

ADVISORY NOTE 41

Guidance for those involved in the early-stage design of Passive Fire Protection - Service Penetration Seals, including Architects

Introduction

The way that passive fire protection systems have traditionally been designed and specified across construction sites in the UK often leads to problems later in the construction phase. Issues arise with interfaces between different systems such as service penetrations through compartment walls and locations where the structural fire protection interacts with compartment walls.

In Advisory Note AN33, ASFP advocates for getting PFP manufacturers, specialist designers and contractors involved in the design process as early as possible, to prevent mistakes being hard wired into designs that cannot be covered by existing test and certification data, requiring time consuming and expensive bespoke testing.

One of the common causes of this is that design activity at stages 2 (Concept Design) and 3 (Spatial Co-ordination) of the RIBA Plan of Works does not consider the separation requirements between services fully. If a design seeks to maximise the number of services required and minimise the spacing for construction “efficiency”, then the resultant lack of space / congestion of services will lead to service penetration seals that may be unsupported by test and certification evidence and difficult, **if not impossible, to construct.**

The purpose of this guide is to give architects, MEP consultants and spatial planners a few simple guidelines to help with discussions in RIBA Plan of Works Stages 2 and 3. Use of these guidelines will help to mitigate some of the design decisions that hinder a successful outcome. However, it should be stressed that the following guidelines are not all encompassing and provide no ultimate guarantee of success. The best outcome will always come with early engagement of architects and MEP consultants with specialist passive fire protection designers, manufacturers and installers through RIBA stages 2 and 3.

The concepts and rules within this document should NOT be used as a method for avoiding the need for full design of service penetration seals to be completed before a Gateway 2 application. These recommendations do not represent concepts that could be relied upon as “standard details” for use where a contractor wishes to adopt a Gateway 2 “Approval with Requirements” to fully design service penetration seals after the start of construction. It is the opinion of the ASFP that standard details can not be used as an approach for Gateway 2 / RIBA Plan of Works stage 4 -Technical Design. There are too many variables that invalidate this approach.

ASFP is in the process of producing a new design guide to explain how best to conduct the design of Passive Fire Protection to ensure a compliant and constructable design is achieved at Gateway 2 / RIBA stage 4.

This advisory note has been prepared in conjunction with the Passive Fire Knowledge Group (PFKG) and the Architectural Technical Leads Group (ATLG).

The ASFP position

If it is not possible for MEP consultants and spatial planners to engage with specialist designers, manufacturers and installers, through RIBA stage 2 (Concept Design) and stage 3 (Spatial Coordination), then the following guidelines should be followed to provide a reasonable chance of success.

It should be firmly noted that the following recommendations are purely guidelines written around the most commonly tested services passing through walls and floor systems accepted as standard within the test methodologies at the time of writing this note. They are not designed to be an all-encompassing set of guidelines that guarantee successful design. However, the guidance is given with the intention of aiding identification and therefore prevention of the most common mistakes during the early design process.

Ultimately, the MEP layout, chosen wall/floor system and detailed design of the service penetration seals will need to be fully evaluated to demonstrate compliance with the functional requirements of the Building Regulations, and comply with the requirements of project fire strategies.

The recommendations are:-

- Use a standard supporting construction system for walls & floors wherever possible. See table 1 from BS EN1363-1:2020 for further information. Evidence of fire resistance performance of the supporting construction system shall be available where appropriate and in accordance with relevant standards.
- Design of the supporting construction should also consider any requirement for cavity block work seals so that Fire and/or smoke cannot enter the cavity.
- Place any fire resisting ducts, fire resisting dampers or smoke control dampers in their own individual penetration, unless the duct/ damper has been designed to be part of a multi-duct/damper penetration seal.
- Similarly, flue pipes should also be located in their own individual penetrations.
- Penetrations in compartment walls should be located a minimum **200mm** below the floor slab in a rigid wall and a minimum of **300mm** below slab in a flexible wall.

Flexible Symmetrical Walls – Formed Apertures

- All through penetrations in flexible wall should ideally be framed and lined on all sides by the same construction material.
- In terms of recommended distances between penetrations flexible walls, the following are suggested minimum guidelines
 - **260mm** between all types of adjacent apertures (vertical) including above doors.
 - **360mm** between all types of adjacent apertures (horizontal).
- Maximum aperture dimensions, separation distances and additional requirements will ultimately need to be validated with both the wall system owner and the service penetration seal system owner.
- Services in a multi service aperture should be separated by a guideline minimum of
 - **100mm** from edge of service to aperture edge.
 - **100mm** from edge of service to edge of adjacent service(s).
 - Service Penetration seal system owners may have test data that supports lesser separation distances. Using such data requires a more detailed design process including consideration of space around the services to allow successful installation and completion of the compartmentation requirements.

Flexible Symmetrical Walls – Cored Apertures

Where cored holes are used in place of framed and lined openings, for a single service, or small bunch of cables, the following guideline should be used:

- **200mm** between all types of adjacent service apertures, including doors. (studwork must not be cut). This should be checked with the wall system owner.
- The correct backing material should be used to allow the depth of any seal material to be gauged, assuring the suitability of the system applied.

Rigid Walls and Rigid Floors – Formed apertures and cored apertures

- Minimum service separation guidelines for rigid walls (all service types):
 - **100mm** between adjacent service apertures.
 - **200mm** between service apertures and adjacent door apertures.
 - **2400 x 1200mm** maximum guideline service penetration aperture size for rigid walls.
 - Apertures should be designed considering structural & architectural requirements.
 - A lintel may be needed for blockwork/masonry walls, this should be checked with the structural engineer. A coordination check must be carried out if wind posts are shown.
- Services in a multi service aperture should be separated by a guideline minimum of
 - **100mm** from edge of service to aperture edge.
 - **100mm** from edge of service to edge of adjacent service(s).
 - Service Penetration seal system owners may have more favourable data, but this requires a more detailed design process to access.
- Guidance does not apply to hollow core floors. Please consult service penetration seal system owners for more information.

Service Considerations

- Dimension from edge of service referenced above includes any insulation applied to services as part of their normal operating function.
- Service support is essential and varies from manufacturer to manufacturer, currently a minimum of 250mm both sides of walls and above floors would be generally acceptable across multiple manufacturers but should be checked with the service penetration seal system owner and the service system owner.
- Couplers, joints, valves, flanges, bends, etc., should not be within 500mm of service penetration seals unless covered by test evidence. Gaskets must be fire resistant.
- Services penetrating at angles other than 90° to the wall need detailed consideration.
- There may be instances which require additional acoustic resistance. This should be checked with the project acoustic consultant.
- There may be instances where services are required to have a specific separation from other services required by other regulations, such as gas transmission regulations.
- Consideration should also be given to ensure that the service is compatible with the proposed service penetration seal system. There may be compatibility issues caused by plasticisers in service penetration seal mastics and certain plastic pipe materials (See ASFP Advisory Note AN22 for more details).

No guidelines are provided for asymmetric flexible wall constructions (Shaft Wall) and flexible floor constructions. Whilst these are common in construction, they are not identified as standard construction types within the relevant parts of the BS EN 1366 suite of tests covering the fire resistance

of different types of penetration seal. Please consult with penetration seal system owners for more information on test conducted on non-standard supporting constructions.

It should be firmly noted that the above dimensions are considered to be guidelines written around the appropriate test standards and most commonly available tested or certified service penetration seal details. They are not provided to be a rigid set of design guidelines. However, the use of information in this document will enable the user to prevent most of the common mistakes in design at RIBA stages 2 and 3.

Ultimately, the MEP layout, chosen wall/floor system and detailed design of the service penetration seals will need to be fully evaluated at RIBA stage 4 / Gateway 2 to demonstrate compliance with the functional requirements of the Building Regulations and compliance with the requirements of the project fire strategy.

Wall system owners and passive fire protection system owners may well have data which allows smaller distances than those quoted above. These can be relied upon if designs at RIBA 2 and 3 include a fully developed MEP design to allow exact specification of the passive fire protection system in relation to the dimensions and material types of all services.

Summary

In order to enable successful co-ordination of the Services design, the best approach is for the PFP designer, manufacturer and installer to cooperate at RIBA stage 2 and proceed as per ASFP Advisory Note AN33. Early engagement in the fire design process with specialist fire protection contractors, consultants and manufacturers is critical to ensuring issues are identified and the correct specification and system design is achieved. This will ensure the legislative requirements and compliance of the project is achieved without needing expensive and time-consuming redesign or project specific fire testing.

Whilst the architect / principal designer may not necessarily have the competence to determine the compliance of passive fire protection details, it is an essential part of the process that they engage fire specialists to avoid issues down the line.

Provision of information to the other contractors on site is needed so that all are aware of the importance of keeping to the design to ensure no additional costs or technical issues arise throughout the construction phase.

Design Better, Build Better, Collaborate on Design, Build to the Design, Enforce the Design

Further information

Further information can be found on the ASFP website at [#">www.asfp.org.uk.#](http://www.asfp.org.uk)

For information on Passive Fire Knowledge Group (PFKG) visit www.pfkg.org

For information on the Architectural Technical Leads Group visit www.atlg.uk

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