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Fire assessment report

Combustible pipes protected with BOSS MaxiCollars, UniWrap, PWP Wrap and In-wall Collars

Sponsor: Boss Products (Australia) Pty Ltd

Report number: FAS210203 Revision: R1.0

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Quality management

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R1.0	Issue: 31 Aug 2022	Reason for issue	Report issued to Boss Products (Australia) Pty Ltd for review and comment.		
	Expiry: 31 Aug 2027		**Prepared by**	**Reviewed by**	**Authorised by**
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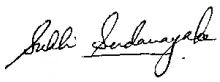
		Signature			

Executive summary

This report documents the findings of the assessment undertaken to determine the expected fire resistance level (FRL) of various combustible pipes penetrating wall and floor separating elements protected with BOSS Maxi Collars, BOSS In-Wall Collars, BOSS PWP pipe wrap and BOSS UniWrap in accordance with AS 1530.4:2014 and in general accordance with AS 4072.1:2005.

BOSS MaxiCollar™ is a pipe closure device used to form penetration seals where combustible pipes, cables and metal pipes with insulation penetrate walls and floors. The intended use of BOSS MaxiCollar™ is to reinstate the fire resistance performance of flexible and rigid walls and floor constructions, where they are penetrated by services. The BOSS MaxiCollar™ consists of a steel shell lined with intumescent strips and are clamped around the service and screw fixed back to the supporting element.

Unless where specified, BOSS MaxiCollar™ must be installed on both the exposed and unexposed faces of vertical separating elements and on the exposed face of horizontal separating elements. Exceptions are specified as applicable.

BOSS In-Wall collar is a pipe closure device that is installed within a core drilled aperture in a wall or floor. The In-Wall collar assessed in this report is the BOSS MaxiCollar-IW™100 mm prototype B with a row of slots on top and bottom of the collar.

BOSS UniWrap and PWP pipe wrap (nominally 40 mm width × 2 mm thick with a density of 1.3 kg/m^3) have an intumescent composition and is developed to provide a high-volume expansion and pressure seal at the aperture during a fire. BOSS UniWrap or BOSS PWP wrap must be wrapped around the pipe flush with the surface of the separating element on both the exposed and unexposed sides in walls and mid-depth in floors. UniWrap may also be housed in a metal sleeve.

BOSS Batt is identified as a high-density mineral fibre board that has an ablative coating.

Furthermore, sealants such as BOSS FireMastic-300 and Firemastic-HPE are also used as local fire protection systems.

In this assessment, combustible pipes protected with the fire protection systems described above are assessed. The combustible pipes considered in this assessment include uPVC, HDPE, PP, PP-R, PE, PEX, PEX-AL and CPVC pipes.

The analysis in sections 7 to 9 of this report found that the proposed systems, together with the described variations, are expected to achieve the fire resistance levels (FRL) as shown in Table 10 to Table 35 for BOSS MaxiCollars™ and from Table 39 to Table 45 for BOSS UniWrap and PWP wrap – in accordance with AS 1530.4:2014.

The variations and outcome of this assessment are subject to the limitations and requirements described in sections 2, 3 and 9 of this report. The results of this report are valid until 31 August 2027.

Contents

1. Introduction

This report documents the findings of the assessment undertaken to determine the expected fire resistance level (FRL) of various combustible pipes penetrating wall and floor separating elements protected with BOSS Maxi Collars, BOSS In-Wall Collars, BOSS PWP pipe wrap and BOSS UniWrap in accordance with AS 1530.4:2014[1] and in general accordance with AS 4072.1:2005[2].

This report may be used as evidence of suitability in accordance with the requirements of the relevant National Construction Code (NCC) to support the use of the material, product, form of construction or design as given within the scope of this assessment report. It also references test evidence for meeting deemed to satisfy (DTS) provisions of the NCC as applicable to the assessed systems.

This assessment was carried out at the request of Boss Products (Australia) Pty Ltd. The sponsor details are included in Table 1.

Table 1 Sponsor details

Sponsor	Address
Boss Products (Australia) Pty Ltd	Unit 1 16 Atkins Rd, Taren Point NSW 2229

2. Framework for the assessment

2.1 Assessment approach

An assessment is an opinion about the expected performance of a component or element of structure if it was subject to a fire test.

No specific framework, methodology, standard or guidance documents exists in Australia for doing these assessments. We have therefore followed the 'Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence' prepared by the Passive Fire Protection Forum (PFPF) in the UK in 2021[3].

This guide provides a framework for undertaking assessments in the absence of specific fire test results. Some areas where assessments may be offered are:

- Where a modification is made to a construction which has already been tested
- The interpolation or extrapolation of results of a series of fire resistance tests, or utilisation of a series of fire test results to evaluate a range of variables in a construction design or a product
- Where, for various reasons – eg size or configuration – it is not possible to subject a construction or a product to a fire test.

Assessments will vary from relatively simple judgements on small changes to a product or construction through to detailed and often complex engineering assessments of large or sophisticated constructions.

This assessment uses established empirical methods and our experience of fire testing similar products to extend the scope of application by determining the limits for the design based on the tested constructions and performances obtained. The assessment is an evaluation of the potential fire resistance performance if the elements were to be tested in accordance with AS 1530.4:2014.

[1] Standards Australia, 2014, Methods for fire tests on building materials, components and structures – Part 4: Fire-resistance tests for elements of construction, AS 1530.4:2014, Standards Australia, NSW.
[2] Standards Australia, 2005, Components for the protection of openings in fire-resistant separating elements: Service penetrations and control joints, AS 4072.1:2005, Standards Australia, NSW.
[3] Passive Fire Protection Forum (PFPF), 2021, Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence, Passive Fire Protection Forum (PFPF), UK.

This assessment has been written using appropriate test evidence generated at accredited laboratories to the relevant test standard. The supporting test evidence has been deemed appropriate to support the manufacturer's stated design.

2.2 Compliance with the National Construction Code

This assessment report has been prepared to meet the evidence of suitability requirements of the NCC 2019, including amendments[4] under A5.2 (1) (d).

This assessment has been written in accordance with the general principles outlined in EN 15725:2010[5] for extended application reports on the fire performance of construction products and building elements. It also references test evidence for meeting a performance requirement or deemed to satisfy (DTS) provision of the NCC under A5.4 for fire resistance levels as applicable to the assessed systems.

This assessment report may also be used to demonstrate compliance with the requirements for evidence of suitability under NCC 2016, including amendments[6].

2.3 Declaration

The 'Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence' prepared by the PFPF in the UK requires a declaration from the client. By accepting our fee proposal on 22 December 2021, Boss Products (Australia) Pty Ltd confirmed that:

- To their knowledge, the component or element of structure, which is the subject of this assessment, has not been subjected to a fire test to the standard against which this assessment is being made.
- They agree to withdraw this assessment from circulation if the component or element of structure is the subject of a fire test by a test authority in accordance with the standard against which this assessment is being made and the results are not in agreement with this assessment.
- They are not aware of any information that could adversely affect the conclusions of this assessment and – if they subsequently become aware of any such information – they agree to ask the assessing authority to withdraw the assessment.

3. Limitations of this assessment

- The scope of this report is limited to an assessment of the variations to the tested systems described in section 4.3.
- This report details the methods of construction, test conditions and assessed results that are expected if the systems were tested in accordance with AS 1530.4:2014.
- The results of this assessment are applicable to fire exposure from either side for the assessed wall systems and fire exposure from below for the assessed floor systems in accordance with the requirements of AS 1530.4:2014.
- The BOSS MaxiCollars™ must be attached with steel screws, anchors or fixings that are suitable for the substrate to which the pipe collar is fitted.
- FRLs assessed for flexible walls and for AAC blockwork walls, Hebel walls and Speedpanel walls can be applied to the same services penetrating through rigid walls, having the same or greater thickness, as applicable, (including Concrete, Solid Masonry, Speedpanel, Hebel and Korok) with an established FRL as required as tested or assessed by an ATL.
- FRLs assessed for minimum 75 mm thick AAC walls can be applied to 60 mm thick Pronto Panel walls provided that the aperture has been built-up locally to be minimum 75 mm thick.

[4] National Construction Code Volumes One and Two - Building Code of Australia 2019 including Amendments, Australian Building Codes Board, Australia
[5] European Committee for Standardization, 2010, Extended application reports on the fire performance of construction products and building elements, EN 15725:2010, European Committee for Standardization, Brussels, Belgium.
[6] National Construction Code Volumes One and Two - Building Code of Australia 2016 including Amendments, Australian Building Codes Board, Australia

Any build-up of thinner rigid walls must extend minimum 100 mm in all directions from the aperture. Where collars are fixed to the build-up board, the fixings must extend beyond the thickness of the build-up so that the threading screws into the rigid wall.

- The minimum spacing between multiple services protected with BOSS Maxi Collars passing through BOSS Batts in walls can be 0 mm. For services placed in close proximity, collars must be fixed to both faces and sealant must be applied into the annular gap around the pipe for a depth of 10 mm behind the pipe collar at each face of the separating element. If the services are angled, the maximum FRL will be -/90/90. Other services will be attributed the maximum FRL that they have achieved in other tests.
- FRLs obtained for combustible pipes protected with UniWrap can be extended to the same services protected with PWP wrap in walls and floors – provided that the PWP wrap is installed on both sides of the separating element in both walls and floors flush with the surface of the separating element. The number of intumescent layers must be the same as that assessed for UniWrap.
- Services penetrating two layers of 50 mm thick BOSS Batts in rigid floors can be attributed the respective tested FRL up to -/120/120.
- A blank seal with one layer of 50 mm thick BOSS Batts in rigid floors can be attributed an FRL up to -/60/60.
- Support of services in walls and floors must be maintained as per AS 1530.4:2014 and AS 4072.1:2005 requirements.
- All FRL attributed to PP pipes are applicable for PP-R pipes.
- FRLs achieved by UniWrap can be extended for PWP pipe wrap provided that the PWP wrap is also installed in the same method and with the same number of intumescent layers.
- The FRLs assessed for steel framed walls are interchangeable with timber framed walls with the limitation that there can be no penetrations within 100 mm of the timber stud.
- The following field of application is applicable based on the tested pipe end configurations as given in Table 2 for combustible pipes in accordance with BS EN 1366-3:2021[7].

Table 2 Field of application for pipe end configurations for combustible pipes

		Tested			
		U/U	**C/U**	**U/C**	**C/C**
Covered	**U/U**	Y	N	N	N
	C/U	Y	Y	N	N
	U/C	Y	Y	Y	N
	C/C	Y	Y	Y	Y
Y=acceptable, N=not acceptable					

- This report is only valid for the assessed system/s and must not be used for any other purpose. Any changes with respect to size, construction details, loads, stresses, edge or end conditions – other than those identified in this report – may invalidate the findings of this assessment. If there are changes to the system, a reassessment will need to be done by an Accredited Testing Laboratory (ATL) that is accredited to the same nominated standards of this report.
- The documentation that forms the basis for this report is listed in Appendix A and Appendix B.
- This report has been prepared based on information provided by others. Warringtonfire has not verified the accuracy and/or completeness of that information and will not be responsible for any errors or omissions that may be incorporated into this report as a result.

[7] European Committee for Standardization, 2021, Fire resistance tests for service installations. Penetration seals, BS EN 1366-3:2021, European Committee for Standardization, Brussels, Belgium.

- This assessment is based on the proposed systems being constructed under comprehensive quality control practices and following appropriate industry regulations and Australian Standards on quality of materials, design of structures, guidance on workmanship and expert handling, placing and finishing of the products on site. These variables are beyond the control and consideration of this report.

4. Description of the specimen and variations

4.1 System description

BOSS MaxiCollar™ is a pipe closure device used to form penetration seals where combustible pipes, cables and metal pipes with insulation penetrate walls and floors. The intended use of BOSS MaxiCollar™ is to reinstate the fire resistance performance of flexible and rigid walls and floor constructions, where they are penetrated by services. The BOSS MaxiCollar™ consists of a steel shell lined with intumescent strips and are clamped around the service and screw fixed back to the supporting element.

Unless where specified, BOSS MaxiCollar™ must be installed on both the exposed and unexposed faces of vertical separating elements and on the exposed face of horizontal separating elements. Exceptions are specified as applicable.

BOSS In-Wall collar is a pipe closure device that is installed within a core drilled aperture in a wall or floor. The In-Wall collar assessed in this report is BOSS MaxiCollar-IW™100 mm prototype B with a row of slots on top and bottom of the collar.

BOSS UniWrap and PWP pipe wrap (nominally 40 mm width × 2 mm thick with a density of 1.3 kg/m^3) have an intumescent composition and is developed to provide a high-volume expansion and pressure seal at the aperture during a fire. BOSS UniWrap or BOSS PWP wrap must be wrapped around the pipe flush with the surface of the separating element on both the exposed and unexposed sides in walls and mid-depth in floors. UniWrap may also be housed in a metal sleeve.

BOSS Batt is identified as a high-density mineral fibre board that has an ablative coating.

Furthermore, sealants such as BOSS FireMastic-300 and Firemastic-HPE are also used as local fire protection systems.

In this assessment, only combustible pipes protected with the fire protection systems described above are assessed. The combustible pipes considered in this assessment include uPVC, HDPE, PP, PP-R, PE, PEX, PEX-AL and CPVC pipes.

The specific elements of construction that the system Protecta FR Collar may be used to provide a penetration seal in, are as follows:

- Flexible walls: The wall must have a minimum thickness of 76 mm and comprise steel studs or timber studs lined on both faces with minimum 1 layer of 13 mm thick plasterboards. Walls are required to have an established fire resistance level (FRL) as tested or assessed by an accredited testing laboratory. Unless where specified, the wall cavity of flexible walls must be filled with R2.2 Glasswool Batt insulation.

  For services tested in walls with two layers of 13 mm thick plasterboards on both faces, single layer walls are permitted provided that the area around the penetration is built up with an additional layer of fire rated plasterboard (100 mm × 100 mm from the edge of the aperture).

  For timber framed walls no part of the penetration seal may be closer than 100 mm to a stud, the cavity must be closed between the penetration seal and the stud, and minimum 100 mm of insulation confirmed to be deemed non-combustible in accordance with AS 1530.1:1994 must be provided within the cavity between the penetration seal and the stud.

- Rigid walls: The wall must have a minimum thickness of 75 mm and comprise concrete, aerated concrete or solid masonry, with a minimum density of 650 kg/m^3. Walls are required to have an established fire resistance level (FRL) as tested or assessed by an accredited testing laboratory for the required fire resistance period.

- Rigid floors: The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m^3. Floors are required to have an

established fire resistance level (FRL) as tested or assessed by an accredited testing laboratory for the required fire resistance period.

Wall and floor elements are required to have an established fire resistance level (FRL) as tested or assessed by an accredited testing laboratory for the required fire resistance period. In cases where the FRL of the wall or floor is less than that of the penetration, the FRL will be derated accordingly.

4.2 Referenced test data

The assessment of the variations to the tested systems and the determination of the expected fire performance is based on the results of the fire tests documented in the reports listed in Table 3.

Table 3 Reference test data

Report number	Test sponsor	Test date	Testing authority
EWFA 49527300.3	BOSS Fire (Australia) Pty Ltd	12 July 2018	Warringtonfire, Australia
FRT190033 R1.0	BOSS Products (Australia) Pty Ltd	6 August 2018	Warringtonfire, Australia
WF393094	Report sponsor known to Warringtonfire	21 December 2017	Warringtonfire, UK
FRT180137 R2.0	BOSS Fire & Safety P/L	7 March 2019	Warringtonfire, Australia
EWFA 34923800.2	BOSS Fire and Safety	4 June 2015	Warringtonfire, Australia
EWFA 33090200.1	BOSS Fire & Safety Pty Ltd	20 March 2015	Warringtonfire, Australia
BMT/FEI/F15008	Report sponsor known to Warringtonfire	11 February 2015	BMTRADA
WF350704	Report sponsor known to Warringtonfire	31 March 2015	Warringtonfire, UK
BMT/FEI/F14135	Report sponsor known to Warringtonfire	7 January 2014	BMTRADA
WF350177	Report sponsor known to Warringtonfire	11 March 2015	Warringtonfire, UK
FRT180473 R1.0	BOSS Fire & Safety P/L	12 March 2019	Warringtonfire, Australia
BMT/FEI/F15009	Report sponsor known to Warringtonfire	12 February 2015	BMTRADA
WF387432	Report sponsor known to Warringtonfire	23 October 2017	Warringtonfire, UK
WF348262 Issue 3	Report sponsor known to Warringtonfire	22 January 2015	Warringtonfire, UK
FRT180472 R2.0	BOSS Fire & Safety P/L	8 March 2019	Warringtonfire, Australia
FRT180474 R1.0	BOSS Fire & Safety P/L	17 January 2020	Warringtonfire, Australia
WF364404 Issue 2	Report sponsor known to Warringtonfire	9 May 2016	Warringtonfire, UK
FRT190428 R1.0	BOSS Products (Australia) Pty Ltd	12 December 2019	Warringtonfire, Australia
FSP 1846	BOSS Fire & Safety Pty Ltd	14 August 2017	CSIRO
WF402946	Report sponsor known to Warringtonfire	26 September 2018	Warringtonfire, UK
WF361932	Report sponsor known to Warringtonfire	16 March 2016	Warringtonfire, UK
2019-Efectis-R001874	Report sponsor known to Warringtonfire	23 July 2019	Efectis Nederland
WF398296 Issue 2	Report sponsor known to Warringtonfire	15 May 2018	Warringtonfire, UK

Report number	Test sponsor	Test date	Testing authority
WF382553 Issue 2	Report sponsor known to Warringtonfire	18 April 2017	Warringtonfire, UK
WF367689	Report sponsor known to Warringtonfire	27 July 2016	Warringtonfire, UK
WF415515	Report sponsor known to Warringtonfire	16 July 2019	Warringtonfire, UK
WF371150/R	Report sponsor known to Warringtonfire	30 August 2016	Warringtonfire, UK
WF416496	Report sponsor known to Warringtonfire	20 August 2019	Warringtonfire, UK
EWFA 43580700.1	Boss Products Australia and Speedpanel Australia	13 September 2016	Warringtonfire, Australia
WF304406/B	Report sponsor known to Warringtonfire	30 March 2011	Warringtonfire, UK

4.3 Variations to the tested systems

The variations to the tested systems – together with the referenced standard fire tests – are described in Table 4.

Table 4 Variations to tested systems

Reference tests	Description	Variations
All test reports referenced in Table 3.	Various combustible pipe penetrations protected with BOSS Maxi Collars, BOSS In-Wall collars, BOSS PWP wrap, and BOSS UniWrap were tested in accordance with BS EN 1366-3:2009[8] and AS 1530.4:2014.	It is proposed to assess: • The systems tested in accordance with BS EN 1366-3:2009 to AS 1530.4:2014 • All tested penetrations protected with various BOSS sealing systems to determine their expected FRL in walls and floors • Fire resistance levels obtained by protected services penetrating flexible walls to rigid walls with an equivalent or greater thickness and density • Fire resistance levels obtained by protected services penetrating rigid walls to rigid walls with equivalent or greater thickness and density • Fire resistance levels obtained by protected services penetrating walls to thinner walls with build-up • Fire resistance levels obtained by protected services penetrating rigid floors to rigid floors with equivalent or greater thickness and density • BOSS PWP wrap as an alternative to BOSS UniWrap

[8] European Committee for Standardization, 2009, Fire resistance tests for service installations. Penetration seals, BS EN 1366-3:2009, European Committee for Standardization, Brussels, Belgium.

4.4 Schedule of components

Table 5 and Table 6 outlines the schedule of components for the assessed systems

Table 5 Schedule of components of assessed systems in walls

Item	Description	
Separating element		
1.	Item name	Flexible wall separating element
	Description	• Minimum 92 mm deep steel/timber stud with 1 layer of 13 mm thick fire-rated plasterboard clad on both the exposed and unexposed sides. • Minimum 50 mm deep steel/timber stud with 2 layers of 13 mm thick fire-rated plasterboard clad on both the exposed and unexposed sides • Minimum 64 mm deep steel/timber stud with 2 layers of 13 mm thick fire-rated plasterboard clad on both the exposed and unexposed sides • Minimum 92 mm deep steel/timber stud with 2 layers of 13 mm thick fire-rated plasterboard clad on both the exposed and unexposed sides • Shaftwalls with 25 mm thick shaftliner on exposed side and 2 layers of 13 mm thick fire-rated plasterboard clad on the unexposed side. For large apertures, the apertures must be lined with the same number of plasterboard layers. Unless where specified, the wall cavity must be filled with R2.2 Glasswool Batt insulation. If services are installed in timber-framed walls, there must be no penetrations within 100 mm of the timber stud. The wall must have been tested or assessed by an accredited testing laboratory (ATL) to achieve the required FRL in accordance with AS 1530.4:2014.
2.	Item name	Rigid wall separating element (with or without build-up)
	Description	• Minimum 100 mm thick Concrete • Minimum 100 mm thick Solid and hollow masonry • 78 mm thick Speedpanel • 78 mm thick Korok • 75 mm thick Hebel walls • Minimum 60 mm thick Pronto panel with additional build-up to increase thickness locally around the aperture to 75 mm. Thinner rigid walls can be built-up on either one or both sides to achieve the minimum thickness required as assessed for the required FRL. The build-up could be fire-rated plasterboard, Calcium silicate board, MgO board or BOSS batts and should extend at least 100 mm on all directions from the aperture. Where collars are fixed to the build-up board, the fixings must extend beyond the thickness of the build-up so that the threading screws into the rigid wall. The wall must have been tested or assessed by an accredited testing laboratory (ATL) to achieve the required FRL in accordance with AS 1530.4:2014.
Services		
3.	Item name	Combustible pipes
	Description	uPVC, HDPE, PP, PP-R, PE, PEX, PEX-AL and CPVC pipes
Sealant		
4.	Item name	BOSS FireMastic-HPE
	Installation	Installed into the aperture between the service and collar on both the exposed and the unexposed sides.
	Item name	BOSS FireMastic-300
	Installation	Installed into the aperture between the service and collar on both the exposed and the unexposed sides.

Item	Description	
		Applied at the interface of BOSS Maxi Collar and the separating element on both exposed and unexposed sides. Gunned into the annular gap around the pipe behind the pipe collar on both exposed and unexposed sides. Applied at the annular gap, either flushed with the surface of the wall or with a sealant fillet, when UniWrap is placed in the aperture Used to join cut batts and at the edge between the batt and the service or separating element.
Fire stopping protections		
5.	Item name	BOSS MaxiCollar™ – diameter ranging from 32 mm to 400 mm
	Number of intumescent layers	Ø32 mm MaxiCollar – 2 layers Ø40 mm MaxiCollar – 3 layers Ø50 mm MaxiCollar – 3 layers Ø55 mm MaxiCollar – 3 layers Ø65 mm MaxiCollar – 3 layers Ø80 mm MaxiCollar – 4 layers Ø100 mm MaxiCollar – 5 layers Ø110 mm MaxiCollar – 5 layers Ø140 mm MaxiCollar – 5 layers Ø160 mm MaxiCollar – 9 layers Ø200 mm MaxiCollar – 9 layers Ø250 mm MaxiCollar – 12 layers Ø400 mm MaxiCollar – 12 layers Each layer is 2 mm thick and 30 mm wide or 40 mm wide depending on the size of the collar
	Installation	In walls, the collars are installed on both the exposed and the unexposed sides with fixings.
	Item name	BOSS MaxiCollar-IW 100 mm Prototype B
	Size	Overall dimension of nominal 126.5 mm outer diameter, 111.1 inner diameter. The height of the collar depends on the thickness of the separating element. The outer shell of the collar is made from nominal 0.7 mm thick steel.
	Intumescent	3 layers of intumescent strips with nominal 2 mm thickness
	Installation	The collar is inserted into the aperture and 3 Ø4.2 mm × 25 mm long button head screws are used to secure the collar to the separating element. The annular gap and interface on the exposed side between the wall and the collar is sealed with BOSS FM-300.
	Item name	BOSS UniWrap™ with or without metal sleeve
	Size	40 mm width × 2 mm thick Steel sleeve: 118 mm length × 1 mm thick
	Density	Nominal 1300 kg/m^3
	Installation	Wrapped around the pipe flush to the plasterboard on the exposed and unexposed sides of walls. Secured to the pipe with plastic electrical tape.
	Item name	BOSS PWP pipe wrap
	Size	40 mm width × 2 mm thick with PE sheathing
	Installation	Wrapped around the pipe flush to the plasterboard on the exposed and unexposed sides of walls.
BOSS Batt		
6.	Item name	BOSS Batt with ablative coating

Item	Description	
	Size	Maximum 0.36 m^2 with an aspect ratio of 1:1 if installed as a single layer Maximum 0.6 m^2 with an aspect ratio of 2:1 if installed as a double layer
	Nominal density	Minimum 145 kg/m^3
	Installation	Batts may be friction-fitted in the aperture or pattress-fitted overlapping the separating element. If friction-fitted and bedded within the aperture, the overall size of the batts may be made of cut batt sections butt jointed together and fitted after the pipes are installed. Sealant must be used to bed the cut batts together and to seal the edges of the batt with the separating element and with the pipe.
Build-up		
7.	Item	Calcium silicate board, MgO board or BOSS Batt
	Installation	Installed to locally thicken apertures in rigid walls thinner than 75 mm (and greater than 60 mm). The board must extend 100 mm from the aperture in all directions.
Fixings		
8.	Item name	Collar fixing
	Product name	• For plasterboard walls, use minimum 6 g plasterboard screws with sufficient length of screw for an embedment into the framing of minimum 20 mm. 25 mm washers or as appropriate based on the collar size • For rigid walls and floors, use minimum 60 mm long screw-in masonry anchor with washer • For BOSS Batts, use pigtail screws Screws can vary depending on the size of the collar. Screws should be sufficient to maintain the collar in place in case of fire.
	Installation	• 3 × screws are used to secure each BOSS MaxiCollar™ to the separating element for collars with diameter up to 100 mm. • 4 × screws to be used for large collars with a diameter greater than 100 mm.
	Item name	BOSS Batt fixing dependent on the separating element
	Installation	• For flexible walls, the batt Is fixed using 6 × 80 mm steel screws and washers at 300 mm centers or at batt corners. • 4 × minimum 75 mm long screw in Masonry anchor with washer in rigid walls With thicker walls, screw length must be varied to maintain minimum embedment

Table 6 Schedule of components of assessed systems in floors

Item	Description	
Separating element		
1.	Item name	Floor
	Description	• ComFlor® 60 - consisting of three composite floor decking jointed together at the bottom and a concrete layer (minimum density of 2400 kg/m^3) cast on top with steel reinforcement grid (F72 reinforcement mesh). Maximum thickness 130 mm and minimum thickness 70 mm. BOSS batts must be secured into the floor on the bottom rib of the decking with minimum four 75 mm long masonry anchors with washers. The gap between the top rib and the BOSS batt must be covered with a trapezoid shaped BOSS batt. The cut edge and core hole of the BOSS Batt were painted with BOSS Ablative coating. • Minimum 150 mm thick aerated concrete floor with a minimum nominal density of 650 kg/m^3. • Minimum 150 mm thick concrete floor with a minimum nominal density of 2400 kg/m^3. • 235 mm thick ceiling system with timber framing (MGP10, 190 × 45 mm) clad with 2 layers of 13 mm fire-rated plasterboard layers on the exposed side and 19 mm thick particleboard flooring on the unexposed side.
Services		
2.	Item name	Combustible pipes
	Description	uPVC, HDPE, PP, PP-R, PE, PEX, PEX-AL and CPVC pipes
Sealant		
3.	Item name	BOSS FireMastic-HPE
	Installation	Installed into the aperture between the service and collar on both the exposed and the unexposed sides.
	Item name	BOSS FireMastic-300
	Installation	Applied at the interface of BOSS MaxiCollar and the separating element on both exposed and unexposed sides or the exposed side as specified. Gunned into the annular gap around the pipe behind the pipe collar on both exposed and unexposed sides or the exposed side as specified. Used to join cut batts and at the edge between the batt and the service or separating element. Applied at the annular gap, either flushed with the surface of the floor or with a sealant fillet, when UniWrap is placed in the aperture
Fire stopping protections		
4.	Item name	BOSS MaxiCollar™ – diameter ranging from 32 mm to 400 mm
	Number of intumescent layers	Ø32 mm MaxiCollar – 2 layers Ø40 mm MaxiCollar – 3 layers Ø50 mm MaxiCollar – 3 layers Ø55 mm MaxiCollar – 3 layers Ø65 mm MaxiCollar – 3 layers Ø80 mm MaxiCollar – 4 layers Ø100 mm MaxiCollar – 5 layers Ø110 mm MaxiCollar – 5 layers Ø140 mm MaxiCollar – 5 layers Ø160 mm MaxiCollar – 9 layers Ø200 mm MaxiCollar – 9 layers Ø250 mm MaxiCollar – 12 layers Ø400 mm MaxiCollar – 12 layers

Item	Description	
		Each layer is 2 mm thick and 30 mm wide or 40 mm wide depending on the size of the collar
	Installation	In floors, the collars are installed on either the exposed side or on both the exposed and the unexposed sides with fixings.
	Item name	BOSS MaxiCollar-IW 100 mm Prototype B
	Size	Overall dimension of nominal 126.5 mm outer diameter, 111.1 inner diameter. The height of the collar depends on the thickness of the separating element. The outer shell of the collar is made from nominal 0.7 mm thick steel.
	Intumescent	4 layers of intumescent strips with nominal 2 mm thickness
	Installation	The collar is inserted into the aperture and 3 Ø4.2 mm × 25 mm long button head screws are used to secure the collar to the separating element. The annular gap and interface on the exposed side between the wall and the collar is sealed with BOSS FM-300.
	Item name	BOSS UniWrap™ with or without metal sleeve
	Size	40 mm width × 2 mm thick Steel sleeve: 118 mm length × 1 mm thick
	Density	Nominal 1300 kg/m^3
	Installation	Wrapped around the pipe at mid-depth of floor. Secured to the pipe with plastic electrical tape.
	Item name	BOSS PWP pipe wrap
	Size	40 mm width × 2 mm thick with PE sheathing
	Installation	Wrapped around the pipe flush to the plasterboard on the exposed and unexposed sides of floors.
BOSS Batt		
5.	Item name	BOSS Batt with ablative coating
	Size	Maximum 1.12 m^2 with an aspect ratio of 2:1 if installed as a single layer with no penetrations (only as a blank seal) Maximum 0.35 m^2 with an aspect ratio of 2.85:1 if installed as a double layer
	Nominal density	Minimum 145 kg/m^3
	Installation	Batts may be friction-fitted in the aperture or pattress-fitted overlapping the separating element. If friction-fitted and bedded within the aperture, the overall size of the batts may be made of cut batt sections butt jointed together and fitted after the pipes are installed. Sealant must be used to bed the cut batts together and to seal the edges of the batt with the separating element and with the pipe.
Fixings		
6.	Item name	Collar fixing
	Product name	• For rigid floors, use minimum 60 mm long screw-in masonry anchor with washer • For BOSS Batts, use pigtail screws
	Installation	• 3 × screws are used to secure each BOSS MaxiCollar™ to the separating element for up to 100 mm diameter. • 4 × screws to be used for large collars with a diameter greater than 100 mm.
	Item name	BOSS Batt fixing dependent on the separating element
	Installation	• HW13M4 Hollow wall anchor for plasterboard ceiling systems • 4 × minimum 75 mm long screw in Masonry anchor with washer in rigid floors With thicker floors, screw length must be varied to maintain minimum embedment

Figure 1 to Figure 21 shows the assessed systems.

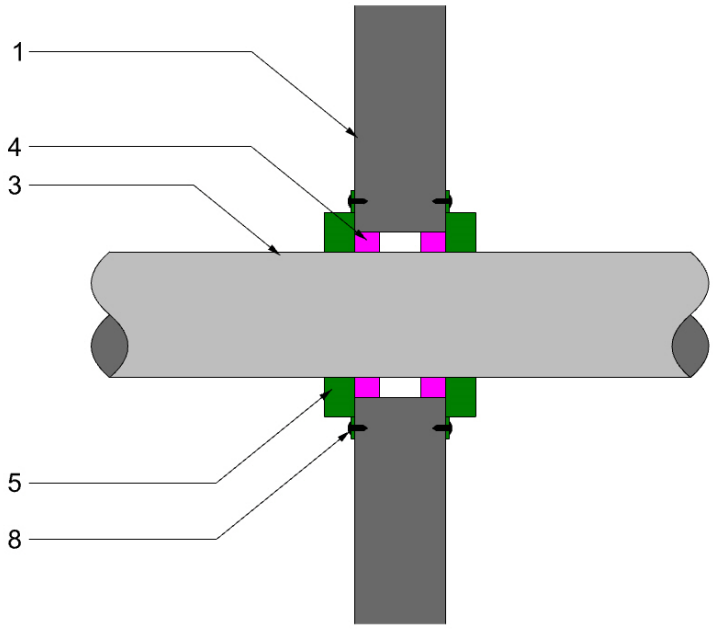


Figure 1 Pipes fitted perpendicular to flexible wall with BOSS Maxi Collars on both faces

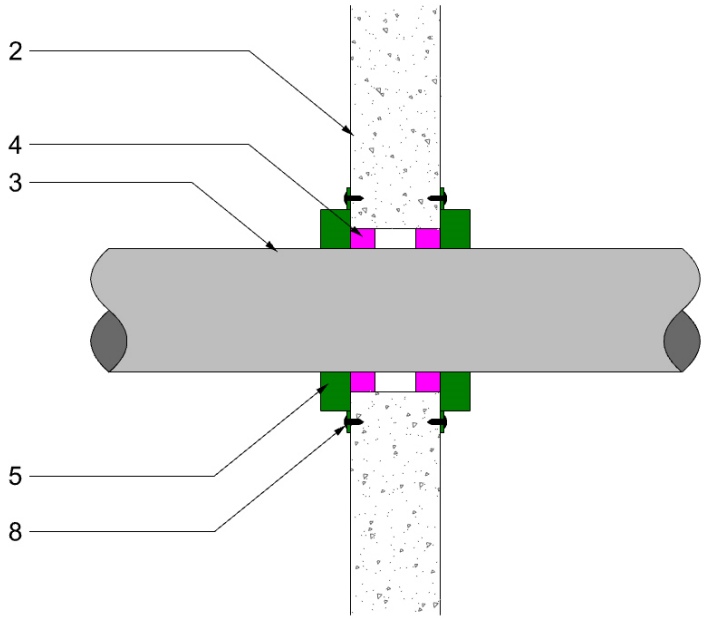


Figure 2 Pipes fitted perpendicular to rigid wall with BOSS Maxi Collars on both faces

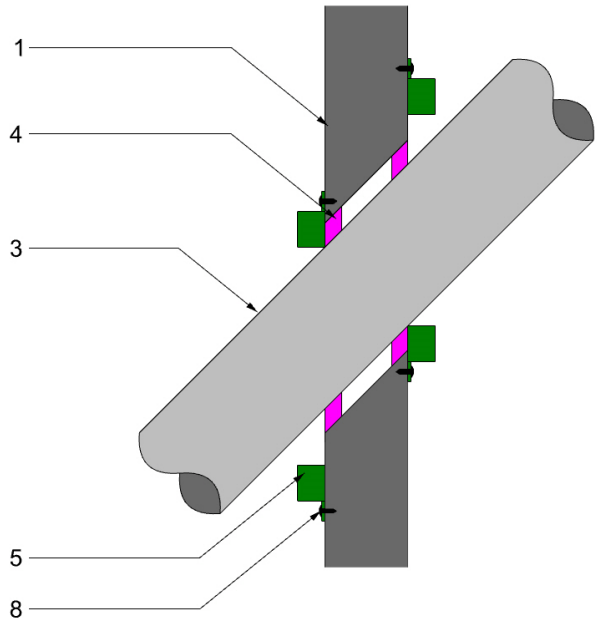


Figure 3 Pipes fitted at an angle of 30º to wall with BOSS Maxi Collars on both faces

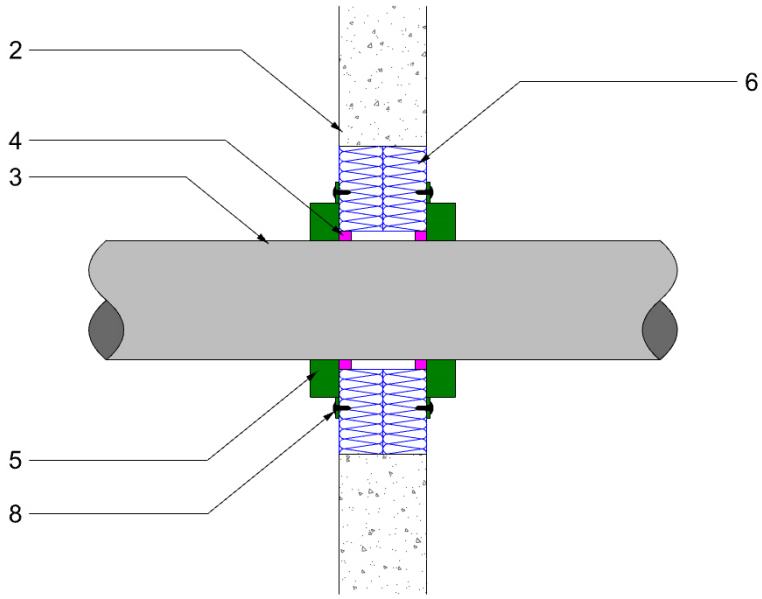


Figure 4 Pipes fitted perpendicular to rigid wall with two layers of BOSS Batts friction-fitted in aperture and BOSS Maxi Collars on both faces

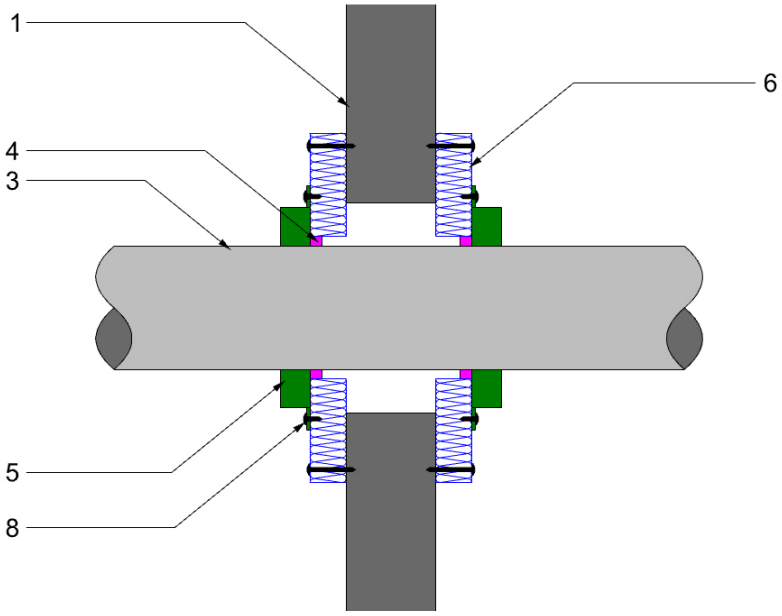


Figure 5 **Pipes fitted perpendicular to flexible wall with two layers of BOSS Batts pattress-fitted in aperture and BOSS Maxi Collars on both faces**

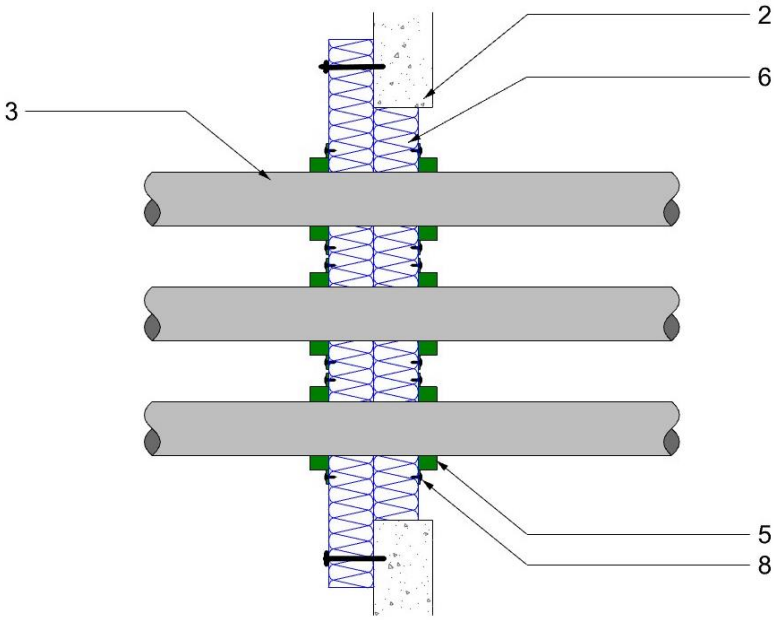


Figure 6 **Multiple pipes in rigid walls fitted perpendicular to one layer of BOSS Batt friction-fitted and one layer of BOSS Batt pattress-fitted to the aperture.**

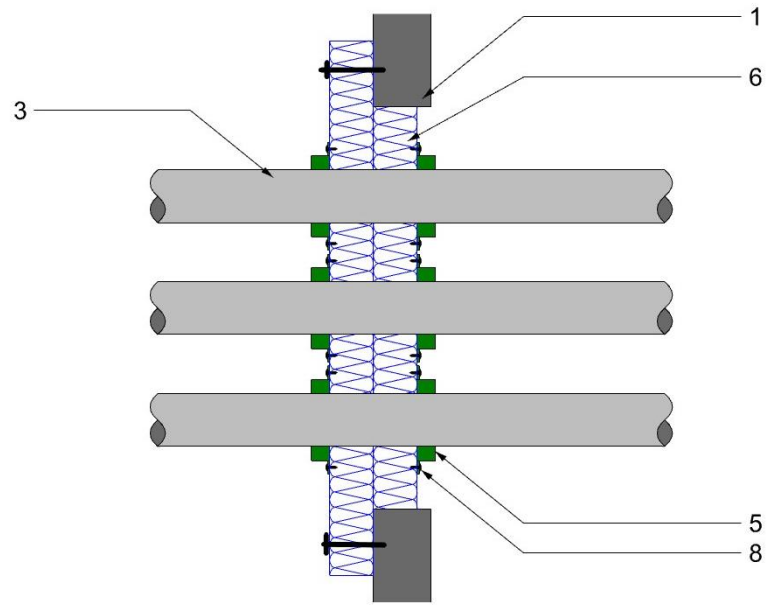


Figure 7 **Multiple pipes in flexible walls fitted perpendicular to one layer of BOSS Batt friction-fitted in aperture and one layer of BOSS Batt pattress-fitted to the aperture.**

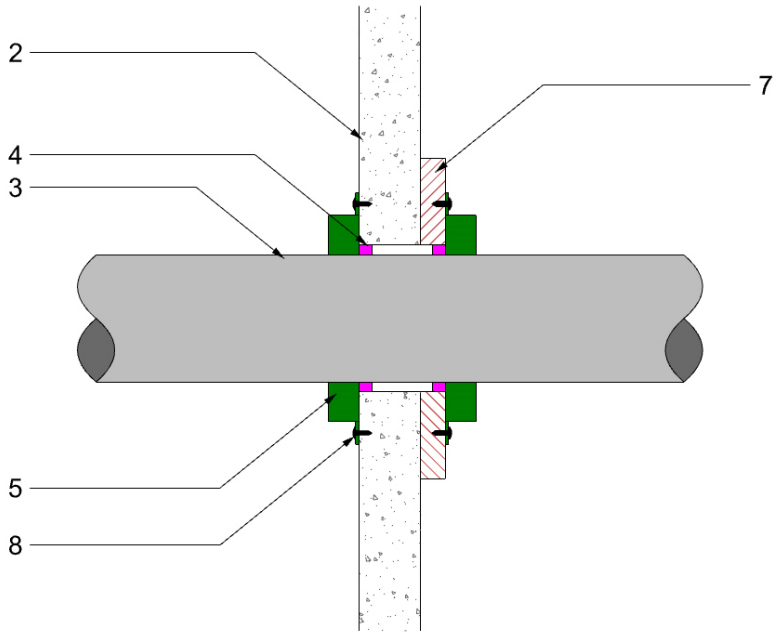


Figure 8 **Pipes fitted perpendicular to rigid wall with build-up (fire-rated plasterboard, Calcium silicate board, MgO board or BOSS Batt) and BOSS Maxi Collars on both faces**

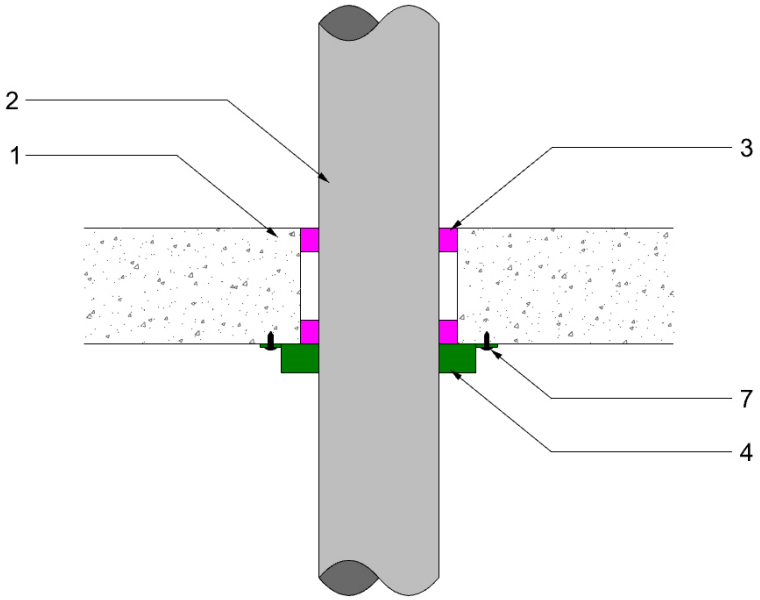


Figure 9 Pipes fitted perpendicular to floor with BOSS Maxi Collars on exposed face

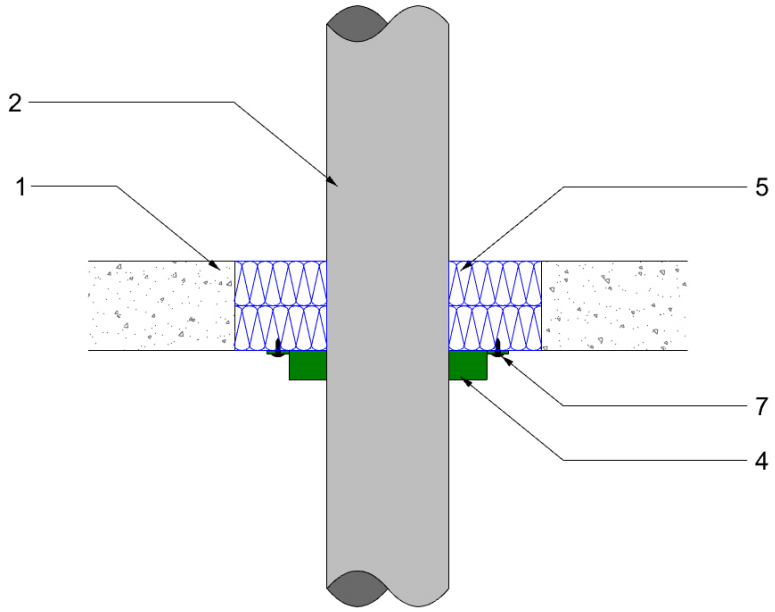


Figure 10 Pipes fitted perpendicular to floor with aperture fitted with two layers of friction-fitted BOSS Batts and BOSS Maxi Collars on exposed face

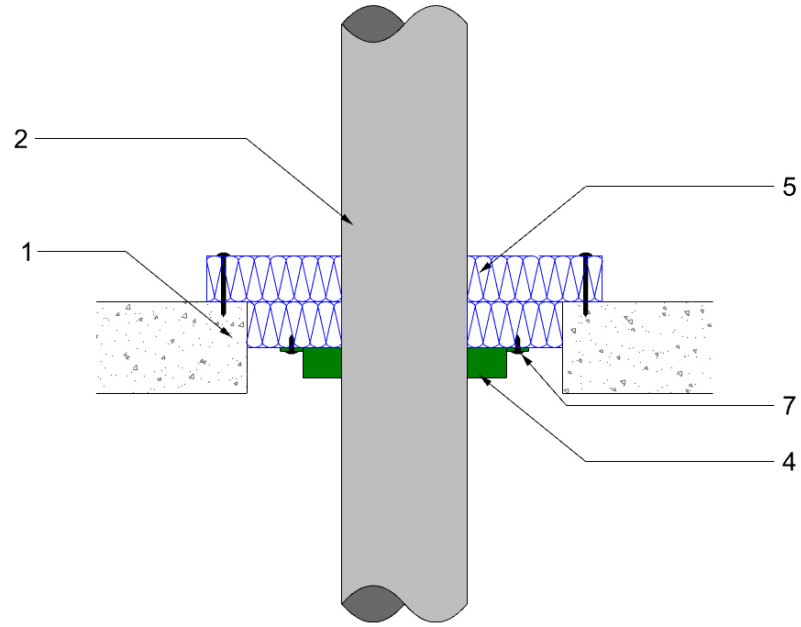


Figure 11 **Pipes fitted perpendicular to floor with aperture fitted with one layer of friction-fitted and one layer of pattress fitted BOSS Batts and BOSS Maxi Collar on exposed face**

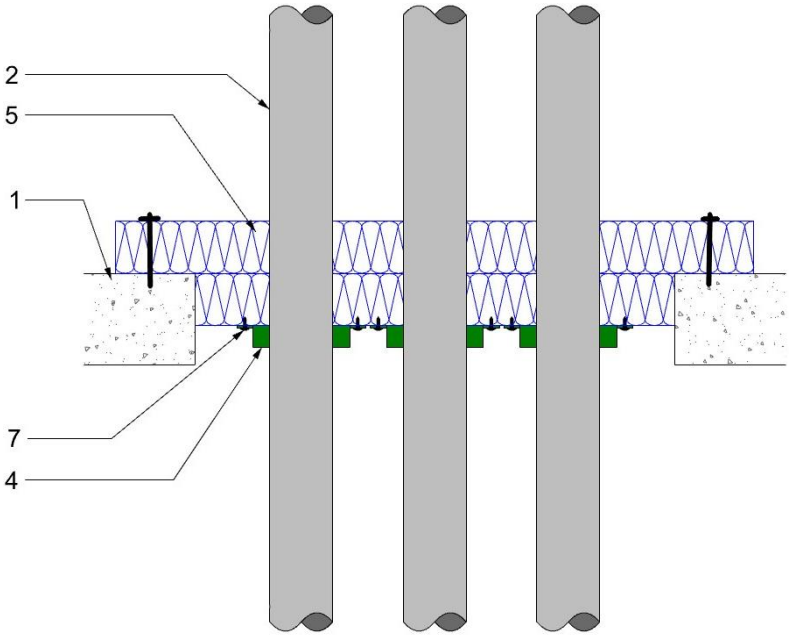


Figure 12 **Multiple pipes fitted perpendicular to floor with aperture fitted with one layer of friction-fitted and one layer of pattress fitted BOSS Batts and BOSS Maxi Collar on exposed face**

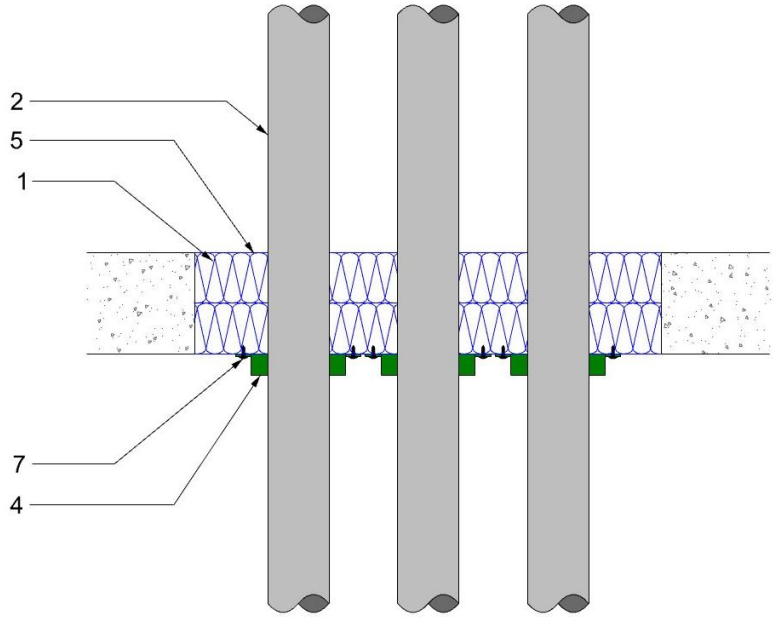


Figure 13 Multiple pipes fitted perpendicular to floor with aperture fitted with two layers of friction-fitted BOSS Batts and BOSS Maxi Collars on exposed face

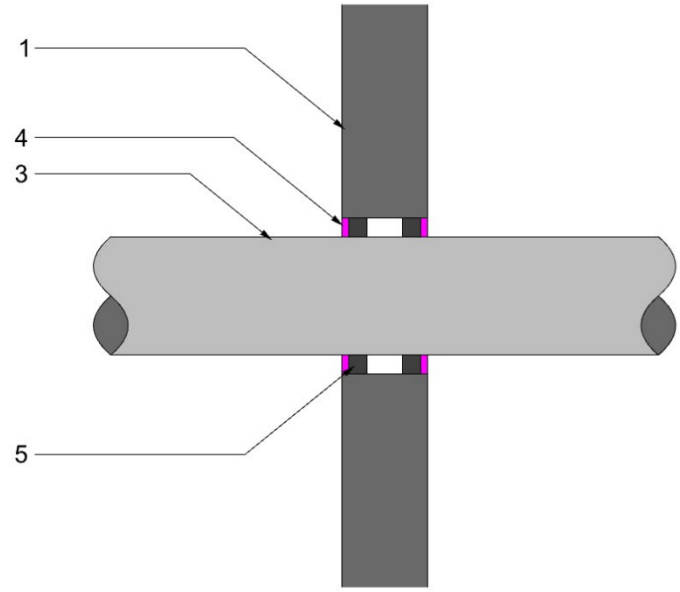


Figure 14 Pipes fitted perpendicular to flexible wall with BOSS UniWrap on both faces

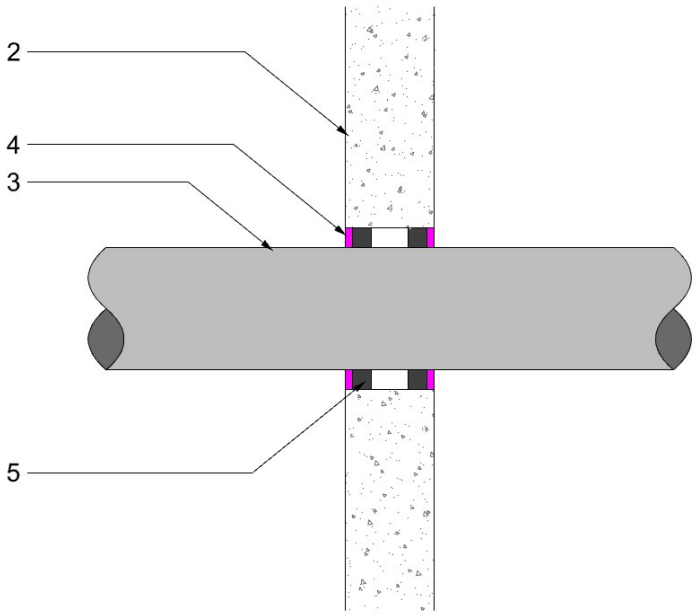


Figure 15 Pipes fitted perpendicular to rigid wall with BOSS UniWrap on both faces

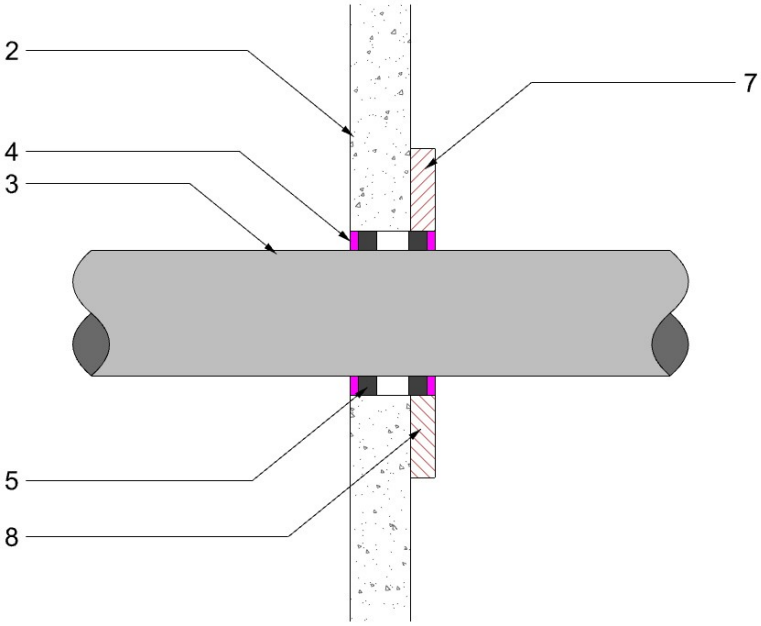


Figure 16 Pipes fitted perpendicular to rigid wall with build-up (fire-rated plasterboard, Calcium silicate board, MgO board or BOSS Batt) and BOSS UniWrap on both faces

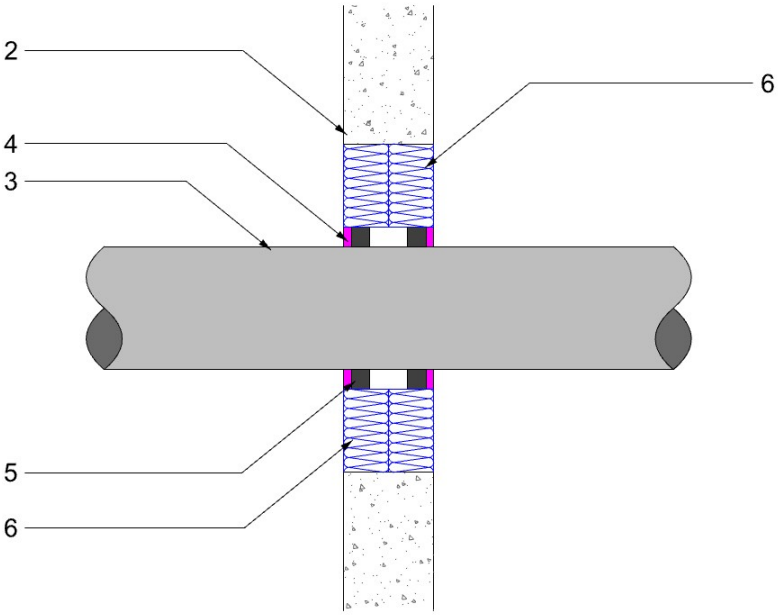


Figure 17 Pipes fitted perpendicular to rigid wall with two layers of BOSS Batts friction-fitted in aperture and BOSS UniWrap on both faces

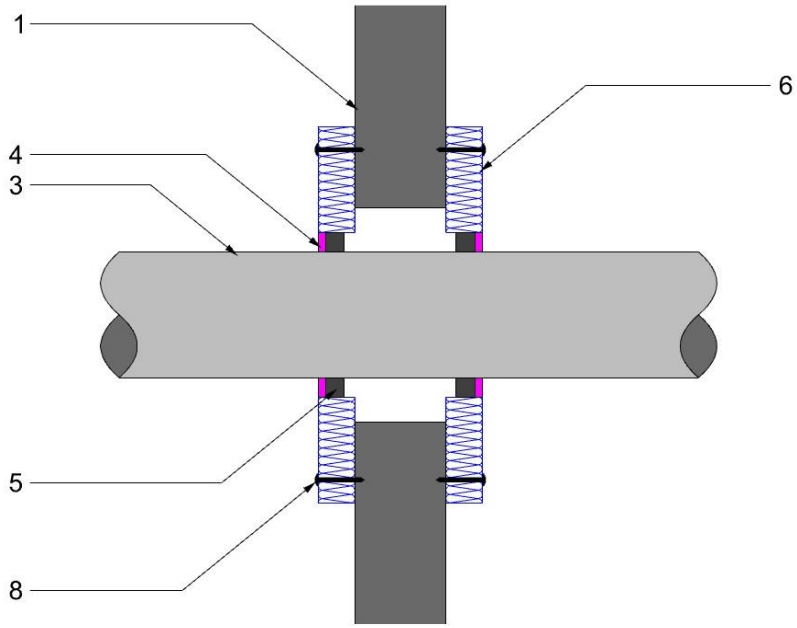


Figure 18 Pipes fitted perpendicular to rigid wall with two layers of BOSS Batts pattress-fitted in aperture and BOSS UniWrap on both faces

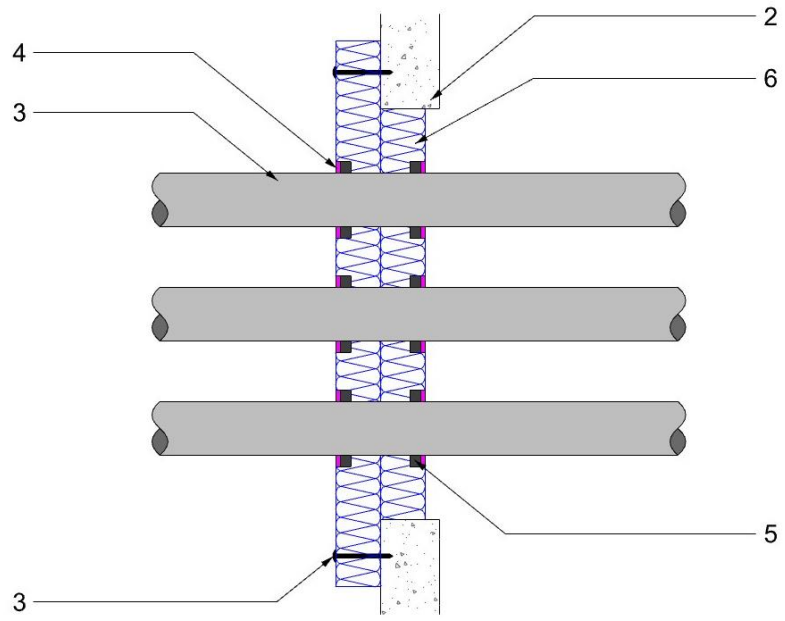


Figure 19 **Multiple pipes with UniWrap in rigid walls fitted perpendicular to one layer of BOSS Batt friction-fitted in aperture and one layer of BOSS Batt pattress-fitted to the aperture.**

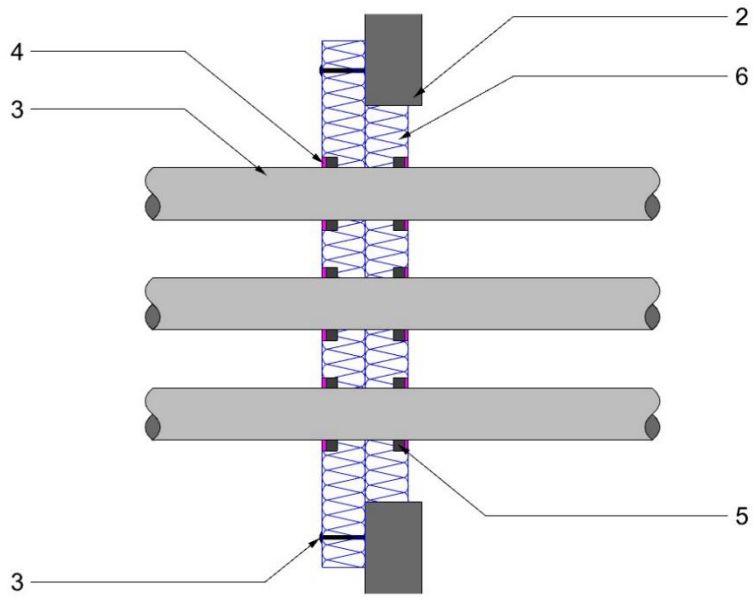


Figure 20 **Multiple pipes with UniWrap in flexible walls fitted perpendicular to one layer of BOSS Batt friction-fitted in aperture and one layer of BOSS Batt pattress-fitted to the aperture.**

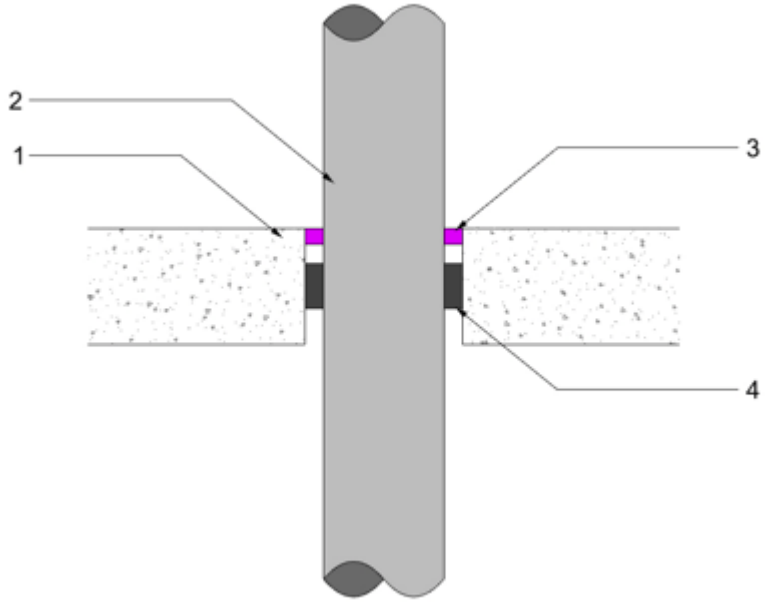


Figure 21 Pipes fitted perpendicular to floor with BOSS UniWrap at mid-depth

5. Relevance of EN 1366.3:2009 test data with respect to AS 1530.4:2014

5.1 Description of variation

The fire resistance tests WF393094, WF387432, WF348262, WF415515. WF371150, WF402946, WF416496, 2019-Efectis-R001874, WF3664404, WF350704, WF350177, WF361932, WF367689, BMT/FEI/F14135, BMT/FEI/F15008, BMT/FEI/F15009 were conducted in accordance with EN 1366-3:2009[9] and EN 1363-1:1999[10]. This standard differs from AS 1530.4:2014 and the significance of these differences is discussed below.

5.2 Methodology

The method of assessment used is summarised in Table 7.

Table 7 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Qualitative

5.3 Assessment

5.3.1 Temperature regime

The furnace temperature regime for fire resistance tests conducted in accordance with AS 1530.4:2014 follows the same trend as EN 1363-1:1999.

The parameters outlining the accuracy of control of the furnace temperature in AS 1530.4:2014 and EN 1363-1:1999 are not appreciably different.

5.3.2 Furnace thermocouples

The furnace thermocouples specified in AS 1530.4:2014 are type K, mineral insulated metal sheathed (MIMS), with a stainless-steel sheath having a wire of diameter of less than 1.0 mm and an overall diameter of 3 mm. The measuring junction protrudes at least 25 mm from the supporting heat resistant tube.

The furnace thermocouple specified in EN 1363.1:1999 is made from a folded steel plate that faces the furnace chamber. A thermocouple is fixed to the side of the plate facing the specimen, with the thermocouple hot junction protected by a pad of insulating material.

The plate part is to be constructed from 150 $\pm$ 1 mm long by 100 $\pm$ 1 mm wide by 0.7 $\pm$ 0.1 mm thick nickel alloy sheet strips.

The measuring junction is to consist of nickel chromium/nickel aluminium (Type K) wire as defined in IEC 60584-1, contained within mineral insulation in a heat-resisting steel alloy sheath of nominal diameter of 1 mm, with the hot junctions electrically insulated from the sheath.

The thermocouple hot junction is to be fixed to the geometric centre of the plate by a small steel strip made from the same material as the plate. The steel strip can be welded to the plate – or may be screwed to it – to facilitate replacement of the thermocouple. The strip should be approximately 18 mm by 6 mm if it is spot-welded to the plate, and nominally 25 mm by 6 mm if it is to be screwed to the plate. The screw is to be 2 mm in diameter.

The assembly of plate and thermocouple should be fitted with a pad of inorganic insulation material 97 $\pm$ 1 mm by 97 $\pm$ 1 mm by 10 $\pm$ 1 mm thick with a density of 280 $\pm$ 30 kg/m^3.

[9] European Committee for Standardization, 2009, Fire resistance tests for service installations. Penetration seals, BS EN 1366-3:2009, European Committee for Standardization, Brussels, Belgium.
[10] European Committee for Standardization, 1999, Fire resistance tests – General requirements, BS EN 1363-1:1999, European Committee for Standardization, Brussels, Belgium.

The relative locations of the furnace thermocouples for the exposed face of the specimen – for AS 1530.4:2014 and EN 1363-1:1999 – are 100 mm + 10 mm and 100 mm + 50 mm, respectively.

The furnace control thermocouples required by EN 1363-1:1999 are less responsive than those specified by AS 1530.4:2014. This variation in sensitivity can produce a potentially more onerous heating condition for specimens tested to EN 1363-1:1999, particularly when the furnace temperature is changing quickly in the early stages of the test.

5.3.3 Specimen thermocouples

For penetration sealing systems, thermocouples are fixed in generally similar locations on the unexposed face in accordance with both EN 1363-1:1999 and AS 1530.4:2014.

5.3.4 Furnace pressure

For services penetrating vertical and horizontal separating elements, the furnace pressure conditions are very similar between EN 1366-3:2009 and AS 1530.4:2014.

The parameters outlining the accuracy of control of the furnace pressure in AS 1530.4:2014 and EN 1363-1:1999 are also not appreciably different.

5.3.5 Performance criteria

AS 1530.4:2014 specifies the following performance criteria for building materials and structures:

- structural adequacy (not relevant to the referenced test).
- integrity.
- insulation.

Integrity

The integrity criteria differ slightly between AS 1530.4:2014 and EN 1363.1:1999.

While a specimen maintains its insulation performance, the specimen shall be deemed to have failed the integrity criterion – in accordance with AS 1530.4:2014 – if it collapses or sustains flaming or other conditions on the unexposed face, which ignites the cotton pad when applied for up to 30 seconds.

A penetration specimen shall be deemed to have failed the integrity criterion in accordance with AS 1530.4:2014 when any of the following occurs:

- Sustained flaming for 10 seconds.
- A gap forms that allows the passage of hot gases to the unexposed face and ignites the cotton pad when applied for up to 30 seconds.

Except for minor technical variations, the integrity criteria in EN 1363-1:1999 are generally applied in a comparable manner.

Insulation

The general insulation criteria of AS 1530.4:2014 and EN 1363-1:1999 are not appreciably different.

5.3.6 Specimen configuration

AS 1530.4:2014 specifies for plastic pipes that the external projection away from the furnace shall be a minimum of 2000 mm. The pipes shall be capped on the exposed side and left uncapped on the unexposed side.

EN 1366-3:2009 requires that the pipes extend on the fire side and non-fire side by a minimum of 500 mm. The plastic pipes tested in the referenced tests had both ends uncapped – thus presenting a more onerous case than that prescribed in AS 1530.4:2014.

Plastic pipes tested in the referenced fire resistance tests generally extend 500 mm on exposed and unexposed sides. This variation is addressed in the following section.

5.3.7 Application of test data to AS 1530.4:2014

The variation in furnace heating regimes, furnace pressure, furnace thermocouples, and the responses of the different thermocouple types to the furnace conditions are not expected to have an overall significant effect on the outcome of the referenced fire resistance tests.

The plastic pipes tested in the reference tests extended 500 to 550 mm away from the walls and floors on the unexposed side rather than 2000 mm as required by AS 1530.4:2014.

Theoretically, this difference can affect the drawing of hot gases through the pipe by a ‘stack effect’ and can lead to high temperatures on the unexposed side of the specimen when compared to having a shorter pipe extension on the unexposed side.

The impact of the stack effect on the tested services can be significant when there are gaps at the penetrations and hot gasses are passing in the pipes, particularly for floor specimens. The longer the length of pipe above the collar, the greater the increase in pressure across the collar or gap.

However, for each of the assessed plastic pipe services, the referenced test data shows that the BOSS sealing systems completely closed off the softened plastic pipe via the intumescing material such that the temperatures measured on the pipe remained steady or steadily increasing – without exhibiting any secondary temperature peaks – for the given fire resistance periods in sections 7 to 9. If the expanded intumescent material fully blocks the pipe aperture on the exposed side or within the aperture then – irrespective of the length of the pipe on the unexposed side – the service is expected to perform similarly. Based on this rationale, the stack effect is not expected to be significant – even if the plastic pipe length on the unexposed side is 2000 mm. Thus, the difference in service length for plastic pipes between EN 1366.3:2009 and AS 1530.4:2014 is not expected to cause any difference in performance for the assessed services.

For walls, the stack effect is not as significant. In any case, the same rationale applied above applies.

Based on the above discussion, the referenced test data from test reports WF393094, WF387432, WF348262, WF415515. WF371150, WF402946, WF416496, 2019-Efectis-R001874, WF3664404, WF350704, WF350177, WF361932, WF367689, BMT/FEI/F14135, BMT/FEI/F15008, BMT/FEI/F15009 can be used to support this assessment conducted to AS 1530.4:2014.

6. Relevance of AS 1530.4:2005 test data with respect to AS 1530.4:2014

6.1 Description of variation

The fire resistance tests EWFA 34923800.2 and EWFA 33090200.1 were conducted in accordance with AS 1530.4:2005, which differs from AS 1530.4:2014. The effect these differences have on fire resistance performance of the referenced test specimens is discussed below.

6.2 Methodology

The method of assessment used is summarised in Table 8.

Table 8 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Qualitative

6.3 Assessment

6.3.1 Temperature regime

The furnace heating regime in fire resistance tests conducted in accordance with AS 1530.4:2014 follows a similar trend to that in AS 1530.4:2005.

The specified specimen heating rate in AS 1530.4:2005 is given by:

$$T_t - T_0 = 345\log(8t + 1) + 20$$

Where:

Tt = furnace temperature at time t, in degrees Celsius.

T_0 = initial furnace temperature, in degrees Celsius.

t = the time into the test, measured in minutes from the ignition of the furnace.

The parameters outlining the accuracy of control of the furnace temperature in AS 1530.4:2014 and AS 1530.4:2005 are not appreciably different.

6.3.2 Furnace pressure

The furnace pressure conditions for single and multiple penetration sealing systems in AS 1530.4:2005 and AS 1530.4:2014 are not appreciably different.

The parameters outlining the accuracy of control of the furnace pressure in AS 1530.4:2014 and AS 1530.4:2005 are not appreciably different.

6.3.3 Performance criteria

AS 1530.4:2014 specifies the following performance criteria for building materials and structures:

- structural adequacy (not relevant).
- integrity.
- insulation.

6.3.4 Integrity

The failure criteria for integrity in AS 1530.4:2014 and AS 1530.4:2005 are not appreciably different.

6.3.5 Insulation

The positions of thermocouples and failure criteria for insulation in AS 1530.4:2014 and AS 1530.4:2005 are not appreciably different.

6.3.6 Application of the test data to AS 1530.4:2014

Based on the above discussion and in absence of any foreseeable integrity and insulation risk, it is concluded that the results relating to the integrity and insulation performance of the specimens – tested in the referenced tests – can be used to assess the integrity and insulation performance in accordance with AS 1530.4:2014.

7. Fire resistance performance of services protected with BOSS MaxiCollar™

7.1 Description of variation

It is proposed that combustible pipes penetrating flexible and rigid walls, rigid floors and ceiling constructions are assessed to be protected with BOSS MaxiCollar™. BOSS MaxiCollars™ are fire resisting pipe collars consisting of steel casing with internal layers of graphite based intumescent layers.

In this assessment, combustible pipes protected with BOSS MaxiCollar™ are assessed. The combustible pipes considered in this assessment include uPVC, HDPE, PP, PP-R, PE, PEX, PEX-AL and CPVC pipes.

The vertical separating elements considered in this assessment are as given below. Unless where specified, the wall cavity of flexible walls must be filled with R2.2 Glasswool Batt insulation:

- Minimum 50 mm deep steel/timber stud with 1 layer of 13 mm thick fire-rated plasterboard clad on both the exposed and unexposed sides.
- Minimum 92 mm deep steel/timber stud with 1 layer of 13 mm thick fire-rated plasterboard clad on both the exposed and unexposed sides.
- Minimum 50 mm deep steel/timber stud with 2 layers of 13 mm thick fire-rated plasterboard clad on both the exposed and unexposed sides
- Minimum 64 mm deep steel/timber stud with 2 layers of 13 mm thick fire-rated plasterboard clad on both the exposed and unexposed sides
- Minimum 92 mm deep steel/timber stud with 2 layers of 13 mm thick fire-rated plasterboard clad on both the exposed and unexposed sides
- Shaftwalls with 25 mm thick shaftliner on exposed side and 2 layers of 13 mm thick fire-rated plasterboard clad on the unexposed side. For large apertures, the apertures must be lined with the same number of plasterboard layers.
- FRLs assessed for flexible walls and for AAC blockwork walls, AAC walls, Hebel walls and Speedpanel walls can be applied to the same services penetrating through rigid walls, having the same or greater thickness, as applicable, (including Concrete, Solid Masonry, Speedpanel, Hebel and Korok) with an established FRL as required as tested or assessed by an ATL.
- Minimum 60 mm thick Pronto panel can be installed with additional build-up to increase thickness locally around the aperture to the required thickness.

The horizontal separating elements considered in this assessment are:

- ComFlor® 60
- Minimum 150 mm thick AAC or concrete floor (minimum nominal density 2400 kg/m^3)

7.2 Methodology

The method of assessment used is summarised in Table 7.

Table 9 Method of assessment

Assessment method	
Level of complexity	Complex assessment
Type of assessment	Qualitative

7.3 Fire resistance performance of BOSS MaxiCollars™ in walls

7.3.1 The separating element

Test reports EWFA 49527300.3, WF402946, FRT190033 R1.0, WF393094, WF387432, WF348262, WF415515, 2019-Efectis-R001874, FSP1846, WF 364404 Issue 2, FRT190428 R1.0, EWFA 34923800.2, EWFA 33090200.1, BMT/FEI/F14135, BMT/FEI/F15009, WF416496 and FRT180473 R1.0 were referenced to determine the fire resistance performance of combustible pipe penetrations protected with BOSS MaxiCollars™ installed on both the exposed and unexposed faces of the vertical separating elements.

Flexible walls must have a minimum thickness of 76 mm and comprise steel studs or timber studs lined on both faces with minimum 1 layer of 13 mm thick plasterboards. Unless where specified, the wall cavity of flexible walls must be filled with R2.2 Glasswool Batt insulation.

For services tested in walls with two layers of 13 mm thick plasterboards on both faces, single layer walls are permitted provided that the area around the penetration is built up with an additional layer of fire rated plasterboard (100 mm × 100 mm from the edge of the aperture).

For timber framed walls no part of the penetration seal may be closer than 100 mm to a stud, the cavity must be closed between the penetration seal and the stud, and minimum 100 mm of insulation confirmed to be deemed non-combustible in accordance with AS 1530.1:1994 must be provided within the cavity between the penetration seal and the stud.

Rigid walls must be minimum 75 mm thick and must be AAC, concrete or solid masonry. Thinner rigid walls (such as Minimum 60 mm thick Pronto panel) must be built-up on either one or both sides to achieve the minimum thickness required as assessed for the required FRL. The build-up could be fire-rated plasterboard, Calcium silicate board, MgO board or BOSS batts and must extend at least 100 mm on all directions from the aperture. Where collars are fixed to the build-up board, the fixings must extend beyond the thickness of the build-up so that the threading screws into the rigid wall.

FRLs assessed for flexible walls and for AAC blockwork walls, Hebel walls and Speedpanel walls can be applied to the same services penetrating through rigid walls, having the same or greater thickness, as applicable, (including Concrete, Solid Masonry, Speedpanel, Hebel and Korok) with an established FRL as required as tested or assessed by an ATL.

For all cases, the wall must have been tested or assessed by an accredited testing laboratory (ATL) to achieve the required FRL in accordance with AS 1530.4:2014.

7.3.2 Large apertures protected with BOSS sealing systems

Where specified, services penetrating single or double layers of 50 mm thick BOSS batts (density 145 kg/m^3) are also protected with BOSS MaxiCollars™ installed on both faces. The BOSS batts may be pattress fitted overlapping (minimum 100 mm overlap) the separating element or friction-fitted in the aperture bedded with BOSS FireMastic-300 sealant. The maximum aperture size in walls is 1200 mm × 500 mm.

If pattress fitted, the batts must be fixed using 6 × 80 mm steel screws and washers at 300 mm centers or at batt corners. If friction-fitted and bedded within the aperture, the overall size of the batts may be made of cut batt sections butt jointed together and fitted after the pipes are installed. Sealant must be used to bed the cut batts together and to seal the edges of the batt with the separating element and with the pipe. The BOSS batts must be coated on both faces with ablative coating. Additionally, each vertical and horizontal cut of the batt must be sealed with BOSS FireMastic-300 sealant at the interface between the batts and the service and between the batt and the separating element.

FRLs assessed in flexible walls and rigid walls are applicable to the same services penetrating a large aperture fitted with two layers of 50 mm thick BOSS Batts friction-fitted or pattress fitted on either side provided that the Batts have been tested or assessed in this configuration to have the minimum established FRL by an ATL.

Additionally, large apertures up to 500 mm × 500 mm may also be sealed with PyroSeal 2K Expanding Sealer foam in minimum 100 mm thick walls for the FRLs given in Table 20.

7.3.3 BOSS MaxiCollars™ in walls

The appropriate size of BOSS MaxiCollars™ must be fitted around the pipe at each face of the separating element and fixed to the separating element using the appropriate screws (see Table 5). BOSS FireMastic-HPE or BOSS FireMastic-300 must be cartridge gunned into the annular gap around the pipe to the depth specified in Table 10 to Table 20 behind the collar and between the aperture and the separating element.

The minimum spacing between multiple services protected with BOSS MaxiCollars™ passing through BOSS Batts in walls can be minimum 0 mm. For services placed in close proximity, collars must be fixed to both faces and sealant must be applied into the annular gap around the pipe for a depth of 10 mm behind the pipe collar at each face of the separating element. If the services are angled, the maximum FRL will be -/90/90. Other services will be attributed the maximum FRL that they have achieved in other tests.

Considering the above, the fire resistance performance of various combustible pipe penetrations in walls can be assessed as given in Table 10 to Table 20.

Minimum 100 mm thick flexible[1] or rigid walls

Table 10 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[2]	FRL
PE	50	3 – 4.6	10.0	50 mm Maxi Collar	FM300 to a depth of 10 mm	-/120/120 U/U
	110	10.0	10.0	110 mm Maxi Collar		-/60/60 U/U[3]
		2.7	10.0	110 mm Maxi Collar		-/120/60 U/U
		2.7 – 10.0	10.0	110 mm Maxi Collar		-/60/60 U/U
	125	3.1	10.0	125 mm Maxi Collar		-/120/120 U/U
		3.1 – 11.4	10.0	125 mm Maxi Collar		-/90/90 U/U
	160	4.0	10.0	160 mm Maxi Collar		-/120/120 U/U[3]
	125	3.1	10.0	125 mm Maxi Collar	FM300 to a depth of 12.5 mm	-/120/120 U/U
PP / PP-R	50	2.0	10.0	50 mm Maxi Collar	FM300 to a depth of 10 mm	-/120/90 U/U
		2.0 – 6.9	10.0	50 mm Maxi Collar		-/120/60 U/U
		2.9	10.0	50 mm Maxi Collar	FM300 to a depth of 12.5 mm	-/120/120 U/C
	110	2.7	10.0	110 mm Maxi Collar	FM300 to a depth of 10 mm	-/120/90 U/U
		2.7 – 10.0	10.0	110 mm Maxi Collar		-/90/90 U/U
		2.7 – 10.0	10.0	110 mm Maxi Collar	FM300 to a depth of 12.5 mm	-/120/120 U/C

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[2]	FRL
	125	3.1	10.0	125 mm Maxi Collar	FM300 to a depth of 10 mm	-/120/90 U/U
		3.1	10.0	125 mm Maxi Collar	FM300 to a depth of 12.5 mm	-/120/120 U/C
		3.1 – 17.1	10.0	125 mm Maxi Collar	FM300 to a depth of 10 mm	-/60/60 U/U[3]
	160	4.0	10.0	160 mm Maxi Collar		-/90/90 U/U
		4.0 - 9.1	10.0	160 mm Maxi Collar		-/15/15 U/U[3]
		4.0 - 14.6	10.0	160 mm Maxi Collar	FM300 to a depth of 12.5 mm	-/120/120 U/C
		9.1	10.0	160 mm Maxi Collar	FM300 to a depth of 10 mm	-/15/15 U/U
PVC	50	1.8	10.0	50 mm Maxi Collar	FM300 to a depth of 12.5 mm	-/120/120 U/C
		1.8 – 3.7	10.0	50 mm Maxi Collar	FM300 to a depth of 10 mm	-/120/90 U/U
	110	4.2	5.0	110 mm Maxi Collar		-/120/120 U/C
		4.2 – 7.4	10.0	110 mm Maxi Collar	FM300 to a depth of 12.5 mm	-/120/120 U/C
		4.2 – 6.6	10.0	110 mm Maxi Collar	FM300 to a depth of 10 mm	-/120/120 U/U
	125	7.4	10.0	125 mm Maxi Collar		-/120/90 U/U
		4.8 – 7.4	10.0	125 mm Maxi Collar		-/90/90 U/U
		6.0	10.0	125 mm Maxi Collar	FM300 to a depth of 12.5 mm	-/120/120 U/C
	160	6.2 – 9.5	10.0	160 mm Maxi Collar	FM300 to a depth of 10 mm	-/120/120 U/U
		6.2 – 9.5	10.0	160 mm Maxi Collar	FM300 to a depth of 12.5 mm	-/120/120 U/C
HDPE	50	2.9	10.0	50 mm Maxi Collar	FM300 to a depth of 12.5 mm	-/120/120 U/C
	110	2.7 – 10.0	10.0	110 mm Maxi Collar		-/120/120 U/C
	160	4.9 – 9.5	10.0	160 mm Maxi Collar		-/120/120 U/C
uPVC	160	2.8	20.0	160 mm Maxi Collar	12 mm thick armaflex lagging	-/120/120 C/U

[1] 50 mm steel stud lined with two layers of 13 mm thick fire rated plasterboard on each side
[2] Sealant applied behind the collar between the pipe and the aperture on both the exposed and unexposed sides
[3] Cavity insulation of the plasterboard wall is optional

Minimum 118 mm thick flexible[1] or rigid walls

Table 11 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
PP / PP-R	32	5.8	3	32 mm Maxi Collar	FireMastic-HPE in the gap between the collar and pipe	-/60/60 C/U
uPVC	40	5.0	5	40 mm Maxi Collar		-/60/60 C/U
	50	4.5	5	50 mm Maxi Collar		-/60/60 C/U
	80	6.4	5	80 mm Maxi Collar		-/60/60 C/U
CPVC	50	10.1	5	50 mm Maxi Collar		-/60/30 C/U
[1] 92 mm steel stud lined with one layer of 13 mm thick fire rated plasterboard on each side						

Minimum 144 mm thick flexible[1] or rigid walls

Table 12 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC (sandwich core)	100	3.2	5	100 mm Maxi Collar	-	-/120/120 C/U
[1] 92 mm steel stud lined with two layers of 13 mm thick fire rated plasterboard on each side						

Minimum 75 mm thick AAC wall with minimum nominal density of 38.8 kg/m^2 or normal weight concrete wall

Table 13 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	40	3.0	15.0	40 mm Maxi Collar	FM300 to a depth of 5 mm	-/120/90 C/U
	50	2.6	13.0	50 mm Maxi Collar		-/120/120 C/U
	80	3.4	11.0	80 mm Maxi Collar		-/120/120 C/U
uPVC (sandwich core)	100	3.8	10.5	100 mm Maxi Collar		-/120/- C/U

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
[1] Sealant applied behind the collar between the pipe and the aperture on both the exposed and unexposed sides						

Minimum 100 mm thick AAC block wall or solid masonry wall

Table 14 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[1]	FRL
PP / PP-R	110	2.7	10.0	110 mm Maxi Collar	FM300 to a depth of 10 mm	-/120/120 U/U, U/C
						-/60/30 C/U
						-/120/120 C/U[2]
	160	4.0	10.0	160 mm Maxi Collar		-/120/120 U/U
						-/120/120 C/U
						-/120/120 C/U[2]
	250	6.2	10.0	250 mm Maxi Collar		-/120/120 C/U
[1] Sealant applied behind the collar between the pipe and the aperture on both the exposed and unexposed sides [2] A 10 mm diameter hole present 75 mm back from the pipe opening on the exposed side						

Table 15 Pipes fitted with 90º U-bend with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[1]	FRL
PP / PP-R	110	2.7	10.0	110 mm Maxi Collar	FM300 to a depth of 10 mm	-/120/120 C/U[2]
	160	4.0	10.0	160 mm Maxi Collar		-/120/120 C/U[2]
[1] Sealant applied behind the collar between the pipe and the aperture on both the exposed and unexposed sides [2] Capped by bend on exposed side						

Minimum 150 mm thick AAC block wall or solid masonry wall

Table 16 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
PE	400	8.0	0	400 mm Maxi Collar	-	-/15/15 U/C

Large apertures sealed with 50 mm thick BOSS Batt bulkheads

Table 17 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC Sandwich core	100	3.6	5.0	320 mm × 320 mm × 40 mm thick BOSS Bulkhead Batt on the exposed side installed on top of the main fire protection of 1200 mm × 500 mm × 50 mm thick BOSS batts and secured with pigtail screws at 50 mm in from the edges on four sides. A 10 mm bead of mastic applied on the perimeter of the batt as a smoke seal.	100 mm Maxi Collar	-/120/120 C/U

Large apertures sealed with BOSS Batts in minimum 76 mm thick walls

Table 18 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	110	6.6	0	Single 50 mm thick BOSS Batt bedded within 600 mm × 600 mm aperture with FM300	110 mm Maxi Collar	-/60/60 U/C
PE	110	2.7	0		110 mm Maxi Collar	-/60/60 U/C
PP / PP-R	50	2.9	0		50 mm Maxi Collar	-/60/60 U/C

Large apertures sealed with BOSS Batts in minimum 100 mm thick walls

Table 19 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	110	6.6	0	Double 50 mm thick BOSS Batts pattress fitted on either side of aperture or friction fitted into 600 mm × 600 mm aperture with FM300	110 mm Maxi Collar	-/120/120
PE	110	2.7	0		110 mm Maxi Collar	-/120/120
PP / PP-R	50	2.9	0		50 mm Maxi Collar	-/120/120
Note: Spacing between pipes was tested at minimum 25 mm.						

Large apertures sealed with PyroSeal 2K Expanding Sealer foam in minimum 100 mm thick walls

Table 20 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	110	6.6	0	PyroSeal 2K Expanding Sealaer (2-component polyurethane foam) in 500 mm × 500 mm × 100 mm aperture	110 mm Maxi Collar	-/120/90 U/C
PE	110	2.7	0		110 mm Maxi Collar	-/120/120 U/C
PP / PP-R	50	2.9	0		50 mm Maxi Collar	-/120/120 U/C
Note: Spacing between pipes was tested at 0 mm.						

7.3.4 Oversized BOSS MaxiCollars™ in walls

The fire resistance performance of oversized BOSS MaxiCollars™ in walls are assessed as given in Table 21 to Table 26.

Minimum 100 mm thick flexible[1] or rigid walls

Table 21 Pipes fitted at a 30º angle to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum aperture (mm)	Primary protection	Secondary protection[2]	FRL[3]
PP / PP-R	50	2.9	50 96	110 mm Maxi Collar	FM300 to a depth of 10 mm	-/90/90 C/U
PVC	110	6.6	156 × 110	160 mm Maxi Collar		-/120/90 C/U
PE	110	2.7	156 × 110	160 mm Maxi Collar		-/90/90 C/U

[1] 50 mm steel stud lined with two layers of 13 mm thick fire rated plasterboard on each side
[2] Sealant applied behind the collar between the pipe and the aperture on both the exposed and unexposed sides
[3] Cavity insulation in plasterboard wall is optional

Table 22 Pipes fitted perpendicular to wall with BOSS Maxi Collar installed on unexposed side

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
Consentric 60/100	Outer pipe:101 mm Inner pipe:60 mm	Outer pipe:1.9 mm Inner pipe:2.0 mm	-	110 mm Maxi Collar	-	-/120/120 U/U
Consentric c80/120	Outer pipe:121 mm Inner pipe:82 mm	Outer pipe:1.5 mm, inner pipe:2.4 mm	-	125 mm Maxi Collar	-	-/120/120 C/U

Minimum 116 mm thick flexible[1] or rigid walls

Table 23 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
CPVC	33.4	2.6	0.8	40 mm Maxi Collar	-	-/120/120 C/U
	42.2	3.3	0.9	40 mm Maxi Collar	-	-/120/90 C/U
	48.3	3.8	0.85	50 mm Maxi Collar	-	-/120/120 C/U
	60.3	4.7	0.85	65 mm Maxi Collar	-	-/120/90 C/U

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
[1] 64 mm steel stud lined with two layers of 13 mm thick fire rated plasterboard on each side						

Minimum 118 mm thick flexible[1] or rigid walls

Table 24 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
PP / PP-R	20	4.6	6	32 mm Maxi Collar	FireMastic-HPE in the gap between the collar and pipe on both sides	-/60/60 C/U
PEX	20	6.3	10	32 mm Maxi Collar		-/60/30 C/U
	25	6.2	2.5	40 mm Maxi Collar		-/60/30 C/U
PEX-AL	25	5.3	2.5	32 mm Maxi Collar		-/60/30 C/U
[1] 92 mm steel stud lined with one layer of 13 mm thick fire rated plasterboard on each side						

Minimum 144 mm thick flexible or rigid walls

Table 25 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
PEX	25	3.1	3.5	32 mm Maxi Collar	FireMastic-HPE in the gap between the collar and pipe on both sides	-/120/60 C/U
[1] 92 mm steel stud lined with two layers of 13 mm thick fire rated plasterboard on each side						

Minimum 78 mm thick Speedpanel walls

Table 26 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC DWV	110	3.5	2.5	142.8 mm Maxi Collar	FM300 applied 10 mm deep behind the collars on both sides and FireMastic-HPE	-/240/60 C/U

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
					applied as a 5 mm fillet on the joint between collar and panel on both sides.	
					FM300 on the joint between collar and panel on both sides.	-/120/90 C/U
PVC-C	160	7.7	6.0	205 mm Maxi Collar	FM300 applied 10 mm deep behind the collars on both sides	-/240/120 C/U

7.4 Fire resistance performance of BOSS MaxiCollars™ in floors

7.4.1 The separating element

Test reports FRT18137 R2.0, BMT/FEI/F15008, WF350704, WF350177, WF361932, WF367689, WF416496, and FRT180474 were referenced to determine the fire resistance performance of combustible pipe penetrations protected with BOSS MaxiCollars™ installed in horizontal separating elements.

Fire resistance performance of combustible pipes penetrating composite floors have been tested in FRT18137 R2.0 where combustible pipes penetrated ComFlor60® floor system consisting of three composite floor decking jointed together at the bottom and concrete layer (minimum density 2400 kg/m^3) cast on top with steel reinforcement grid (F72 reinforcement mesh). The thickness of the floor was maximum 130 mm and minimum 70 mm. BOSS batts were secured into the floor on the bottom rib of the decking with minimum four 75 mm long masonry anchors with washers. The gap between the top rib and the BOSS batt was covered with trapezoid shaped BOSS batt. The cut edge and core hole of the BOSS Batt was painted with BOSS Ablative coating.

Results obtained in minimum 235 mm thick ceiling or ceiling-floor systems – as tested in FRT180474 R1.0 – can be applied to ceiling or ceiling-floor systems of greater thickness of the same construction as tested with 2 layers of 13 mm fire-rated plasterboard on the exposed face.

Results obtained in 150 mm AAC floors can be extended to floors systems of greater thickness and greater density in accordance with section 10 of AS 1530.4:2014 describing permissible variations. Therefore, minimum 150 mm thick AAC or normal weight concrete floor slabs with a minimum density of 650 kg/m^3 are expected to achieve the same fire resistance performance as observed for the tested 150 mm thick AAC floors.

7.4.2 Large apertures protected with BOSS sealing systems

Services penetrating Gypsum based mortar, identical to BOSS FireMortar-360, in 1400 mm × 700 mm × 100 mm apertures in minimum 150 mm thick AAC or normal weight concrete floors protected with BOSS MaxiCollar™ installed on the exposed face are expected to achieve the FRLs given in Table 32.

uPVC and PE pipes penetrating 2 layers of 50 mm thick BOSS batts fitted back-to-back and bedded within a 1000 mm × 350 mm aperture in a minimum 150 mm thick floor are also assessed as given in Table 35. The combustible pipes must be protected with BOSS MaxiCollar™ on the exposed face.

The established performance of large apertures protected with a single layer of 50 mm thick BOSS batts is determined based on test results from WARRES 304406B. Specimen A consisted of a 1600 mm × 700 mm blank seal with one single layer of nominally 50 mm thick mineral fibre batt identical to BOSS batt with nominal density of 140 kg/m^3. The batt was coated on both faces with stopseal coating and was friction fitted within the aperture. Specimen A achieved an FRL of -/60/60 with integrity failure occurring at 79 minutes and insulation failure occurring at 63 minutes. According to the test observations, the perimeter edges of specimen A only began to separate away from the supporting construction at approximately mid-span on the long edge after 60 minutes (at 62 minutes 20 seconds). Therefore, the FRL of single batts as blank seals in floors can be assessed to be -/60/60.

7.4.3 BOSS MaxiCollars™ in floors

The appropriate size of BOSS MaxiCollars™ must be fitted around the pipe on the exposed side of the separating element (unless otherwise specified) and fixed to the separating element using the appropriate screws (see Table 6). BOSS FireMastic-HPE or BOSS FireMastic-300 must be cartridge gunned into the annular gap around the pipe to the depth specified in Table 27 to Table 32 behind the collar and between the aperture and the separating element.

Considering the above, the fire resistance performance of various combustible pipe penetrations in walls can be assessed as given in Table 27 to Table 32.

ComFlor® 60

Table 27 Pipes fitted perpendicular to the floor with BOSS Maxi Collar installed on the exposed side

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC DWV	100	3.3	13.5	100 mm Maxi Collar	330 mm × 330 mm BOSS Batt installed on the bottom rib of the composite floor. The gap between the batt and the top rib of the composite floor covered with trapezoid shape BOSS Batt. FM300 to a depth of 5 mm between the pipe and the aperture finished flush on both sides.	-/120/120 C/U
HDPE	75	3.5	8.5	75 mm Maxi Collar	290 mm × 290 mm BOSS Batt installed on the bottom rib of the composite floor. The gap between the batt and the top rib of the composite floor covered with trapezoid shape BOSS Batt. FM300 to a depth of 5 mm between the pipe and the aperture and finished with a 10 mm × 10 mm fillet on the unexposed side and finished at 5 mm depth flush on the exposed side.	-/120/120 C/U
The minimum thickness of the ComFlor® 60 is 70 mm, and the maximum thickness is 130 mm.						

Minimum 150 mm thick AAC or normal weight concrete floor

Table 28 Pipes fitted perpendicular to the floor with BOSS Maxi Collar installed on the exposed side

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[1]	FRL
PP / PP-R	50	2.9	10.0	50 mm Maxi Collar	FM300 to a depth of 5 mm on unexposed face only	-/240/240 U/C
	110	2.7	11.0	110 mm Maxi Collar	FM300 to a depth of 10 mm	-/60/60 U/U
		2.7 – 10.0	11.0	110 mm Maxi Collar	FM300 to a depth of 5 mm	-/15/15 U/U
		2.7 – 10.0	10.0	110 mm Maxi Collar	FM300 to a depth of 5 mm on unexposed face only	-/240/240 U/C
	125	3.1	10.0	125 mm Maxi Collar	FM300 to a depth of 5 mm on unexposed face only	-/240/240 U/C
	160	4.0 – 14.6	10.0	160 mm Maxi Collar	FM300 to a depth of 5 mm on unexposed face only	-/240/240 U/C
PE	110	2.7	10.0	110 mm Maxi Collar	FM300 to a depth of 5 mm	-/240/240 U/C
		2.7	11.0	110 mm Maxi Collar	FM300 to a depth of 10 mm	-/30/30 U/U
		2.7 – 10.0	11.0	110 mm Maxi Collar	FM300 to a depth of 10 mm	-/15/15 U/U
	125	3.1	10.0	125 mm Maxi Collar	FM300 to a depth of 5 mm	-/240/240 U/C
uPVC	50	1.8	10.0	50 mm Maxi Collar	FM300 to a depth of 5 mm	-/240/240 U/C
	110	4.2 – 7.3	10.0	110 mm Maxi Collar	FM300 to a depth of 5 mm	-/240/240 U/C
	110	4.2 – 6.6	11.0	110 mm Maxi Collar	FM300 to a depth of 10 mm	-/30/30 U/U
	125	6.0	10.0	125 mm Maxi Collar	FM300 to a depth of 5 mm	-/240/240 U/C
	160	6.2 – 9.5	10.0	160 mm Maxi Collar	FM300 to a depth of 5 mm	-/240/240 U/C
HDPE	50	2.9	10.0	50 mm Maxi Collar	FM300 to a depth of 5 mm	-/240/240 U/C
	110	10.0	10.0	110 mm Maxi Collar	FM300 to a depth of 5 mm	-/240/240 U/C
	160	4.9 – 9.5	10.0	160 mm Maxi Collar	FM300 to a depth of 5 mm	-/240/240 U/C

[1] Sealant applied behind the collar between the pipe and the aperture on the exposed side unless otherwise specified

Table 29 Pipes fitted perpendicular to the floor with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[1]	FRL
PP / PP-R	110	2.7	10.0	110 mm Maxi Collar	FM300 to a depth of 10 mm	-/120/120 U/U
						-/120/- C/U
						-/120/120 C/C
						-/120/120 C/U[2]
	160	4.0		160 mm Maxi Collar		-/120/- C/U
						-/120/120 C/U[2]
						-/120/- U/U
						-/120/120 C/C

[1] Sealant applied behind the collar between the pipe and the aperture on both the exposed and unexposed sides
[2] A 10 mm diameter hole present 75 mm back from the pipe opening on the exposed side

Table 30 Pipes fitted with 90º U-bend with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[1]	FRL
PP / PP-R	110	2.7	10.0	110 mm Maxi Collar	FM300 to a depth of 10 mm	-/120/120 C/U[2]
	160	4.0	10.0	160 mm Maxi Collar		-/120/- C/U[2]

[1] Sealant applied behind the collar between the pipe and the aperture on both the exposed and unexposed sides
[2] Capped by bend on exposed side

Minimum 235 mm thick ceiling or ceiling-floor with 2 × 13 mm plasterboard layers on exposed face

Table 31 Pipes fitted perpendicular to the ceiling with BOSS Maxi Collar installed on the exposed side

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC DWV	32	2.3	5.0	40 mm Maxi Collar	FM300 on unexposed side to the depth of the particleboard flooring and finished flush with the surface	-/90/90 C/U RISF: 48 minutes
uPVC conduit	25	2.0	23.5 13.0	80 mm Maxi Collar	FM300 on unexposed side to the full depth of the particleboard flooring and FireMastic-HPE on the interface between the fire collar and the service on exposed side to the depth of the fire collar and finished flush with the collar	-/90/90 C/U RISF: 53 minutes
				65 mm Maxi Collar		-/90/90 C/U RISF: 24 minutes

Large apertures sealed with Gypsum based mortar identical to BOSS FireMortar-360 in minimum 150 mm thick AAC or normal weight concrete floors

Table 32 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on the exposed side

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
PE	110	4.2	0	Gypsum based mortar identical to BOSS FireMortar-360 in 1400 mm × 700 mm × 100 mm aperture	110 mm Maxi Collar	-/120/120 U/C
	160	9.5	0		160 mm Maxi Collar	-/120/120 U/C
uPVC	160	9.5	0		160 mm Maxi Collar	-/120/120 U/C

7.4.4 Oversized BOSS MaxiCollars™ in floors

The fire resistance performance of oversized BOSS MaxiCollars™ in floors are assessed as given in Table 33 and Table 34.

ComFlor® 60

Table 33 Pipes fitted perpendicular to the floor with BOSS Maxi Collar installed on the exposed side

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	25	2.2	5.0	32 mm Maxi Collar	265 mm × 265 mm BOSS Batt installed on the bottom rib of the floor. The gap between the batt and the top rib of the floor covered with trapezoid shape BOSS Batt. FM300 to a depth of 5 mm between the pipe and the aperture and finished with a 10 mm × 10 mm fillet on the unexposed side and finished at 5 mm depth flush on the exposed side.	-/120/120 C/U
The minimum thickness of the ComFlor® 60 is 70 mm, and the maximum thickness is 130 mm.						

Minimum 150 mm thick AAC or normal weight concrete floor

Table 34 Pipes fitted perpendicular to the floor with BOSS Maxi Collar installed on the exposed side

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[1]	FRL
PP / PP-R	50	1.8 – 6.9	11.0	55 mm Maxi Collar	FM300 to a depth of 10 mm applied behind the collar between the pipe and the aperture on both the exposed and unexposed sides	-/90/90 U/U
		6.9	11.0			-/120/120 U/U
PE	50	3.0	11.0			-/60/60 U/U
		3.0 – 4.6	11.0			-/45/45 U/U
uPVC	50	2.4	11.0			-/90/60 U/U

Large apertures sealed with BOSS Batts in minimum 150 mm thick AAC or normal weight concrete floors

Table 35 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	110	4.2	0	Two layers of 50 mm BOSS Batts fitted back-to-back and bedded within 1000 mm × 350 mm wide aperture using FM300 sealant. The overall size was made of cut batt sections butt jointed together with sealant.	140 mm Maxi Collar	-/120/120 C/U
	160	9.5	0		200 mm Maxi Collar	-/120/120 C/U
PE	160	9.5	0		200 mm Maxi Collar	-/120/120 C/U

8. Fire resistance performance of services protected with BOSS In-Wall collars

8.1 Description of variation

It is proposed to assess BOSS In-Wall collars in wall and floor separating elements. BOSS In-Wall or Drop in collars consists of intumescent strips installed at the mid-height of a metal sleeve that is then inserted into a core hole drilled in rigid floor separating elements and secured to the floor with mechanical fixings on the unexposed side.

8.2 Methodology

The method of assessment used is summarised in Table 36.

Table 36 Method of assessment

Assessment method	
Level of complexity	Complex assessment
Type of assessment	Qualitative

8.3 In walls

In EWFA 43580700.1, a 78 mm thick Speedpanel wall system and a 125 mm thick plasterboard wall system were tested in two sections. Specimen M was a 100 mm diameter uPVC pipe which penetrated the Speedpanel wall section. The pipe was capped on the exposed side and open on the unexposed side (C/U). The core hole size was 130 mm diameter.

As referenced in test report EWFA 43580700.1, a BOSS MaxiCollar-IW 100 mm Prototype B type In-wall collar was tested in specimen M. The overall dimension of the collar was nominal 126.5 mm in outer diameter, 111.1 in inner diameter and 81.8 mm in nominal height. The outer shell of the collar was made from nominal 0.7 mm thick steel. There was a row of slots on top and bottom of the collar.

The collar consisted of three layers of 2 mm thick intumescent layers which had a nominal density of 1275 kg/m^3. Three number of 4.2 mm diameter and 25 mm long button head screws were used to secure the collar to the separating element. The annular gap and the interface between the exposed face of the wall and the collar was sealed with BOSS FireMastic-300.

Specimen M achieved an integrity performance of 121 minutes with no failure for the test duration and an insulation performance of 110 minutes with the temperature of 194ºC measured on the pipe, 25 mm away from the collar.

It is proposed that the above fire resistance performance is applicable to walls with a thickness equal to or greater than 78 mm. Increasing the thickness is expected to reduce the deflections in the wall and therefore is not expected to be detrimental to the tested fire performance of specimen M and the performance of the In-Wall collar.

Based on the above, it is expected that combustible pipes with a nominal outer diameter of 100 mm in walls with a thickness greater than 78 mm protected with BOSS MaxiCollar-IW 100 mm Prototype B will achieve an FRL of -/120/90. The screw fixings, annular gap and sealant application must be maintained as tested. The density of the separating element must be greater than 10.1 kg/m as tested for the Speedpanel wall.

8.4 In floors

In FRT 180137 R2.0, a ComFlor®60 composite floor system with a maximum thickness of 130 mm and minimum thickness of 70 mm was tested. Specimen G was a 100 mm diameter uPVC DWV pipe in a 155 mm diameter aperture. It was protected by a BOSS Drop in collar or In-Wall collar.

The overall dimension of the collar was nominal 120 mm in outer diameter, 111 in inner diameter and 150 mm in nominal height. The outer shell of the collar was made from nominal 1.7 mm thick steel.

The collar consisted of four layers of 2 mm thick intumescent layers which had a nominal density of 1185 kg/m^3.

The BOSS Drop in collar was placed in from the unexposed side and fixed with mechanical fixings (4 No. of 9 mm diameter and 52 mm long). BOSS FireMastic-300 sealant was applied into the annular gap between the separating element, the service and the metal sleeve to a depth of 25 mm. The mastic was finished flush on the unexposed side. Sealant was also installed into the annular gap between the separating element and the metal sleeve to a depth of 5 mm. The mastic was finished following the profile of the composite floor deck.

Specimen G achieved an integrity performance of 121 minutes with no failure for the test duration and an insulation performance of 104 minutes with the temperature of 202ºC measured on the separating element, 25 mm away from the collar.

It is proposed that the performance of In-Wall collars is also assessed in rigid floor separating elements with a thickness greater than 130 mm. In specimen G, the service penetrated the web of the composite floor deck where half of the service penetrated the top rib and half of the service penetrated the bottom rib. Test photographs show that half of the In-Wall collar is visible on the exposed face. Therefore, if the In-Wall collar is installed in a solid separating element with a minimum thickness of 130 mm, it is expected that the collar and the specimen will perform similarly or better than observed in FRT180137 R2.0.

Based on the above, it is expected that combustible pipes with a nominal outer diameter of 100 mm in floors with a thickness greater than 130 mm protected with BOSS MaxiCollar-IW 100 mm Prototype B will achieve an FRL of -/120/120 provided that the separating element has an established FRL equal to or greater than -/120/120. The screw fixings, annular gap and sealant application must be maintained as tested. The density of the separating element must be greater than 2400 kg/m^3 as tested for the composite floor.

8.5 Conclusion

Based on the discussion in sections 8.3 and 8.4, it is expected that BOSS MaxiCollar-IW 100 mm Prototype B will achieve the FRLs given in Table 37 below with the limitations also specified in Table 37.

Table 37 Pipes fitted perpendicular to the wall or floor with BOSS MaxiCollar-IW 100 mm Prototype B installed in aperture

Separating element	Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
Minimum 78 mm thick AAC or rigid wall with minimum linear density 10.1 kg/m	uPVC	100	3.3	15	BOSS MaxiCollar-IW 100 mm Prototype B 120 mm in outer diameter, 111 mm in inner diameter and 150 mm in nominal height. Placed in from the exposed side for walls and placed in from the unexposed side for floors	The annular gap and the interface between the exposed face of the wall and the collar sealed with BOSS FireMastic-300.	-/120/90 C/U
Minimum 130 mm rigid concrete floor with minimum density 2400 kg/m^3				27.5		BOSS FireMastic-300 sealant applied into the annular gap between the separating element, the service and the metal sleeve to a depth of 25 mm. The mastic was finished flush on the unexposed side. Sealant also installed into the annular gap between the separating element and the metal sleeve to a depth of 5 mm. The mastic must be finished flush with the separating element.	-/120/120 C/U
Note: The screw fixings, annular gap and sealant application must be maintained as tested.							

9. Fire resistance performance of services protected with BOSS UniWrap

9.1 Description of variation

It is proposed that combustible pipes penetrating flexible and rigid walls and rigid floors are assessed to be protected with BOSS UniWrap graphite-based intumescent wrap. BOSS UniWrap (nominally 40 mm width × 2 mm thick with a density of 1.3 kg/m^3) have an intumescent composition and is developed to provide a high-volume expansion and pressure seal at the aperture during a fire.

In this assessment, combustible pipes protected with BOSS UniWrap are assessed. The combustible pipes considered in this assessment include uPVC, HDPE, PP, PP-R, PE, PEX, PEX-AL and CPVC pipes.

The vertical separating elements considered in this assessment are as given below. Unless where specified, the wall cavity of flexible walls must be filled with R2.2 Glasswool Batt insulation:

- Minimum 92 mm deep steel/timber stud with 1 layer of 13 mm thick fire-rated plasterboard clad on both the exposed and unexposed sides.
- Minimum 50 mm deep steel/timber stud with 2 layers of 13 mm thick fire-rated plasterboard clad on both the exposed and unexposed sides
- Minimum 64 mm deep steel/timber stud with 2 layers of 13 mm thick fire-rated plasterboard clad on both the exposed and unexposed sides
- Minimum 92 mm deep steel/timber stud with 2 layers of 13 mm thick fire-rated plasterboard clad on both the exposed and unexposed sides
- Shaftwalls with 25 mm thick shaftliner on exposed side and 2 layers of 13 mm thick fire-rated plasterboard clad on the unexposed side. For large apertures, the apertures must be lined with the same number of plasterboard layers.
- FRLs assessed for flexible walls and for AAC blockwork walls, AAC walls, Hebel walls and Speedpanel walls can be applied to the same services penetrating through rigid walls, having the same or greater thickness, as applicable, (including Concrete, Solid Masonry, Speedpanel, Hebel and Korok) with an established FRL as required as tested or assessed by an ATL.
- Minimum 60 mm thick Pronto panel can be installed with additional build-up to increase thickness locally around the aperture to the required thickness.

The horizontal separating elements considered in this assessment are:

- Minimum 150 mm thick AAC or concrete floor (minimum nominal density 2400 kg/m^3)

9.2 Methodology

The method of assessment used is summarised in Table 7.

Table 38 Method of assessment

Assessment method	
Level of complexity	Complex assessment
Type of assessment	Qualitative

9.3 Fire resistance performance of BOSS UniWrap in walls

9.3.1 The separating element

Test reports EWFA 49527300.3, WF393094, WF371150, WF 415515, 2019-Efectis-R001874, FRT180472 R2.0, FSP 1846 were referenced to determine the fire resistance performance of

combustible pipe penetrations protected with BOSS UniWrap installed on both the exposed and unexposed faces of the vertical separating elements.

Flexible walls must have a minimum thickness of 100 mm and comprise steel studs or timber studs lined on both faces with minimum 1 layer of 13 mm thick plasterboards. Unless where specified, the wall cavity of flexible walls must be filled with R2.2 Glasswool Batt insulation.

For services tested in walls with two layers of 13 mm thick plasterboards on both faces, single layer walls are permitted provided that the area around the penetration is built up with an additional layer of fire rated plasterboard (100 mm × 100 mm from the edge of the aperture).

For timber framed walls no part of the penetration seal may be closer than 100 mm to a stud, the cavity must be closed between the penetration seal and the stud, and minimum 100 mm of insulation confirmed to be deemed non-combustible in accordance with AS 1530.1:1994 must be provided within the cavity between the penetration seal and the stud.

Rigid walls must be minimum 100 mm thick and must be AAC, concrete or solid masonry. Thinner rigid walls (such as Minimum 60 mm thick Pronto panel) must be built-up on either one or both sides to achieve the minimum thickness required as assessed for the required FRL. The build-up could be fire-rated plasterboard, Calcium silicate board, MgO board or BOSS batts and must extend at least 100 mm on all directions from the aperture. Where collars are fixed to the build-up board, the fixings must extend beyond the thickness of the build-up so that the threading screws into the rigid wall.

FRLs assessed for flexible walls and for AAC blockwork walls, Hebel walls and Speedpanel walls can be applied to the same services penetrating through rigid walls, having the same or greater thickness, as applicable, (including Concrete, Solid Masonry, Speedpanel, Hebel and Korok) with an established FRL as required as tested or assessed by an ATL.

For all cases, the wall must have been tested or assessed by an accredited testing laboratory (ATL) to achieve the required FRL in accordance with AS 1530.4:2014.

9.3.2 Large apertures protected with BOSS sealing systems

Where specified, services penetrating single or double layers of 50 mm thick BOSS batts (density 145 kg/m^3) are also protected with BOSS UniWrap installed in the aperture flush on both faces. The BOSS batts may be pattress fitted overlapping (minimum 100 mm overlap) the separating element or friction-fitted in the aperture bedded with BOSS FireMastic-300 sealant. The maximum aperture size in walls is 600 mm × 600 mm.

If pattress fitted, the batts must be fixed using 6 × 80 mm steel or wood screws and washers at 300 mm centers or at batt corners. If friction-fitted and bedded within the aperture, the overall size of the batts may be made of cut batt sections butt jointed together and fitted after the pipes are installed. Sealant must be used to bed the cut batts together and to seal the edges of the batt with the separating element and with the pipe. The BOSS batts must be coated on both faces with ablative coating. Additionally, each vertical and horizontal cut of the batt must be sealed with BOSS FireMastic-300 sealant at the interface between the batts and the service and between the batt and the separating element.

FRLs assessed in flexible walls and rigid walls are applicable to the same services penetrating a large aperture fitted with two layers of 50 mm thick BOSS Batts friction-fitted or pattress fitted on either side provided that the Batts have been tested or assessed in this configuration to have the minimum established FRL by an ATL.

9.3.3 BOSS UniWrap in walls

BOSS UniWrap must be wrapped around the pipe within the annular gap with the specified number of layers, flush with the surface of the separating element on both the exposed and unexposed sides in walls. The given number of layers in Table 39 to Table 43 refer to the number of layers required on each side of the separating element. UniWrap may also be housed in a metal sleeve.

The resulting gap must then be sealed with BOSS FireMastic-300 sealant with a sealant fillet on the surface of the separating element as specified in Table 39 to Table 43.

The minimum spacing between multiple services protected with UniWrap or BOSS PWP passing through BOSS Batts in walls can be less than 100 mm provided that the pipe diameter is less than 125 mm for an FRL of -/90/90. Otherwise, the spacing must be maintained at 200 mm.

Considering the above, the fire resistance performance of various combustible pipe penetrations in walls can be assessed as given in Table 39 to Table 43.

Minimum 100 mm thick flexible[1] or rigid walls

Table 39 Ducts fitted perpendicular to the wall with BOSS UniWrap installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum aperture (mm)	Primary protection	Secondary protection	FRL
uPVC duct	204 × 60	2.5	218 × 74	UniWrap × 3 layers	FM300 sealant to seal the end of the wrap	-/120/120 U/U
	110 × 54	2.0	126 × 62	UniWrap × 3 layers	FM300 used at perimeter edge on the unexposed face only	-/15/15 U/U
	220 × 90	2.0	236 × 98			-/60/60 U/U
[1] 50 mm steel stud lined with two layers of 13 mm thick fire rated plasterboard on each side						

Table 40 Pipes fitted perpendicular to the wall with BOSS UniWrap installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	200	7.7	35.0	UniWrap × 5 layers and 25 mm wide × 40 mm deep fillet of FM300 at face of separating element on both sides	-	-/120/120 U/C
[1] 50 mm steel stud lined with two layers of 13 mm thick fire rated plasterboard on each side						

Minimum 116 mm thick flexible[1] or rigid walls

Table 41 Pipes fitted perpendicular to the wall with BOSS UniWrap installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	40	2.7	10.0	UniWrap in metal sleeve × 1 layer	FM300 in annular gap between the wall, service and metal sleeve. The mastic finished flush on both sides.	-/120/120 C/U
	50	3.5	10.0	UniWrap in metal sleeve × 2 layers		-/120/120 C/U
	80	3.4	11.0	UniWrap in metal sleeve × 2 layers		-/120/- C/U
CPVC	33.4	2.6	5.0	UniWrap in metal sleeve × 2 layers	FM300 applied in a 5 mm × 5 mm fillet on both sides.	-/120/60 C/U
	48.3	3.8	4.85	UniWrap in metal sleeve × 2 layers		-/120/90 C/U
	60.3	4.7	4.85	UniWrap in metal sleeve × 2 layers		-/120/90 C/U
[1] 64 mm steel stud lined with two layers of 13 mm thick fire rated plasterboard on each side						

Minimum 118 mm thick flexible or rigid walls

Table 42 Pipes fitted perpendicular to the wall with BOSS UniWrap installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
PEX	25	6.2	5.0	UniWrap in metal sleeve × 2 layers	-	-/60/60 C/U
[1] 92 mm steel stud lined with one layer of 13 mm thick fire rated plasterboard on each side						

Large apertures sealed with BOSS Batts in minimum 100 mm thick walls

Table 43 Pipe fitted perpendicular to the wall with BOSS UniWrap installed on both sides

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	40	1.9	31.0	600 mm × 600 mm wide aperture with 100 mm insulation cut back from the opening. The aperture sealed with a double layer of 50 mm thick with each BOSS Batt pattresses fitted onto each face of the separating element. UniWrap × 3 layers and 5 mm deep fillet of FM300 at face of separating element on both sides	25 mm thick phenolic foam insulation c/s	-/120/90 U/C
		3.0	21.0		15 mm thick phenolic foam insulation c/s	-/120/90 U/C
		1.9	38.0		32 mm thick phenolic foam insulation c/s	-/120/120 U/C
		3.0	15.0		9 mm thick phenolic foam insulation c/s	-/120/120 U/C
	110	4.2	35.0	600 mm × 600 mm wide aperture with 100 mm insulation cut back from the opening. The aperture sealed with a double layer of 50 mm thick with each BOSS Batt pattresses fitted onto each face of the separating element. UniWrap × 5 layers and 5 mm deep fillet of FM300 at face of separating element on both sides	25 mm thick phenolic foam insulation c/s	-/120/120 U/C
		6.6	30.0		20 mm thick phenolic foam insulation c/s	-/120/90 U/C
		4.2	42.0		32 mm thick phenolic foam insulation c/s	-/120/120 U/C
		6.6	23.0		13 mm thick phenolic foam insulation c/s	-/120/120 U/C
	110	7.6	10.0	Two friction-fitted 50 mm thick BOSS Batts with PS coating bedded in 600 mm × 600 mm aperture with sealant and installed in accordance with Annex F of 1366-3. All edges sealed with FM300	UniWrap × 4 layers sealed in with FireMastic-HPE	-/120/120 U/U
		4.9	10.0	Two pattress-fitted 50 mm thick BOSS Batts with PS coating in 470 mm × 470 mm aperture. Pattress formation is 30 mm and 100 mm of insulation is cut back. All edges sealed with FM300		-/60/60 C/U
		5.2	6.0	Double friction-fitted 50 mm thick BOSS Batts with PS coating bedded in 600 mm × 600 mm aperture with sealant. All edges sealed with FM300		-/90/90 C/U
PP / PP-R	120	3.6	6.0			-/90/90 C/U
PE	126	3.4	6.0			-/90/90 C/U

9.4 Fire resistance performance of BOSS UniWrap in floors

9.4.1 The separating element

Test reports WF361932, WF355667, WF367689 were referenced to determine the fire resistance performance of combustible pipe penetrations protected with BOSS UniWrap installed in horizontal separating elements.

Results obtained in 150 mm AAC floors can be extended to floors systems of greater thickness and greater density in accordance with section 10 of AS 1530.4:2014 describing permissible variations. Therefore, minimum 150 mm thick AAC or normal weight concrete floor slabs with a minimum density of 650 kg/m^3 are expected to achieve the same fire resistance performance as observed for the tested 150 mm thick AAC floors.

9.4.2 Large apertures protected with BOSS sealing systems

Services penetrating Gypsum based mortar, identical to BOSS FireMortar-360, in 1400 mm × 700 mm × 100 mm apertures in minimum 150 mm thick AAC or normal weight concrete floors protected with UniWrap installed at mid-depth of the floor are expected to achieve the FRLs given in Table 32.

9.4.3 BOSS UniWrap in floors

BOSS UniWrap must be wrapped around the pipe within the annular gap with the specified number of layers, at mid-depth of the floor separating element. UniWrap may also be housed in a metal sleeve. The resulting gap must then be sealed with BOSS FireMastic-300 sealant with a sealant fillet on the surface of the separating element as specified in Table 44 to Table 45.

The minimum spacing between multiple services protected with BOSS UniWrap passing through rigid floors can be minimum 0 mm up to a pipe diameter of 200 mm. The UniWrap must be placed at mid-depth of the separating element. Other services will be attributed the maximum FRL that they have achieved in other tests.

When UniWrap pipe wraps are installed at the mid-depth of the rigid floors, the thickness of the floor may be increased but the distances from the pipe wrap to the surfaces on both the exposed and unexposed sides must be maintained.

Considering the above, the fire resistance performance of various combustible pipe penetrations in floors can be assessed as given in Table 44 to Table 45.

Minimum 150 mm thick AAC floor

Table 44 Pipes fitted perpendicular to the wall with BOSS UniWrap installed mid-depth of floor

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[1]	FRL
PP / PP-R	50	2.0 – 6.9	6.0	UniWrap × 2 layers	FM300 to a depth of 10 mm	-/240/240 U/C
	200	4.9	12.0	UniWrap × 10 layers		-/240/240 U/C
		4.9 – 18.2	12.0	UniWrap × 10 layers		-/120/120 U/C
HDPE	50	3.0 – 4.6	6.0	UniWrap × 2 layers		-/240/240 U/C
	200	4.9 – 18.2	12.0	UniWrap × 10 layers		-/240/240 U/C
uPVC	50	2.4 – 3.7	6.0	UniWrap × 2 layers		-/240/240 U/C
	200	7.7 – 9.6	12.0	UniWrap × 10 layers		-/60/60 U/C
		9.6	12.0	UniWrap × 10 layers		-/240/120 U/C

[1] Sealant applied between the pipe and the aperture on the unexposed side only

Large apertures sealed with Gypsum based mortar identical to BOSS FireMortar-360 in minimum 150 mm thick AAC floors or normal weight concrete floors

Table 45 Pipes fitted perpendicular to the wall with BOSS UniWrap installed mid-depth of the floor

Pipe	Nominal pipe diameter (mm)	Pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	200	7.7 – 9.6	0	Gypsum based mortar identical to BOSS FireMortar-360 in 1400 mm × 700 mm × 100 mm aperture	UniWrap × 10 layers	-/90/90 U/C

Note: Spacing between pipes was tested at 0 mm.

9.5 Fire resistance performance of PWP wraps in walls and floors

It is proposed that FRLs achieved by penetrations protected with UniWrap as given in Table 39 to Table 45 can be extended for penetrations protected with PWP pipe wrap, provided that the PWP wrap is installed on both sides of the separating element in both walls and floors flush with the surface of the separating element. The number of intumescent layers must be the same as that assessed for UniWrap.

It is understood that PWP wraps are similar to UniWrap and consist of intumescent strips that provide a high-volume expansion and pressure seal at the aperture during a fire protecting combustible pipes. The main difference between PWP wrap and UniWrap is that PWP wraps also consist of a PE sheathing.

In order to make a comparison of the fire performance between PWP wraps and UniWraps, reference is made to test reports WF398296 and WF393094. In WF398296, the tested specimen consisted of an aerated concrete floor construction with overall dimensions 1720 mm wide × 2215 mm long × 150 mm thick. Specimens D1 to D6 consisted of 125 mm diameter PE, PVC and PP pipes with varying pipe wall thicknesses. A wrap identical to PWP wrap was installed in the aperture on both faces of the floor. The wrap comprised of 4 layers of 2 mm thick intumescent layers and a sealant identical to FM300 was used to seal the end of the pipe wrap. All specimens achieved integrity and insulation performances of 198 minutes which was the test duration.

This performance is compared with test WF361932 where pipes protected with UniWrap was tested in a 150 mm thick aerated concrete floor construction. The UniWrap was installed at mid-depth of the separating element. PP and uPVC pipes with nominal outer diameter of 200 mm were tested with 10 layers of UniWrap. It is considered that a 200 mm pipe is more onerous than a pipe with the same material with a diameter of 125 mm. These pipes achieved -/120/120 for PP pipes with a wall thickness of 4.9 – 18.2 mm and -/240/120 for uPVC pipes with a pipe wall thickness of 9.6 mm.

Therefore, if the UniWrap tested is substituted with PWP wrap with the same number of 10 layers installed on each face of the floor (i.e. 10 layers on each side), the achieved FRLs in WF361932 (assessed in Table 44) are not expected to be affected.

Similarly, in WF355667, the tested specimen consisted of a 3000 mm × 3035 mm high × 100 mm thick wall with 50 mm deep steel studs and two layers of 12.5 mm thick fire-rated plasterboard on each face. The framework was infilled with 50 mm thick mineral wool insulation having a nominal density of 100 kg/m^3. Several combustible pipes were tested penetrating the wall and protected with PipeBloc PWP wrap which is stated to be identical to BOSS PWP wrap by the report sponsor.

Specimen 3 was a 50 mm diameter PVCu pipe with a wall thickness of 3.7 mm in an aperture which was 58 mm in diameter. The penetration was protected with a single layer of 2 mm thick PipeBlock PWP friction fitted in the aperture on each face of the wall. Comparison is made with a 50 mm diameter uPVC pipe (pipe wall thickness is 3.5 mm) in an aperture of 70 mm which was protected with 2 layers of UniWrap in a metal sleeve tested in FRT180472. Both these services achieved -/120/120. Since the UniWrap housed in a metal sleeve can be expected to have an improved performance than when the intumescent strips are installed without a metal sleeve, this comparison demonstrates that the PWP wrap is expected to exhibit a similar fire resistance performance as UniWrap.

Similarly, other penetrations were also tested as specimens 4 and 5 with 50 mm diameter PE and PP pipes also achieving -/120/120. This is compared to test WF415515 where 200 mm diameter PP and PE pipes were tested with 5 layers of UniWrap and 25 mm wide × 40 mm fillet of FM300 sealant was applied on each face of the wall. Both these services achieved an FRL of -/15/15. This comparison demonstrates that the PWP wrap demonstrated an improved fire resistance performance compared to UniWrap for these pipes.

Based on the above discussion, it is expected that pipes protected with PWP wrap can be expected to perform equivalently to pipes protected with UniWrap and therefore, the FRLs obtained for combustible pipes protected with UniWrap can be extended to the same services protected with PWP wrap in walls and floors – provided that the PWP wrap is installed on both sides of the separating element in both walls and floors flush with the surface of the separating element. The number of intumescent layers must be the same as that assessed for UniWrap – in accordance with AS 1530.4:2014.

10. Validity

Warringtonfire Australia does not endorse the tested or assessed product in any way. The conclusions of this assessment may be used to directly assess fire resistance, but it should be recognised that a single test method will not provide a full assessment of fire resistance under all conditions.

Due to the nature of fire 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 is based on test data, information and experience available at the time of preparation. If contradictory evidence becomes available to the assessing authority, the assessment will be unconditionally withdrawn and the report sponsor will be notified in writing. Similarly, the assessment should be re-evaluated, if the assessed construction is subsequently tested since actual test data is deemed to take precedence.

The published procedures for the conduct of tests and the assessment of test results are subject to constant review and improvement. It is therefore recommended that this report be reviewed on, or before, the stated expiry date.

This assessment represents our opinion about the performance of the proposed systems expected to be demonstrated on a test in accordance with AS 1530.4:2014, based on the evidence referred to in this report.

This assessment is provided to Boss Products (Australia) Pty Ltd for their own specific purposes. This report may be used as evidence of suitability in accordance with the requirements of the relevant National Construction Code. Building certifiers and other third parties must determine the suitability of the systems described in this report for a specific installation.

Appendix A Drawings and additional information

Table 46 Details of drawings

Figure no.	Provided by	Date
Figure 1 and Figure 21	Boss Products Australia Pty Ltd	16 May 2022

Appendix B Summary of supporting test data

B.1 Test report – EWFA 49527300.2

Table 47 Information about test report

Item	Information about test report
Report sponsor	Boss Fire (Australia) Pty Ltd, Unit 8/15-23 Kumulla Road, Caringbah, NSW 2229
Test laboratory	Warringtonfire Australia (formerly T/A Exova Warringtonfire), 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was done on 12 July 2018.
Test standards	The test was done in accordance with AS 1530.4:2014.
Variation to test standards	None
General description of tested specimen	The test specimen consisted of a 92 mm deep steel framed wall cladded with 13 mm USG Boral Firestop plasterboard on both exposed and unexposed sides. The wall cavity was filled with Fletcher Insulation Pink Partition 14 R1.3 insulation. There was a 20 mm gap between the test frame and the top edge of the wall, 15 mm gap between the test frame and the vertical edge of the wall and 10 mm gap between the test frame and the bottom edge of the wall. The gaps were filled with FM300 sealant. The wall system was penetrated by 11 pipe services and 2 cable services. The services relevant to this assessment are listed in Table 48.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2014.

The test specimen achieved the following results – see Table 48.

Table 48 Results summary for this test report

Specimen	Aperture (mm)	Primary protection	Secondary protection	FRL
1 – Ø25 mm PEX/AL/PEX pipe with a wall thickness of 5.3 mm	30	BOSS 32 mm MaxiCollar	FireMastic-HPE in the gap between the collar and pipe on both sides	-/60/30
2 – Ø25 mm PEX pipe with a wall thickness of 6.2 mm	35	BOSS UniWrap® in metal sleeve	None	-/60/60
3 – Ø25 mm PEX pipe with a wall thickness of 6.2 mm	30	BOSS 32 mm MaxiCollar	FireMastic-HPE in the gap between the collar and pipe on both sides	-/60/30
4 – Ø20 mm PEX pipe with a wall thickness of 6.3 mm	40	BOSS 40 mm MaxiCollar		-/60/30
5 – Ø20 mm PP-R pipe with a wall thickness of 4.6 mm	32	BOSS 32 mm MaxiCollar		-/60/60
6 – Ø40 mm uPVC pipe with a wall thickness of 5.0 mm	50	BOSS 40 mm MaxiCollar	None	-/60/60
7 – Ø50 mm uPVC pipe with a wall thickness of 4.5 mm	65	BOSS 50 mm MaxiCollar	FM300 in the gap between the collar and pipe on both sides	-/60/60
8 – Ø50 mm cPVC pipe with a wall thickness of 10.1 mm	60	BOSS 50 mm MaxiCollar	None	-/60/30
12 – Ø80 mm uPVC pipe with a wall thickness of 6.4 mm	90	BOSS 80 mm MaxiCollar	None	-/60/60

Specimen	Aperture (mm)	Primary protection	Secondary protection	FRL
13 – Ø32 mm PP-R pipe with a wall thickness of 5.8 mm	38	BOSS 32 mm MaxiCollar	FireMastic-HPE in the gap between the collar and pipe on both sides	-/60/60
Note: • The MaxiCollars were installed on both faces of the wall • The pipe end configurations were C/U				

B.2 Test report – FRT190033 R1.0

Table 49 Information about test report

Item	Information about test report
Report sponsor	Boss Products (Australia) Pty Ltd, Unit 8/15-23 Kumulla Road, Caringbah, NSW 2229
Test laboratory	Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was done on 6 August 2018.
Test standards	The test was done in accordance with AS 1530.4:2014.
Variation to test standards	None
General description of tested specimen	The test specimen consisted of a 92 mm deep steel framed wall clad with two layers of 13 mm USG Boral Firestop plasterboard on both exposed and unexposed sides. The wall cavity was filled with Fletcher Insulation Pink Partition 14 R2.2 insulation. There was a 20 mm gap between the test frame and the top edge of the wall, 15 mm gap between the test frame and the vertical edge of the wall and 10 mm gap between the test frame and the bottom edge of the wall. The gaps were filled with FM300 sealant. The wall system was penetrated by 12 pipe services and 1 cable service. The services relevant to this assessment are listed in Table 50.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2014.

The test specimen achieved the following results – see Table 50.

Table 50 Results summary for this test report

Specimen	Aperture (mm)	Primary protection	Secondary protection	FRL
C – Ø25 mm PEX pipe with a wall thickness of 3.1 mm	32	BOSS 32 mm MaxiCollar	FireMastic-HPE in the gap between the collar and pipe on both sides	-/120/60
K – Ø100 mm uPVC pipe (Sandwich type) with a wall thickness of 3.2 mm	110	BOSS 100 mm MaxiCollar	None	-/120/120
Note: • The MaxiCollars were installed on both faces of the wall • The pipe end configurations were C/U				

B.3 Test report – WF393094

Table 51 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Warringtonfire UK, Holmesfield Road, Warrington WA1 2DS, United Kingdom.
Test date	The fire resistance test was done on 21 December 2017.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The test specimen consisted of a drywall construction 3000 mm wide × 3035 mm high × 100 mm thick. The framing consisted of 50 mm wide galvanised steel studs, at maximum 600 mm centres friction fitted into galvanised steel C-section head and base track. Each side of the stud frame was faced with two layers of 12.5 mm thick Gypsum type F plasterboard. The dry wall framework was infilled with a single layer of nominally 50 mm thick mineral wool insulation. The wall incorporated twelve circular apertures, three oval apertures, eighteen square apertures and seven rectangle apertures. Each aperture was penetrated by a range of services and sealed with various fire stopping products. The dry wall construction incorporated two vertical free edges.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 52.

Table 52 Results summary for this test report

Specimen	Aperture (mm)	Primary protection	Secondary protection	FRL
S – 204 mm × 60 mm deep PVC duct with a wall thickness of 2.5 mm	218 mm wide × 74 mm deep	3 layers of pipe wrap identical to BOSS UniWrap	1 mm thick fire-resistant sealant identical to FM300 on both faces	-/120/120
T – Ø160 mm PE pipe with a wall thickness of 4.0 mm	Ø180 mm	160 mm diameter Pipe collar identical to BOSS MaxiCollar on both faces	Fire-resistant sealant identical to FM300 cartridge gunner into the 10 mm annular gap around the pipe for a depth of 10 mm behind the collar at each face	-/120/120
U-1 – angled Ø110 mm PE pipe with a wall thickness of 2.7 mm	156 mm × 110 mm oval aperture	Oversized 160 mm diameter Pipe collar identical to BOSS MaxiCollar on both faces	Fire-resistant sealant identical to FM300 cartridge gunner into the 10 mm annular gap around the pipe for a depth of 10 mm behind the collar at each face	-/90/90
U-2 – angled Ø50 mm PP pipe with a wall thickness of 2.9 mm	50 mm × 96 mm oval aperture	Oversized 110 mm diameter Pipe collar identical to BOSS MaxiCollar on both faces	Fire-resistant sealant identical to FM300 cartridge gunner into the 10 mm annular gap around the pipe for a depth of 10 mm behind the collar at each face	-/90/90
U-3 – angled Ø110 mm PVC pipe with a wall thickness of 6.6 mm	156 mm × 110 mm oval aperture	Oversized 160 mm diameter Pipe collar identical to BOSS MaxiCollar on both faces	Fire-resistant sealant identical to FM300 cartridge gunner into the 10 mm annular gap around the pipe for a depth of 10 mm behind the collar at each face	-/120/90
V – Ø110 mm PE pipe with a wall thickness of 10.0 mm	Ø130 mm	110 mm diameter Pipe collar identical to BOSS MaxiCollar on both faces	Fire-resistant sealant identical to FM300 cartridge gunner into the 10 mm annular gap around the pipe for a depth of 10 mm behind the collar at each face	-/60/60

Specimen	Aperture (mm)	Primary protection	Secondary protection	FRL
Y – Ø120 mm PP pipe with a wall thickness of 17.1 mm	Ø145 mm	125 mm diameter Pipe collar identical to BOSS MaxiCollar on both faces	Fire-resistant sealant identical to FM300 cartridge gunner into the 10 mm annular gap around the pipe for a depth of 10 mm behind the collar at each face	-/60/60
Z – Ø160 mm PP pipe with a wall thickness of 9.1 mm	Ø145 mm	160 mm diameter Pipe collar identical to BOSS MaxiCollar on both faces	Fire-resistant sealant identical to FM300 cartridge gunner into the 10 mm annular gap around the pipe for a depth of 10 mm behind the collar at each face	-/15/15

B.4 Test report – FRT180137 R2.0

Table 53 Information about test report

Item	Information about test report
Report sponsor	BOSS Fire & Safety P/L, 15 – 23 Kumulla Road, Caringbah NSW 2229, Australia.
Test laboratory	Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was done on 7 March 2019.
Test standards	The test was done in accordance with AS 1530.4:2014.
Variation to test standards	None
General description of tested specimen	The tested specimen consists of a composite floor system 1830 mm wide × 1590 mm long × 130 mm (maximum) or 70 mm (minimum) thick (ComFlor® 60). The composite floor consisted of three composite floor decking's jointed together at the bottom and concrete layer on top. The concrete was reinforced by steel reinforcement grid.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2014.

The test specimen achieved the following results – see Table 54.

Table 54 Results summary for this test report

Specimen	Service	Aperture (mm)	Primary protection	Secondary protection	FRL
D	100 mm uPVC DWV pipe	Ø127 mm	BOSS Batt	100 mm BOSS MaxiCollar™ BOSS FireMastic - 300	-/120/120
G	100 mm uPVC DWV pipe	Ø155 mm	120 mm BOSS Drop-In collar	BOSS FireMastic – 300	-/120/90
H	75 mm HDPE pipe	Ø92 mm	BOSS Batt	75 mm BOSS MaxiCollar™ BOSS FireMastic – 300	-/120/120
I	25 mm uPVC conduit pipe	Ø35 mm	BOSS Batt	32 mm BOSS MaxiCollar™ BOSS FireMastic – 300	-/120/120

B.5 Test report – EWFA 34923800.2

Table 55 Information about test report

Item	Information about test report
Report sponsor	BOSS Fire and Safety, Unit 8 / 15-23 Kumulla Road, Caringbah NSW 2229, Australia.
Test laboratory	Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was done on 4 June 2015.
Test standards	The test was done in accordance with AS 1530.4:2005.
Variation to test standards	The pressure for the 5-10 minute period was above the limits prescribed in AS 1530.4:2005 by 11 Pa. this exceeded the pressure requirement of the standard and was therefore more severe than required by the standard. Based on the above the results of this test remain valid. The furnace pressure was below the limits stated in AS 1530.4:2005, clause 2.10.3.1(c) by 9 Pa between 230-240 minutes due to deterioration of the specimen. See table A5.2 for details. Due to the state of the lowest penetration at the time, the reduction in pressure is unlikely to have invalidated the results. During these intervals the furnace temperature deviation was within the limits and the specimen temperature curves did not exhibit unexpected variations. Hence this pressure behaviour is not likely to affect the performance of the pipe system.
General description of tested specimen	The test specimen consisted of 78 mm thick Speedpanel panels vertically orientated to form a vertical wall system. The wall system was penetrated by 5-offdifferent service penetrations which were protected by various BOSS collars and mastic. The gap between the perimeter track and the Speedpanel on the bottom edge was sealed with BOSS FireMastic HPE mastic on the unexposed side and BOSS FireMastic-300 mastic on the exposed side. The gap between the perimeter track and the Speedpanel on the top edge was sealed with BOSS FireMastic 300 mastic. BOSS FireMastic-300 was used to protect the interface between the panel and the perimeter blockwork.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2005.

The test specimen achieved the following results – see Table 56.

Table 56 Results summary for this test report

Specimen	Service	Pipe diameter (mm)	Aperture size (mm)	Protection (unexposed side)	Protection (exposed side)	FRL
A	100 mm uPVC	110	Ø122	BOSS MaxiCollar	121.7 mm BOSS MaxiCollar	-/240/60
E	160 mm PVC-C	160	Ø172	BOSS MaxiCollar	263 mm BOSS MaxiCollar	-/240/120

B.6 Test report – EWFA 33090200.1

Table 57 Information about test report

Item	Information about test report
Report sponsor	BOSS Fire & Safety Pty Ltd, Unit 8 / 15-23 Kumulla Road, Caringbah NSW 2229, Australia.
Test laboratory	Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was done on 20 March 2022.
Test standards	The test was done in accordance with AS 1530.4:2005.
Variation to test standards	None
General description of tested specimen	The test specimen consisted of 78 mm thick Speedpanel panels vertically oriented to form a vertical wall system. The wall system was penetrated by 11-off different service penetrations which were protected by various collars, BOSS batt and Selleys Fireblock mastic. Selleys Fireblock mastic was also used to protect the interface between the panels and the concrete lintel in various configurations.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2005.

The test specimen achieved the following results – see Table 58.

Table 58 Results summary for this test report

Specimen	Service	Aperture	Primary protection	FRL
I	Ø110 mm uPVC pipe	Ø115 mm	BOSS MaxiCollar	-/120/90

B.7 Test report – BMT/FEI/F15008

Table 59 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	BMTRADA
Test date	The fire resistance test was done on 11 February 2015.
Test standards	The test was done in accordance with BSEN 1366-3:2009 and BSEN 1363-1:2012.
Variation to test standards	None
General description of tested specimen	The test specimen consisted of a 150 mm thick × 1800 mm wide × 1800 mm deep lightweight aerated concrete blockwork floor slab, built above a 1500 mm × 1500 mm furnace aperture.
Instrumentation	The test report states that the instrumentation was in accordance with BSEN 1366-3:2009 and BSEN 1363-1:2012.

The test specimen achieved the following results – see Table 60.

Table 60 Results summary for this test report

Specimen	Service	Primary protection	Integrity	Insulation
A	Ø110 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 132 minutes	No failure at 132 minutes
B/C	Ø110 mm PP pipe with connecting pipe bend section	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 132 minutes	No failure at 132 minutes
D	Ø110 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 132 minutes	Failure at 7 minutes
E	Ø110 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 132 minutes	No failure at 132 minutes
F/J	Ø160 mm PP pipe with connecting pipe bend section	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 132 minutes	F - No failure at 132 minutes J - Failure at 9 minutes
G	Ø160 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 132 minutes	Failure at 11 minutes
H	Ø110 mm PP pipe with connecting pipe bend section	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 132 minutes	No failure at 132 minutes
I	Ø160 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 132 minutes	Failure at 132 minutes
K	Ø160 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 132 minutes	Failure at 9 minutes
L	Ø160 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 132 minutes	Failure at 132 minutes

B.8 Test report – WF350704

Table 61 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Warringtonfire UK, Holmesfield Road, Warrington WA1 2DS, United Kingdom.
Test date	The fire resistance test was done on 31 March 2015.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The test specimen consisted of an aerated concreted floor 2230 mm long × 1740 mm wide × 150 mm thick provided with nine circular apertures penetrated by a range of plastic pipes plugged on the unexposed side. Each specimen was protected with a single pipe collar identical to BOSS MaxiCollars fitted to the underside of the concrete floor assembly. Each specimen was positioned within an aperture which was cut to give a nominal 10 mm anular gap. The annular gap was filled to a depth of 5 mm with sealant identical to FM300 to both side of the floor assembly.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 62.

Table 62 Results summary for this test report

Specimen	Service	Primary protection	Integrity	Insulation
A	Ø110 mm PP pipe	Pipe collar identical to Boss MaxiCollar fixed to the underside	No failure at 264 minutes	No failure at 264 minutes
B	Ø110 mm PVC pipe	Pipe collar identical to Boss MaxiCollar fixed to the underside	No failure at 264 minutes	No failure at 264 minutes
C	Ø110 mm PVC pipe	Pipe collar identical to Boss MaxiCollar fixed to the underside	No failure at 264 minutes	No failure at 264 minutes
D	Ø110 mm PP pipe	Pipe collar identical to Boss MaxiCollar fixed to the underside	No failure at 264 minutes	No failure at 264 minutes
E	Ø110 mm HDPE pipe	Pipe collar identical to Boss MaxiCollar fixed to the underside	No failure at 264 minutes	No failure at 264 minutes
F	Ø110 mm PE pipe	Pipe collar identical to Boss MaxiCollar fixed to the underside	No failure at 264 minutes	No failure at 264 minutes
G	Ø125 mm PVC pipe	Pipe collar identical to Boss MaxiCollar fixed to the underside	No failure at 264 minutes	No failure at 264 minutes
H	Ø125 mm PE pipe	Pipe collar identical to Boss MaxiCollar fixed to the underside	No failure at 264 minutes	No failure at 264 minutes
I	Ø125 mm PP pipe	Pipe collar identical to Boss MaxiCollar fixed to the underside	No failure at 264 minutes	No failure at 264 minutes

B.9 Test report – BMT/FEI/F14135

Table 63 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	BMTRADA
Test date	The fire resistance test was done on 7 January 2014.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The test specimen consists of various penetrations in a 100 mm thick × 1500 wide × 1500 high light weight aerated concrete blockwork wall.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 64.

Table 64 Results summary for this test report

Specimen	Service	Primary protection	Integrity	Insulation
A	Ø110 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 140 minutes	No failure at 140 minutes
B	Ø110 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	Failure at 66 minutes	Failure at 34 minutes
C/G	Ø110 mm PP pipe with connecting pipe bend section	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 140 minutes	No failure at 140 minutes
D	Ø110 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 140 minutes	No failure at 140 minutes
E	Ø110 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 140 minutes	No failure at 140 minutes
F	Ø110 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 140 minutes	No failure at 140 minutes
H	Ø110 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 140 minutes	No failure at 140 minutes

B.10 Test report – WF350177

Table 65 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Warringtonfire UK
Test date	The fire resistance test was done on 11 March 2015.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The test specimen consists of various penetrations in a 2230 mm long × 1740 mm wide × 150 mm thick autoclaved aerated concrete floor system.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 66.

Table 66 Results summary for this test report

Specimen	Service	Primary protection	Integrity	Insulation
A	Ø50 mm PVC pipe	Pipe collar identical to Boss Maxi collar	No failure at 250 minutes	No failure at 250 minutes
E	Ø50 mm PP pipe	Pipe collar identical to Boss Maxi collar	No failure at 250 minutes	No failure at 250 minutes
H	Ø50 mm HDPE pipe	Pipe collar identical to Boss Maxi collar	No failure at 250 minutes	No failure at 250 minutes
B	Ø160 mm PVC pipe	Pipe collar identical to Boss Maxi collar	No failure at 250 minutes	No failure at 250 minutes
C	Ø160 mm PVC pipe	Pipe collar identical to Boss Maxi collar	No failure at 250 minutes	No failure at 250 minutes
D	Ø160 mm PP pipe	Pipe collar identical to Boss Maxi collar	No failure at 250 minutes	No failure at 250 minutes
F	Ø160 mm PP pipe	Pipe collar identical to Boss Maxi collar	No failure at 250 minutes	No failure at 250 minutes
G	Ø160 mm HDPE pipe	Pipe collar identical to Boss Maxi collar	No failure at 250 minutes	No failure at 250 minutes
I	Ø160 mm HDPE pipe	Pipe collar identical to Boss Maxi collar	No failure at 250 minutes	No failure at 250 minutes

B.11 Test report – FRT180473 R1.0

Table 67 Information about test report

Item	Information about test report
Report sponsor	BOSS Fire & Safety P/L
Test laboratory	Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was done on 12 March 2019.
Test standards	The test was done in accordance with AS 1530.4:2014.
Variation to test standards	None
General description of tested specimen	The test specimen consists of various penetrations protected with BOSS MaxiCollars in a 75 mm AAC wall.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2014.

The test specimen achieved the following results – see Table 68.

Table 68 Results summary for this test report

Specimen	Service	Local fire-stopping protection	FRL
C	100 mm uPVC (Sandwich core) pipe	BOSS 100 mm MaxiCollar + BOSS FireMastic - 300	-/120/0
E	40 mm uPVC pipe	BOSS FireMastic HPE	-/120/90
F	50 mm uPVC pipe	BOSS 50 mm MaxiCollar + BOSS FireMastic - 300	-/120/120
G	80 mm uPVC pipe	BOSS 80 mm MaxiCollar + BOSS FireMastic - 300	-/120/120

B.12 Test report – BMT/FEI/F15009

Table 69 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	BMTRADA
Test date	The fire resistance test was done on 12 February 2015.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The test specimen consists of various penetrations in a 100 mm thick × 1500 mm wide × 1500 high lightweight aerated concrete blockwork wall.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 70.

Table 70 Results summary for this test report

Specimen	Service	Primary protection	Integrity	Insulation	FRL
A	Ø160 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 150 minutes	No failure at 150 minutes	-/120/120
B/E	Ø160 mm PP pipe with connecting pipe bend sections	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 150 minutes	No failure at 150 minutes	-/120/120
C	Ø160 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 150 minutes	No failure at 150 minutes	-/120/120
D	Ø160 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 150 minutes	No failure at 150 minutes	-/120/120
F	Ø160 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 150 minutes	No failure at 150 minutes	-/120/120
G	Ø250 mm PP pipe	Pipe collar identical to Boss MaxiCollar + sealant identical to FM300	No failure at 150 minutes	No failure at 150 minutes	-/120/120

B.13 Test report – WF387432

Table 71 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Warringtonfire UK, Holmesfield Road, Warrington WA1 2DS, United Kingdom.
Test date	The fire resistance test was done on 23 October 2017.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The test specimen consists of a drywall construction with overall dimensions of 3000 mm wide × 3035 mm high × 100 mm thick. The wall incorporated 25 circular apertures, each penetrated by a range of plastic pipes sealed with various fire-stopping products.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 72.

Table 72 Results summary for this test report

Specimen	Service	Primary protection	Integrity	Insulation
A	Ø50 mm PE pipe - 3 mm thick wall	Pipe collar identical to Boss MaxiCollar fit to both faces of the partition + sealant identical to FM300 around the pipe for a depth of 10 mm behind each pipe collar	No failure at 132 minutes	Failure at 126 minutes
B	Ø50 mm PE pipe – 4.6 mm thick wall		No failure at 132 minutes	No failure at 132 minutes
C	Ø50 mm PVC pipe – 1.8 mm thick wall		No failure at 132 minutes	Failure at 111 minutes
D	Ø50 mm PVC pipe - 3.7 mm thick wall		No failure at 132 minutes	Failure at 115 minutes
E	Ø50 mm PP pipe-2 mm thick wall		No failure at 132 minutes	Failure at 112 minutes
F	Ø50 mm PP pipe-6.9 mm thick wall		No failure at 132 minutes	Failure at 83 minutes
G	Ø110 mm PE pipe-2.7 mm thick wall		No failure at 132 minutes	Failure at 82 minutes
H	Ø110 mm PE pipe-10 mm thick wall		Failure at 83 minutes	Failure at 83 minutes
I	Ø110 mm PVC pipe-4.2 mm thick wall		No failure at 132 minutes	No failure at 132 minutes
J	Ø110 mm PP pipe-2.7 mm thick wall		No failure at 132 minutes	Failure at 108 minutes
K	Ø110 mm PP pipe-10 mm thick wall		Failure at 90 minutes	Failure at 90 minutes
L	Ø110 mm PVC pipe-4.2 mm thick wall		No failure at 132 minutes	No failure at 132 minutes
M	Ø110 mm PVC pipe-6.6 mm thick wall		No failure at 132 minutes	Failure at 120 minutes
N	Ø125 mm PVC pipe-4.8 mm thick wall		Failure at 114 minutes	Failure at 113 minutes
O	Ø125 mm PVC pipe-7.4 mm thick wall		No failure at 132 minutes	Failure at 109 minutes

Specimen	Service	Primary protection	Integrity	Insulation
P	Ø125 mm PP pipe-3.1 mm thick wall		No failure at 132 minutes	Failure at 105 minutes
Q	Ø125 mm PP pipe-17.1 mm thick wall		Failure at 79 minutes	Failure at 79 minutes
R	Ø125 mm PE pipe-3.1 mm thick wall		No failure at 132 minutes	Failure at 122 minutes
S	Ø125 mm PE pipe-11.4 mm thick wall		Failure at 97 minutes	Failure at 91 minutes
T	Ø160 mm PE pipe-6.2 mm thick wall		No failure at 132 minutes	No failure at 132 minutes
U	Ø160 mm PE pipe-9.5 mm thick wall		No failure at 132 minutes	No failure at 132 minutes
V	Ø160 mm PE pipe-4 mm thick wall		Failure at 115 minutes	Failure at 115 minutes
W	Ø160 mm PE pipe-9.1 mm thick wall		Failure at 19 minutes	Failure at 19 minutes
X	Ø160 mm PE pipe-4 mm thick wall		Failure at 17 minutes	Failure at 16 minutes
Y	Ø160 mm PE pipe-9.5 mm thick wall		Failure at 129 minutes	Failure at 129 minutes
Note: All pipes were tested in U/U configuration				

B.14 Test report – WF348262 Issue 3

Table 73 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Warringtonfire UK, Holmesfield Road, Warrington WA1 2DS, United Kingdom.
Test date	The fire resistance test was done on 22 January 2015.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The test specimen consists of a gypsum plasterboard wall assembly with overall dimensions of 3000 mm wide × 3000 mm high × 100 mm thick. The wall incorporated various plastic pipes protected with collars and sealant.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 74.

Table 74 Results summary for this test report

Specimen	Service	Primary protection	Integrity	Insulation
A	Ø50 mm HDPE pipe - 2.9 mm thick wall	Pipe collar identical to Boss MaxiCollar fit to each face of the wall	No failure at 150 minutes	No failure at 150 minutes
B	Ø50 mm PP pipe – 2.9 mm thick wall		No failure at 150 minutes	Failure at 120 minutes
D	Ø50 mm PVC pipe – 1.8 mm thick wall		No failure at 150 minutes	No failure at 150 minutes
C	Ø110 mm PP pipe -10 mm thick wall		No failure at 150 minutes	Failure at 142 minutes
E	Ø110 mm PVC pipe-4.2 mm thick wall		No failure at 150 minutes	No failure at 150 minutes
F	Ø110 mm HDPE pipe-10 mm thick wall		No failure at 150 minutes	No failure at 150 minutes
G	Ø110 mm HDPE pipe-2.7 mm thick wall		No failure at 150 minutes	No failure at 150 minutes
H	Ø110 mm PP pipe-2.7 mm thick wall		No failure at 150 minutes	No failure at 150 minutes
I	Ø110 mm PVC pipe-7.4 mm thick wall		No failure at 150 minutes	Failure at 146 minutes
J	Ø125 mm PVC pipe-6 mm thick wall		No failure at 150 minutes	No failure at 150 minutes
K	Ø125 mm PP pipe-3.1 mm thick wall		No failure at 150 minutes	No failure at 150 minutes
L	Ø160 mm HDPE pipe-9.5 mm thick wall		No failure at 150 minutes	No failure at 150 minutes
M	Ø125 mm PP pipe-3.1 mm thick wall		No failure at 150 minutes	No failure at 150 minutes
N	Ø160 mm PVC pipe-9.5 mm thick wall		No failure at 150 minutes	No failure at 150 minutes
O	Ø160 mm PVC pipe-6.2 mm thick wall		No failure at 150 minutes	No failure at 150 minutes

Specimen	Service	Primary protection	Integrity	Insulation
P	Ø160 mm HDPE pipe-4.9 mm thick wall		No failure at 150 minutes	No failure at 150 minutes
Q	Ø160 mm PP pipe-14.6 mm thick wall		No failure at 150 minutes	No failure at 150 minutes
R	Ø160 mm PP pipe-4.0 mm thick wall		No failure at 150 minutes	No failure at 150 minutes
Note: All pipes were tested in U/C configuration				

B.15 Test report – FRT180472 R2.0

Table 75 Information about test report

Item	Information about test report
Report sponsor	BOSS Fire & Safety P/L
Test laboratory	Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was done on 8 March 2019.
Test standards	The test was done in accordance with AS 1530.4:2014.
Variation to test standards	None
General description of tested specimen	The test specimen consists of 1 116 mm plasterboard wall system of 1200 mm wide × 1200 mm high × 116mm thick with various pipe penetrations and GPOs.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2014.

The test specimen achieved the following results – see Table 76.

Table 76 Results summary for this test report

Specimen	Service	Primary protection	Secondary protection	FRL
C	Ø100 uPVC sandwich core pipe	BOSS UniWrap® in metal sleeve	FireMastic - 300	-/0/0
E	Ø40 uPVC pipe	BOSS UniWrap® in metal sleeve	FireMastic - 300	-/120/120
H	Ø80 uPVC pipe	BOSS UniWrap® in metal sleeve	FireMastic - 300	-/120/0
I	Ø50 uPVC pipe	BOSS UniWrap® in metal sleeve	FireMastic - 300	-/120/120

B.16 Test report – FRT180474 R1.0

Table 77 Information about test report

Item	Information about test report
Report sponsor	BOSS Fire & Safety P/L
Test laboratory	Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was done on 17 January 2020.
Test standards	The test was done in accordance with AS 1530.4:2014.
Variation to test standards	None
General description of tested specimen	The test specimen consists of a ceiling system of 1760 mm wide × 1760 mm high × 235 mm thick with various pipe and cable penetrations.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2014.

The test specimen achieved the following results – see Table 78.

Table 78 Results summary for this test report

Specimen	Service	Local fire-stopping protection	FRL
D	1 × 32 mm steel sprinkler pipe	Thermal defence wrap, BOSS UniWrap and BOSS FireMastic 300	-/90/90
H	1 × 32 mm uPVC DWV pipe	BOSS FireMastic 300 and BOSS MaxiCollar 40 collar	-/90/90

B.17 Test report – WF364404 Issue 2

Table 79 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Exova Warringtonfire, Holmesfield Road, Warrington WA1 2DS, United Kingdom.
Test date	The fire resistance test was done on 9 May 2016.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The test specimen consisted of a drywall construction of overall dimensions 3000 mm wide × 3000 mm high × 100 mm thick, The framing consisted of 50 mm wide galvanised mild steel studs, at maximum 600 mm centres, friction fitted into galvanised steel head and base channels. Each side of the frame was faced with two layers of 12.5 mm thick 'Gypsum Fireline' plasterboard. The framework was infilled with 50 mm thick mineral wool insulation having a nominal density of 96 kg/m^3.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 80.

Table 80 Results summary for this test report

Specimen	Service	Aperture	Primary protection	Secondary protection	FRL
A	Ø50 mm PP pipe with a wall thickness of 2.9 mm	50 mm	Single layer of 50 mm thick batt identical to BOSS batt	Pipe collar identical to BOSS MaxiCollar fixed to each face	-/120/120
B	Ø110 mm uPVC pipe with a wall thickness of 6.6 mm	110 mm			-/120/120
C	Ø110 mm PE pipe with a wall thickness of 2.7 mm	110 mm			-/120/120
F	Ø50 mm PP pipe with a wall thickness of 2.9 mm	50 mm	Double layer of 50 mm thick batt identical to BOSS batt	Pipe collar identical to BOSS MaxiCollar fixed to each face	-/120/120
G	Ø110 mm uPVC pipe with a wall thickness of 6.6 mm	110 mm			-/120/120
H	Ø110 mm PE pipe with a wall thickness of 2.7 mm	110 mm			-/120/120

B.18 Test report – FRT190428 R1.0

Table 81 Information about test report

Item	Information about test report
Report sponsor	BOSS Products (Australia) Pty Ltd
Test laboratory	Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was done on 12 December 2019.
Test standards	The test was done in accordance with AS 1530.4:2014.
Variation to test standards	None
General description of tested specimen	The test specimen consisted of 50 mm bulkheat batt system penetrated by three varying penetration systems and a blank seal incorporating a vertical joint. The services relevant to this assessment are listed in Table 82.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2014.

The test specimen achieved the following results – see Table 82.

Table 82 Results summary for this test report

Specimen	Service	Aperture	Primary protection	Secondary protection	FRL
A	Ardent Super Pair FR 13 mm 3/8” × 3/4"	84 mm	BOSS Bulkhead Batt	Ablative coating, BOSS MaxiCollar 100, BOSS FireMastic-HPE	-/120/90
B	Ø150 mm copper pipe	152 mm		Ablative coating, BOSS FireMastic-300, BOSS P40_MAK Wrap	-/120/45

B.19 Test report – FSP 1846

Table 83 Information about test report

Item	Information about test report
Report sponsor	BOSS Fire & Safety Pty Ltd
Test laboratory	CSIRO
Test date	The fire resistance test was done on 14 August 2017.
Test standards	The test was done in accordance with AS 1530.4:2014.
Variation to test standards	None
General description of tested specimen	The specimens consisted of 9 service penetrating a plasterboard wall and protected by various fire stopping systems. The penetrated wall system contained a 116 mm thick plasterboard lined frame wall system comprising two layers of 13 mm thick Fyrechek plasterboard on each side of 64 mm thick metal studs, with an established FRL of -/120/120, report reference FAR2357.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2014.

The test specimen achieved the following results – see Table 84.

Table 84 Results summary for this test report

Specimen	Service	Aperture	Primary protection	FRL
1	48.3 mm OD Spears FlameGuard CPVC pipe	50 mm	BOSS MaxiCollar	-/120/120
2	42.2 mm OD Spears FlameGuard CPVC pipe	44 mm	BOSS MaxiCollar	-/120/90
3	33.4 mm OD Spears FlameGuard CPVC pipe	35 mm	BOSS MaxiCollar	-/120/120
4	48.3 mm OD Spears FlameGuard CPVC pipe	58 mm	BOSS FireMastic-300 and Boss UniWrap	-/120/90
5	33.4 mm OD Spears FlameGuard CPVC pipe	43 mm	BOSS FireMastic-300 and Boss UniWrap	-/120/60
7	60.3 mm OD Spears FlameGuard CPVC pipe	70 mm	BOSS FireMastic-300 and Boss UniWrap	-/120/90
9	60.3 mm OD Spears FlameGuard CPVC pipe	62 mm	BOSS MaxiCollar	-/120/90

B.20 Test report – WF402946

Table 85 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Warringtonfire UK, Holmesfield Road, Warrington WA1 2DS, United Kingdom.
Test date	The fire resistance test was done on 26 September 2018.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The construction was made up of two drywall partitions, one had overall dimensions of 1775 mm wide × 3000 mm high × 75 mm thick and the other had overall dimensions of 1200 mm wide × 3000 mm high × 75 mm thick. The two drywall partitions were separated by a 25 mm gap. The framings for both partitions comprised 50 mm wide galvanised steel studs at maximum 600 mm centres, friction fitted into galvanised steel 'C-section' head and base track. Each side of the stud frame was faced with a single layer of 12.5 mm thick Gypsum 'Type F' plasterboard. The drywall framework was infilled with a single layer of nominally 50 mm thick mineral wool insulation with a measured density of 45 kg/m^3 which was cut back 100 mm from the apertures. First wall incorporated eleven apertures, second wall incorporated two apertures. Each aperture was penetrated by a range of services, sealed with various fire stopping systems. Between each wall a linear gap seal was installed. Each wall construction incorporated two free edges. The services relevant to this assessment are listed in Table 86.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 86.

Table 86 Results summary for this test report

Specimen	Service	Aperture	Primary protection	Secondary protection	Integrity (minutes)			Insulation (minutes)
					Cotton pad	Sustained flaming	Gap gauge	
M	Ø110 mm PVC pipe with a wall thickness of 6.6 mm	600 mm × 600 mm	50 mm thick 600 mm × 600 mm batt identical to BOSS batt bedded within the aperture using	Pipe collar identical to BOSS MaxiCollar fixed to each face	66*	66*	66*	66*
	Ø110 mm PE pipe with a wall							

Specimen	Service	Aperture	Primary protection	Secondary protection	Integrity (minutes)			Insulation (minutes)
					Cotton pad	Sustained flaming	Gap gauge	
	thickness of 2.7 mm		a fire-rated sealant identical to BOSS FireMastic-300.					
	Ø50 mm PP pipe with a wall thickness of 2.9 mm							
*The test duration. The test was discontinued after 66 minutes.								

B.21 Test report – WF361932

Table 87 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Warringtonfire UK, Holmesfield Road, Warrington WA1 2DS, United Kingdom.
Test date	The fire resistance test was done on 16 March 2016.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The specimens were installed with the aerated concrete floor construction. The section of floor had overall dimensions of 2240 mm long × 1735 mm wide × 150 mm thick and was provided with twelve circular apertures, each penetrated by a range of plastic pipes which were plugged on the unexposed side. Each 50 mm diameter service was fitted with two pipe wraps identical to BOSS UniWrap and each 200 mm service was fitted with ten layers. The pipe wrap was self adhered to the service and fitted to mid depth of the aperture. Each annular gap was sealed with a single bead of a sealant identical to BOSS FireMastic-300 to the unexposed face of the floor assembly.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 88.

Table 88 Results summary for this test report

Specimen	Service	Aperture	Primary protection	Integrity (minutes)			Insulation (minutes)
				Cotton pad	Sustained flaming	Gap gauge	
B	Ø50 mm PP pipe with a wall thickness of 6.9 mm	62 mm	Pipe wrap identical to BOSS UniWrap self adhered and fitted centrally in the aperture. A bead of sealant identical to BOSS FireMastic-300 was used to seal the aperture on the unexposed face of the floor.	264*	264*	264*	264*
C	Ø50 mm PP pipe with a wall thickness of 2 mm	62 mm		264*	264*	264*	264*
F	Ø50 mm HDPE pipe with a wall thickness of 4.6 mm	62 mm		264*	264*	264*	264*
G	Ø50 mm HDPE pipe with a wall thickness of 3 mm	62 mm		264*	264*	264*	264*
J	Ø50 mm uPVC pipe with a wall thickness of 3.7 mm	62 mm		264*	264*	264*	172

Specimen	Service	Aperture	Primary protection	Integrity (minutes)			Insulation (minutes)
				Cotton pad	Sustained flaming	Gap gauge	
K	Ø50 mm uPVC pipe with a wall thickness of 2.4 mm	62 mm		264*	264*	264*	264*
A	Ø200 mm PP pipe with a wall thickness of 18.2 mm	224 mm	Pipe wrap identical to BOSS UniWrap self adhered and fitted centrally in the aperture. A bead of sealant identical to BOSS FireMastic-300 was used to seal the aperture on the unexposed face of the floor.	120#	120	120	120
D	Ø200 mm PP pipe with a wall thickness of 4.9 mm	224 mm		264*	264*	264*	264*
E	Ø200 mm HDPE pipe with a wall thickness of 18.2 mm	224 mm		264*	264*	264*	264*
H	Ø200 mm HDPE pipe with a wall thickness of 4.9 mm	224 mm		264*	264*	264*	264*
I	Ø200 mm uPVC pipe with a wall thickness of 9.6 mm	224 mm		242	245#	245	185
L	Ø200 mm uPVC pipe with a wall thickness of 7.7 mm	224 mm		70	71#	71	70

*The test duration. The test was discontinued after 262 minutes.

#Specimen blanked off to allow the test to continue,

B.22 Test report – 2019-Efectis-R001874

Table 89 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Efectis Nderland
Test date	The fire resistance test was done on 23 July 2019.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The test specimen consisted of a standard flexible wall being n EI 90 lightweight plasterboard faced steel stud partition. Totally 5 penetration seals were placed in the standard flexible wall. The penetration seals consisted of a batt identical to BOSS batt, being two layers of 50 mm fibre board. The mineral fibre boards of specimen 1, 2 and 4 were placed flush with the exposed and unexposed face of the wall. The mineral fibre boards were fixed by friction into apertures and were bonded to the flexible wall. The mineral fibre boards of specimen 3 was placed against the flexible wall with an overlap of 30 mm, specimen 10 with an overlap of 50 mm, and were fixed by means of 80 mm wood screws. The apertures in the flexible wall had different dimensions. On the perimeter of the boards a sealant identical to BOSS FireMastic-300 was applied to bond it to the flexible wall. Around the aperture of penetration seal 3 and 10, the insulation of the flexible wall was removed (cut back) at a width of 100 mm. The apertures of penetration seal 1 and 4 were made without any additional modifications. The services relevant to this assessment are listed in Table 90.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 90.

Table 90 Results summary for this test report

Specimen	Service	Aperture	Primary protection	Secondary protection	Integrity (minutes)	Insulation (minutes)
1A	Ø110 mm uPVC pipe with a wall thickness of 7.6 mm	130 mm	600 mm × 600 mm batt with PS coating identical to BOSS batt	4 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	123	120
1B	Ø152 mm Copper pipe with a wall thickness of 3.3 mm + 25 mm thick Armaflex lagging	180 mm	600 mm × 600 mm batt with PS coating identical to BOSS batt	2 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	123	55
3a	Ø42 mm Copper pipe with a wall thickness of 1.1 mm +	N/A	470 mm × 470 mm batt with PS coating identical to BOSS batt	2 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	87	100

Specimen	Service	Aperture	Primary protection	Secondary protection	Integrity (minutes)	Insulation (minutes)
	25mm thick kingspan Tarec lagging					
3b	Ø110 mm uPVC pipe with a wall thickness of 4.9 mm	130 mm	470 mm × 470 mm batt with PS coating identical to BOSS batt	4 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	87	109
4a	Ø120 mm PP pipe with a wall thickness of 3.6 mm	132 mm	600 mm × 600 mm batt with PS coating identical to BOSS batt	4 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	115	106
4b	Ø126 mm PE pipe with a wall thickness of 3.4 mm	138 mm	600 mm × 600 mm batt with PS coating identical to BOSS batt	4 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	115	107
4c	Ø126 mm uPVC pipe with a wall thickness of 5.2 mm	138 mm	600 mm × 600 mm batt with PS coating identical to BOSS batt	4 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	115	109
4d	222 mm × 90 mm uPVC duct	230 mm × 98 mm	600 mm × 600 mm batt with PS coating identical to BOSS batt	2 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	5	75
5	Ø55 mm Beverage pipe with a wall thickness of 1.8/1.6 mm + Insulation 15 and 9.6mm	102 mm		3 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	123	123
6	Ø42 mm Copper pipe + 10 mm thick Armaflex lagging	70 mm		2 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	123	71
7	Ø157 mm Copper pipe + 40 mm thick Armaflex lagging	179 mm		2 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	123	68
8	Ø42 mm Copper pipe + 34 mm thick Armaflex lagging	62 mm		2 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	123	123
9	Ø155 mm Copper pipe + 12 mm thick Armaflex lagging	155 mm		2 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	123	32

Specimen	Service	Aperture	Primary protection	Secondary protection	Integrity (minutes)	Insulation (minutes)
11	Ø89.2 mm Blazemaster CPVC pipe with a wall thickness of 7.2 mm	129 mm		22-28 mm of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	123	123
12	Ø26.8 mm Blazemaster CPVC pipe with a wall thickness of 2.5 mm	67 mm		14-24 mm of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	123	123
13	Concentric pipes with outer pipe Ø 101 mm and inner pipe Ø60 mm	117 mm		110 mm pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	123	3
14	Concentric pipes with outer pipe Ø 121 mm and inner pipe Ø82 mm	133 mm		125 mm pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	1231	123
17	125 mm Silicate board			Sealant identical to BOSS FireMastic-300	123	117
18	Ø160 mm Copper pipe with a wall thickness of 2.8 mm + 12 mm thick Armaflex lagging	200 mm		160 mm pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	123	120

B.23 Test report – WF398296 Issue 2

Table 91 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Warringtonfire UK, Holmesfield Road, Warrington WA1 2DS, United Kingdom.
Test date	The fire resistance test was done on 15 May 2018.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The specimen consisted of a wall construction of overall dimensions 1500 mm wide × 1500 mm high × 150 mm thick. The blockwork wall incorporated three apertures, two penetrated by a range of pipes, and one linear gap seal. The construction was installed into the high-density concrete frame. The floor construction had overall dimensions of 1720 mm wide × 2215 mm long × 150 mm thick. The floor was constructed out of aerated concrete slabs with eight apertures, penetrated by a range of pipes and bus bars. The construction was installed into a mild steel frame. The services relevant to this assessment are listed in Table 92.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 92.

Table 92 Results summary for this test report

Specimen	Service	Aperture	Primary protection	Secondary protection	Integrity (minutes)			Insulation (minutes)
					Cotton pad	Sustained flaming	Gap gauge	
E1	Ø160 mm PVC pipe with a wall thickness of 9.5 mm	1000 mm × 350 mm	Two 50 mm back to back batt identical to BOSS batt	Pipe collar identical to BOSS MaxiCollar fixed to the exposed face of the fire batt using pigtail screws.	144	144	147#	144
E2	Ø110 mm PVC pipe with a wall thickness of 4.2 mm				164	164	169#	169#
E3	Ø160 mm PE pipe with a wall thickness of 9.5 mm				164	164	169#	169#

*The test duration. The test was discontinued after 198 minutes.
Specimen blanked off to allow the test to continue.

B.24 Test report – WF382553 Issue 2

Table 93 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Warringtonfire UK, Holmesfield Road, Warrington WA1 2DS, United Kingdom.
Test date	The fire resistance test was done on 18 April 2017.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	Specimens were installed into dry wall partitions 1200 mm wide × 3000 mm high. The partition framing comprised 70 mm wide galvanised mild steel studs, at maximum 600 mm centres, friction fitted into galvanised steel head and base channels. One side of the stud frame was faced with two layers of 12.5 mm thick Gypsum Fireline plasterboard. The framework was infilled with 50 mm thick Knauf mineral wool insulation referenced, Earthwool Universal Slab RS33. Plasterboard strips 75 mm wide × 12.5 mm thick were fitted to vertical studs on the non-boarded face of the partition. The partitions were fitted such that the Fireline boarded face of one partition faced the heating conditions of the test and non-boarded face of the other partition faced the heating conditions of the test. Both partitions were installed with two free vertical edges. The services relevant to this assessment are listed in Table 94.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 94.

Table 94 Results summary for this test report

Specimen	Service	Aperture	Primary protection	Integrity (minutes)			Insulation (minutes)
				Cotton pad	Sustained flaming	Gap gauge	
G1	Ø42 mm Copper pipe + 19 mm thick Armaflex lagging	42 mm	2 layers of pipe wrap identical to BOSS UniWrap	55*	55*	55*	46
G2	Ø42 mm Copper pipe + 19 mm thick Armaflex lagging	42 mm	2 layers of pipe wrap identical to BOSS UniWrap	55*	55*	55*	47
I1	Ø125 mm uPVC pipe with a wall thickness of 3.0 mm	125 mm	Pipe collar identical to BOSS MaxiCollar	7	7	8	7
I2	Ø125 mm uPVC pipe with a wall thickness of 3.0 mm	125 mm	Pipe collar identical to BOSS MaxiCollar	50	50	55*	50
K1-1	Ø110 mm uPVC pipe with a wall thickness of 6.6 mm	110 mm	Pipe collar identical to BOSS MaxiCollar	7	7	7	7

Specimen	Service	Aperture	Primary protection	Integrity (minutes)			Insulation (minutes)
				Cotton pad	Sustained flaming	Gap gauge	
K1-2	Ø110 mm PE pipe with a wall thickness of 2.7 mm	110 mm	Pipe collar identical to BOSS MaxiCollar	7	7	7	7
K1-3	Ø50 mm PP pipe with a wall thickness of 2.9 mm	50 mm	Pipe collar identical to BOSS MaxiCollar	7	7	7	7
K2-1	Ø110 mm uPVC pipe with a wall thickness of 6.6 mm	110 mm	Pipe collar identical to BOSS MaxiCollar	46	46	55*	51
K2-2	Ø110 mm PE pipe with a wall thickness of 2.7 mm	110 mm	Pipe collar identical to BOSS MaxiCollar	46	46	55*	35
K2-3	Ø50 mm PP pipe with a wall thickness of 2.9 mm	50 mm	Pipe collar identical to BOSS MaxiCollar	46	46	55*	46
*The test duration. The test was discontinued after 55 minutes.							

B.25 Test report – WF367689

Table 95 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Warringtonfire UK, Holmesfield Road, Warrington WA1 2DS, United Kingdom.
Test date	The fire resistance test was done on 27 July 2016.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The specimens supporting construction had overall dimensions of 2230 mm long × 1740 mm × 150 mm thick and it was provided with a single aperture measuring 1400 mm long × 700 mm wide. The aperture was sealed with a 100 mm thick mortar barrier identical to BOSS FireMortar-360. The barrier was penetrated by a standard range of services. The services relevant to this assessment are listed in Table 96.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 96.

Table 96 Results summary for this test report

Specimen	Service	Aperture	Primary protection	Integrity (minutes)			Insulation (minutes)
				Cotton pad	Sustained flaming	Gap gauge	
B	Ø200 mm PP pipe with a wall thickness of 4.9 mm	200 mm	Mortar identical to BOSS FireMortar-360 and 10 layers of pipe wrap identical to BOSS UniWrap	21##	21	21	19
C	Ø200 mm uPVC pipe with a wall thickness of 7.7 mm	200 mm	Mortar identical to BOSS FireMortar-360 and 10 layers of pipe wrap identical to BOSS UniWrap	114##	114	114	114

Specimen	Service	Aperture	Primary protection	Integrity (minutes)			Insulation (minutes)
				Cotton pad	Sustained flaming	Gap gauge	
D	Ø200 mm uPVC pipe with a wall thickness of 9.6 mm	200 mm	Mortar identical to BOSS FireMortar-360 and 10 layers of pipe wrap identical to BOSS UniWrap	114##	114	114	114
E	Ø160 mm uPVC pipe with a wall thickness of 9.5 mm	160 mm	Mortar identical to BOSS FireMortar-360 and pipe collar identical to BOSS MaxiCollar	153##	153	153##	153
F	Ø160 mm PE pipe with a wall thickness of 9.5 mm	160 mm	Mortar identical to BOSS FireMortar-360 and pipe collar identical to BOSS MaxiCollar	159*	159*	159*	156
G	Ø110 mm PE pipe with a wall thickness of 4.2 mm	110 mm	Mortar identical to BOSS FireMortar-360 and pipe collar identical to BOSS MaxiCollar	159*	159*	159*	159*

*The test duration. The test was discontinued after 159 minutes.
##Specimen blanked off to allow the test to continue.

B.26 Test report – WF415515

Table 97 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Warringtonfire UK, Holmesfield Road, Warrington WA1 2DS, United Kingdom.
Test date	The fire resistance test was done on 16 July 2019.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The specimens consisted of two drywall constructions with overall dimensions of 1200 mm wide × 3000 mm high × 100 mm thick. The dry wall constructions was separated by a 500 mm wide × 150 mm thick blockwork pillar. The drywall constructions comprised of 50 mm wide galvanised steel studs, at maximum 600 mm centres, friction fitted into 52 mm wide galvanised steel 'C-section' head and base track. Each side of the stud frame was faced with two layers of 12.5 mm thick Gypsum Type F plasterboard. The drywall framework was infilled with a single layer of nominally 50 mm mineral wool insulation with a measure density of 45 kg/m^3 which was cut back 100 mm from the apertures. The wall incorporated ten apertures, each penetrated by a range of services sealed with various fire stopping props. The services relevant to this assessment are listed in Table 98.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 98.

Table 98 Results summary for this test report

Specimen	Service	Aperture	Primary protection	Integrity (minutes)			Insulation (minutes)
				Cotton pad	Sustained flaming	Gap gauge	
A	110 mm × 54 mm PVC Duct	126 mm × 62 mm	3 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	19#	19#	19#	18

Specimen	Service	Aperture	Primary protection	Integrity (minutes)			Insulation (minutes)
				Cotton pad	Sustained flaming	Gap gauge	
B	2200 mm × 90 mm PVC Duct	236 mm × 98 mm	3 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	77	105#	105#	62
C	Ø200 mm PP pipe with a wall thickness of 4.9 mm	270 mm	5 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	17	17	22#	17
D	Ø200 mm PE pipe with a wall thickness of 11.9 mm	270 mm	5 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	24	25	26#	24
E	Ø200 mm PVC pipe with a wall thickness of 7.7 mm	270 mm	5 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS FireMastic-300	132*	132*	132*	132*
G-1	Ø110 mm uPVC pipe with a wall thickness of 6.6 mm	500 mm × 500 mm	100 mm thick PyroSeal 2K expanding sealer cartridge and pipe collar identical to BOSS MaxiCollar installed to each pipe on both faces	132*	132*	132*	103
G-2	Ø110 mm PE pipe with a wall thickness of 2.7 mm			132*	132*	132*	132*
G-3	Ø50 mm PP pipe with a wall thickness of 2.9 mm			132*	132*	132*	132*

*The test duration. The test was discontinued after 132 minutes.

#Specimen blanked off to allow the test to continue.

B.27 Test report – WF371150/R

Table 99 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Warringtonfire UK, Holmesfield Road, Warrington WA1 2DS, United Kingdom.
Test date	The fire resistance test was done on 30 August 2016.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The drywall construction was of overall dimensions 3000 mm wide × 3000 mm high × 100 mm thick. The framing was comprised 50 mm wide galvanised mild steel studs, at maximum 600 mm centres, friction fitted into galvanised steel head and base channels. Each side of the stud frame was faced with two layers of 12.5 mm thick Gypsum Fireline plasterboard. The framework was infilled with 50 mm thick mineral wool insulation having a nominal density of 100 kg/m^3. The services relevant to this assessment are listed in Table 100.
Instrumentation	The test report states that the instrumentation was in accordance BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 100.

Table 100 Results summary for this test report

Specimen	Service	Aperture	Primary protection	Secondary protection	Integrity (minutes)			Insulation (minutes)
					Cotton pad	Sustained flaming	Gap gauge	
A	Ø200 mm uPVC pipe with a wall thickness of 7.7 mm	220 mm	600mm × 600mm × 1-layer of 50mm fire batt with ablative coating identical to BOSS batt	5 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS Firemastic-300	66#	66	66#	64

Specimen	Service	Aperture	Primary protection	Secondary protection	Integrity (minutes)			Insulation (minutes)
					Cotton pad	Sustained flaming	Gap gauge	
B	Ø200 mm PP pipe with a wall thickness of 4.9 mm	220 mm		5 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS Firemastic-300	66#	66#	66#	66
C	Ø200 mm HDPE pipe with a wall thickness of 11.9 mm	220 mm		5 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS Firemastic-300	66#	66#	66#	66
D	Ø200 mm uPVC pipe with a wall thickness of 7.7 mm	220 mm	600mm × 600mm × 1-layer of 50mm fire batt with ablative coating identical to BOSS batt	5 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS Firemastic-300	20#	20#	20#	20#
E	Ø200 mm PP pipe with a wall thickness of 4.9 mm	220 mm		5 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS Firemastic-300	20#	20#	20#	20#

Specimen	Service	Aperture	Primary protection	Secondary protection	Integrity (minutes)			Insulation (minutes)
					Cotton pad	Sustained flaming	Gap gauge	
F	Ø200 mm PP pipe with a wall thickness of 11.9 mm	220 mm		5 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS Firemastic-300	20#	20#	20#	20#
G	Ø110 mm uPVC pipe with a wall thickness of 4.2 mm + 25 mm thick penolic foam insulation C/S	180 mm	600mm × 600mm × 1-layer of 50mm fire batt with ablative coating identical to BOSS batt	5 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS Firemastic-300	132*	132*	132*	122
H	Ø110 mm uPVC pipe with a wall thickness of 6.6 mm + 20 mm thick penolic foam insulation C/S	170 mm		5 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS Firemastic-300	132*	132*	132*	119
I	Ø40 mm uPVC pipe with a wall thickness of 3.0 mm + 15 mm thick penolic foam insulation C/S	82 mm		3 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS Firemastic-300	132*	132*	132*	102

Specimen	Service	Aperture	Primary protection	Secondary protection	Integrity (minutes)			Insulation (minutes)
					Cotton pad	Sustained flaming	Gap gauge	
J	Ø40 mm uPVC pipe with a wall thickness of 1.9 mm + 25 mm thick penolic foam insulation C/S	82 mm		3 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS Firemastic-300	132*	132*	132*	101
K	Ø110 mm uPVC pipe with a wall thickness of 4.2 mm + 32 mm thick penolic foam insulation C/S	102 mm	600mm × 600mm × 1-layer of 50mm fire batt with ablative coating identical to BOSS batt	5 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS Firemastic-300	120	120	120#	120
L	Ø110 mm uPVC pipe with a wall thickness of 6.6 mm + 13 mm thick penolic foam insulation C/S	156 mm		5 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS Firemastic-300	122	122	122#	122
M	Ø40 mm uPVC pipe with a wall thickness of 3.0 mm + 9 mm thick penolic foam insulation C/S	70 mm		3 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS Firemastic-300	126	126	126	126

Specimen	Service	Aperture	Primary protection	Secondary protection	Integrity (minutes)			Insulation (minutes)
					Cotton pad	Sustained flaming	Gap gauge	
N	Ø40 mm uPVC pipe with a wall thickness of 1.9 mm + 32 mm thick penolic foam insulation C/S	116 mm		3 layers of pipe wrap identical to BOSS UniWrap and sealant identical to BOSS Firemastic-300	122	122	122#	122
*The test duration. The test was discontinued after 132 minutes. # Specimen blanked off to allow the test to continue.								

B.28 Test report – WF416496

Table 101 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Warringtonfire UK, Holmesfield Road, Warrington WA1 2DS, United Kingdom.
Test date	The fire resistance test was done on 20 August 2019.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The horizontal supporting construction had overall dimensions of 2250 mm long × 1750 mm wide ×150 mm thick. The floor was provided with twelve circular apertures and one square aperture, each penetrated by a range of pipes of cables. The services relevant to this assessment are listed in Table 102.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 102.

Table 102 Results summary for this test report

Specimen	Service	Aperture	Primary protection	Integrity (minutes)			Insulation (minutes)
				Cotton pad	Sustained flaming	Gap gauge	
A	Ø400 mm PE pipe with a wall thickness of 8.0 mm	400 mm	Pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	19	19	24#	19
B	Ø110 mm PP pipe with a wall thickness of 2.7 mm	132 mm	Pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	74	74	76#	74

Specimen	Service	Aperture	Primary protection	Integrity (minutes)			Insulation (minutes)
				Cotton pad	Sustained flaming	Gap gauge	
C	Ø110 mm PE pipe with a wall thickness of 2.7 mm	132 mm	Pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	30	30	33#	30
D	Ø110 mm PE pipe with a wall thickness of 10.0 mm	132 mm	Pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	29	29	33#	26
F	Ø110 mm PP pipe with a wall thickness of 10.0 mm	132 mm	Pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	25	25	25#	25
G	Ø110 mm uPVC pipe with a wall thickness of 6.6 mm	132 mm	Pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	41	41	42#	41
H	Ø110 mm uPVC pipe with a wall thickness of 4.2 mm	132 mm	Pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	41	41	43#	40
I	Ø55 mm PP pipe with a wall thickness of 6.9 mm	72 mm	Pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	128	128	129*	128

Specimen	Service	Aperture	Primary protection	Integrity (minutes)			Insulation (minutes)
				Cotton pad	Sustained flaming	Gap gauge	
J	Ø55 mm PE pipe with a wall thickness of 4.6 mm	72 mm	Pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	81	81	83#	81
K	Ø55 mm PP pipe with a wall thickness of 1.8 mm	72 mm	Pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	108	108	111#	108
L	Ø55 mm uPVC pipe	72 mm	Pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	43	43	45#	33
M	Ø55 mm PE pipe with a wall thickness of 3.0 mm	72 mm	Pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	52	52	53#	52
N	Ø55 mm uPVC pipe with a wall thickness of 2.4 mm	72 mm	Pipe collar identical to BOSS MaxiCollar and sealant identical to BOSS FireMastic-300	91	93	94#	87

*The test duration. The test was discontinued after 129 minutes.
#Specimen blanked off to allow the test to continue.

B.29 Test report – EWFA 43580700.1

Table 103 Information about test report

Item	Information about test report
Report sponsor	Boss Products Australia and Speedpanel Australia
Test laboratory	Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was done on 13 September 2016.
Test standards	The test was done in accordance with AS 1530.4:2014
Variation to test standards	None
General description of tested specimen	The test specimen consisted of two wall sections. The north side of the wall was a 78 mm thick Speedpanel wall (vertically orientated) and it was penetrated by various services. Only service M is relevant to this assessment.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2014.

The test specimen achieved the following results – see Table 48.

Table 104 Results summary for this test report

Specimen	Aperture	Primary protection	Secondary protection	FRL
M – Ø100 mm uPVC pipe	Ø130 mm	BOSS MaxiCollar-IW 100 Prototye B	BOSS FireMastic-300 at the annular gap and interface on the exposed side between wall and collar	-/120/90

B.30 Test report – WF355667 Issue 4

Table 105 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Exova Warringtonfire, Holmesfield Road, Warrington, WA1 2DS, United Kingdom
Test date	The fire resistance test was done on 7 December 2015.
Test standards	The test was done in accordance with EN 1366-3:2009 and EN 1363-1:2012.
Variation to test standards	None
General description of tested specimen	The specimen consisted of a 3000 mm × 3035 mm high × 100 mm thick wall with 50 mm deep steel studs and two layers of 12.5 mm thick fire-rated plasterboard on each face. The framework was infilled with 50 mm thick mineral wool insulation having a nominal density of 100 kg/m^3.
Instrumentation	The test report states that the instrumentation was in accordance with EN 1366-3:2009 and EN 1363-1:2012.

The test specimen achieved the following results – see Table 106.

Table 106 Results summary for this test report

Specimen	Seal type	Aperture size	FRL
3 – Ø50 mm PVCu pipe with a wall thickness of 3.7 mm	The penetration was protected with a single 2 mm thick wrap idemtical to PWP wrap friction fitted in the aperture each side of the partition.	58 mm	-/120/120
4 - Ø50 mm PE pipe with a wall thickness of 4.6 mm		58 mm	
5 - Ø50 mm PP pipe with a wall thickness of 6.9 mm		58 mm	
6 – Ø200 mm HDPE pipe with a wall thickness of 7.7 mm	The penetration was protected with 5 layers of 2 mm thick wrap identical to PWP wrap friction fitted in the aperture each side of the partition.	224 mm	-/15/15

B.31 Test report – WF304406/B

Table 107 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Warringtonfire
Test laboratory	Exova Warringtonfire, Holmesfield Road, Warrington, WA1 2DS, United Kingdom
Test date	The fire resistance test was done on 30 March 2011.
Test standards	The test was done in accordance with EN 1366-3:2009 and EN 1363-1:2012.
Variation to test standards	None
General description of tested specimen	The specimen consisted of a floor with overall dimensions 2045 mm by 1540 mm and 150 mm thick which was provided with a 1600 mm × 700 mm aperture into which a blank penetration seal and a 2000 mm × 200 mm aperture in which was installed a linear joint seal. Only specimen A which is the blank seal is relevant to this assessment.
Instrumentation	The test report states that the instrumentation was in accordance with EN 1366-3:2009 and EN 1363-1:2012.

The test specimen achieved the following results – see Table 108.

Table 108 Results summary for this test report

Specimen	Seal type	Integrity	Insulation	FRL
A	1600 mm × 700 mm aperture with 1 layer of nominally 50 mm thick mineral fibre batt identical to BOSS batt with nominal density of 140 kg/m^3. The batt was coated on both faces with stopseal coating and was friction fitted within the aperture.	79 minutes	63 minutes	-/60/60

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