15m	3.15 ER 6m	43.47 ER 90m²	5.8	96% of ER 86.4m²	0

Given the level of compartmentation for residential units, and the available distance to relevant boundary, the permitted unprotected area is 100%.

6.4 Roof Construction

The recommendations in this section are principally concerned with the performance of roofs when exposed to fire from the outside. The separation distance is the minimum distance from the roof (or part of the roof) to the relevant boundary. Separation distances should be as recommended in the following table by the type of roof covering and the size and use of the building.

It is noted that due to the presence of solar panels, roof covering is recommended to meet B_{roof}(T4) rating as a minimum, to limit fire spread due to a fire starting in the solar panels – further recommendations are made in the following section of this report.

Separation distances for roof coverings

Classification 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
B _{ROOF} (t4)	Acceptable	Acceptable	Acceptable	Acceptable
C _{ROOF} (t4)	Not acceptable	Acceptable	Acceptable	Acceptable
D _{ROOF} (t4)	Not acceptable	Acceptable ^{B), C)}	Acceptable ^{B)}	Acceptable
E _{ROOF} (t4)	Not acceptable	Acceptable ^{C)}	Acceptable	Acceptable
F _{ROOF} (t4)	Not acceptable	Not acceptable	Not acceptable	Acceptable ^{C)}

NOTE 1 Unwired glass at least 4 mm in thickness has a B_{ROOF}(t4) classification.

NOTE 2 See 24.6.2 for limitations on plastic roof lights.

A) The performance of roof coverings is classified in accordance with BS EN 13501-5:2016.

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 and is at least 1.5 m from any similar part, with the roof between the parts covered with class A2-s3, d2 or better materials.

Figure 17: Limitations on roof coverings (Table 11 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.

6.5 Solar Panels

The presence of the solar panels and their mounting system may contribute to fire spread across the roof causing greater damage to the roof. Currently there are no UK fire tests to assess the fire spread properties of the solar panels, however the commercially available products are tested to standard UL1703 (UL 1703 Standard for Flat-Plate Photovoltaic Modules and Panels), this standard includes variety of performance test to solar panels including the fire spread properties.

The UL1703 standard classifies the solar panels in terms for fire spread properties ranges from Class C (fundamental fire resistance) to Class A (highest fire resistance).

To pass the test standard, the flame spread may not exceed the following:

- Class A – 1.82m (after 10 minutes exposure to flame)
- Class B – 2.40m (after 10 minutes exposure to flame)
- Class C – 3.90m (after 4 minutes exposure to flame)

It is recommended to use solar panels with Class B or better as tested to UL1703.

Isolation switches for the solar panel will be provided at Ground Floor within the relevant cores.

The following is also recommended:

- use of non-combustible roof coverings beneath PV arrays
- fire-resistant construction from the exterior inward to mitigate roof penetration



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 Fire-fighting Shafts

As both Block A and B are over 18m high from ground, and over 900m² in floor area, two fire-fighting shafts will be provided per block.

All four cores (A1, A2, B1 and B2) serving the two blocks will therefore be provided with the following:

- A fire-fighting stair that is at least 1100mm in clear width and enclosed in 120 minutes fire rated construction.
- The open balcony approach to each apartment provides the necessary ventilation to reduce the risk of smoke entering into the fire-fighting/evacuation lift and stair shafts.
- A fire-fighting lift conforming to BS EN 81-20 and BS EN 81-72 and enclosed in 120 minutes fire rated construction.
- A dry rising main (in accordance with BS 9990), with outlets on every floor located within the fire-fighting stair shaft, and inlets located externally at Ground, within 18m of where a fire appliance vehicle can park.

Blocks A and B will be provided with all of the above, in accordance with BS 9991 and the hose distance requirements of that standard are met (60m as measured from the dry riser outlet to the furthest point of the furthest apartment, on a route suitable for laying hose).

Only services associated with the firefighting shaft, such as ventilation systems and lighting for the firefighting shafts, should pass through or be contained within the firefighting shaft. It is also considered acceptable to route services within these components which are related to essential fire safety, or related safety, equipment. Any other such services will need to be fully fire separated from the firefighting shaft by REI 120 minutes rated construction from each side separately.

To achieve acceptable resistance to damage of enclosing and separating partitions, unless constructed of materials such as brick or concrete, partitioning around and within firefighting shafts should require the criteria for conformity set out in the table below, when tested in accordance with BS 5234-2:1992 Annex F (severe duty):

Tests for partitions

Test	Severity	Criteria for conformity
a) Stiffness ^{A)}	500 N	No significant damage, maximum deflection ^{B)} 10 mm and residual deflection 1 mm
b) Small hard body impact ^{C)} :		
1) surface damage	10 N·m	No significant damage
2) perforation	30 N·m	No perforation
c) Large soft body impact ^{D)} :		
1) damage	100 N·m	2 mm maximum deformation
2) structural damage	120 N·m	No collapse or dislocation
d) Crowd pressure	1.5 kN/m	No collapse or dangerous damage ^{E)}

A) Force applied via a 150 mm diameter plate.

B) Deflection of the partition from the vertical.

C) Body is a 50 mm steel sphere.

D) Body is sphericoconical bag 600 mm × 400 mm filled with hardened glass beads.

E) Force applied by a 2.5 m horizontal beam.

Figure 18: Table 19 of BS 9991:2024 – test requirements for partitions in and enclosing fire-fighting shafts

Firefighters lift cars should be clearly and conspicuously marked with a notice conforming to BS ISO 3864-1 for supplementary text stating “Firefighters lift: Do not use for non-domestic goods or refuse”.

7.2.1 External wall construction adjacent to firefighting shafts

Per Figure 46 of BS 9991 (reproduced below) where a fire-fighting shaft is sited against an exterior wall, if any glazed area or opening in the exterior wall of the fire-fighting shaft is less than 500mm from the junction of the fire-fighting shaft with the exterior wall, then the fire resistance of the external wall immediately adjacent to the glazed area or opening should be not less than 1 hour from both sides for a horizontal distance of 500mm (REI 60 from each side separately).

It should be noted that whilst the figure indicates ‘X’ as ‘≥500mm’ the intent is that the fire resistance period only needs to be achieved for a distance up to 500mm.



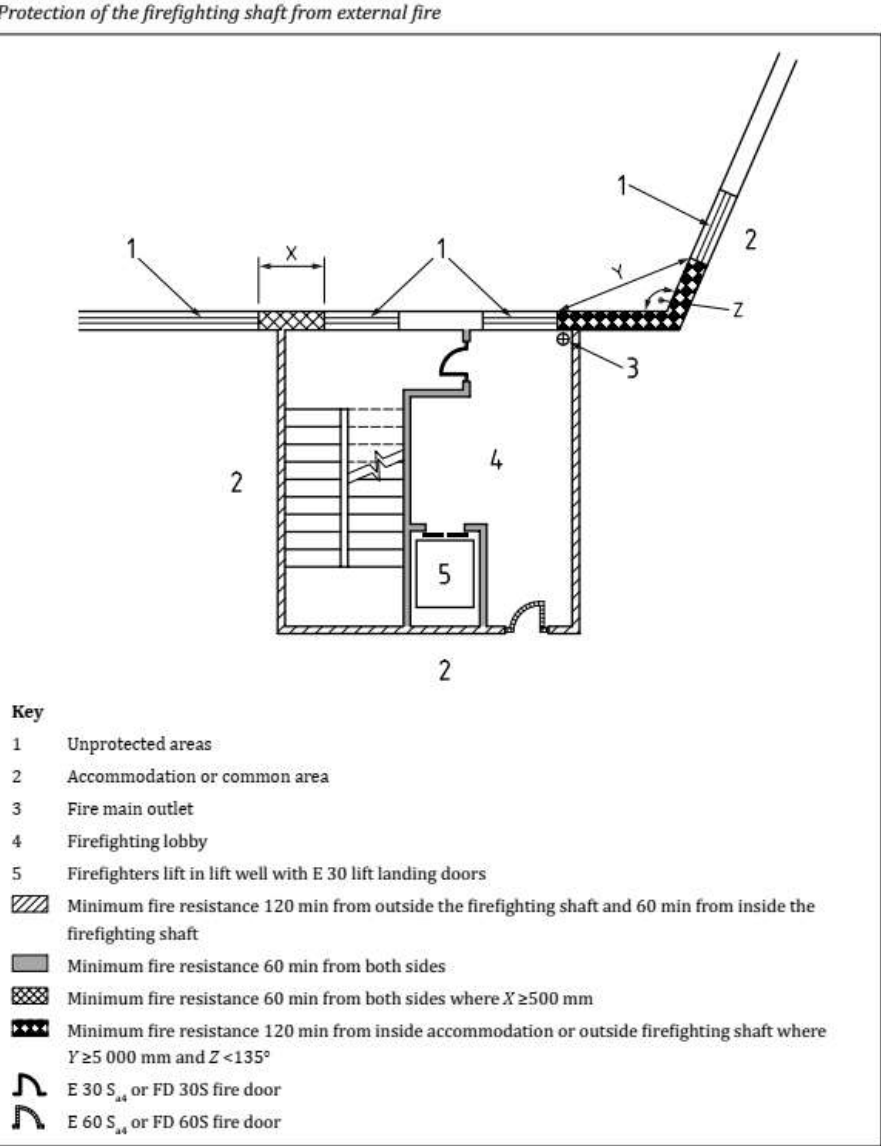


Figure 19: Figure 46 of BS 9999 (protection of fire-fighting shaft from external fire)

7.2.2 Fire Fighting Lifts

A firefighting 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 the recommendations elsewhere in this strategy and lift installations should conform to BS EN 81-72 and BS EN 81-20.

The power supply of the lift and lighting should consist of primary and secondary (emergency, standby or alternative) supplies. There should also be means to minimize the effect of water penetration into the firefighters lift well.

Firefighters' lifts, associated systems such as secondary power supplies, and any drainage and ventilation provided during firefighting operations, should have a regime of checks, maintenance and thorough examination as recommended in BS EN 81-72.

Annex G of BS 9991 provides guidance on typical arrangements to keep firefighters lift wells free from water, with example methods as follows. It would be considered that these methods would also suitably apply to evacuation lifts:

- The use of a raised threshold to the lift entrance, at least 25mm (Figure G.1 of BS 9991)
- The use of a drainage grid to the lift entrance (Figure G.2 of BS 9991), and
- The use of a floor sloped away from the lift entrance, minimum fall of 1:100 (Figure G.3 of BS 9991)

At least one of these methods would be suitable for implementation in each case and should similarly be applied to evacuation lifts.

7.2.3 Access for Vehicles

Pumping appliances should have access to the perimeter at points near the mains, so that fire-fighters can enter the building to make a hose connection from the fire appliance to pump water into the main.

The dry rising main inlets should be located no more than 18m from where a fire appliance can park.

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 18 of BS 9991. As the developments highest occupiable floor is greater than 11m, a high reach appliance will be referenced. Requirements are detailed in the below table:

Table 10: Measurements for high reach appliance vehicle access route (Table 18 of BS 9991)

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	26	29	4	17

Any security features added to the access route (e.g. gates), will be provided with a means to override/open/unlock etc to ensure these do not prevent the fire service gaining access to this route.

7.2.4 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). BS 9991 also sets out the following requirements:

A secure information box should include:

- simple floor plan layouts, indicating number of floors and flats, any relevant fire resistance provisions, internal access provisions, firefighting facilities, building services and any specific hazards;
- relevant information (including operating instructions, access codes and keys) relating to equipment/fixed installations/active systems (e.g. smoke control systems) provided for means of escape or firefighting;
- information regarding the implications of any fire engineering strategy on the performance of the building during a fire, e.g. reduced fire resistance of elements of structure or areas of the building with additional fire protection measures;
- information relevant to preventing environmental damage;
- relevant information (including operating instructions) relating to lifts provided for means of escape or firefighting. Where evacuation lifts or firefighters lifts are installed, these should be clearly signed at the fire and rescue service access level, and relevant information should be available detailing the locations of the main switch, rescue controls and machinery spaces; and
- information regarding any evacuation alert system (EAS) for use by the fire and rescue service (see above).

Where schematic fire system plans are provided, fire protection facilities shown on any of these plans should be labelled, and where plan symbols are used, a key to the symbols should be provided.

The premises information box should also include details in relation to provisions to enable the evacuation of disabled people (including the location and mode of operation of evacuation lifts). A log should be kept of any residents who are likely to require assistance in the event of a fire in order to evacuate their dwelling and/or the building. The fire and rescue service should be made aware of the log and its location (i.e. the secure information box).

7.2.5 Evacuation alert systems

In blocks of flats with a top storey over 18m above ground level an evacuation alert system (EAS) is to be provided, designed and commissioned in accordance with BS 8629.

The EAS should not be integrated with a fire detection and fire alarm system (or any other system), and no devices (such as fire detectors), other than evacuation alert devices, should be connected to the EAS.

Evacuation alert and control indicating equipment (EACIE) for the EAS should be sited in accordance with BS 8629. The EACIE should be located such as not to impinge on the effective width of escape routes. It is recommended that provision is made in the main entrance of Block A in this regard so that the evacuation zone grouping (which will include distinct zones within each block, as well as shared zones across each block) can be controlled from one location.

Within each flat, at least one evacuation alert sounder, conforming to BS EN 54-3, should be provided. The sound pressure level of the alarm signal at each open bedroom doorway should be at least 85 dB(A). The sound pressure level within other habitable rooms should be at least 60 dB(A) when all doors in the dwelling are closed. Facilities should be incorporated in accordance with BS 8629 to enable additional devices to be added to alert people who are Deaf or have a hearing impairment.

The cables and wiring for the EAS should meet the recommendations given in BS 8629.

Wayfinding Signage for the Fire Service

The following guidance is from BS 9991:2024 but it may also be noted that Approved Document B Vol. 1 (2019 with 2020, 2022 and 2025 amendments) contains the same wording.

To assist the fire service to identify each floor in a block of flats with a top storey more than 11m above ground level, floor identification signs and flat indicator signs should be provided.

The floor identification signs should meet all of the following conditions.

- a. The signs should be located on every landing of a protected stairway and every protected corridor/lobby (or open access balcony) into which a firefighting lift opens.

- b. The text should be in sans serif typeface with a letter height of at least 50mm. The height of the numeral that designates the floor number should be at least 75mm.
- c. The signs should be visible from the top step of a firefighting stair and, where possible, from inside a firefighting lift when the lift car doors open.
- d. The signs should be mounted between 1.7m and 2m above floor level and, as far as practicable, all the signs should be mounted at the same height.
- e. The text should be on a contrasting background, easily legible and readable in low level lighting conditions or when illuminated with a torch

The wording used on each floor identification sign should take the form ‘Floor X’, with ‘X’ designating the number of the storey, as intended for reference by residents. The floor number designations should meet all of the following conditions:

- a. The floor closest to the mean ground level should be designated as either Floor 0 or Ground Floor.
- b. Each floor above the ground floor should be numbered sequentially beginning with Floor 1.
- c. A lower ground floor should be designated as either Floor –1 or Lower Ground Floor.
- d. Each floor below the ground floor should be numbered sequentially beginning with Floor –1 or Basement 1.

All floor identification signs should be supplemented by flat indicator signs, which provide information relating to the flats accessed on each storey. The flat indicator signs should meet all of the following conditions.

- a. The signs should be sited immediately below the floor identification signs, such that the top edge of the sign is no more than 50mm below the bottom edge of the floor identification sign.
- b. The wording should take the form Flats X–Y, with the lowest flat number first.
- c. The text should be in sans serif typeface with a letter height of at least half that of the floor indicator sign.
- d. The wording should be supplemented by arrows when flats are in more than one direction.
- e. The text and arrows should be on a contrasting background, easily legible and readable in low level lighting conditions or when illuminated with a torch.

7.3 Hydrants

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.

There are four existing hydrants located around the site, which will be located within 100m (see Figure 16) of the dry riser inlets for each block. Therefore, no additional hydrants are required.



Show Hydrants

N17 6

243 hydrant(s) found.

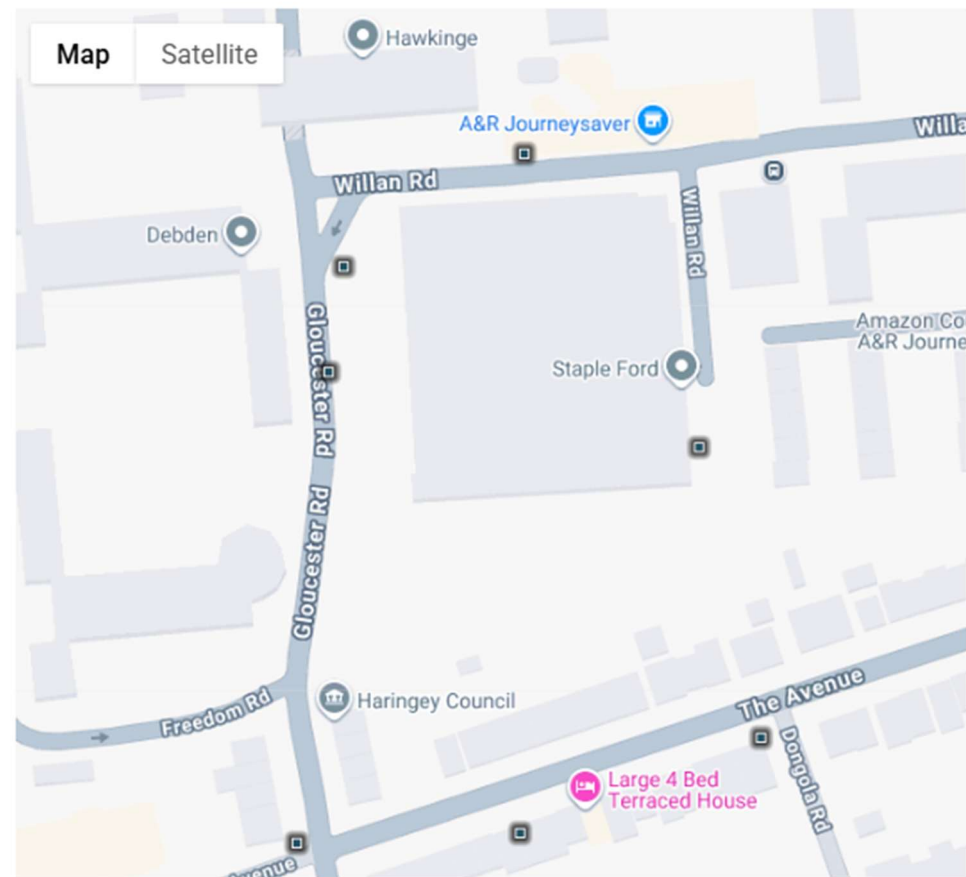


Figure 20: Hydrant locations (taken from RISC Authority Hydrant Mapping tool website)

8. Appendix A – Competency Statement

We can confirm our competency concerning the design of your building project, in alignment with the requirements and standards outlined in the Building Safety Act and PAS 8671.

Since the inception of Maze Fire in 2022 we have worked on ca. 20 health related schemes (including current projects) providing diverse fire consultancy services ranging from RIBA Stage 2 – 4 fire strategy development utilising the latest Approved Document or BS 9991 as appropriate (inclusive of supporting engineering analysis such as CFD smoke modelling), RIBA 5 construction stage support, Planning Gateway 1 statements, London Plan Fire Statements (where applicable), internal fit-out variation reviews, PAS 9980 external wall assessments and fire risk assessments. Maze Fire have also provided 3rd Party review services in relation to high-rise residential projects.

All of our staff either carry similar memberships and/or have been trained internally with demonstrable experience and competence. Individual fire engineers will be members, at varying grades, of one or more of the following:

- Institute of Fire Engineers (IFE).
- Institute of Fire Safety Managers (IFSM).
- Fire Protection Association (FPA).
- The Confederation of Fire Protection Association Europe (CFPA).
- Chartered Association of Building Engineers (CABE).

Our staff have a hugely diverse and rich experience of applying fire engineering principles across the majority of sectors. All engineers work in accordance with our strict quality assurance processes, and all work is reviewed by a more, or equally, experience member of staff. All Maze projects are led by a Principal Consultant (or higher grade).

CV's and certificates are available upon request.

Company Information	
Company Name	Maze Fire Consulting Ltd
Address	2 nd Floor Queens Chambers 5 John Dalton Street Manchester M2 6ET
Telephone	0161 513 0300
Email	info@mazefire.com



9. Appendix B – Evacuation Lift Operation

The following information is presented for the attention of the MEP design team to set out strategic requirements applicable to this building – the detailed design of the evacuation lifts and operation is outside the scope of Maze Fire’s appointment.

9.1 BS 9991 and BS EN 81-76

As set out in earlier sections of this strategy, evacuation lifts are to be provided in locations associated with each stair core. Each core will be a firefighting shaft and one the lifts in each core will be an evacuation lift.

As noted in the preceding sections of the fire strategy BS 9991 makes reference to BS EN 81-76 in respect of further detail associated with the design, functioning and control of evacuation lifts.

Within BS 9991, BS EN 81-76 is specifically mentioned in nine notes. The following sections below reference where BS EN 81-76 informs these notes (one of these notes is not repeated in the following sections as it makes reference to Class A evacuation lifts which are not applicable to this design). The guidance in this appendix is not exhaustive, and the MEP engineer and Design Team should make full reference to the detail set out in BS EN 81-76 as relevant to the principles expressed in this fire strategy when designing the system.

The following statement from BS 9991 is of relevance in relation to the first note regarding BS EN 81-76 in that guidance:

‘7.4 Provision, design and operation of lifts used for evacuation

NOTE 1 This subclause makes extensive reference to BS EN 81-76. At the time of publication of this edition of BS 9991, the final draft FprEN 81-76 is being prepared after addressing comments on prEN 81-76 made at its public consultation. When BS EN 81-76 is published, it is expected that users of BS 9991 will adopt its requirements for evacuation lifts. ‘

In the period since the above statement was made in the current BS 9991, BS EN 81-76 has been formally published as of 31/07/205.

The National Foreword to BS EN 81-76 notes that:

‘This standard forms part of a series of standards concerning the safe design of passenger and goods passenger lifts. It is intended to be read in conjunction with the other standards in the series; in particular, the base standard BS EN 81-20 for the design of new lifts.’

And (all section references in the quoted text are to the various parts of the standard):

‘The implementation of a safe evacuation lift depends on the satisfactory integration of the evacuation lift into the building. This needs collaboration between those responsible for the lift and those responsible for other aspects (outside the lift) such as:

- *building-related conditions in which the lift is installed (see Annex C);*
- *the number and size of evacuation lifts based on capacity assessment (see B.1.2, C.2);*
- *specification of optional modes for driver assisted evacuation and/or automatic evacuation operation (see Introduction, Annex B);*
- *specification of the evacuation lift as either of Class A or Class B (see Introduction, B.1.1);*
- *minimum lift car size depending on whether the intended use is to include a stretcher or trolley stretcher, and whether the evacuation lift is Class A or Class B (see 4.3.2);*
- *a means to suspend evacuation operation if fire or smoke is detected (see 4.3.6, 4.4.2, 4.5.4, C.3);*
- *whether the evacuation lift is also a firefighters lift (see 4.4.1);*
- *signals to recall the lift and for selection of evacuation operational mode(s) (see 4.4.2);*
- *for automatic evacuation operation, any signals for active floor alarms and a signal for the evacuation of all floors (see 4.4.2, 4.5.3.2.2);*

- *clarification that any emergency voice communication system in a temporary waiting space outside the lift is separate from the communication system required on a lift with remote assisted evacuation operation or driver assisted evacuation operation (see 4.7).’*

The purpose of this fire strategy appendix is to describe the strategic requirements for the Gould Street project in respect of each of the above considerations, for the attention of, and implementation by, the design team.

9.2 Building-Related Conditions in which the Lift is Installed (Annex C BS EN 81-76)

As noted in Section 7.4.2 of BS 9991:

‘When published, BS EN 81-76 is expected to include requirements for evacuation lifts and information about building-related conditions in which the lift is installed.’

Annex C of BS EN 81-76 sets out requirements in relation to documenting information on the building-related conditions in which the lift is installed, covering the following:

9.2.1 Evacuation Plan

An evacuation plan should be drawn up by the Building Management, based on the provisions in this strategy. In relation to the provision of evacuation lifts as part of that plan, the following may be noted:

- 4 of the 8 lifts in the building will have the functionality of evacuation lifts (see Section 9.3 for description)
- The lifts are sized as Class B lifts to the spatial requirements identified in BS EN 81-70. The sizes in this project should be designed to be consistent with these requirements.
- These lift sizes are characterised in BS EN 81-70 as accommodating ‘...one wheelchair user and a few other passengers. It also allows a wheelchair to be rotated within the car’
- For normal operation of the buildings ‘stay-put’ policy, and given the observations in Section 9.3 below it would be considered that there is more than sufficient capacity in a standard evacuation scenario.
- Notwithstanding this, upon occupation of the building the building management could ascertain and review on a regular basis the degree to which occupants present may require the use of evacuation lifts to escape to ensure that this is documented against the stated lift capacity available on each floor of the building.
- The evacuation plan could also make reference to the general provisions and capacities for means of escape as set out elsewhere in the main body of this fire strategy.

The key points to be addressed in the evacuation plan with regard to the evacuation lifts are the following:

- The size and the capacity of the evacuation lift(s).
Note: this is commented on further above and in Section 9.3
- The defined duration of the evacuation.
Note: See Section 9.2.11.
- The floors to be evacuated with the evacuation lift(s).
Note: All upper floors within the building will be provided with facility to use evacuation lifts. As the building operates a stay-put policy it is initially envisaged that only one apartment where a fire has initiated would use the lift to evacuate but that this functionality would remain until such time as either smoke is detected in the evacuation lift lobby or the Fire Service commence operations.
- The evacuation exit landing(s) (EEL) which is the floor to exit the building during the evacuation.
Note: In each case the final EEL will be at Level 0 with a step-free route to outside leading from that discharge level.
- An alternative way of evacuation of persons with disabilities in case the evacuation lift is not available.

Note: Within the building there are multiple evacuation lifts in separate locations with secondary power supplies as defined by the referenced standards, reducing the chances of multiple points of failure in different locations of the building. Occupant safety is further enhanced by robust compartmentation and smoke ventilation measures in support of the general stay-put policy. Routine maintenance and testing should be in place as set out in Section 9.11 to keep the provisions in working order. In the case of unforeseen circumstance where multiple lifts are out of order, it would be necessary for the building management to implement additional measures in respect of ensuring persons with disabilities can both access, and safely evacuate from, the building.

9.2.2 Operating Environment

In respect of the operating environment of evacuation lifts, BS EN 81-76 notes that the environment for safe operation of the evacuation lift includes:

- the well where the evacuation lift is located;
- the evacuation lift machinery spaces;
- any ducts containing hoses, piping, electrical cables or suspension means between evacuation lift machinery spaces and the evacuation lift well;
- the safe area in front of the evacuation lift landing doors of the floors defined to be served during evacuation;
- an alternative escape route from each safe area;
- the route from each evacuation exit landing (EEL) to the machinery space where the evacuation lift's emergency operation devices are located.

And requires:

- *That the evacuation lift's operating environment is protected from the effects of fire and ingress of smoke for at least the defined duration of the evacuation. When defining the duration of evacuation operations, the risk of possible unavailability of the evacuation lift service is addressed.*
- *That the evacuation lift's operating environment is provided with a fire detection and fire alarm system. When fire or smoke is detected in the evacuation lift's operating environment, a suspend service signal is given to the evacuation lift.*
- *That maintenance of the fire detection and fire alarm system is possible from outside the lift well.*

With regard to the first two points, the provisions set out elsewhere in this strategy address these items.

With regard to the third point, it would be necessary for the MEP designer to ensure that this access provision is made.

9.2.3 Safe Area

Annex C of BS EN 81-76 requires the following as relevant to the proposed design:

- *that at a safe area is a designated area where persons with disabilities can wait for the lift service in relative safety while the evacuation process is under way.*
- *that safe areas are provided in front of every landing door according to the evacuation plan. A safe area may... be used as exit route.*

Within the proposed design evacuation lift lobbies are provided, meeting the minimum spatial requirements in BS 9991. The lobbies are also protected by preceding ventilation afforded by the open deck access approach.

9.2.4 Evacuation Exit Landing

It is required that for each evacuation exit landing (EEL), an evacuation recall signal is provided to the lift control system. For each lift in this building the EEL is at Level 0. The control system (recall signal) may be initiated by an evacuation lift switch or provided externally in the lobby.

9.2.5 Emergency Operation Signage

It is required that the location and access route to the machinery space where the evacuation lift emergency operation devices are located is included in a signage label at each EEL (emergency operation devices are located on an emergency and test panel or in the machinery space and are needed for the release of entrapped passengers).

9.2.6 Water Management

Annex C of BS EN 81-76 requires the following in this regard:

- *'...that water ingress to the lift well during the evacuation process is prevented. This applies to every entrance to the evacuation lift well, including entrances where fire doors are used*

Suitable methods to prevent water ingress to the lift well include:

- *the provision of drainage channels in front of a door of the lift well and drainpipes; or*
- *raising or ramping of the floor in front of a door of the lift well so that any water will not enter the lift well but will drain away down the stairs or in to drains.'*

Note: As set out in earlier sections of this fire strategy, Annex G of BS 9991 provides guidance on typical arrangements to keep firefighters lift wells free from water, with example methods as follows. It would be considered that these methods would also suitably apply to evacuation lifts:

- The use of a raised threshold to the lift entrance
- The use of a drainage grid to the lift entrance, and
- The use of a floor sloped away from the lift entrance
- See also Section 7.2.2 of this strategy

9.2.7 Signals to the Evacuation Lift

BS EN 81-76 requires:

That depending on the selected evacuation operation(s), relevant signals from Table 1 (of BS EN 81-76), including suspend service signal, are provided to the evacuation lift.

That the lift is prevented from unintentionally returning to normal operation by keeping the evacuation recall signal active during the evacuation operation.

The relevant signals are described elsewhere in this Appendix.

9.2.8 Remote-Assisted Evacuation Operation

This mode of operation will not be applied to this building (see Section 9.4 below).

9.2.9 Intermediate Emergency Doors

This consideration is not relevant to this project as the distance between consecutive landing doorsills does not exceed 7m.

9.2.10 Protection of Electric Wires and Cables and Hydraulic Hoses

It is required that electric wires and cables and hydraulic hoses, which are located outside of the evacuation lift's operating environment (see Section 9.2.2) and which are provided for evacuation operation, have at least the same degree of fire protection as the evacuation lift well.

9.2.11 Power Supply for Evacuation Lifts

The requirements are as follows as relevant to this project.



It is required that the power supply system of a class B evacuation lift consist of a primary and a secondary power supply. The secondary power supply is also required to supply car lighting and the evacuation communication systems.

It is required that, in addition to the primary supply, the control and monitoring equipment for a remote evacuation operation is fed from a secondary power supply or has a backup supply.

It is required that the secondary power supply is sufficient to operate the evacuation lift at the rated load and rated speed for at least a period equal to the defined duration of the evacuation. It is proposed to provide the for the same duration of operation as other life safety equipment within the building (minimum 60 minutes).

It is required that the selection of the secondary power supply considers the lift's acceleration current and the regenerated power.

It is required to ensure that the secondary power supply is effectively independent from the building's normal power supply.

It is required that that the changeover from primary to secondary power is automatic on loss of the primary supply. When the power supply is re-established and the lift is in evacuation operation, the lift shall become available for service within 60s. If the lift needs to move to establish its position, it shall not move more than one floor and towards the active EEL and indicate its position. Registered calls, the activated evacuation operation and communication systems shall remain after the changeover of electrical supply.

9.2.12 Air Pressurisation of the Lift Well

This requirement is not relevant to this project.

9.2.13 Noise

It is required that the noise level from the building fire detection and alarm system is less than 80 dB(A) at positions 0.5m from the microphones and the speakers of the evacuation lift's communication systems.

9.3 Number and Size of Evacuation Lifts

As indicated in this strategy, four of the eight lifts in the building (one per core) will have functionality of evacuation lifts.

The building will generally operate a stay-put policy as is typical for general needs housing. This is supported by the holistic range of measures set out in the fire strategy (e.g. appropriate compartmentation, smoke ventilation, sprinklers, detection systems, building construction and firefighting access).

In the event that the Fire Service determine to trigger a wider evacuation using the evacuation alert system, it would be considered that there is reasonable evacuation lift provision to assist the Fire Service to enable evacuation of residents on the affected floors who have particular mobility needs. This is also supported by the spatial requirements of the lifts (see below).

Section B.1.2 of BS EN 81-76 notes indicatively that around 10% of the general population might be regarded as having difficulties using stairs.

Therefore, even in the event of a wider evacuation process initiated by the Fire Service covering zones of three floors the expected usage of each evacuation lift would be of the order of ~2 persons per lift per floor (based on an occupancy of ~40 persons per floor as a maximum) which would be considered to be met by the proposed provision within the number of lift cycles required for at least one cycle per floor.

9.4 Specification of Operational Modes

9.4.1 General Overview

As noted in Section 7.4.2 of BS 9991:

‘When published, BS EN 81-76 is expected to include options for “driver-assisted evacuation operation” and “automatic evacuation operation”. Driver-assisted evacuation is the default method of lift operation for evacuation lifts.’

And:

‘When published, BS EN 81-76 is expected to describe driver-assisted evacuation operation and automatic evacuation operation.’

BS EN 81-76 described three alternative modes for a lift to be used for the evacuation of persons with disabilities and advises that one or more can be selected / combined based on the building type and evacuation strategy. The modes are summarised as:

- automatic evacuation operation;
- remote assisted evacuation operation;
- driver assisted evacuation operation.

The first of these, automatic operation, can facilitate an independent evacuation (e.g. where evacuation assistants might not be available or take time to mobilize) of persons with disabilities.

Remote-assisted evacuation is dependent on providing a remote evacuation assistant who does not travel with the lift car, but who controls the lift from a remote location. As well as the staffing resource this mode requires particular communication and video monitoring provisions. It is not proposed to provide this mode of operation for this building.

Driver-assisted evacuation operation allows full control of the evacuation lift by an evacuation assistant who travels within the car.

BS 9991 states that an evacuation lift should include driver-assisted evacuation operation. Driver-assisted evacuation operation supplemented with automatic evacuation operation should be provided where the building does not have 24h staffing and may also be provided where the building does have 24h staffing.

Therefore, the provision for this building will be for the lifts to be provided with the functionality of driver assisted evacuation operation and automatic evacuation operation in view of the number of lifts present across the building.

In both automatic and driver-assisted mode, the evacuation lifts run until such time as the fire and rescue service arrive (upon which they may take the management of the evacuation, though where driver-assisted resource is present the evacuation lifts could still continue to operate under their control subject to consultation with the attending fire service during an incident.

Figure A.1 of BS EN 81-76 signposts the relevant parts of the standard with respect to a given operational mode. This is repeated below for the reference of the wider design team.

Further detail in relation to the operation of the relevant modes is set out in the following sections of this report in order of Priority as defined in Figure B21 and Figure B22.

Note: As set out in Section 9.4.6 below, the lift control system of a Class B evacuation lift is required to accept the following signals (on top of those required by Table 1 of BS EN 81-76):

- A signal per each floor defined to be served during the evacuation, where the signal identifies an active floor alarm; and
- A signal for the evacuation of all floors defined to be served during the evacuation.

The interruption of a connection to the lift control system shall be as shown in Figure B23 for the modes of operation relevant to this building. In case of any evacuation operation signal becomes inactive unintentionally, the lift is prevented from returning to normal operation by keeping the evacuation recall signal active during the evacuation operation.



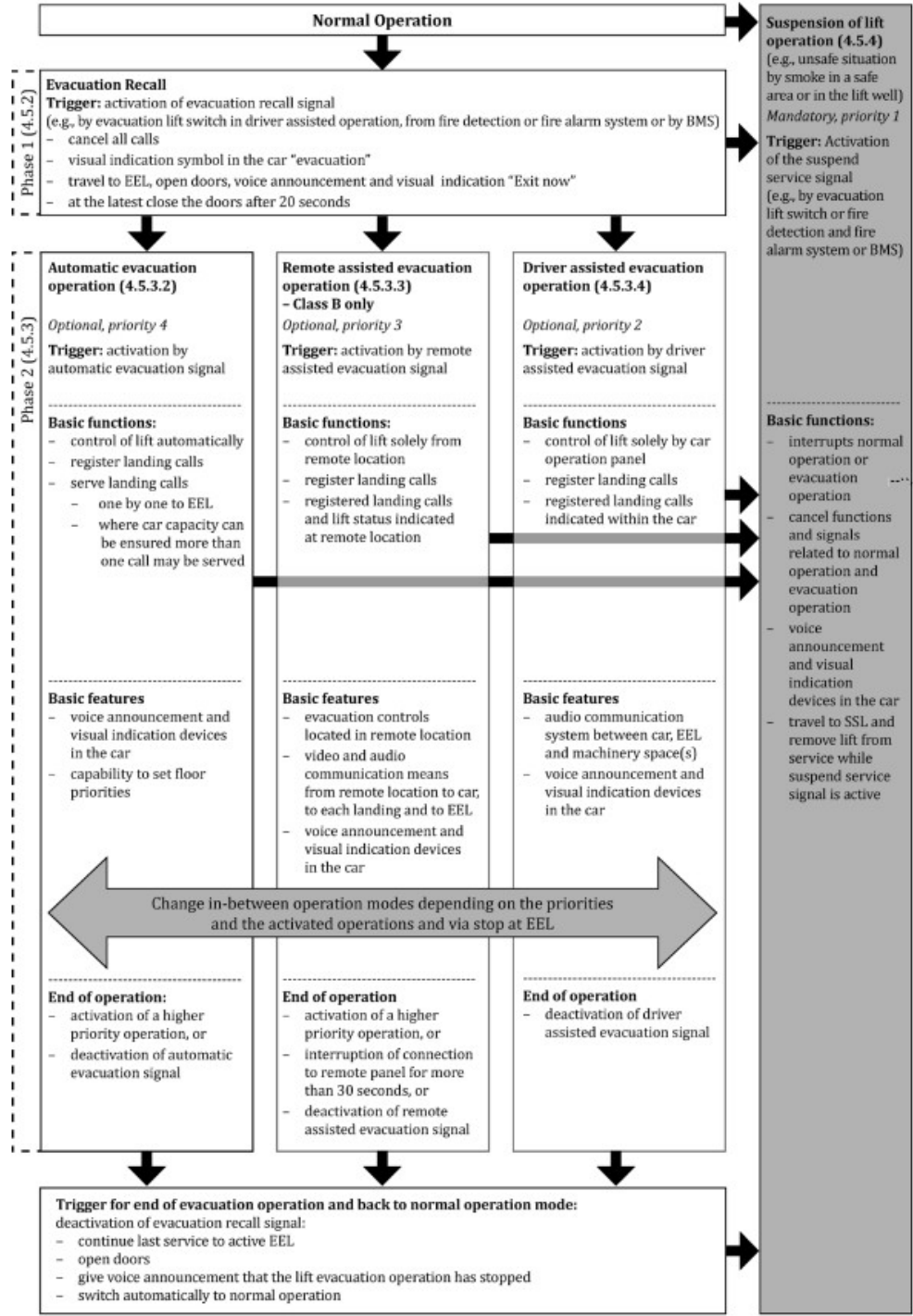


Figure A.1 — Overview of evacuation lift operations

Figure B21: Figure A.1 of BS EN 81-76 – overview of evacuation lift operations

Table 1 — Summary of evacuation controls, functions and priorities

Control name	Function name	Signal priority ^a	Clause	Requirement
the suspend service signal	Suspend service	1 (Highest)	4.5.4	Mandatory
the driver assisted evacuation signal	Driver assisted evacuation operation	2	4.5.3.4	Optional
the remote assisted evacuation signal	Remote assisted evacuation operation	3	4.5.3.3	Optional
the automatic evacuation signal	Automatic evacuation operation	4	4.5.3.2	Optional
the evacuation recall signal for each EEL	Evacuation recall (Phase 1)	5 (Lowest)	4.5.2	Mandatory
the floor alarm signal for each floor	Control of evacuation zone and floor priorities.	Applicable for automatic evacuation operation only.	4.5.3.2.2 a)	Mandatory for class B Optional for class A
the evacuation of all floors signal				

^a The priority of a control signal does not confer any preference for the use of the relative evacuation operation.
NOTE The selection of (an) appropriate optional evacuation operation(s) is based on the evacuation strategy.

Figure B22: Table 1 of BS EN 81-76, summary of evacuation controls, functions and priorities

Table 2 — Signal connection interruption reaction

Connection interruption of:	The lift control system shall consider the signal as:
the suspend service signal	active (see 4.5.4)
the driver assisted evacuation signal	active (see 4.5.3.4.2)
the remote assisted evacuation signal	inactive (see 4.5.3.3.3)
the communication of the remote evacuation control panel for more than 30 s	panel inactive (see 4.5.3.3.3)
the automatic evacuation signal	active (see 4.5.3.2.3)
the evacuation recall signal	active
the floor alarm signal for each floor	inactive
the evacuation of all floors signal	inactive

Figure B23: Table 2 of BS EN 81-76, signal connection interruption reaction

9.4.2 Evacuation Recall (Phase 1)

The trigger for evacuation recall is the activation of the recall signal either from an evacuation lift switch (in driver-assisted mode), or a signal from the fire detection and alarm system. This then results in all lift calls being cancelled, the visual indication symbol in the car switching to 'evacuation' and the lift travelling to the EEL (from which point the doors open and there is then a voice announcement and visual indication of 'Exit Now'. The doors then close after 20s at the latest.

The detail of this mode of operation, which is in Phase 1 of an evacuation process, is set out in BS EN 81-76 as follows (references in the quoted text to figures and sections are to those in the standard, for the attention of the MEP team in defining the detailed design):

'An evacuation recall signal shall be provided for each EEL either by an evacuation lift switch, if provided, or provided externally.'



On receipt of the first activated evacuation recall signal, corresponding landing shall be considered as the active EEL. Other evacuation recall signals shall be ignored until the first signal is reset. The active EEL shall be assigned in the sequence received.

In case of

- receipt of the first recall signal; or
- change of active EEL when none of the evacuation operations (Phase 2) is active (see also Table 1 and Table 2); or
- change of evacuation operation mode,

the lift shall behave as described as follows:

- a) all registered car calls shall be cancelled, and no new car calls shall be registered;
- b) all registered landing calls shall be cancelled, and no new landing calls shall be registered. This requirement is not valid in case of change of evacuation operation mode;
- c) a visual indication as shown in Figure 1 with minimum dimensions of 20 mm × 20 mm and located in the car shall be activated. The visual indication shall remain activated as long as the lift is in evacuation operation;
- d) door re-open button (EN 81-20:2020, 5.3.6.3), door close button (where provided), door protective device (EN 81-20:2020, 5.3.6.2.2.1 b)), door reopening device (EN 81-20:2020, 5.3.6.2.2.1 d)) and remote alarm system (EN 81-20:2020, 5.12.3) shall remain operative;
- e) a car parked at a landing, shall close the doors and travel nonstop to the active EEL. When the doors are not closed after 20 s, the protective device according to EN 81-20:2020 5.3.6.2.2.1 b) shall be made inactive and the doors shall attempt to close as defined in EN 81-20:2020, 5.3.6.2.2.1 b) 4);
- f) a car travelling away from the active EEL shall make a normal stop latest at the nearest possible landing without opening the doors, a voice announcement according to 4.3.10 shall announce “evacuation” and the car shall return to the active EEL;
- g) a car travelling towards the active EEL shall continue its travel nonstop to the active EEL. If the lift has already started stopping at a level, it shall:
 - make a normal stop without opening doors;
 - give a voice announcement “evacuation” according to 4.3.10;
 - continue to the active EEL;
- h) on arriving at the active EEL, the car shall open its door and shall make a voice announcement according to 4.3.10 and a visual indication informing the user(s) to leave the evacuation lift. The visual indication shall be located within or above the car operating panel or above the car door(s);
- i) when the doors are not closed at the active EEL after 20 s, the protective device according to EN 81-20:2020 5.3.6.2.2.1 b) shall be made inactive, the doors shall attempt to close as defined in EN 81-20:2020, 5.3.6.2.2.1 b) 4);
- j) any landing call at the active EEL shall initiate opening of the doors;
- k) the well shall be automatically illuminated.

On deactivation of the evacuation recall signal and when any evacuation operation is not active, the car shall travel to the latest active EEL, open the doors and then the lift shall return to normal operation and visual indication (see 4.5.2 c)) shall be deactivated. A voice announcement according to 4.3.10 shall announce that the evacuation operation of the lift has stopped.’

9.4.3 Evacuation Operation (Phase 2)

As set out in BS EN 81-76:

‘4.5.3.1.1 After the evacuation recall (see 4.5.2) is completed and when evacuation operation is activated (see Table 1), the lift shall operate as follows:

a) registration of landing calls shall be reactivated on those landings intended to be served according to the evacuation strategy;

b) when the lift is capable of serving landing calls, information about this service capability of the lift shall be available for external systems;

NOTE This information is used e.g. for controlling evacuation route indicators.

c) service capability and the active EEL indications (see 4.6.3.2) shall be activated;

d) at any landing intended to be served, activation of any landing control device or any accessibility button according to EN 81-70:2021+A1:2022, 5.4.2.2.3, shall register a landing call;

e) the call registration feedback shall be according to EN 81-70:2021+A1:2022, Table 4, item g);

f) if evacuation operation is not available, all existing landing calls shall be cancelled and call registration feedback shall not be given.

4.5.3.1.2 In case of a change of the active EEL, existing landing calls shall not be cancelled. If a lift is on its way to the active EEL during a change of the active EEL it shall behave as follows:

- a) a car travelling towards the new EEL shall continue its travel non-stop to the new EEL;
- b) if the car has already started stopping at the previous EEL, it shall make a normal stop and without opening doors continue to the new EEL;
- c) a car travelling away from the new EEL shall make a normal stop latest at the nearest possible landing without opening the doors and return to the new EEL.’

9.4.4 Suspension of Operation (Priority 1)

As noted in Section 7.4.2 of BS 9991:

‘When published, BS EN 81-76 is expected to describe the evacuation lift suspend service operation. It is also expected to provide requirements for evacuation lift operation from the receipt of the suspend service signal.’

This mode of operation is Priority 1 and results from a potentially unsafe situation by smoke in the evacuation lift lobby or the lift well.

The trigger would be activation of the suspend signal service (e.g. by evacuation lift switch, or fire detection and alarm system).

The results of this trigger are:

- Normal or evacuation operation are interrupted
- All functions and signals related to normal and evacuation operation are cancelled.
- Voice announcement and visual indication devices in the car operate to communicate this status
- The lift travels to the Suspend Service Landing (SSL) and is removed from service whilst this signal is active. For this building it is proposed that the SSL and EEL be the same for each lift (i.e. at Level 0)

The detail of the above mode of operation is set out in Section 4.5.4 of BS EN 81-76 for reference of the MEP designer and is not repeated here. The general operational principles are set out above.

9.4.5 Driver-Assisted Operation (Priority 2)

The overarching principles of this mode of operation, which occurs in Phase 2 of the evacuation process, are as follows.

For this mode of operation, the following staffing resource is required (as set out in BS EN 81-76);

- the evacuation assistants are designated, and they are trained, including having drills, and capable of carrying out the necessary duties quickly and efficiently at all times during which the building is occupied;



- one of the evacuation assistants, possibly located close to the location of the emergency and test panel or machinery space, is trained and designated to undertake the rescue procedure if required.

In this mode the lift is under manual control by an evacuation assistant from the lift car operating panel.

This mode overrides the automatic evacuation operation.

- After the procedure set out in Section 9.4.3 above, and when the driver assisted evacuation signal is active, the lift shall operate as follows:
 - *a) registered landing calls shall be indicated in the car by blinking car call acceptance light of the given landings or by indicating the floor identification on a display;*
 - *b) where multiple lifts in a group are in evacuation operation, all registered landing calls shall be indicated in each car in the driver assisted evacuation operation. If one of the cars has a registered car call to a landing, indication of the registered landing call shall be cancelled from the other car(s);*
 - *c) the active EEL shall be indicated in the car;*
 - *d) all heat and smoke sensitive door protection devices shall be made inactive;*
 - *e) constant pressure on a car call button or on a door close button shall cause the car door to close. Closing shall start only after 1 to 2 s delay. If the button is released before the car door is fully closed, the car door shall automatically reopen. When the car door is fully closed, the car call can be registered and the car shall start to travel to the destination landing (see 4.3.11 of BS EN 81-76);*
 - *f) if the car doors are closed by the door close button and no car calls are registered within 15 s, the car shall travel to the active EEL and open its door;*
 - *g) when a new call is registered from the car, the previous car call shall be cancelled. The car shall travel to the newly registered landing;*
 - *h) on arrival at any destination, the car shall automatically open its selected door (see 4.3.9) and remain at the landing until the car door is closed and a new car call is registered as described in e), or until timeout expires as described in f).*

If the driver assisted evacuation signal is deactivated then a voice announcement (per Section 4.3.10 of BS EN 81-76) shall announce that the operation is suspended and the lift car will return to the exit floor, operating as follows:

- if the doors are closed the lift shall return to the active EEL per the procedure outlined in Section 9.4.2 above;
- if the doors are open, after minimum 5 s and maximum 20 s of the given voice announcement, all door protective devices shall be made inactive and the doors shall attempt to close as defined in EN 81-20:2020, 5.3.6.2.2.1 b) 4) and a voice announcement shall announce that the doors are closing and to stand clear of doors. Once the doors are closed, the lift car shall return to the active EEL according to the procedure outlined above.

An evacuation lift switch shall be provided for every evacuation lift having a driver assisted evacuation operation.

The evacuation lift switch shall be located in the safe area at each EEL within 2.0 m horizontally from the evacuation lift, at a height between 1.4m and 2.0m above the floor level. The switch shall be marked with the safety sign shown in Figure 1 of BS EN 81-76. The size of the safety sign shall be at least 100 mm × 100 mm. In addition, it shall be indicated to which lift the switch is associated, in accordance with EN 81-70:2021+A1:2022, 5.4.3.3 c).

The operation of the evacuation lift switch shall be by means of a key. Where no other key type has been agreed, the key shall be the unlocking triangle as defined in EN 81-20:2020, 5.3.9.3. The key shall be available on the site of the lift installation (see also EN 81-20:2020, 0.4.2 a) and 3.2).

The switch shall have at least two positions marked '0' and '1'. There shall be a visual indication of the switch position. In position '1', driver assisted evacuation operation is initiated.

Additional positions are permitted for other evacuation operations (e.g. automatic operation) and for suspension of the service. Additional positions shall be indicated, if applied.

9.4.6 Automatic Evacuation Operation (Priority 3)

This operation mode is, for the purposes of this building, designated Priority 3 as remote-assisted operation is not provided. In this mode of operation, the lift automatically serves given landing calls and then travels to the active EEL.

The overarching principles of this mode of operation, which occurs in Phase 2 of the evacuation process, are as follows.

After the procedure described in Section 9.4.3 above, when the automatic evacuation signal is active, and when no higher priority signal is active (see Figure B22), the lift shall operate as follows, (as set out in BS EN 81-76):

'a) The lift control system of a Class B evacuation lift shall accept the following signals:

— *a signal per each floor defined to be served during the evacuation, where the signal identifies an active floor alarm; and*

— *a signal for the evacuation of all floors defined to be served during the evacuation.*

b) The lift shall register and serve landing calls according to the following (see also B.2.1):

1) Evacuation lifts with either no active floor alarm(s) or with its signal for the evacuation of all floors is active, shall serve landing calls, except from the active EEL, from floors defined to be served during the evacuation.

2) When there is an active floor alarm(s) and the signal for the evacuation of all floors is not active, the lift evacuation zone shall be:

— *the floor(s) with active floor alarm(s);*

— *where there are more than one active floor alarms, the floors between floors with active floor alarms;*

— *up to two floors above the highest active floor alarm; and*

— *up to two floors below the lowest floor with an active floor alarm.*

If one of these floors is the active EEL, this shall be excluded from the lift evacuation zone.

3) When there is an active floor alarm(s) and the signal for the evacuation of all floors is not active, landing calls from the floor(s) with active floor alarm(s) shall be served before other registered landing calls from the lift evacuation zone.

4) When there is an active floor alarm(s) and the signal for the evacuation of all floors is active, landing calls from the floor(s) with active floor alarm(s) shall be served before other registered landing call from all other floors.

c) If the lift has started deceleration to respond a landing call, this landing call shall be served before any other landing calls.

d) On arrival at a landing other than the active EEL, the car shall open the doors and give a voice announcement according to 4.3.10 to inform persons to enter the car (message such as "Evacuation. Enter the car"). A car call or destination indication to the active EEL shall automatically be indicated.

e) The door dwell time shall comply with EN 81-70:2021+A1:2022, 5.2.2. When the actual door dwell time exceeds no more than 20 s, all door protective devices shall be made inactive and the doors shall attempt to close as defined in EN 81-20:2020, 5.3.6.2.2.1 b) 4) and a voice announcement according to 4.3.10 shall be made (message such as "Doors closing. Stand clear of doors").

f) Once the doors are closed, the car of the evacuation lift shall proceed towards the active EEL. A lift having a rated load of at least 1000 kg and an actual load of less than 20 % of the rated load, may serve intermediate landing calls on the way towards the active EEL.

g) In the case of 4.5.3.2.2 f), a voice announcement according to 4.3.10 and a visual indication shall inform persons not to leave the car (message such as "No exit").

h) The activation of any landing control device or any accessibility button according to EN 81-70:2021+A1:2022, 5.4.2.2.3 shall register a new call and shall not prevent the car from closing its doors and leaving the floor.

i) On arriving at the active EEL, the evacuation lift car shall open its door and shall make a voice announcement according to 4.3.10 and a visual indication such as “Exit now”.

Deactivation of automatic evacuation operation will occur in case of any of the following:

- the automatic evacuation signal is deactivated; or
- the remote assisted evacuation signal is activated; or
- the driver assisted evacuation signal is activated,

Automatic evacuation operation shall be ceased when the car next returns to the active EEL. During its return to the active EEL, the car shall not serve any calls from intermediate landings.

9.5 Class Specification of Evacuation Lifts

As set out in this strategy, with reference to BS 9991 the required classification of evacuation lifts will be Class B as the height of the uppermost storey is more than 18m above the lowest adjacent ground level.

9.6 Minimum Lift Car Size

As noted in Section 7.4.2 of BS 9991:

‘... a Class B evacuation lift is expected to have a larger minimum car size and to include additional control requirements for automatic evacuation operation.’

The minimum lift car sizes are required to be those as set out in earlier sections of this strategy. Such dimensions would also satisfy the requirements in respect of firefighting lifts, if a uniform lift size is adopted across the development.

9.7 Firefighting Lifts

It is not proposed that firefighting lifts in this development would have dual functionality of evacuation lifts.

The firefighting lifts should be designed in accordance with BS EN 81-72, including separate specific controls for the use of the Fire Service in operating such lifts.

9.8 Recall and Operational Mode Signals

As noted in Section 7.4.2 of BS 9991:

‘When published, BS EN 81-76 is expected to describe evacuation control signals, functions and signal priorities including these signals.’

And

‘The interface between fire detection and fire alarm systems and lifts is covered in BS 7273-6. 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.’

Requirements for these signals are set out in the preceding sections of this Appendix.

9.9 Automatic Operation Signals

Requirements for these signals are set out in the preceding sections of this Appendix.

9.10 Emergency Voice Communication Systems

As noted in Section 7.4.2 of BS 9991:

‘The temporary waiting space for an evacuation lift should be provided with an emergency voice communication system in accordance with BS 5839-9. Communication points should be at least 500 mm from any wall.

NOTE 4 This communication system is separate from the evacuation lift communication system that is expected to be described in BS EN 81-76 when it is published.’

Per BS EN 81-76, and as relevant to this building, a communication system is required for driver assisted evacuation operation.

This shall be a communication system for interactive two-way speech communication between the evacuation lift car and:

- each EEL. The microphone in the lift car intercom unit shall be active without pressing a control button. The microphone in the active EEL intercom unit shall either be active without pressing a control button or be made active by pressing a control button. The size and the operating force of the button shall be according to EN 81-70:2021+A1:2022, Table 4 and Table 5. Microphones in nonactive EELs shall be muted;
- the evacuation lift machine room or in the case of machine roomless lifts at the emergency and test panel(s). The microphone shall only be made active by pressing a control button on the intercom unit.

Where provided, the microphones of intercom units at other locations shall only be made active by pressing a control button on the intercom unit.

The communication equipment within the lift car and at the EELs shall be a built-in microphone and speaker, and not a telephone handset.

9.11 Car and Landing Control Equipment and Signage

For the attention of the MEP designer, evacuation lift car and landing control equipment, and signage, should be designed in accordance with Section 4.6 of BS EN 81-76.

9.12 Maintenance, Inspection and Testing

As noted in Section 52.3 of BS 9991:

‘Routine maintenance, inspection and testing should be carried out in accordance with the relevant standard(s), including:

... the standard to which the lift was designed and the lift owner’s manual for lifts that can be used for evacuation.

When published, BS EN 81-76 is expected to include requirements for evacuation lifts, instructions for use and guidance on maintenance information.

9.12.1 Information for Use of System

With reference to information for use of the system, BS EN 81-76 specifies the following to be provided as part of the instructions.

The operation of the evacuation lift in response to evacuation control signals and lift controls (see earlier sections of this Appendix) including the following:

- operation of the lift in evacuation recall (Phase 1);
- use of the lift under provided evacuation operation(s) (Phase 2);
- suspension of evacuation operation.
- The use of any evacuation operation communications systems.
- The need for the evacuation lift switch key to be available.
- The location and access route to the machinery space where the evacuation lift emergency operation devices are located.



- Items relevant to equipment described in EN 81-70:2021+A1:2022:
 - the need to maintain safe and unobstructed access to the lift and its control devices on landings.
 - information for adjusting the door dwell time;
 - information for adjusting the sound level of audible signals in the car and at the landings and for adjusting the amplifier of induction loops, if provided.
- In order to ensure the safe and reliable operation of the lift in case of evacuation, it is essential that planned maintenance is carried out and operates in accordance with the instructions provided by the installer (see below).

9.12.2 Checks and Maintenance Requirements

The instructions for use of the system shall include in particular to following information for checks and maintenance:

- Procedures to check correct response of the lift to the actuation of the evacuation lift switch and response to the activation of other evacuation control signals, including suspend service signal.
- Procedure to simulate a failure of the primary power supply to check changeover to the secondary supply and operation from the secondary supply or to check the changeover and operation of automatic rescue operation, if equipped, to check the evacuation operation including communication systems to ensure the lift can be driven to any required floor.

BS 9991 requires evacuation and firefighter lifts switch operation to be tested once a week and be repaired or replaced if found faulty.

