Derbyshire
Fire & Rescue Service
Making Derbyshire Safer

Heritage Premises: Fire Safety Guidance

Background:

Important heritage buildings are **listed** by Historic England. Listing, scheduling, registering and protecting are all forms of **Designation**, for protecting buildings, monuments, parks and gardens, battlefields and wreck sites respectively.

Designation is the act of identifying the most important parts of our heritage so they can receive special protection and make sure that our history can be enjoyed by present and future generations.

All of these sites are brought together in the National Heritage List for England (NHLE)

Buildings and structures which meet the criteria for national protection are listed.

This protection system has been in place since 1947 and operates under; The Planning (Listed Buildings and Conservation Areas) Act 1990.

Guidance to selection criteria is available on Historic England`s web site:

http://historicengland.org.uk/listing/selection-criteria/listing-selection/

Listed Buildings:

Listing helps us acknowledge and understand our shared history. It marks and celebrates a building's special architectural and historic interest, and also brings it under the consideration of the planning system so that some thought will be taken about its future.

The older a building is, the more likely it is to be listed.

All buildings built before 1700 which survive in anything like their original condition are listed, as are most of those built between 1700 and 1840. Particularly careful selection is required for buildings from the period after 1945. A building has normally to be over 30 years old to be eligible for listing.

Categories of listed buildings:

Grade I buildings are of exceptional interest, only 2.5% of listed buildings are Grade I.

Grade II* buildings are particularly important buildings of more than special interest; 5.5% of listed buildings are Grade II*.

Grade II buildings are of special interest; 92% of all listed buildings are in this class and it is the most likely grade of listing for residential property.

The effect of listing to Fire Inspection:

Listing is not a preservation order intending to prevent change. It does not freeze a building in time; it simply means that listed building consent must be applied for in order to make any changes to that building which might affect its special interest.

Listed buildings can be altered, extended and sometimes even demolished within government planning guidance. The local authority uses listed building consent to make decisions that balance the site's historic significance against other issues, such as its function, condition or viability.

The serving of a “Notice” relating to a listed building will in practice be likely to result in consultation with the local Conservation Officer or English Heritage before the Responsible Person can carry out material alterations. The Fire Authority must consult when serving an Enforcement Notice requiring alterations to the premises: Article 30 (5) (e)

How to identify a listed property:

The National Heritage List for England (NHLE) will state whether the property is listed.

http://historicengland.org.uk/listing/the-list/

Alternatively contact the local authority, who will also be able to advise if the premises are in a conservation area.

The National Heritage List for England (NHLE) is the only official and up-to-date database of all nationally designated heritage assets, including:

Listed buildings, scheduled monuments, registered parks and gardens, registered battlefields, Applications for Certificates of Immunity, Current Building Preservation Notices.

World Heritage Sites are recorded but are inscribed separately by UNESCO.

Derbyshire listed premises:

Grade I and Grade II * Listed buildings which are subject to the Fire Safety Order are currently audited thematically and will be included in the Risk Based Inspection Programme where deemed necessary.

Grade II buildings which form the largest group of listed buildings are mainly residential but could be used for regulated activities and be unknown to the Fire and Rescue Service.

The Conservation Principles:

In most of their work, architects and fire consultants will try to achieve a balance between the simplest, most cost effective means of minimising the risks of fire and the effect of this protection on the building's usefulness, its earning capacity and its real estate value. In a historic building, the same criteria will be addressed, but in a way that causes minimal or no damage to the buildings special quality. Effectively, this is adjustment of the standard decision-making process, rather than simply accommodating fire measures to the buildings usefulness or economic value, the design takes the preservation of the existing fabric and aesthetic into consideration. This `conservation approach' is effectively a brief within a brief; exactly the same aim — the protection of life and property — but with different constraints for decision-making. In effect, the normal design process is given an unaccustomed focus by the overlaying need to conserve and protect the interests of posterity.

A Heritage building still has to comply with fire safety legislation.

Consultation and other interested parties:

The permissions needed when a building is Statutorily Listed

Small scale repairs on a like-for-like basis will not need listed building consent. However, to make changes to the fabric of the building will require an application for consent.

Listing simply means that changes to a building are subject to special control through the planning system. The local planning authority will only give approval for works when satisfied that these are compatible with the special interest of the building.

Other bodies may be involved in the decision-making process, especially for higher graded buildings. These include:

- Historic England/English Heritage
- National amenity bodies
- Government departments
- Derbyshire County Council or Derby City Council

Large alterations may need to be made to help the building to survive. However, some minor changes can have damaging effects and can devalue the property.

Altering a listed building is a specialised task and generally the standards for materials and repair methods are higher than for non-listed buildings.

If the property is listed and enforcement is required then consultation is initially with the Responsible Person or Duty Holder and if it involves material alterations the District Council Conservation Officers.

Conservation Officers in Derbyshire:

Conservation Officers in Derbyshire (CODS) is an informal association of all local authority conservation officers in the County, dealing mainly with historic buildings, historic areas and archaeological sites. The group includes some officers from neighbouring Councils and a few representatives of local amenity societies.

CODS meet quarterly, it is important to note that CODS meetings are NOT open to members of the public. However minutes of each meeting and associated documents are available to view.

Where consulted the local Conservation Officer will consider the implications and requirements of an Enforcement Notice and respond with suggestions, solutions and areas of concern or pass on to Historic England.

Contact names for all historic building conservation officers in Derbyshire can be obtained from the Derbyshire County Council website.

http://www.derbyshire.gov.uk/environment/conservation/buildings_risk_register/

Peak Park Planning:

In some circumstances it is possible that the Peak Park planning board may have to be consulted but this will be limited to building works that require their permission.

http://www.peakdistrict.gov.uk/planning

Other agencies and organisations:

The Derbyshire Historic Building Trust's Register is limited to buildings and is particularly valuable as a source of information for grade II and unlisted historic buildings which are not monitored by Historic England. The buildings registered are considered to be at risk from vacancy, under-use, neglect or structural disrepair.

This information is continually updated by Derbyshire County Council with information provided by the local authorities and is arranged in order of District or Borough Council, then alphabetically by parish or town.

Owners of listed buildings, which are not being maintained in a 'proper state of preservation' can be subject to legal action by a local authority under the Planning (Listed Buildings and Conservation Areas) Act 1990, to enforce proper repairs, and in default this neglect may lead to compulsory purchase proceedings by the council.

The Society for the Protection of Ancient Buildings (SPAB) was founded in 1877 to counteract the highly destructive 'restoration' of medieval buildings being practised by many Victorian architects. Today it is the largest, oldest and most technically expert national pressure group fighting to save old buildings from decay, demolition and damage. http://www.spab.org.uk/

English Heritage publishes a series of technical guidance notes on fire safety and historic buildings. Many local authorities provide useful leaflets on historic door types in their areas and appropriate repair techniques.

Guidance with Passive and Active fire safety measures:

Generic guidance will be found in the appropriate DCLG publications, additional guidance relating more specifically to Heritage Buildings has been included below.

Passive fire safety:

Compartmentation is the division of a building into separate fire compartments, using fire resisting walls, partitions and ceilings. This limits the size of fire and stops spread from one part of the building to another. Examination of most buildings will show that each has its own natural lines of compartmentation, which can be utilised to provide separation elements capable of providing a level of fire protection from 30 minutes to an hour or more. When deciding on a compartment strategy for the building, a full understanding of the location of hidden voids should be available to those responsible for the decisions.

Where services pass through a compartment floor, wall or cavity barrier then fire stopping should be provided to maintain (60min) fire-resistance. All pipes should be fitted with a proprietary sealing system capable of maintaining the fire-resistance of the floor, wall or cavity barrier. Any door in compartment walls should be fire resisting and self-closing and should not be propped or wedged open. They should self-close effectively to sit squarely within the frames. Any excessive gaps caused by warping or dropping of the hinges should be remedied. Holes in compartment walls or ceilings, formed for the passage of cables or pipes should be fire stopped to the appropriate standard.

Roof and roof voids are an important feature of the fire resistance characteristics of any building, separation of the roof void is an essential element of upgrading the fire performance of the building. Installing fire-insulating barriers that do not line up with the existing compartment lines in the accommodation below will undermine the fire integrity of the structure.

The existence of hidden voids is difficult to ascertain, but original plans of the building may reveal where they can be found. The problem with these voids is that they form hidden paths for fire, smoke and the products of combustion to spread unnoticed to parts of the building quite remote from the place of origin. The fact that the fire is hidden also makes it almost impossible to tackle without a major dismantling of the building fabric.

Floor construction in traditional buildings presents a special area of vulnerability. Apart from a small number of buildings that have stone or brick vaulted floors with excellent fire resistance, common floor constructions in traditional buildings are of timber construction. Early forms of construction lacked an applied ceiling, with the floor boarding itself laid over the joists providing little fire resistance. The protection offered by a floor to a fire from below depends on the plaster ceiling. The age and condition of the plaster and the strength of its key to the lath will greatly affect its ability to perform in fire.

Upgrading the fire resistance of a floor can be a difficult task, which may result in some loss of historic fabric, but there are a number of recognised upgrading methods:

(a) Consolidate any deficiencies in the original construction,
(b) Introduce mineral fibre quilt supported between or below the joists,
(c) Insert intumescent sheet material over or under existing surfaces,
(d) Insert intumescent material between floor and wall cavities,
(e) Apply intumescent coatings to ceilings,
(f) Apply additional layers of fire resistant boards to ceilings.

Thick stone walls have a great resistance to the passage of smoke, heat and flame, although numerous flues and other voids can weaken their integrity in fire. The common construction of walls lined with lath and plaster or timber panelling creates narrow continuous cavities, these present one of the most vulnerable elements in terms of fire resistance. The cavities often link with those present in floors and can run throughout a building, giving an easy fire path with both fuel (timber) and air present. A fire can smoulder unnoticed for many hours before breaking out some distance from the actual point of origin.

Many compartment walls do not continue up into the roof void, or are compromised by openings, thus permitting the unhindered and rapid spread of fire along the roof space.

The height of the ceiling has a dramatic effect on the spread of smoke and flames and if sufficiently high will delay the moment when hot smoke starts to descend from ceiling level and mushroom out. The heat in the smoke plume could affect doors and break down the fire resistance. If the windows are higher than the tops of the doors, the heat from the fire could break the glass and allow the hot smoke and gases to vent.

Surface spread of flame rating of walls and ceilings has an impact on the speed of growth of fire within compartments. Full height timber panels and other wall coverings e.g. wallpaper, layers of paint, artefacts and tapestries can give flames a path from low level to ceiling height, so encouraging rapid fire spread.

In terms of structural fire safety, doors may be the only combustible element in an otherwise fire-resistant wall and as such represent a fundamental weakness in respect of the containment of fire and smoke. Those which contain glazing or fabric panels or which have gaps or splits in their construction may allow fire to spread between otherwise separate compartments. However, all closed doors provide some degree of resistance to the spread of fire and smoke and even very old timber doors will offer a level of fire resistance, although only perhaps delaying a fire for around 15 minutes. Where such doors are set in a solid frame with a deep stile and rebate this period might be extended, and the delay in the spread of fire will make it possible to evacuate a building and summon the fire and rescue service. The fire performance of existing doors and their frames can often be improved whilst maintaining their original fabric and aesthetic appearance using applied intumescent products. However, where a risk assessment or exercise to improve fire compartmentation identifies the need to upgrade the fire performance of key doorways to prevent the passage of fire for longer periods, for example 60 minutes, replacement doors and frames may need to be considered. It may also be that door frames and hardware can be upgraded unobtrusively to improve fire resistance without damage to the door leaf itself — for example, by installing a deeper rebate.

The following approaches (which can be used in combination) have been successfully adopted in a range of occupancies and are widely recognised as providing the necessary levels of improvement:

- bed door panels onto existing rails with intumescent paste and then coat panels with intumescent varnish, paint or paper;

- attach an intumescent veneer to the thinner parts of the construction such as the fielded parts of the panels;
- saw through each panel to split it in half, introduce an intumescent sheet between the half's and then reaffix and bed the panel into rails with intumescent paste; and
- split the entire door into two halves, introduce an intumescent sheet the width of the saw cut and then re-join.

Applying intumescent surface treatments can improve the fire rating of a door to a nominal 20 to 30 minutes' fire resistance. This may be adequate for many purposes, but where a greater rating is deemed necessary the same procedure augmented by intumescent and/or cold smoke seals on door edges and frames may achieve the desired objective.

Despite frequently being of intrinsic historic value, doors are often the fundamental weakness in a separating wall. Doors and frames that have gaps in their construction, or contain glazing that is not fire resistant, may readily allow fire to spread beyond the compartment of origin.

There may be some situations where it is not practical to improve the fire resistance of a door, either because of its method of construction or because of intrinsic historic value making an alteration unacceptable.

In the latter situation and as a last resort, the doors might be removed and placed in storage keeping the doors safely in a controlled environment to prevent damage or distortion, preferably in the building itself, or blocking up the side of importance behind doors that are fixed shut may offer a more appropriate outcome. Situations such as this can occur for a variety of reasons. In buildings which have undergone changes in use and/or design it is quite common to find door sets in openings which were not intended for that purpose. Structural openings were sometimes oversized to allow flexibility in deciding where ultimately to locate the doors at a later stage in the building process. Large door sets often have brick arch openings covered with decorative panelling. Sometimes voids exist behind the frame assembly. When upgrading a door it is important to consider the whole door set, including the voids behind the frame.

The structural stability of a door in a fire resistance test is related to the size of the door (height, width and thickness) and the size of the stiles and rails. Doors can be upgraded to provide the required level of fire resistance using the same principles. Every effort should be made to retain historic glass and replacement should be seen as an option of last resort.
Any glass removed should be handled carefully and stored for repairs or reuse. During a fire, glass can melt in intense temperatures, or shatter due to gaseous explosions. Glazed openings are a potential weakness in the passive control of fire in otherwise sealed compartment walls. Options that could be considered include improvements to the way glass is held into its frame, provision of secondary glass and frames and replacement of existing glass with thicker or fire resistant glass. Fire resistant glass is available in several forms, including 'wired' glass, modified toughened or laminated glass and insulated glass, complying with the current standard.

Traditional buildings often have a substantial amount of timber. Timber has a degree of fire resistance that increases with the thickness of the component under attack. Therefore, whilst thin timbers such as window shutters and door panels, decorative wall lining boards and other trims will readily burn, large timber stud frames, and structural elements such as beams, columns and roof members will burn at a slower rate and may perform their function for longer and even beyond the duration of the fire.

Traditionally, plaster was applied directly onto solid masonry, but later the primary technique employed was lath and plaster. This involved applying plaster to a timber frame, comprising thin strips (laths) that were nailed to upright studs attached to the wall. A cavity was left between the wall and plaster. Whilst theoretically giving a good level of fire resistance, the performance of traditional plaster is usually reliant on the condition of the mechanical bond ('key') between the plaster and laths, and if lost, plaster will start to detach. Performance in a fire may be unpredictable and at a certain stage in a fire complete failure may occur.

Door closers; Face-fixed overhead closers with lever arms may be fixed on the door or the frame, and on either the opening or closing side of the door. It is generally recommended that they are fixed at the head of the door. They operate principally through hydraulic or rack-and-pinion mechanisms and are manufactured in different sizes, each capable of closing doors up to a defined weight. They are adjustable to vary the force exerted and incorporate a 'checking action' to avoid the door leaf impacting violently on the frame as it shuts.

These closers are designed for new building work, but some varieties of closer may be suitable for installation in historic buildings. Fixing the closer is a simple operation, involving minimal screw holes in timbers. However, potential damage may occur to existing adjacent surfaces if the scope of movement of the several parts is not fully understood.

Concealed overhead closers are similar in operation to face-fixed devices, but the barrel of the mechanism is hidden from view within a recess in the door or frame. The lever arm remains visible. There are minimum dimensions of door rail members into which this type of closer can be fitted. It may not be acceptable to consider cutting a historically significant door for this closer. Care must also be taken to avoid reducing the fire resistance of the door when removing wood to install the closer. Where concealed overhead closers need to be installed using specially designed intumescent protection jackets to delay failure during a fire, it is important to check that the fire test results are relevant to the intended use.

Floor springs operate by means of an arm or shoe which is fitted to the bottom of the door at its hinge point. A hydraulic or spring-operated closer is contained in a casing which is sunk into and fixed to the solid structure of the floor. This can be structurally quite intrusive and is not suitable for all forms of historic flooring.

Jamb closers have a mechanism consisting of springs and a hydraulic unit contained within the cut-out butt end of the hinge stile of a door (or corresponding part of door frame). Loss of wood through mortising the door to install the mechanism does not normally affect the fire resistance of the door. Chains connect the unit to a fixed plate. This type of closer is closest to achieving a visually unobtrusive installation and may cause least damage to the fabric. There are limitations on the weight of door which can be satisfactorily closed and experience has shown there may be difficulties where differing air pressures exist on either side of a door.

Tail sprung and flap closers are available but these are suitable only for the lightest type of door. They comprise a metal cylinder containing a coiled spring and the whole assembly is face-fixed to the door frame. A tail rod or flap bears onto the surface of the door and forces it closed under direct pressure. Rising butt hinges, which rely on the weight of a door to close it, are generally not an acceptable choice.

There are also supplementary devices, normally in the form of a spring under tension and weight-operated devices usually only found on sliding doors. (Sliding doors are, in most cases, not suitable as designated fire exits.) It is likely that in some cases the visual intrusion of top-fitting devices, unless these are already in place, may preclude their use. Under floor devices may be more acceptable, especially when it is remembered that many of these permit a door to swing in both directions.

Hinge closers are available but may require cutting of jambs or doors and new holes for fitting but can be considered.

Active fire safety:

The introduction of fire protection systems, to improve the fire performance of the building, should only be done after the following points have been considered:

(a) Essential: The fire systems should be central to meeting the objectives of the protection of life, buildings and contents.
(b) Appropriate to risk: Any system that is installed should be appropriate to the risks being considered.
(c) Compliant with legislation: Systems should be installed according to demonstrable performance-based and other legislatively prescribed standards of safety.
(d) Minimally invasive: The retrospective fitting of fire systems should involve minimal degrees of physical intervention on the historic structure.
(e) Sensitively integrated: Installed systems should be designed to be integrated sympathetically with the historic fabric and its detail.
(f) Reversible: Fire systems should be installed according to a reversible, 'plug-in, plug-out' installation philosophy so that if a feature is removed then the listed aspect of the building remains perfectly intact as it was before.

Fire detection and warning systems are effective fire safety measures for heritage buildings. They can be installed to provide property protection or for life safety, both of which should be installed to comply with current British Standard 5839 part 1 or part 6 or equivalent.

When installing an alarm system in a historic building the aim should be to install minimum invasive detection. There are several types of systems available on the market but examples of systems that have been sympathetically installed in historic buildings include:

Aspirating smoke detectors offer potential for minimum invasion and reversible installation in sensitive environments. *Aspirating smoke detectors* have a low probability of false alarms. This is due to an integrating effect: small samples of low density smoke in several sampling points will raise an alarm, while quite dense smoke in one sampling point only will not.

Wireless point detectors can offer high reliability and are unobtrusive.

Visual and thermal image fire detectors (camera software fire detection) may be used in large indoor spaces from well hidden locations. The visual category is prone to deception by moving objects and shadows. Thermal ones discriminate any movements or shade and detect fire by temperatures exceeding set limits.

Beam smoke detectors can be used in large rooms with ornate ceilings.

Heat detectors, either 'fixed' temperature or 'rate of rise'(or combined) type, which monitor the temperature of the air within an area and give an alarm if it rises above a predetermined temperature or rises too quickly;

Flame sensors designed to detect the presence of a flame either by its infrared or ultraviolet emissions, or by the unique frequency of the flame 'flicker';

Smoke detectors, either photo-optical or ionisation type, which detect the actual presence of smoke in the area of the detector. Both types are effective sensors but the ionisation detector is potentially better at detecting smoke from flaming fires which produce relatively small particles while the photo-optical sensor is much better at detecting smouldering fires. Ionisation detectors are prone to false actuations as a result of their sensitivity – such phenomena as burning toast, dust, steam, aerosol sprays and small insects have been known to cause false alarms;

The ideal position for detectors is as detailed in the British Standard, as central as possible. To satisfy aesthetics they are often placed close to the wall above the door, so that they cannot be seen when entering the room. Smoke testing in a variety of premises has shown that natural air currents influence the movement of smoke. Doorways and windows often provide these air currents which very effectively keep the smoke away from the detectors, rendering them useless. Detectors that are recessed, or placed above holes in the ceilings, or hidden behind beams and lights are also ineffective.

Measures should be undertaken to decrease the probability of false alarms while retaining response sensitivity to real fires. There should also be some consideration with regard to the transferring of the call from an automatic signal to a call centre. Consideration must be given to the frequency of false alarm instances and whether it is appropriate to introduce filtering practices to prevent false alarms from being transmitted to the emergency services.
The fire authority may agree, subject to guarantees regarding staff training, to install any or some call-points inside cupboards or in recesses.

Signs and notices:

Fire exit signage should be provided with pictograms. They should be large enough to be clearly seen from the furthest viewing distances. The signs should be in the colours detailed in the 'The Health and Safety (Safety Signs and Signals) Regulations'. They are best sited above the exit doors, but could be hung by chains from the ceiling or brackets where they would spoil ornate architraves. Signs that meet the criteria in BS 5499 and BS EN 7010 also meet the standard of the Regulations and can be used.

Notices detailing the actions to be taken in case of fire should be provided adjacent to the fire alarm break-glass call points.

Blue disc signs stating 'Fire door keep shut' should be affixed to self-closing doors. Where there are particularly ornate doors, these notices may be fitted to the leading edge and in the frame of the door, where they will only be seen when the door is open. Notices stating "Fire door keep locked shut" are affixed to doors such as cupboards or boiler rooms, which are fitted with locks rather than self-closing devices. Doors fitted with automatic closing devices should have the notice "Automatic fire door keep clear". It may be possible to relax these notices where stewards are present.

It should be accepted that in historic buildings (especially those which are not open to the public on a continual basis) there is a case for taking a more flexible view of the need for and positioning of exit and escape route signs.

Sensitivity to historic interiors should dictate the actual placement of the signs in accordance with the findings of the fire risk assessment. in some historic buildings the enforcing authorities have accepted the use of some non-standard signs, and where the appearance of the interior of a building is thought to be of particular importance it may be possible to adopt an alternative approach to signage.

The skilful use of emergency lighting units to illuminate both exit signs as well as other safety signs should be encouraged and should not only minimise the disruption caused by the introduction of additional wiring and light units but could also save money.

Photo luminescent signs are simple to install and although more expensive than conventional signs do not need supplementary lighting. However, the period they require under normal lighting conditions to regain their luminescence and make them effective must be considered.

The type of extinguisher provided should reflect the potential fire risk for each area. Training in the use of fire fighting equipment should be given to all staff expected to use it.

In the case of historic buildings, especially those which may contain a wide range of historic artefacts , it should be noted that while dry power extinguishers are effective on both Class B fires and fires involving electrical equipment, the chemical used in most of these extinguishers (normally a mixture of mono-ammonium phosphate and ammonium sulphate) can have a damaging effect on delicate materials such as paintings, china, glass, silver, brass and fabrics such as carpets, curtains and tapestries. In a recent incident where a dry powder extinguisher was maliciously discharged at the same time as two water extinguishers, the hygroscopic nature of the powder caused damage to a range of surfaces and contents resulting in a clean-up bill in excess of £300,000, dry powder extinguishers should not be recommended inside historic buildings.

In most cases, with the approval of the fire authority, there is no reason why extinguishers should not be allowed to be free-standing or placed on purpose-built bases. Equally, there is no good reason, subject to the findings of the fire risk assessment, why extinguishers should not be concealed in cupboards, wall recesses or inside panelling provided that appropriate signs complying with the Health and Safety (Safety Signs and Signals) Regulations 1996 are provided and maintained and that staff know where the extinguishers are located. Careful examination of the situation may make it clear that such signage is superfluous as the only statutory justification for such signage is based on the findings of the fire risk assessment where the provision of signs relates to the requirements of life safety

Adequate and appropriate maintenance of all fire protection systems and facilities is of the utmost importance as all of these requirements should be available and in good condition at all times.

Depending on the risks and hazards identified within the fire risk assessment, the findings may determine that a sprinkler/water mist system is required within the premises in order to remove/reduce the risk/hazard to an acceptable level. Where a bespoke suppression system has been installed, this should be fully accounted for within the fire risk assessment.

Automatic fire suppression and firefighting systems not only detect and notify the presence of a fire but also actually fight the outbreak. A properly designed, installed and maintained system will, at the very least, contain a fire to a small area and consequently reduce the extent of damage. Indeed, in many cases the system will manage to extinguish the fire before the arrival of the fire and rescue service. The damage minimisation potential of suppression systems is especially beneficial in the historic buildings context where historic fabric or contents may be irreplaceable.

Perhaps one of the most important single approaches to successfully addressing fire safety that meets the intent of the legislation where full compliance with the requirements would be impossible due to heritage protection constraints is the use of an automatic fire suppression system.

Sprinkler system and piping, especially if exposed, is frequently one of the reasons that sprinkler systems are considered to have a negative visual impact on a historic building. There are however ways to conceal or disguise piping so that its presence in a historic building is both as discreet as possible and sympathetic to the aesthetics of the building.
In comparison with sprinklers, ***water mist*** systems use comparatively small amounts of water to fight a fire — and this means less water has to be stored, which can result in substantial cost savings. The reduction in the volume of water which has to be stored may also offer benefits in respect of the storage space which might otherwise be required. Mist systems also offer potential for installation in locations which are too small to accommodate the pumps of a conventional sprinkler system. A further benefit, of particular interest in historic buildings, is the minimisation of water damage in the event of activation.

It is unlikely that a ***foam system*** would be an appropriate agent for general use in historic buildings. Foam systems may have limited application in historic buildings for specialised local protection — for example, for the protection of boiler rooms where fuel oil is burned.

Gas systems are unlikely to be suitable for protecting large volume spaces due to the quantity of gas required and the difficulty of maintaining the appropriate concentrations of gas within the protected space for the duration of a fire's life. It is therefore unlikely that such systems will be suitable for the majority of applications in protecting the interior spaces of historic buildings. However, gas systems can be ideal for providing specialised protection of smaller rooms or spaces such as transformer chambers and switch rooms, or other utility spaces perceived to be at high risk. In the heritage context, gas systems have been successfully employed for the protection of archive storage areas.

Escape lighting:

Provided in regulated buildings to illuminate the escape routes following power failure or loss of primary lighting. The most common type of lighting unit likely to be installed in historic buildings to provide escape lighting is the self-contained unit that is wired into the building's lighting circuit. The units are often supplied with appropriate fire exit signs already attached. Combined units are fitted with two bulbs, one of which is illuminated by the primary lighting circuit, the other being powered in a supply failure by an internal battery. This enables the normal luminaires to also provide emergency lighting, and it also tends to improve the aesthetics of the installation. In certain cases it may be possible to refurbish existing light fittings to incorporate emergency facilities.

Emergency lighting and emergency escape lighting conforming to BS5266 parts 1, 7 and 8 should be provided in those buildings where there is no natural light or where they are used in the hours of

darkness. These lights are normally powered by battery packs and only illuminate upon mains or local lighting sub-circuit failure.

A further alternative would be to fit a Static Inverter Unit which would supply standby power to selected luminaires on a separate circuit avoiding installation of emergency units.

Management of fire safety in places of worship:

The Fire Safety (2005) Order applies to most premises with the exception of dwellings. For the first time fire safety legislation was unambiguously applied to churches, placing the responsibility for fire safety on the 'responsible person'. In practice the people managing the Church must identify the responsible person or people. For example, in Anglican churches the 'body corporate' – the parochial church council – is the responsible person and boards of trustees in some of the non-conformist churches may also be in a similar position.

The responsible person must ensure that a suitable and sufficient fire risk assessment is completed. It is recommended that the competency of the assessor is ascertained before the assessment is undertaken and that they have appropriate experience of such occupancies. It is an advantage to involve a member of the church in undertaking the fire risk assessment because they know the building better than anyone from outside the church.

The procedures arising from the fire risk assessment should be recorded in the emergency strategy. If the procedures involve actions to be taken before certain events such as the unlocking of doors or providing extra exit signs, a system of checks will have to be implemented to ensure that these procedures have been carried out before the event begins. Where procedures for evacuating the church rely on lay persons to perform particular functions in an emergency, such as opening doors or helping disabled persons, they should receive instruction on their exact roles, which should be reinforced at regular intervals. When a congregation is unusually large, as may happen for weddings, funerals or other special services, the responsible person should ensure that a person trained in the evacuation procedures supervises the lay persons and congregation so that in an emergency the building can be evacuated safely. Often there are ways out of church buildings that are not normally considered exit routes. These include exits through the vestry and other areas of the church not usually used for services. When these exits are brought into use for large services, they should be kept unlocked and indicated with green exit signs incorporating pictograms. It may be possible to provide justification for an increased capacity for special services through consideration of the following:

- The time for escape to be compromised in a church with a very high ceiling is longer than one with a low ceiling, because it takes longer for the smoke to filter down to head height. This is fortunate because larger churches with bigger congregations tend to have higher ceilings than smaller churches with smaller numbers. If a balcony or gallery is in use, this, being closer to the likely build-up of smoke in the body of the church, may need special consideration regarding its evacuation;

- A fire occurring in the main body of the church, which is the biggest threat to the congregation, would be discovered and tackled in its early stages because it would be instantly detected;

- The amount of combustibles, particularly kindling, is restricted and controlled, so the likelihood of a fire occurring and the size of fire is smaller so there is less smoke;

- The probability of a fire occurring during special services is low because of their infrequency; and

- Inward opening doors are stewarded and so can be opened immediately in case of emergency. Where the bell ringing chamber or organ stall is above the ground floor, a procedure has to be in place to warn the bell ringers and/ or organist that an emergency has occurred and that they need to evacuate. This may be an automatic system or someone who stays on the ground floor and raises the alarm by going up the tower. The noise of the church bells will sometimes make audible warnings ineffective, so a visual indicator such as a strobe light may be needed where an automatic alarm is provided.

Empty historic buildings:

Their historic associations, opportunities for concealment, valuable internal fittings, and remote or secluded locations are among the factors that make them especially vulnerable.
Intruders in empty buildings may have a number of motives:

- to steal any contents;
- to strip the buildings of anything of value;
- to strip the buildings of any architectural fixtures and fittings or burn down the buildings to destroy the evidence of the crime;
- to squat on a permanent or semi-permanent basis; and
- to use the buildings for illegal activities.

Arson fires usually follow a pattern, beginning with the setting of small fires causing limited damage. If the building is not regularly inspected and, as required, re-secured and repaired promptly, an escalation in the frequency and size of incidents can be expected, often resulting in the total destruction of the building. Preventing or reacting to 'small' incidents can therefore prevent a major loss happening. Fires in empty buildings present problems to firefighters that do not normally occur in occupied premises. For example, weakening of the structure may occur due to vandalism, aging and decay, damage caused when stripping out fittings, or the starting of small fires. All of these hazards can have serious consequences for firefighters attempting to safely access the building, potentially resulting in severe or even fatal injuries. Where the fire and rescue service considers that there is an undue risk of harm involved in entering an empty building, a decision may be taken to fight a fire from outside only, with the consequence that the damage to the building by fire, smoke and water is likely to be significantly increased

Developing a contents/ snatch list:

Although not included in the legal obligations to comply with the Fire Safety (2005) order, when giving advice on fire safety measures to a heritage building it can include reference to protecting the contents and artefacts from the risk of fire which will assist in any salvage operation during or after a fire.

A detailed inventory of contents/snatch list should be prepared. It should indicate the location of each item and establish a basic priority coding system. The inventory should explain the method of fixing and release of fixed items. Items should also be identified which may be removed by sliding down plastic sheeting from windows. Examples of a salvage list for a room along with priority items within rooms are shown below:

- Rooms of special value or large items that cannot be removed (or are built in to the structure) should also be given a priority code, both to direct firefighting effort and to allow an order of post-fire damage limitation work to be established. Plans may include arrangements for draining or diverting water from firefighting and for protection and drying out.

- Photographs, drawings and other records of the building should be made. These can prove invaluable when firefighters, unfamiliar with the building and contents, are committed to remove or protect contents for damage limitation purposes. A copy of these records should be kept off-site because this will reduce the risk of total loss in case of disaster and will secure restoration plans.

- Decide how snatch list items and other items will be removed quickly from their positions. Consider quick-release fixing methods for priority items. These methods should be compatible with the security measures at the building.

This can be made available to the Fire and Rescue Service as best practice in pre-planning for fires in Heritage buildings.