Seals and approval

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Correctly specifying and applying fire-stopping products is vital in ensuring building safety, writes Niall Rowan

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Passive fire protection (PFP) makes a building safe when fire breaks out by ensuring it does not collapse, and by subdividing it to prevent the spread of smoke and flames.

PFP comprises fire doors, walls, protection to the structural frame, and fire-stopping of services passing through walls or floors. It works by keeping fire and smoke in a single compartment, ensuring there are no gaps through which these can escape.

The Building Regulations set minimum standards for life safety in the design and construction of buildings, and these provisions are expanded in statutory guidance documents such as Approved Document B in England and national equivalents in Scotland, Northern Ireland and Wales.

This guidance defines the maximum size of compartments in the building and the fire resistance requirements for each wall, floor and ceiling. The period of time for which the element must resist a fully developed fire generally ranges from 30 minutes to 2 hours, depending on the usage of the premises, the size and location of the compartment and the presence of other protection systems.

Openings

The construction of the walls, floors and ceilings will be carried out in accordance with these design criteria. But in order for any building to be useable, provision must be made for openings for mechanical and electrical services and expansion joints, as well as for fire doors. It is these holes to which fire-stopping must be applied.

There are many proprietary fire-stopping products available that are designed to seal compartment breaches and fill construction joints, thereby restoring the fire resistance of the wall, floor or ceiling to its original state. These need not only provide a barrier to fire, but also need to avoid the possibility of services burning away and leaving holes in the compartment.

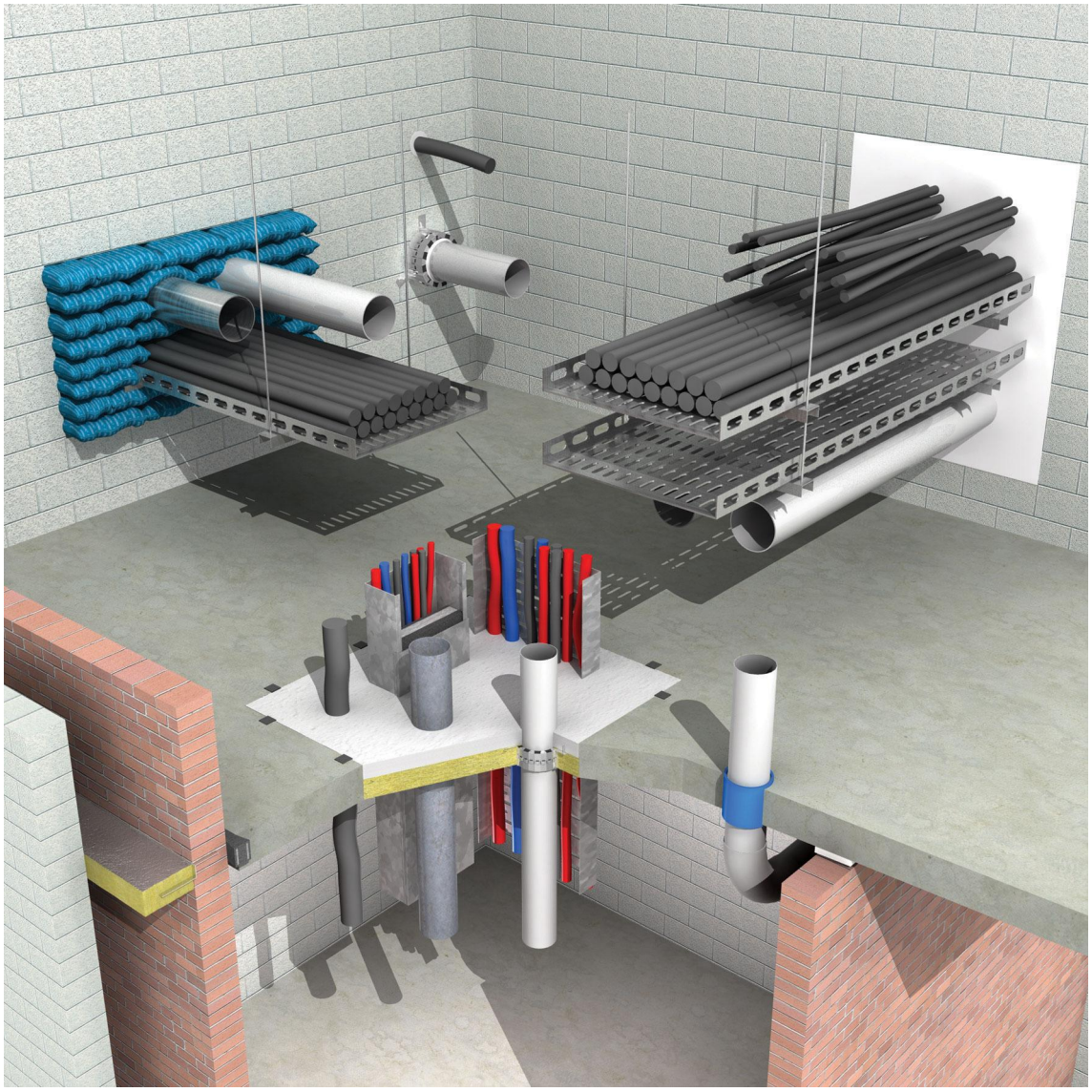

Figure 1. An overview of a fire-stopping application

While the primary purpose of fire-stopping is to make good any breaches in compartment walls and floors, it is also important to remember that they must also prevent heat transmission. Consequently, the fire resistance of separating elements of compartment walls and products used to reinstate breaches is expressed in minutes of integrity ? that is, the time for which they prevent the passage of flames and hot gases ? and insulation ? how long they limit the temperature rise on the unexposed face. If a product has a claimed fire resistance of 60 minutes, the user should be confident that the fire-stopping satisfies both the integrity and insulation requirements for this time.

It is important to ensure that the product specified is suitable for the intended application by confirming that its fire test and other evidence adequately support the end use. Similarly, products from one manufacturer should never be mixed with those of another, because if they have not been tested together they may not work in combination; see the Association for Specialist Fire Protection (ASFP) advisory note Use of firestopping components from different

manufacturers/systems for more information.

Fire test evidence

It is vital to determine that the testing, inspection, design appraisal or assessment processes adopted are sufficient to ensure that the fire testing and certification as presented are appropriate for the intended application.

Not all potential configurations in which a product or system is to be used can realistically be tested. In such circumstances, a range of tests may be carried out in different configurations, with data then extrapolated to provide an assessment report.

Such evidence of performance from test or assessment may have been undertaken through a nationally recognised testing laboratory such as one accredited by UKAS , the UK Accreditation Service, and based on an appropriate recognised standard, for instance a British or European Standard. Some fire consultants are also able to undertake assessments.

Such comprehensive reports should not be confused with indicative or ad-hoc tests: while these allow manufacturers to assess how their products or systems may perform, the information should not be used to demonstrate performance against any regulatory requirement, and the reports of these tests contain an appropriate limitations statement.

The type of penetration seal used for each service differs and a mixed penetration seal will fail prematurely

Should test evidence of this kind be submitted, then it is essential to examine the whole report and not just the fire test data, as all of the conditions for the use of the fire test will be covered in the report?s introduction. If the data given is based on a small-scale or indicative test, ask to see other evidence of full-scale testing in compliance with the appropriate standard. If you have any doubts, seek advice from the body that undertook the test. Guidance is available from the ASFP advisory note Indicative or Ad-hoc Testing .

Certificated contractors

The ASFP recommends that all fire-stopping products should be 3rd-party-certificated and that fire-stopping work should only be carried out by contractors that have been certified by 3rd parties. Using products and installers from a UKAS-accredited 3rd-party certification scheme will ensure an auditable trail from the specialist that installed the relevant fire protection measure, back through to the product or systems manufacturer.

The certification process includes:

- selection of samples from the factory or market;
- surveillance by testing, factory production control, ongoing audit procedures and quality management system evaluation to ensure consistency;
- labelling that identifies the certification body;
- maintenance of a register of certificated products;
- independent inspection of installations; and
- accredited certificates of conformity issued by the installer.

When appointing a contractor, it is important to ensure that they can prove their competency to install the type of fire protection product to be used. All ASFP contractor members are certificated by 3rd parties, so always look for the association?s logo.

The ASFP also recommends that a complete record is made of all installations in a building, with labels applied as part of the certification process to enable future remedial work to trace them. Similarly, photographs of the completed installation can also assist with verification of the work. A certificate of completion must also be provided as part of the inspection process.

Best practice

To help specifiers, building owners and installers fit the most appropriate product in the correct way, the ASFP offers a range of guidance documents.

In many applications, fire-stopping products have to accommodate movement of the services or joints in everyday usage. Sealants used around hot water or chiller pipes can be subject to expansion or contraction of the pipework, which will result in both tensile and shear loads on the product. If it cannot withstand such loads then it is likely it will fail when exposed to fire.

Similarly, the gap between the slab edge and a curtain-wall construction will be subject to movement of the wall?s facade due to positive and negative wind loads. Any fire-stopping product used in this situation should demonstrate its ability to recover its shape during testing.

Facade movement must be accommodated by a flexible seal that needs to be adhered or mechanically fixed to the slab according to the manufacturer?s guidelines; see ASFP advisory note Horizontal linear gap seals used in curtain walling systems for more details.

There is also a tendency for building designers to put all the services together in 1 opening. However, the type of penetration seal used for each service differs, and a mixed penetration seal will fail prematurely. Consequently, the ASFP recommends that fire-resisting compartment walls or floors that are to be penetrated by services should be designed at an early stage in the project, so the correct seal can be used with each penetrating service aperture.

In most cases, this should mean segregation of the penetrating services into different openings so the correct type of seal and support can be provided. If a mixed penetration seal has already been constructed that requires fire-stopping, guidance must be obtained from the seal manufacturer to ensure that it can be used for all penetrating services.

Fire footage

The ASFP video on the correct specification and installation of fire-stopping describes the vital role of compartmentation, and explains why any breaches in compartment walls and floors for service openings must be appropriately sealed.

Featuring footage of a fire test carried out on behalf of the ASFP, the video clearly demonstrates how correctly installed fire-stopping can effectively hold back smoke and fire, while, if incorrectly chosen and installed, it will fail, allowing smoke and flames to spread quickly.

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Further information

- Related competencies include Fire safety
- Image ? PROMAT
- This feature is taken from the RICS Building control journal (February/March 2018)
- Related categories: Building control ; Fire and life safety