

Whitepaper – Fire Stopping & Smoke Control

Fire stopping and smoke control products and design assist in preventing the rate of spread of fire and smoke through a building, with the aim of giving people time to escape. Passive protective measures also hold back the fire in order that it can be extinguished by fire fighters, limiting the proportion of the building which is damaged by fire.

During a fire, fire and smoke spreads principally by finding gaps in walls and ceilings, finding weaknesses in the structure which are not fire resisting, and by travelling through windows and external surfaces to re-enter at upper levels. Fire can also spread by heat being conducted through conductive elements of structure such as steel. Ventilation systems, if not properly designed with fire dampers, can allow the spread of fire and smoke throughout a building.

What does the legislation require?

Fire legislation, which is written for the purpose of life protection, requires duty holders in non-domestic premises to assess fire risks and put in place arrangements for:

- a.) The prevention of fire and
- b.) To protect people from fire when it occurs. Protection includes having and maintaining effective fire compartments where this is necessary. Legislation also requires that new buildings and alterations to structures, whether domestic or non-domestic, comply with Building Regulations standards on fire safety. Building Regulations are country specific although there are significant similarities from country to country. Part B of the Building Regulations for England and Wales (and national equivalents) covers fire protection. This lays down the minimum fire resistance periods for elements of construction of buildings in a classification of use, including extents or floor areas. The Building Regulations provide for fire separation by means of walls and floors of fire resistant construction generally referred to as fire compartments. Permissible fire compartment size depends on fire risk and the availability of other controls such as sprinkler protection. The Regulatory Reform (Fire Safety) Order 2005 applies in England and Wales and requires Responsible Persons, in relation to non-domestic premises, to conduct a risk assessment and to implement fire precautions. Responsible Persons are normally employers but in the absence of a relevant employer, the duties fall to others who have control of non-domestic premises. Similar legislation applies within Scotland and Northern Ireland.

Fire Doors

Fire doors are designed to prevent the spread of fire and smoke for life protection purposes, and sometimes to limit damage and financial loss.

Fire doors come in a range of fire resistance levels and are generally purchased as complete door sets including the frame and door furniture. The reason for this is that it is the whole door set which will have been certified by a test laboratory.

Doors should be clearly marked with the fire resistance. Two common standards in the UK are the British Woodwork Federation (BWF) Certifier scheme for wooden fire doors and the BM Trada Q Mark scheme. Products conforming to the schemes are clearly marked with coloured symbols which relate to 30 minute, 60 minute, 2 hour ratings, etc. It is possible for a good quality fire door to be rendered completely ineffective by inadequate installation, damage, or by it being blocked or wedged open. There are certified

installers who have received training under these schemes and therefore understand the requirements for installation and maintenance.

It is possible to retro-fit combined intumescent and smoke seals to existing doors of robust construction which will improve their resistance to fire and smoke. However, it is unlikely that this will result in a door providing 30 minutes fire resistance. Older fire doors which were designed and installed before the use of intumescent materials can be upgraded by the use of intumescent fire and smoke seals to ensure an effective 30 or 60 minute fire resistance. Steel fire doors can be designed to resist fire for four hours and may be used on plant rooms or to divide industrial or commercial premises to minimise property damage. It is worth noting however, that they do not have the same insulating properties and will radiate heat into the room, causing ignition of combustible materials close to the door.

Fire doors, unless held on automatic release devices, are designed to be kept closed and should therefore not be wedged open. The doors should be labelled with standard signage 'Fire Door, Keep Shut' or 'Fire Door, Keep Locked' as appropriate. Self-closing devices should be fitted to fire doors, unless the door is designed to be locked shut and should not be tampered with.

Fire doors which are held open on an automatic door release mechanism will close using the self-closing device on activation of the alarm – either due to release of a magnetic holder or by sound activated release. The use of such devices should be fully evaluated through fire safety risk assessment prior to installation. CCFOA Guidance should be taken into account which requires, for example, smoke detection to be present on both sides of the door, where the door leads onto a protected route. The guidance also requires that where door releases are fitted to corridor fire doors, fire detection should be present in rooms leading on to the corridor as well as smoke detection on both sides of the door. The correct operation of the devices should be checked each week during the weekly alarm test and the doors should be kept shut when not required to be open, e.g. out of hours. Fire doors should also be inspected at least every six months to ensure that they close effectively and that there is no damage or deterioration that might compromise their effectiveness.

Generally fire doors are not required to meet a standard of insulation and therefore combustibles need to be kept clear particularly of glazing panels to avoid ignition caused by contact with the hot glass.

Fire Shutters and Curtains

Fire shutters and curtains are installed to separate compartments and are often designed to provide a high degree of protection. Shutters may be designed to close manually or automatically, on activation of fire detection or melting of a fusible link. The area beneath the shutter or curtain must be kept clear. Most fire shutters do not provide insulation so it is important that combustible materials are kept well clear of the shutter in the same way as described for steel fire doors above. Fire resistant fabrics are often used during temporary works to provide fire separation between compartments.

Small Openings in Compartments

There are many products available for sealing small openings in compartments to restore fire resistance to the design criteria. These products include intumescent fillers, mastics, pillows, seals, expanding fillers and damper mechanisms. These must be correctly installed and there are now non-mandatory certification schemes available for these installers.

Internal Walls and Ceilings

Fire stopping within buildings and the provision of fire compartments can be achieved with block or metal studwork with fire resisting building board or plasterboard on both sides. The rating of the partition should

be corroborated by reference to British Standards and by reference to the manufacturer's information and fire test certification.

For the partition to be effective in stopping fire and smoke, unless the ceiling itself is providing the fire separation, the partition will need to extend up past the ceiling to the underside of the roof structure or the floor above, where the gap should be filled with an approved fire-insulating materials such as intumescent or mineral fibre insulation.

Where doors penetrate an internal partition, it is important to ensure that the door and frame match the same fire resistance of the required partition.

Internal Ceilings

If the ceiling is providing the fire compartment, then it is important to ensure that the plasterboard specification is adequate or that ceiling tiles are clipped in place in accordance with the manufacturer's instructions. A note should be included in the operating and maintenance manual to ensure that the client and tenant are aware of the importance of these clips in maintaining the integrity of the fire compartment and the importance of not leaving tiles missing. In many cases the steel structural supports of a building may rely on fire resistant ceilings below to prevent the steelwork heating under fire conditions, losing strength and causing the building to collapse. For this reason structural steelwork is often protected by insulated fire resistant material or an intumescent coating.

Cavity Barriers

Fire stopping within cavities can be achieved with proprietary cavity barriers that are available from most insulation manufacturers. Advice should be sought from the chosen manufacturer on the best product available for a specific application and the required fire resistance.

Depending on the size of the ceiling void, intermediate cavity barriers may be required. Generally this would be at 20m centres. Cavity barriers within ceilings are generally proprietary fire quilts that are suspended from the structure above down to the ceiling.

Care should be taken in the management of asbestos containing materials which were often used as fire separating materials in the past. Further information is provided in Asbestos Essentials www.hse.gov.uk/asbestos/essentials. It is important that asbestos is not only properly managed to prevent exposure, but is also not removed, without alternative arrangements being taken to provide fire separation or protection of structural steel.

Automatic Smoke Control and Pressure - Differential Systems

Fire engineers include mechanisms in more complex building designs which will control heat and smoke in a building during a fire. These mechanisms include automatically opening vents, automatically deploying smoke curtains, pressurised stairways, smoke control shafts, etc. It is important for the Health and Safety Practitioner and Facilities Manager to fully understand the arrangements in place and ensure that systems are tested, inspected and maintained at the required frequencies. Such fire engineered solutions often enable other precautions to be relaxed, for example travel distances may be extended due to the introduction of such controls.

This information is provided for general reference purposes only. If you have a specific enquiry relating to this topic please contact Wirehouse on:

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