



tenos

▀ Southgate 2
The University of Huddersfield

TS230208-R02-ISSUE01
RIBA Stage 3 Fire Strategy Report

for:
AHR
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In preparing this fire strategy report it has been assumed that all aspects of the design and construction will, unless stated otherwise in this report, be in accordance with the recommendations of Approved Document B, applicable British Standards and codes of practice.

This report relates only to statutory requirements when the building is completed. Additional fire safety measures may be appropriate during construction or for insurance, loss prevention or environmental protection purposes.

The terminology “will” or “will be” as used in this report represents the recommendation/ understanding of Tenos Ltd regarding the proposed design, construction or management of the facility. The validity of this report is dependent upon these items being implemented as described.

This report relates to a project that is subject to third party approval. It must be ensured that the contents of this report are agreed with all relevant approval bodies prior to implementation.

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1 Introduction

- 1.1 This report presents the RIBA Stage 3 fire safety strategy for the Southgate 2 development at The University of Huddersfield
- 1.2 The strategy sets out the measures that are proposed to satisfy the functional requirements of the Building Regulations 2010^{1.1}.
- 1.3 This strategy does not in itself demonstrate compliance with the Regulatory Reform (Fire Safety) Order 2005^{1.2}. To comply with the requirements of the Order a preliminary fire risk assessment should be undertaken prior to occupation. This should be updated after occupation to identify any additional risks that may have been introduced. Subject to a suitable and sufficient fire risk assessment, additional physical fire safety measures should not be required unless high hazard materials or processes are introduced.
- 1.4 Legislation is concerned only with protecting the health and safety of people in and around a building and is not specifically intended to provide protection against damage or consequent financial losses. Whilst measures for life safety will often provide an element of property protection, it is recommended that consideration be given to a separate study regarding the limitation of direct and indirect losses that could occur as a result of fire damage.
- 1.5 There are several references in the report to fire safety design measures which have been requested by the University of Huddersfield or Calderstones & Huddersfield NHS Trust for property protection, business resilience or asset protection reasons. Where these measures are detailed in the report their inclusion for non-life safety reasons has been highlighted.
- 1.6 The fire strategy report is a statement of why the building needs to be safe from fire and how that safety will be achieved. It sets out the scope of the fire safety considerations and the design objectives, which in this instance are driven by a statutory obligation to protect people in and around the building. It explains the combination of measures that will provide this protection, in other words the assumed fire safety management arrangements and the physical fire precautions (such as means of escape and protection systems). These have been determined through reference to codes and guidance documents, consideration of risk (i.e. hazards and consequences) and review of the building's performance requirements (i.e. what it needs to do and look like). The fire strategy report substantiates the preferred approach and in so doing provides the basis for its approval.
- 1.7 The fire strategy report is not a system design document, nor a detailed design specification. It is a statement of intent that signposts the fire protection measures (e.g. escape stairs) and their associated performance requirements (e.g. 30 minutes fire resistance). Detailed design (e.g. material and product specifications, fire alarm system, etc.) and implementation of the strategy rests with the relevant design disciplines (e.g. architect, structural engineer, mechanical and electrical engineer, etc.) and, ultimately the building user. Reference should be made to Approved Document B^{1.3}, applicable British Standards and other guidance in relation to all specifications and system design. Any query regarding the intent, recommendations or interpretation of the fire strategy should be referred to Tenos.
- 1.8 This fire safety strategy has been developed on the basis of the drawings and other design information listed in Annex A1.
- 1.9 This report should be read in conjunction with Tenos Fire Compartmentation Mark Ups TS230208-D02-Issue02.

Design Team Notes

The report includes a number of "Design Team Notes" (shown in bold black text) which indicate those aspects of the design as shown on the plans that are not currently consistent with the strategy or items which will require further design development. Once these items are resolved the notes will be removed from the report.

2 Brief description of the building

Geometry & Building Construction

- 2.1 The Southgate 2 building will be a new teaching facility on the Southgate site for the University of Huddersfield (UoH).
- 2.2 It is the second University of Huddersfield building to be developed on the Southgate site and will be positioned to face on to Leeds Road (A62) and Pine Street, from which fire service vehicle access will be possible.
- 2.3 The building will consist of lower ground, ground, four above ground-storeys of accommodation and an accessible roof level. There will be three plant rooms and a substantial number of Photo Voltaic (PV) panels) at roof level. In accordance with Diagram D6 in Approved Document B, the height of the top storey in a building excludes roof top plant areas and any top storeys consisting exclusively of plant areas. Therefore, referencing the elevation drawings in Table A1.2, the height of the uppermost storey will be 20.6 m when measured from Level 4 to lower ground floor level.
- 2.4 Two staircases will be provided, which will serve every above ground storey, including roof level. Levels 2 - 4 will be more than 7.5m above fire service vehicle access level and so the west stair will be designed as a firefighting shaft. The east stair will serve the lower ground level as well as the upper storeys. It will be designed as a protected shaft and will be augmented with some features of a firefighting shaft.
- 2.5 A light well will connect first floor level with the upper storeys of the building to provide vertical connection. The light well will not be classified as an atrium as it will not pass through fire compartmentation.
- 2.6 A life safety sprinkler system will be installed throughout the building and will be in accordance with the recommendations in BS EN 12845^{11.47}, including the additional measures to improve system reliability and availability as described in Annex F of that standard.
- 2.7 The building will have maximum overall dimensions of 46m by 42m and have a footprint area of approximately 1,280m².
- 2.8 It has been confirmed by the project's Structural Engineers (Curtins Consulting) that the main structural frame will be formed with precast concrete columns and concrete walls with steel delta beams on all floors except the ground floor where there will be a steel frame transfer structure. The floors will be 250mm precast hollow-core concrete planks with 100mm concrete topping. The cladding solution is not confirmed but it is expected to be primarily brick cladding with internal SFS.
- 2.9 A section of the roof will be designed as a Green Roof and a section designed as a Blue Roof.

Building Use and Occupancy Type

- 2.10 A summary of the use of each storey is set out in Table 2.1 below.

Table 2.1 – Building Use Summary

Storey	Description
Lower Ground Floor	There will be an external service yard accessed by a ramp connecting to internal plant rooms, sprinkler pump room, a storeroom and other essential services. This area will be for maintenance access only.
Ground Floor	An NHS outpatient diagnostic clinic will be located at this level, operated by Calderdale & Huddersfield NHS Trust. The UoH students will have a separate entrance (west side revolving door in Figure 2.1 overleaf).
First Floor	Floors 1 and 2 will house classrooms, phantom head and PACS laboratories (training use - non industrial), and clinical skills training suites, as well as diagnostic equipment and dentistry bays.
Second Floor	
Third Floor	The third floor is currently a "fallow floor," and will be occupied by a tenant to the UoH. For the purposes of this report it will constitute a shell and core demise.
Fourth Floor	The UoH will fit-out the fourth floor to be used by their subsidiary, Innovation 3M Buckley. The floor will comprise offices, meeting rooms, event spaces and laboratories.
Roof	The roof will accommodate three plant rooms and will be substantially covered by Photo Voltaic (PV) panels). The southern section of the roof will be a Green Roof.

- 2.11 During RIBA Stage 3 the NHS Trust has advised that the ground floor will be occupied by patients undergoing diagnostic and / or screening services and therefore may be categorised under Care Quality Commission Code (DSS).
- 2.12 Patients in these areas will be ambulatory or capable of independently evacuating using a wheelchair and therefore will be no more dependent than occupants of any other public assembly building. Considering this, the ground floor will be principally designed in accordance with Approved Document B Vol. 2^{11.3}. However, at the request of the NHS Trust, additional fire compartmentation will be provided to provide several places of relative safety to allow patients to escape under less pressure of time.
- 2.13 Patients at second floor may undergo minor dental procedures or treatment where local anaesthetic is used. Local anaesthesia of this nature is not expected to restrict mobility so that patients will require assistance to escape in the event of fire and therefore these areas will be classified as Purpose Group 5 (Assembly and Recreation) and so ADB will be also adopted for the fire safety design of this area.
- 2.14 It should be noted that the clinical accommodation at first floor level comprising the Acute Ward, X-ray, Ultrasound and CT Lab are "mock" clinical accommodation provided to train UoH students only. It will not be occupied by dependent or high dependency patients.

Level 3

- 2.15 This fire strategy documents the fire safety design of Level 3 to shell and core stage only and provides sufficient information to enable the fire safety design of the fit-out areas to be co-ordinated with the wider strategic fire safety design.
- 2.16 It is understood that fire safety related building services such as the automatic fire detection and alarm system; emergency lighting; emergency exit signage and the building sprinkler system will form part of the fit-out strategy in order to better suit a tenant's layout. Further, it will not be separated from all other areas of the building with fire resisting construction.
- 2.17 This arrangement is considered to be acceptable on completion of the shell build, in terms of life safety, as the area will not be accessible to building occupants nor will contain any fire load or ignition sources. However, it is recommended that this temporary condition i.e. completion of shell build, prior to fit out, is tightly controlled with management procedures (see Section 9.9) and reviewed with the building's insurers to ascertain whether interim measures are required.



Figure 2.1 – Schematic plan of main building components - Ground Floor shown for building shape (refer to architectural plans listed in Annex A1 for detailed layouts)



Figure 2.2 – Render drawing of Southgate 2 building

3 Statutory requirements

Building Regulations

3.1 The building will be subject to the provisions of the Building Regulations 2010^{11.1}, which are the primary basis for statutory control of building design in England and Wales.

Part B – Fire safety

3.2 For fire safety, the functional requirements of the Building Regulations are set out under the following headings:

Requirement B1 - Means of warning and escape

Requirement B2 - Internal fire spread (linings)

Requirement B3 - Internal fire spread (structure)

Requirement B4 - External fire spread

Requirement B5 - Access and facilities for the fire service.

3.3 For ease of reference this report addresses each of these requirements in order.

Standard guidance

3.4 Guidance on compliance with the requirements of Part B of the Building Regulations for non-domestic premises is presented in Volume 2 of Approved Document B^{11.3} (ADB). In some cases the guidance in ADB is replaced or supplemented by reference to other standards, for example: to specific Annexes and Clauses of BS 9999^{11.4} for building features such as fixed seating in rows; or to BS 5839-1^{11.10} for detailed guidance in respect of the design, installation and maintenance of fire alarm systems.

3.5 As described in Paragraph 2.12 above, there will be independent patients in the DSS facility on the ground floor and patients under local anaesthesia in the dentistry bays at second floor. Patients in either areas will be ambulatory or capable of independently evacuating using a wheelchair under the direction of the building management and therefore the guidance in ADB will be adopted.

3.6 There is no obligation to adopt the recommendations given in ADB, or other guidance documents, if the functional requirements of the Regulations are met in some other way. However, any alternative approach to compliance with the guidance in ADB should nonetheless clearly demonstrate that the requirements of the regulations have been fulfilled by some other acceptable means or method.

Regulatory Reform (Fire Safety) Order

3.7 Responsibility for compliance with the Regulatory Reform (Fire Safety) Order 2005 (FSO)^{11.2} will rest with the “Responsible Person”. In a workplace, the Responsible Person will usually be the employer together with persons who may have control of other parts of the premises. In other cases the person(s) who has control of the premises will be the Responsible Person.

3.8 The FSO places specific duties on the Responsible Person such as carrying out a risk assessment and providing first-aid firefighting equipment. The main requirements of the FSO are outlined in section 9 of this report and more detailed guidance is available in a series of Fire Safety Risk Assessment Guides published by H M Government^{11.9}.

3.9 Where building work and fire protection measures comply with the current Building Regulations in respect of fire safety and a suitable and sufficient fire risk assessment has been undertaken, additional physical measures should not normally be required under the FSO unless high-hazard materials or processes are introduced into the building.

3.10 As several organisations will occupy this building, it will be essential that all parties of cognisance of Article 22 of the FSO:

(1) *Where two or more responsible persons share, or have duties in respect of, premises (whether on a temporary or a permanent basis) each such person must—*

(a) *co-operate with the other responsible person concerned so far as is necessary to enable them to comply with the requirements and prohibitions imposed on them by or under this Order;*

(b) *(taking into account the nature of his activities) take all reasonable steps to co-ordinate the measures he takes to comply with the requirements and prohibitions imposed on him by or under this Order with the measures the other responsible persons are taking to comply with the requirements and prohibitions imposed on them by or under this Order; and*

(c) *take all reasonable steps to inform the other responsible persons concerned of the risks to relevant persons arising out of or in connection with the conduct by him of his undertaking.*

4 Means of warning and escape

Fire alarm and detection systems

Alarm

- 4.1 The building will adopt a simultaneous evacuation strategy following an initial investigation period.
- 4.2 An electrical fire alarm system will be provided in accordance with BS 5839-1^{11.10} incorporating sufficient sounders to be clearly audible throughout the building. A Visual Alarm Device (“VAD”) will be installed in the open rooftop areas to ensure suitable warning for persons working in relative isolation and due to high background ambient noise levels.
- 4.3 Notwithstanding the adoption of ADB as the design code for the NHS demise, Paragraph 2.36 of HTM 05-02^{11.49} strongly recommends the fire detection and alarm system in this area complies with the relevant guidance in HTM 05-03 Part B^{11.50}. This principle will be adopted in the design of the automatic fire detection and alarm system in this area.
- 4.4 The fire alarm system will be of the analogue addressable type and the main panel will be installed within the UoH demise. A repeater panel will be provided within the NHS Trust demise.
- 4.5 BS 9999: 2017 recommends that where there are two or more fire and rescue service access points repeater panel should be provided at all Fire & Rescue Service access points. Given the proximity of the main fire alarm panel in the UoH demise and the repeater panel in the NHS demise, it is not proposed to provide repeater panels within the firefighting shaft.
- 4.6 Manual call points in accordance with BS EN 54-11^{11.12} will be provided adjacent to all storey exits and final exits.

Detection

- 4.7 A detection system will be installed throughout the building in accordance with BS 5839-1^{11.10}. An L1 level of coverage will be provided to accord with the Employer’s Requirements of both the University of Huddersfield and the NHS Trust.
- 4.8 The fire detection system will generally utilise optical smoke detectors but heat detectors will be installed where there is a potential for steam or fumes, etc., to give rise to unwanted alarms (e.g. hygiene rooms or shower rooms).
- 4.9 It is recommended that optical beam detection be installed across the lightwell at the soffit of Level 1 in order to provide detection coverage above the accommodation at the base of the lightwell.
- 4.10 Automatic fire detection must be provided to the soffit of the undercroft at Lower Ground Floor Level (“LGF”).

Occupant numbers

- 4.11 On the basis of the calculations set out in Annex A2, the maximum calculated occupancy of the building will be 1,162 persons. This figure does not include the third floor as the use of this area is currently unknown.
- 4.12 Tenos has been advised by AHR that the design occupancy of the upper storeys (Level 1, 2 and 4) will be 130 persons per storey.

Outline Cause & Effects Strategy

- 4.13 An outline cause and effects schedule is presented in Table 4.1 below.

Table 4.1 - Outline cause and effects schedule

Activation	Effect
Single detector or optical beam detection <i>(in either UoH or NHS Trust demise)</i>	Initiate 180 second investigation period Electro-magnetic locking devices de-energise Broadcast local evacuation signal within Transformer & HV Switch Room and on the rooftop plant area.
Single call point <i>or</i> Second device (call point or detector) <i>or</i> Single device and timeout of investigation period <i>or</i> Sprinkler flow switch	Broadcast evacuation signal <i>(in both NHS and UoH demise)</i> Illuminate Emergency Do Not Enter sign if activation occurs at LGF Level. <i>(See Paragraph 4.25)</i> West core lifts return to access level, Goods Lift to return to LGF Normal ventilation plant shuts down

Design of horizontal escape routes

Travel distances

- 4.14 All rooms and sections of the building should be provided with at least two escape routes except where the single direction of travel is less than 18m and the room or area has an occupant capacity of 60 or less.
- 4.15 However, as currently designed, the simulation ‘Acute Ward’ on the first floor and the Technician’s Space on the second floor each has a travel distance of approximately 23m in a single direction (thus 5m above the recommendation of 18m in ADB). In our opinion this arrangement will continue to meet the functional requirement of the Building Regulations, due to the provision of a life safety sprinkler system in this area. This should increase the available time to escape before the onset of untenable conditions.
- 4.16 Where escape is available in at least two directions (separated by at least 45°) the maximum travel distance to the nearest exit will not exceed 45m and is therefore consistent with the recommendations of ADB.

Number and siting of exits

- 4.17 All doors on escape routes that accommodate more than 60 people will be hung to open in the direction of escape.
- 4.18 A Large Classroom will be located adjacent to the southern elevation at both Level 1 & Level 2. Each of these classrooms will have two retractable partitions to enable them to be divided in to three smaller rooms. When the retractable partitions are extended the calculated occupancy of the three individual rooms will be fewer than 60 persons.
- 4.19 However, when either or both of the partitions are retracted, the doors serving these areas may be used by more than 60 people and so should be hung to open in the direction of escape.

Design Team Note: All doors serving the Large Classrooms should be hung to open in the direction of escape.

- 4.20 The ground floor waiting space will have a calculated maximum occupancy of 155 persons. As there will be more than 60 persons but less than 600 persons, the waiting room will require a minimum of 2 exits. There will be two exits; one which leads direct to outside and an alternative through the diagnostic facility to a final exit and therefore the layout is sufficient.

Plant rooms

- 4.21 The travel distance in the plant rooms located at Lower Ground Floor and Roof Level will be restricted to 9m in one direction and 18m where escape is available in more than one direction. Onward escape in open air may then be made to either storey exit.
- 4.22 Travel distances to plant spaces located in the open air, such as around the rooftop PV panels, will not exceed 60m where only a single direction of escape is provided and 100m where two directions of escape are available.
- 4.23 At Lower Ground Floor ("LGF") Level an alternative exit from the Generator and the Essential Services room will open and encroach on to the adjacent escape corridor. ADB recommends that doors should be recessed along an escape route to prevent it reducing the effective width. However, when the Generator and Essential Services doors are open the residual width of the route will be approximately 1m and so will still provide sufficient capacity for the very limited number of people expected to use it in an emergency.

Undercroft

- 4.24 A soffit will be located above a large section of the external service yard at LGF Level. There are several exits from rooms / corridors at this storey which discharge into this covered space. There is a risk that occupants entering this area will still not be in a place of ultimate safety despite leaving the building as they will not have escaped direct to atmosphere.
- 4.25 An 'Emergency Do Not Enter' ("EDNE") sign will be installed above the final exit door from the corridor; the Generator room and Non Essential Services room. The EDNE sign will be non-maintained and configured to illuminate on activation of automatic fire detection located in (1) the rooms described above, and (2) the Transformer and HV Room. Occupants may use the alternative escape route via the basement access stair to reach grade level.
- 4.26 Occupants within the Transformer and HV Room must first pass into the undercroft before reaching a place of ultimate safety. This arrangement is considered acceptable on the basis that travel distances within the room of fire origin will be relatively short (9m); the undercroft will not contain any fire load and therefore a fire should not originate in this space and work within these spaces will be infrequent and on a permit to work basis.
- 4.27 The escape route through the undercroft and up the service ramp must be demarcated (see Para 4.87).

Inner rooms

- 4.28 At each level the central circulation area will contain breakout / study accommodation and therefore, in terms of strict compliance with ADB, rooms accessed from this space would be deemed inner rooms.

- 4.29 Inner rooms should adhere to the following recommendations of ADB:
- have an occupancy that does not exceed 60 people;
 - be entered directly from the access room (i.e. "Circulation space");
 - the single direction travel distance should not exceed 18m;
 - in accordance with the recommendations of ADB, the access room (circulation space) should be provided with automatic smoke detection and a suitable alarm system to give immediate warning of a fire in the access room to occupants of the inner room.
 - the escape route from the inner room should not pass through more than one access room (see below);

- 4.30 The rooms around the perimeter of the central circulation space will comply with these recommendations except in respect of occupancy, travel distances, and the requirement for occupants to pass through more than one access room. These variations are considered below.

Occupancy

- 4.31 When (1) the partitions are retracted within the two large classrooms at first and second floor level and (2) the Event Space at fourth floor is in full use the occupancy of these areas may be greater than 60 persons.

- 4.32 Whilst technically an inner room, it should be noted that if a fire were to occur in the central circulation area, several exits from the Large Classroom are still expected to be available as the access/egress doors from this room(s) are located so they are remote from one another. The likelihood of all exits being compromised simultaneously is therefore considered to be low. Pass doors will be provided within the partitions to ensure that lateral escape to an alternative exit can be accessed.

Travel distances

- 4.33 Areas of the building where extended travel distances occur and the measures to mitigate these are described in Paragraph 4.15 above.

Inner inner rooms

- 4.34 There are several inner-inner rooms throughout the building, for example, the Dirty Area at first floor (accessed via the Acute Ward and Breakout/Study space). This arrangement is not compliant with current guidance as access to the room is via more than one access room but is considered to meet the functional requirement of the Building Regulations due to the comprehensive automatic fire detection (to warn of a fire in the access rooms), sprinkler protection to reduce the fire size and rate of development and the travel distance arrangements described in Para 4.15.

Storeys divided into different occupancies

- 4.35 The ground storey consists of both the UoH and the NHS Trust demise. The means of escape strategy has been developed on the basis that occupants will not pass through each other's demise, whilst not exceeding the maximum recommended travel distances.

Subdivision of corridors

- 4.36 Corridors on the ground floor that are more than 12m long that connect two or more storey exits will be subdivided by self-closing fire doors located approximately half-way between the storey exits.
- 4.37 The subdivision within the NHS demise on the ground floor will be provided with 30 minute fire resisting construction carried up to the underside of the soffit through the ceiling cavity to provide the sub-division set out in Method 2 within Diagram 2.9 of ADB.

Width of escape routes

- 4.38 The clear width of horizontal escape routes from the building will comply with the recommendations of Table 2.3 of ADB. In all areas needing to be served by two exits, the exit capacity has been calculated assuming that the largest exit is unavailable (in the case of the above-ground storeys, one storey exit has been discounted).
- 4.39 The storey exits at ground floor level within NHS demise provide capacity for 500 persons. This is sufficient for the calculated population of 258 persons.
- 4.40 The single exit from the UoH reception can accommodate up to 60 persons, which is sufficient for the calculated occupancy.
- 4.41 At the upper storeys, after discounting an exit to simulate it being compromised by fire and smoke, the remaining 1,700mm wide storey exit can accommodate up to 340 persons. The width of an escape route should not reduce in width along its length as it will restrict the flow of escaping occupants.

Design Team Note: The stair width is approximately 1,400mm wide. Either the width of the 1,700mm storey exits should be reduced to 1,400mm, which will result in a storey exit capacity of 280 persons or the stair should be widened to 1,700mm.

- 4.42 It should be noted that if the storey exit is reduced to 1,400mm, as per Para 4.41, there would not be sufficient capacity for the maximum calculated occupancy. There would be capacity for the maximum design occupancy confirmed by the Project Architect (approximately 130 persons per storey) but not the ADB calculated occupancy (this would need 1,550mm doors and stairs).

Open spatial planning

- 4.43 An open lightwell connects the first, second, third and fourth floor levels.
- 4.44 Level 3 will be developed to shell and core stage only and therefore the fit out layout is currently unknown. As such escape in relation to open spatial planning can only be considered as part of the fit out fire strategy.
- 4.45 The fitout of second floor level will be completed as part of this project and the layout indicates that escape will be via the circulation routes adjacent to this open connection.
- 4.46 At Level 2 an alternative escape route is available to the occupants of the Large Classroom(s) that does not pass within 4.5m of the open connection as illustrated below in Figure 4.1. This alternative route will still be available even with the retractable partitions extended as pass doors will be provided within them.
- 4.47 Notwithstanding the above, immediate warning of a fire within the lightwell is akin to an inner room arrangement (albeit over several storeys) and therefore escape is expected to occur in the early stages of fire development. The provision of a life safety sprinkler system throughout the building is expected to limit fire development and so delay the onset of untenable conditions.

Pass doors

- 4.48 The width of the pass doors must be sufficient to accommodate the cumulative occupancy of this space as persons move east to west laterally through the classrooms. The doors to the east and west which lead to the circulation corridor also need to be wide enough to accommodate the total number of occupants. On the basis of the arrangement shown in Figure 4.1 above the pass doors should have a minimum width of 750mm each and the east and west doors into the corridor should be a minimum of 850mm wide. The doors need to swing in both directions to ensure escape can be made in both directions.
- 4.49 It should be noted that wider corridors and doorways may be required to satisfy the requirements of Part M of the Building Regulations. Guidance is given in Approved Document M (ADM)^{11.7}.

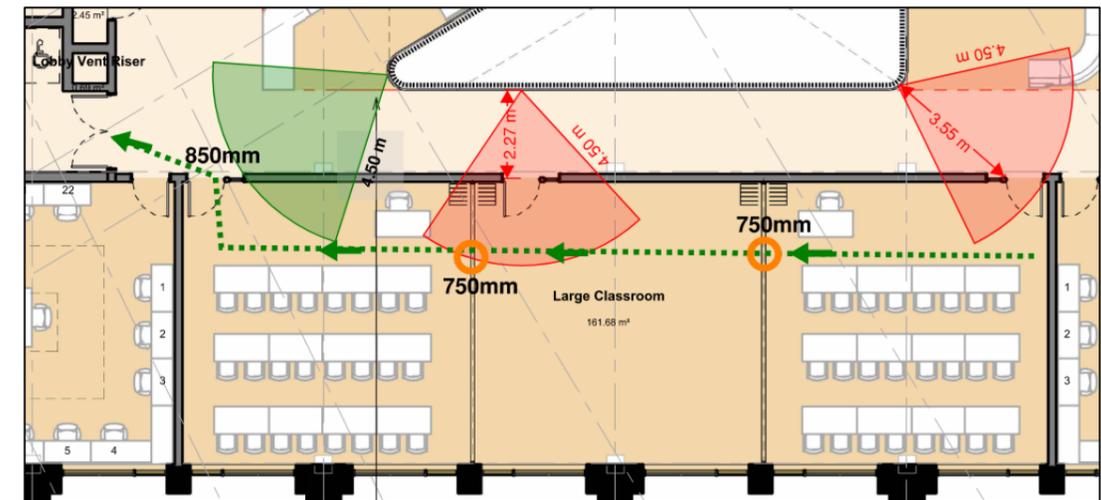


Figure 4.1 – Escape arrangements adjacent to Level 2 void edge

Revolving doors

- 4.50 A revolving door will be provided at the entrance to the University of Huddersfield and the NHS demise. A revolving door is not a suitable means of escape route and therefore a pass door is provided directly adjacent to each.

Vertical escape

Width of escape stairs

- 4.51 A simultaneous evacuation strategy will be adopted and therefore the stair capacity has been calculated using Table 3.2 of ADB. Both stairs will have an effective clear width of 1,400mm and each serves accommodation at four storeys (first – fourth) and therefore the capacity of each stair will be 445. The stair capacity calculations are presented in Annex A2.
- 4.52 Protected lobbies will be provided to both stairs at every level (except roof level) and therefore it is not necessary for one to be discounted. Therefore, the total combined capacity of the stairs will be 890 persons.
- 4.53 The total calculated occupancy of the upper storeys, excluding Level 3, is 863 persons (see Annex A2 for detailed calculations). The Project Architect (AHR) has confirmed that the actual design occupancy of each storey will be 130 persons.
- 4.54 The stair capacity is sufficient for the anticipated occupancy whether based on the maximum calculated occupancy (excluding level 3) or the Architect's confirmed design occupancy. It should be noted that on the basis of the maximum calculated occupancy the residual stair capacity will limit the occupancy of Level 3 to 30 persons only. Future management procedures should ensure that the total occupancy of the upper floors does not exceed 890 persons or the stairs should be widened to accommodate the maximum calculated occupancy.

Protection of escape stairs

- 4.55 Both stairs will be enclosed in construction having a fire resistance of at least 120 minutes and provided with protected lobbies please see Section 8 for further information.

Lower Ground Floor stairs

- 4.56 The building is served by two stairs of which one will be terminated at ground level (west) and the other (east) will continue to LGF Level. The LGF leg of the east stair will be accessed via a protected lobby at LGF level in accordance with Paragraph 3.41 of Approved Document B Vol. 2.
- 4.57 The lower leg will be provided with 60 minutes fire resistance and designed as a protected shaft due to it passing through the compartment floor separating LGF and ground floor level.
- 4.58 At ground floor level the upper and lower legs of the stair will be separated with construction that has 60 minutes fire resistance and an FD60S door.

Provisions for persons of reduced mobility

- 4.59 This section describes the building features and fire protection measures that will be provided to enable the safe evacuation of persons of reduced mobility (PRMs) from the building. In all cases, fire safety management procedures should be developed for the evacuation of any PRMs (see Section 9 of this report), which includes the preparation of Personal Emergency Evacuation Plans (PEEPs) for employees or regular building users who may need assistance.
- 4.60 Flat or ramped access will be provided to enable wheelchair users to reach a final exit or a protected refuge.
- 4.61 At the upper storeys protected refuges will be provided within the protected lobby of the east and west escape stairs.
- 4.62 Each refuge space will be an area accessible to a wheelchair of minimum dimensions 900mm by 1400mm, in which a wheelchair user can await assistance. The refuge space will not obstruct the flow of other people escaping.
- 4.63 Each refuge will be provided with an emergency voice communication system complying with BS 5839-9^{11.11} and consisting of Type B outstations that communicate with a suitable location on site capable of providing immediate management assistance whilst the building is occupied, such as the location of the main fire alarm panel.
- 4.64 A disabled refuge will not be provided at plant room storeys i.e. Level 5 or LGF as these areas will be accessed for maintenance only. It is expected that a degree of manual dexterity will be required to perform the maintenance tasks and therefore unlikely wheelchair users are unlikely to access these areas.

Evacuation lifts

- 4.65 The UoH Estates & Facilities department has confirmed that an evacuation lift will be required to assist in the evacuation of PRMs.
- 4.66 The west firefighting shaft will be provided with a firefighting lift. The lift will be available for the evacuation of PRMs under the direction of building management prior to the arrival of the fire and rescue service.
- 4.67 The east stair will not be provided with a lift. Building management will need to develop suitable fire safety management procedures to ensure PRMs occupying the wheelchair refuges may be evacuated via the staircase e.g. using an Evac Chair. See Section 9.
- 4.68 The firefighting / evacuation lift should be designed in accordance with Annex G of BS 9999 and BS EN 81-72:2020^{11.52}.

General escape provisions

Doors protecting escape routes

- 4.69 On the ground floor, where doors are hung to swing in both directions, or where they are used to subdivide corridors, they will be provided with vision panels.

Height of escape routes

- 4.70 All escape routes will have a clear headroom of at least 2m with no projections below this height, except for doorways.

External walls of protected stairs

- 4.71 Both protected stair enclosures will project such that there is an internal angle between the external wall of the stair and the building façade.
- 4.72 The façade of the east stair that is perpendicular to the building façade will be provided with 120 minutes fire resistance (from outside to in) at all storeys.
- 4.73 The façade of the west stair that is perpendicular to the building will also be provided with 120 minutes fire resistance (from outside to in) at all storeys. This protection should be extended to the Reception / Waiting façade itself as the firefighting stair access point is directly adjacent to the building line. However, the arrangement is considered acceptable on the basis that if the fire were to occur in reception / waiting area then it is unlikely that access to the firefighting shaft will be used.
- 4.74 The onward escape route from the west stair is discussed further in Para 4.87.

Design of ramps and stairs

- 4.75 All ramps on escape routes will meet the provisions of Approved Document M (ADM)^{11.7}.
- 4.76 Stairs that are used only for escape in the downward direction may not need to be designed in accordance with Approved Document M^{11.7}. However, it should be noted that there may then be additional requirements for accessibility contained in ADM that fall outside the scope of this report.

Lift Enclosures

- 4.77 A Goods Lift will connect LGF and Ground Floor. The lift will be designed as a protected shaft and enclosed with construction that has at least 60 minutes fire resistance. The lift will be approached via a protected lobby (30 minutes) at LGF and therefore the arrangement will meet the recommendations in statutory guidance.

Final exits

- 4.78 Final exits will be of sufficient width to accommodate the number of persons expected to use them.
- 4.79 Final exits will be sited to ensure rapid dispersal from the building and be located away from openings to hazardous rooms such as refuse or boiler rooms.
- 4.80 The final exits will serve both a level or ramped escape route and a level threshold will be provided.

Lighting of escape routes

- 4.81 All escape routes will be provided with adequate artificial lighting, and lighting on escape stairs will be on a separate circuit from that supplying any other part of the escape route.
- 4.82 Emergency escape lighting in accordance with BS 5266-1^{11.13} will also be provided throughout all escape routes, as recommended in Table 5.1 of ADB. On power failure the emergency escape lighting will be capable of operating for 3 hours.

Exit signs

- 4.83 Every escape route (other than those in ordinary use) will be marked by emergency exit signs complying with BS ISO 3864-1^{11.14} and BS 5499-4^{11.15}. Emergency exit signs will be located to meet the requirements of the Health and Safety (Safety Signs and Signals) Regulations^{11.17,11.18} and the Regulatory Reform (Fire Safety) Order^{11.2}.
- 4.84 Refuges will also be identified with appropriate signage which will include a blue mandatory sign worded "Refuge - keep clear".

Access control measures

- 4.85 Measures designed to restrict access into or within the building for security purposes will not adversely affect the escape provisions. Where a door on an escape route needs to be secured when the building is occupied it will be capable of being readily operated, without a key, from the side approached by persons making their escape.

Onward external escape routes

- 4.86 The width of all onward escape routes will maintain the aggregate clear width of the final exits leading into them and will not be obstructed or reduced in width by elements such as landscaping, etc.

West Stair

- 4.87 The onward escape routes from the west stair core will require occupants to pass within 1,800mm of the building façade. Therefore, the external wall of the reception / waiting area within 1,800mm of the external route should provide 30 minutes fire resistance (integrity only).

Lower Ground Floor Level

- 4.88 Onward escape from the Lower Ground Floor Level will be initially via the undercroft before accessing the service yard. The route through the service yard should be clearly defined and illuminated and if guarded with protective barriers in accordance with BS 6180^{11.51}.

5 Internal fire spread (linings)

Linings

- 5.1 The wall and ceiling linings throughout the building will comply with the European classifications summarised in Table 5.1 below.

Table 5.1 - Classification of wall and ceiling linings

Location	European class (BS EN 13501-1)
Walls and ceilings in rooms up to 30m ²	D-s3, d2
Walls and ceilings in other rooms	C-s3, d2
Circulation spaces	B-s3, d2

- 5.2 Various exceptions and modifications can apply, and reference should be made to Section 6 of ADB for detailed guidance.
- 5.3 It is proposed that timber battens will partially line the central circulation space lightwell. This material must meet the minimum classification B-s3, d2 in accordance with BS EN 13501-1 set out above. It is strongly recommended that the timber must be supplied and certified as having a waterproof (i.e. non-hygroscopic), pressure impregnated treatment to achieve this performance and be maintained in accordance with manufacturers recommendations.

Plastic roof-lights, glazing and lighting diffusers, etc.

- 5.4 Plastic roof-lights, glazing, suspended ceilings and lighting diffusers (if present) will comply with the recommendations of Clauses 6.8 and 6.13 – 6.18 of ADB.

6 Internal fire spread (structure)

Loadbearing elements of structure

- 6.1 For a building of this nature i.e. which has a storey more than 18m above lowest adjacent ground level (but less than 30 metres) the minimum period of fire resistance for elements of structure when a suitably designed sprinkler system is provided throughout, will be 60 minutes, in accordance with Table B4 of Approved Document B.
- 6.2 On the ground floor of Southgate 2, at the request of the NHS Trust, the MRI Suite, which comprises the Tech Room, MRI room and the MRI Control Room will not be provided with sprinkler protection.
- 6.3 Consequently, these areas will be separated from the rest of the floor plate with REI 90 minutes fire resisting walls and the period of fire resistance of any elements of structure passing through these unsprinklered rooms will need to increase locally to 90 minutes (the period of fire resistance required for a building of this height where sprinkler protection is not provided).
- 6.4 The roof structure will support a substantial amount of plant and will form part of a rooftop escape route and therefore the roof structure will have 60 minutes fire resistance.

Compartment walls

- 6.5 ADB recommends that large buildings are subdivided into fire-resisting compartments with the objective of:
- ▶ preventing rapid fire spread that could trap the occupants;
 - ▶ reducing the chances of a fire becoming so large that it threatens fire service personnel and people in the vicinity of the building.
- 6.6 In relation Southgate 2, fire-resisting or compartment walls may be needed to:
- ▶ comply with recommended compartment size limits;
 - ▶ separate different occupancies;
 - ▶ enclose places of special fire hazard;
 - ▶ reduce limitations on unprotected areas.

6.7 These are discussed below.

Limitation of compartment size

- 6.8 Table 8.1 of ADB sets out maximum recommended compartment areas for a single floor level. In this instance, for an Assembly and Recreation building, an area limit of 4,000m² with a sprinkler system is recommended.
- 6.9 The maximum size of an individual storey will be 1,180m², which is significantly less than the recommended maximum size.

Separation of occupancies

- 6.10 The building will accommodate different occupancies in the Assembly and Recreation purpose group, for instance, the ground floor level will be occupied by both the NHS and the UoH. A compartment wall of 60 minutes fire resistance will be provided between these areas.

- 6.11 No doors will be provided in the compartment wall between occupancies except where required as part of the means of escape design.

Places of special fire hazard

- 6.12 The areas listed below are designated as places of special fire hazard and will be enclosed within 30-minute fire-resisting construction (walls, floors and doors); penetrating services will be fire stopped and provided with fusible-link fire dampers as appropriate.
- ▶ oil-filled-transformer and switchgear rooms;
 - ▶ boiler rooms;
 - ▶ storage for fuel or other highly flammable materials (including the diesel back-up sprinkler pump and gas bottle store on the lower ground floor).

Essential life safety services

- 6.13 Rooms containing essential life safety services, for example, the sprinkler pump room and the generator room will be enclosed in 120 minutes fire resistance.

NHS Trust Requirements

Separation of alternative escape routes on the Ground Floor

- 6.14 As described in paragraph 4.37 additional 30-minute fire resisting walls will be provided throughout the ground floor level to provide places of relative safety for patients to escape under less pressure of time.

Asset Protection

- 6.15 As described in paragraphs 6.2 and 6.29 the MRI Suite will not be provided with sprinkler protection and consequently must be enclosed with construction that has at least 90 minutes fire resistance in order to comply with the recommendations in BS EN 12845:2015.
- 6.16 The NHS Trust has requested that the CT suite (including surrounding CT infrastructure) is enclosed with 60 minutes fire resisting construction. Sprinkler protection will still be provided throughout this area despite the additional fire resisting separation.
- 6.17 The NHS Trust has requested that the IT Hub is also enclosed with construction that has 30 minutes fire resistance for business resilience reasons. Sprinkler protection will still be provided in this room.

Fire Hazard Rooms

- 6.18 At a project review meeting with stakeholders during RIBA Stage 3, it was requested by the NHS Trust that in addition to rooms described as places of special fire hazard in statutory guidance (in Paragraph 6.12 above), the following rooms are also enclosed with 30-minute fire resisting walls:
- ▶ Cleaner's Cupboards
 - ▶ Store rooms;
 - ▶ Disposal hold;
 - ▶ Consumables Linen Suite;

Compartment floors

- 6.19 On the Southgate 2 scheme, compartment floors will be provided to (1) separate different occupancies, and (2) separate the ground floor from a basement;
- 6.20 On the basis of the compartmentation strategy set out above, the light well connecting first – fourth floor will not constitute an atrium for life safety purposes as fire compartmentation will not be breached. Items (a) and (b) are discussed further below.

Separation of occupancies

- 6.21 As described previously, the building will accommodate two different overarching organisations i.e. the UoH and the NHS Trust and as such a compartment floor of 60 minutes fire resistance will be provided at first floor level to separate them.
- 6.22 Within the tenanted area of the UoH demise at Level 3, based on the provision of a common fire detection and alarm system; continuation of the sprinkler system throughout the tenanted spaces and the prospective tenants limited to either Assembly and Recreation or Office use, separation of individual occupancies with fire resisting construction is not considered necessary.

Separation of basement

- 6.23 The floor separating the ground and lower ground will be constructed as a compartment floor that has 60 minutes fire resistance.

Construction of compartment walls and floors

- 6.24 Compartment walls will extend to the soffit of the structural slab above (i.e. go from slab to slab). Allowance will be made for structural movement and flexible fire stopping will be provided at the junctions between fire-resisting elements.
- 6.25 Where a compartment wall or floor meets an external wall, the junction will be fire stopped with suitable materials (e.g. mineral fibre or a proprietary fire stopping system) providing the same period of fire resistance as the compartment wall or floor.
- 6.26 Where a compartment wall meets with the roof, the junction will be fire-stopped, and the segment of roof spanning the compartment wall be constructed in accordance with Clauses 8.25 – 8.29 and Diagram 8.2 of ADB. A zone of the roof 1500mm either side of a compartment wall should have a covering designated B_{ROOF}(t4) when tested in accordance with BS EN 13501-5^{11.44} on a deck of material of Class A2-s3, d2 or better (to BS EN 13501-1^{11.41}).

Sprinkler protection

- 6.27 The height of the top storey above ground will not exceed 30m and the maximum compartment size will not exceed the recommendations of Table 8.1 of ADB (i.e. 2,000m² with sprinklers) and therefore sprinkler protection is not needed to comply with statutory guidance.
- 6.28 However, at the request of the UoH, a sprinkler system will be installed throughout the building, except for some limited exceptions. It will be designed and installed in accordance with the recommendations in BS EN 12845, including the additional measures to improve system reliability and availability as described in Annex F of that standard.
- 6.29 It should be noted that the omission of sprinkler protection in the MRI Suite is neither a permitted nor a necessary exception in BS EN 12845 and therefore is a deviation from sprinkler design guidance. The MRI suite will be separated from the rest of the storey by 90 minutes fire resisting construction to accord with this standard.

- 6.30 A review of the relevant hazards within the building indicates that an Ordinary Hazard 1 (OH1) hazard classification in accordance with BS EN 12845 would be appropriate but this should be confirmed with the specialist sprinkler designer.

Design Team Note: The sprinkler system hazard classification and omission of sprinklers in the MRI suite should be confirmed with the specialist sprinkler designer.

Sprinkler system infrastructure

- 6.31 It is intended that a series of UoH buildings will be developed sequentially across the Southgate site over the next few years, each provided with sprinkler protection. The aim of the University is to share some elements of the sprinkler system infrastructure between buildings with the objective of providing an integrated infrastructure across the entire site.
- 6.32 Tenos understand that it is proposed that the sprinkler system serving Southgate 2 will share some infrastructure with the sprinkler system installed in Southgate 1 (Daphne Steele Building), including the water supply.
- 6.33 In principle, as the owner and operator responsible for the sprinkler system will be the same for both buildings this approach will, in our view, meet the objectives of the sprinkler design code i.e. providing a suitable water supply at all material times.

Design Team Note: This arrangement is atypical and will need to be reviewed with the specialist sprinkler contractor, project stakeholders and the approving authorities. Please see Paragraph 9.9.

Protected shafts for services

- 6.34 Shafts for lifts, chutes, ducts and pipes that pass through compartment floors will be constructed as protected shafts.
- 6.35 All protected shafts conveying services will be enclosed in fire-resisting construction providing 60 minutes fire resistance. Doors or hatches into the shafts will be locked shut and will provide a fire resistance of at least 30 minutes.
- 6.36 Shafts used for conveying oil or gas will comply with the recommendations of paragraphs 8.36 to 8.38 of ADB.

Concealed spaces (cavities)

- 6.37 To inhibit the unseen spread of fire and smoke, any concealed spaces or cavities in the construction will be sealed and sub-divided with cavity barriers.
- 6.38 Cavity barriers should be provided in accordance with Section 9 of ADB. This includes cavity barriers:
- at the edges of cavities and around openings penetrating them;
 - at the junctions between external cavity walls and compartment walls and floors;
 - at junctions between a cavity wall and every compartment or fire resisting barrier;
 - on protected escape routes, above and below any fire resisting construction that is not carried the full storey height;
 - above and below any fire doors provided in corridors to sub-divide escape corridors;
- 6.39 Various exceptions and additions to the above can apply and therefore reference should be made to Section 9 of ADB for specific guidance.

- 6.40 In the case of an external wall construction, of a building which, by virtue of paragraph 9.10d of ADB ('external cladding system with a masonry or concrete inner leaf' – for buildings not put to residential or institutional use), is not subject to the provisions of Table 9.1 of ADB, the surfaces which face into cavities should also meet the provisions of Table 12.1 of ADB, and provisions in Section 9 of ADB.
- 6.41 With the exception of the areas described in 6.42 below, cavity barriers will be constructed of materials capable of providing a fire resistance of 30 minutes integrity and 15 minutes insulation.
- 6.42 Cavity barriers within a stud wall or partition, and around openings penetrating cavities (e.g. window openings in external cavity walls) may be formed of either:
- ▶ 0.5mm-thick steel;
 - ▶ 38mm-thick timber;
 - ▶ Mineral wool under compression when installed in the cavity; or
 - ▶ 12mm-thick calcium silicate, cement-based or gypsum-based board.

Protection of openings and fire stopping

- 6.43 All penetrations through fire resisting separating elements (e.g. protected escape routes and compartment walls/floors) will be provided with fire doors, fire stopping, fire seals and fire/smoke dampers in accordance with the detailed recommendations of Section 10 of ADB. Some of the main provisions are summarised below.

Fire doors

- 6.44 Doors in compartment walls will have the same fire resistance as the wall in which they are installed but do not need to be smoke sealed unless they also support the means of escape. Doors to protected shafts will provide at least half the period of fire resistance required for the shaft (subject to a minimum of 30 minutes). For further information on the recommendations relating to fire doors see Annex A4 of this report and Appendix C of ADB.

Fire stopping

- 6.45 Joints between fire-separating elements will be fire-stopped to maintain the fire resistance of those elements.
- 6.46 Openings through fire-separating elements should be minimised in both number and size. Where cables, conduits, ducts or pipes must pass through a fire resisting barrier the penetrations will be sealed with a proprietary sealing system that has been tested for the specific service / substrate materials and opening size and demonstrated to maintain the fire resistance of the fire-separating element.
- 6.47 It is strongly recommended that fire stopping works be carried out by a third-party UKAS-accredited installer.

Protection of ventilation ductwork

- 6.48 The mechanical ventilation system should not assist in transferring fire and smoke through the building in such a manner as to put protected escape routes at risk; and should maintain the fire-resistance of the walls / floors through which it penetrates.
- 6.49 Where ductwork penetrates fire-resisting walls it will be provided with fire/smoke dampers or suitable fire-resisting enclosures, as appropriate.
- 6.50 Detailed guidance is provided in Clauses 10.6 – 10.22 of ADB Volume 2 and this will need to be accounted for in the detailed ventilation system design undertaken by others, but some of the key provisions are outlined below.

Ductwork penetrating protected stairways

- 6.51 If protected stairways are provided with day-to-day ventilation, a separate and dedicated ventilation system will be provided for each stair.
- 6.52 Ventilation ductwork serving a protected stairway that passes through any other area will be fire resisting from the point where it leaves the protected stairway.
- 6.53 Ventilation ductwork serving other areas (e.g. the accommodation or other parts of the escape route) which passes through a protected stairway will be fire resisting where it passes through the protected stairway.

Ductwork penetrating other protected escape routes

- 6.54 ES classified fire and smoke dampers actuated by the smoke detection system will be provided where ductwork enters or leaves each section of the protected horizontal escape route it serves.
- 6.55 Alternatively, for cases where ductwork passes through a protected horizontal escape route without ventilating that area, it will be fire resisting where it passes through the protected escape route.

Plant room extract ductwork

- 6.56 Separate and independent extraction systems will be provided for the plant rooms, and air extracted from these areas will not be recirculated.

Ductwork passing through other fire-separating elements

- 6.57 Where ductwork penetrates fire-separating elements (other than those described above), mechanical fire dampers will be provided, or the ductwork will be fire-resisting if it does not serve both compartments.

General provisions for fire / fire and smoke dampers

- 6.58 Dampers will be classified to BS EN 13501-3^{11.43} and conform to BS EN 15650^{11.40}. Fire dampers will have the same period of fire resistance (integrity) as the wall or floor they penetrate, but in no case less than 60 minutes. In addition, ES classified fire and smoke dampers will resist smoke leakage for the same period.
- 6.59 Fire dampers will generally be activated by means of a thermal device that will cause damper closure at a temperature of approximately 74°C. In some circumstances, motorised fire / fire and smoke dampers will be installed which operate automatically in response to the smoke detection system (see sections above). However, these dampers will also incorporate a thermally activated release device with a 74°C activation temperature.
- 6.61 All dampers will be securely fixed within the thickness of the construction of the fire-separating element they penetrate.
- 6.62 All dampers will be installed so as to allow inspection, testing and maintenance of the damper and actuator.

Design Team Note: The extent and applicability of the above design guidance will depend on the design and routing of the mechanical ventilation and air conditioning system. It is essential that the fire strategy is reviewed and updated when the mechanical ventilation design has been finalised at RIBA Stage 4.

7 External fire spread

7.1 The provisions for external fire spread address two key issues, namely:

- **fire spread over the walls** – control of the combustibility of external walls (i.e. materials) and the propensity for fire spread over surfaces and through cavities; and
- **fire spread from one building to another** – control of the fire resistance of external walls* and fire performance of roofs, having regard to the proximity of other buildings.

* External walls may also require fire resistance for other purposes, e.g. to protect means of escape or maintain load bearing structural fire resistance – see section 6.

7.2 It should be noted that the definition of ‘external walls’ introduced into the Building Regulations and Approved Document B in December 2018 also includes windows and doors within the wall, as well as any external decorative finishes.

Fire spread over the external walls

Combustibility of external walls – Building with a top storey of at least 18m above ground level

7.3 The building will have a storey (not including roof-top plant areas or any storey consisting exclusively of plant rooms) of at least 18m above ground level, but will not contain:

- one or more dwellings; or
- an institution; or
- room for residential purposes

7.4 Therefore, the building will not be classed as a ‘relevant building’ under Regulation 7(4) of the Building Regulations, and the guidance in Section 12 of Approved Document B will apply.

7.5 The relevant guidance in Section 12 of Approved Document B regarding the combustibility of external walls in buildings with a top storey of at least 18m above ground is presented in 7.6 – 7.13 below.

7.6 To control fire spread over the external walls they should achieve either of the following:

- Follow the provisions given in paragraphs 12.5 to 12.10 [of ADB V2], which provide guidance on:
 - External surfaces.
 - Materials and products.
 - Cavities and cavity barriers.
- Meet the performance criteria given in the BRE Report 135^{11.26} for external walls using full-scale test data from BS 8414-1^{11.27} or BS 8414-2^{11.28}.

7.7 In relation to buildings of any height or use, 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.

External surfaces

7.8 The external surfaces (i.e. outermost external material) of external walls should comply with the provisions in Table 12.1 [of ADB V2 – reproduced in Figure 7.1 below]. The provisions in Table 12.1 [of ADB] apply to each wall individually in relation to its proximity to the relevant boundary.

7.9 Relevant metal composite material should not become part of an external wall, or specified attachment, of any building.

Materials/products

7.10 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 Class A2-s3, d2 or better (see Appendix B [of ADB]).

7.11 This restriction does not apply to masonry cavity wall construction which complies with Diagram 9.2 in Section 9 [of ADB].

Cavities and cavity barriers

7.12 Cavity barriers should be provided in accordance with Section 9 [of ADB].

7.13 In the case of an external wall construction of a building which, by virtue of paragraph 9.10d [of ADB] (external cladding system with a masonry or concrete inner leaf), is not subject to the provisions of Table 9.1 [of ADB], the surfaces which face into cavities should also meet the provisions of Table 12.1 [of ADB] and provisions in Section 9 [of ADB].

Building type	Building height	Less than 1000mm from the relevant boundary	1000mm or more from the relevant boundary
‘Relevant buildings’ as defined in regulation 7(4) (see paragraph 12.15)		Class A2-s1, d0 ⁽¹⁾ or better	Class A2-s1, d0 ⁽¹⁾ or better
All ‘residential’ purpose groups (purpose groups 1 and 2)	More than 11m	Class A2-s1, d0 ⁽²⁾ or better	Class A2-s1, d0 ⁽²⁾ or better
	11m or less	Class B-s3, d2 ⁽²⁾ or better	No provisions
Assembly and recreation	More than 18m	Class B-s3, d2 ⁽²⁾ or better	From ground level to 18m: class C-s3, d2 ⁽³⁾ or better From 18m in height and above: class B-s3, d2 ⁽²⁾ or better
	18m or less	Class B-s3, d2 ⁽²⁾ or better	Up to 10m above ground level: class C-s3, d2 ⁽³⁾ or better Up to 10m above a roof or any part of the building to which the public have access: class C-s3, d2 ⁽³⁾ or better ⁽⁴⁾ From 10m in height and above: no minimum performance
Any other building	More than 18m	Class B-s3, d2 ⁽²⁾ or better	From ground level to 18m: class C-s3, d2 ⁽³⁾ or better From 18m in height and above: class B-s3, d2 ⁽²⁾ or better
	18m or less	Class B-s3, d2 ⁽²⁾ or better	No provisions

NOTES:

In all cases all the following provisions apply.

- Regulation 7(1A) prohibits the use of relevant metal composite materials in the external walls of all buildings of any height (see paragraphs 12.12 and 12.13).
- The advice in paragraph 12.4 should always be followed.

In addition to the provisions within this table, buildings with a storey 18m or more above ground level should also meet the provisions of paragraph 12.6.

In addition to the provisions within this table, buildings with a storey 11m or more above ground level should also meet the provisions of paragraph 12.7.

1. The restrictions for these buildings apply to all the materials used in the external wall and specified attachments (see paragraphs 12.14 to 12.17 for further guidance).
2. Profiled or flat steel sheet at least 0.5 mm thick with an organic coating of no more than 0.2mm thickness is also acceptable.
3. Timber cladding at least 9mm thick is also acceptable.
4. 10m is measured from the top surface of the roof.

Figure 7.1 – Reproduction of Table 12.1 (Reaction to fire performance of external surface of walls) of Approved Document B

Fire spread to other buildings

Space separation – relevant boundaries

- 7.14 The relevant boundaries have been taken to the midpoint of Leeds Road and Pine Street for the north and south elevations, respectively. The relevant boundary has been taken to the Southgate #2 site boundary on the east elevation. A notional boundary exists between the Southgate #2 Building and the existing Daphne Steele Building on the west elevation based on the Daphne Steele’s fire strategy developed by Design Fire Consultants. A notional boundary has been applied between these two buildings because, although they are on the same site, they fall under Purpose Group 5, Assembly and Recreation.

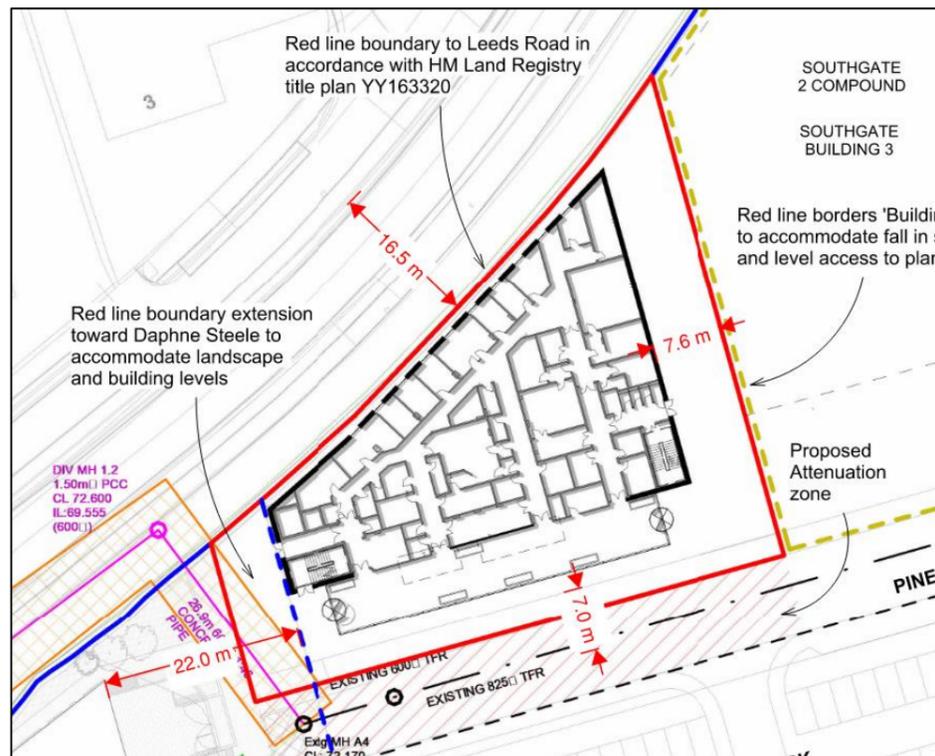


Figure 7.2 - Relevant Boundaries

- 7.15 It should be noted that in Figure 7.2 above, the boundary to the east elevation of Southgate #2 is shown as 7.6m. However, at the design team meeting dated 12th October 2023, it was confirmed by the Project Architect (AHR) that the boundary has been moved 2.5m further away (i.e. closer to the prospective Southgate 3 building). The distance from the east elevation of Southgate 2 to the potential location of the Southgate 3 elevation is 10.1m.
- 7.16 A notional boundary at the midpoint of this separation distance will be adopted i.e. 5.05m.

Allowable unprotected areas

- 7.17 With the exception of the allowable unprotected areas (UPA) calculated in this section, the external walls will need to meet with the provisions set out in ‘Fire resistance of external walls’ below.
- 7.18 The allowable UPA have been assessed using the enclosing rectangle method of BRE report BR 187 (*External fire spread. Building separation and boundary distances*)^{11,25}.

- 7.19 The guidance in BR 187 provides two values for the emitter radiation intensity to be used for the assessment of UPA: 168kW/m² and 84kW/m² corresponding to a ‘standard’ and ‘reduced’ fire load density, respectively. BR 187 states that the appropriate value to use is given in the national building regulation guidance depending on the Purpose Group or class of the occupancy.

- 7.20 However, the current edition of ADB no longer provides such recommendations. Therefore, the emitter radiation intensity adopted for the assessment has been based upon the values implicit in the calculation tables in BR 187 – i.e. 84kW/m² for the assembly and recreation compartments.

- 7.21 Except for MRI Suite, the building will be fitted throughout with a sprinkler system in accordance with Appendix E of ADB and so in relation to space separation calculations (except for elevations adjacent to the MRI Suite), either of the following is permitted:

- The boundary distance can be halved, to a minimum distance of 1
- The amount of unprotected area can be doubled.

- 7.22 The calculations are presented in Annex A3. In summary the findings demonstrate that a percentage of the external façade on the south and east elevation is required to be protected.

Design Team Note: Using the elevation drawing referenced in Annex A1, this analysis has been completed on the basis that areas of brickwork façade will be protected area i.e. provide EI 60/15 when tested from the internal face of the building as per Para 7.23 below. All other areas e.g. windows, spandrel panels, doors etc. have been taken to be unprotected areas and have no fire resistance performance.

Fire resistance of external walls

- 7.23 All external walls will be located more than 1m from the relevant boundary and so will be of fire-resisting construction providing 60 minutes integrity and 15 minutes insulation when tested from the internal face of the building, with the exception of allowable unprotected areas (see assessment above). Allowable unprotected areas need not be provided with any specific level of fire resistance (e.g. windows that are allowable unprotected areas may be glazed with non-fire-resisting glass).

Roof coverings

- 7.24 The minimum separation distance to any point on a relevant boundary (see above) is 5.05m, the building is in Purpose Group 5, and has a cubic capacity greater than 1,500m³. Therefore, in accordance with Table 14.1 of ADB, all roof covering materials will as a minimum comply with the European designation B_{ROOF(t4)} when classified in accordance with BS EN 13501-5^{11,44}. See also ‘Construction of compartment walls and floors’ in section 6 of this report for additional provisions where roof coverings pass over compartment walls.

Green Roof

- 7.25 Best practice guidance for green roofs and walls (also called living walls) can be found in *Fire Performance of Green Roofs and Walls*^{11,29}, published by the Department for Communities and Local Government. A summary of some of the main design recommendations in this code are listed below:

- 500mm pebble border at perimeter (unless perimeter is adjacent to façade whereby the border should increase to 900mm in width)
- 500mm border on lift overruns
- Roof outlets – 500mm border
- Services penetrations – 500mm border (including antenna supports, pipes and other services)
- 1000mm wide break every 40m of green roof length.

Plastic rooflights

- 7.26 Any plastic rooflights will comply with the recommendations of Clauses 14.5 - 14.7 of ADB.

8 Access and facilities for the fire service

Vehicle access

- 8.1 Due to the height of the top storey an internal firefighting strategy will be adopted.
- 8.2 The design of fire service vehicle access routes and parking positions within 18m (and line of sight) of each dry riser inlet point will generally be in accordance with paragraphs 15.7 to 15.10 of ADB but the acceptability of the access routes should be agreed with the Fire & Rescue Service.

Table 8.1 - Vehicle access route specification

Appliance	Min. width of road between kerbs (m)	Min. width of gateways (m)	Min. turning circle between kerbs (m)	Min. turning circle between walls (m)	Min. clearance height (m)	Min. carrying capacity (tonnes)
Pumping	3.7m	3.1m	16.8m	19.2m	3.7m	24*
High Rise	3.7m	3.1m	26.0m	29.0m	4.0m	17

*Whilst ADB recommends 12.5 tonnes, 24 tonnes is the requirement set by the West Yorkshire Fire and Rescue Service^{11.53}.

Design Team Note: Fire Appliance dimensions to be reviewed with the Local Fire & Rescue Service to ensure that the access route is acceptable.

- 8.3 Vehicle access will be provided to the southern elevation via Pine Street which is accessible from Old Leeds Road. It was observed that access to Pine Street is currently limited by a 2.5m height restriction barrier, as shown below in Figure 8.1. It has been confirmed that this will be removed to allow access for a fire appliance.

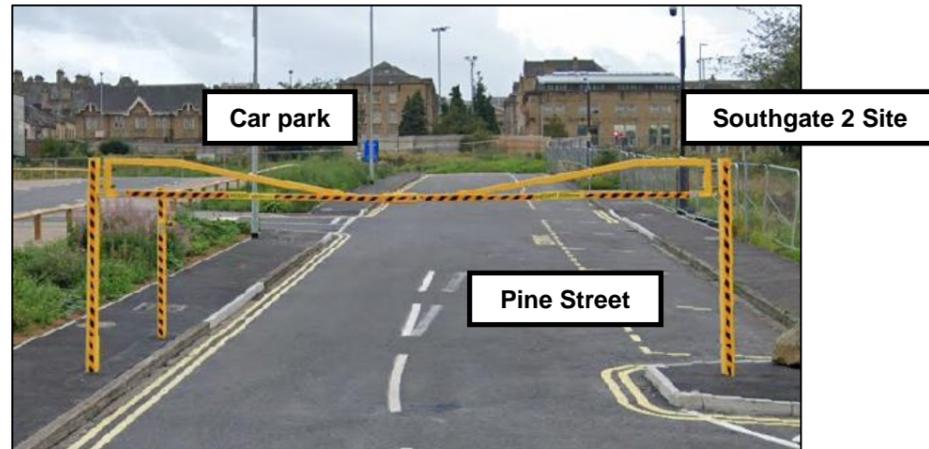


Figure 8.1 - Traffic height restriction barrier on Google Maps ©

- 8.4 In the Daphne Steele Building fire strategy a through road between Southgate Road and Pine Street is provided. A fire appliance will have access beyond the Southgate 2 building and can turn around using the road infrastructure around the Daphne Steele building. The route is indicated in the excerpt from the fire strategy in Figure 8.2 below.

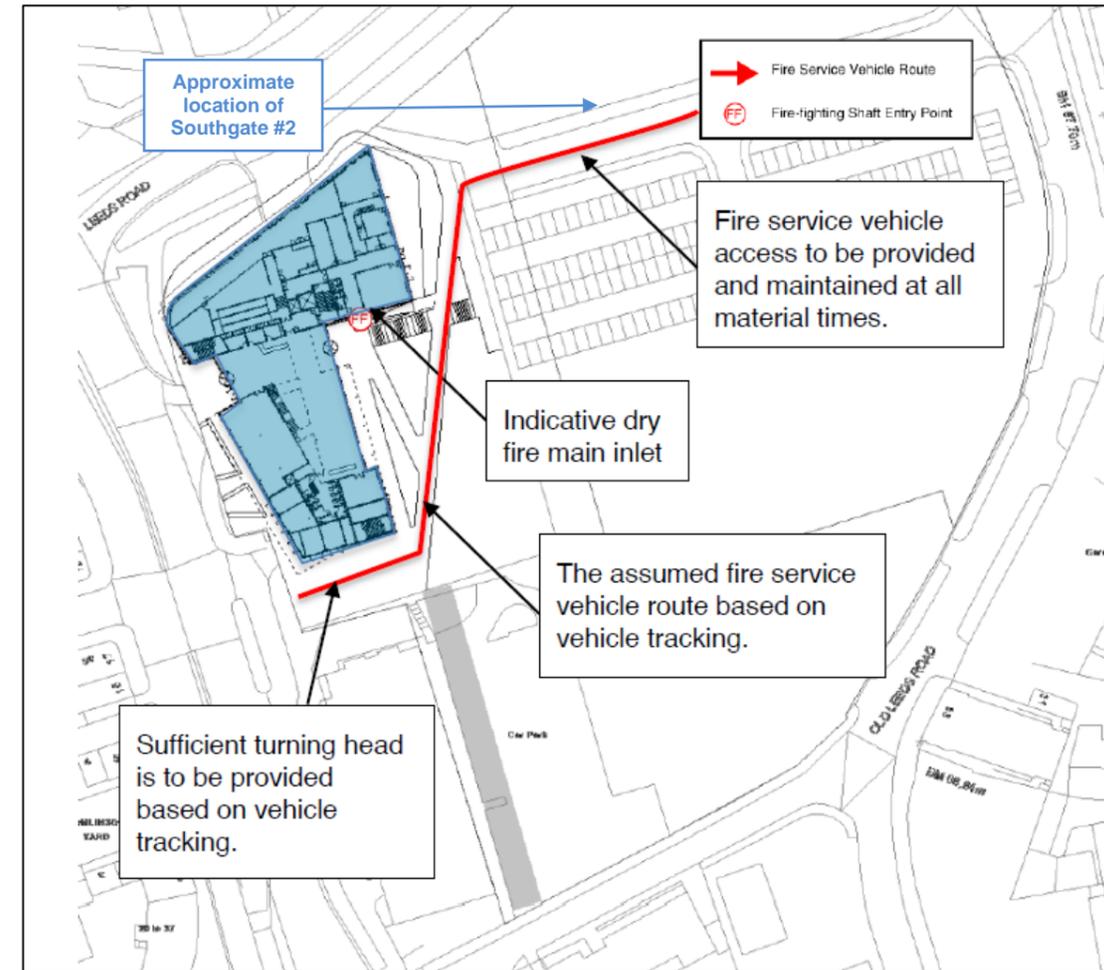


Figure 8.2 - Through road between Southgate and Pine Street Figure 7 extracted from DFC Daphne Steele's Fire Strategy Report

Venting heat and smoke from Lower Ground Floor Level

- 8.15 The Lower Ground Floor Level will be more than 3m below external ground level on three sides and open to the service yard on the east elevation. The basement will be approximately 270m².
- 8.16 Several external doors are provided in the east elevation at this level through which smoke may vent directly from accommodation to the undercroft and on to atmosphere. Accommodation that does not have a door which opens direct to the undercroft / atmosphere can be ventilated through interconnecting rooms and corridors.
- 8.17 A number of rooms will be enclosed in fire resisting construction (minimum 30 minutes fire resistance) for different fire safety reasons and therefore spread in this storey is expected to be limited, notwithstanding the provision of sprinklers. It will also sub-divided to allow a fire to be approached from two opposite directions i.e. from the east stair enclosure or from grade level at LGF (accessed via the service access ramp).

9 Regulatory Reform (Fire Safety) Order

9.1 On completion of the building, responsibility for compliance with the Regulatory Reform (Fire Safety) Order 2005 (FSO)^{11.2} will rest with the Responsible Person (see section 3 of this report). This section outlines some of the main requirements of the FSO for consideration by the Responsible Person.

First aid firefighting equipment

9.2 Suitable portable fire extinguishers will need to be provided throughout the building. Guidance is available in BS 5306-8 (Fire extinguishing installations and equipment on premises. Selection and positioning of portable fire extinguishers – Code of practice)^{11.45}.

9.3 As described in Para 4.67, consideration should also be given to the provision of evacuation chairs or other measures to assist in the vertical evacuation of people with impaired mobility from the east stair enclosure.

Risk assessment

9.4 To comply with FSO a fire risk assessment must be in place when the building is first occupied. It is therefore recommended that a preliminary risk assessment be carried out prior to occupation. This should then be updated after the building is occupied to identify any additional risks that may have been imported by the occupiers.

9.5 Guidance on the risk assessment process is given in a series of H M Government guides entitled Fire Safety Risk Assessment^{11.9}. Unless hazardous materials or processes are introduced into a building complying with the Building Regulations it should not normally be necessary to provide additional physical fire safety measures over and above those required to satisfy Part B.

Fire safety management procedures

9.6 This fire safety strategy has been developed on the assumption that the building will be properly managed. Once the building is in use the management regime should be maintained and any variation in that regime should be subject to a suitable fire risk assessment.

9.7 Procedures for the management of fire safety should be developed and documented in a fire safety manual. Guidance on fire safety management procedures is given in Clause 9 and Annex H of BS 9999^{11.4} and a typical fire safety manual might include:

- ▶ Fire safety policy statement
- ▶ Fire safety management structure
- ▶ Coordination with other parties (e.g. in a shared building)
- ▶ Emergency response
- ▶ Evacuation of people with special needs
- ▶ Contingency and salvage plans
- ▶ Emergency responsibilities of designated staff
- ▶ Summary of fire safety strategy and plans for the building
- ▶ Fire risk assessment
- ▶ Procedures for dissemination of information
- ▶ Selection and control of materials
- ▶ Maintenance and testing of fire safety equipment
- ▶ Routine housekeeping (e.g. removal of combustible waste)
- ▶ Fire safety training
- ▶ Fire drills
- ▶ Decoration, alteration and building work
- ▶ Audit procedures and updating of the manual
- ▶ Fire safety records
- ▶ References.

9.8 When the building is in use a suitable fire safety management regime should be established and any variations to the procedures should be the subject of a risk assessment.

Project-specific management procedures

9.9 The nature of this project requires the adoption of some specific fire safety procedures that will need to be included within the fire safety management plan. These items are summarised below:

- ▶ The sprinkler system water supply will be shared between the Daphne Steele building and Southgate #2. Whilst the UoH will have overarching fire safety responsibility for both buildings there needs to be communication between the Responsible Person within the UoH will Responsible Persons in the NHS Trust or any other third party whenever the sprinkler tank water supply is unavailable (and adequate control measures taken accordingly).
- ▶ The area of undercroft directly adjacent to the HV Switch Room and Transformer Room is the sole escape route for occupants of these areas.. It must be kept clear at all material times to ensure that unimpeded escape can be made and the likelihood of a fire is kept to a minimum.
- ▶ On completion of the shell and core design Level 3 must remain inaccessible to building occupants and devoid of fire load. On this basis building services such as sprinklers and fire alarm along with fire compartmentation may not be installed until fit out stage.

9.10 It is recommended that the procedures above are reviewed with the proposed building operator or their representative to ensure that they are compatible with their normal operational procedures.

10 Conclusion

- 10.1 Subject to implementation of the recommendations set out in the Design Team Notes above where required, on the basis of the fire safety strategy presented in this report, it is our opinion that the building will satisfy the functional requirements of Part B (fire safety) of the Building Regulations.
- 10.2 To comply with the Regulatory Reform (Fire Safety) Order, the building user(s) will need to implement suitable fire safety management procedures and carry out a fire risk assessment prior to and shortly after occupation (see section 9). Subject to a suitable and sufficient fire risk assessment, additional physical fire safety measures should not be required unless high hazard materials or processes are introduced.
- 10.3 As the requirements of the Building Regulations and Fire Safety Order are set out in functional terms and can be interpreted in differing ways, it is essential that the recommendations of this report are agreed with the relevant approvals bodies prior to implementation.
- 10.4 Regulation 38 of the Building Regulations requires that fire safety information be given to the person responsible for the occupied building. Therefore, copies of the finalised fire strategy report and other relevant fire safety information should be issued to the responsible person.

11 References

- 11.1 The Building Regulations 2010 (as amended). SI 2010 No. 2214. The Stationery Office Limited. 2010
- 11.2 Regulatory Reform (Fire Safety) Order 2005. SI 2005 No. 1541. The Stationery Office Limited. 2005
- 11.3 The Building Regulations 2010, Approved Document B: Fire Safety – Volume 2: Buildings other than dwellings, 2019 edition incorporating 2020 and 2022 amendments. RIBA Books. 2022
- 11.4 BS 9999:2017. Fire safety in the design, management and use of buildings – Code of practice
- 11.5 The Building Regulations 2010, Approved Document J: Combustion appliances and fuel storage systems, 2010 edition incorporating 2010 and 2013 amendments. The Stationery Office Limited. 2013
- 11.6 The Building Regulations 2010, Approved Document K: Protection from falling collision and impact, 2013 edition. The Stationery Office Limited. 2013
- 11.7 The Building Regulations 2010, Approved Document M: Access to and use of buildings, 2015 edition incorporating 2016 amendments. The Stationery Office Limited. 2016
- 11.8 The Building Regulations 2010, Approved Document 7: Materials and workmanship, 2013 edition incorporating 2018 amendments. The Stationery Office Limited. 2018
- 11.9 Fire Safety Risk Assessment, Series of guides published by H M Government 2006
- 11.10 BS 5839-1:2017. Fire detection and fire alarm systems for buildings. Code of practice for system design, installation, commissioning and maintenance of systems in non-domestic premises (*Incorporating Corrigendum No. 1*)
- 11.11 BS 5839-9:2011. Fire detection and alarm systems for buildings. Code of practice for the design, installation, commissioning and maintenance of emergency voice communication systems
- 11.12 BS EN 54-11:2001. Fire detection and fire alarm systems. Manual call points
- 11.13 BS 5266-1:2016. Emergency lighting. Code of practice for the emergency lighting of premises
- 11.14 BS ISO 3864-1:2011. Graphical symbols. Safety colours and safety signs. Design principles for safety signs and safety markings
- 11.15 BS 5499-4:2013. Graphical symbols and signs. Code of practice for escape route signing
- 11.16 BS 5499-5:2002. Safety signs, including fire safety signs. Signs with specific safety meanings
- 11.17 Health and Safety (Safety Signs and Signals) Regulations 1996. SI 1996 No. 341. The Stationery Office Limited. 1996
- 11.18 Safety Signs and Signals. The Health and Safety (Safety Signs and Signals) Regulations 1996. Guidance on Regulations. L64 (Third edition). Health and Safety Executive. 2015
- 11.19 BS 5906:2005. Waste management in buildings – Code of practice
- 11.20 BS EN 1125:2008. Building hardware. Panic exit devices operated by a horizontal bar, for use on escape routes. Requirements and test methods
- 11.21 BS 7157:1989. Method of test for ignitability of fabrics used in the construction of large tented structures
- 11.22 BRE report (BR 274). Fire Safety of PTFE-based Materials Used in Buildings. 1994
- 11.23 BS EN 12101-2:2017. Smoke and heat control systems. Specification for natural smoke and heat exhaust ventilators
- 11.24 BS EN 12101-3:2015. Smoke and heat control systems. Specification for powered smoke and heat exhaust ventilators (Fans)
- 11.25 BRE Report (BR 187). External fire spread. Building separation and boundary distances, Second edition. Building Research Establishment. 1991
- 11.26 BRE report (BR 135). Fire performance of external thermal insulation for walls of multi-storey buildings, Third edition. Building Research Establishment. 2013
- 11.27 BS 8414-1:2015+A1:2017. Fire performance of external cladding systems. Test method for non-loadbearing external cladding systems applied to the masonry face of a building
- 11.28 BS 8414-2:2015+A1:2017. Fire performance of external cladding systems. Test method for non-loadbearing external cladding systems fixed to and supported by a structural steel frame
- 11.29 Fire Performance of Green Roofs and Walls. ISBN: 978 1 4098 3997 2. Department for Communities and Local Government. August 2013
- 11.30 BS 9990:2015. Non automatic fire-fighting systems in buildings – Code of practice
- 11.31 BS 3251:1976. Specification. Indicator plates for fire hydrants and emergency water supplies
- 11.32 BS 476-3:2004. Fire tests on building materials and structures. Classification and method of test for external fire exposure to roofs (*incorporating Amendments Nos. 1 and 2*)
- 11.33 BS 476-4:1970. Fire tests on building materials and structures. Non-combustibility tests for materials
- 11.34 BS 476-8:1972. Fire tests on building materials and structures. Test methods and criteria for the fire resistance of elements of building construction (*withdrawn*)
- 11.35 BS 476-20:1987. Fire tests on building materials and structures. Method for determination of the fire resistance of elements of construction (general principles) (*Incorporating Amendment No. 1*)
- 11.36 BS 476-21:1987. Fire tests on building materials and structures. Method for determination of the fire resistance of loadbearing elements of construction
- 11.37 BS 476-22:1987. Fire tests on building materials and structures. Methods for determination of the fire resistance of non-loadbearing elements of construction
- 11.38 BS 476-23:1987. Fire tests on building materials and structures. Methods for determination of the contribution of components to the fire resistance of a structure (*Incorporating Amendment No. 1*)
- 11.39 BS 476-24:1987. Fire tests on building materials and structures. Method for determination of the fire resistance of ventilation ducts
- 11.40 BS EN 15650:2010. Ventilation for buildings. Fire dampers
- 11.41 BS EN 13501-1:2018. Fire classification of construction products and building elements. Classification using test data from reaction to fire tests.
- 11.42 BS EN 13501-2:2016. Fire classification of construction products and building elements. Classification using data from fire resistance tests, excluding ventilation services
- 11.43 BS EN 13501-3:2005+A1:2009. Fire classification of construction products and building elements. Classification using data from fire resistance tests on products and elements used in building service installations: fire resisting ducts and fire dampers
- 11.44 BS EN 13501-5:2016. Fire classification of construction products and building elements. Classification using data from external fire exposure to roofs tests
- 11.45 BS 5306-8:2012. Fire extinguishing installations and equipment on premises. Selection and positioning of portable fire extinguishers – Code of practice

- 11.46 BS 7273-4:2015. Code of Practice for the operation of fire protection measures. Actuation of release mechanisms for doors
- 11.47 BS EN 12845:2015. Fixed firefighting systems. Automatic sprinkler systems. Design, installation and maintenance
- 11.48 BS 8519:2010. Selection and installation of fire-resistant power and control cable systems for life safety and fire-fighting applications – Code of practice
- 11.49 Health Technical Memorandum 05-02 Guidance in support of functional provisions for healthcare premises. The Department of Health 2015
- 11.50 Health Technical Memorandum 05-03: Part B. Fire detection and alarm systems. The Stationery Office, 2006.
- 11.51 BS 6180, Barriers in and about buildings – Code of practice
- 11.52 BS EN 81-72, Safety rules for the construction and installation of lifts – Particular applications for passenger and goods passenger lifts – Part 72: Firefighters lifts
- 11.53 West Yorkshire Fire & Rescue Service, 2019. 'Fire Safety – Public Advice: Access for Fire Appliances'.

Approved Document B – Note regarding technical specifications

Where Approved Document B makes reference to a named standard or other guidance document, the relevant version of the standard is the one listed at the end of the publication, even where this standard has been superseded or replaced.

Therefore, the British Standards and other guidance documents referenced by this report are generally those referenced by the current publication of ADB (and not necessarily the most recent version of the standard / guidance document).

Newer versions may be used as a source of guidance provided that they continue to address the relevant requirements of the Building Regulations.

A1 Annex A1 - Drawings and information

A.1.1 The following information has been used in the preparation of this report:

Drawings

Table A1.1 - Drawings used in preparing this report

Reference	Title/ description	Rev.	Author
SG2-AHR-B2-LG-DR-A-20000	Lower Ground Plan	P6 S1	AHR Architects Ltd.
SG2-AHR-B2-00-DR-A-20000	Ground Floor Plan	P6 S1	AHR Architects Ltd.
SG2-AHR-B2-01-DR-A-20000	First Floor Plan	P8 S1	AHR Architects Ltd.
SG2-AHR-B2-02-DR-A-20000	Second Floor Plan	P7 S1	AHR Architects Ltd.
SG2-AHR-B2-03-DR-A-20000	Third Floor Plan	P6 S1	AHR Architects Ltd.
SG2-AHR-B2-04-DR-A-20000	Fourth Floor Plan	P8 S1	AHR Architects Ltd.
SG2-AHR-B2-05-DR-A-20000	Roof Plan	P6 S1	AHR Architects Ltd.
SG2-AHR-P2-00-DR-A-90000	Site Location Plan	P2 S1	AHR Architects Ltd.
SG2-AHR-B2-XX-DR-A-20100	Elevations	P5 S1	AHR Architects Ltd.

Information

- A.1.2 Civil and Structural RIBA 2 Report (Draft), Curtins, Ref: SG2-CUR-B2-XX-RP-S-00001-P03, Issued: 7th July 2023, Rev: P03.
- A.1.3 Architecture Design Reports, AHR Architects Ltd., Ref: PS2021-003-Lot1, Issued: April 2023
- A.1.4 Meeting Minutes from Design Team Meeting Nr 2 on the 12th of July 2023 at 10am, University of Huddersfield – Southgate 2

A2 Annex A2 - Means of escape calculations

A.2.1 This Annex sets out the analyses of the exit and stair capacities for the building.

Occupant numbers

Table A2.1 – Occupancy numbers

Area	Floor space factor (m ² /person)	Covers	Occupancy (persons)
Ground Floor			
NHS Demise			
Reporting Room (11.92m ²)	N/A	2	2
Lung Function & Spiro (20m ²)	N/A	N/A	4
Consult/Exam 1 (15m ²)	5.0	N/A	3
Consult/Exam 2 (15m ²)	5.0	N/A	3
Consult/Exam 3 (15m ²)	5.0	N/A	3
Consult/Exam 4 (16m ²)	5.0	N/A	4
Consult/Exam 4 (16m ²)	5.0	N/A	4
Staff Hot Desks (17m ²)	N/A	4	4
Staff Beverage Snack Prep (16m ²)	7.0	N/A	3
Recovery Bay & Shared Discharge Lounge (24.6m ²)	1.0	N/A	25
MRI Tech Room (22.88m ²)	6.0	N/A	4
MRI Control (12.77m ²)	N/A	3	3
Preparation/ Cannulation Room (8m ²)	N/A	2	2
Waiting area (154.79m ²)	1.0	N/A	155
Phlebotomy (30.87m ²)	5.0	N/A	7
POCT test (9.05m ²)	5.0	N/A	2
Clean Utility (12m ²)	7.0	N/A	2
Counselling (7.79m ²)	N/A	2	2
Viewing/Imaging (12m ²)	N/A	2	2
General & Chest X-Ray	N/A	2	2

Area	Floor space factor (m ² /person)	Covers	Occupancy (persons)
CT Sub Wait (15.92m ²)	N/A	8	8
CT Control Room (12.1m ²)	N/A	2	2
CT Scanner (33.94m ²)	N/A	1	1
CT Tech Room (5.38m ²)	6.0	N/A	1
Dirty Utility (9.97m ²)	7.0	N/A	2
Cannulation (7.91m ²)	N/A	2	2
IT Hub (10.61m ²)	6.0	N/A	2
Storage spaces (40.75m ²)	30.0	N/A	2
Cleaner (6.87m ²)	7.0	N/A	1
Total Occupancy (Ground Floor - NHS)			257
Ground Floor UoH Demise			
Reception/Waiting (43.22 m ²)	1.0	N/A	44
Total occupants (Ground Floor - UoH)			44
First Floor			
Acute Ward (131.85 ²)	-	16 ¹	16
Observation Room (9.2m ²)	5.0	-	2
Academic Hot Desks (57.77m ²)	-	31	31
PACS Lab 2 (80.84 m ²)	-	30	30
Large Classroom (161.68m ²)	-	75 ²	75
PACS Lab 1 (80.84)	-	30	30
Observation (8.28m ²)	5.0	-	2
Observation (8.29m ²)	5.0	-	2
Control (11.54m ²)	6.0	-	2
Observation (8.28m ²)	5.0	-	2
X-Ray (52.71m ²)	-	1	1

¹ Assuming 3 persons attending each simulated patient.

² Occupancy based on 25 persons per individual classroom each separated by a retractable partition i.e. 75 persons in total.

Area	Floor space factor (m ² /person)	Covers	Occupancy (persons)
Ultrasound (54.54m ²)	-	3	3
CT lab (54.54m ²)	-	1	1
Briefing Room (13.07m ²)	-	2	2
Meeting (17m ²)	-	8	8
Meeting (17m ²)	-	8	8
Breakout space (63.59m ²)	0.7	N/A	91
Total occupants (First Floor)			306
Second Floor			
Clinical Skills – Dental Health (209.87 m ²)	N/A	66 ³	66
Waiting and reception (34.56m ²)	1.0	N/A	35
Dirty Room (14.09m ²)	7.0	N/A	3
Clean Room (25.22m ²)	7.0	N/A	4
Technicians Space (95.03m ²)	6.0	N/A	16
Comms Rooms (total 16.82m ²)	30	N/A	1
Storeroom (24.82m ²)	30	N/A	1
Phantom Head Lab (80.84m ²)	-	23	23
Large Classroom (161.68m ²)	-	75 ⁴	75
Breakout (62.57m ²)	1.0	N/A	63
Phantom head Lab (80.84m ²)	-	23	23
Total occupants (Second Floor)			310
Third Floor (Fallow Floor)			
Fallow floor area (852.29m ²)	N/A	N/A	-
Fourth Floor (Innovation 3M occupied)			
Event Space; including Café-style Island (85.25m ²)	N/A	66 ⁵	66

³ Assumed 3 persons per bay.

⁴ Occupancy based on 25 persons per individual classroom each separated by a retractable partition i.e. 75 persons in total.

⁵ 64 covers plus two speakers assumed.

Area	Floor space factor (m ² /person)	Covers	Occupancy (persons)
Lab 1 (60.17m ²)	5.0	N/A	13
Lab 2 (62.07m ²)	5.0	N/A	13
Lab 3 (30.19m ²)	5.0	N/A	7
Lab 4 (30.19m ²)	5.0	N/A	7
Lab 5 (30.19m ²)	5.0	N/A	7
Lab 6 (30.19m ²)	5.0	N/A	7
Lab 7 (66.53m ²)	5.0	N/A	14
Maker Space (36.74m ²)	5.0	N/A	8
Office A (25.58m ²)	N/A	4	4
Large Meeting (34.62m ²)	N/A	12	12
Office B (27.17m ²)	N/A	6	6
Office C (15.01m ²)	N/A	2	2
Office D (25.27m ²)	N/A	6	6
Office E (15.01m ²)	N/A	2	2
Office F (20.53m ²)	N/A	4	4
Large Meeting (53.65m ²)	N/A	18	18
Reception/ Breakout space (14.54m ²)	0.7	N/A	21
Rentable workspaces (50.59m ²)	-	30	30
Total occupants (Fourth floor)			247
Total occupants (excluding third floor)			1120
Total occupants (excluding ground and third floor)			863

Capacity of horizontal and storey exits

A.2.2 The capacity of horizontal and storey exits have been calculated on the basis that the largest exit is blocked by fire and is therefore unavailable.

A.2.3 Exit capacities have been calculated on the following basis:

Table A2.2 – Capacity of escape routes

Maximum number of persons	Minimum clear width (mm)
60	750
110	850
220	1050
more than 220	5mm per person

Lower Ground Floor

A.2.4 The lower ground floor consists of predominantly plant areas and is expected to be occupied for maintenance purposes only. There are external doors on the majority of the plant rooms, an exit direct to outside at grade level and access upwards to ground floor level via the east core escape stair. Based on the minimal quantity of people, the exit capacity is expected to be sufficient for the anticipated population.

Ground Floor

Table A2.3 – Ground floor exit capacity.

MOE	Width (mm)	Capacity (persons)
Ground Floor (NHS demise)		
Main entrance	1,100	220
West Elevation	1,400	280
East Elevation	1,600	320
Total (after discounting)		500

A.2.5 After discounting the largest exit on the east elevation there is exit capacity for 500 persons on the ground floor. This is sufficient for the calculated design occupancy for the CDC area of 257 persons.

A.2.6 The means of escape from the University of Huddersfield demise is 1100mm wide. The reception area has a calculated design occupancy of 44 persons and therefore a single inward opening door is sufficient for the maximum calculated population.

First to Fourth Floor

A.2.7 The first to fourth floors all have two storey exits MOE-01 and MOE-02 as shown above in Figure A2.2.



Figure A2.1 – First to Fourth floor exit provision

Table A2.4 – Capacity available

MOE	Width (mm)	Capacity (persons)
First Floor to Fourth Floor		
MOE-01	1,700	340
MOE-02	1,700	340
Total (after discounting)		340

A.2.8 After discounting the largest exit which is MOE-02, there is exit capacity for 340 persons on each upper level. The largest occupancy is the second floor with a calculated occupancy of 309 persons. The storey exit width is sufficient for the anticipated population at each storey.

A.2.9 The storey exit should be equal to the stair width on the upper storey levels. Please see Paragraph 4.41.

A.2.10 It should be noted that if the storey exit is reduced to 1,400mm, as per Para 4.41, there would not be sufficient capacity for the maximum calculated occupancy. There would be capacity for the maximum design occupancy confirmed by the Project Architect (approximately 130 persons per storey) but not the ADB calculated occupancy (this would need 1,550mm doors and stairs).

Capacity of escape stairs

A.2.11 The building has been designed on the basis of simultaneous evacuation and therefore the stair capacity has been evaluated on the basis of Table 3.2 of ADB as follows:

Table A2.5 – Escape stair capacity

Stair reference	Stair width (mm)	No. of floors served	Capacity provided
East Stair	1400	4	445
West stair	1400	4	445
Total vertical escape capacity	890		

A.2.12 As per, Section 4.24, a staircase does not need to be discounted as they are served by protected lobbies. Therefore, the capacity of the East Stair and West stair is 445 people each i.e. 890 persons in total.

A.2.13 The stair capacity is sufficient for the anticipated occupancy whether based on the calculated occupancy (excluding Level 3) or the Architect's confirmed design occupancy. It should be noted that on the basis of the calculated occupancy the residual stair capacity will limit the occupancy of Level 3 to 30 persons.

A.2.14 Note that wider exits and corridors may be necessary to satisfy Part M of the Building Regulations.

A3 ▶ Annex A3 - Unprotected area calculations

A.3.1 The allowable unprotected areas have been assessed using the enclosing rectangle method of BRE report BR 187^{11.25}.

A.3.2 The tables below show the worst case allowable unprotected area for the largest compartment on each elevation, either at ground floor (below the compartment floor separating ground and first floor) or the upper storeys above it.

Fire resistance of external walls

A.3.3 All external walls will be located more than 1m from the relevant boundary and so will be of fire-resisting construction providing 60 minutes integrity and 15 minutes insulation when tested from the internal face of the building, with the exception of allowable unprotected areas (see assessment above). Allowable unprotected areas need not be provided with any specific level of fire resistance (e.g. windows that are allowable unprotected areas may be glazed with non-fire-resisting glass).

Boundaries

A.3.4 The unprotected area evaluation is detailed below. Where the boundary distance is measured to a notional boundary, the distance is given the suffix (N); the suffix (S) is given if the distance measured is to a site boundary or centre of a road.

Heat Flux

A.3.5 The guidance in BR 187 provides two values for the emitter radiation intensity to be used for the assessment of UPA: 168kW/m² and 84kW/m² corresponding to a 'standard' and 'reduced' fire load density, respectively.

A.3.6 BR 187 states that the appropriate value to use is given in the national building regulation guidance depending on the Purpose Group or class of the occupancy.

A.3.7 However, the current edition of ADB no longer provides such recommendations. Therefore, the emitter radiation intensity adopted for the assessment has been based upon the values implicit in the calculation tables in BR 187 – i.e. 84kW/m² for the assembly and recreation compartments.

Sprinklers

A.3.8 Except for the MRI Suite, the building will be fitted throughout with a sprinkler system in accordance with Appendix E to ADB and so in relation to space separation calculations (except for elevations adjacent to the MRI Suite), either of the following is permitted:

- ▶ The boundary distance can be halved, to a minimum distance of 1m.
- ▶ The amount of unprotected area can be doubled.

A.3.9 The tables overleaf indicate where either of the above have been altered as a result of the provision of sprinklers.

Design Team Note: The extent of what constitutes protected / unprotected areas on the east and south elevation is Tenos' interpretation and must be reviewed and reconfirmed with the Project Team at RIBA Stage 4 when the detailed design and specification of the external walls has been concluded.

Table A3.1 - Evaluation of allowable unprotected areas on ground level

Elevation	Heat Flux (kW/m ²)	Boundary distance (m)	Dimensions of elevation / compartment (h x w) (m)	Enclosing rectangle (h x w) (m)	Allowable % of UPA within enclosing rectangle	Compliant?
North	84	16.5 (S)	5 x 53.0	3.4 x 35	100%	YES
East	84	5.05 ^A (N)	5 x 25.7	3.4 x 19.7	100%	YES
East (MRI Suite)	84	5.05 ^A (N)	5 x 15.5	- ^B	-	YES
South (NHS demise)	84	7.0 (S)	5 x 35	3.4 x 35	100%	YES
South (UoH demise)	84	7.0 (S)	5 x 7.7	3.4 x 7.7	100%	YES
West	84	8.6 (N)	5 x 15.6	3.4 x 15	100%	YES

^A Notional boundary taken as the mid-point between the façade of Southgate #2 and Southgate #3 site boundary

^B No openings in this section of the façade (except for small Quench Pipe penetration) and therefore an enclosing rectangle cannot be established.

Table A3.2 – Evaluation of allowable unprotected areas on upper levels

Elevation	Heat Flux (kW/m ²)	Boundary distance (m)	Dimensions of elevation / compartment (h x w) (m)	Enclosing rectangle (h x w) (m)	Allowable % of UPA within enclosing rectangle	Compliant?
North	84	16.5 (S)	16.8 x 53.0	15.3 x 36.3	100%	YES
East	84	5.05 (N)	16.8 x 44.5	16.8 x 36.0	50.22% ^C	YES ^D
South	84	7.0 (S)	16.8 x 47.0	15.3 x 43.4	68.2% ^B	YES ^E
West	84	8.6 (N)	16.8 x 18.0	16.8 x 10.2	98.69%	YES ^F

^C Percentage of allowable UPA shown has been doubled due to the provision of a suitably designed sprinkler system

^D Total area of enclosing rectangle is 604m². The actual area of UPA within the enclosing rectangle is currently 300m² and is therefore 50% of the area of the enclosing rectangle and therefore compliant.

^E Total area of enclosing rectangle is 664m². The actual area of UPA within the enclosing rectangle is currently 451.2m² and is therefore 68% of the area of the enclosing rectangle and therefore compliant.

^F Allowable % of UPA within enclosing rectangle shown may be doubled due to the presence of a life safety sprinkler system and therefore compliant.

A.3.10 The above figures assume that compartment floors are provided separating lower ground from ground and ground from first floor levels. These floors will be constructed as a fire-resisting compartment floor as described in section 6 of this report.

A4 Annex A4 - Fire protection systems

Fire doors

- A.4.1 Fire doors should be specified in accordance with the recommendations of Appendix C of ADB. For initial guidance some of the key recommendations are summarised below.
- A.4.2 All fire doors should satisfy the appropriate fire resistance criteria in accordance with BS EN 13501-2^{11.41}. For example, doors satisfying these criteria for 30 minutes fire resistance would be designated FD30 or E30 respectively.
- A.4.3 Doors protecting escape routes also need to restrict smoke leakage. A suffix (S) is added to denote compliance with national tests for smoke leakage and (Sa) for compliance with the European system. For example doors satisfying the smoke leakage criteria and providing 60 minutes fire resistance would be designated either FD60S or E60Sa.
- A.4.4 The test evidence used to substantiate the rating of a door should be checked to ensure that it is applicable to the whole installed assembly.

Closers

- A.4.5 All fire doors should be fitted with self-closing devices or automatic release devices except for fire doors to cupboards and service shafts that will normally be kept locked shut.
- A.4.6 Where fire doors serve protected stairways that are part of primary circulation routes, the doors should be fitted with an automatic release mechanism.

Automatic release and unlocking arrangements

- A.4.7 Where the fire strategy refers to electrical control arrangements that unlock, release or open doors in the event of fire, the design, installation, commissioning and maintenance of these arrangements should comply with the appropriate recommendations of BS 7273-4^{11.46}.

Signage

- A.4.8 Except for lift landing doors, doors to and within flats, and bedroom doors in Purpose Group 2b (residential (other)) premises, all fire doors should be marked with the appropriate fire safety signs complying with and BS 5499-5^{11.16} according to whether the door is to be:
 -  kept closed when not in use;
 -  kept locked when not in use;
 -  held open by an automatic release mechanism.
- A.4.9 Fire doors to cupboards and service ducts should be marked on the outside and all other fire doors should be marked on both sides.

Fire-resisting construction

- A.4.10 The fire resistance performance of a building element in a fire resistance test is specified in terms of the following criteria:
 -  **Resistance to collapse** (loadbearing capacity). This applies only to loadbearing elements such as beams, columns, floors and loadbearing walls.
 -  **Resistance to fire penetration** (integrity). This applies to separating elements such as compartment walls and doors, and indicates the length of time taken before the element is penetrated by significant gaps or flames.

-  **Resistance to heat transfer** (insulation). This indicates the length of time taken before a specified temperature is reached on the unexposed (cold) face of the element.

- A.4.11 A compartment floor would need to satisfy all three criteria for the specified period whereas a door is normally only assessed in terms of its integrity performance.
- A.4.12 Fire-resisting glazing must always satisfy the integrity criterion but does not always need to meet the insulation criterion.
- A.4.13 Glazing in compartment walls should satisfy both the integrity and insulation criteria for the specified period of fire resistance. However, where glazed screens provide protection to escape routes, uninsulated glazing may be acceptable in limited areas. Guidance on the use of uninsulated glazing protecting escape routes is given in Table B5 of ADB.
- A.4.14 The fire resistance of various forms of construction is classified in terms of European tests or National (British Standard) tests.
- A.4.15 In the European system products are classified in accordance with BS EN 13501-2^{11.41}.

Sprinklers

- A.4.16 Sprinkler systems should comply with Appendix E of ADB and the recommendations of BS EN 12845^{11.47} for the relevant occupancy. The sprinkler system should incorporate the additional measures to improve system reliability and availability, which include:
 -  subdivision into zones with a maximum area of 2400m² per zone;
 -  electronic valve monitoring of each zone;
 -  wet pipe systems only;
 -  quick response heads (normally);
 -  duplicate installation control valve sets;
 -  duplicate water supplies.
- A.4.17 Where the design includes variations from the above code the sprinkler contractor may be unable to issue a certificate of conformity.

Fire detection and alarm systems

- A.4.18 Fire detection and alarm systems should comply with BS 5839-1^{11.10}.
- A.4.19 The extent of detector coverage is determined by the category of system. Life safety systems are subdivided into different system types depending upon the extent of detector coverage:
 -  L1 Detectors installed throughout all areas of the building.
 -  L2 Includes areas covered by an L3 system plus full coverage of specified higher risk rooms.
 -  L3 Includes the areas covered by an L4 system plus additional detectors in the rooms opening onto escape routes adjacent to the doors onto those escape routes.
 -  L4 Detectors installed within all escape stairways, corridors and other areas forming common escape routes.
 -  L5 Systems in which the protected area(s) and/or location of detectors are designed to satisfy a specific fire safety objective (with coverage different from categories L1 to L4). The extent of coverage may be more or less than in the other categories.
- A.4.20 Detector spacing will vary according to room and ceiling geometry but typically under a flat ceiling smoke detectors should be located so that any point within a room is within 7.5m of a smoke detector or 5.3m of a heat detector.

Emergency lighting

- A.4.21** Emergency lighting should be installed in accordance with the recommendations of BS 5266-1^{11,13}.
- A.4.22** The primary purpose of emergency lighting is to illuminate escape routes and safety equipment.
- A.4.23** Specific recommendations are given in Table 5.1 of ADB but an emergency lighting system would typically cover the following areas:
- ▶ exit doors;
 - ▶ escape routes;
 - ▶ areas immediately outside final exits; and external escape routes;
 - ▶ emergency escape signs;
 - ▶ stairways;
 - ▶ open plan areas of more than 60m;
 - ▶ changes in floor level;
 - ▶ windowless rooms;
 - ▶ all areas open to the public;
 - ▶ toilet accommodation over 8m²;
 - ▶ emergency control room;
 - ▶ electrical generator, switchgear and battery rooms.
- A.4.24** It is recommended that units with a standby power duration of 3 hours be utilised as this will often enable reoccupation of the building immediately after a power failure.

Electrical power supplies

- A.4.25** Where it is essential for certain electrical equipment to continue to function during a fire, provisions should be made to ensure a secure supply on a protected circuit.
- A.4.26** Guidance on the selection and installation of protected circuits is given in BS 8519^{11,48}, which makes reference to the performance recommendations in related standards, e.g. BS 5839-1 for fire alarm systems, BS 5266-1 for emergency lighting, and others.
- A.4.27** The key criteria for power supply systems to fire alarms, emergency lighting, fire extinguishing systems, sprinkler systems, firefighting shaft systems, firefighting and evacuation lifts, motorised fire shutters, and data communications systems that link fire safety systems are outlined below but reference should be made to BS 8519 for detailed guidance.

Protected circuits

- A.4.28** Protected circuits should meet the following criteria:
- ▶ Cables should:
 - at least meet the requirements of PH30 classification when tested in accordance with BS EN 50200:2015 (incorporating Annex E), or an equivalent standard;
 - be protected against exposure to the fire by:
 - only passing through routes of negligible fire load or;
 - separation from any significant fire risk by a wall, partition or floor with a fire resistance not less than that required for the building;
 - be protected from mechanical damage;
 - be supported by non-combustible support systems.
 - ▶ Protected circuits should be separate from any circuit provided for any other purpose.

Secondary power supply

- A.4.29** A secondary power supply should be provided for all life safety systems, e.g.:
- ▶ an automatically starting generator; or
 - ▶ a supply from another substation; or
 - ▶ back-up batteries (where the power demand for a system is low).
- A.4.30** The secondary supply should provide power within 15s of failure of the primary supply and be of sufficient capacity to maintain all life safety systems in operation for a minimum of 3 hours.
- ▶ The electrical power supply to life safety and fire protection equipment should be separate from all other circuits in the building so that the failure of other equipment does not render the installation inoperative.
 - ▶ Each connection to the power supply should be via an isolating protective device reserved solely for the life safety and fire protection equipment and independent of any other main or sub-main circuit. Such isolating protective devices (with high-rupturing safety devices) should be clearly labelled and identified as to their purpose. They should be secured against unauthorized operation and should, except for maintenance, be kept locked on.
 - ▶ The supply to these isolating protective devices should be independent of the main switch for the building and be appropriately labelled.
 - ▶ The distribution should be so organised that the secondary supply remains live when the remainder of the building supplies are isolated in an emergency.
 - ▶ The primary and secondary sources of power should be protected against fire and water damage. They should be separated from each other, so that a failure of one system does not affect the other.
 - ▶ Cables, switchgear and other equipment transmitting the secondary power supply should be separated from those of the primary supply.
 - ▶ Monitoring facilities should be provided in the central control room (when provided) to show that power is available up to the final control point, e.g. motor contactor, for all fire safety systems.

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