

Fire Safety Design Strategy for Building Works and Refurbishments

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1. Introduction

The University of Leicester is a research-led university accommodating over 17,000 students and approximately 4500 Academics and Staff. The main campus is located in the centre of Leicester, with residential accommodation and other facilities also located at Oadby and remote sites. The University estate numbers over 300 premises, ranging from single to multi-storey buildings, including unique and listed buildings.

This document sets out the standards that apply to University of Leicester Campus (hereby referred to as UoL) and its design requirement for fire safety. It will apply to newly constructed buildings and existing buildings that are being refurbished. In some cases, this standard exceeds the Building Regulation requirements as it represents good practice in the Higher Education sector.

Building Regulations are a set of minimum standards which only apply to newly constructed buildings or work on buildings which come within the definition of a Material Change of Use or Material Alteration (as defined in the Building Regulations 2010) and the purpose of this guide will be to provide a standard policy specifying the standard that is required by the University.

This document also seeks to a link between legislation such as the Building Regulations and fire safety management to allow the Responsible Person and any appointed employee or contractor to understand what is required by the University.

2. Objective and Scope of this Document.

This guide is intended for use in the design of all buildings owned and managed by UoL, including newly constructed buildings and those being refurbished or subject to a change in use. This guide should also be consulted to inform decisions about tenanted buildings where the implication of building changes (through construction work or change of use) may affect building occupants and users. UoL will cooperate with building owners, building managers and tenants (as appropriate) to ensure compliance with statutory requirements.

This guide is intended to ensure a consistent approach, and to identify the UoL desired strategy when the proposed use and ongoing building management requirements necessitate a variation from prescriptive standards.

This guide is intended to facilitate high standards of fire safety design and application, secure best value and sustainability in relation to the design and use of UoL premises.

It is important to recognise that UoL premises are occupied and used by a variety of people with different capacities and requirements, and it not limited to students, academics and other UoL staff.

The effective application of fire safety design and management principles should not be considered in isolation and this document should therefore be viewed alongside other relevant UoL policies, guides and standards relating to the management of health and safety, equalities, procurement, environmental protection and quality.

The most recent versions of reference documents and policies are to be referred to when undertaking any new build or refurbishment project.

3. Governance and responsibilities

The Regulatory Reform (Fire safety) Order 2005 establishes the requirement for the University to undertake fire risk assessments and to address preventative and protective measures aimed at reducing the risk of fire and mitigating its effects.

The Order places a duty on the 'Responsible Person' to:

"make and give effect to such arrangements as are appropriate, having regard to the size of his undertaking and the nature of its activities, for the effective planning, organisation, control monitoring and review of the preventative and protective measures."

The Responsible Person for all UoL premises, as defined in the Regulatory Reform (Fire Safety) Order 2005 is the University Council with delegated responsibility given to the President and Vice-Chancellor (Chief Executive) of the University of Leicester.

The day to day responsibility for fire safety in design sits within the UoL Estates and Campus Services division (ECS). Advice can be obtained from the ECS Health & Safety Business Partner in the first instance.

4. Legislation and Standards

Fire safety legislation, Building Regulations Approved Document B and relevant British Standard documentation are in place to support designers in arriving at a suitable and sufficient final design solution.

The reference to any relevant guides is not intended to be exhaustive but to provide an indication of the range of requirements that need to be taken into account when approaching fire safety design and management.

The University will comply with all relevant legislation relating to the design and build of its accommodation and to ensure that an appropriate and broadly acceptable standard of fire safety management is adopted, the guidance described in this document takes into consideration the requirements and recommendations contained in the following documents:

1. Building Regulations and Approved Documents
2. BS 9999 Code of practice for fire safety in the design, management and use of buildings
3. The Regulatory Reform (Fire Safety) Order
4. PAS 911: Fire strategies - guidance and framework for their formulation
5. BS 7974 Application of fire safety engineering principles to the design of buildings. Code of practice

6. The Health and Safety at Work Act and associated Regulations, including The Dangerous Substances and Explosive Atmosphere Regulations (DSEAR)
7. The Licensing Act
8. The Housing Act
9. HTM 105

Approved Documents are issued by the Secretary of State for the purpose of providing practical guidance with respect to the requirements of the Building Regulations and represent the minimum standard that will be applied by the University. There may be circumstances in which the University environment requires variation from national codes of practice or standards based on whole life building use, flexibility to meet property protection and business continuity objectives and the provision of premises suitable for a wide range of users. University standards may include specific provisions for non-fire safety aspects, including the requirements of the Equalities Act. As a result, the University may specify higher standards than those set out in legislation, regulation or guidance.

A fire safety engineering approach that takes into account a total fire safety package is an alternative approach to the fire safety strategy and design for a particular building and is recognised in Approved Documents as a means of satisfying the functional requirements of the Building Regulations.

When carrying out 'notifiable work' (defined as building work which requires an application under the Building Regulations), the requirements of those regulations must be met. There are, however, 3 different methods of meeting these requirements for the purposes of fire safety:

1. Approved Document B to the Building Regulations;
2. BS 9999 and
3. BS 7974 (series) Fire Engineering.

Those standards allow detailed professional knowledge to be applied in order to arrive at a final design solution. Consultation between the UoL project managers and the relevant staff within the UoL Estates and Campus Services division (ECS) prior to the commencement of notifiable work will enable the most suitable approach to be selected, and to ensure consistency of the application of the most suitable methodology to secure the desired solution.

5. Approved Document B, BS 9999 Fire safety design and management in buildings & Fire Engineering BS7479 (series)

- a) Notifiable work occurs when work under Regulation 5 of the Building Regulations is carried out, for example when a new building is erected or an existing one is adapted or refurbished and then that work must be "notified" to a building control body. In all cases the work must comply with the requirements of the Building Regulations 2010, however as mentioned in paragraph 4d there are 3 methods of meeting these requirements:
- b) Approved Document B is the simplest method of showing compliance and should be the first approach used when designing a new or refurbished building. This method entails following the guidance in Approved Document B2 to the Building Regulations 2010. This 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 fire service.

- c) Some situations are more complicated, and a more flexible design approach is required, so if design compliance cannot be achieved by using the method specified in Approved Document B then the approaches defined in BS 9999 can be used.
- d) Using the approach defined in BS 9999 allows features such as high ceilings, detection and alarm systems and sprinklers to be used to increase acceptable travel distances or even decrease the size or numbers of exits or stairs.
- e) If the specified design can still not be achieved using the approaches defined in BS then a fire-engineered approach can be used. For this there is a suite of documents under the BS 7974 series which must only be used by a competent person. These standards allow detailed professional knowledge to be used to arrive at a final design which will satisfy more complicated projects.
- f) However, application of these 3 methods must only be done by a competent person and although some parts of buildings can be fire engineered and others may appear to be done in accordance with Approved Document B guidance or BS 9999, the approaches must never be mixed and if an approach is applied to part of a building then the same approach must be applied to the whole building.
- g) UoL (ECS) in conjunction with Building Control will decide which method should be followed on a case by case basis.
- h) 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 design so as not to create a material alteration for the purposes of the Building Regulations and potentially adversely affecting the fire protection arrangements in adjacent areas.

6. Fire Design Strategy

The UoL design strategy is based on early detection and warning of fire in order to preserve life by facilitating speedy evacuation from its premises. New UoL premises and those undergoing major refurbishment will be required to satisfy the principle that the extent of fire and smoke damage will be minimised and confined as close as possible to the point of fire origin. When carrying out 'notifiable work' (that is building work which requires an application under the Building Regulations), the requirements of those regulations must be met.

a) Life safety

When considering the factors that will influence escape related to the risk profile and occupancy levels of a specific building, it is important to look at the stages in the process of escape and the maximum distances people can be expected to travel. Escape is generally considered in four distinct stages as follows:

Stage 1 – escape from the room or area of fire origin

Stage 2 – escape from the compartment of origin via the circulation route to a protected stairway or an adjoining compartment offering refuge

Stage 3 – escape from the floor of origin to the ground level

Stage 4 – escape at ground level away from the building.

The University's requirement for means of escape provision will be in accordance with relevant legislation and Approved Codes of Practice and informed by a risk assessment based on the intended occupation and use of the building in question with a pre-fire design assessment being carried out by the designer to incorporate the client/end user input.

Means of escape in any new build or refurbishment project will be provisioned in support of a single stage simultaneous evacuation protocol (See Section 7c). UoL is responsible for all matters relating to the fire risk assessment process and standards to be applied. This will include the audit of fire strategy, fire risk assessment and statutory compliance throughout build stages.

Means of escape travel distances will be in accordance with the relevant purpose group(s) identified in the Approved Documents Building Regulations; BS 9999 and BS 7479 (series) Fire Engineering, unless, through the application of fire engineering principles, distances can be increased in response to identified need or design requirements.

UoL will seek to avoid the use of external escape stairs or spiral stairs in any future design for a new build project or refurbishment where possible.

During the design phase, every effort will be made to avoid dead-end conditions and inner room situations. Where dead-end corridors exist, they shall be protected corridors, separated from the remainder of the accommodation by a minimum of 30 minutes fire resistance, having FD30S door sets fitted with self-closing devices.

Inner room situations will be addressed by the following:

1. The access room shall not be a place of special fire hazard, and

2. Either, a suitably sited vision panel shall be located in the dividing wall or door; the access room shall be fitted with automatic fire detection, or the dividing wall shall terminate at least 500mm from the ceiling.

b) Property protection

In addition to life safety, the University is also aware of the potential impact of a fire on its ability to provide first class teaching and research facilities, through loss of facility, research capability or denial of access. Beyond those passive and active fire safety measures introduced for life safety, there is scope to make provision to limit the extent of fire and smoke spread, reducing the time and cost associated with reinstatement, and minimising business interruption.

Wherever practicable, to secure property protection, the guiding strategy for compartmentation should be to restrict the spread of fire to the room of origin.

As part of any future design project for new build or refurbishment projects, UoL will ensure that the UoL Business Continuity Plan and procedures (as well as fire risk assessment methodologies) are applied in order to identify those additional measures required to reduce the potential and extent of business interruption in the event of a fire.

c) Whole-life building approach

When considering the design requirements for fire safety systems in University premises it is important to adopt a whole-life approach; which includes future maintenance and management requirements. This will take into account potential changes of use through the life of the building, avoid the need to provide retrospective solutions, and reduce ongoing maintenance and management costs incurred during statutory and standards-compliance testing.

When considering the selection and procurement of active fire safety systems and components, it is important to factor in quality, reliability, availability, serviceability (including access) as well as the cost of replacement parts. UoL will therefore seek to work with designers, installers, commissioning engineers, contractors and suppliers specifying third-party certificated as far as reasonably possible to identify through life costs or otherwise quality assured fire protection products and services wherever possible as part of any new build or refurbishment project.

In addition, to insist on high standards of workmanship to minimize fire risks both in the completed building and during construction, and to eliminate as far as practicable, costs associated with rectification of problems created by poor workmanship or product design and specification.

d) Equality Act

In the design and specification of fire safety requirements for new build or refurbishment projects, there is a requirement for UoL to consider the needs of those building users who have a disability. As with other aspects of fire safety, designing-in measures is more cost effective than retrospective installation.

Fire safety elements to be considered include the provision of evacuation lifts, disabled refuges with communication facilities, alarm device provision that support visually and audibly impaired users,

accessible doors on exit routes, and evacuation strategies. Evacuation plans will be developed at the planning stage to ensure that facilities are subsequently provided at the development phase.

Those responsible in ECS for the design and procurement of new build or refurbishment projects are required to consult with the relevant UoL personnel responsible for advising on equality matters as well as building users and occupiers in order to ensure that reasonable adjustments are incorporated at the design stage. Reference must also be made to Approved Document 'M'.

e) Building Manuals

In accordance with Regulation 38 of the Building Regulations for England and Wales it is the contractor's responsibility to provide fire safety information, including, design, installation and commissioning certificates, to the 'Responsible Person' at the completion of a project, or when the building or extension is first occupied. This will include information relating to fire alarm and detection systems, emergency lighting provision, automatic suppression systems and cause and effect devices such as plant or machinery interfaces and electronic door access override controls.

This information will form the basis of a Building Manual that will be provided to all new buildings or following major refurbishment, supplemented by generic and building specific fire safety management information. Manuals will also contain plans and schematics showing the location of all fire safety equipment provided within the building, together with details of the ongoing maintenance and test requirements.

For those buildings that have a fire engineering solution, the Manual will need to contain a description of the principles, design assumptions and calculations supporting the solution employed, together with the ongoing maintenance and management requirements.

f) Fire safety management

It is widely acknowledged that the facilities installed into a building for life safety will only be effective if it is adequately managed, maintained and monitored over the whole life of the building, and if those persons responsible for fire safety management are adequately trained to manage fire safety, and handle incidents.

To ensure that an appropriate and acceptable standard of fire safety management is adopted, the University will take recommendations contained in BS 9999: Code of practice for fire safety in the design, management and use of buildings, PAS 7: Fire risk management system - Specification, and other relevant best practice into account.

The guidance contained in BS 9999 and PAS 7 is primarily concerned the safety of persons in and around buildings, but also takes into account the need to protect property and the environment, and to minimise business disruption. The following reference documents have been prepared to support of the University's fire safety management system:

- UoL Risk Assessment
- UoL Fire safety Policy
- UoL Building Manuals

The Regulatory Reform (Fire safety) Order 2005 places a duty on the Responsible Person to carry out and maintain a suitable and sufficient fire risk assessments. Information obtained from a review of previous UoL fire risk assessments will be used to inform the design of any proposed new build or refurbishment, in order to design out known or previously identified risks wherever possible. All design submissions will need to evidence how this has been achieved.

Fire safety design can only work if supported by effective fire safety management and controls that limit 'unsafe' practices and reduce the likelihood of a fire occurring. It is essential therefore that building managers/custodians are actively engaged in the development and review of fire safety management procedures, guidance and audit.

With regard to levels of fire safety management that can be applied to a building or in the case of the University, the entire site, Level 2 is considered to be the minimum standard in accordance with BS 9999 categorisation. Level 2 management factors include: identifies and reacts to any changes and work required on site, has clear lines of responsibility; a permit system; logging and audit processes.

7. Consultation and Communication

The University is committed to ensuring that internal and external communications and consultation processes relevant to this guide are in place and are effective.

Consultation and communication regarding the University's fire safety information will be in accordance with existing procedures and processes detailed within the relevant guidance issued by the University.

8. Life Safety

a) Occupancy

The basic principles underpinning effective fire safety arrangements is that persons within a building should receive early warning in the case of an outbreak of fire and should be able to make their way to a place of safety, without reliance on emergency responders. A place of safety is generally accepted to be outside the building at a point from which evacuees can safely disperse.

In order to make their way to a place of safety persons may pass through a route classed as a place of relative safety such as a protected staircase, corridor, or through a dividing wall between buildings or within buildings. Occupancy figures for upper floor levels in taller buildings may be required to be limited in order to meet the stair and exit capacities. Where this is the case, information will be provided in the Building Manual and displayed in notices on the relevant floors.

When considering the means of escape from premises, occupancy numbers and characteristics will need to be factored into design and provision. Approved Document 'B' provides the basis for calculating the capacity of stairs and exits provided for means of escape purposes and will be used by the University in all future projects. The occupancy capacity of a room or occupied space is defined as the maximum number of persons it can hold, based on dividing the useable floor area by a floor space factor which, in the case of places of assembly is currently 0.5m²/person. The

calculated occupancy capacity will in turn inform the requirement for exits (number, location and width).

When considering the means of escape, and the active and passive fire safety measures required to satisfy the above principles, consideration must be given to infrequent users of the premises, including members of the public who visit premises. Additional considerations are also required in those premises used for entertainment and where alcohol is licensed for sale. Relevant guidance will be applied in those circumstances together with consultation with the appropriate Licensing and enforcing authorities within whose areas the premises are located.

b) University administration, teaching and leisure facilities

When calculating the exit requirements for larger teaching, conference and leisure facilities, and places of assembly, reference will be made in the first instance to the methods of calculation of occupancy figures contained in Approved Document 'B', together with any associated guidance issued by the local Fire and Rescue Service and Licensing Authorities, informed by a risk assessment based on the intended occupation and use of the space in question.

In larger teaching or seminar rooms where the occupant capacity calculation exceeds 60 persons, additional means of escape exit provision to meet the requirements contained in Approved Document 'B' will be provided.

In places of entertainment, reference will also be made to the technical standards contained in relevant documents including the Technical standards for Places of Entertainment published by the Association of British Theatre Technicians.

c) Residential accommodation including halls of residence

Guidance contained in "HM Government guidance on fire safety risk assessment: Sleeping Accommodation", provides information that will be applied in any design being considered by the University. The opportunity to design-in fire safety and design-out risk through the introduction of practical solutions to remove potential ignition sources eg by use of hard-wired domestic appliances, timer controls, and integrated USB charging points, will be an integral part of the process.

Communal kitchen/dining areas will incorporate a design layout that secures means of escape and minimises fire hazards with features that include siting the kitchen area and cooking appliances at the furthest point from the exit door from the room; and prevents toasters, rice cookers etc. from being sited under wall units by having them hard-wired into fused outlets in areas remote from wall units.

Kitchens with cooking appliances will be provided Stove Guard 'Sentry Cook' or similar devices designed to limit the potential for a fire involving unattended cooking, (See also Management Control Section 5(f)). Doors from kitchen/dining rooms will be equipped with self-closing devices and mains powered 'door-open' warning devices such as the 'Dorwatcher' device, which prevents the door being held open other than for short periods.

d) Evacuation strategy

In the design and construction work for of all new buildings and refurbishments, UoL will aim to apply a simultaneous single stage evacuation strategy. As a consequence, fire detection and alarm system design and performance, as well as building evacuation plans will be tailored to support this strategy.

Fire safety procedures within the University must make provision for occupants who might need assistance to make their way to a place of safety. In all new build and major refurbishment projects, provision will be made to support strategies for persons who might need assistance with evacuation, including the provision of evacuation lifts or a firefighting lift used for evacuation purposes subject to the agreement of the fire and rescue service, and refuges with communication facilities. Refuges will comply with the following:

- Enclosed in fire resisting structure.
- Provided with communications for any person in the refuge linked to Campus Security
- Accessible to and from the outside via a protected escape route.
- Provided with emergency lighting.
- Provided with Fire Action Notices, emergency numbers and egress procedure.
- Sole use for egress purposes for individuals with identified special egress needs.
- Refuge areas should only be used as a temporary haven whilst awaiting egress.

Refuge communication facilities will be connected to Campus Security.

Where there is an identified need to use evacuation chairs or other portable devices, consideration must be given to the number, location and availability of university personnel to aid evacuation. To comply with Health and Safety legislation, all members of staff who would be expected to use evacuation equipment i.e. an Evac+Chair must have documented training and certification to demonstrate competency in their ability to use the chair.

Evacuation chairs or other portable devices will not be provided in residential accommodation. Arrangements for the evacuation of persons requiring assistance from new or refurbished buildings should be informed through discussion between ECS and the relevant UoL personnel responsible for equality matters. Arrangements will be based on a General Emergency Evacuation Plan (GEEP), intended for buildings used by an undefined or transient population.

9. Property Protection

As stated above, the University recognises the value of measures aimed at preventing business interruption and reducing the impact of a fire on its operations and reputation.

Fire protection measures aimed at property protection will be considered in all new building designs and existing property improvement schemes. Such measures may include additional or increased standards of compartmentation beyond that required for life safety, the addition of active fire safety measures including fire suppression systems.

Where identified at the design stage, consideration will be given to additional fire protection aimed at safeguarding high-value assets (monetary or academically significant assets e.g. research facilities or equipment). This protection will be designed to BS 5839 Part 1, Category L1 with fault and fire monitoring to ARC, including the potential to install a sprinkler system.

- I. For buildings providing sleeping accommodation – Category L1: with automatic fire detectors installed in all areas within the building.

- II. For other accommodation – Category L2: automatic fire detectors installed in all escape routes, rooms opening onto escape routes, and other defined areas
Regardless of the size of the premises and the category of system installed, all special risk areas will be provided with appropriate fire detection.

10. Special risk areas

Special fire hazard areas are defined within Approved Documents as being: boiler rooms, oil-filled transformer rooms, storage spaces for fuel or other highly-flammable substances (addressed through fire risk and DSEAR assessment), or rooms housing a fixed internal combustion engine. Additional consideration should be given to service risers, areas containing plant or goods of high value, data processing equipment, high hazard goods or processes, or any business-critical areas seek advice from Safety Services. Special risk areas will be required to meet specific requirements for compartmentation, including doors and service penetrations, automatic fire detection and signage.

A protected lobby will be provided between an escape stairway and a place of special fire hazard. The lobby should have not less than 0.4m² permanent ventilation or should be protected from the ingress of smoke by a mechanical smoke control system.

For new building or refurbishment projects in which it is known that areas of special fire risk containing potentially dangerous or explosive atmospheres and therefore subject to a DSEAR assessment, advice must be sought in the first instance from the ECS H&S Business Partner at the design / planning stage.

Special risk areas will be equipped with automatic fire detection appropriate to its intended use.

a) Tea points and rest rooms

UoL will seek to limit and manage rest rooms and 'tea points' ensuring that the area within which they are situated is adequately fire protected and the range of appliances provisioned is acceptable e.g. kettles or coffee machines, microwave ovens and fridges.

Doors to rooms containing tea points or similar facilities will be required to offer a minimum of 30 minutes fire resistance (FD30S), complete with intumescent strips and cold smoke brush seals, and be made positively self-closing by means of an overhead self-closing device.

b) Laboratories

HTM67 forms basis for laboratory design although there could be variation dependant on the design use of the lab. Stocks of flammable liquids will be stored within flammables cabinets to have fire resistance attaining 60 minutes.

Laboratories are asked to keep the volume of flammable liquids to a minimum. From guidance from the HSE this is notionally a maximum of 50litres in any laboratory. Smaller volumes of 500ml may be present on the laboratory bench or shelves. Stocks of compressed gases and solvents will be stored in external stores.

Laboratories will be enclosed in fire resisting materials offering a minimum of 60 minutes fire resistance, to include access doors. Doors to laboratories will be equipped with self-closing devices. All penetrations in compartmentation shall be effectively fire stopped using proprietary materials and methods to the same fire-resisting standard and certified as such by the installer. Fire and health and safety hazards shall be anticipated and carefully evaluated so that appropriate protective measures can be incorporated into the design wherever possible. There must be sufficient and suitable storage facilities within laboratories based on projected quantities and classes of materials.

Hazard warning signage in accordance with the Health and Safety (Safety Signs and Signals) Regulations and the Classification, Labelling and Packaging of Chemicals Regulations, similar to that required by COSHH Regulations, will be affixed outside laboratories, appropriate to the hazards contained therein.

c) Plant rooms

Plant rooms containing electrical distribution, ventilation or air handling equipment, or heat generation and distribution equipment will be enclosed in fire resisting materials offering a minimum of 60 minutes fire resistance, to include access doors. All penetrations in compartmentation shall be effectively fire stopped using proprietary materials and methods to the same fire-resisting standard.

Third party certification will be required.

Mechanical plant will be interfaced with the fire alarm system, together with any gas or fuel intakes. All such interfaced equipment must be provided with a key switch to allow independent testing of the system and equipment or activation by the Fire Service if required.

Heat generation equipment using gas will be required to have flame failure devices fitted.

d) Kitchens

Kitchens within the University that have commercial/industrial cooking ranges will be required to be contained within a fire rated compartment meeting a minimum of 60 minutes fire resistance, including any doors and service penetrations that pass through the structure.

Access to servery areas or dining rooms will be provided with doors FD30S, self-closing and fitted with vision panels, together with automatic roller shutters designed to release on actuation of fire detection within the kitchen or servery, for other openings.

Kitchens within the University that contain commercial/industrial cooking ranges, will be provided with automatic fire suppression systems such as the Ansul Restaurant Fire Suppression system.

Hoods and extraction ductwork, including access points and filters will be specified and designed in such a way as to reduce fat, oil and grease deposits building up within them, and to ease cleaning and maintenance. Baffle or cartridge type filters should be specified in preference to mesh types. Consideration will also be given to the provision of automatic fire suppression within extraction ductwork. Best practice guides DW172 and TR19 (BESA publications) will be used to inform design principles for use in the University environment.

Kitchens will be provided with gas-proving equipment, fire detection and CO2 monitoring devices; all gas-fuelled appliances will be equipped with flame failure devices.

e) Storerooms

Storerooms will be enclosed in fire resisting materials offering a minimum of 60 minutes fire resistance, to include access doors. All penetrations in compartmentation shall be effectively fire stopped using proprietary materials and methods to the same fire-resisting standard. Doors to store rooms shall be FD30S standard, complete with intumescent strips and cold smoke brush seals, and be made positively self-closing by means of an overhead self-closing device.

11. Technical requirements

a) Passive fire protection

Passive Fire Protection (PFP) is an integral component structural fire protection and fire safety in a building. PFP attempts to contain fires or slow the spread, through use of fire-resistant walls, floors, and doors. Structural fire protection safeguards the essential structural components of the building and its integrity.

In respect of internal fire spread (structure) the Building Regulations stipulate the following (Requirement B3):

Where reasonably necessary to inhibit the spread of fire within the building, measures shall be taken, to an extent appropriate to the size and intended use of the building, comprising either or both of the following:

- Sub-division of the building with fire-resisting construction.
- Installation of suitable automatic fire suppression systems.

The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.

Compartmentation is achieved through the introduction of fire barriers formed from walls, floors, ceilings and cavity barriers. The purpose of compartmentation is four-fold, namely:

- Preventing rapid fire spread trapping occupants in the building, and protecting escape routes;
- Reducing the possibility of fires becoming large and therefore more dangerous to occupants, the fire and rescue service, and persons in the vicinity of the building; and
- Containing the fire to a single compartment, minimising fire damage to the property and business interruption
- Protecting areas of high financial or strategic value

Approved documents specify the requirements for building sub-division based on the use of the building, the fire loading, height to the topmost floor and the availability of sprinkler protection. University floor space could be classed in the 'assembly and recreation' purpose group, or 'shop and commercial' for which Building Regulations permit a compartment size of 2000m².

This is a substantial area and as a result sub-compartmentation of areas over 1000m² will be considered, based on property protection/business continuity needs, and risk assessment. This can be achieved by utilising internal walls and corridors. The number of openings shall be kept as low as reasonable practical and hidden voids will be protected by suitable cavity barriers.

With the exception of joinery products, new build projects will be constructed from building materials that will not make a significant contribution to the early stages of a fire or contribute to the spread of fire. Particular construction provisions apply to walls common to two or more buildings, walls dividing buildings into separate parts, and construction enclosing special fire hazards.

Special fire hazard areas are defined as including: boiler rooms, oil-filled transformer rooms, storage spaces for fuel or other highly-flammable substances, or rooms housing a fixed internal combustion engine. Additional consideration should be given to areas containing plant or goods of high value, data processing equipment, high hazard goods or processes, or any business-critical areas.

For the purpose of this guide, in addition to plant, boiler rooms, flammable substance stores or process areas, the University has identified the following as being special fire hazard areas, items or processes. As a result, any area or room falling into the above categories or locations will be separated from the remainder of the building by construction offering a minimum of 60 minutes fire resistance.

Walls and doors to protected corridors and protected staircases forming means of escape will offer a minimum of 30 minutes fire resistance. Corridor walls will be continuous to the structural soffit. Corridors leading to alternative means of escape will be sub-divided in accordance with the guidance contained in Approved Document 'B'.

b) Penetrations, cavity barriers and fire stopping

Every service that is installed in a building, such as water pipes, electrical supplies, cable trunking and lighting units, can compromise the fire resistance of a room by creating openings in its walls, floor and ceiling. In respect of the protection of openings and fire-stopping in order to inhibit the spread of fire, the Building Regulations state:

"If a fire-separating element is to be effective, every joint or imperfection of fit, or opening to allow services to pass through the element, should be adequately protected by sealing or fire-stopping so that the fire resistance of the element is not impaired."

Provisions in respect of fire-stopping are detailed as follows:

- joints between fire-separating elements should be fire-stopped;
- all openings for pipes, ducts, conduits or cables to pass through any part of a fire-separating element should be kept as few as possible, as small as practicable and fire-stopped.

The use of a building may change during its life, and it is therefore important to consider what passive fire protection can be included in fire compartmentation 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 safe way of running cables through compartment walls. Intumescent protection sleeves with internal smoke barriers shall therefore be installed where cables pass through fire compartment walls; and should be of a suitable size to allow for future extra cabling.

Any plans and specifications for new build or refurbishment supplied to the University must include details of fire protection measures that are to be included. Any voids within a building need to be effectively separated at determined locations with cavity barriers to limit the unseen spread of fire and smoke. Barriers for fire and smoke should provide at least 30 minutes fire resistance including insulation and integrity; those just for smoke require integrity only.

Where vertical fire separation is specified between floors, a cavity barrier to the required fire rating is necessary between floors and curtain walls or other adjoining substrates. They must be installed to the manufacturer's fire tested detail to ensure that wall deflection due to thermal movement and other factors, will not compromise effectiveness.

Suspended ceiling cavity barriers not forming structural fire separation are typically created by flexible 'curtain' products made from mineral wool or woven glass fibre fabric.

Only certified fire-stopping or linear gas sealing products and systems will be used. Fire stopping requirements must be expertly determined and applied in order to ensure compliance. Third party accreditation is a key requirement.

60 minutes fire-resisting compartmentation is required at all access points and where services leave shafts other than at floor levels. Detection will normally be required at the top of all service shafts.

c) Doors and door furniture

Fire door sets are designed to restrict the spread of fire and the products of combustion within a predicted time period and will normally feature a self-closing device. All fire door sets will be marked as a fire door and should be kept closed at all times. The use of wedges and other items as hold open devices is not permitted within any of the University's premises.

Fire resisting door sets

All door sets identified as being required to protect means of escape will be of a minimum 30-minute fire resisting standard (FD30S) equipped with a self-closing device, intumescent strips and cold smoke brush seals, tested in accordance with the requirements of BS 476 Part 22 and BS 8214. Doors providing access to circulation areas, and forming corridor sub-divisions will be fitted with vision panels, taking into account the needs of all occupants, including wheelchair users.

Doors on escape route will be required to open in the direction of escape travel. Doors required to open in two directions will be required to be fitted with vision panels.

Store and cupboard doors will be 30-minute fire resisting standard (FD30S), with intumescent strips and cold smoke brush seals but are not required to be equipped with a self-closing device. They will be equipped to enable them to be locked when not in use.

Doors to rooms designated as special risk rooms require 60-minute fire door sets to be fitted to meet the requirements of Approved Documents. Depending on the access requirements, doors can be either fitted with a self-closing device, or the door must be kept locked shut and a fire door sign “Fire Door Keep Locked Shut” affixed to the outside face.

Automatic hold open devices

The use of automatic hold-open devices (electromagnetic or electromechanical) on fire doors may be considered in some instances. Automatic hold-open devices will not be approved for use on doors forming staircase enclosures. Doors held open by automatic hold-open devices must be closed at night, and therefore an automatic timer is to be installed as part of the detection and alarm system, or management arrangements must be put in place to ensure this occurs. Consideration must be given to the needs of mobility-impaired occupants when siting hold-open devices, however auto opening devices that aid mobility impaired persons may not be suitable in all locations.

The requirement for acoustic door hold-open devices should be avoided in new build or refurbishment projects through effective design and planning in favour of electromagnetic or electromechanical hold open devices. Acoustic hold open devices will not be fitted to doors on primary escape routes. The use of acoustic door hold-open devices will only be fitted in other circumstances following a fire risk assessment where recommendations are made to do so accordingly.

Electromagnetic locking devices

Where electromagnetic locking devices are fitted to doors on escape routes for security or access control purposes, including sliding doors, the following shall apply:

- The lock shall release to allow the door to be opened on the actuation of the fire alarm system;
- Each door shall be equipped with a green manual override ‘break glass’ device complete with relevant signage;
- The lock shall release to allow the door to be opened on the failure of the electricity supply.

Door fastenings

Doors on escape routes should only be fitted with simple fastenings that can be readily opened without the use of a key, and without having to operate more than one device.

The University will specify wherever possible that final exit doors on escape routes are only equipped with push bar or push pad type fittings. In the case of places of assembly such as theatres, seminar rooms or exhibition areas, exit doors will only be fitted with push bar-type fittings.

Self-closing devices

In locations where self-closing devices are required to be fitted to fire doors, they shall be overhead units meeting the requirements of BS 1154. This requirement also applies to double and 1½ leaf door sets, where each leaf shall be fitted with an individual overhead self-closing device.

Double doors are to be avoided wherever practicable and if they must be used should not have rebated meeting edges.

Air transfer grilles

Any fire resisting door that is required to have an air transfer grille fitted shall not be compromised in terms of its fire resisting qualities. Doors that are not required to resist the passage of smoke can be fitted with grilles containing only a heat-activated intumescent type device. Those doors that are required to resist the passage of both smoke and fire (on internal escape routes) shall be fitted with an electromagnetic / electromechanical device interfaced with the fire detection and alarm system.

Door signage

All fire doors shall be fitted with “Fire Door Keep Shut” signs. Cupboards and storerooms will be fitted with “Fire Door Keep Locked” signs. Doors with electro-magnetic hold-open devices will be fitted with “Automatic Fire Door Keep Clear” signs.

d) Glazing

Glazing forming part of escape routes shall meet requirements contained in the relevant British Standards and Approved Documents in relation to size, location, and periods of integrity and insulation.

The glazing components of fire doors (vision panels) will be factory fitted clear fire-resistant glazing clearly identified by etched markings and installed in accordance with the relevant standard. Vision panels will be positioned for the benefit of all occupants, including wheelchair users.

e) Active fire protection

Active fire protection is characterised by the requirement for a ‘response’ in order to work. The response in question could be either automatic in nature or activated manually. Active fire protection systems include automatic sprinklers, gaseous fire suppression systems, fire curtains or shutters, or openable smoke vents.

Automatic fire sprinklers

Automatic sprinkler systems are an effective way to protect both people and property from fire. The benefits of their inclusion in industrial, educational and commercial premises is well recognised, including within Building Bulletin 100, the Government’s design guide for schools. Sprinklers inhibit fire growth and can hold a fire in check until fire and rescue service intervention.

The addition of sprinklers can also be used to provide design benefits within BS9999 by increasing flexibility and reducing the fire growth rates applied by one category when assigning risk, potentially increasing travel distances. The addition of sprinklers can also reduce insurance premiums, reduce business continuity risk, and support environmental objectives by reducing fire damage and emissions.

Other automatic fire suppression systems

In specific high-hazard or high value locations an assessment will be made to determine whether a fixed inert gas fire suppression system is required. In locations where a specific hazard is located and portable fire extinguishers are provided, staff in those areas will be trained in their use. In locations where gaseous systems are provided there will be an in-built delay to enable persons present to evacuate before operation.

f) Emergency and escape lighting

Emergency and escape lighting is generally provided to enable the occupants of a building to safely negotiate escape routes and to locate, and operate as necessary, any fire safety equipment provided. Escape lighting is particularly important on escape routes where there are changes in levels or direction, or where occupants are required to manipulate emergency devices such as door opening mechanisms.

Emergency and escape lighting will be provided in accordance with BS5266, which details the requirements for lighting levels and locations. UoL will specify that emergency and escape lighting luminaires in all new build and refurbishment projects will be of the self-contained battery type, activated automatically in the event of a failure of a local sub-circuit, with a battery duration of 3 hours. Depending on the required location, either maintained (always on) or non-maintained (only lit in the event of a mains failure) will be provided.

A combined emergency lighting luminaire is one that contains two or more lamps, one of which is energized from the emergency supply and the other from the normal lighting supply. Maintained emergency lighting will be specified for use in places of assembly such as theatres, seminar rooms, cinemas, clubs and assembly halls within the University.

Emergency lighting units in all new build premises or buildings undergoing major refurbishment will have a self-test functionality and monitoring capability utilising a Digital Addressable Lighting Interface (DALI). In other circumstances, devices are to be installed in a uniform manner that ensures that tell-tale devices can be readily seen from the ground without having to resort to ladders or other equipment to access them.

g) Fire detection and alarm systems

The University recognises both the Regulatory Reform (Fire safety) Order 2005 requirement to equip premises with appropriate fire detection and alarms “having regard to the dimensions and use of the premises, the equipment contained on the premises, the physical and chemical properties of the substances likely to be present and the maximum number of persons who may be present at any one time”, and the life safety benefits of early fire detection.

In order to provide early detection and warning of fire in any of its buildings, the University will ensure that all of its buildings are equipped with automatic fire detection and alarm systems conforming to the relevant parts of BS5839: Part 1.

The British Standard has different categorisations for fire alarm and detection systems, based on life or property protection objectives, and the extent of detector coverage provided. The University’s

policy for the provision of fire alarm and detection systems underpins its design strategy objective of preserving life by providing early detection and warning to occupants of its buildings.

This will be achieved by the following (determined through fire risk assessment):

- For buildings providing sleeping accommodation – Category L1: with automatic fire detectors installed in all areas within the building.
- For other accommodation – Category L2: automatic fire detectors installed in all escape routes, rooms opening onto escape routes, and other defined areas, regardless of the size of the premises and the category of system installed, all special risk areas will be provided with appropriate fire detection.

To avoid unwanted fire signals, programmable multi-sensor detectors will be installed in special risk areas. During normal work hours, smoke detectors can be isolated and reliance placed on heat detectors. Outside normal work hours the smoke detectors are activated, in addition to the heat detectors. Where the ambient background noise precludes the use of alarm sounders, visual alarms will be installed. Monitoring arrangements linked to Building Management Systems will also be included in any new scheme or refurbishment programme. Only addressable fire alarm systems will be specified.

Detectors sited in remote locations will be fitted with a remote indicator in the nearest corridor or circulation space.

All fire detection and alarm components will be uniquely numbered. All devices be addressable and uniform in design, to enable detector heads to be interchanged when circumstances dictate.

Subject to an identified requirement, all new buildings will be provided with a voice alarm system in addition to sounders / strobes provided in accordance with BS5839: Part 1 as above. All new voice alarm systems will be designed and installed to meet the requirements of BS5839: Part 8. All new fire alarm sounders will have the facility to make voice announcements.

New fire alarm installations shall be provided with the capability to accommodate vibrating pagers for the hard of hearing, linked to the relevant fire alarm panel, to provide an alert to individuals that the fire alarm system has actuated. In addition, sounders incorporating strobe alerters will be used in corridors and circulation spaces and in other areas determined by GEEP/PEEP processes.

Manual Call Points will be provided in accordance with BS 5839 Part 1.

Fire alarm installations will be required to ensure that all actuations will automatically be transmitted to Campus Security from all new installations in buildings. Relevant mechanical plant within each building is required to be interfaced with the fire alarm system e.g. air handling, or mains gas. Interfaces will also be required for door-hold magnetics / mag locks in order to report the incident to UoL Campus Security.

The telephone system in new buildings will incorporate emergency speed-dial provision, plus direct line phones in reception areas or lobbies, or on the outside of the building as appropriate.

Steps will be taken to reduce the incidence of false or unwanted fire signals at the design stage by the introduction of high integrity detection – devices capable of robust differentiation of false,

unwanted and real fire signatures, and methods of communicating actual fire alarms to Campus Security (identifying the source as a high integrity device).

Guidance on the reduction of unwanted fire signals through effective design and management will be obtained from the following sources:

- British Standards Institution (BS 5839 -1)
- British Fire Protection System Association
- Fire Protection Association
- Fire Industry Association
- National Fire Chiefs Council (NFCC)

h) Fire safety signage

Fire signs are generally required for the following reasons:

- To identify exit routes and doors
- To identify the location of fire safety equipment or devices e.g.
- To provide information to persons present e.g. Fire Action Notices

Fire safety signage must conform to the requirements of the Health & Safety (Safety Signs and Signals) Regulations and BS 5499.

Exit signage will include 'figure moving through doorway' pictograms. People with restricted vision or colour perception may experience difficulty in seeing or recognising fire safety signs which will include fire exit signs. Additional fire safety signs may be required that are sufficiently large and well designed with a good, clear typeface and sited so that they can be seen easily and can be readily distinguishable. It is sometimes useful to supplement a safety sign with text to aid understanding.

Fire safety devices e.g. manual call points, emergency door override points, and firefighting equipment will be provided with relevant signage, incorporating pictograms. Fire Action Notices will be located correctly adjacent to all Manual Call Points, as well as places of assembly and circulation. Non-illuminated signage shall be photo-luminescent.

All signage should be as large as practical to aid those with impaired vision. There should also be clear colour contrast of doorways, edge marking of stairs and steps etc.

i) Fire-fighting shafts

New buildings with a floor height of more than 18m will be provided with firefighting shafts containing firefighting lifts in accordance with Approved Document 'B'. Buildings with a storey floor area exceeding 900m² will contain at least two firefighting shafts.

j) Fire Hydrants: dry and wet rising mains / access for the fire and rescue service

Fire hydrants, fire and rescue service access, and rising mains will be provided in all new buildings in accordance with the requirements contained in Approved Document 'B' and BS9990.

12. Other provisions

a) Lightning protection

Lightning protection will be provided in accordance with BS EN 62305 in those premises where an assessment of the risk has been undertaken by a competent engineer and recommendations are made for its installation.

b) Security

As a consequence of its location and operational environment (open access), the University Campus cannot be considered to be a wholly secure environment, despite the presence of 24/7 security. Security from the threat of arson will be considered during the design phase of any new project. Advice and information will be sought from Campus Security and external security professionals as appropriate in order to reduce the opportunity and likelihood of arson, through practical means.

Where CCTV is to be provided for security purposes, consideration shall be given to using Infra-Red enhanced cameras that give better night time vision allowing operators to more easily identify smoke and small fires. Access control will be provided to high risk, high value or commercially sensitive areas within all new buildings.

c) Furniture and furnishings

The University's policy in relation to the provision of furniture and furnishings, is that only those items that conform to the relevant British Standard or Regulation will be procured for use within UoL. In addition, only those items conforming to the relevant British Standard or Regulation will be introduced into the University by academics, staff and students.

d) Waste management

Any new building design will incorporate adequate secure storage for bulk waste with lockable receptacles located either externally at least 8m from buildings, preferably in a secure compound, or in a 60-minute fire compartment within the ground floor only accessed via an external locked door.

e) Storage

Consideration will be given to the provision of lockable storage areas and cleaner's cupboards not only for combustible materials but also bulky or temporary equipment and furniture to prevent the obstruction of escape routes. Storage in vertical risers and plant rooms will not be acceptable unless suitable compartmentation and means of warning in case of a fire are provided.

Gas cylinders, hazardous chemicals and substances may be necessary in some areas within buildings. Where this is the case, appropriate storage facilities will be incorporated into the design.

Suitable external storage is preferred. Where gases, hazardous chemicals and substances are stored internally, signage complying with the Classification, Labelling and Packaging Regulations will be required at the external entrances into the building and on the door leading into the room where the cylinder or substance is kept

f) Electrical sockets

Sufficient electrical sockets on sensitive RCD devices must be provided to negate the need for multi-point adaptors and compensate for the managerial limits of portable appliance testing (PAT).

g) Competent designers, providers and installers

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

Design, Installation contractors will therefore hold third party certification for each type of passive fire protection they install. 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 standard.

In order to achieve the most effective and reliable fire protection, all active and passive fire protection products, installers and commissioning companies are to be third party certificated by a body holding UKAS (United Kingdom Accreditation Service) accreditation for the product or services they certificate. Manufacturers in such schemes will be pleased to provide details of their certification, typically by bodies such as Building Research Establishment (LPCB), BAFE® (British Approvals for Fire Equipment) Warrington Certification (FIRAS), BM TRADA, IFCC, FM Global and Underwriters Laboratories.

An 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 British Research Establishment (BRE), and Warrington Certification.

h) Commissioning and Handover

In accordance with the requirements of the CDM Regulations, Building Regulations and BS9999, the principle contractor for all new buildings is responsible for ensuring that fire safety information is provided to the client. This should be in the form of a fire safety manual containing design information, commissioning and completion certificates, and system operating, maintenance and repair documentation.

