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The fire resistance of 3M Fire Barrier Pillows protecting cables and metal pipes in walls and floors

Regulatory Information Assessment Report

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The Client : 3M Australia Pty Ltd

Commercial-in-confidence

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30/3/2017	**30/3/2017**	**30/3/2017**

Copyright and disclaimer

Important disclaimer

Contents

1 Introduction

This Regulatory Information Report refers to the assessment report FCO-3217B titled; Assessment of the fire resistance of 3M Fire Barrier Pillows protecting cables and metal pipes in walls and floors in accordance with AS 1530.4-2014 and AS 4072.1-2005.

This report is prepared for the purpose of meeting the Evidence of Suitability Requirements of NCC Volume 1 Specification A2.3 for FRL.

This report reviews and confirms the extent to which the reference combustibility tests listed in section 2 meet the requirements of the test standards listed in section 4 of the report. The proposed variations to the tested construction presented in section 3 are subject to an analysis in Appendix B and the conclusions are presented in Section 5 of this report.

2 Supporting Data

This assessment report refers to various test reports to support the analysis and conclusions of this report. They are listed below;

Report Reference	Test Standard	Outline of Test Specimen
BWA2243200	AS 1530.4-2005	Various apertures in a wall including electrical cables protected by 3M Fire Barrier Pillows
BWA2243202	AS 1530.4-2005	Various apertures in a floor including electrical cables protected by 3M Fire Barrier Pillows
EWFA 2800000	AS 1530.4-2005	Two pipe penetrations and two cable penetrations in a wall protected by 3M Interam E-5A-4 Endothermic Mat.
WF155355	EN 1363-3:2004	Various apertures in a plasterboard wall penetrated by electrical cables and metal pipes and protected by 3M Fire Barrier Pillows
WF155352	EN 1363-3:2004	Various apertures in a masonry wall penetrated by electrical cables and metal pipes and protected by 3M Fire Barrier Pillows
EWFA 44065600.1	AS 1530.4-2014	Various core cable services penetrating through a nominally 103mm thick steel stud plasterboard wall. Cables protected with 3M MPP Moldable Putty and 3M Fire Barrier Duct Wrap 615+
EWFA 44713000	AS 1530.4-2014	Various core cable services penetrating through a nominally 75mm thick AAC wall. Cables protected with combinations of 3M MPP Moldable Putty and 3M Fire Barrier Duct Wrap 615+

The test reports BWA2243200, BWA2243202, EWFA 2800000, EWFA 44065600.1 and EWFA 44713000 were undertaken by Exova Warringtonfire Aus (formally Bodycote Warringtonfire) and sponsored by 3M Australia, Pty Ltd.

The test reports WF155355 and WF155352 were undertaken by Exova UK (Formally Bodycote Warringtonfire UK) and sponsored by 3M UK Pte.

3 Proposed Variations

The proposed construction for apertures protected with 3M Fire Barrier Pillows shall be as tested in BWA2243200 and BWA2243202 subject to the variations listed below:

Floors

The proposed floor construction shall be as tested in BWA2243202 subject to the following variations:

- Inclusion of metal pipes tested in WF155355.
- Increase in floor depth.
- Optional applicability to Self-Locking pillows.
- Without services as a blank seal.
- Cable and pipe penetrations shall be wrapped for a length of 300mm or 600mm each side of the floor construction with 3M Fire Barrier Duct Wrap 615+.
- For D1 and D2 cables with or without cable trays.
- The service penetrations shall be located a minimum of 40mm apart.
- Maximum aperture size 425mm with max area of 0.128m^2

Walls

The proposed wall construction shall be as tested in BWA2243200 subject to the following variations:

- Inclusion of metal pipes as tested in WF155355.
- Variation of support construction to drywall, masonry, hollow block or concrete of width 116mm or thicker.
- Supporting drywall shall be nominally 116mm or thicker, of construction previously shown by testing in accordance with AS 1530.4-2005 to be capable of an FRL of at least -/120/-. The tested specifications shall be based on a framework of studs and channels with webs at least 92mm wide, lined on both sides with at least two layers of gypsum plasterboard at least 13mm thick. The supporting data shall show the drywall construction can tolerate apertures (doors, glazing, dampers, service seals, etc.) at least as large as the proposed 3M Fire Barrier Pillow seals.
- Supporting walls of clay brickwork, solid masonry blockwork of at least 600kg/m^3, solid or hollow masonry blockwork of normal weight concrete or, reinforced concrete, shall be at least 116mm and previously shown by testing in accordance with AS 1530.4-2005 to be capable of an FRL of at least 120/120/120 or -/120/120 as a wall.
- Optional applicability to Self-Locking pillows.
- Extension of aperture size to 800mmx 600mm.
- Without services as a blank seal.
- Cable and pipe penetrations shall be wrapped for a length of 300mm or 600mm each side of the floor construction with either 3M Fire Barrier Duct Wrap 615+.
- For D1 and D2 cables with or without cable trays.
- Cables and Conduits as tested in EWFA 44713000.1 specimens B and D.
- The service penetrations shall be located a minimum of 40mm apart.
- Maximum aperture size 425mm with max area of 0.128m2

4 Referenced Standards

Standards:

AS 1530.4-2014	Methods for fire tests on building materials, components and structures Part 4: Fire resistance tests of elements of building construction.
AS 4072-2005	Components for the protection of openings in fire-resistant separating elements Part 1 Service penetrations and control joints

5 Conclusion

On the basis of the analysis presented in the referenced assessment, it is the opinion of this Testing Authority that the tested prototypes described in Section 2 when varied as described in Section 3 will achieve the performance below when submitted to a test in accordance with the test methods referenced in Section 4. It is required that the systems described below be fitted to supporting wall and floor construction that has been tested or assessed to achieve the required FRL.

Description of 3M Fire Barrier Pillows

Table 1 Description of 3M Fire Barrier Pillows and installation

Product	Description	UPC Number	3M Stock No.	Unit	Qty	Wt.
Fire Barrier Self-Locking Pillow (Small)	2" x 4" x 9"	50051115-16578-3	98-0400-5472-2	Each	24	12.0
Fire Barrier Self-Locking Pillow (Medium)	2" x 6" x 9"	50051115-16579-0	98-0400-5473-0	Each	16	11.0
Fire Barrier Self-Locking Pillow (Large)	3" x 6" x 9"	50051115-16580-6	98-0400-5474-8	Each	20	17.5





Floors

The performance of 3M Fire Barrier Pillows and 3M Fire Barrier Self-Locking Pillows protecting apertures in normal weight concrete floors is shown in Table 2. The apertures may incorporate PVC insulated cables, metal pipes or may be empty. Refer to Table 2 and 3 and Figure 1, 2 and 3.

Table 2 includes the performance for cable and pipes that penetrate 3M Fire Barrier Pillows or 3M Fire Barrier Self- Locking Pillows with a maximum aperture 425mm x 300mm and maximum area of 0.128m^2

Table 2 - Performance of Cables and Pipes through 3M Fire Barrier Pillows in Floors 120mm thick or greater

Penetrating Service	Wrap on Service	Wrap Length each side	Install on Details	FRL
PVC insulated cables as per AS 1530.4- 2005 Appendix D1 (With or without cable Trays)	None	-	Figure 1 and 2	-/180/60
	3M Fire Barrier Duct Wrap 615+	300	Figure 1 and 3	-/180/90
		600		-/180/120
PVC insulated cables generally, AS 1530.4-2005 Appendix D1 and D2 cables (With or without cable Trays)	None	-	Figure 1 and 2	-/180/30
	Fire Barrier Duct Wrap 615+	300	Figure 1 and 3	-/180/90
		600		-/180/120
Empty (Blank Seal)	None	-	Figure 1 and 2	-/120/90
Copper or ferrous pipes 15mm (max) x 0.91mm (max)	None	-		-/180/30
	3M Fire Barrier Duct Wrap 615+	300	Figure 1 and 3	-/180/60
		600		-/180/120
	19mm thick Armaflex insulation	Continuous through pillows		-/180/30
Steel pipe 34mm (max) x 3.5mm (max)	None	-	Figure 1 and 2	-/180/30
	3M Fire Barrier Duct Wrap 615+	300	Figure 1 and 3	-/180/60
		600		-/180/120
	19mm thick Armaflex insulation	Continuous through pillows		-/180/30

Table 3- Specification of items in drawings for floors

ID	Description
1	AS 1530.4-2005 Appendix D1 – PVC insulated power supply cables a minimum of 50mm from the edge of the aperture. CP 25WB+ Caulk applied to gaps within cable bundle a depth of at least 25mm from both sides.
2	AS 1530.4-2005 Appendix D2 – Telecommunication cables a minimum of 50mm from the edge of the aperture. CP 25WB+ Caulk applied to gaps within cable bundle a depth of at least 25mm from both sides.
3	Copper or ferrous pipes 15mm x 0.91mm. Diameter may be decreased and wall thickness may be increased. Pipe wrapped with MPP pad for depth of pillow (item 8)
4	Copper or ferrous pipes 15mm x 0.91mm. Diameter may be decreased and wall thickness may be increased and with 19mm thick Armaflex insulation that penetrated pillows. Pipe wrapped with MPP pad for depth of pillow (item 8)
5	Steel pipe 34mm x 3.5mm. Diameter may be decreased and wall thickness may be increased. Pipe wrapped with MPP pad for depth of pillow (item 8)
6	Steel pipe 34mm x 3.5mm. Diameter may be decreased and wall thickness may be increased and with 19mm thick Armaflex insulation that penetrated pillows. Pipe wrapped with MPP pad for depth of pillow (item 8)
7	Normal weight concrete floor slab, 120mm thick or greater
8	3M MPP Pad wrapped around service
9	3M Fire Barrier Pillows OR 3M Fire Barrier Interlocking Pillows, installed around the services with a minimum compression of 20%.
12	A fillet of 3M MPP pad 30mm long and 12mm x 12mm was installed in the corner of the aperture, prior to the installation of the pillows.
13	3M Fire Barrier Duct Wrap 615+ sealed with 3M 425 Aluminium Foil Tape applied along the edge of the wrap and Filament tape used in parallel direction to the wall as an assembly aid to hold the 615+ duct wrap in place until metal straps are installed. The wrap was held in place with metal straps at 200mm centres compressing wrap to 70% of its original thickness.
14	Optional 3M Fire Barrier Sealant CP 25WB+ Intumescent.

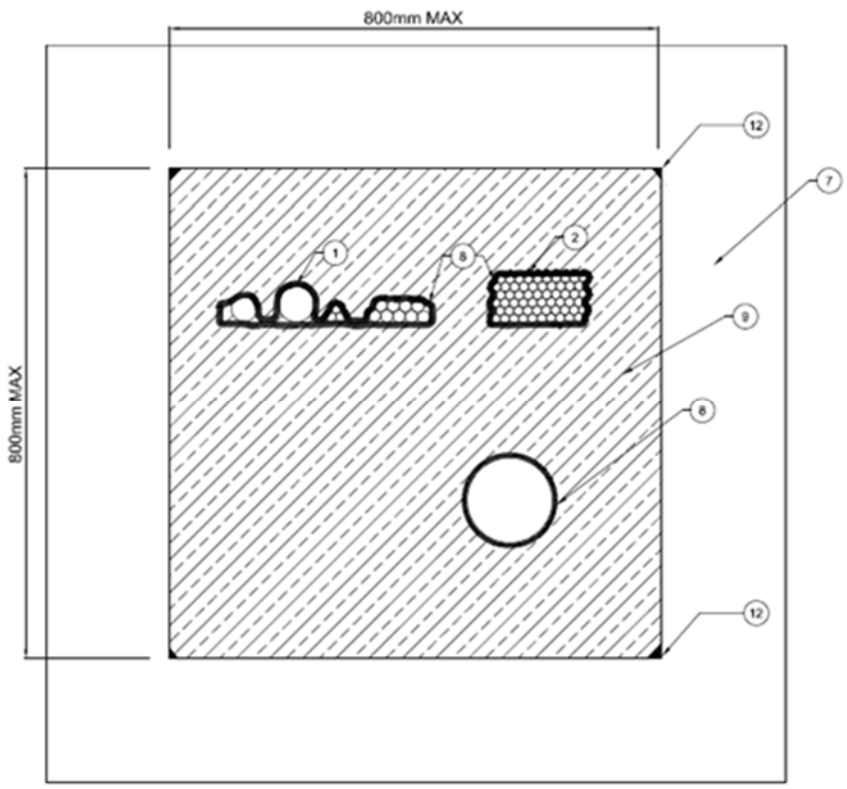

Figure 1– Typical arrangement of apertures filled with 3M Fire Barrier Pillows in floors

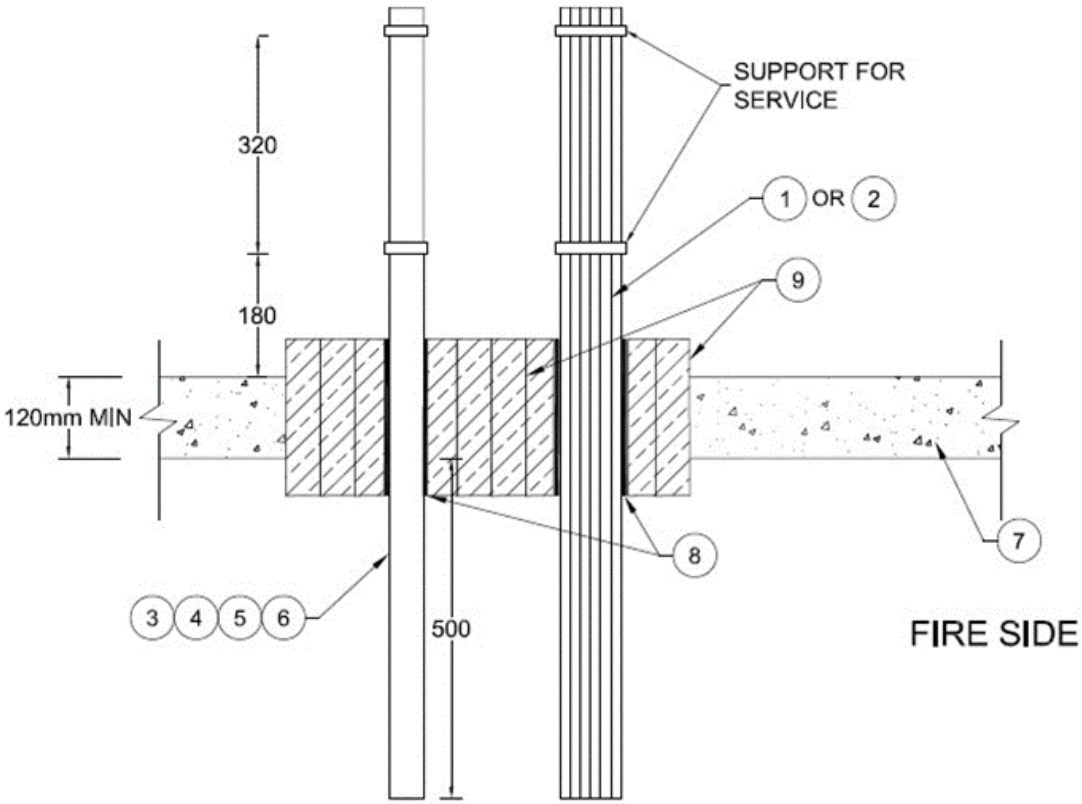

Figure 2– Typical details for cables and metal pipes penetrating 3M Fire Barrier Pillows in floors

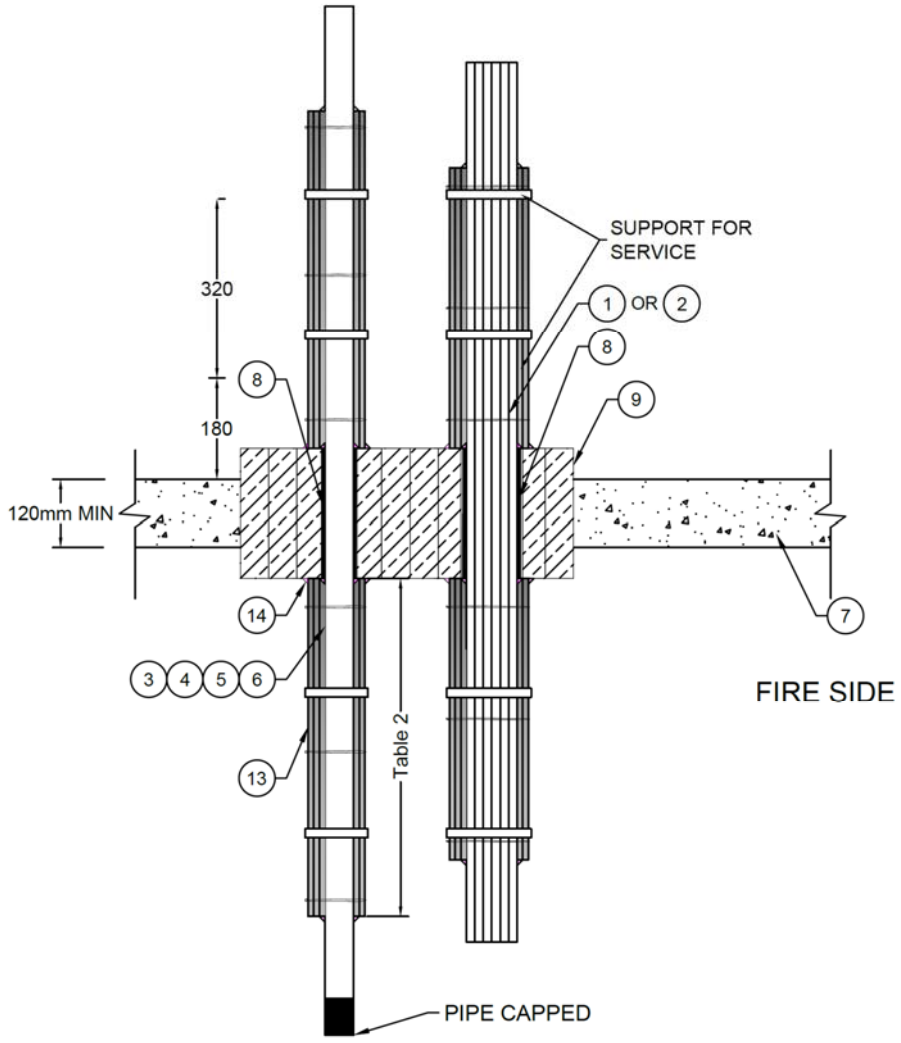

Figure 3– Typical details for cables and metal pipes wrapped with Emat in floor

Wall Penetrations

The performance of 3M Fire Barrier Pillows protecting apertures in solid or hollow masonry and normal weight concrete walls is shown in Table 4, 5, 6 and 7. The apertures may incorporate PVC insulated cables, metal pipes or may be empty.

Table 4 - Performance of cables and pipes through 3M Fire Barrier Pillows in all walls 116mm (min) (item 10)

Penetrating Service	Wrap on Service	Wrap Length each side	Install on Details	FRL
PVC insulated cables generally, AS 1530.4-2005 Appendix D1 and D2 cables (with or without cable trays)	None		Figure 4 and 5	-/120/30
	3M Fire Barrier Duct Wrap 615+	300	Figure 4 and 6	-/120/60
		600		-/120/120
Single cables up to 20mm in diam. (16mm^2 3C+ECable)	None	None	Figure 4 and 5	-/120/120
80mm cable bundles. Cables up to 20mm in diam. (16mm^2 3C+ECable)	3M Fire Barrier Duct Wrap 615+	150mm	Figure 4 and 6	-/120/120
Empty (Blank Seal)	None	-	Figure 4 and 5	-/120/30
Copper or ferrous pipes 15mm (max) x 0.91mm (max)	None	-		-/120/30
	3M Fire Barrier Duct Wrap 615+	300	Figure 4 and 6	-/120/60
		600		-/120/120
	19mm thick Armaflex insulation	Continuous through pillows		-/120/30
Steel pipe 34mm (max) x 3.5mm (max)	None	-	Figure 4 and 5	-/120/30
	3M Fire Barrier Duct Wrap 615+	300	Figure 4 and 6	-/120/60
		600		-/120/120
	19mm thick Armaflex insulation	Continuous through pillows		-/120/30

Table 5 - Performance of cables and pipes through 3M Fire Barrier Pillows in 100mm solid or hollow core masonry, normal weight concrete

Penetrating Service	Wrap on Service	Wrap Length each side	Install on Details	FRL
PVC insulated cables generally, AS 1530.4-2005 Appendix D1 and D2 cables (With or without cable trays)	None	-	Figure 4 and 7	-/120/30
	3M Fire Barrier Duct Wrap 615+	300	Figure 4 and 8	-/120/60
		600		-/120/120
Single cables up to 20mm in diam. (16mm^2 3C+ECable)	None	None	Figure 4 and 5	-/120/120
80mm cable bundles. Cables up to 20mm in diam. (16mm^2 3C+ECable)	3M Fire Barrier Duct Wrap 615+	150mm	Figure 4 and 6	-/120/120
Empty (Blank Seal)	None	-	Figure 4 and 7	-/180/30
Copper or ferrous pipes 15mm (max) x 0.91mm (max)	None	-		-/180/30
	3M Fire Barrier Duct Wrap 615+	300	Figure 4 and 8	-/180/60
		600		-/180/120
	19mm thick Armaflex insulation	Continuous through pillows		-/180/30
Steel pipe 34mm (max) x 3.5mm (max)	None	-	Figure 4 and 7	-/180/30
	3M Fire Barrier Duct Wrap 615+	300	Figure 4 and 8	-/180/60
		600		-/180/120
	19mm thick Armaflex insulation	Continuous through pillows		-/180/30

Table 6 - Performance of cables and pipes through 3M Fire Barrier Pillows in 75 mm (min) AAC (e.g. "Hebel")

Penetrating Service	Wrap on Service	Wrap Length each side	Install on Details	FRL
PVC insulated cables generally, AS 1530.4-2005 Appendix D1 and D2 cables (With or without cable trays)	None	-	Figure 4 and 7	-/120/30
	3M Fire Barrier Duct Wrap 615+	300	Figure 4 and 8	-/120/60
		600		-/120/120
Single cables up to 20mm in diam. (16mm^2 3C+ECable)	None	None	Figure 4 and 5	-/120/120
80mm cable bundles. Cables up to 20mm in diam. (16mm^2 3C+ECable)	3M Fire Barrier Duct Wrap 615+	150mm	Figure 4 and 6	-/120/120
Empty (Blank Seal)	None	-	Figure 4 and 7	-/180/30
Copper or ferrous pipes 15mm (max) x 0.91mm (max)	None	-		-/180/30
	3M Fire Barrier Duct Wrap 615+	300	Figure 4 and 8	-/180/60
		600		-/180/120
	19mm thick Armaflex insulation	Continuous through pillows		-/180/30
Steel pipe 34mm (max) x 3.5mm (max)	None	-	Figure 4 and 7	-/180/30
	3M Fire Barrier Duct Wrap 615+	300	Figure 4 and 8	-/180/60
		600		-/180/120
	19mm thick Armaflex insulation	Continuous through pillows		-/180/30

Table 7- Specification of items in drawings for walls

ID	Description
1	AS 1530.4-2005 Appendix D - D1 Cables, IC15WB+ Caulk or Moldable Putty applied to gaps within cable bundle a depth of at least 25mm from both sides.
2	AS 1530.4-2005 Appendix D – D2 Cables, IC15WB+ Caulk or Moldable Putty applied to gaps within cable bundle a depth of at least 25mm from both sides.
3	Copper or ferrous pipes 15mm x 0.91mm. Diameter may be decreased and wall thickness may be increased. Pipe wrapped with MPP pad for depth of pillow.
4	Copper or ferrous pipes 15mm x 0.91mm. Diameter may be decreased and wall thickness may be increased and with 19mm thick Armaflex insulation that penetrated pillows. Pipe wrapped with MPP pad for depth of pillow
5	Steel pipe 34mm x 3.5mm. Diameter may be decreased and wall thickness may be increased. Pipe wrapped with MPP pad for depth of pillow
6	Steel pipe 34mm x 3.5mm. Diameter may be decreased and wall thickness may be increased and with 19mm thick Armaflex insulation that penetrated pillows. Pipe wrapped with MPP pad for depth of pillow.
8	3M MPP Pad wrapped around service.
9	3M Fire Barrier Pillows OR 3M Fire Barrier Interlocking Pillows, installed around the services with a minimum compression of 20%.
11	Either 100mm thick plasterboard lined wall capable of achieving the required FRL as a wall or 100mm thick masonry or concrete wall capable of achieving the required FRL as a wall or 75mm thick AAC panel capable of achieving the required FRL as a wall.
12	A fillet of 3M MPP pad 30mm long and 12mm x 12mm was installed in the corner of the aperture, prior to the installation of the pillows. Any visible gaps around the perimeter to be
13	3M Fire Barrier Duct Wrap 615+ sealed with 3M 425 Aluminium Foil Tape applied along the edge of the wrap and Filament tape used in parallel direction to the wall as an assembly aid to hold the 615+ duct wrap in place until metal straps are installed. The wrap was held in place with metal straps at 200mm centres compressing wrap to 70% of its original thickness.
14	3M Fire Barrier Sealant CP 25WB+ Intumescent. Not for 3M Fire Barrier Duct Wrap 615+

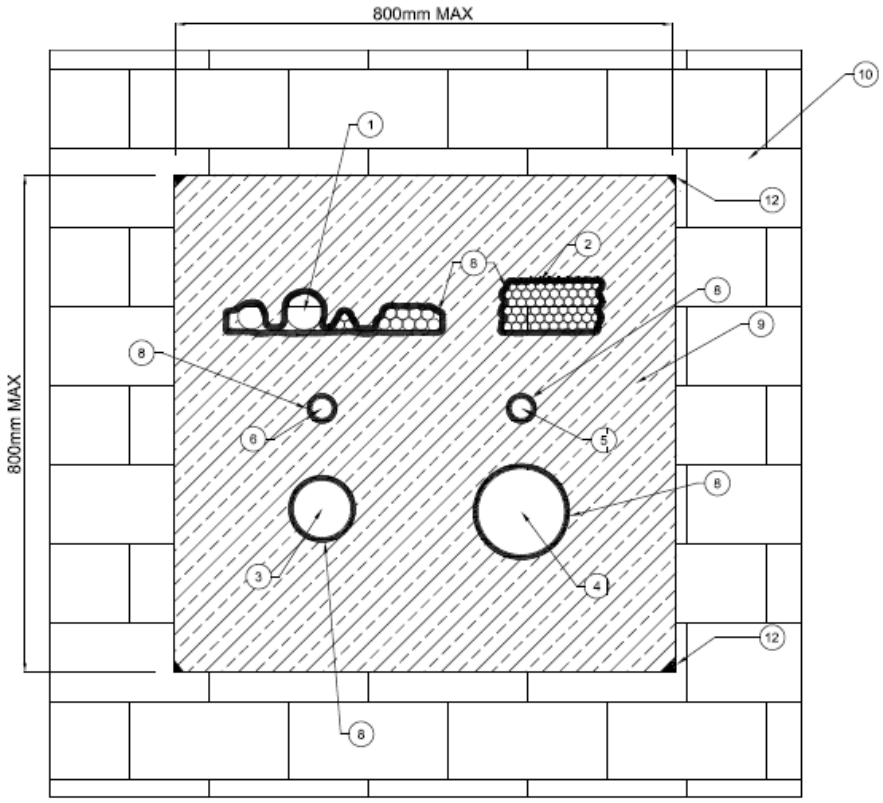

Figure 4– Typical arrangement of apertures filled with 3M Fire Barrier Pillows in walls

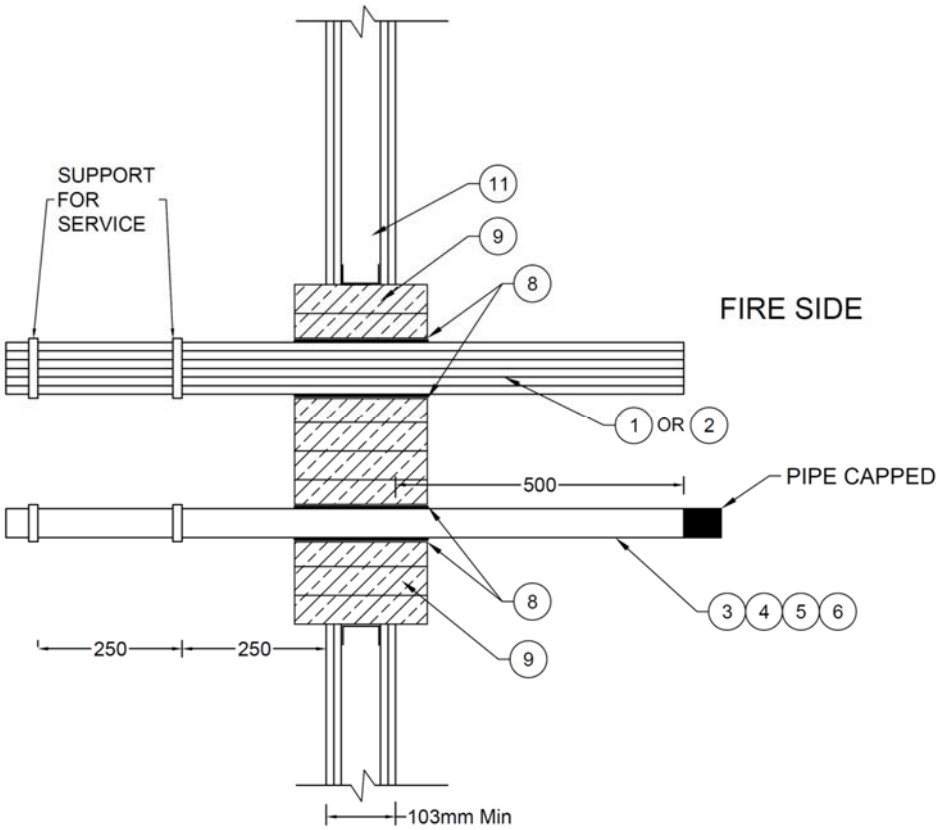

Figure 5– Typical details for cables and metal pipes penetrating 3M Fire Barrier Pillows in plasterboard walls

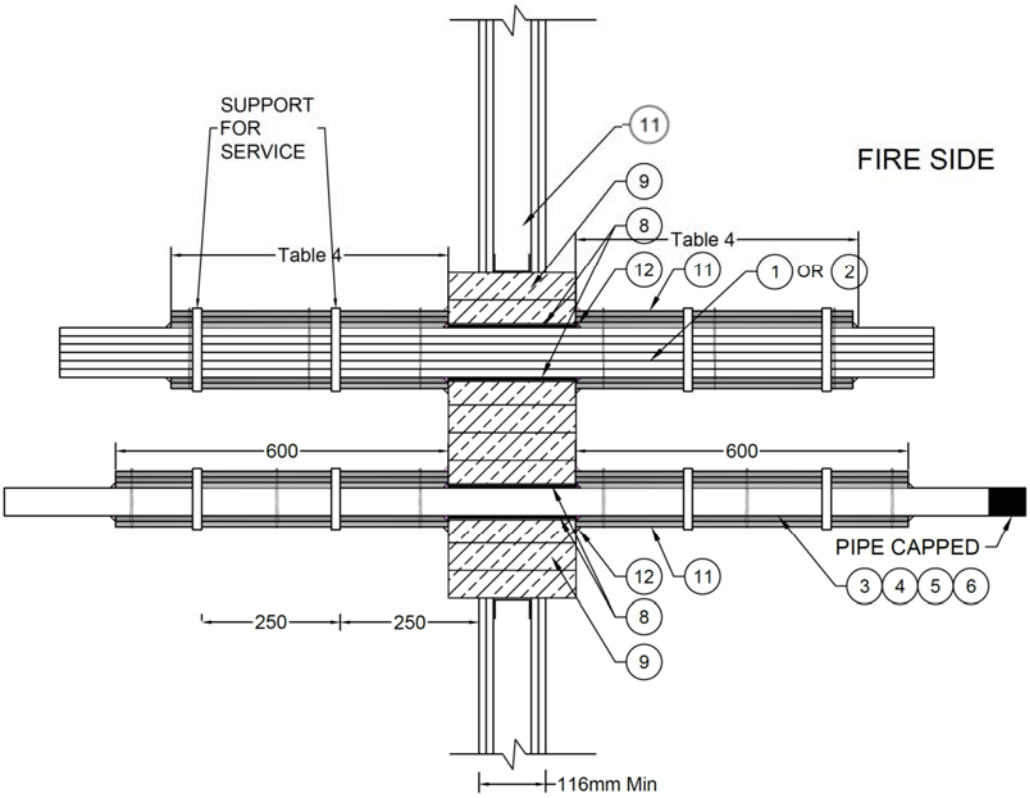

Figure 6– Typical details for wrapped cables and metal pipes in plasterboard walls

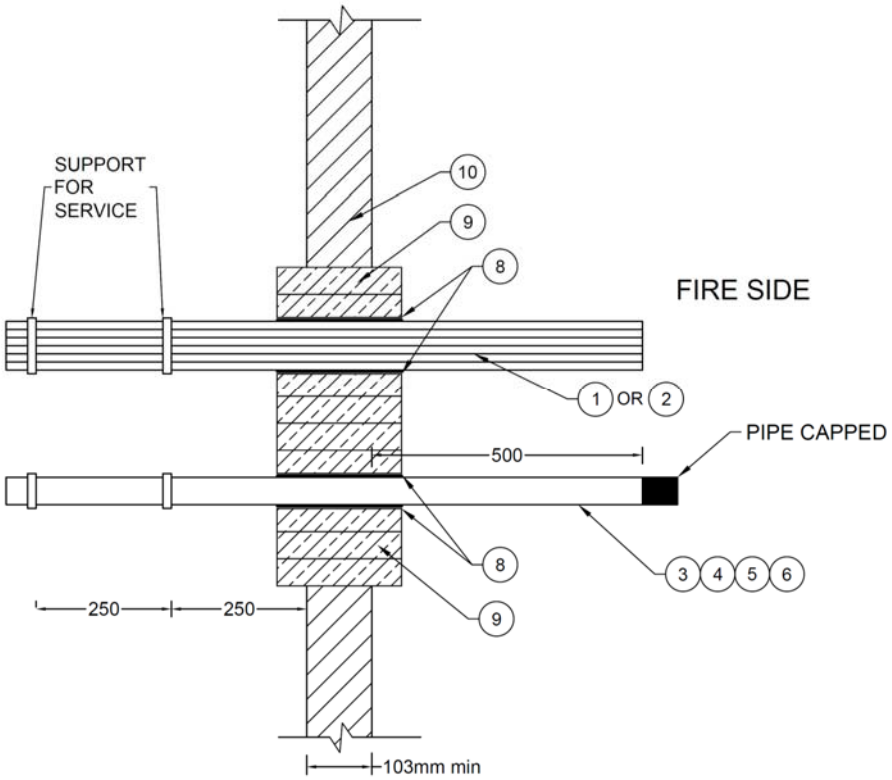

Figure 7– Typical details for wrapped cables and metal pipes penetrating 3M Fire Barrier Pillows in masonry or concrete walls

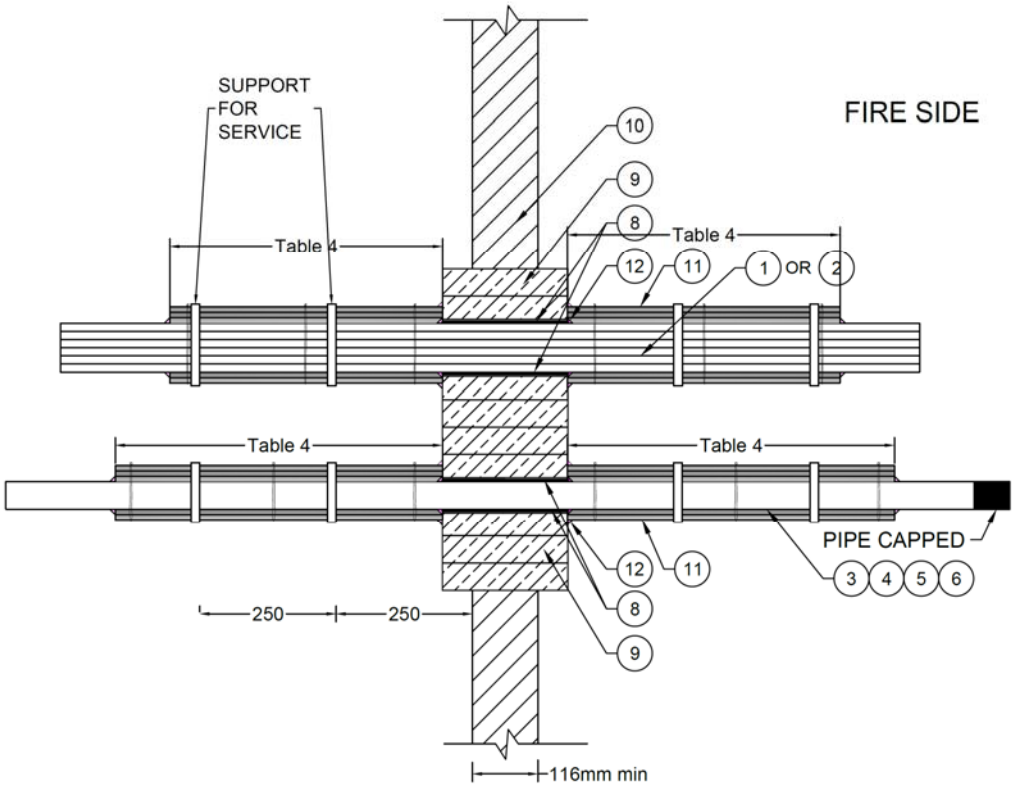

Figure 8– Typical details for wrapped cables and metal pipes in masonry or concrete walls

6 Term of Validity

This assessment report will lapse on 31st January 2022. Should you wish us to re-examine this report with a view to the possible extension of its term of validity, would you please apply to us three to four months before the date of expiry. This Division reserves the right at any time to amend or withdraw this assessment in the light of new knowledge.

7 Limitations

The conclusions of this assessment report may be used to directly assess the fire resistance performance under such conditions, but it should be recognised that a single test method will not provide a full assessment of the fire hazard under all fire conditions.

Because of the nature of fire resistance testing, and the consequent difficulty in quantifying the uncertainty of measurement, it is not possible to provide a stated degree of accuracy. The inherent variability in test procedures, materials and methods of construction, and installation may lead to variations in performance between elements of similar construction.

This assessment report does not provide an endorsement by CSIRO of the actual products supplied to industry. The referenced assessment can therefore only relate only to the actual prototype test specimens, testing conditions and methodology described in the supporting data, and does not imply any performance abilities of constructions of subsequent manufacture.

This assessment is based on information and experience available at the time of preparation. The published procedures for the conduct of tests and the assessment of test results are the subject of constant review and improvement and it is recommended that this report is reviewed on or, before, the stated expiry date.

The information contained in this assessment report shall not be used for the assessment of variations other than those stated in the conclusions above. The assessment is valid provided no modifications are made to the systems detailed in this report. All details of construction should be consistent with the requirements stated in the relevant test reports and all referenced documents.

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