

# Technical Bulletin: Penetrations in Fire Resistant Walls

## FR-TB-AU-1010-2-31156

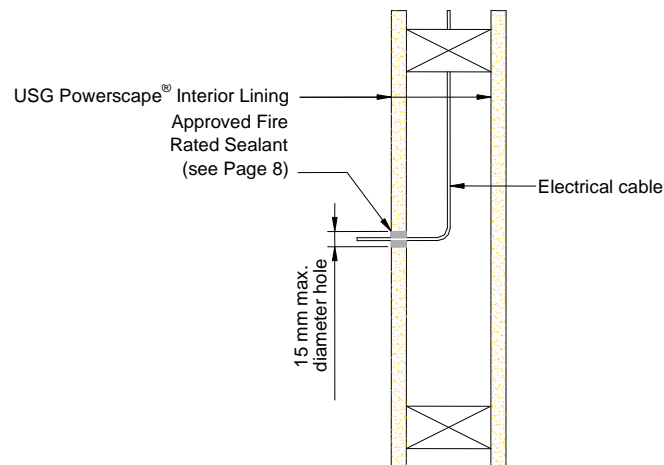
### Introduction

In many structures it is often required that electrical and plumbing fittings be located in or on fire resistant walls. Care needs to be taken when detailing these fittings for installation on a fire resistant wall to ensure the integrity of the system and to prevent premature failure. Inadequate design or installation can lead to paths for the flames to penetrate into the wall cavity. This can result in premature integrity and insulation failure as well as structural failure of the wall framing.

The following document provides detailing information for a wide range of services that are located in, on or pass through fire resistant walls.

### Electrical Cable Penetrations in Steel and Timber Framed Walls

Suitable for all USG Powerscape® Interior Lining Walls with (120)/120/120 FRL or less.



**Figure 1**  
**Cable Penetrations – Walls**

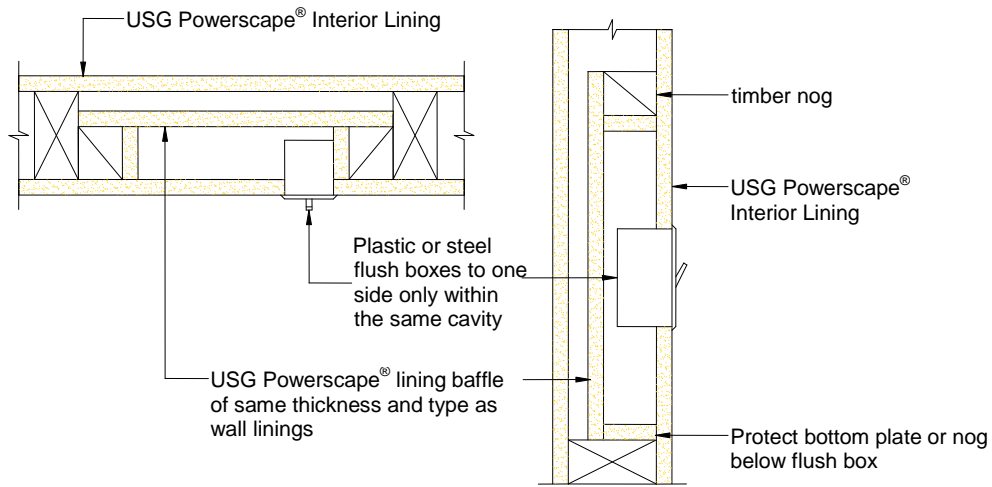
### Flush Boxes in Walls

Suitable for all USG Powerscape® Interior Lining Fire Rated Walls with a (120)/120/120 FRL or less.

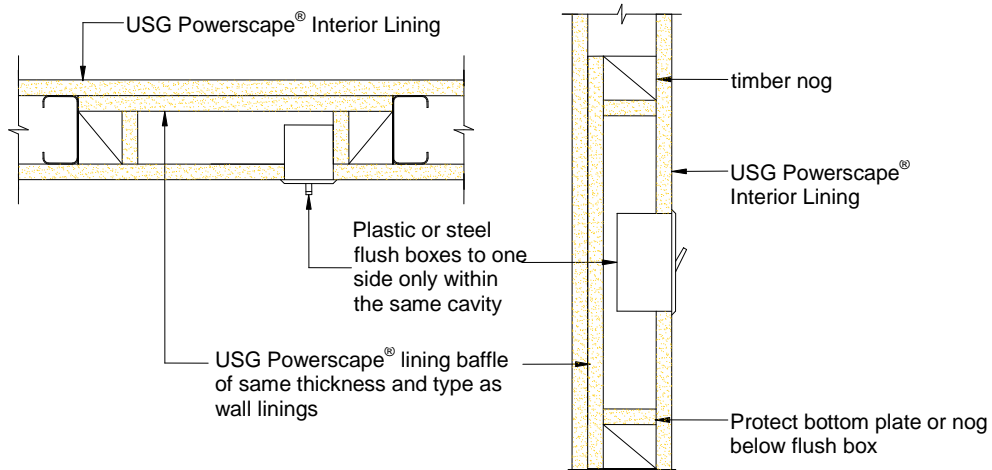
Flush boxes may be installed into vertical fire separations using fire stop baffles constructed as illustrated below. The following other conditions apply:

- Back to back flush boxes are not permitted in the same stud cavity.
- Either steel or plastic flush or surface mounted flush boxes may be used.
- Up to two single width flush boxes or one double width flush box are permitted per stud cavity.
- Wall linings are not fixed to the framing which supports the baffle boards.

Alternatively, fire rated flush boxes can be used.



**Figure 2**  
**Construction of the flush box baffle fire stop for symmetrical (two-way) timber framed fire walls**

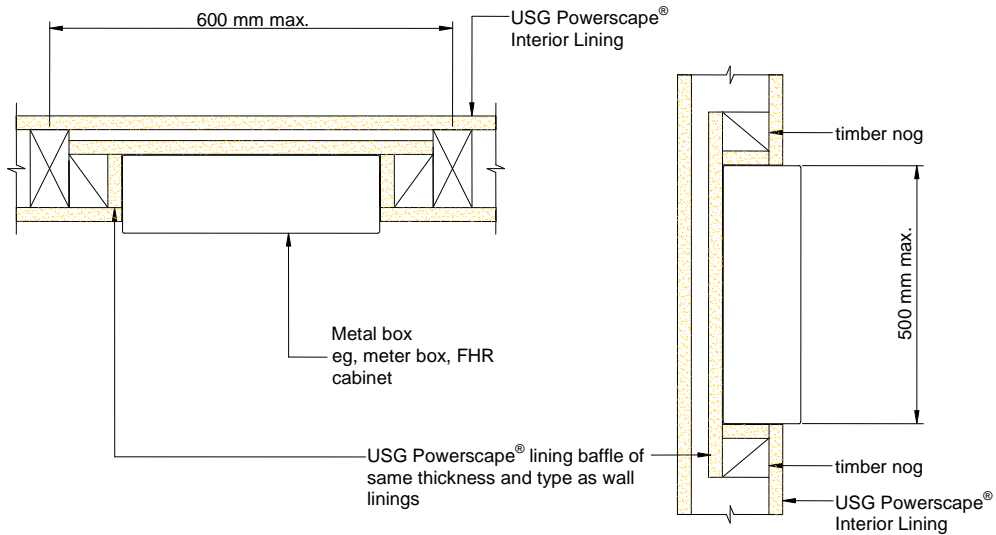


**Figure 3**  
**Construction of the flush box baffle fire stop for symmetrical (two-way) steel framed fire walls**

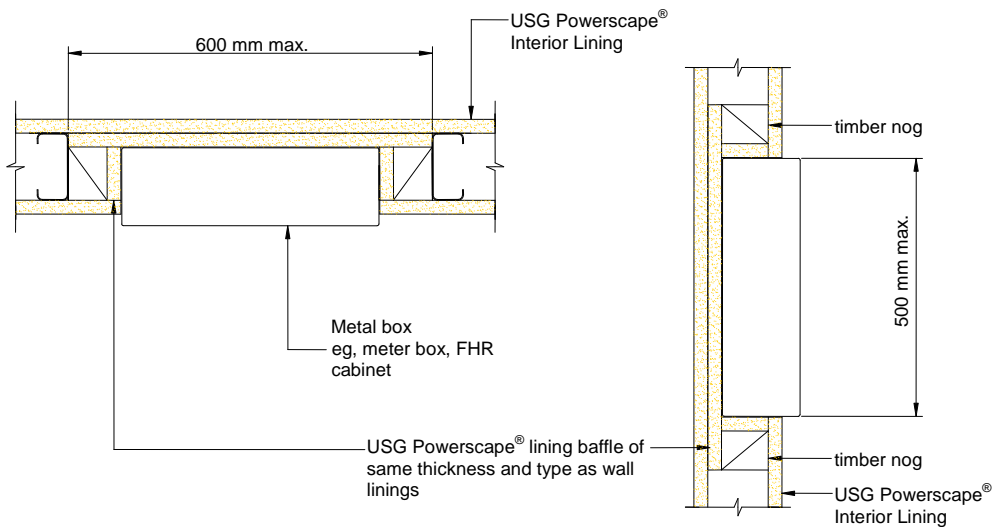
## Larger Recesses in Walls

Suitable for all USG Powerscape® Interior Lining Fire Rated Walls with a (120)/120/120 FRL or less.

- This solution is for larger recessed fixtures such as meter boxes, fire hose reels, etc.



**Figure 4**  
Construction of fire rated larger recesses in walls for symmetrical (two-way) timber framed fire walls



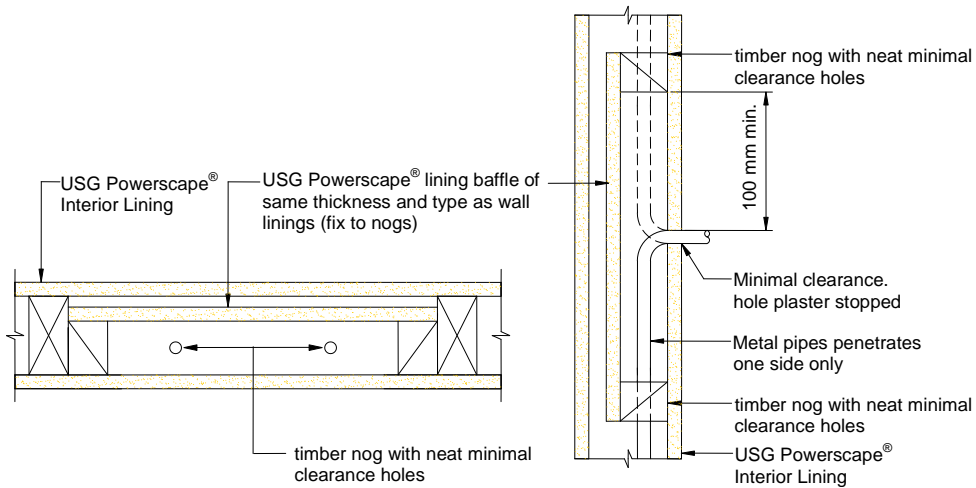
**Figure 5**  
Construction of fire rated larger recesses in walls for symmetrical (two-way) steel framed fire walls.

## Metal Pipes in Walls – Pipe Penetrates One Side of the Fire Separation Only

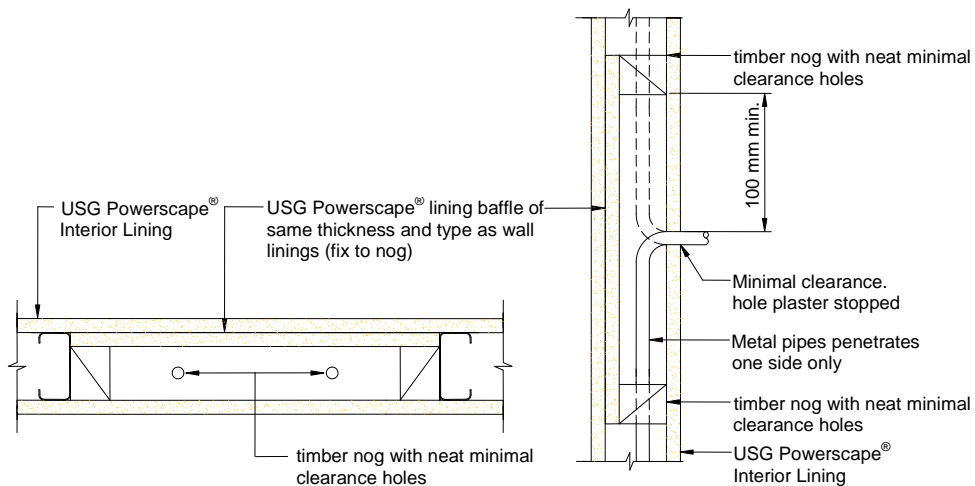
Suitable for all USG Powerscape® Interior Lining Fire Rated Walls with a (120)/120/120 FRL or less.

Metal pipes may penetrate one side only of vertical fire separations provided fire stop baffles are constructed as detailed below. The following other conditions apply:

- Maximum pipe diameter is 80mm.
- Penetrations on opposite sides of the wall within the same stud cavity are not permitted.
- Only two pipe penetrations per stud cavity is permitted.
- Copper and Brass pipe penetrations in walls rated (60)/60/60 require a minimum 16mm baffle thickness even if linings are less than 16 mm in thickness. For all other ratings and materials, baffle thickness may equal lining thickness.



**Figure 6**  
**Metal Pipes in Timber Framed Walls**



**Figure 7**  
**Metal Pipes in Steel Framed Walls**

## Fire Stopping of Metal Pipes Through Powerscape® Fire Rated Walls

### General Requirements

Metal pipe penetrations can be formed through 2-way USG Powerscape® Fire Rated Walls using the system described below.

The following conditions apply:

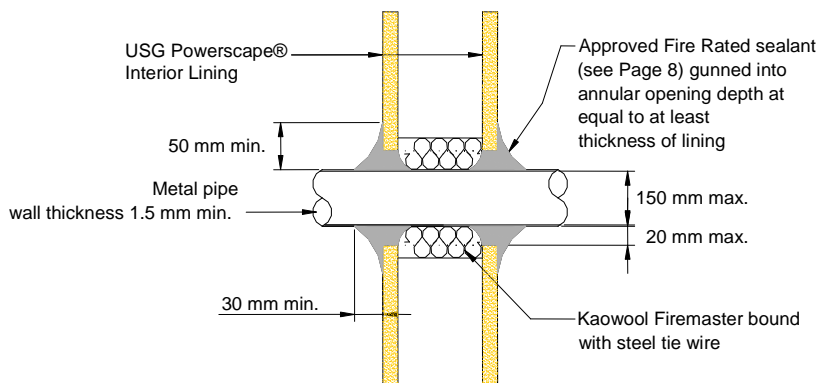
- The USG Powerscape® Fire Rated Wall must be a two-way system
- One-way universal walls are excluded
- The pipe material must be steel, copper or brass
- The pipe diameter must not exceed 150 mm
- The pipe wall thickness must not be less than 1.5 mm

### Fire stopping at the wall junction

Metal pipe penetrations must be fire stopped at the wall junction using the method (cavity insulation) as described below.

### Additional requirements

Additional requirements apply depending on the required FRR and the pipe material. The requirement for ceramic fibre lagging or a radiation guard is to ensure that the pipe does not conduct heat to the unexposed side of the wall which could ignite combustibles and cause fire spread (insulation criterion).



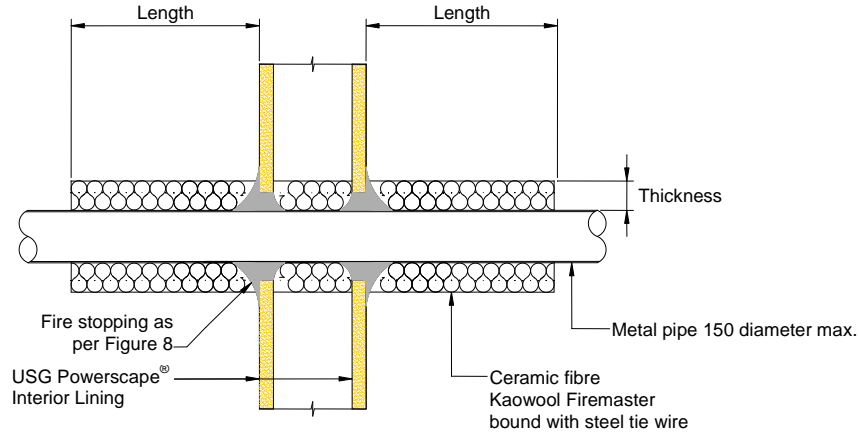
**Figure 8**  
**Metal pipes through USG Powerscape® Fire Rated Walls**

**Table 1. Additional requirements of metal pipes through USG Powerscape® Fire Rated Walls**

Additional Requirements		FRL of Timber or Steel Framed Wall Time up to and Including (minutes)		
		30	60	120
Pipe Material	Steel	OK	OK	OK
	Copper	OK	OK	OK
	Brass	OK	OK	No
Ceramic Fibre Lagging		No	Required	No
Radiation Guard		No	No	Required

### Installation of Ceramic Fibre Lagging for Metal Pipe Fire Stops

The following system applies only to metal pipe penetrations of 60 minutes FRL where lagging is required in accordance with Table 1.



**Figure 9**  
**Lagging for Metal Pipes**

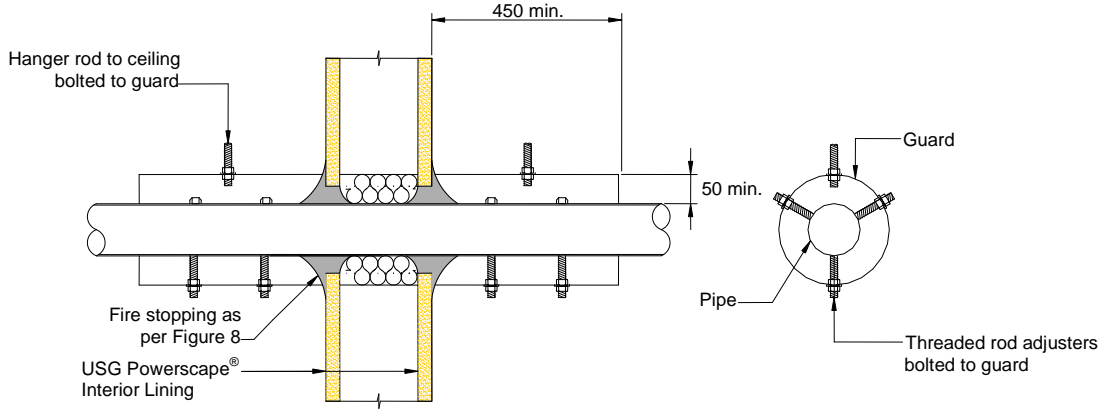
The following table is used to determine the length and thickness of ceramic fibre to be used.

**Table 2. Ceramic Fibre Insulation Details**

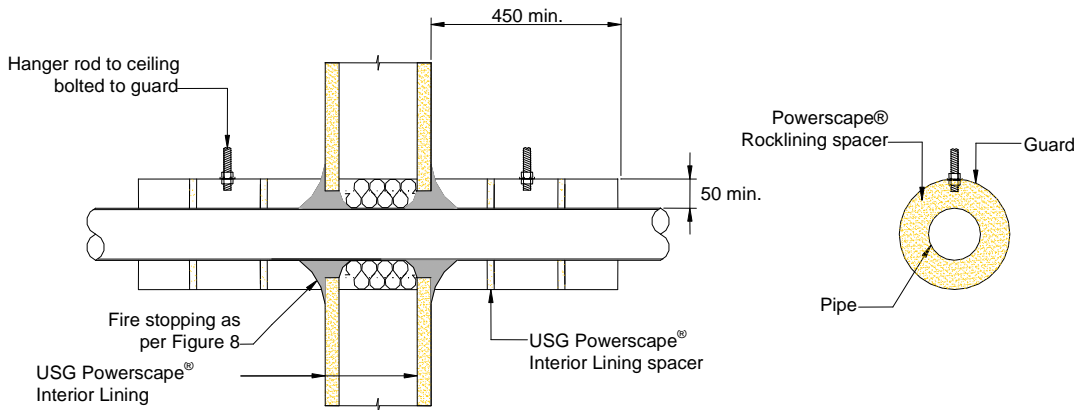
Pipe Diameter	Metal	Minimum Insulation Thickness (mm)	Minimum Length (mm)
Up to 50 mm	Steel	25	600
	Copper/Brass	25	1200
Greater than 50 mm and less than 150 mm	Steel	50	600
	Copper/Brass	50	1200

## Installation of Radiation Guards for Metal Pipe Fire Stops

The following system applies only to metal pipe penetrations of up to and including 120 minute FRL where radiation guards are required in accordance with Table 1.



**Figure 10**  
**Option 1 – (Both sides of wall)**



**Figure 11**  
**Option 2 – (Both sides of wall)**

## Fire Rated Doors

Fire rated doors for use in fire rated plasterboard walls will have similar performance when used in USG Powerscape® interior lining fire rated walls. Performance is actually expected to be enhanced as a result of the extra board stiffness, greater fixing capacity and lack of paper face.

## Installation of Bathroom Fittings and Penetrations

Suitable for all USG Powerscape® Interior Lining Fire Rated Walls with a (120)/120/120 FRL or less.

Metal or uPVC plastic pipes may penetrate one side only of vertical fire separations provided fire stop baffles are constructed as detailed below. Plastic pipes melt at high temperatures and penetrations must be carefully detailed at the building design stage. The following other conditions apply:

- Maximum pipe diameter is 50mm
- Penetrations on opposite sides of the wall within the same stud cavity are not permitted, except where a double stud wall system is specified (see Figures 12 & 13)
- Copper and Brass pipe penetrations in walls require a minimum 16mm heat baffle thickness even if linings are less than 16 mm in thickness (Figure 13). The baffle is to be 600 x 600mm with the top position approximately 350-400mm above the top of the top penetrations (Figure 14) and fixed with 4 x 40 x 8g high thread drywall screws per stud each side
- Wash basins and tap fixtures are to be securely fastened to 600 x 400 x 18mm x 9 ply timber nogs minimum, fitted between the studs in the wall cavity with 4 x 25mm x 6g high thread drywall screws per stud each side (Figure 15)
- uPVC plastic pipes must be sealed with an intumescent fire collar such as Promat Promostop Unicollar with a rating no less than the wall system FRL (Figure 16)
- All penetrations and fitting gaps, including fire collars, must be sealed with an approved fire rated sealant

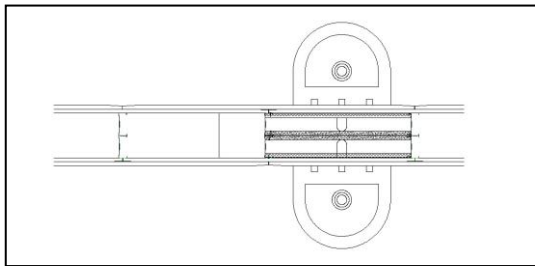


Figure 12

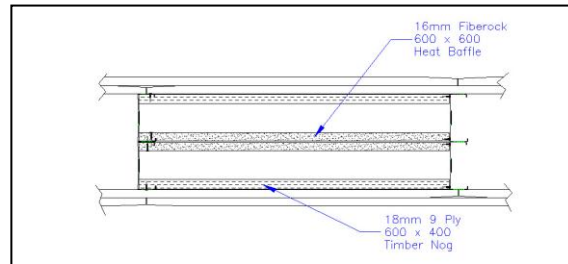


Figure 13

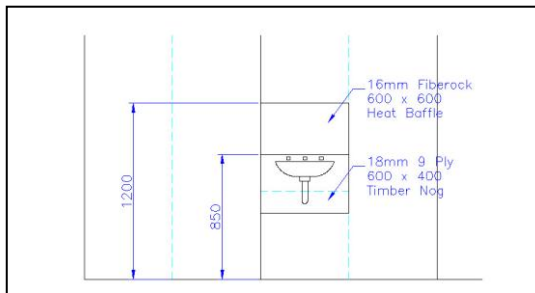


Figure 14



Figure 15



Figure 16

## Approved Fire Sealants and Ceramic Fibre Blanket

- Pyropanel Multiflex Sealant
- Flamex One Sealant
- Hilti CP606 fire resistant joint filler
- Hilti CP620 expanding fire sealant
- Hilti CP611A Intumescent fire stop sealant
- Promaseal Supa Mastic
- Bostik Fireban One
- sealant has been tested in a drywall as part of a penetration
- Kaowool Fibremaster Ceramic Fibre