

Promat



PROMINA® 60
Smoke Barrier



The purpose of a cavity barrier is to prevent the spread of smoke and flame from penetrating and/or moving within a concealed space in a fire compartment. Documents supporting the regulations provide guidance on where such barriers should be located within hidden voids in a building and they usually give examples of deemed-to-satisfy barriers for voids in stud walls or partitions.

If a barrier in a concealed space coincides with a compartment wall or floor it will normally be required to provide the same fire performance as the wall or floor. If the barrier is located between such walls or floors however, the barrier is defined as a “cavity barrier” and will normally only be required to provide 30 minutes integrity and 15 minutes insulation.

A large cavity barrier is defined as a barrier across a void in which a square with 1m sides can be accommodated. A small cavity barrier is one in which such a square cannot be accommodated. A large cavity barrier is required to provide 30 minutes integrity and 15 minutes insulation while a small cavity barrier need only provide 30 minutes integrity. Cavity barrier definitions are also dependent on the requirements of local building regulations.

Fire Resistant Test Standards

Cavity Barriers

Cavity barriers should normally be tested or assessed in accordance with BS 476: Part 22 or AS 1530: Part 4 and be required to satisfy the failure criteria of integrity and insulation for 30 minutes and 15 minutes respectively when exposed to fire from either side (for exceptions see above and local building regulations guidance documents or, if relevant, insurance codes).

It should be noted that in some instances, the integrity and insulation criteria not only reflect performance requirements but are in fact considerably higher than those outlined above. For example, if the cavity barrier is situated above or on top of a -/120/120 compartment wall, then this cavity barrier would be required to provide a similar fire resistance to the wall below, i.e. -/120/120.

Smoke Barriers

In fire situations, smoke usually kills more people faster than heat, flames or structural collapse. Most modern buildings today have an engineered smoke control system which frequently involves the use of smoke reservoirs by means of constructing smoke channelling screens and curtains. Smoke reservoirs are used to prevent the lateral spread of smoke and to collect smoke for removal.

Smoke curtains and screens must meet the requirements of BS 7346: Part 3: 1990, which requires the screen to withstand a fire temperature of 600°C (± 20°C) for a minimum of 30 minutes. Promat solutions offer a permanent, easy to install, maintenance free and cost efficient method to meet and exceed the requirements of the above standard.

General Design Consideration

① Size of Barrier & Location

As previously noted, there may be occasions when the required performance of the barrier will differ from the general requirement of 30 minutes integrity and 15 minutes insulation. This is certainly the case if a cavity barrier is located above a compartment wall, for example.

② Differential Movement

Cavity barriers are often located between two buildings elements that may move at different rates in normal conditions and/or in the event of a fire, e.g. a floor and a suspended ceiling. The design of the barrier must therefore make an allowance for such movement while still maintaining the required levels of integrity and insulation.

③ Service Penetrations

To maintain fire and, where applicable, acoustic performance of the barrier system, perimeter gaps must be filled with suitable caulking material. PROMASEAL® AN Acrylic Sealant or other tested* fire and acoustically rated material of equivalent or better performance must be used.

Care needs to be taken in detailing a suitable fire stopping system around any penetration of the barrier by services. Allowance should be made for movement of the services in both ambient and in fire conditions to ensure loads are not applied to the cavity barrier.

Please see separate documents for details of the PROMASEAL® and PROMASTOP® fire stopping range.

④ Adjoining Structure

It is essential that the surrounding building elements, e.g. roof, floor or walls, do not collapse in the event of a fire. A cavity barrier in a roof space, for instance, will require that the roof truss to which it is secured is also protected to prevent collapse when exposed to fire for at least 30 minutes, or the regulatory performance requirement, whichever is the longer period of time.

*“Tested” is defined as the use of an alternative sealant which has been shown to provide adequate performance by being subject to a certified, standard fire test in conjunction with the relevant Promat system.



Clockwise from above:

120 minute fire resistant smoke barriers using PROMINA® 60 at Carrefour in Klang, Malaysia; PROMATECT®-H spandrel walls over gap between floor slabs and external claddings at Samsung Tower in Church Street, Singapore; fire resistant spandrel walls at a tobacco plant in Tsingtao, China.





Up to -/120/120 fire resistance in accordance with the requirements of BS 476: Part 22 and AS 1530: Part 4

- ❶ 9mm thick PROMINA® 60 board at each side and bottom, constructed in strict accordance with manufacturer's recommendations
- ❷ For minimum -/120/- fire resistance: No cover fillet is required
For minimum -/120/120 fire resistance: 100mm x 9mm thick PROMINA® 60 cover fillet to be fixed to each face of the framing channel prior to the installation of the main boards (omitted in the illustration for clarity)
- ❸ For minimum -/120/- fire resistance: No mineral wool is required
For minimum -/120/120 fire resistance: 50mm x 100kg/m³ density of mineral wool to be filled in the cavity (omitted in the illustration for clarity)
- ❹ Minimum 50mm x 38mm of galvanised steel channel at nominal 610mm centres, thickness in accordance with below table depending on the barrier height
- ❺ Minimum 50mm x 38mm of top galvanised steel channel, thickness in accordance with below table depending on the barrier height, fixed to ❹ using minimum four pieces of ❷ by two on each flange
- ❻ Minimum 50mm x 38mm of bottom galvanised steel channel, thickness in accordance with below table depending on the barrier height, fixed to ❹ using minimum two pieces of ❷ by one on each flange
- ❼ Minimum 25mm long self tapping screws at maximum 200mm centres
- ❽ Minimum 30mm long anchor bolts, types and fixing centres in accordance with below table depending on the barrier height.
- ❾ All perimeter gaps caulked with PROMASEAL® AN Acrylic Sealant to achieve the required fire resistance performance
- ❿ Masonry or concrete supporting construction, with fire resistance equal to or higher than that of the smoke barrier system

| Barrier height | ≤ 1000mm | ≤ 2000mm | ≤ 3000mm | ≤ 4000mm |
|--|----------|----------|----------|----------|
| Galvanised steel channel thickness of ❹, ❺ and ❻ | 0.6mm | 1.2mm | 2mm | 2.5mm |
| Anchor bolt type of ❽ | M6 | M10 | M10 | M10 |
| Nominal fixing centres of ❽ | 600mm | 500mm | 500mm | 400mm |

Following is a standard Architectural Specification for a smoke barrier system constructed using PROMINA® 60. The designer must determine the suitability of the design to the application and regulatory requirements before undertaking or constructing any works relating to the specification and where in doubt should obtain the advice of a suitably qualified engineer. All installations must be certified by the contractor as appropriate.

Fire Attack From Either Side

120 minutes fire resistance, integrity only in accordance with the criteria of BS 476: Part 22 and AS 1530: Part 4.

Supporting Structure

Care should be taken that any structural element to which the smoke barrier system is affixed, e.g. a beam, floor or wall, has a minimum equivalent fire resistance.

Lining Boards

9mm thick PROMINA® 60 matrix engineered mineral boards as manufactured by Promat International (Asia Pacific) Ltd. All joints to be coincident with steel framing. Standard board dimensions should be 2440mm x 1220mm x 9mm.

Fixing

The steel framework consists of top and bottom horizontal steel channels, and vertical studs, 50mm x 38mm x 0.6mm thick at nominal 610mm centres. The top horizontal channel is of minimum size 50mm x 38mm and at least 0.9mm thick for barrier depths up to 1m and 1.6mm thick for barrier depths up to 2.44m. The top channel is fastened to the concrete soffit with M6 steel anchors 30mm in length, at 600mm maximum centres. The vertical studs are fastened to the top channel with two steel pop-rivets or two steel self tapping screws on both sides of each stud. The bottom horizontal channel similar dimensions to the vertical studs is fastened to the bottom of each stud with one steel pop-rivet or one steel self-tapping screw on both sides of each stud.

PROMINA® 60 boards are fixed to both sides of the framework with 25mm self tapping screws at maximum 200mm centres, a minimum of 12mm from the board edge. Vertical board joints must coincide with the steel framework and be staggered between the two faces of the barrier. There are no horizontal board joints.

Tests & Standards

The complete system along with the material and framing is tested and/or assessed to meet the requirements of BS 476: Part 22 and AS 1530: Part 4.

Butt Jointing

Plain butt joints between machined edges of boards. ⁽¹⁾

Joints filled in preparation for painting. ⁽²⁾

Joints filled and taped in preparation for decoration. ⁽³⁾

Follow-on Trades

Surface of boards to be prepared for painting/plastering/tiling ⁽⁴⁾ in accordance with manufacturer's recommendations.

NOTE:

- ^{(1), (2), (3), (4)} deleted as appropriate.
- All perimeter gaps caulked with PROMASEAL® AN Acrylic Sealant.

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