

Alterations to Enhance Fire Safety

CHAPTER 17



17.1 Introduction

- 17.1.1 Fire is one of the greatest threats to the fabric and contents of a protected structure. The object of fire safety legislation, quite rightly, concentrates on the saving of lives and prevention of injury to persons. However, in the case of a protected structure, additional consideration needs to be given to minimising damage to the historic fabric and contents in the event of fire. Many protected structures may be particularly vulnerable too because of their remoteness or lack of occupancy. Older buildings may be more vulnerable too because of traditional construction techniques which included the extensive use of timber in concealed spaces or because of unrecorded alterations, such as the installation of services, which created routes through the fabric for the spread of smoke and fire.
- 17.1.2 Compromise from all sides will often be needed to resolve conflicting requirements of fire safety and architectural conservation. Where possible, planning officials and fire officers should liaise during the course of a planning application, to ensure the best solution is found. This can be done by using the mechanisms available under Section 13 of the Fire Services Act 1981.
- 17.1.3 In the interests of good conservation, consultation between the applicant, the planning authority and the fire authority should take place, where possible, at a pre-planning stage. It is generally of advantage to all concerned to resolve any major issues at an early stage.

17.2 Applications for Works to Enhance Fire Safety

- 17.2.1 Where the planning authority considers that an application for works to a protected structure would require alterations to enhance fire safety that have the potential to adversely affect the character of the building, the planning authority should consult the fire authority. Where the fire officer advises that extensive or potentially unacceptable works may be required, the planning authority may then request that the applicant submit a fire risk analysis as further information in order to allow an assessment of the full impact of the proposed development on the structure. It may be advisable for the applicant to engage a specialist fire consultant in order to achieve a satisfactory level of fire safety with minimal intervention into the fabric of the structure.
- 17.2.2 Where an application for planning permission has been granted which does not address fire

protection, an applicant should be advised that further planning permission will be required, where necessary alterations would materially affect the character of the protected structure.

- 17.2.3 It is impossible to prescribe a standard approach as each protected structure is unique and will require an individual assessment of its vulnerability. Fire-safety design solutions should impact as little as possible on the important elements and fabric of a protected structure. In principle, there should be minimal intervention into the existing fabric of the protected structure, and alterations which impact on important fabric should be readily reversible.
- 17.2.4 Occasionally works to enhance fire protection would necessitate a level of intervention which the planning authority considers unacceptable in terms of excessive loss or disruption of the historic fabric. In such cases, the developer should be encouraged to explore alternative fire-safety solutions, including alternative uses, which may have fewer implications for fire safety.
- 17.2.5 Where permission for works to enhance fire safety is refused, the planning authority should notify the fire authority of the decision.

17.3 Technical Guidance Document B of the Building Regulations

- 17.3.1 A flexible approach is required when considering the fire protection measures suitable for a historic building. It is recognised in Technical Guidance Document (TGD) B of the Building Regulations that, in the case of an existing building, there may be constraints that would not exist with a new building and that some variation of the provisions of TGD-B may be appropriate. The Department has also published a series of guides/codes of practice in relation to fire safety in existing buildings for the purposes of assisting building owners in meeting their statutory obligations under the Fire Services Act 1981.
- 17.3.2 Because of the importance of preserving the architectural character of a protected structure, imaginative compromises will often have to be made between active and passive fire protection measures. A number of possible compensatory measures are outlined in TGD-B of the Building Regulations for works to existing buildings. Where works would materially affect the character of the protected structure the onus should be on the applicant to show that alternative solutions to fire safety enhancement have been fully explored.

17.4 Means of Escape in Case of Fire

17.4.1 The safe escape of occupants from a building in the event of fire is of primary importance. However, with a protected structure it may be neither practicable nor appropriate to comply with particular requirements of TGD-B of the Building Regulations. For this reason, compensating measures are allowed to be provided when dealing with an existing building. These measures include all or some of the following:

- a) enhanced levels of life safety protection by automatic fire detection and alarm systems;
- b) reduced travel distances;
- c) enhanced smoke-control measures;
- d) pressurisation of stairway enclosures;
- e) protection to escape routes from places of special fire risk;
- f) enhanced performance of fire doors;
- g) additional structural fire-protection measures such as increased levels of compartmentation of the building.

There may be special requirements for providing means of escape for people with disabilities, which will also have to be considered.

Escape routes and exits

17.4.2 Escape routes should generally be internal where they can be accommodated without damaging good internal fabric or decoration. The use of external escape stairs should be avoided where possible because of their large and usually negative impact on the external appearance of the building. In addition, the requirement for windows or doors adjacent to an external escape stairs to have adequate fire resistance could involve the alteration of original joinery and the loss of historic glass. Where the installation of an external escape stairs is unavoidable, it should be carefully designed and efforts made to locate it inconspicuously. Escape stairs should not be permitted on principal elevations nor where they would impact on important views of the structure.

17.4.3 Requirements for adequate means of escape from a building may include proposals for the insertion of new doorways in external walls, the conversion of existing window openings into doors or the replacement of historic windows such as sash windows with other opening types. Such proposals should be carefully considered by the planning authority.



The use of external escape stairs should be avoided on important elevations or where they would be obtrusive in an important view of the structure



Proposals that require the conversion of original window openings into doors to facilitate escape will require very careful consideration and should avoid impacting on surviving early or original windows and on important elevations. There may also be a potential impact on nearby windows which may require re-glazing with fire resistant glass

- 17.4.4 For weatherproofing reasons, entrance doors traditionally open inwards and most internal doors open into rooms rather than outwards as may be required for escape purposes. Proposals to re-hang a historic door in order to reverse the opening direction may require unacceptable alterations to the doorframe or to the appearance of an important interior.

Lighting and signing of escape routes

- 17.4.5 The need for the lighting and signing of escape routes should be carefully considered so as to reduce the impact on the character of the interior while clearly defining the routes. In certain sensitive interiors, the applicant may be required to install specially designed fittings that suit the location while fulfilling fire-safety requirements.

Fire-protected lobbies and corridors

- 17.4.6 Where proposed alterations to provide enhanced fire protection would require the inclusion of protected lobbies, corridors or staircases into the interior of a protected structure, works may be necessary which would have a serious impact on the character of the building. This could include works to upgrade the fire resistance of historic walls, floors, ceilings, staircases or doorcases.

- 17.4.7 The insertion of a new fire-resistant lobby into an interior could damage the appearance of rooms and disrupt important decorative schemes. The applicant should be able to prove that alternative solutions and the provision of compensatory features have been explored. Where the insertion of a new lobby is permitted, its design should be appropriate and take account of the existing architecture of the interior. The reversibility of the new works should not be an excuse for poor or unsympathetic design.

Fire detection and alarm systems

- 17.4.8 A fire-detection and alarm system is an essential part of the fire-safety strategy for all buildings. The early detection of fire is of great benefit in reducing damage and danger to both life and property. Automatic detection systems can detect the presence of fire from smoke, heat or infra red/ultra violet radiation and other emissions. Some buildings may require a different form of detection system for different locations. The character of an important interior can be harmed by the inappropriate design or intrusive location of a detection system and its associated wiring, for example, smoke detectors mounted on a decorative ceiling.



The reversal of a door to allow it to open in a different direction may require obtrusive alterations to a historic doorcase and may make the original hinges and locks redundant



The use of standard signage may not be appropriate in high-quality interiors. Alternative designs are available which minimise the visual impact while fulfilling fire-safety obligations



The design of a new protected lobby within a fine historic interior should take great care to avoid adverse visual and physical impacts: interrupting a symmetrical space or cutting across decorative plasterwork may not be acceptable regardless of whether the proposed works are reversible

- 17.4.9 Where a detection or alarm system is proposed for the interior of a protected structure, the installation should as far as practicable be carried out without damaging the fabric and appearance of the structure. The detection system chosen should be appropriate to the location in addition to satisfying fire safety legislation.

Fire suppression

- 17.4.10 Proposals may be made to install fire suppression systems, including hose reels or sprinklers. These systems together with their associated drainage can be difficult to conceal and their use in protected structures, particularly those with high-quality interior work, is often inappropriate. They may be considered acceptable in protected structures where they can be installed in concealed locations as part of major refurbishment works.

17.5 Internal Fire Spread (Linings)

- 17.5.1 Some protected structures may have internal finishes which are combustible such as timber panelling to walls or ceilings and which may constitute a fire risk. Alternative fire-safety solutions should be sought to the removal of important internal linings. Other inappropriate works could include proposals to cover over important internal linings or finishes with other linings in such a way as to damage the fabric or appearance of a protected interior.

17.6 Internal Fire Spread (Structure)

Load-bearing structural elements

- 17.6.1 Many protected structures will include load-bearing structural elements of combustible materials such as timber. Alternative fire-safety solutions to proposals which require the removal or replacement of combustible structural elements, where these are important to the special interest of the protected structure, should be developed. The encasement of timber, iron or steel structural elements to enhance fire safety may damage the appearance of a protected interior particularly where there are decorative elements such as scrolled brackets, cusped columns and the like.

Compartmentation

- 17.6.2 Compartmentation is a major part of passive fire protection but one which can cause difficulties when applied to a protected structure. In order to achieve the necessary subdivision of the building, works may be required to upgrade the fire



Recent advances have been made in the design of fire detection systems allowing for unobtrusive installations within fine interiors. Systems such as aspirating or air sampling systems (top) consist of a sampling unit, remotely located, and small diameter pipes requiring only minute holes in the ceiling fabric to allow air to be drawn and sampled. The impact on a decorative ceiling contrasts favourably with the large, usually white, plastic smoke detectors (middle) previously used in many historic interiors



Fire suppression systems have been developed for high quality interiors, using small, unobtrusive sprinkler heads and flexible pipework, which minimise the impact on the fabric of the building compared to traditional sprinkler systems. The decision to introduce a fire suppression system into a building must balance the benefits of early detection and suppression and the reduced amount of water used compared to traditional fire-fighting methods with the disadvantages of the risk of accidental discharge and the disruption caused to the building during installation

resistance of floors, ceilings, walls and doors in a historic interior.

Undivided roof spaces

- 17.6.3 Undivided roof spaces may exist not only between parts of a building but between different buildings in a terrace. It may be possible to deal with many of these concealed spaces by unobtrusively subdividing them.

Upgrading historic walls, floors and ceilings

- 17.6.4 The fire resistance of existing timber walls or floors may require to be upgraded. This can be achieved by the addition of fire-resisting layers above, beneath or between existing studs or floor joists. The voids between studs or joists can also be filled with flame-resisting materials. There are a number of proprietary methods which have been developed for upgrading the fire resistance of floors which may be appropriate. Upgrading works should not involve loss or damage to important plasterwork on walls and ceilings or of historic floors. The applicant should be advised to explore alternative methods of satisfying the requirements of enhancing fire safety.

Upgrading historic staircases

- 17.6.5 The removal or replacement of important staircases or parts of staircases should generally not be permitted. Alternative methods of meeting the requirements of fire-safety enhancement should be investigated by the applicant.

Upgrading historic doors

- 17.6.6 Historic doors and doorcases are particularly vulnerable to inappropriate changes in order to achieve a specific fire resistance. Panelled doors have an inherent weakness in terms of fire resistance because of rebated panels. Traditional door details often include voids behind architraves which also lessen the effectiveness of a doorset to perform in the event of a fire.
- 17.6.7 Where an authentic door or doorcase of acknowledged quality or interest remains, efforts should be made to retain it in situ rather than replace it with a replica fire-resistant door. While a historic doorcase may not appear to meet a recognised standard of fire resistance, it nonetheless offers some degree of protection which might be acceptable in particular circumstances. Modest upgrading may be possible by using seals and linings or the application of intumescent paint or paper. Proposals to replace existing timber or glazed panels with alternative materials may not always be acceptable. The same is true of proposals to dismantle a historic panelled door in order to insert fire-resistant layers within the construction.



There will generally be a visual and material impact on a building caused by encasing structural elements in fire-resisting materials. Alternative measures should be explored if these elements contain decorative detailing that would be disturbed or concealed by such work or if encased elements such as a timber floor, as shown here, or roof may become susceptible to fungal attack as a result of the treatment



Decorative plaster ceilings can be upgraded by adding fire-resisting layers between the joists, which should be carried out without loss or damage to the plasterwork, floorboards or structural timbers



Increasing the fire performance of panelled doors may require a combination of methods. It can be assisted by work such as applying intumescent strips to the door and frame edges. The composition and condition of the door and doorset and presence of surviving historic door furniture, such as box locks or wrought iron hinges, should be examined in order to find the most appropriate solutions

- 17.6.8 Where the historic door is located within a thick wall, it may be acceptable to incorporate an appropriate fire-resisting door within the same structural opening whilst leaving the original door in place.
- 17.6.9 As a last resort, where a door cannot be brought up to required standards without unacceptable alteration, it may be appropriate that it be recorded and tagged before being carefully dismantled and safely stored in the building for possible reinstatement at a later date and an appropriate replacement door fitted.
- 17.6.10 Added elements of ironmongery required for fire protection, such as door closers, hold-open devices and the like, should be visually acceptable for the location.
- Concealed spaces**
- 17.6.11 The presence of concealed voids or openings within the structure of an old building can make compartments ineffective. There may be interconnecting spaces behind panelling or wall linings or between floor or ceiling joists or there may be undivided roof spaces.
- 17.6.12 It may be possible to deal with many of these concealed spaces by unobtrusively subdividing them. Other situations will require a careful balance of other fire-protection measures in order to provide an acceptable solution.

17.7 External Fire Spread

Roof coverings

- 17.7.1 Some protected structures have combustible roof-coverings such as thatch or timber shingles and alterations may be required to improve the fire resistance of such roofs. However, consideration should be given to the fact that flame-retardant treatments for thatch must be renewed regularly to maintain effectiveness and the chemicals used may damage the material or encourage its decay.
- 17.7.2 The replacement of historic or decorative glass with wired or other fire-resistant glass in rooflights and skylights should not be permitted. It may be considered acceptable to allow for fire-resistant secondary glazing to be used but only where this would not adversely affect the appearance of the original glass.



Small and unobtrusive door closers and hold-open devices are available, which should be used if standard ironmongery specifications would be unacceptable due to the visual and physical impact on the interior and its elements



Where a door lining can accommodate a second door without requiring intrusive visual or physical alterations, the provision of an appropriately detailed fire-resisting door can be an acceptable method of upgrading the opening. In this example the new door is to the left in the photograph

Walls

- 17.7.3 The external walls of protected structures may be finished with combustible materials such as timber boarding, framing or shingles. Where these finishes form part of the special interest of the structure, proposals to enhance the fire resistance of such materials should not damage the fabric or appearance of these walls.

17.8 Access and Facilities for the Fire Service

Sources of water for fire-fighting

- 17.8.1 Where a protected structure is sited in a remote location away from a mains water supply, consideration needs to be given to the necessity for an adequate water supply for fire-fighting. Where an application is received for works to such a building, the planning authority could consider, as a condition of permission, the provision of water-storage tanks or otherwise adjacent to the protected structure. The appearance and siting of such water storage should not adversely affect the character of the protected structure or of an ACA. Consideration should be given to upgrading, or improving access to, existing water features located adjacent to the building such as ornamental lakes or fountains, which could serve as water sources. Alternatively, underground water-holding tanks could be provided where the construction of these would not disrupt important areas of hard landscaping or gardens.

Vehicle access

- 17.8.2 A range of compensating measures are considered appropriate under TGD-B where it is not possible to provide sufficient access for the fire service to existing buildings. These measures could include additional personnel access to the building for fire-fighting, additional internal fire mains and other facilities to assist fire-fighting. These requirements should be resolved in consultation with the fire authority.

17.9 Management**Fire prevention measures**

- 17.9.1 In the case of fire damage to protected structures, prevention is obviously better than cure. No matter how well reinstatement works are carried out, lost historic fabric is gone forever and can only be replaced in replica. Under Section 18 (2) of the Fire Services Act 1981 it is the duty of the persons in control of a number of specified building types to take all reasonable measures to guard against the outbreak of fire on such premises. However, a planning authority may have little opportunity to input into the operational practices that are undertaken in the management of a protected structure. The owners and occupiers of these buildings should be encouraged to take certain steps in order to prevent their building becoming endangered by fire. Such steps might include the preparation of a regularly monitored fire-safety plan.
- 17.9.2 A fire risk assessment should be carried out for the protected structure. This would be most useful in advance of preparing a detailed planning application. The likelihood of fire can be reduced by the identification of risks and their elimination or by the management of those which cannot be eliminated. Common causes of fire in protected structures include electrical faults, building or renovation work, arson and accidental fire from hearths, smoking, kitchens and the like. Many of these causes can be eliminated or minimised by the adoption of certain operational procedures such as banning smoking in or around the building or adjacent to flammable material such as thatch, the use of 'hot work' procedures during refurbishment work and the storing of combustible materials within the building. Staff training, where appropriate, should include maintenance and testing techniques as well as preparation for emergencies. Lightning may be a possible danger, particularly to large isolated structures. Where appropriate, these structures should be protected with earthed lightning-conductors.

- 17.9.3 Some of these matters could be dealt with as conditions of planning permission for works to protected structures.



Lightning conductors may be a requirement on tall or otherwise vulnerable structures. The conductors should be channelled to earth unobtrusively; this example shows a discreetly coloured lightning conductor carefully concealed behind a downpipe