

Fire Compliance of Pipework Systems

I must say, that my thanks to Nigel Green and the rest of the SoPHE team for helping this year's technical conference be a great as it was. Nigel and I delivered a piece on passive fire seals for pipework which we think was well received, as we attempted to take some of the complexity out of the current difficulties with selection. So for those that missed out on our dulcet tones on the day, we have done a small piece on what the outputs were.

Passive fire protection and the routes to demonstrate reasonable levels of safety and health have come to the forefront in planning engineering projects in recent years. For this reason and due to the level of complication surrounding what achieves a reasonable level of safety and health, we believe that some guidance around the subject would be of use for our members and readers.

Pipe work passive fire protection falls under the classification of BS EN 13501-2:2023 and the testing standard which is BS EN 1366-3:2021. There is the test standard BS476-20 :1987 that also provides a method for the determination of the fire resistance, though this standard has no direct field of application, is not specific to pipework and is less onerous test procedure and is ad hoc. The advice is to use the BS EN 1366-3 tested solutions over BS 476-20, where practicable.

There are two main types of pipework to consider passive fire protection seals for, metallic (non-combustible) and plastics (combustible). The factors that need to be considered when selecting the fire sealing method are as follows:

- Type of pipe work materials, outside diameters, pipe wall thickness, jointing method, reaction to fire and service supports.
- Pipe end configuration open and closed position in capped and uncapped arrangements. U/U, U/C, C/U, CC.
- The type of penetration i.e., single pipe or multiservice
- The need for insulation both thermally, acoustically and for radiant heat transfer Insulation (I) which leads to CS, CI, LS, LI arrangements.
- The wall/floor type, orientation (H-Horizontal, C-Vertical) and its thickness/density
- The Fire Resistance required in terms of Integrity (E) and Insulation (I)
- Chemical Compatibility with the sealants and insulation.
- The pipework support distance from the wall

As the selection of the passive fire protection materials normally falls to a specialist fire protection trade, the first recommendation is to ensure that one has been engaged on the project. As we recognise that projects can be small in nature and one may not be appointed, it is advisable that contact is made with the technical team of one of the passive fire seal manufacturers/suppliers. A passive fire protection specialist trade will use the suppliers (passive fire protection seal manufacturers) on the market to advise the products that are available and that are compatible with both pipe material, the wall or floor construction and the required fire resistance that is required. However, each pipework system has its first principles of system use, foul system (Approved Document: H) or rainwater (H) or it could be chilled water (AD:L). The point here is that the above information must be passed to the specialist fire protection trade or the passive fire seal manufacturer by each pipework system type at each wall penetration location.

Each condition must be specifically designed, if this is not done, how does anyone determine its appropriateness or perform a quality control check once it's installed in the final condition.

The other point to note is that passive fire protection products cannot be mixed and matched from different passive fire protection manufacturers. There will be no tested evidence of compatibility.

The risk here for our members is that there are limits to what seal types can be used if the wall is not the correct type of standard supporting construction, the wall thickness is too thin, there are multiple services in the same penetration hole, the aperture is too large through where the pipe(s) travels etc. It needs an early coordinated approach. The bottom line is a specialist passive fire protection specialist will not install a seal that does not conform to the tested details. I.e., BS EN 1366-3 testing states '*A penetration and the accompanying penetration seal shall be as in practice*'.

Materials and insulation

Where the material is metallic (non-combustible) the pipe can either be installed in a multiservice penetration with other services (except Fire Dampers, Flues, Fire Resisting Ductwork, Busbars – these are single service penetration holes only) or within their own penetration. Metallic pipework, is a medium for transferring heat, should be insulated both sides of the wall. In some cases, the insulation that is used for this function is part of the tested system and cannot be substituted. Ideally, the insulation that forms part of a tested solution should be installed by the passive fire protection specialist trade, as they might not certify the installation. In other cases, there are intumescent wraps that are installed around the insulation within the wall, again, these should be installed by the passive fire protection specialist. The other key item to consider is the size of the pipe, where they are larger than 100mm dia, they may need to be within their own hole by default. The support of the pipework must also be in line with the passive fire protection manufacturers requirements, i.e., 300mm from the wall could be the maximum. Always check with the passive fire protection manufacturer or passive fire protection specialist trade who can advise. Below are some examples from FSI.

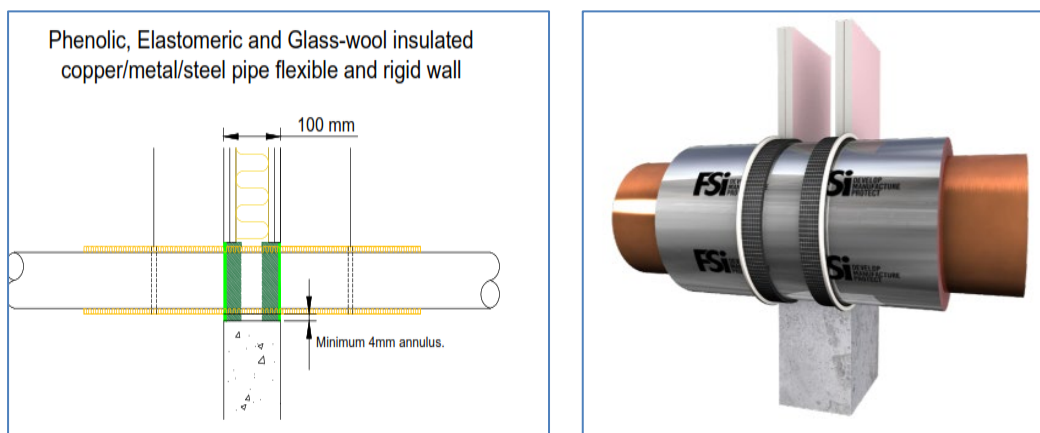


Fig 1. Non Combustible pipe within its own hole with an intumescent insulation wrap

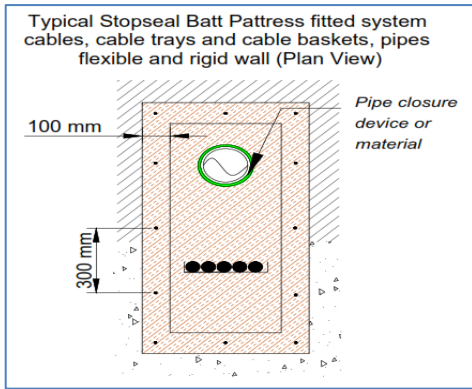


Fig 2. Non Combustible pipe within a multi service penetration.

Where the material is plastic (combustible) the pipe can either be installed in a multiservice penetration with other services (except Fire Dampers, Flues, Fire Resisting Ductwork, Busbars – these are single service penetration holes only) or within their own penetration. Plastic pipework is not a medium for transferring heat and has been crushed within the wall or seal. The type of intumescent/crushing device is dependent on the type of plastic pipe. The material and its wall thickness must be discussed with the passive fire protection manufacturer or passive fire protection specialist trade, as the crushing devices are not universal. The other key thing to consider is the size of the pipe, where they are larger than 100mm, they may need to be within their own hole by default. The support of the pipework must also be in line with the passive fire protection manufacturers requirements, i.e., 300mm from the wall could be the maximum. Ideally, the crushing device that forms part of a tested solution should be installed by the passive fire protection specialist trade, as they might not certify the installation. Always check with the passive fire protection manufacturer or passive fire protection specialist trade who can advise. Below are some examples from FSI.

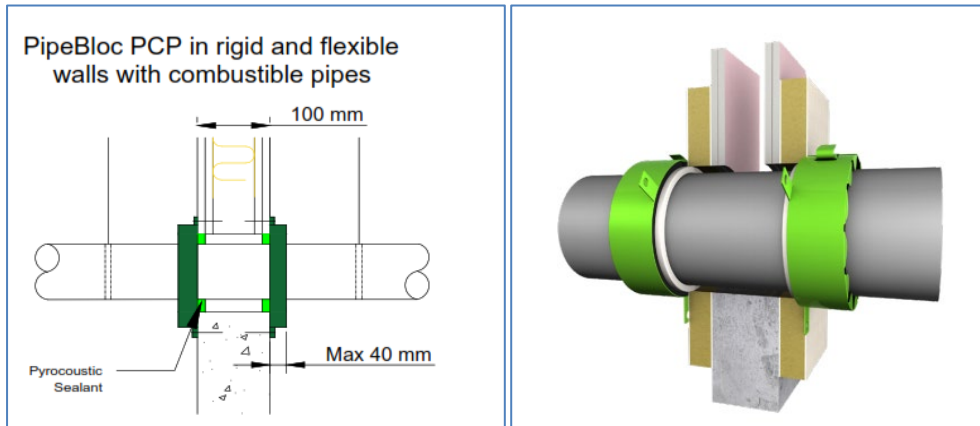


Fig 3. Combustible pipe within its own hole with a crush collar

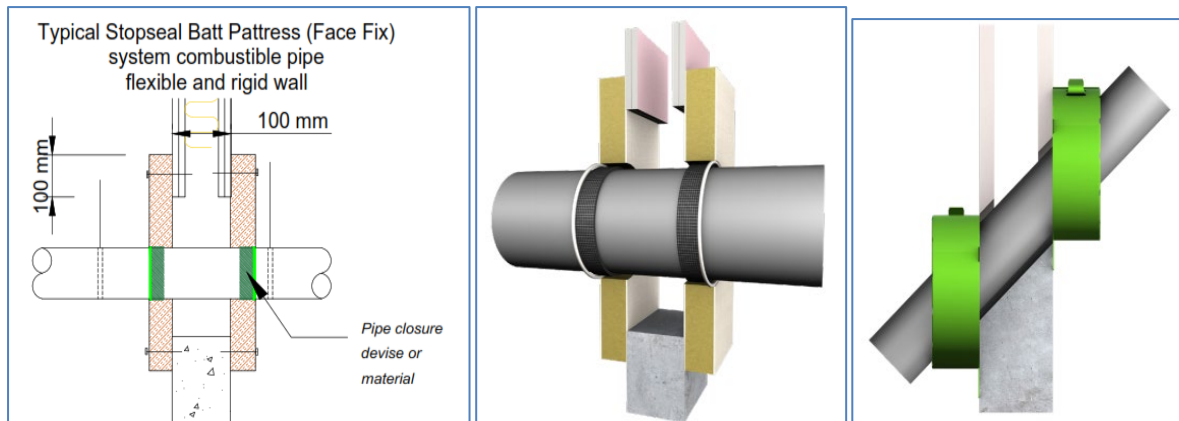


Fig 4. Combustible pipe within its own hole with an intumescent wrap

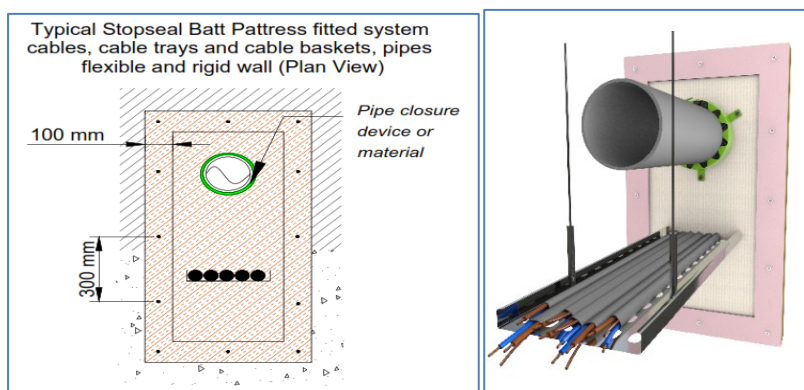


Fig 5. Combustible pipe within it's a multi service penetration with a collar or intuscent wrap

Fire resistance

The fire resistance of the device must be selected to match the fire resistance of the wall in terms of Integrity (E) and Insulation (I). This is normally contained within the Architects drawings or within the Fire Strategy Plans. All passive fire seal devices and methods rely on the walls or substrates being a standard supporting construction material. These are either flexible walls tested to BS EN 1364-1 or rigid constructions with a density of 650 kg/m³ or higher. If the wall is not tested or does not meet the density and thickness requirements and symmetry, then passive fire seal manufacturers/supplies may not be able certify the installation in the wall/floor. Always check the compatibility with the passive fire protection manufacturer or passive fire protection specialist trade. Note: The wall should be tested but also classified in accordance with 13501-2. this is stated in 1366-3.

The fire resistance for the seals will vary dependant on the size and thickness of the standard supporting construction (walls/floor) and the size of the opening. A general rule is the larger the multiservice penetration the lower the rating becomes. The lower the thickness of the wall, the same can apply. Where the pipes are installed in multiservice penetrations, there are distances that must be maintained between combustible and non-combustible pipes or to other services, like trays or ladder racks within the penetration. There are also distances between the sides of the aperture to the pipes that must be maintained in all penetration types. If the penetration is a multiservice opening using ablative batts, as the

sealing method, 40% of the opening must be free of services. Always check with the passive fire protection manufacturer or passive fire protection specialist trade who can advise.

Chemical Compatibility

When using CPVC pipes (sprinklers) care must be taken with the passive fire protection mastics as they will react with the plastic pipework causing leaks to occur. There are only certain mastics that can be used for these systems. If the CPVC pipework is within a multi service opening, then the mastic compatibility must be checked with both the passive fire protection supplier and the pipework manufacturer. If this is not done and the pipework fails, any insurance can be come invalidated.

This is a light touch note and further guidance can be found within the following documents.

FIRESTOPPING OF SERVICE PENETRATIONS BEST PRACTICE IN DESIGN AND INSTALLATION – BESA, ASFP, BSRIA, FIS, GPDA.

ASFP - On-site guide to installing fire-stopping

CPVC Compatibility

<https://www.lubrizol.com/CPVC/FBC-System-Compatible-Program/System-Compatible-Product-Finder>

<https://parts.spearsmfg.com/Cpl.aspx>

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