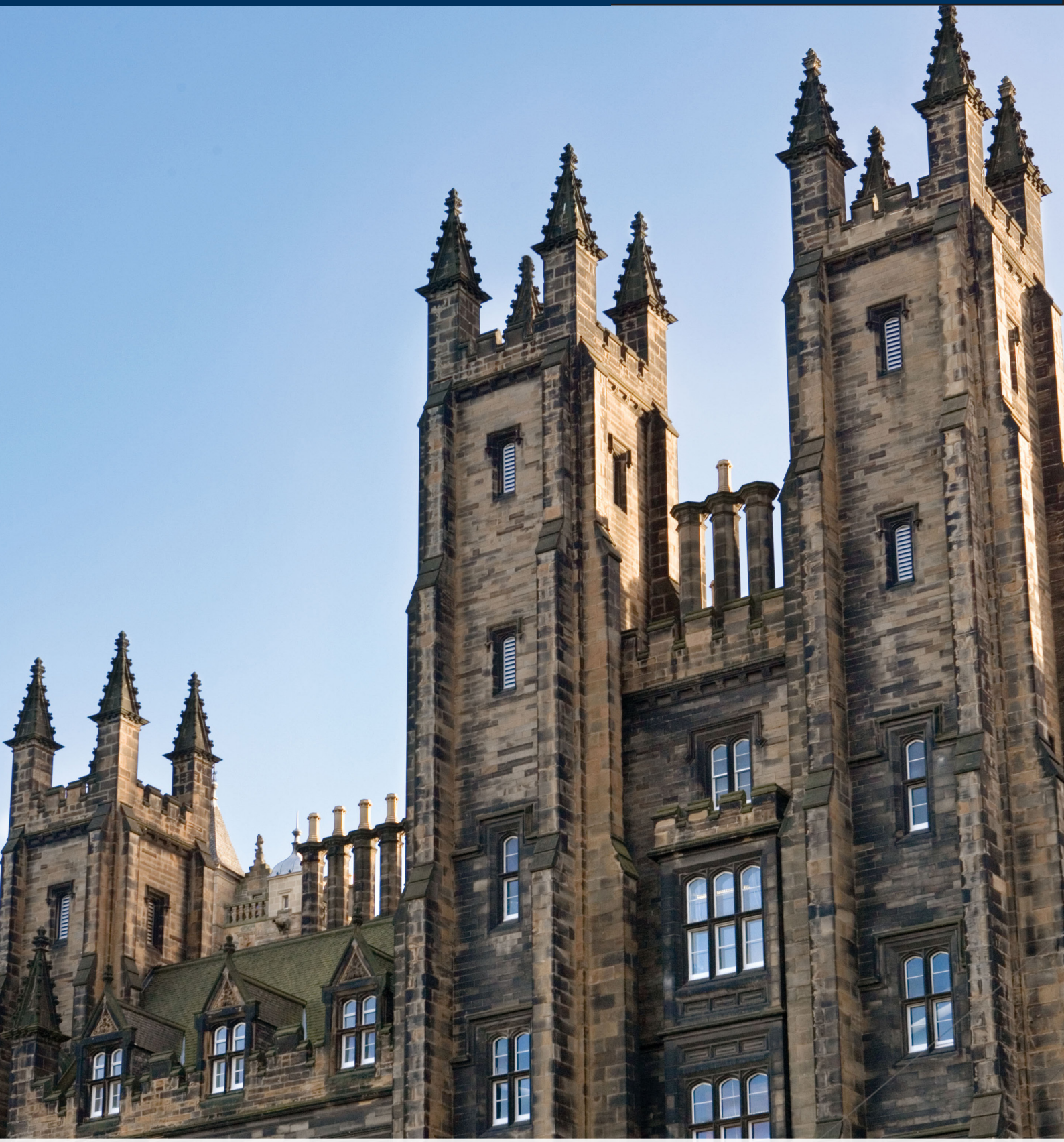
THE UNIVERSITY of EDINBURGH
Estates Department



Estates Design Guideline No. 9

Fire Safety Management

Important Comment on Estates Design Guidelines, Assets & Standards
These Design Guidelines, Assets and Standards and the associated suite of documents have been produced in order to furnish external design consultants and contractors with guidance on required University standards for inclusion within their proposed project design. These guidelines are to be used as supplementary information during project design stage, and as such, detail the minimum standards expected from the University Estates Department. Please note, these guidelines do not absolve the project design team including, sub-consultants and sub-contractors of their legal and contractual obligations under, design liability, statutory regulations and health and safety legislation.

Estates Design Guidelines (Assets & Standards) No. 9: Fire Safety Approval Procedure	
Estates Design Guidelines (Assets & Standards) No 9 -Fire Safety Lead : Fire Risk Management Group	Name Signed Off Date
Estates Design Guidelines (Assets & Standards) No 9 Fire Safety - Equality Check Lead: Fire Risk Management Group	Name Signed Off Date
Estates Design Guidelines (Assets & Standards) No 9 Fire Safety check and approval – Director of Estates Operations	Name Signed Off Date
Estates Design Guidelines (Assets & Standards) No 9 Fire Safety approval by EMG and Health and Safety Committee	Name Signed Off Date
Estates Design Guidelines (Assets & Standards) No 9 -Fire Safety approval by Estates Committee	Name Signed Off Date
Estates Design Guidelines (Assets & Standards) No 9 -Fire Safety sign off by Duty Holder	Name Signed Off Date
Estates Design Guidelines (Assets & Standards) No 9 -Fire Safety Future review date Sign off by Responsible Person (Policy)	Name Signed Off Date

Version Control for Estates Design Guidelines (Assets & Standards) No 9: Fire Safety

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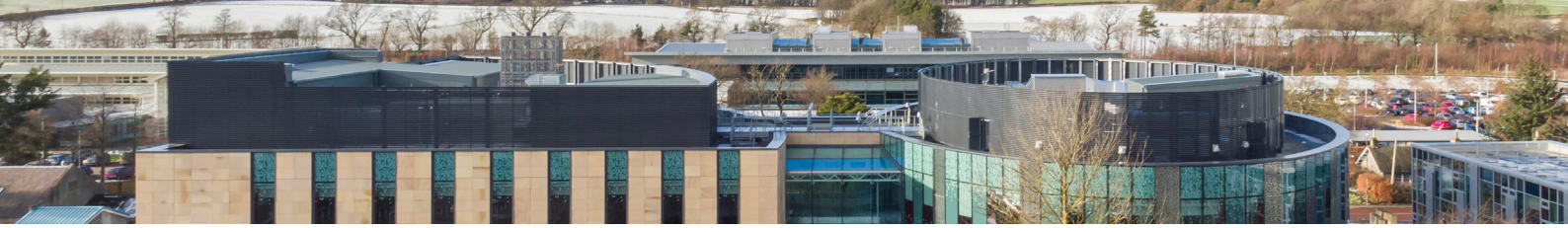

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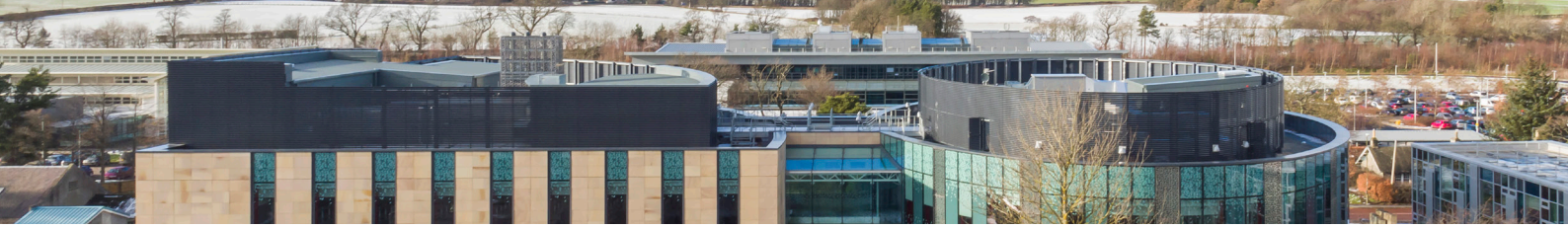

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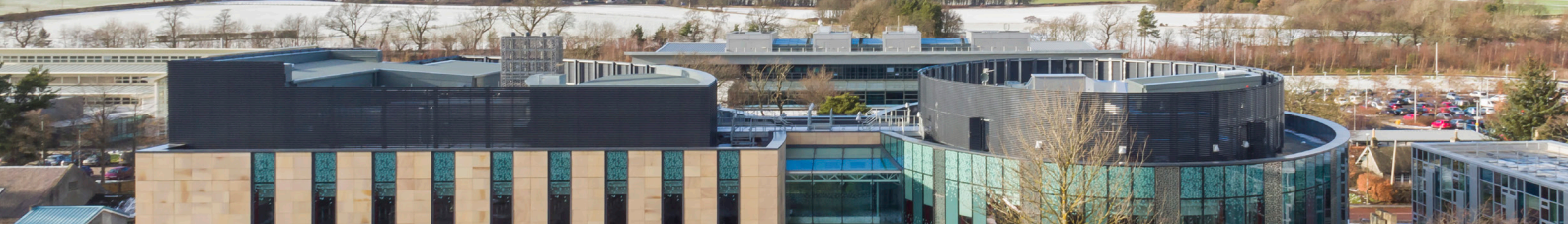

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1.0 Introduction

The UoE Design Guidelines (as a whole), have been developed for employees of the UoE, Design Teams, Architects, Engineers, Project Managers, external consultants and contractors. This documentation has been developed to enable Design Teams and Contractors to have a broad understanding of the principles that the University of Edinburgh will require to be adopted for any future developments.

The guide is primarily designed to be used in conjunction with Royal Institute of British Architects (RIBA) stages. The actual extent and scope of the design guide to be incorporated for any future development will be based upon the specific project requirements.

The UoE Design Guidelines aim to discuss strategic matters and does not provide an exhaustive treatment of statutory or best practice design and compliance requirements; its primary purpose is to establish a starting point for design briefs, support the consultation process and outline existing assets and standards. It is the responsibility of Design Team readers/duty holders to ensure subsequent designs are complete, compliant and able to meet the final approved brief when measured in use.

1.1 Important Notice – Essential Prior Reading

It is essential for readers of this document to first refer to Design Guideline No.1 entitled *"Estates Design Guidelines (Assets & Standards) Introduction and Application"*, which serves to provide the principles and overview with vital information and context that will apply to all projects.

1.2 Purpose of the University of Edinburgh Estates Design Guidelines (Assets and Standards)

The purpose of the Estates Guidelines is to act as a briefing document to give designers an overview of the minimum design requirements, constraints and challenges presented by the University of Edinburgh's particular needs. It applies to all new-build, refurbishment, minor works and change of use projects, including property leased by the University, controlling quality in the production of designs, specifications and the subsequent performance of buildings, developed to a consistently high standard and ensuring continuity throughout the University Estate.

The University of Edinburgh encourages innovation; however, all project Design Teams should ensure that their proposed projects have end user considerations and ease of maintenance at its core.

The use of the University of Edinburgh Estates Guidelines, Assets and Standards will not take the place of, or remove, any of the professional responsibility from Design Teams and Contractors to fully comply with the requirements within this document. Given the complex, diverse and growing estate, not all eventualities can be fully defined within this document.

Should any projects deviate from these guidelines, a technical submittal outlining the deviation, reason why and impact to the University maintenance strategy should be prepared and forwarded to the nominated University project representative for liaison with the Building Services Group (BSG).

A review of this deviation shall be carried out by the BSG; a final decision on the deviation shall be communicated to the appropriate design/construction team.

1.3 Interpretation of UoE Estates Design Guidelines, Assets and Standards

The Estates Design Guidelines, Assets and Standards are required to be issued with all project contractual documentation in order to inform project design and construction teams of expected standards to ensure quality continuity across its Estate.

Glossary of Terms:

1.3.1 Enforced Requirements

The use of the word(s) ‘shall’, ‘are required’, ‘is required’ ‘must’ or ‘will’ denotes a requirement that is non- negotiable and shall be used as the basis for designs, technical submissions and/or activities. If such a statement conflicts with a statutory obligation then a technical submittal shall be issued to the University project representative for liaison with the BSG for their final decision regarding compliance with the documentation.

1.3.2 Requirements Needing Confirmation

The use of the word ‘may’ denotes a negotiable requirement or indication of a solution, where innovation and further calculation, design and discussion may be required to arrive at an optimised solution.

1.3.3 Quality

The Design Guide aims to arrive at the University of Edinburgh’s highest design aspirations and standards. It may be that, at the University of Edinburgh’s sole discretion, solutions are value managed and then value engineered during subsequent design iterations. Design Teams and Contractors are encouraged to consider where value management and subsequent value engineering may result in an improved financial performance should funding constraints occur. All mechanical and electrical value management and value engineering exercises carried out shall be forwarded to the BSG for review.

1.3.4 Assets and standards

The Design Guidelines endeavours to set out Assets and Standards that will maximise the benefits realisation for the UoE to achieve its strategic objectives and maximise value for money. This will involve coordinated and optimised planning in conjunction with Procurement, robust asset selection with particular reference to existing legacy assets and standards on the University Estate, for reasons of utilisation and continuity of maintenance, replacement of parts, renewal and ultimate disposal.

1.3.5 Currency of Third Party Documents

Where superseded standards and regulatory documents are referred to in the text, the reader shall apply current revisions and amendments to their project. Should there be any ambiguity, the BSG should be contacted for clarity.

1.3.6 Proof

Where the word ‘proof’ is used, e.g. ‘proof is required’, a written report or installation certificate must be produced for approval depending on context.

1.4 Review Design Data Process (RDD)

All proposed designs shall be submitted to the Project Manager, respective Estates Teams and Building Services Group for review and comments, the response will be categorised as follows:

A. Design Team to acknowledge comments and continue to develop the design to the next stage.

B. Design Team to acknowledge comments and update the design in accordance with comments and resubmit for consideration before proceeding to the next stage.

C. Design Team to acknowledge comments and completely review and update the design in accordance to the agreed design principles and resubmit for consideration before proceeding to the next stage.

In addition to the above, the UoE may request specific technical submission to support the RDD and may include the request setting out with proof, e.g. calculations, drawings, etc.

The purpose of the RDD is to ensure designs meet the strategic requirements of the UoE and do not compromise the future operations and maintenance provision. The obligations owed by external architects, consultants and contractors to UoE and their liabilities to UoE is not in any way diminished or otherwise reduced by the RDD.

1.5 The Obligations Owed

By external Design Teams, consultants and contractors to University of Edinburgh and their liabilities to University of Edinburgh is not in any way diminished or otherwise reduced by the approval process. University of Edinburgh is not taking over the roles and duties of the external Design Teams, consultants and contractors who will remain legally responsible for the design and/or works carried out by them or on behalf of their staff, agents, sub- consultants and/or sub-contractors.

1.6 Version Control and Updates

The Estates Design Guidelines, Assets and Standards will be updated annually. The anticipated date of issue being January each calendar year. This is subject to change.

The version number will, using 2018 as an example, move from 2018 V1.0 at the end of January to 2019 V1.0 for the following year. The picture or colour of front cover of each new version will be changed to simplify referencing.

Any new or amended content is highlighted in yellow so readers can easily identify changes from previous versions. If there are no further revisions, a guidance note will accompany the issue.

1.7 Purpose of UoE Design Guideline No 9

The purpose of this document is to set out the guidelines and standards that apply to University of Edinburgh (hereby referred to as UoE) Estate and its design requirement for Fire Safety. This document will apply to newly constructed buildings and existing buildings, which are scheduled to be refurbished. In some cases, this standard exceeds the Building Regulation requirements, as it represents good practice in the Higher Education sector.

The Building (Scotland) Regulations set out to ensure that new buildings and works achieve the objectives of the Building (Scotland) Act 2003 in terms of health, safety, welfare, and convenience of persons; conservation of fuel, power; and sustainable development, and the purpose of this guide will be to provide a standard that is required by the UoE.

This document also seeks to make a link between Fire Safety legislation and Building Regulations in achieving Fire Safety Management to allow the Duty Holder and any appointed employee or contractor to understand the requirements of the UoE. The responsibility for complying with the Fire (Scotland) Act 2005 and the associated Fire Safety (Scotland) Regulations 2006 rests with the University Court

This UoE Design Guideline No 9 is for designers, engineers, specifiers, installers and commissioning and maintenance engineers of Fire Safety for UoE Estates from the Developed Design Stage (RIBA Stage 3) to when the building is in use (RIBA Stage 7).

- To align the requirements of the Scottish Buildings Standards Technical Handbook/ Building (Scotland) Regulations, fire safety legislation and the University. There is potential conflict between these as the Non –Domestic Technical Handbook /Building Regulations are generic and often prescriptive whilst fire safety legislation encourages creative solutions relative to actual use and management.

- To provide an indication of non-prescriptive preferred solutions and appropriate standards. The content is not a statement of requirements or intended to replace existing British or European technical standards or national guidance; reference to these will still be necessary. To facilitate high standards, best value and sustainability in terms of fire related issues in the design of buildings.

- If a Fire Safety aspect is not covered in these Fire Safety guidelines and standards, the relevant codes of practices, British Standards and building regulations are to be applied and followed. For any general and specific queries, advice is to be obtained from the FSU (Fire Safety Unit). In the event that documents referred to within this document, which have been superseded, the most recent versions are to be referred to. Any other doubts, concerns or points of clarification on Fire Safety matters are to be referred to the FSU.

- This document applies to all buildings managed or owned by the UoE. In any tenanted building, buildings works, adaptations or changes are prohibited to being carried out to any part of a building, which will potentially affect the Fire Safety aspects of that or any other building. Permission from FSU, (where the Duty Holder is The University Court), and the Landlord of the property or nominated agent and written in the respective lease and/or Licence for Works, must be sought.

- Where a building within the UoE estate, does not fall under the responsibility of the Principal, then the occupier will have a shared responsibility for meeting the statutory requirements concerning fire safety measures. Please refer to Fire Safety (Scotland) regulations 2006 (s21).

Any clarifications or exceptions regarding this document must be addressed to the FSU.

2.0 Legislation and best practice standards for reference

The University will comply with all relevant legislation and regulations relating to the design and structure of the building. Academic, administrative buildings and all residential property are subject to the requirements of the Fire Scotland Act (2005) and the Building Regulations (the latter only for new build and refurbishment projects).

In addition, residential accommodation, including Halls and Houses of Multiple Occupancy, are subject to the Housing (Scotland) Act 2006 and the Civic Government (Scotland) Act 1982. Further guidance relating to sleeping accommodation is also provided in the following publications from the Scottish Government:

- Small Premises Providing Sleeping Accommodation (Revised July 2010)
- Medium & Large Premises Providing Sleeping Accommodation (Revised February 2008)

Clubs and bars are subject to the conditions contained within the Licensing (Scotland) Act 2005.

Where reasonably practicable, the University will comply with national Codes of Practice and guidance relating to building design and fire safety management. This includes Approved Documents in support of the Building Regulations for new build and refurbishment projects (mandatory unless acceptable alternative means of meeting the requirements of the Building (Scotland) Act 2003 are identified and agreed with Building Control)

Scottish Buildings Standards Technical Handbooks – Section 2 - Fire, BS 9999 & Fire Engineering.

When carrying out any construction work (that is building work which requires an application under the Building Regulations), the requirements of those regulations must be met. There are, however, three different methods of meeting these requirements for the purposes of Fire Safety; Section 2 of the Scottish Buildings Standards Technical Handbook, BS 9999 2008 and BS 7479 (series) Fire Engineering.

Notifiable work occurs when work under Part 2 – Section 8 of the Building (Scotland) Act 2003 are carried out, for example, when a proposed building is constructed or an existing one is adapted or refurbished and then that work must be “notified” to a Building Control body. In all cases the works must comply with the requirements of the Building Regulations 2004, however as mentioned in paragraph 4a, there are three methods of meeting these requirements:

Complying with the Technical Standards is the simplest method of demonstrating compliance and shall be the adopted as the preferred first approach used when designing a new or refurbished building. This method entails following the guidance in Section 2 of the Scottish Buildings Standards Technical Handbooks (Non-Domestic), which involves following simple easy to use guidance and tables, which show acceptable methods for planning early warning, and means of escape, fire/smoke resistance and control, restricting fire spread, and access for the attending fire service.

Some situations are more complicated and a more flexible design approach is required, so if design compliance is difficult to achieve by using the method specified in the Scottish Buildings Standards Technical Handbooks, then the approaches defined in BS 9999 (2008) which can be adopted. Using the compensatory approach as defined in BS 9999 allows features such as high ceilings, detection and Fire Warning System/s and sprinklers to be used to increase acceptable travel distances or even decrease the size or numbers of exits or stairs.

If the specified design, can still not be achieved using the approaches defined in BS9999, then a Fire Engineered approach may be used, with reference to a suite of documents under the BS 7974 series which must only be used by a competent person. These standards allow detailed professional knowledge and judgement to be applied in order to develop a final design solution, which will satisfy projects that are more complicated.

However, a competent person must only undertake the application of these three methods and although some parts of buildings can be fire engineered and others may be considered in accordance with the Scottish Buildings Standards Technical Handbook or BS 9999.

Please note that these approaches must not be mixed and if an approach is applied to part of a building then the same approach shall be consistently applied to the whole building.

It will be up to the University of Edinburgh - Fire Safety Unit (FSU) in conjunction with Building Control to review which method may be used on a case-by-case basis.

Where an extension or refurbishment of a defined area is undertaken it must not be considered in isolation and all surrounding areas must be accounted for in the proposed design, in order that a material alteration for the purposes of the Building Regulations is not created, which may potentially adversely affect the fire protection arrangements in adjacent areas.

3.0 Design Consultation and Notification Process for Projects

Designers must plan for the fact that there are many circumstances specific to the University environment that may require variation from the national codes of practice or standards. This is often to take account of potential future changes of use, allow flexibility in the use of buildings, and provide premises suitable for a wide range of users and activities. The University standards may include specific provisions to cater for non-fire safety aspects, in particular special needs requirements under the Equality Act 2010 etc., to cater for visitors, or to ensure consistency of supply. In some circumstances, the University may specify higher standards than those set out in legislation, regulations and Approved Documents.

For these reasons, it is a requirement that the FSU must be consulted and invited by the Project Manager and Design Teams to comment on the building Fire Safety Strategy and design proposals at an early stage and throughout the Plan of Work stages. The FSU or other competent persons acting under the FSU and authorised to do so, must review the building Fire Safety Strategy at appropriate stages of the design and construction.

If any building or part of a building undergoes a change of use that might affect the fire risk or Fire Safety Strategy, the FSU **must** be consulted with, to ensure that the building fire risk assessment is reviewed and to confirm that the fire precautions remain appropriate.

The Scottish Building Standards Technical Handbook (Non-Domestic) and Building Regulations require a suitable and sufficient Fire Safety Strategy, but are generic and tend towards prescription. Fire safety legislation encourages creative solutions relative to the use and management of a building and the wider University estate.

In order to gain a clear understanding of the use of a building and the University's fire safety management practices, the selection of appropriate fire safety precautions at the design stage, a thorough consultation with key stakeholders is required i.e. Architect, Structural Engineer, M&E Engineers, Fire Engineers, University Estates Department and the FSU. The output of this process will mitigate unacceptable risk to students, staff and visitors, abortive work, and unacceptable on-going cost and managerial interventions.

Addressing issues at a late stage is likely to cause conflict, delay, additional expense or management burden, and have a negative impact on fire safety arrangements. Effective consultation shall ensure that the potential negative effects are mitigated, and improvements can be considered for inclusion. Consultation should not cause any delay and is likely to reduce cost and disruption.

Early and comprehensive consultation with the FSU is key to achieving effective fire safety standards, which are compliant with the relevant legislation. The FSU must be consulted on all fire related aspects from conception to completion, on a timely basis i.e. early stage schedule of accommodation complete with form, function and adjacencies. The Scottish Fire and Rescue Service (SFRS), Local Authority Building Control Officer, and other relevant persons must be consulted on a regular basis throughout the life of the project, in an open transparent manner.

4.0 Fire Safety Design Summary Development

The emphasis for fire safety design shall be on early detection, suppression and evacuation for the protection of life. The protection of property for business continuity, property of national or historic importance, property of high importance to the University, content of national or historic importance, content of importance to the University, and the environment shall also be considered.

Compliance with Approved Codes of Practice is expected where practical; however, BS 9999 and Fire Engineering may be used where appropriate. Any variation from simple compliance with Approved Codes of Practice will require full explanation in the Fire Safety Strategy and the Fire Safety Design Summary including any implications for future changes in design or use.

The category of use for academic buildings will normally be either ‘Education Premises’ or ‘Large Place of Assembly’; sleeping accommodation will normally be ‘Student Accommodation’ or ‘Hotel’.

The design shall address all of the fire related challenges present, including:

- Primary use, activities and function of the building must be fully known;
- Fire loading of the building in its potential operational state must be fully known i.e. including Furniture and fixed equipment;
- Multi use buildings often with content of national or historic importance;
- Common changes of use of space e.g. installation of IT, electrical equipment, telephone lines etc. frequently added to or changed, creating the potential for breaching fire compartmentation;
- Inflated and often unpredictable occupancy due to open public access and difficulty in controlling entry;
- Extensive range of users including disabilities, ages, cultures and religions, some with little English or appreciation of fire safety, who are often unfamiliar with the building;
- Frequent door wedging, use of corridors and common areas for displays etc. with no clear understanding of fire loading restrictions;
- Increased use of personal headphones, resulting in not hearing fire alarm sounders;
- Large student bodies often working unsupervised; and some anti-social behaviour including abuse of fire safety equipment, although not as prevalent as often anticipated.
- Increasing use of buildings and facilities on 24/7 basis

The following sections **must** be applied and are regarded as minimum standards for the University of Edinburgh.

5.0 Reaction in the Event of a Fire

5.1 Compartmentation – Provision (Please refer for more detail to NDTH Fire Section 2.1)

Whilst compartmentation is a requirement of the Building Regulations, it has the following additional benefits:

- It helps to prevent rapid fire and smoke spread within the building;
- It reduces the potential of fire spread, on the basis that big fires are more dangerous to occupants, fire and rescue personnel and other relevant persons.
- It helps to reduce the risk of total loss of a part or full building thus reducing the impact on business continuity.
- Provides the capacity for staged or progressive evacuation and Temporary Waiting Spaces.

The following features shall always be subject to compartmentation:

- Escape routes: protected or fire-fighting staircases; protected corridors for dead-end situations; where persons may be required to utilise some form of airlock or sterilisation system to make their escape.
- Vertically rising shafts that penetrate through horizontal compartmentation (lift shafts, service risers etc.)
- Walls common to two or more buildings or separate domains (tenants etc.).
- Areas where intended activity or content involves a high risk of fire i.e. sub-stations, switch rooms, plant rooms, workshops, laboratories, catering kitchens, etc.
- Voids above non-fire rated ceilings when these bridge compartment partitions, doors etc.
- Premises with a sleeping risk

The scope for specifying short/medium and long duration fire resistance may also be required for areas such as business critical areas, high value resources and high value collections

5.2 Sub-Compartmentation (Please reference NDTH Fire Section 2.1 for more detail)

In buildings where alternative staircases are provided for means of escape, there is a requirement to protect the stairs. The building materials used to protect and divide areas of floor space tend to provide a minimum of thirty minutes fire resistance.

Placing fire doors where two of these walls are opposite each other on the corridor can divide the space in half without causing additional extra cost. For layouts that are more complex this may take a little more design effort but the principle can be repeated.

Most University floor space can be classed in the purpose group for ‘Assembly and recreation, Shop and commercial’ where Building Regulations may allow a compartment size of 2000m^2. This is a substantial allowance such that a fire could effectively take out a large area. Sub-compartmentation of areas over 1000m^2 utilising the internal walls and corridors shall be considered.

5.2.1 Fire Doors – Application

Where there is a potential risk of breaches in compartments, due to fire doors being wedged in the open position, the application of approved hold open devices may be considered. The application of hold open devices shall be applied in conjunction with an interface unit connected to the fire detection and warning system. The provision for hold open devices must be reviewed in consultation with the FSU and confirmed in the Fire Safety Design Summary.

5.2.2 Penetrations

It must be accepted that as a building moves forward in its life span, there will be occasions where, for various reasons, penetrations will be made through a compartment wall. In general this shall be avoided if at all possible, but it is accepted that one of the main reasons for penetrations is the running of services and this must be addressed using appropriate proprietary systems.

It is therefore important to consider what passive fire protection can be included into fire compartmentation walls to pre-empt the need for future penetrations. The inclusion of devices such as fire sleeves to allow for the running of cables when installing fire compartment walls will provide the end user and future contractors with a quick and safe way of running cable through compartment walls.

Intumescent protection sleeves with internal smoke barriers shall be installed where cables pass through fire compartment walls. The size of the sleeve shall be of suitable size to allow for future extra cabling.

Where, during the process of refurbishing or upgrading existing buildings, the opportunity arises to inspect existing compartmentation, the compartmentation shall be inspected and any deficiencies made good as part of the upgrading or refurbishment works.

5.2.3 Vertical Service Shafts etc.

Medium Fire resistance (60 minutes) fire resisting compartmentation is required at all access points and where services leave shafts rather than at floor levels. Detection will normally be required at the top of service shafts, complete with remote LED indicator as required.

5.2.4 Ventilation, Ducts and Dampers

Ventilation ductwork shall be non-combustible. Ductwork shall be enclosed in a minimum of 30 minutes fire resistant material where present in an escape route. Automatic fire dampers shall be provided where they pass through fire separating elements. The integrity of those elements is to be maintained by using one of three basic methods:

- Method 1: Protection using fire dampers;

  Automatic fire dampers provided where the duct passes through fire resisting elements. There may be a requirement under the Scottish Buildings Standards Technical Handbooks/Building Regulations for these to be operated on activation of the fire warning and detection system. Safe and effective access for regular maintenance to these fire dampers must be provided together with identification e.g. asset tag.

- Method 2: Protection using fire resistant enclosures;

  The ventilation equipment is located in fire resisting enclosure with fire doors, and access is restricted.

- Method 3: Protection using fire-resisting ductwork

  Fire resisting ductwork with a minimum performance to match the penetrated element.

5.3 Means of Escape and Safe Egress

The UoE policy is to ensure all buildings are accessible to all users, including those who may have difficulty evacuating. Means of escape for such persons **must** be considered in the initial stages of the design process and development of the Fire Safety Strategy.

All escape routes shall be designed to enable self-evacuation of people with mobility impairments wherever practical: Steps shall be avoided; slopes of no more than 1:20 are acceptable. Any requirement for evacuation assistance or equipment shall be avoided where practical, however (where required) the preference of the type and manufacturer of evacuation chairs is to be reviewed with the FSU along with their locations.

Horizontal disabled escape routes into separate compartments may be considered as an alternative to vertical escape, where reasonably practical. For vertical evacuation, the project design team shall assess the need for an evacuation lift/s to be implemented into the project design based on the overall fire/evacuation strategy and risk profile of the building. Proposed evacuation lifts that do not meet the overall requirements of BS9999:2017, and in particular sections 45.9, G.1, G.2 and G.2.2, will not be considered as acceptable to UoE Estates. It is essential that the design team hold combined consultations with the UoE PM/BSG/FSU/H&S to discuss the provision of evacuation lifts. Consideration to provide an alternative means of escape together with temporary waiting spaces (complete with the required compartmentation) and provision of an EVC system, **must** be reviewed in conjunction with the FSU. This also applies where temporary waiting spaces are located below access level e.g. in basements.

A final exit door shall not lead people into an enclosed area from which there is no further escape. In addition final exit fire doors to access level must be fitted with locks that can be accessed from the outside to assist means of escape and give access to the First Responder and Emergency Services as required. It is anticipated that a standard suited key will be adopted across the University estate and a spare key is to be lodged within a glass key box or fire safety equipment cabinet located adjacent to the fire alarm master panel location within the building i.e. main entrance foyer.

In general, all final exits shall provide level access to a place of safety. Where a final exit leads to steps outside a building, provision shall be made for a temporary waiting space within the building, fitted with an EVC linked to the main Emergency Communication panel. In addition, the provision for EVC systems required to provide a means of communication and escape must be reviewed in conjunction with the FSU.

Consideration for Means of escape for physically, cognitive or sensory impaired persons **must** be made early in the design of a new build or refurbishment. In new builds and refurbishments, Temporary Waiting Spaces of a minimum dimension of 700mm x 1200mmm shall be provided in a protected lobby, protected zone, external escape stair, or an adjacent compartment. An appropriate Emergency Voice Communications (EVC) system shall be provided within these spaces to enable communications and reassurance with the individuals waiting. EVC's are to be fitted to all new build and refurbishment projects where Temporary Waiting Space exist (or are proposed), all to be detailed on the floorplans, a laminated copy of which is to be located adjacent to the Fire Alarm master panel. In addition, sounders within existing Temporary Waiting Spaces are to be removed and replaced with VADS to aid effective communication in these areas.

All accessible buildings that require a means to support assisted evacuation shall be provided with an evacuation chair, or similar apparatus, to assist with the evacuation of impaired persons. The 'chair' shall be located within a protected zone immediately adjacent to the main panel of the voice communication system (EVC) for the premises i.e. entrance foyer. Where buildings extend beyond 5 levels an additional chair (apparatus) is required at 5th level, 10th level, 15th level etc. In complex multi stair buildings a fire risk assessment will be required to determine the appropriate level of distribution of evacuation chairs. In all cases, such matters require to be discussed and reviewed with the Fire Safety Unit (FSU).

5.4 Simultaneous Evacuation

The simplest escape strategy is to ensure that, as soon as a fire has been confirmed, all of the occupants leave the building simultaneously. The activation of a call point or detector gives an instantaneous warning from all fire alarm sounders for an immediate evacuation.

5.5 Phased Evacuation

The operation of a call point or detector gives an initial evacuation signal on the storey or zone affected; an 'alert' warning signal may be given in other parts of the premises. The decision to evacuate the remainder of the occupants requires to be integrated within the Fire Safety Strategy and reviewed with the FSU and/or The Scottish Fire and Rescue Service, and will be subject to a dynamic Fire Risk Assessment.

In large or complex buildings, a phased evacuation procedure by floor level will generally be required in order to provide manageable sized alarm zones and reduced disruption. This will require the alignment of fire compartmentation. It is essential that adequate means of communication between storeys or zones is provided within the management arrangements; a public address system or voice alarm, instead of sounders, is the most suitable way to control the evacuation process.

5.6 Progressive Evacuation

Progressive horizontal evacuation is where occupants leave a compartment to an adjacent compartment leading to a storey exit. This form of evacuation is not common place within the sector but may be considered in consultation with the FSU.

5.7 Managed or Delayed Evacuation

To minimise the potential for unwanted fire alarm signals, consideration can be given to ‘managed’ fire warning systems. This allows for a period of investigation to be undertaken prior to full alarm. Such processes will only be considered where full consultation has been completed with the FSU and will only be considered for smoke sensing devices and not for call points or heat sensing devices.

5.8 Occupant Capacity

Occupancy figures are often the deciding factor in regards to the width of escape routes, staircases and doorways. Although UoE specifications will be met, there is often some spare exit width or occupancy capacity in completed designs, which is not supplied. This information is crucial when considering changes of use, and must be supplied by the Design Team.

Future flexibility of use and all restrictions on exit capacity must be considered and reviewed with the FSU. Maximum capacities for each space, permitted by the finished design, shall be included in the Fire Safety Design Summary and Fire Safety Manual.

Where UoE specification or furniture plans do not indicate the number of people in office accommodation, a figure of 10m2 per person may be used. Please refer to the UoE Space norms. Guidance recognises that where specific or comparative data are available to demonstrate the actual maximum occupancies, this data may be used instead of the standard floor space factors.

5.9 Exit routes

Single direction escape routes and rooms within rooms shall be avoided. The design and location of staircases and lifts must be considered in support of the Fire Safety Strategy for the building.

The sequence of escape for all exit routes requires to be “room > circulation space > place of safety”

Display information and items are often required within corridors. Where this is the case, fixed encased display facilities are to be provided. Such facilities shall not be provided within protected escape routes or stair enclosures.

Where exit routes are through an open plan area, the floor surface shall indicate the route, and management policies shall ensure that these areas are kept clear of any obstructions.

Access and security controlled locking systems on doors used on the means of escape routes including:

- automatic sliding or pivot leaf doors that do not have a mechanical override in the direction(s) of escape
- a normal latch with a handle operating an electrical strike plate,
- systems that rely on the release of Electro-magnetic locks or operate by a code, push button or card reader to allow the door to open

The above types of systems will require special consideration and arrangements to ensure that they fail-safe, or can be mechanically overridden at all times in the event of an emergency. The final arrangements for their application must reviewed with the FSU as early in the design stages as possible, and be included in the Fire Safety Design Summary.

The Design Team shall follow the requirements set out in section 2.9.18 – 21 of the Non-Domestic Technical Standards in relation to the provision of locking mechanism's (including the appropriate overrides) and their application throughout a building.

The provision of automatic sliding doors as final exit doors, if used, shall have a secondary by-pass door installed, where it is anticipated that the final exit door may require to mechanically locked-down. Provision of sliding doors (along with bypass doors where required) **must** be reviewed with the FSU and included in the Fire Safety Design Summary.

Where, for operational or academic reasons, a building requires to be accessible at all times, the final exit doors must not be capable of being 'mechanically locked off or electromagnetically locked down' unless the final exit door/ doors have the provision of a 'by-pass door' immediately adjacent and available, or by the use of a mechanical override e.g. panic bar. This provision must be accommodated for new build developments, however for existing buildings it is acknowledged that this may not be practicable. In these circumstances, the design team must again consult fully with the FSU on any design solutions.

5.10 Exit widths

Allowance may be required for UoE specified furniture, break-out areas etc.

Allowance must also be made for the width of powered wheelchairs and to take account of disabled persons who may need to go against the flow.

Spare exit width over the UoE occupancy specification permitted by the finished design shall be included in the Fire Safety Design Summary.

5.11 Emergency Lighting & Wayfinding

In all new or completely refurbished buildings, a fully monitored, addressable emergency lighting system is to be used to reduce maintenance costs and provide accurate records of maintenance required by statutory regulations.

All new, replacement or refurbished Emergency Escape lighting shall be designed, installed and commissioned by a competent person to BS 5266 – 1: 2011.

Systems shall include a self-test facility unless individual units are identifiable. Consideration must be given to areas where hazards are present in respect of people with impaired vision

In whole or part floor refurbishments, fully monitored, addressable emergency lighting systems are to be considered as part of the project and provided with capacity sufficient so that other parts of the building can be added as part of strategic maintenance/replacement funding in the future.

The UoE emergency lighting levels achieved for each area are to comply with the minimum standards contained within BS 5266-7. An escape lighting luminaire shall generally be sited to provide appropriate illuminance near each exit door and at positions where it is necessary to emphasize potential danger or safety equipment (note: 'near' is considered to be within 2m measured horizontally). In areas such as Plant Rooms, Electrical Switch Rooms, Lift Motor Rooms, Communications Rooms etc., the level of illumination under mains failure conditions must be in excess of 20 lux and the provision made in all luminaires to ensure even distribution.

Illuminated (LED) escape signage shall be utilised as far as reasonably practicable and shall augment emergency lighting. Non- illuminated signage shall be photo-luminescent.

5.11.1 Signage and Wayfinding

Routes specifically for the use of people with mobility impairments (i.e. alternatives to staircases) shall be indicated with the standard wheelchair user symbol in green. Signage indicating the route to Temporary Waiting Spaces must also be provided.

There shall be clear colour contrast of doorways, edge marking of stairs etc. to aid those with impaired vision.

All fire exit signage is required to comply with BS 5499.

5.12 Lifts

The project design team shall assess the need for an evacuation lift/s to be implemented into the project design based on the overall fire/evacuation strategy and risk profile of the building. Proposed evacuation lifts that do not meet the overall requirements of BS9999:2017, and in particular sections 45.9, G.1, G.2 and G.2.2, will not be considered as acceptable to UoE Estates. It is essential that the design team hold combined consultations with the UoE PM/BSG/FSU/H&S to discuss the provision of evacuation lifts.

For further information on Evacuation Lifts, please see Lift Estates Design Guidelines No 7.

Lifts and Evacuation Lifts shall carry standard **'do not use in a fire'** signage supplemented with the disabled exit route sign where suitable.

5.13 Doors

Final exit doors shall be fitted with single action locks and provide level exit or be ramped to 1:20 max.

All fire doors shall be:

- Fitted with intumescent strips and smoke seals (brush variety only);
- Of contrasting colour to the walls or frame;
- Provided with disabled friendly handles usable by a closed fist and one-handed operation;
- Operable one handed with a maximum of 30N opening force;
- To allow flexibility in future usage all room door sets, corridor fire door sets and partitions adjoining circulation corridors must be of a medium fire resisting standard and capable of being fitted with self-closing devices.
- Each door must be marked and labelled as being of fire resisting construction to the required level e.g. FD30/60/90/120, along with S when smoke resisting
- Where the fire risk assessment indicates a need for room doors to be designated as fire doors they must be marked 'Fire Door -- Keep Closed' and be fitted with a self-closer.
- Corridor doors are generally to be provided with magnetic hold open devices

  Interfaced to the fire detection and warning system; where used at the junction of alarm zones they must release on activation of either zone;
- Where magnetic door locks are used at the junction of fire detection and warning system zones they must release on activation of the system of either zone;
- All electrical door closers, locks and hold opens must fail open in the event of a power failure;
- All doors on an escape route and final exits that incorporate a security device, or are automatic doors that require an access card or entry code must fail to the open position in the case of a fire detection and warning system activation. Mechanical overrides e.g. push/panic bars or push through sliding doors must be fitted on doors as required by the NDTH
- All doors on an escape route and final exits that can be secured by a manual key lock must have a handle or other simple fastening that can be easily operated, without the need for a key or other specific technical knowledge, from the side approached by people making their escape;
- All final exit doors must be fitted with locks that can be accessed from the outside to assist means of escape and give access to the Fire Service as required.
- Mains powered tamper proof open door alarms (screamers) shall be considered on all student kitchen doors (these have proven effective at reducing false alarms from cooking);
- Kitchen doors must be fitted with combined intumescent strips with brush smoke seals (minimum FD30S standard);
- Means of access to all rooms must be available to emergency personnel; and
- Access control systems must be programmed such that all escape routes serving areas which may be occupied are available should there be a fire. In general, there shall be no requirement to use a card, code etc. when evacuating from a building. However there may be specific areas of restricted access where security arrangements override this position.

6.0 Active Systems

6.1 Suppression Systems

The installation of a suppression system may have many positive benefits:

- Greater flexibility in building design.
- The reduction, through a risk assessment process, of active and passive fire safety measures.
- Reduced disruption and business continuity risk.
- Meeting environmental targets by a reduction in the risk of water pollution from firefighting, the amount of waste materials damaged in the fire going to landfill and the need for the use of raw materials for rebuilding purposes.
- Suppression systems shall generally be in accordance with the appropriate BS 8458-201 and BS 8489-1:2016

6.2 Water Misting and Sprinkler systems

Water mist systems rather than sprinkler systems greatly reduce the risk of water damage and reduce spatial need for water storage tanks.

Sprinkler or water mist suppression systems are to be considered at initial design stage by the Design Team working in conjunction with the FSU, for all projects involving sleeping accommodation and high fire risk projects. Automatic sprinkler systems extinguish or control fires by discharging water locally. Detection is handled mechanically by heat sensitive elements which can be constructed from soldered links or glass bulbs containing oil based liquids. The thermal element holds in place a plug which prevents water from flowing from the sprinkler head. The thermal elements respond to localised heating which acts to release the plug and allow water to flow.

Key facts about their operation are:

- Automatic sprinklers will typically only operate in areas where fire is present allowing adjacent rooms or areas to remain unaffected;
- Discharge in the presence of fire is extremely reliable (98 to 99.8%) and discharge in the absence of fire is rare;
- They have an 80-95% [1] probability of being successful;
- Generally the cost and design complexity increases with fire risk. Offices which are considered lower risk have a lower water demand compared to high-bay warehousing that requires sprinklers to operate at a higher water demand;
- Systems can be designed to conceal pipes, and the availability of decorative sprinkler heads allows them to be matched with the interior of the space.
- An automatic sprinkler system consists of water supply (tank, pump and valves) and sprinkler installation (pipes and heads).

The specifications of the design depend primarily on the hazard classification of the occupancy of the building. The specifications include head spacing dimensions, assumed area of maximum operation (number of heads in-operation), design density (water discharge), water supply period, and tank volume.

Automatic sprinkler system design:

- The maximum area of coverage per sprinkler head depends on hazard classification and sprinkler mounting orientation (i.e. sidewall or overhead);
- Design density is the water discharge required in litres per minute over the assumed area of maximum operation. This can be summarised as the flow of water required which increases proportionally with the occupancy risk category;
- Area of operation is the design assumption for the maximum area over which the sprinklers will operate in a fire delivering the design density. This addresses the nature of the fire risk and recognises that some fires will grow faster than others;
- Water supplies are required to be capable of supplying the required flow (depending on the system design) for a minimum duration that varies from 30 to 90 minutes depending on the hazard classification;
- Minimum water volume requirement (water tank size) also depends on the hazard classification and the system type (wet, pre-action or dry).

Design standards

- The automatic sprinkler standards applicable at the time of writing this document are:

  a) BS EN 12845:2015 – Fixed firefighting systems: Automatic sprinkler systems.
  b) BS 9251:2014 – Fire sprinkler systems for domestic and residential occupancies.
  c) LPC Rules for Automatic Sprinkler Installations 2015 incorporating BS EN 12845 (inc.TB229)

6.3 Gas Systems

Gas suppression systems shall be used to protect valuable materials or equipment where they would not react well to water.

These systems will normally have a pre-determined countdown period before activating to allow for persons to egress from the area and if they shall still be in the area after activation, it will still be possible for them to make good their escape without any adverse effects.

6.4 Systems for kitchens (not accommodation)

A suppression system, which distributes a fine mist spray of a chemical, designed to react with burning fat, is required over cooking ranges and deep fat fryers. These systems work by the chemical reacting with the oil to form a coating or crust over the oil, which has both a cooling effect and also cuts off the oxygen supply thus extinguishing the fire.

6.5 Automated Fire Detection and Warning Alarm Systems (AFD)

The Design Team will advise on the type of Fire Detection & Warning Systems to be installed as defined in BS 5839, Pt 1 2017. This will be a minimum of L3 category installation, to primarily to protect life. The final category proposed by the Design Team is to be reviewed in collaboration with the FSU, and must be included in the Fire Safety Strategy and Fire Safety Design Summary documents.

For further information on Fire Detection and Warning Systems, please see Electrical Engineering Services Design Guidelines No 6.

The application of Visual Alarm Devices (VADS) in terms of location is to be agreed with Building Control as a variation to EN 54-23:2010. Any new buildings will be constructed using a minimum of a L3 Fire Detection & Warning Systems and having VADS in prominent positions to alert the hearing impaired in compliance with the BS, to give sufficient warning of a fire to the hearing impaired). The exact siting of VADS will be a matter for consideration between the Designer, FSU and Building Control as a variation to EN 54-23:2010. Where alternative systems have been previously installed as existing, the Designers must consult with the FSU to determine future design solutions. The Designer is to consider the occupancy and use of the space. I.e. Student 24/7 facility, and will incorporate such into the proposed design.

The Fire Detection and Warning Systems panel is to be provided with a 'Control Enable' key switch (ref Lowe & Fletcher 007) and 'Plant Over-ride' key switch (ref Lowe & Fletcher 901), (both switches non-retractable in the "on" position). The UoE requires that the Fire Detection and Warning installation for new buildings be connected to the University Security Centre, in order to provide a direct line of communication in the event of a Fire Detection & Warning Systems activation and an automatic notification to be sent.

For all new build and refurbishment projects, all Temporary Waiting Spaces (formally known as Refuge Areas) may have the capability for direct communications links to Security Central Control via an open voice channel system. At present, existing Temporary Waiting Spaces communications systems, generally link the Temporary Waiting Spaces to the Fire Alarm Panel position, and this may be subject of a future upgrade programme. In addition, and to reduce background noise VADs are to be located in areas where conventional sounders may compromise the effectiveness of communication within Temporary Waiting Spaces.

All EVC systems require to be provided with a 'Control Enable' key switch to allow regular testing to be completed that does not require the Fire Detection and Warning system to be activated. EVC systems must not have additional items such as disabled toilet alarm systems combined into them.

6.5.1 Standard / Classification

New systems shall be compatible with or match existing effective systems.

The proposed system level may vary, but specifically L3 enhanced with detection is required in all rooms where the normal occupancy is over four persons, plant rooms, service ducts, lift shafts, air handling ducts and high-risk areas.

The normal standard in sleeping accommodation is L1 with Visual Alarm Devices (VADS) at all bed heads.

6.5.2 Monitoring

All detection and alarm systems will be 24/ 7 monitored at the University Security Control room. Where zoned evacuation is required remote activation must be facilitated.

6.5.3 Zoning

Alarm zones will be required in large buildings and must be based on confirmed fire compartments, usually by floor level. They must include other compartments, which provide single means of escape. The extremities of fire alarm zones shall generally be provided with a break glass call point on the inside each exit from the zone.

6.5.4 Detection Specification

False alarms and changes of room use are a common feature of a University Campus environment and therefore installations, detection and alarm equipment must be universal and adaptable.

The specification shall require addressable, open protocol, detector bases allowing the fitting of ancillary equipment such as VADS.

Combined programmable rate of rise heat and optical smoke units are a preferred option.

Heat detection settings are generally slower to react to a fire, but will be required in areas where smoke detection is likely to cause frequent false alarms. Where the risk of the false alarms is during defined periods only (i.e. commercial kitchens, some laboratories etc.), detection shall be programmed to smoke outside of the risk periods. Student kitchens may be used at any time, therefore heat detection only is appropriate.

Bedroom detectors must be positioned such as to reduce the likelihood of triggering by aerosols, shower steam etc.

CCTV technology and the development of Infra-Red (IR) cameras can be beneficial in the early detection of a fire. Although IR cameras will not identify developing heat sources, they will provide better night-time vision thus allowing CCTV operators to more easily identify smoke and small fires. Most models also have the ability to swap from IR mode to normal, mode when faced with a bright light. At night this has the potential to identify a fire in IR mode and switch to normal mode thus highlighting the fire against a dark background.

Where CCTV cameras are to be installed for security purposes, consideration shall be given to using enhanced IR cameras. This type is particularly useful in remote areas where attendance to alarms by trained personnel may be delayed. **Please see the Security Services Design Guidelines No 8**

6.5.5 Fire Detection & Warning Systems equipment

The Fire Alarm Control Panel is to be located within the vicinity of the Main Entrance foyer to the building, ideally visible from the outside of the building complete with all the associated Fire Alarm Zone diagrams and access/control keys etc. Fire Alarm panels shall be addressable (intelligent) systems.

Manual call points shall be addressable and of the steady pressure break glass type manufactured to BS EN 54 Part 11 and installed to BS 5839 Part 1 2017. Call points within the plant rooms and, electrical LV switch rooms shall be provided with a hinged cover to prevent accidental operation. Call points to vulnerable accessible areas may be fitted with anti-tamper alarms (at final exits only). This is a variation which will be reviewed by the FSU, and agreed in each individual case with Building Control.

All heat detectors **must** be of the analogue addressable type compatible with the control equipment and conform to BS EN 54 Part 5 as indicated on the drawings. The detector shall fit a common universal base. The common universal base shall either be of the pattress or flush fixing type as appropriate.

Smoke detectors **must** be optical type and of the analogue addressable type compatible with the control and indicating equipment and shall conform to BS EN 54 Part 7. The detectors shall fitted on a common universal base, which may fitted either on a pattress or flush fixing type as appropriate.

Combined heat and smoke detectors **must** have the combined properties of both heat and smoke detectors and shall conform to BS EN 54 Part 7, as described above. Combined detectors identity being either heat or smoke shall be determined to suit the areas installed and **must** be programmed, as such by the named specialist trade contractor. All detectors shall have an LED to indicate that it has operated and shall fit a common universal base.

All types of detectors shall be labelled with an identifying asset code to allow easy identification of the unit/s.

The Specialist Trade Contractor will liaise with Estates Operations Management and provide any relevant existing loop drawings.

6.5.6 Air Sampling Systems

Aspirating Smoke Detection (ASD) System utilises an aspirator (fan) to actively draw air into a remote detector, through a sampling pipe network that extends into a protected space. This method of smoke/fire detection is sometimes referred to as Air Sampling Smoke Detection.

The installation, testing, and commissioning of aspirating smoke detection (ASD) systems is governed by several codes and standards. The following codes and standards are required to be referenced while designing ASD systems • Fire Detection and Fire Alarm Systems – Part 20: Aspirating Smoke Detectors (EN54-20); the standard for the installation of ASD systems in Europe • In Europe, for each specific installation the local standards and codes of practice shall be adhered to. Guidance on the design of systems is given in BS 5839, BS 6266 and/or FIA Code of Practice for the Design, Installation, Commissioning and Maintenance of Aspirating Smoke Detector (ASD) Systems

6.5.7 Alarm Sounders

Alarm sounders shall be electronic type and shall be supplied in sufficient quantity and suitably located to achieve the audibility levels prescribed by BS 5839. In areas where the ambient noise levels are expected to be high the sounders shall be supplemented with VADS, location to be agreed between Designer and Building Control as a variation to EN 54-23:2010'. A number of alarm sounders may also include a VAD for visual indication as required by BS5839 and Equalities Act requirements. Sounders shall have an adjustable sound output. This will apply to all new builds and refurbishment projects. Existing situations must be dealt with, via a fire risk assessment process.

All types of sounders shall be labelled with an identifying asset code to allow easy identification of the unit/s.

6.5.8 Sounder Bases

All voice sounder bases shall be loop powered and have adjustable sound output. The specialist trade contractor shall ensure correct loop cards and power supply capacity is installed to accommodate sounder quantities.

Visual Alarm Devices (VADs) in the form of beacons or combined sounder/beacons have been utilised as part of fire alarm systems. These devices assist the hard of hearing or staff working in noisy environments to recognise when a fire alarm has been raised. Specified VADs shall be to product standard, EN 54-23:201 to ensure standardisation of the requirements, test methods and performance of VADs and to ensure light output is measured in a uniform manner.

It is important to avoid discriminating against disabled people. BS EN 54-23 compliant VADs MUST be installed in all sanitary accommodation (not just WCs) and all hotel bedrooms, student accommodation, switch rooms, plant rooms, sub-stations and similar places, plus anywhere where people with impaired hearing are likely to be alone, such as isolated offices/rooms. VADS within Temporary Waiting Space Areas are to be the preferred solution to allow for effective verbal communication. Sounder levels in bedrooms are to provide 75dBA at the bed head.

Visual Indicator Devices (VIDs) in the form of flashing beacons must not be used to warn building occupants of a fire alarm condition, however, they may be used as a supplementary indicator, as a remote indication of detector activation i.e. externally to direct the fire and rescue service to where a fire alarm has originated.

6.5.9 Other Equipment and Systems

Illuminated 'Fire No Entry' light boxes must be provided outside each entrance to the building and each alarm zone; these must continue to function after sounders are silenced until the alarm panel is reset. In some instance lateral evacuation or means of escape may be discouraged.

Voice alarm systems are to be considered at the early stages of the design process, if the existing systems is a voice alarm, please note consultation will be required with the FSU, as this option is a minority installation.

6.5.10 Cause & Effects

The “cause and effect” of alarms and ancillary equipment connected to it is an important aspect of Fire Safety and even the best systems have to take into account “the human factor”. This will give all concerned an understanding of the likely effect of an alarm and what will occur with the alarms and related systems should they be activated. This is important information for the Fire Risk assessor as from this they will be able to estimate peoples’ actions when these systems are activated. Items such as Ventilation Plant, Gas shut-off valves etc. must be included within a Cause and Effect table for review and comment.

Programming must be reviewed with the FSU for the University as management practices often vary from those normally expected; it will usually be such that one device evacuates the zone only, two devices evacuate the building. Detectors in such areas as commercial kitchens will normally be programmed for heat during operating times and smoke out of hours. Any works that may impact on an existing Cause and Effect e.g. in an existing building, must be highlighted, and updated Cause and Effect tables provided for review and comment by the FSU/BSG.

Example of a cause and effect table (what is expected)

CAUSE / EFFECT	Basement Sounders	Ground Floor Sounders	First Floor Sounders	Second Floor Sounders	3no Lifts to Ground Floor	Door Access System	Dust Extraction System	Air Make-up Units	Mechanical Control Panels	Gas Valves	Signal to Deaf Alerter	Signal to LU Security	Vent Stack Extract Fans	Vent Stack Fire Dampers	Atrium Window Vents	Air Compressor	Fume Cupboards	Spray Booths	Bottled Gas Systems
Zone 1 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 2 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 3 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 4 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 5 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 6 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 7 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 8 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 9 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 10 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 11 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 12 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 13 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 14 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 15 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 16 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 17 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 18 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 19 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 20 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 21 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 22 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Zone 23 (Manual or Automatic Activation)	C	C	C	C	X	X	X	X	X	X	X	X	X	X	O	X			X
Activation of Zone 1 to 23 During Weekly Test	C	C	C	C	X	X					X	X							

APPROVED BY

NAME (BLOCK CAPITALS):

ON BEHALF OF:

SIGNATURE:

DATE:

6.5.11 Ancillary Equipment

Gas supplies and air handling systems must be interfaced to cut off on activation of the Automatic Fire Detection System and be provided with an automated reset. Computer server rooms may require specialised alarm systems. All such interfaced equipment must be provided with a key switch to allow independent testing of the system/s and equipment during normal working hours without disruption to the building and its occupants.

6.5.12 Access & Facilities for the Fire Service - general

Any new buildings shall be designed to comply with Section 2.12 of the Scottish Building Standards Technical Handbook (Non-Domestic) 2017 and allow proper access to the building for fire-fighting purposes and provide reasonable allowances for Estates

Operations to assist fire-fighters in the protection of life. Any new buildings shall also be designed and built having appropriate fire-fighting stairs, firefighting/evacuation lifts, dry and wet risers where necessary and be within 60m of a fire hydrant for any building not fitted with a fire main. Fire Service access shall also be considered when refurbishments or rearrangement projects are carried out, including outbuildings or stores, which may change the existing access to an existing building.

All access routes for fire and rescue vehicles **shall** be of a minimum width of 3.5m between any solid barriers such as gateways, 3.7m between kerbs and be capable of carrying a minimum of 12.5 tonnes. There **must** also be a minimum height clearance of 3.7m.

6.5.13 Means of alerting the Fire and Rescue Service (FRS)

The FRS shall be alerted as soon as possible by the fastest means possible. This is normally by the person or persons discovering the fire once they are safe, and done by operating the nearest alarm call point if inside a building or calling the Security Control on 0131 650 2257 (all contractors and sub-contractors should put this number in their mobile phones) or 2222 from any university landline.

If the Fire Detection & Warning System is activated and the Security Control is alerted of this, they may challenge the alarm in some cases to validate and ensure it is a genuine incident and not a false alarm before they call the Fire Service.

6.5.14 Fire hydrants

A clear campus map of all fire hydrants will be held by Security Control and provided to the FRS for use in an emergency as required.

6.5.15 Dry Risers

Any building fitted with a dry riser and any new ones designed with one or more shall have access within 18m to that riser inlet with the inlet being visible from the fire appliance. All dry risers are to have a Yale lock fitted with key type 9A 986 or budget lock. A key shall also be held within the Key Box at the Fire Alarm panel.

6.5.16 Fire-Fighting Shafts and Lifts

Buildings with a floor more than 18m in height **shall** be provided with fire-fighting stairs, which shall provide access to all floors through fire protected routes. Any fire-fighting lifts **shall** be designed and installed in accordance with BS EN 81-72:2003.

Ventilators shall be fitted with a simple handle or lock that can be operated by firefighters. If ventilators are not easily accessible they shall be operated by an automated switch positioned within the building at the fire and rescue service access point or at the point of access to the stair enclosure. In the case of an escape stair and fire-fighting stair, a local control shall also be provided at the topmost storey.

Any locked equipment for fire service use shall be provided with a standard Fire Safety Lock. This will include access gates and barriers, dry riser inlets and outlets, firefighting lift controls, fireman’s switches etc. with keys to be located in a key box mounted adjacent to the Main Fire Alarm Panel.

A copy of the Fire Safety Design Summary plans shall be provided, in A3 encapsulated form, readily available at the entrance to the building for Fire Service use.

The location of electricity supply switches, gas shut offs and unusual or high risks to firefighters shall be indicated by appropriate door signage.

6.5.17 Key Boxes

All fire alarm panels require to be a supplemented with a secure 4 digit key box to store keys for the fire panel, EVC, evacuation lift and other associated equipment etc.

6.5.18 Fire-fighting Equipment

The FSU is responsible for ensuring that the provision for portable FFE is available in all University premises. Where FFE requires to be provided, this is to be arranged with full consultation with the FSU

Specialist extinguishers and suppression systems may be required in science laboratories; computer server rooms, kitchens, areas with valuable contents or the risk of high voltage electrical risk is present.

Where there is a desire to consider accommodation space for recessing portable fire-fighting equipment, full consultation with the FSU requires to be initiated at an early stage of the design process.

7.0 Fire Prevention

The incorporation of fire prevention measures in the design stage will have significant benefits rather than attempting to apply such measures after completion. There may well also be cost benefits to designing in such features, not only in regards to installation costs but after completion in the form of ongoing maintenance costs. Input at the design stage from an experienced Competent Person (FSU) or fire engineer may well have significant benefits.

7.1 Fire/Fuel Loading Information:

Consideration must be given not only to the initial proposed use of a building or facility, but also potential use in the future, as over time, there is likely to be pressure to increase the capacity of buildings above the original design intent capacity.

Information regarding fire loading capabilities for certain materials and products can be found in the PD 7974 – 2011 series of documents. Clear explanations of fuel load limits imposed by the design must be supplied such that end users can interpret them; this is particularly important for escape routes and circulation spaces.

7.2 Furniture and fittings

Future potential furnishing and storage requirements shall also be considered, not least to discourage the desire to turn escape routes into storage areas.

7.3 Waste materials

In today's proactive approach to environmental issues establishments are required to provide various different receptacles for different materials. This leads to the following concerns emerging:

- Waste is retained on site for longer than anticipated, often in more bulk, as it takes longer to fill receptacles.
- Lack of secure storage facilities for bulk waste receptacles, may result in a greater risk of arson
- External storage close to buildings increasing the risk of external fire spread.
- Areas where intended activity or content involves a high risk of fire: plant rooms, workshops, laboratories, catering kitchens, sleeping risk etc.

The UoE must be consulted in order to gain information on the bulk of waste to be stored and the types and numbers of receptacles to be used. Any waste materials, which is loose and combustible resulting from academic courses such as Art, must be carefully considered in the design process.

The design shall incorporate adequate secure storage for bulk waste and receptacles either externally at least 8m from buildings or in a 60min fire compartment within the ground floor only accessed via a locked external door. It is anticipated that a standard suited key will be adopted across the estate and a spare key is to be lodged within a key box or fire cabinet located adjacent to the fire alarm master panel location.

Early consideration of potential re-cycling areas is required within the design as it will not be permissible to consider re-cycling points of any kind within protected escape routes

7.4 Storage

Consideration must be given to the provision of lockable cleaner's cupboards and storage areas not only for combustible materials, but also bulky or temporary equipment and furniture to prevent the obstruction of escape routes. It is anticipated that the Design Team shall also make a provision for suited keys for such areas.

7.5 External Spread

The aim of considering external fire spread is to prevent a fire being able to traverse floors externally and to prevent a fire in one building spreading to neighbouring buildings.

There shall be no bulk waste containers stored or located within 5m of the building. If the outside of the building may be used for display purposes such as large advertisement banners, LED signs or external awnings, such items may present a risk which must be addressed, through a design risk assessment and advice sought from the FSU .

7.6 Location of high fire risk areas

Where practical, high fire risk areas shall be located such that any fire arising in them would have the minimum impact on means of escape e.g. Locating science laboratories, kitchens etc. on the top floor. However, access for firefighting must be considered and additional compartmentation at ground floor level may present a more suitable solution.

Gas cylinders, hazardous chemicals and substances are necessary in some areas. It is to be noted that the Fire Service may decide not to enter such areas in a fire situation, due to the risks involved.
Suitable and sufficient external storage is preferred (with piped gas supplies) over storage cylinder solutions.

- Highly flammable and oxidising materials –bulk amounts will require a blast proof fire compartmented and suitably vented storage area. The vent shaft or ducting shall be fire resisting or compartmented to the same level as the storage area and it shall vent as directly as possible to fresh air. The venting for each store shall be self-contained if it passes through a building, i.e. it shall only ventilate that store and shall not be used for venting of fumes from other areas or stores within a building. Where the vent shaft/ducting passes through a fire compartmented wall or floor fire dampers must be installed to prevent fire spread.

- Compressed gas or liquid gas cylinders – All compressed gas cylinders have the potential to react or explode in a fire. Wherever possible all cylinders will be stored externally with the relevant gases being piped around the building. Where that is not possible only one cylinder of each substance shall be stored internally with all others being stored in a secured external area. Where gases are stored internally, Hazardous Chemical signage will be required at the external entrances into the building and on the door leading into the room where the cylinder/s is stored. It is important for all users of gas cylinders to be trained and competent with respect to isolation.

- In a fire situation, the fire service may prefer to remove the cylinders where it is safe to do so therefore consideration shall be given as to the layout of a building where work areas will require cylinders. The higher up a building the cylinders are being stored the more difficult and time consuming it is for fire fighters to transport cylinders out of the building. Where gases are required at higher levels, strong consideration must be given to the piping of gases from external storage.

- Due to the operational firefighting complexities and potential hazard zones associated with fires involving acetylene cylinders, alternative gases shall be considered and acetylene within buildings are to be viewed as a last resort. In general, Acetylene cylinders are required to be located externally.

7.7 Equipment and Plant Safety Provisions

Sufficient electrical power sockets with integral RCD/RCBO devices must be provided to negate the need for multi-point adaptors and compensate for the frequency limitations of PAT Testing.

Emergency gas shut-offs must be provided in each room being served and it must be accessible and suitably labelled. Please reference the Gas Safety Policy and Procedures.

Automated cooking fume extraction systems must be installed and it shall be sufficient to prevent operation of corridor smoke detection.

Automated cooker cut-offs facilities are to be installed, which will activate when people leave cooking unattended.

8.0 Management Issues

Future management provision requirements

Fire Safety Management must be regarded as of equal importance to fire protection measures. A building with first rate fire protection measures with a poor management regime, may pose a greater risk than a building with limited fire protection measures and good management. It is imperative that Management issues must be considered throughout the design process and detailed in the Fire Safety Design Summary.

The managerial burden shall be reduced as far as is reasonable practicable.
In line with good risk control, engineered solutions are preferable to those reliant on management.

Expertise and training burden:

The aim will be to accommodate the circumstances of the establishment and fit with their standard practices.

Fire risk management objectives, procedures and a programme of audit and management review shall be formalised and implemented.

The future management of fire safety systems is a considerable burden, which must be considered at design stage bearing in mind the ‘fire related challenges’ indicated earlier in this document. The aim shall be to minimise the management resources that will be required. Examples of how this may be achieved include:

- Small alarm zones, with compartmentation, such that those responding to alarms can also deal with evacuation and firefighting issues.
- Evacuation systems which negate or reduce the need for specialist equipment or assistance; allowing for self-evacuation of disabled people for example.
- Systems, which are common campus buildings, can reduce the training requirements for all users. See also the ‘Materials’ section of this document

9.0 Fire Engineering

Where Fire Engineering is proposed for a specific means of escape solution, the additional challenges of the UoE must be included in thorough a risk based analysis. Where evacuation simulation models are to be employed, 3rd Party accreditation is obligatory and required.

The Fire Safety Design Summary must make provision for adequate safety margins and must be built into evacuation time studies, allowing for 'fire related challenges' in particular slow response times and the potential numbers of and variation in users who may have difficulty evacuating which will include staff and students with temporary issues as well as disabled persons.

A Fire engineered solution that relies on Level 1 or enhanced management as a component may require a management solution tailored specifically to the design of a building. This must be reviewed with the FSU before the solution can be considered and accepted.

9.1 Fire Protection Engineering

Designing a building from a 'whole building' approach requires a fire protection engineer to coordinate the different types of fire protection that are designed into buildings including:

- coordination of sprinkler system zoning with fire alarm system zoning
- coordination of sprinkler system water flow and tamper switches with the fire alarm system
- coordination of fire alarm and egress system with building security
- coordination of smoke control systems with detection and HVAC system designs
- coordination of fire separations with architectural designs
- coordination of penetrations of fire rated assemblies with mechanical and electrical designs (e.g., piping, ductwork, and wiring penetrations)
- coordination of means of egress with architectural designs.

Consultation with the FSU on the application of Fire Protection Engineering principles for a whole building design approach is essential.

9.2 Responsibilities

9.2.1 Fire Safety Unit (FSU):

Advice on all fire related issues in building design from inception to completion of projects. This will include reviewing:

The Fire Safety Strategy:

- Content of the Fire Safety Design Summary
- Fire Protection Engineering principles for the whole building design or facility following a thorough consultation process;

- All variations from standard practice; and
- Cause and Effects summary table

9.2.2 Designer:

It is the responsibility of the designer to ensure there is a suitable and sufficient Fire Strategy in place, to initiate the Fire Safety Design Summary, ensuring that the summary is populated as design information becomes available.

The FSU, is deemed to be the 'competent person' for fire safety within the University - advise on all fire related issues in building design from inception to completion of projects. This will include agreeing:

- The Fire Safety Strategy
- The Fire Safety Design Summary

On hand over, the FSU will be the custodians of the Fire Safety Design Summary manual and will populate it with the UoE Fire Safety policy statement, operational records and other fire safety documentation.

9.3 Principal Contractor:

In consultation with the FSU, conduct a fire risk assessment and ensure that suitable and sufficient control measures are implemented, supervised and monitored throughout the project from pre-start to completion and handover and the consideration and impact on adjacent buildings.

This may include consideration of early commissioning of fire systems prior to practical completion to mitigate the risk of fire during the construction phase.

Ensure the FSU is consulted before implementing any changes which may affect the arrangements in respect of fire, during or on completion of the build.

Update the information in the Fire Safety Design Summary with as built information before hand over, and provide all Operation and Maintenance manuals (O&M's).

9.4 Fire Safety Design Summary

The University has adopted BS **9999:2017 Fire safety in the design, management and use of buildings Code of Practice as a standard**

We require the supply of information in the form of a 'Fire Safety Design Summary' which will contain all design information and the fire strategy supplemented with plan drawings in the agreed CAD format, pdf and dwg. This will also be supplemented with a Fire Safety Manual at conclusion of the project.

This documentation must be provided to the University on practical completion and will contain information relating to the design and construction of the building, and the services, fittings and equipment provided in or in connection with the building, which will assist in the operation and maintenance of the building for fire safety purposes.

The proposed content of ‘Fire Safety Design Summary’ and ‘Fire Safety Manual’ is detailed in the Appendices.

Designer - It is the responsibility of the designer to ensure there is a suitable Fire Strategy, and to initiate the development of the Fire Safety Design Summary and compiled as design information becomes available.

9.5 Fire Risk Assessment Preparation

All fire safety features, equipment, signage Fire Safety Design Summary and Fire Safety Manual must be in place before handover. This is to facilitate completion of the Fire Risk Assessment by the FSU (deemed as the ‘competent person’) which must be in place prior to occupation.

Before accepting a building for occupation it is essential that the safety of the staff and public (as well as that of construction personnel if the building is being completed in phases) is assured by ensuring that all safety systems are properly installed and fully operational. On completion of the fire safety systems, the complete installation shall be checked for conformity to the approved drawings and system design.

10.0 Accommodation Facilities

These areas present the highest life risk and therefore extra precautions are required. They are likely to be used both for student living accommodation and, effectively, as hotel accommodation outside term time. Use by people not familiar with the building will be common. Design parameters based simply on student accommodation or flats is unlikely to be a suitable approach. Installation of a sprinkler or misting systems and bi-directional means of escape from all normally occupied rooms is a standard requirement

Following the Report of the Review Panel on Building Standards (Fire Safety) in Scotland, in domestic buildings over 18m there should two stairways and Fire Service activated evacuation sounders in each floor.

10.1 Challenges

Design standards must account the following additional challenges:

- Increasing use for conference visitors and the public (hotel use)
- Privately owned, designed and operated accommodation in the vicinity, resulting in pressure to cut cost.
- Limited supervision and enforcement of fire safety rules.
- Extremely varied and unpredictable sleep, work and social behaviour patterns.
- Inexperienced people cooking with unfamiliar equipment (cause of over 90% of fires in the sector).
- Extensive and often inappropriate use of electrical equipment commonly including items, which do not conform to British Standards.
- Smoking is banned in individual bedrooms, but the risks of candles etc. and unauthorised smoking can be an issue.
- False fire alarms; mainly due to cooking with the kitchen door open, steam from en-suite showers and use of aerosols near detectors.
- There is not normally a managerial presence in the residential buildings, particularly at night. Checking on evacuation is problematic and failure to evacuate is common.
- Disabled accommodation can be provided separately, however the provision for means of escape from all areas must be provided for disabled students, staff and, to ensure that the building design is inclusive.

10.2 Automatic Fire Detection and Warning Systems

Alarm sounders and VADS are to be provided in all escape routes, common areas and normally occupied rooms. Sounders are to be set at 75Dba measured at the bed head in bedrooms. There must be facility to fit vibrating alarms for hearing impaired residents. In general, VADs are to be used in staircases with Temporary Waiting Space Facilities and audible warning devices are to be removed.

Cause and effect programming of detection and alarm systems is crucial. False alarms caused by smoke detector activation by cooking fumes, shower steam and aerosol use are historically common in accommodation buildings. Systems shall be designed to

reduce these as far as reasonably practicable including enhanced automated cooking extraction and careful positioning of detectors.

Call points shall be sited on escape routes in secure areas (i.e. inside flat exits) rather than by final exits to reduce malicious activations suffered when sited in common areas. Sufficient points shall be installed to ensure that anyone leaving a room shall pass one on their escape. Alarmed covers and CCTV coverage are likely to be required for any call points that have to been positioned in common areas.

10.3 Kitchens

In existing buildings there may be instances where there is only a single means of escape. In these circumstances communal kitchens must be located at the furthest end from the exit to facilitate escape.

Measures to reduce fires caused by students cooking must be taken. These could include purpose designed water mist or other suppression systems, cookers with thermostats set below fat ignition temperatures, cooker timers which require manual reset after 15 minutes.

Self-closing kitchen doors are frequently wedged open, and to alleviate the risk, consideration shall be given to the installation of audible alarms (screamers).

11.0 Materials

11.1 Specification & Installation of Materials – General Requirements

Passive fire protection systems if designed, specified and installed correctly will provide many years of reliable protection to the building. However, as the installation of fire protection is part of the building process, general builders, who have no specific training, often install it; this can lead to incomplete or inappropriate installations.

In order to achieve the most effective and reliable fire protection, it is required that all passive fire protection products are third party certificated and that competent contractors install them hold third party certification for that product type. A body holding UKAS (United Kingdom Accreditation Service) accreditation for the product or services they certificate shall provide third party certification for both products and installers.

11.2 Structural Steel Protection Systems

Fire protection systems to structural steelwork come in a variety of materials. All systems shall be installed within the parameters of the manufacturer's fire test/assessment data or third party certification; otherwise, they are unlikely to provide the fire resistance that was specified.

Board materials; normally applied to form a box around structural steel sections. It is relatively easy to check if they have been correctly installed, with particular attention to joints and fixing details.

Sprays and renders; such as non-combustible cementitious or gypsum based products, sprayed or trowelled around the section to provide an insulating layer, tend to be installed by specialist contractors to the required standard.

Intumescent paints; react to heat by swelling up to form and insulating char. Base coats must be applied evenly onto a compatible primer finish in good condition, to specified loadings within the right time frame and within certain ambient temperature and humidity limits. It is neither easy to check, nor rectify if incorrectly applied.

11.3 External Cladding Systems and Insulation

As the need for energy efficiency grows, more innovative ways to insulate and upgrade performance have resulted in a wide variety of systems and materials being used to clad buildings. This has potentially resulted in an increase of the specification and application of more potentially combustible materials to facades. Unfortunately, a number of significant fires have demonstrated the potential risks with the design, specification and application of these systems and the need for strict adherence to design standards, installation standards and on site workmanship by competent and experienced resources.

Guidelines for the use of such systems that are to be considered:

1. The use of a non-combustible insulation material or a cladding system proven to perform in a similar manner must be detailed and specified, such as mineral fibre/wool, stone wool, lamella, or other appropriately fire-rated products. Limited use of combustible claddings such as timber may be acceptable subject to the application of fire treatment coatings, individual circumstances, with

consideration included in the Fire Protection Engineer report and recommendations, and following consultation with the FSU (Fire Safety Unit).

2. With specific reference to the Report of the Review Panel on Building Standards (Fire Safety) in Scotland, the following recommended parameters are to be adhered to:
   a) Any building with a storey at over 11m above the ground should require A2 or better;
   b) All entertainment and assembly buildings, residential care homes and hospitals of any height should also only be A2 or better;
   c) BS8414 (and BR135) would remain as an alternative method of providing evidence to show compliance.
3. A robust external cladding material at ground floor levels is to be used e.g. metal, stone, brick, terracotta and other materials with a high mechanical impact resistance may be acceptable.
4. Appropriately designed and specified fire stopping barriers **must** be included within the cavities, usually, falling in line with fire compartmentation lines as a minimum requirement. The design detail must be carefully considered: such as window/door openings, eaves, wallheads etc. The installation detail of these important elements and their interfaces must be closely monitored and inspected during the construction phase, by all parties.
5. The construction details of external walls needs to be considered in relation to how easy it will be to repair, replaced and how quickly (and easily) fire potentially will spread up the outer face of the building. In the latter case internal fire barriers, or other fire restriction features, are likely to be required at specific intervals along the wall.
6. The Design Team must commission Fire Protection modelling, whose purpose is to illustrate and predict the spread of smoke and heat from fires. I.e. computational fluid dynamics (CFD) to create fire models that can, when expertly used, applied in the design process and assist the understanding of a key stakeholders, as a powerful design and safety tools. The output of this exercise must be included in the RIBA stage reports and provided to the Fire Protection Engineer and FSU for consideration and comments.

11.4 Fire Wall Systems

Firewalls may be loadbearing or non-loadbearing and are made from a variety of materials including masonry, plasterboard, and calcium silicate board and sandwich panels for larger buildings.

Buildings will move in the event of a fire and floor slab deflection can cause stress in partitions. The partition's structural soffit junction detail must be designed to accommodate anticipated movement. The deflection head detail must be correctly installed. A robust method of quality assurance for the fire compliance of dry-lined walls must be in place prior to installation. Please reference the British Gypsum 'White Book' for technical detail.

11.5 Fire Resisting Glazing Systems

Fire resistant glass must be marked with a manufacturers stamp to advise exactly what type and properties of fire performance the glass provides. If such a symbol is not clearly displayed, then it shall be assumed that the glass is not fire resistant.

Fire resistant glazing systems have to be installed as tested assessed or certificated, using the correct, supplier specified, and compatible components. Any site application that deviates from the test, especially those involving the installation of larger panes, must to be re-tested or assessed by a competent person.

The commonest fire resistant glass types provide integrity cannot be used, for example, to protect a Temporary Waiting Space. Other types are available that provide either full insulation (same period of insulation as integrity) or partial insulation, e.g. the insulation value is approximately half the integrity value.

Security or safety glass cannot be expected to provide any tested fire performance unless expressly stated, stamped on the glazing and certified as such.

Expert advice and more detailed information on glazing systems can be sought from the Glass and Glazing Federation: www.ggf.org.uk

11.6 Fire Doors - Construction

A fire door ‘assembly’ is a system where all or several items (door leaf or blank, frame, glazing, hinges and other hardware) are sourced separately and typically assembled on site.

A fire ‘doorset’ is a door system where everything has been supplied from one source (typically a 3rd party certified door manufacturer), partly or completely pre-assembled where all of the components are fire tested as a unit.

Pre-assembled doorsets are preferred as they are the best method of attaining fire compliant installations and can be more cost effective as they reduce installation time. Fire Doors must be fitted with intumescent strips and smoke seals (brush type, preventing passage of hot and cold smoke). These can be fitted to either the door, frame, or a combination of both as part of the assembly/door set.

All fire doors must be fully 3rd party certified, which will normally be identified by being plugged in accordance with the BM TRADA Q Mark Assurance scheme or carry the BWF Certification label, backed by the Manufacturers Primary Fire test evidence in accordance with BS476: Part 22.They shall also be identified in a Door Schedule and corresponding layout plans within the O&M.

Fire door frames must be kiln dried to prevent non-compliant gaps through warping. The minimum density for FD30 frames is 500KG/m3, either softwood or hardwood; for FD60 door-sets the minimum is 650gk/m3 and the timber must be hardwood.

FD60S doors are to be installed as a minimum standard for areas with Temporary Waiting Spaces. Fire doors to Temporary Waiting Spaces must have adequate smoke brush seals and intumescent strips to the threshold/edges/frames to ensure that the Temporary Waiting Space area will actually perform as intended.

10mm lipping and bushed bearing hinges shall be specified for high usage doors to reduce the likelihood of defects and maintenance burden.

11.7 Fire-stopping and linear gap sealing

When fire-stopping around services a number of factors must be considered:

- required period of fire resistance
- type, number and size of services contained within the aperture
- how the fabric of the building will react in a fire
- later addition or removal of services
- load bearing or impact resistance requirements
- thermal movement or other ambient conditions
- acoustic or other non-fire issues

All fire stopping/sealing shall be carried out in accordance with BS EN 1366-3:2004, BS EN 1366-4: 2006 and BS 476-20: 1987. Stopping/sealing shall also be marked/labelled by the contractor in each location it is carried out.

Products shall only be installed as fire tested/assessed/certified and systems shall not be mixed and matched as manufacturer's products will vary and products from one manufacturer may not work with complementary products from another manufacturer. Similarly, door seals damaged by the introduction of additional services shall be repaired with the same product. All products used for stopping/sealing shall be specified and installed in strict accordance with manufacturers written instructions and approved construction details.

Urethane foams are rarely tested or suitable for sealing service penetrations. They **must not** be used unless evidence is provided to confirm they are tested and certified as suitable for the proposed application.

The correct type of intumescent mastic must be specified for each application:

- Acrylic mastics are the most basic in terms of fire performance. 3rd Party accreditation is a key requirement;
- Silicone mastics are waterproof and generally more flexible; they shall be used in cavity voids and other areas where thermal movement of the structure and moisture may occur.
- Graphite mastics generally have both a high expansion capability and the ability to exert pressure. They shall be used around cables and small plastic pipes as they will displace and dam penetrations as such services melt.

Linear gaps generally occur where different components of a building interface. Fire-stopping requirements must be expertly determined, taking into account a number of factors such as the level of fire resistance required and how the interfacing components might behave in a fire in terms of expansion and deflection, to guarantee compliance. The attainment of fire compliant linear gap seals can be problematic, if the passive fire protection of a building has been fragmented into different sub-contractor's work's packages. The responsibility for the linear gaps resides with the Principal Contractor.

Within a roof void, in addition to the installation of vertical barriers, fire-stopping shall be carried over the full thickness of the walls and the roof covering is to be designated for penetration by fire spread of flame. If roof support members pass through a wall, fire protection to these members for a distance of 1500mm either side of the wall is required.

11.8 Cavity barriers

Cavity barriers to extend a fire wall to the soffit or to fill a gap between a door set and the soffit must provide both fire integrity and insulation, and are typically made from a 'coated batt' system.

Raised floor cavity barriers can be used to provide acoustic barriers and / or an air seal, especially if forming an integral part of a building's air plenum. They are typically made of foil faced mineral wool systems where they are not likely to be disturbed or breached by services or operatives. Where barriers have the potential to be breached, coated batt systems or similar, fire tested for this detail must be specified, potentially inclusive of cable transit sleeves.

Where access is required, or expected, through cavity barriers e.g. roof voids/attics, for maintenance or inspection purposes, then appropriate fire doors (specified to match the required rating of the barrier) must be installed within the barrier, rather than relying on access through barrier systems. This will prevent damage to barriers, or the potential for the barriers being disturbed and left open.

11.9 Ducts and Dampers

In ordered to maintain compartmentation in some situations, there can be a requirement to fire rate ductwork to prevent fire from breaking out of or entering ducts. This is particularly important where ducts/ dampener are located on escape routes

Fire dampers shall be installed within ventilation ductwork in the following situations:

- Unprotected ductwork. Wherever ventilation ductwork passes through a fire-resisting wall or floor or any other fire-resisting division;
- Ductwork in a fire-resisting enclosure. At all points at which the ventilation ductwork passes through the fire-resisting enclosure; and
- Fire-resisting ductwork. Wherever the ventilation ductwork is penetrated by an unprotected branch, inlet or outlet

Installations shall always be in the plane of the fire resisting division, and not elsewhere in the duct.

Where ducts penetrate drywalls they must be framed with studwork, lined with plasterboard and effectively sealed as per the duct manufacturer's detail. All dampers must be accessible for future maintenance.

Electrical Cables for Fire Detection & Warning Systems etc.

Cables for Fire Detection & Warning Systems. As a minimum, all cables for Fire Detection & Warning Systems will be fire resistant in accordance with BS 5839 – Part 1 2017.

In general, the cabling is to be manufactured with a low smoke, zero halogen thermoplastic sheath, third party approved to LPCB and BASEC Standard – Enhanced Fire Alarm Cable Minimum 1.5mm conductor size and must meet the performance requirements of BS6387 Category CWZ, EN 50200 PH30 & PH60, BS EN 50200 Annex E, BS EN 60332-1-2, BS EN 60332-3-24, BS EN 61034-2

Please reference Electrical Design Guidelines No 6 in respect of specification of Fire Detection Systems, Emergency Voice Communication Systems and Emergency Lighting

Any other standards to be considered must be confirmed with the FSU and University Project Manager.

There is a tendency for cables to be run and installed throughout buildings in areas that cannot be effectively fire sealed. The use of fire tested transit sleeves, pre-installed to cater for such runs, shall be adopted where practicable.

Please note that BS 5839 precludes the use of plastic tie clips, cable ties or trunking where these products are the sole means of cable support. Electrical trunking boxes almost invariably have no external fire rating and shall be fire-stopped.

11.10 Fire Curtains and Shutters

Care must be taken in ensuring that what is specified and installed provides the fire resistance required; for example if it is intended to create a 30 minute protected escape route, fire curtains must possess 30 minute insulation from excessive heat together with hot and cold smoke protection and not just 30 minutes fire integrity. Fire Shutters provide a similar function to fire curtain and are often used to provide 120min fire separation. Both types of products shall only be installed and maintained by 3rd Party certified installers. For the application of fire shutters, an interface unit to the fire alarm system is to be installed, such that the fire shutter will motorise closed in the event of a fire.

Suitable arrangements must be in place to ensure that the escape of building users is not impaired, where fire curtains/shutters are specified.

11.11 Timber Frame Buildings

Timber frame buildings are unforgiving of poor passive fire protection. Softwood framework has very little fire resistance and mainly relies on plasterboard for protection. Unless expertly clad and sealed, adhering strictly to the board manufacturer's instructions, the risk of fire entering wall cavities where it can be extremely difficult to locate and fight. Any actions or changes to a building that might breach the internal cladding must be strictly managed, through quality control and inspections during construction.

12.0 Quality Assurance

12.1 Competent Installers

Under the Fire Scotland Act the Responsible Person is charged with ensuring that Competent Persons are used. It is therefore important to unambiguously specify the standard of workmanship required.

However, standard specifications will often cover 'workmanship' in a generic way that will provide little practical or specific guidance. Instructions such as "unless otherwise specified the standard of workmanship required shall be to BS 8000", are not sufficient as the BS is very general and contains little detail on passive fire protection.

Modern methods of construction often include materials which are less robust and forgiving of latent defects caused by poor workmanship than in the past; there is a very small margin for error with installation if the required fire performance is to be achieved.

Passive fire protection is rarely a complete package of work delivered by a specialist installer. Elements are typically split into related sub-contractor packages and often undertaken by persons not adequately skilled, thus leading to poor standards of installation. As stated in the ASFP document „Ensuring Best Practice for passive fire protection in buildings' "as the objective of passive fire protection material installation is to protect the life of the building occupants the work shall not be allocated to contractors for whom it is an add-on function".

The CIBSE Fire Engineering Guide also recognises these issues, stating that "it is common that the fire separating elements are not properly installed or maintained" and "the fire-resisting performance of a compartmentation element is only as good as the weakest link".

With all built-in components, especially those concealed within the fabric of the building, it is difficult to assess the quality of workmanship once installed. It is often equally difficult, and potentially very costly, to upgrade the performance of a system that has been incorrectly installed.

A sufficient level of competence and expertise with evidence of a robust Quality Assurance system is required to ensure that fire protection systems meet the required standards.

Monitoring of 'passive' fire protection is often extremely difficult and failures not apparent until a fire occurs. There is a reluctance to carry out invasive inspections or access hidden voids at the 'handover' stage of a project or later in the life of buildings. If the integrity of the workmanship is questionable, the intensity of inspections of workmanship must be increased and undertaken during the construction process, in order to mitigate issues.

In addition 'passive' fire protection is often prone to 'out of sequence' damage as additional services are retrospectively installed.

If damage to the fire separating components takes place it is very important that such damage is repaired by those who are competent to do so. As stated in the FPA 'Passive Fire Protection Handbook' "on-site modifications that are not approved shall not be permitted, or the use an installation contractor that cannot demonstrate the appropriate level of competence and experience".

12.2 Third Party Certification Products

Active and passive fire protection products shall be 3rd Party certificated. Manufacturers in such schemes will be pleased to provide details of their certification, typically provided by UKAS accredited bodies such as BRE / LPCB, Warrington Certification, BM TRADA, IFCC, FM Global and UL. Should there be any doubt or ambiguity as to product listing then clarification can be readily sought by visiting the appropriate website.

12.3 Installers

Although there is currently no legal requirement of 3rd Party Certification for structural fire protection installers, the Technical Handbook: Non-Domestic states that:

"Some independent certification schemes specify how workmanship will deliver a declared level of performance. The relevant person carrying out the work should show that the workmanship will provide the appropriate level of protection and performance. Schemes, including "Certification of design" and "Certification of constructions" that register installers of materials can provide a means of ensuring that work has been carried out by knowledgeable contractors to appropriate standards."

The 'Fire Protection Association" Essential Principles Design Guide' states: "All fire protection products / systems shall be installed by adequately trained specialist installers shall be third party certified to install the specific product / system when an appropriate scheme is available".

12.4 Limitations on Installers

It is necessary to understand some of the limitations on installers to ensure that all potential workmanship issues are covered. Project managers shall check that 3rd party certificated contractors hold certification for each & every product they install. For example BRE/LPCB scheme LPS 1531 covers the requirements for the approval and listing of companies installing or applying the following passive fire protection products:

- Penetrations, Cavity Barriers and Linear Gap Seals
- Fire Rated Board and Cladding to Steels
- Intumescent Coatings to Structural Elements
- Fire Rated Spray Materials
- Fire Rated Ductwork Systems
- Fire Resisting Dampers
- Fire Resistant Compartment Wall Systems
- Very few if any companies are in the scheme for all types of products.

It should be noted that this scheme does not apply to fire doors; these are covered by two separate schemes: LPS 1271 for installing Fire and Security Doors, Door sets, Shutters and Active Smoke / Fire Barriers; LPS 1197 for repairing and maintaining them. Some organisations will be licensed for only one or more, but not all of the products within these two schemes.

It should also be noted that some schemes will allow a member of the scheme to undertake work outside of the scheme, potentially to a lower QA standard. It is therefore crucial that the Responsible Person ensures that all aspects of the work being undertaken by a 3rd party accredited installer are covered by the scheme in which they claim to operate and that all work they are undertaking can be fully certified upon completion.

12.5 Alternative to third party certification

The alternative to 3rd party accreditation schemes to guarantee competent installations is by using inspection and auditing services to guarantee that fire safety components are being installed competently to the required standard of workmanship. Suitable organisations to undertake such inspections include BRE, Warrington Certification, BM TRADA, IFCC and the BWF.

12.6 In House quality assurance checks

This may be an option where a suitably competent person is employed and has access at relevant stages in the construction. Where used, proof of competence and a schedule of inspection must be provided.

12.7 Planned Preventative Maintenance

The future management of fire safety components is an important function, which must be considered at design stage; a primary aim being to minimise the resources that will be required to maintain them.

12.8 Maintenance, test, check and training burden

It may well be difficult to recruit, organise and train people to carry out functions such as first responders to alarm activations, fire wardens, evacuation stewards, operators of evacuation equipment, extinguisher users etc.

The factors to consider include:

- Time: the duration of tasks
- Expertise: Level of knowledge required and training implications
- Access: Requirements to work at height, confined spaces etc.
- Lifespan: frequency of tasks and working life before replacement
- Expected examples of equipment include:
- Service free water mist extinguishers to cover all except risk of metal fires or in high voltage electrical equipment areas
- Self-test facilities on emergency lighting systems
- Quality doors and fittings and hold open devices
- How hidden spaces and cavities within the building can be readily accessed to both inspect and maintain the in-built fire safety components

13.0 APPENDICES:

13.1 Appendix No 1: Fire Safety Strategy

The Fire Safety Strategy document shall include the following:

- Provide a full description of the assumptions and philosophies that led to the fire safety design, including explicit assumptions regarding the management level and designated use of the building, housekeeping and other management functions;
- Explain the nature of the fire safety planning, construction and systems designed into the building, and their relationship to overall safety, evacuation and management;
- Describe the basic fire precaution measures;
- Provide information, etc., relating to other reasons for protecting the building – property, contents, fabric, heritage, environment, and insurer's requirements.
- Cause and Effect

13.2 Appendix No 2: Fire Safety Design Summary

The requirement for a 'Fire Safety Design Summary' came into effect on 1 October 2013 as a result of amendments to The Building (Procedure) (Scotland) Regulations 2004 and the Building (Forms) Scotland Regulations 2005. This requires a Fire Safety Design Summary document to be submitted for approval as part of the completion certificate application. This requirement is applicable to new non-domestic buildings, including extensions, where the building warrant application has been submitted from 1 October 2013.

The Fire Safety Design Summary document is to assist the operation and maintenance of the building's fire safety systems and with fire risk assessments. For example, it shall include:

- Number of exits, travel distance, occupancy capacity, compartmentation;
- Method of evacuation;
- A description of any alternative approaches / fire engineering solutions;
- A description of any smoke-control system;
- A description of any fire detection and alarm system;
- A description of any sprinkler system;
- A description of any fire-fighting facilities;
- A list of any design assumptions based on the fire safety management of the building;
- List/s of any commissioning certificates / maintenance schedules; and,
- Reference to any specialist reports, e.g. fire engineering report.

The design limits of the maximum numbers of persons who may safely use each space including escape routes, staircases, exits etc. This shall be augmented with the maximum numbers of mobility impaired persons.

- Design imposed restrictions not shown on the plan drawing i.e. fire loading etc.
- Any pre-planned procedures agreed with the fire and rescue service
- Documentation to describe the use, test, servicing and maintenance of the fire safety features and equipment.
- Detail the prevention and security measures (including measures for the prevention of arson);
- Details interactions with security, building management, other safety systems, etc.

13.3 Appendix No 3: Fire Safety Manual content includes

Before a building is occupied, a fire safety manual shall be completed. The purpose of the manual is to clearly define the nature of the fire safety systems provided for the building. It shall include:

- An explanation of the overall fire safety strategy;
- Evacuation procedures;
- Design documentation to describe the use of each fire safety system;
- Staff roles in the event of a fire: their responsibility, authority and accountability; and,
- A detailed maintenance routine.

The Fire Safety Manual should be reviewed periodically and when any alterations are made to the building. Further details of the suggested contents of the fire safety manual are provided in Annex H of BS 9999 Code of practice for fire safety in the design management and use of buildings.

The design limits of the maximum numbers of persons who may safely use each space including escape routes, staircases, exits etc. This shall be augmented with the maximum numbers of mobility impaired persons.

- Design imposed restrictions not shown on the plan drawing i.e. fire loading etc.
- Any pre-planned procedures agreed with the fire and rescue service
- Documentation to describe the use, test, servicing and maintenance of the fire safety features and equipment.
- Detail the prevention and security measures (including measures for the prevention of arson);
- Details interactions with security, building management, other safety systems, etc.

A fire safety plan drawing showing all fire safety related features i.e.

- Escape routes indicating maximum as built capacity, minimum width to meet the client occupancy levels and any not suitable for disabled persons or specifically provided for them.
- Room use and maximum as built occupancy number.
- High fire risk areas.
- Hazardous areas and storage.
- Compartmentation including fire resistance of partitions, floors, fire shutters etc. All passive fire protection components and elements must be shown.
- Fire and final exit doors indicating securing, hold open or self-closing devices.
- Detection and alarm equipment including zones, ancillary and interfaced items.
- Emergency lighting units.
- Firefighting equipment including hydrants, dry risers and items for Fire Service use.
- Electricity and gas supply cut-offs.
- Ventilation systems controls, ductwork and dampers.

- Fire related signage.
- Smoke control zones and equipment.
- Firefighting and evacuation lifts and controls.
- Control points for any other fire related equipment (ventilation, gas, electricity etc.).
- Access (exterior and interior) for the fire and rescue service and hazards to fire-fighters (e.g. some types of sandwich panels).
- Temporary Waiting Spaces and specialist disabled equipment.
- Assembly points and/or muster stations.

13.4 Appendix No 4: Bibliography of Standard Referred to and Other Useful References

- **The Building (Scotland) Act 2003** http://www.gov.scot/Topics/Built-Environment/Building/Building-standards/ProceduralLegislation/scottishlegislation
- **The Building (Scotland) Regulations 2004** http://www.legislation.gov.uk/ssi/2004/406/contents/made
- **The Scottish Buildings Standards Technical Handbook (Non-Domestic) 2017** http://www.gov.scot/Topics/Built-Environment/Building/Building-standards/techbooks/techhandbooks/th2017ndgen
- **The Fire Safety (Scotland) Regulations 2006** http://www.legislation.gov.uk/ssi/2006/456/contents/made
- **Fire (Scotland) Act 2005** http://www.gov.scot/Topics/Justice/policies/police-fire-rescue/fire/FireLaw/News
- **BS 5499-4:2013** Safety signs, including Fire Safety signs - Part 4: Code of practice for escape route signing.
- **BS 5499-10:2014** Safety signs, including Fire Safety signs - Part 10: Guidance for the selection and use of safety signs and Fire Safety notices.
- **The Health and Safety** (Safety Signs and Signals) **Regulations 1996**
- **Fire Safety Risk Assessments:** Educational Establishments**.** https://www.gov.uk/government/publications/fire-safety-risk- assessment-educational-premises
- **Fire Safety Risk Assessments;** Large Places of Assembly. https://www.gov.uk/government/publications/fire-safety-risk-assessment- large-places-of-assembly
- **BS 5839 Parts 1 2017, 3 & 8** Fire detection and Fire Warning Systems for buildings
- **BS 8300:2009+A1:2010 Design** of buildings and their approaches to meet the needs of disabled people. Code of practice
- **BS EN 15004-1** Fixed Firefighting systems – Gas extinguishing systems
- **BS ISO 7010:2011** Graphical symbols. Safety colours and safety signs. Registered safety signs
- **BRE report (BR187)** External fire spread: Building separation and boundary distances 1991
- **British Compressed Gas Association** (BCGA) Codes of Practice
- **Construction** (Design & Management) **Regulations 2015**
- **Fire Prevention on Construction Sites** Joint Code of Practice on the Protection from Fire of Construction Sites and Buildings Undergoing Renovation. Produced by the Fire Protection Association.
- **Fire Safety in Construction** HSG168, produced by the Health and Safety Executive
- **Health and Safety at Work** etc. Act 1974
- **The Building Act 1984**
- **The Equality Act 2010**
- **The Equality Act (Specific Duties) (Scotland) 2012**
- **Workplace (**Health, Safety and Welfare**) Regulations 1992** (as amended)
- **Dangerous Substances and Explosive Atmospheres**. Dangerous Atmospheres Regulations 2002. Approved Code of Practice and Guidance. L138 HSE Books 2003 ISBN 0 7176 2203 7

- Link to Competent Persons Scheme List: https://www.gov.uk/guidance/competent-person-scheme-current-schemes- and-how-schemes-are-authorised

13.5 Appendix No 5: Health and Safety, Fire Planning Pre-commencement, during the Construction Process and handover

Before any construction works start, the likely impact on the existing building fire safety arrangements must be assessed.

The Construction (Design and Management) Regulation 2015 (CDM 2015) require the University to provide proportionate information on the health and safety hazards of the site, including design and construction hazards to all designers and contractors appointed to the project. This includes fire safety information

CDM 2015 also requires the Principal Contractor:

- To ensure so far as is reasonably practicable, suitable and sufficient safe access and egress from every construction site
- to take Suitable and sufficient steps to prevent, so far as is reasonably practicable, the risk of injury to a person during the carrying out of construction work arising from fire,
- To make where necessary in the interests of the health or safety of a person on a construction site, suitable and sufficient arrangements for dealing with any foreseeable emergency must be made and, where necessary, implemented, and those arrangements must include procedures for any necessary evacuation of the site or any part of it
- To ensure where necessary in the interests of the health or safety of a person on a construction site, a sufficient number of suitable emergency routes and exits are provided to enable any person to reach a place of safety quickly in the event of danger
- To ensure where necessary in the interests of the health or safety of a person on a construction site, suitable and sufficient fire-fighting equipment and fire detection and alarm systems are provided and located in suitable places.
- To ensure fire-fighting equipment or fire detection and alarm systems are examined and tested at suitable intervals and properly maintained.
- To ensure fire-fighting equipment which is not designed to come into use automatically is easily accessible.
- To ensure that each person at work on a construction site is, so far as is reasonably practicable, instructed in the correct use of fire-fighting equipment which it may be necessary for the person to use.
- To ensure where a work activity may give rise to a particular risk of fire, a person must not carry out work unless suitably instructed
- To ensure Fire-fighting equipment is indicated by suitable signs.

Principal Contractors must carry out a fire risk assessment in accordance with their duty under the Fire (Scotland) Act 2005

Arrangements on site are the responsibility of the Principal Contractor but potential effects on others must be considered in liaison with the University

Due consideration must be given to the effect of work activity on existing fire safety arrangements.

Pre-Construction Phase Safety Plan

The following fire prevention and fire safety guidance documents contain important information, which should form the basis of arrangements made.

- Fire Prevention on Construction Sites 9th edition - HSG 168 Fire safety in construction
- The risk assessments and control measures must include consideration of the impact of the proposed works on the following areas:
- Prevention of fire and control of ignition sources.
- The Means of Escape for occupants to a place of safety; this includes the physical protection of routes, floor surfaces, locks & door furniture and emergency and safety lighting for escape routes etc.
- The building's Fire Compartmentation to protect occupants and escape routes; this includes fire door management, demolitions, fabric removals, penetrations of fire compartment walls and floors by services, pipe work and electrical and data cabling The provision of passive fire protection element of structure and to maintain fire compartmentation.
- The storage and use of hazardous goods by contractors that increases the fire loading or introduces hazardous materials to the site; which includes combustible waste removal, storage and use of hazardous materials such as gas cylinders and flammable liquids and hot works
- The elimination of unwanted fire alarms caused by automatic fire detection being contaminated due to dust, construction activities or works to the fire alarm system within the site or the immediate project site boundaries.
- Consideration for the early commissioning of fire sprinkler system during the construction process, if available, to mitigate the risk of fire. The recommissioning of the system prior to the handover to the client to ensure that the active fire protection, consisting of a water supply system, providing adequate pressure and flowrate to a water distribution piping system, onto which fire sprinklers are connected and ready to bring into service .

These considerations should generate suitable control measures and documented arrangements to protect all 'relevant persons'. These control measures must be in place prior to works starting.

13.6 Appendix No 6: Competent Person at handover check list

The issue of the Practical Completion Certificate will be in accordance with the Conditions of Contract and the decision of the Project Manager.

Check List	**Y**	**N**	**N/A**
Has the Fire Alarm been commissioned for the Project and has the Test Certificate been issued? (Please note this applies to new systems, new zones for existing buildings or the re-commissioning of existing systems)			
Design Certificate – to be signed by the designer.			
Installation Certificate – to be signed by the installer.			
Commissioning Certificate – to be signed by the commissioning engineer.			
Demonstration Certificate (Including cause and effect) – to be signed by the Project Manager (on behalf UoE)			
Acceptance Certificate – to be signed by the Project Manager (on behalf UoE)			
Have the Fire Alarm mimic diagrams been installed adjacent to the Fire Alarm Panel and repeaters?			
Have the Fire Alarm Strategy drawings and description been submitted together with a copy of the marked up plan showing audibility record for Fire Alarm sounders?			
Has the Fire Safety Manual been completed and handed over to the FSU?			
Has the Emergency Lighting Test Certificate been issue?			
Design Certificate – to be signed by the designer.			
Installation Certificate – to be signed by the installer.			
Demonstration Certificate (Including cause and effect) – to be signed by the Project Manager (on behalf UoE)			
Commissioning Certificate – to be signed by the commissioning engineer.			
Acceptance Certificate – to be signed by the Project Manager (on behalf UoE)			
Have all fire resisting doors within the scope of the project been subjected to an inspection by a competent person?			
Has the necessary fire signage (including Fire Action Notices) been supplied and fixed in accordance with Health & Safety (Safety Signs & Signals) Regulations 1996 and BS 5499?			
Have commissioning certificates been provided for specialist equipment for Fire & Rescue Service use (i.e. Smoke Extract & Control Systems, Dry Rising Mains, Fire Fighting Lifts etc.) been provided where necessary?			
Is firefighting equipment (such as portable fire extinguishers) fixed in place accordance with BS 5306: Part 8?			
Is there evidence that fire stopping and other passive fire protection components have been installed by 3rd Party accredited installers to a manufacturer's fire tested system?			

Have details of all passive fire components installed, including dry-lined fire walls and fire doors been included in the Fire Safety Manual?			
Has all the third party certification been included in the Fire Manual?			
Has the Fire Safety Design Summary been supplied, does it contain all required information and are arrangements in place to revise these as built?			
Has the Fire Risk Assessment been conducted?			
Are arrangements in place to ensure fire safety during the fit out and occupation period?			
Signed: Project Manager -	Date:		
Signed: Fire Safety Unit -	Date:		

13.7 Appendix No 7: Clarification / Deviation / Exception Sign off schedule

Please see Guide No 1

13.8 Appendix No 8: Standards and Legislation /Regulations Conflict (sign off) schedule

Please see Guide No 1

13.9 Appendix No 9: Reviewable Design Data sign off schedule

Please see Guide Number No 1

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