

Fire Compartmentation in Buildings

Fire compartmentation in buildings in the form of walls and floors is designed to protect the occupants in and around a building and fire and rescue service personnel from the spread of fire by containing it in the compartment of origin for a period of time.

Compartmentation is a vital part of the fire safety design of a building and seeks to divide large spaces into smaller, more manageable ones should a fire occur. Fire compartmentation is also used in order to create a safe, protected means of escape for the building occupants.

In simple buildings there may be little in the way of compartmentation other than to provide a means of escape, e.g, a single storey office building may be open plan with a single staircase servicing the upper floor. This staircase will be designated as a means of escape and as such will be a fire compartment that is designed to protect the occupants as they evacuate the building.

Larger more complex buildings will make much greater use of compartmentation. For instance, in a high rise accommodation block each apartment or flat is a separate unit and it will, in fire terms, be separated from the other flats or units around it in order that fire spread can be avoided. Larger flats may have additional fire separation within them in order to protect the occupants' means of escape.

Occupancy/residency has a significant impact on the life safety requirements and the reliance on fire separation, with risk factors such as mobility of the occupants, typical age of the occupants, building use and risk etc needing to be considered.

The fire resistance of a compartment wall or floor is a measure of its ability to:-

- Withstand collapse and/or
- Maintain its integrity by resisting fire penetration and/or
- Insulate against the transfer of excessive heat.

In simple terms, the wall or floor must remain functional for the duration of the designed fire resistance period. The compartment wall or floor should not crack or develop holes that allow flame, smoke and hot gases to pass through it, and if appropriate, it should maintain a level of insulation such that the non-fire side does not increase in temperature by more than 140°C above ambient. This fire resistance period is measured in terms of time from 30 minutes up to 4 hours and beyond in some circumstances.

Compartmentation falls into the category of passive or built-in fire protection meaning that it is part of the building fabric and generally does not need to be activated in the event of a fire. There are no ongoing checks or maintenance regimes associated with the compartment wall or floor, however, its integrity must be maintained in order for it to be effective.

Buildings are there to be used, therefore fire compartments by necessity have doors passing through them and electrical and mechanical services need to be routed around the building and in doing so will obviously breach the compartment.

Fire Doors

A well designed fire door can provide a barrier to the spread of fire and smoke without causing too much hindrance to the general movement of people around the building. Each fire door will be designed to provide this function depending on the building specific design criteria e.g the purpose of the building, its location in the building, occupants' characteristics and the fire associated hazards.

A fire door required to provide resistance to the passage of a fire must be fitted with intumescent seals which react to the heat of a fire and expand to close gaps between the door and its frame.

The spread of smoke is also a threat to life, particularly in the early stages of a fire, for this reason fire doors should be fitted with a 'cold smoke' seal to prevent the ingress of smoke around the door edges. Combined smoke and intumescent seals are fitted to protect from all aspects of fire.

Critical to the performance of any fire door is a good, well documented inspection, maintenance and repair regime. A fire door is often one of the most used elements of a building and as a result, fire and smoke seals, hinges, latches and closing mechanisms can become worn. A well run building should have a culture where fire doors are inspected on a regular basis with any defects or faults dealt with as soon as possible. Periodic third party inspections are also a good idea in order that these lifesaving elements are maintained to the required level of performance throughout the life of a building.

Service Penetrations

Any penetration through a fire compartment such as the routing of electrical and mechanical services must also provide the same level of fire resistance as the compartment walls and floors that it penetrates.

The Passive Fire Protection industry has devised many solutions to deal with this, including fire dampers, fire resistant mortars, fire batts, pipe wraps and collars and fire resistant gap fillers and sealants, collectively known as Fire Stopping products and systems.

Manufacturers have extensive fire test evidence to support the use of their Fire Stopping products to maintain the integrity and insulation of the fire resistant compartment. A fire test report should be carefully read in its entirety in order that the specifier or user can ensure that the test evidence is applicable to the use that they are considering. A report showing results from a test of one pipe passing through a batt and mastic fire barrier may not be sufficient evidence to support the use of the same product when multiple services are passing through it. Specifiers should also consider what the pipe is made of. A metal pipe will behave differently to a plastic one when exposed to fire. The plastic one will quickly melt and as a result will need further support and fire protection in the form of an intumescent wrap or collar.

In order that penetrations through compartment walls and floors are adequately protected against fire it is crucial that appropriate products are selected based on adequate and robust fire test evidence, and that these products and systems are correctly installed and maintained in line with the fire test evidence.

All too often, this is not the case and building occupants are put at risk through incorrect specification, selection, installation and/or maintenance of fire stopping products.

Certification

BRE Global in common with the rest of the passive fire protection industry recommends and promotes third party approval of all passive fire protection products and systems as well as the companies who install them, in order that fire safety standards are as robust as they can be.

Independent third party certification is a conformity assessment process which provides confirmation that products and services have met and will continue to meet the requirements of specified standards and other normative documents.

Architects, designers, insurers and contractors have a duty to construct buildings that are safe in the event of fire. Good quality products can be severely compromised by poor installation so it is vital that competent installer companies are employed for the various elements of the passive fire protection. BRE Global's approvals process ensures that the installing company has undergone, and continues to be subjected to, a rigorous audit process, both office and on-site, that ensures they have and maintain the necessary skills and procedures to install passive fire protection products to the required standards.

BRE Global has developed the following passive fire installer schemes:-

- LPS 1197: Approval and listing of companies inspecting, repairing and maintaining fire and security doors, doorsets, shutters and active smoke/fire barriers.
- LPS 1271: Approval and Listing of Companies installing fire and security doors, doorsets, shutters and active smoke/fire barriers.
- LPS 1500: Requirements for the LPCB approval and listing of companies installing construction elements used to provide compartmentation in buildings.
- LPS 1531: Requirements for the LPCB approval and listing of companies installing or applying fire protection products.

By selecting an LPCB approved installing company, you will have gone a long way to making sure that the compartmentation in will deliver the project's fire protection requirements.

To download free copies of the above standards or to view listings of passive fire protection products or installers, please visit www.RedBookLive.com.