JENSEN HUGHES

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: R2.1

Issued date: 9 May 2025 Expiry date: 31 August 2027

Quality management

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			Prepared by	**Reviewed by**	**Authorised by**
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			Prepared by	**Reviewed by**	**Authorised by**
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Jensen Hughes Fire Testing Pty Ltd
ABN 81 050 241 524

Formerly Warringtonfire Australia Pty Ltd[1]

[1] *Warringtonfire Australia Pty Ltd was acquired by Jensen Hughes in December 2023. Jensen Hughes Fire Testing Pty Ltd is not affiliated, associated, authorised, or endorsed by Warringtonfire Australia Pty Ltd, Warringtonfire Testing and Certification Limited or its "Warringtonfire" or "Certifire" brands.*

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 (R2016).

BOSS MaxiCollar™ is a pipe closure device used to form penetration seals where combustible pipes and cables with insulation penetrate walls and floors. The intended use of BOSS MaxiCollar™ is to reinstate the fire resistance performance of flexible and rigid wall 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, CPVC and acoustic pipes.

The analysis in sections 5 to 7 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 41 for BOSS MaxiCollars™ and from Table 45 to Table 51 for BOSS UniWrap and PWP wrap – in accordance with AS 1530.4:2014 and general accordance with AS 4072.1:2005 (R2016).

The variations and outcome of this assessment are subject to the limitations and requirements described in sections 2, 3 and 7 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[2] and in general accordance with AS 4072.1:2005 (R2016)[3].

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[4].

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.

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] 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.
[3] Standards Australia, 2005 (Reaffirmed 2016), Components for the protection of openings in fire-resistant separating elements: Service penetrations and control joints, AS 4072.1:2005, Standards Australia, NSW.
[4] 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.

2.2 Compliance with the National Construction Code

This assessment report has been prepared to meet the evidence of suitability requirements of the NCC 2022[5] under A5G3(1)(d). It references test evidence for meeting deemed-to-satisfy (DTS) provisions of the NCC under A5G5 for fire resistance level that apply to the assessed systems based on Specifications 1 and 2 for fire resistance for building elements.

The proposed details and systems (building elements) in this report are confirmed to be assessed, without the aid of an active fire suppression system, based on prototype tests that are equivalent to or more severe than a standard fire test as specified in section 4.4, in accordance with NCC 2022 S1C2(b). It is also confirmed that the differences between the proposed systems and details compared to the tested prototypes are considered minor in accordance with NCC 2022 S1C2(c).

This assessment report may also be used to demonstrate compliance with the requirements for evidence of suitability under the relevant sections of previous versions of the NCC.

2.3 Compliance with the New Zealand Building Code (NZBC), Clause C

This assessment report has been prepared to meet the evidence of suitability requirements for the relevant clauses of the New Zealand Building Code (NZBC)[6], Part C.

This assessment report may also be used to demonstrate compliance with the requirements for evidence of suitability that meets the normative requirements for demonstrating fire resistance performance as stated in the New Zealand acceptable solutions

2.4 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

[5] National Construction Code Volumes One and Two - Building Code of Australia 2022, Australian Building Codes Board, Australia
[6] New Zealand Building Code - Building Regulations 1992 including Amendments, Ministry of Business, Innovation, and Employment, New Zealand

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.
- FRLs obtained in 150 mm AAC floors with a minimum density of 650 kg/m^3 can be extended to floors systems of greater thickness and greater density in accordance with section 10 of AS 1530.4:2014.
- Any build-up of thinner substrates may be achieved with fire-rated plasterboard, Calcium silicate board, MgO board or BOSS batts. The build-up should extend at least 100 mm on all directions from the aperture. The density of the build-up and the overall thickness of the substrate and the build-up must be minimum as tested. For wall systems, a build-up must be installed on both sides. For floors, a build-up must be installed on both sides or on the exposed side.
- 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 substrate.
- When collars are fixed to the build-up board, the chosen fixings must be approved and appropriate for both the substrate and the build-up. This report specifies the approved fixing with a minimum embedment depth.
- BOSS Batts may be used to infill any oversize apertures within a substrate with an established FRL. BOSS Batt infills may be applied to one or both sides of the substrate and either friction fitted, face fixed or a combination of both –provided that the batts have been tested or assessed in this configuration by an ATL to achieve the minimum established FRL. Additionally, the maximum batt size and the separating element in which the batt is installed is limited to the FRL of the substrate or the Batt as a blank seal.
- The BOSS MaxiCollar can be installed on the underside of ComFlor or other composite or profiled floor systems. ComFlor and similar profiled floors must be designed in compliance with a recognised NZ concrete design standard. Eg NZS3101 AS/NZS2327.
- Where the thickness of a timber substrate is not specifically listed the MaxiCollar may be used and will achieve the rating of the respective timber thickness. Such as 130mm thick timber to achieve a -/90/90 rating. Given that the timber substrate has an established FRL via test or assessment from an ATL or designed for fire resistance. The overall FRL is the lowest achieved by the service or the separating element.
- The minimum spacing between multiple services protected with BOSS Maxi collar passing through BOSS Batts or a substrate of density greater than 140 kg/m^3 in wall system can be 0 mm. Collars must be fixed to both faces and sealant must be applied into the annular gap around the pipe for relevant sealant depth as noted in sections 5.3 and 5.4 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 BOSS Pipe Wrap provided that the BOSS Pipe 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 50 mm of the timber stud.
- 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, the cavity must be closed between the penetration seal and the stud, and minimum 50 mm (extending from the aperture) of insulation confirmed to be deemed non-combustible in accordance with AS 1530.1[7] must be provided within the cavity between the penetration seal and the 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[8].

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. Jensen Hughes 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.
- 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 and cables 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.

[7] The applicable version of the standard must be specified by the jurisdiction of the AHJ
[8] European Committee for Standardization, 2021, Fire resistance tests for service installations. Penetration seals, BS EN 1366-3:2021, European Committee for Standardization, Brussels, Belgium.

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, CPVC and acoustic pipes.

The specific elements of construction that the system BOSS MaxiCollar™ may be used to provide a penetration seal in, are as follows:

- Flexible walls: The wall must have a minimum thickness of 90 mm and comprise steel studs or timber studs lined on both faces with minimum 1 layer of 13 thick plasterboards. Unless where specified, the wall cavity of flexible walls must be filled with R2.2 Glasswool Batt insulation.
- 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. Rigid walls such as Korok and Speedpanel must have a minimum thickness of 78 mm.
- 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.
- Timber substrate: The wall must have a minimum thickness of 110 mm and consist of cross-laminated timber (CLT). The density must be minimum 400 kg/m^3.
- Rigid floors: The floor must have a minimum thickness of 100 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m^3.

Wall and floor elements are required to have an established fire resistance level (FRL) as tested or assessed by an accredited testing laboratory (ATL) for the required fire resistance period Or be designed to a recognised standard accounting for fire resistance as per the relevant building code. In cases where the FRL of the wall or floor is less than that of the penetration, the FRL will be derated accordingly.

Pipes may be fire stopped using an increased collar size. In addition to an appropriately sized collar, the MaxiCollar sizes may be used to fire stop the respective pipe sizes.

Table 3 Approved pipe sizes corresponding to maxicollar dimensions

MaxiCollar Size	Approved Pipe Diameters
MaxiCollar 32	Up to 32mm
MaxiCollar 40	Up to 40mm
MaxiCollar 80	50mm – 80mm
MaxiCollar 100	50mm – 100/110mm
MaxiCollar 150	100/110mm - 150/160mm

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 4.

Table 4 Reference test data

Report number	Test sponsor	Test date	Testing authority
EWFA 49527300.3	BOSS Fire (Australia) Pty Ltd	12 July 2018	Jensen Hughes, Australia
FRT190033 R1.0	BOSS Products (Australia) Pty Ltd	6 August 2018	Jensen Hughes, Australia
WF393094	Report sponsor known to Jensen Hughes	21 December 2017	Warringtonfire, UK
FRT180137 R2.0	BOSS Fire & Safety P/L	7 March 2019	Jensen Hughes, Australia (Formerly known as Warringtonfire Australia)
EWFA 34923800.2	BOSS Fire and Safety	4 June 2015	Jensen Hughes, Australia (Formerly known as Warringtonfire Australia)
EWFA 33090200.1	BOSS Fire & Safety Pty Ltd	20 March 2015	Jensen Hughes, Australia (Formerly known as Warringtonfire Australia)
BMT/FEI/F15008	Report sponsor known to Jensen Hughes	11 February 2015	BMTRADA
WF350704	Report sponsor known to Jensen Hughes	31 March 2015	Warringtonfire, UK
BMT/FEI/F14135	Report sponsor known to Jensen Hughes	7 January 2014	BMTRADA
WF350177	Report sponsor known to Jensen Hughes	11 March 2015	Warringtonfire, UK
FRT180473 R1.0	BOSS Fire & Safety P/L	12 March 2019	Jensen Hughes, Australia (Formerly known as Warringtonfire Australia)
BMT/FEI/F15009	Report sponsor known to Jensen Hughes	12 February 2015	BMTRADA
WF387432	Report sponsor known to Jensen Hughes	23 October 2017	Warringtonfire, UK
WF348262 Issue 3	Report sponsor known to Jensen Hughes	22 January 2015	Warringtonfire, UK
FRT180472 R2.0	BOSS Fire & Safety P/L	8 March 2019	Jensen Hughes, Australia (Formerly known as Warringtonfire Australia)
FRT180474 R1.0	BOSS Fire & Safety P/L	17 January 2020	Jensen Hughes, Australia (Formerly known as Warringtonfire Australia)

Report number	Test sponsor	Test date	Testing authority
WF364404 Issue 2	Report sponsor known to Jensen Hughes	9 May 2016	Warringtonfire, UK
FRT190428 R1.0	BOSS Products (Australia) Pty Ltd	12 December 2019	Jensen Hughes, Australia(Formerly known as Warringtonfire Australia)
FSP 1846	BOSS Fire & Safety Pty Ltd	14 August 2017	CSIRO
WF402946	Report sponsor known to Jensen Hughes	26 September 2018	Warringtonfire, UK
WF361932	Report sponsor known to Jensen Hughes	16 March 2016	Warringtonfire, UK
2019-Efectis-R001874	Report sponsor known to Jensen Hughes	23 July 2019	Efectis Nederland
WF398296 Issue 2	Report sponsor known to Jensen Hughes	15 May 2018	Warringtonfire, UK
WF382553 Issue 2	Report sponsor known to Jensen Hughes	18 April 2017	Warringtonfire, UK
WF367689	Report sponsor known to Jensen Hughes	27 July 2016	Warringtonfire, UK
WF415515	Report sponsor known to Jensen Hughes	16 July 2019	Warringtonfire, UK
WF371150/R	Report sponsor known to Jensen Hughes	30 August 2016	Warringtonfire, UK
WF416496	Report sponsor known to Jensen Hughes	20 August 2019	Warringtonfire, UK
EWFA 43580700.1	Boss Products Australia and Speedpanel Australia	13 September 2016	Jensen Hughes, Australia (Formerly known as Warringtonfire Australia)
WF304406/B	Report sponsor known to Jensen Hughes	30 March 2011	Warringtonfire, UK
147943 R2.3	BOSS Products Pty Ltd	27 March 2024	Holmes Solutions
147008 R3.0	BOSS Products Pty Ltd	18 April 2024	Holmes Solutions
147113 R6.0	BOSS Products Pty Ltd	26 March 2024	Holmes Solutions
147941 R2.2	BOSS Products Pty Ltd	21 June 2024	Holmes Solutions
147942 R2.1	BOSS Products Pty Ltd	24 June 2024	Holmes Solutions
148597 R3.0	BOSS Products Pty Ltd	18 September 2024	Holmes Solutions
148693 R2.1	BOSS Products Pty Ltd	7 October 2024	Holmes Solutions
148815 R1.0	BOSS Products Pty Ltd	5 December 2024	Holmes Solutions
PF23031	BOSS Products Pty Ltd	9 January 2024	FireTSLab
PF23030	BOSS Products Pty Ltd	9 January 2024	FireTSLab

4.3 Variations to the tested systems

The variations to the tested systems – together with the referenced standard fire tests – are described in Table 5.

Table 5 Variations to tested systems

Reference tests	Description	Variations
All test reports referenced in Table 4.	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[9] 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

[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.

4.4 Schedule of components

Table 6 and Table 7 outlines the schedule of components for the assessed systems

Table 6 Schedule of components of assessed systems in walls

Item	Description	
Separating element		
1.	Item name	Flexible wall separating element
	Description	• Minimum 64 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. • Minimum 100 mm thick Boss Batt friction fitted in the aperture, or pattress fitted or a combination of friction fit and pattress fit in a flexible wall system. The pattress fitted layer must overlap the separating element. 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 50 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. • Minimum 110 mm thick CLT wall • 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. • Minimum 100 mm thick Boss Batt friction fitted in the aperture, or pattress fitted or a combination of friction fit and pattress fit in a rigid wall system. The pattress fitted layer must overlap the separating element. 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.

Item	Description	
Services		
3.	Item name	Combustible pipes
	Description	uPVC, HDPE, PP, PP-R, PE, PEX, PEX-AL, CPVC and acoustic 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	BOSS FireMastic-300 can be installed in any of the following instances: Installed into the aperture between the service and collar on both the exposed and the 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 – 2 layers Ø50 mm MaxiCollar – 3 layers Ø55 mm MaxiCollar – 3 layers Ø65 mm MaxiCollar – 3 layers Ø80 mm MaxiCollar – 4 layers Ø100 mm MaxiCollar – 4 layers Ø110 mm MaxiCollar – 4 layers Ø125 mm MaxiCollar – 5 layers Ø140 mm MaxiCollar – 5 layers Ø150 mm MaxiCollar – 9 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

Item	Description		
	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	
	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 140 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 or ablative coating 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	Fire-rated plasterboard, Calcium silicate board, MgO board or BOSS batts	
	Installation	Installed to locally thicken apertures as required. The board must extend a minimum of 100 mm from the aperture in all directions.	
Fixings			
8.	Item name	Collar fixing	
	Product name	The recommended fixings for MaxiCollars are substrate dependant however generally include,	
		For plasterboard walls	• 6g screws • 10G coarse thread laminating screws • Min M6 steel toggle anchors • Min M4 expandable metal anchors/ hollow wall anchors • 8×3/4” Steel hex head screws Minimum 16 mm washers or as appropriate based on the collar size.
		For BOSS Batts	• BOSS Pigtail screws • 10G 38mm coarse thread laminating screws • Minimum 8 ×1 1/2” Steel hex head screws
		AAC, Hebel, SpeedPanel or Korok and other similar substrates	• 14-10×65mm steel hex head screws • 10G×38mm coarse thread laminating screws • 8×3/4” Steel hex head screws
		Concrete, Masonry and other similar substrates	• Min 40mm steel wedge anchors • Min 30mm masonry bolts or masonry screw fixings

Item	Description		
			• Min 40mm sleeve anchors.
		Calcium silicate, MgO or other similar	• 10G 38mm coarse thread laminating screws • 8x3/4” Steel hex head screws
		CLT or timber	• 110 mm thick, Min. 8g × 65 mm • 200 mm thick, Min. 10g × 125 mm
		Washers may be required dependant on the fixings head diameter.	
	Installation	• 3 × screws are used to secure each BOSS MaxiCollar™ to the separating element for collars with diameter up to 200 mm.	
	Item name	BOSS Batt fixing dependent on the separating element	
	Installation	The fixing of the batt on a separating element must be specified via the test/assessment used to establish the FRL of the configuration. The testing or assessment must be conducted by an ATL. With thicker walls, screw length must be varied to maintain minimum embedment of 20 mm.	

Table 7 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. • 120 mm thick concrete floor with a minimum nominal density of 2400 kg/m^3. • Minimum 100 mm thick Boss Batt friction fitted in the aperture, or pattress fitted or a combination of friction fit and pattress fit in a floor system. The pattress fitted layer must overlap the separating element. • 225 mm thick fire rated ceiling system with an established FRL. • Minimum 110 mm thick CLT slab with a minimum nominal density of 400kg/m^3
Services		
2.	Item name	Combustible pipes
	Description	uPVC, HDPE, PP, PP-R, PE, PEX, PEX-AL, CPVC and acoustic 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	BOSS FireMastic-300 can be installed in any of the following instances: Installed into the aperture between the service and collar on both the exposed and the 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		
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 – 2 layers Ø50 mm MaxiCollar – 3 layers Ø55 mm MaxiCollar – 3 layers

Item	Description	
		Ø65 mm MaxiCollar – 3 layers Ø80 mm MaxiCollar – 4 layers Ø100 mm MaxiCollar – 5 layers Ø110 mm MaxiCollar – 4 layers Ø125 mm MaxiCollar – 5 layers Ø140 mm MaxiCollar – 5 layers Ø150 mm MaxiCollar – 9 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 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. Maximum 0.35 m^2 with an aspect ratio of 2.85:1 if installed as a double layer
	Nominal density	Minimum 140 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 or ablative coating must be used to bed the cut batts together and to

Item	Description		
		seal the edges of the batt with the separating element and with the pipe.	
Fixings			
6.	Item name	Collar fixing	
	Product name	BOSS Batts	• BOSS Pigtail screws • 10G 38mm coarse thread laminating screws • Minimum 8 ×1 1/2” Steel hex head screws
		AAC	• 14-10×65mm steel hex head screws • 10G×38mm coarse thread laminating screws • 8×3/4” Steel hex head screws
		Concrete, Masonry and other similar substrates	• Min 40mm steel wedge anchors • Min 30mm masonry bolts or masonry screw fixings • Min 40mm sleeve anchors.
		Calcium silicate, MgO or other similar	• 10G 38mm coarse thread laminating screws • 8x3/4” Steel hex head screws
		CLT	• 110 mm thick, Min. 8g × 65 mm • 200 mm thick, Min. 10g × 125 mm
		Washers may be required dependant on the fixings head diameter.	
	Installation	Fixing through each collar tab	
	Item name	BOSS Batt fixing dependent on the separating element	
	Installation	The fixing of the batt on a separating element must be specified via the test/assessment used to establish the FRL of the configuration. The testing or assessment must be conducted by an ATL. With thicker floors, screw length must be varied to maintain minimum embedment of 20 mm.	

Figure 1 to Figure 29 are provided as typical installation details. They are not exhaustive of all installation combinations and are to be read in conjunction with the key elements of this report

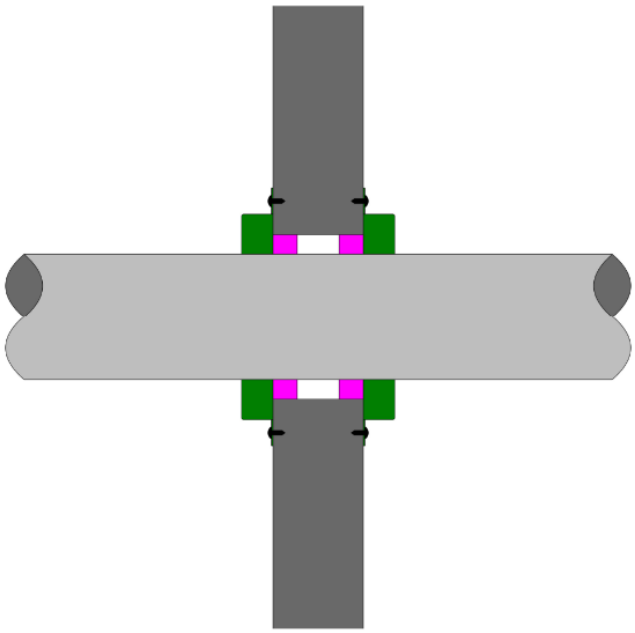

Figure 1 Typical installation of pipes fitted perpendicular to wall system with BOSS MaxiCollar™ installed on both faces

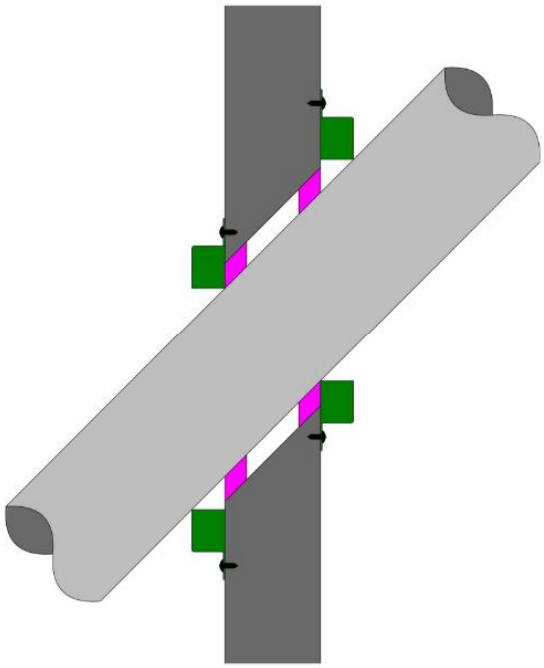

Figure 2 Typical installation of 30º angled pipe in wall with BOSS MaxiCollar™ on both faces

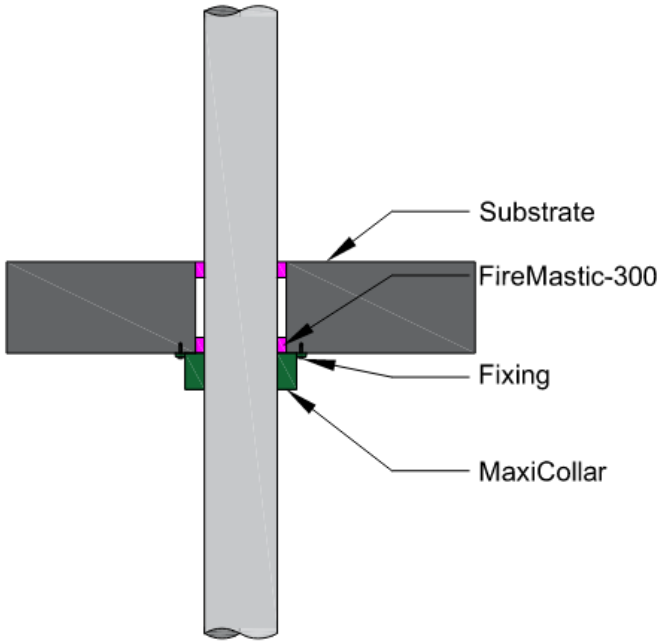

Figure 3 **Typical installation of pipes fitted perpendicular to floor system with BOSS MaxiCollar™ installed on the exposed face**

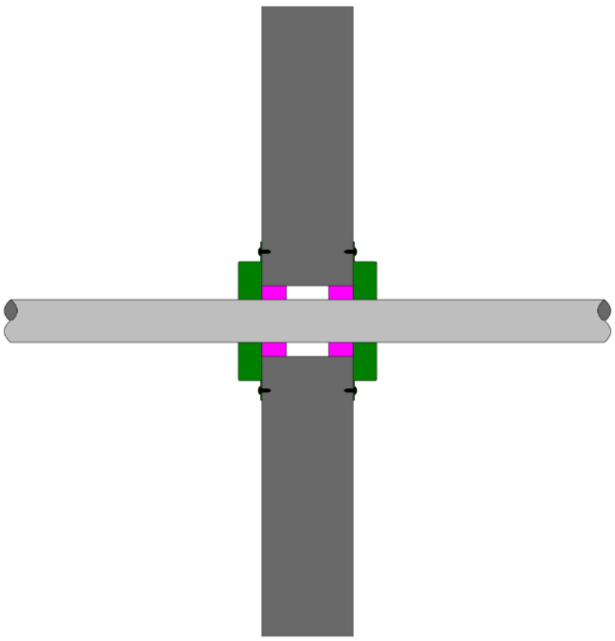

Figure 4 Typical installation of oversized BOSS MaxiCollar™ in walls

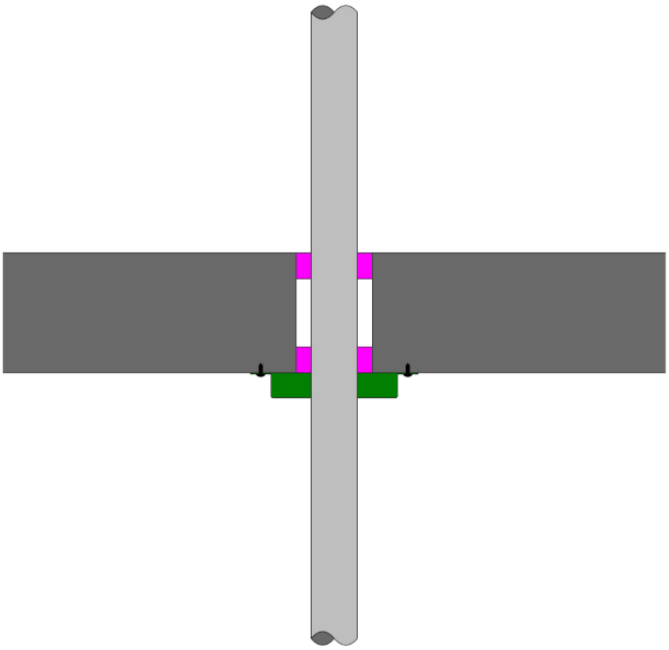

Figure 5 Typical installation of oversized BOSS MaxiCollar™ in floors

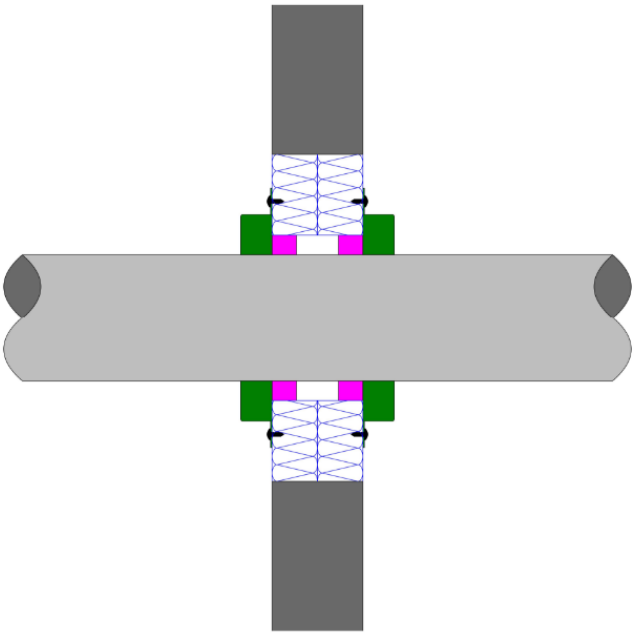

Figure 6 Typical installation of pipes fitted in two layers of BOSS Batt friction fitted to wall aperture and BOSS MaxiCollar™ installed on both faces

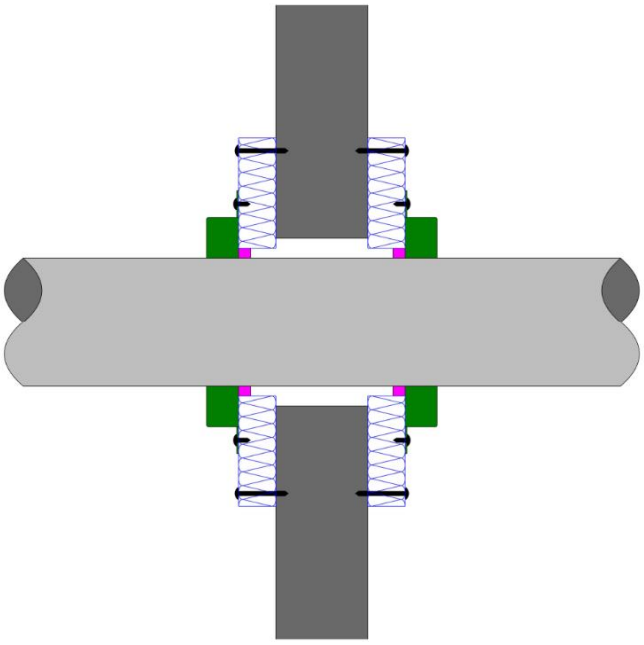

Figure 7 **Typical installation of pipes fitted perpendicular to wall with single layer of BOSS Batts pattress-fitted in aperture and BOSS MaxiCollar™ on both faces**

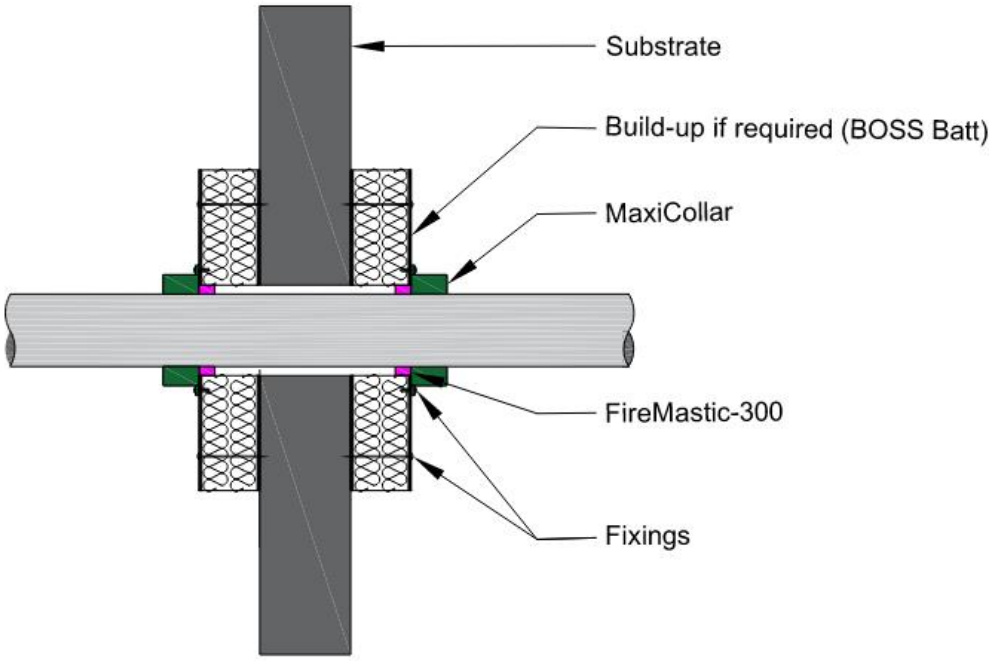

Figure 8 **Typical installation of pipes fitted perpendicular to wall with two layers of BOSS Batts pattress-fitted in aperture and BOSS MaxiCollar™ on both faces**

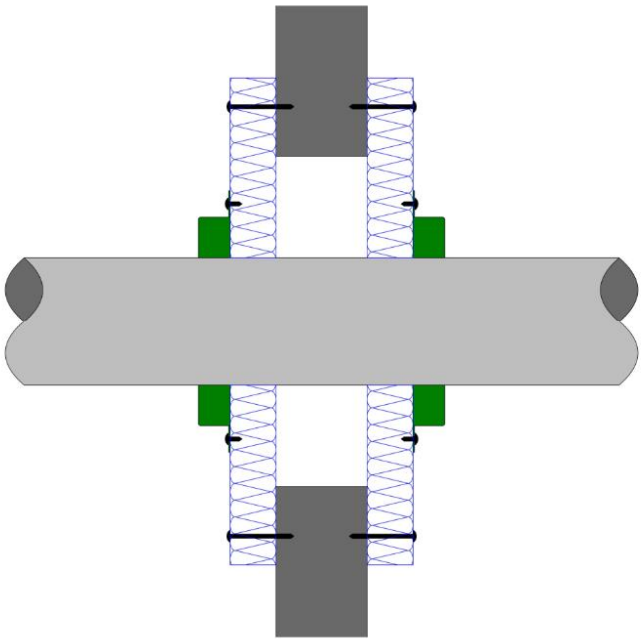

Figure 9 **Typical installation of pipes fitted perpendicular to wall with two layers of BOSS Batts pattress-fitted in aperture and BOSS MaxiCollar™ on both faces with 0 annular gap**

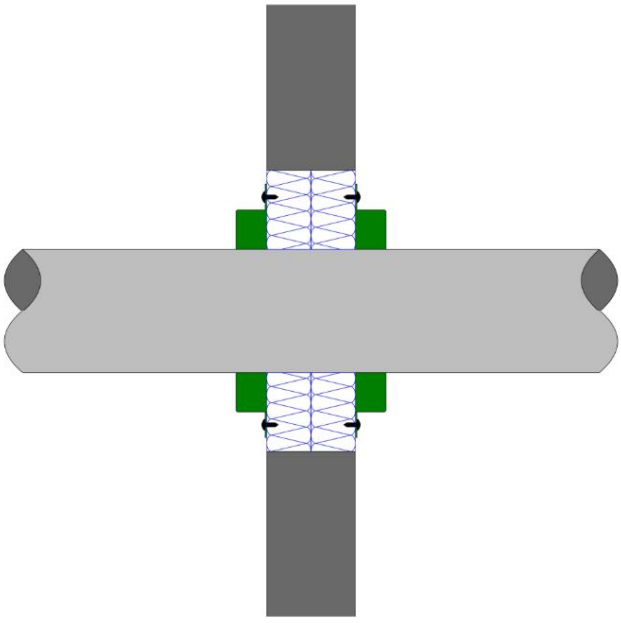

Figure 10 **Typical installation of pipes fitted perpendicular to wall with two layers of BOSS Batts friction-fitted in the aperture and BOSS MaxiCollar™ on both faces with 0 annular gap**

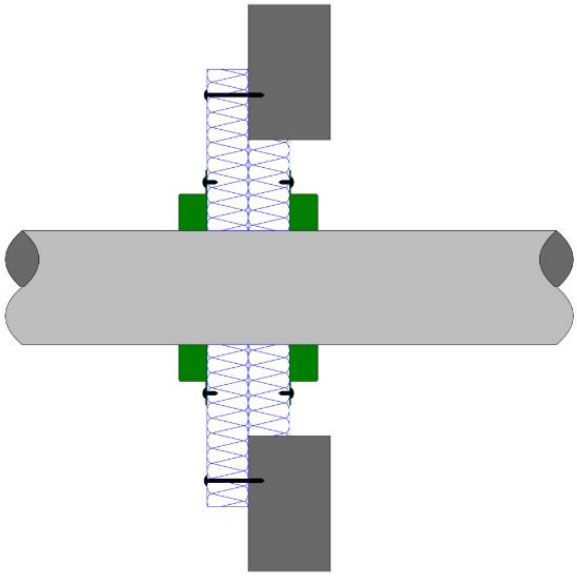

Figure 11 **Pipes fitted perpendicular to wall with aperture fitted with one layer of Batt friction fitted and one pattress fitted on the unexposed side only and BOSS MaxiCollar™ installed on both sides with 0 annular gap**

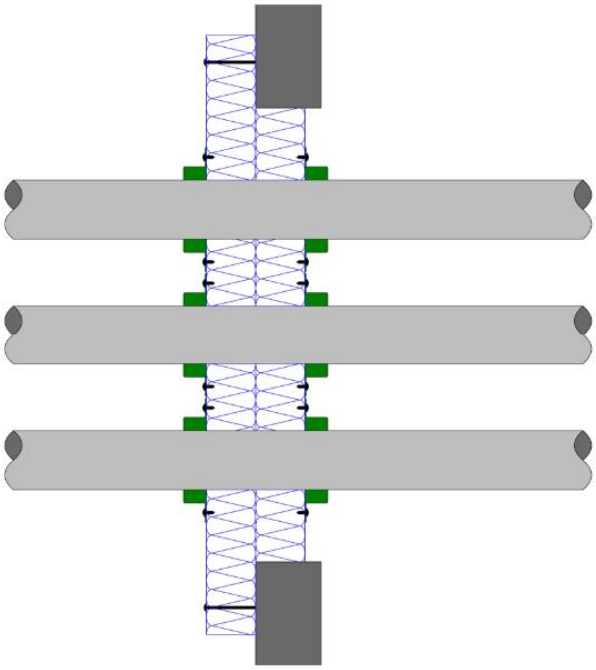

Figure 12 **Typical wall multi penetration installation of pipes fitted perpendicular to wall with two layers of BOSS Batts friction fitted and pattress-fitted in aperture and BOSS MaxiCollar™ with 0 annular gap.**

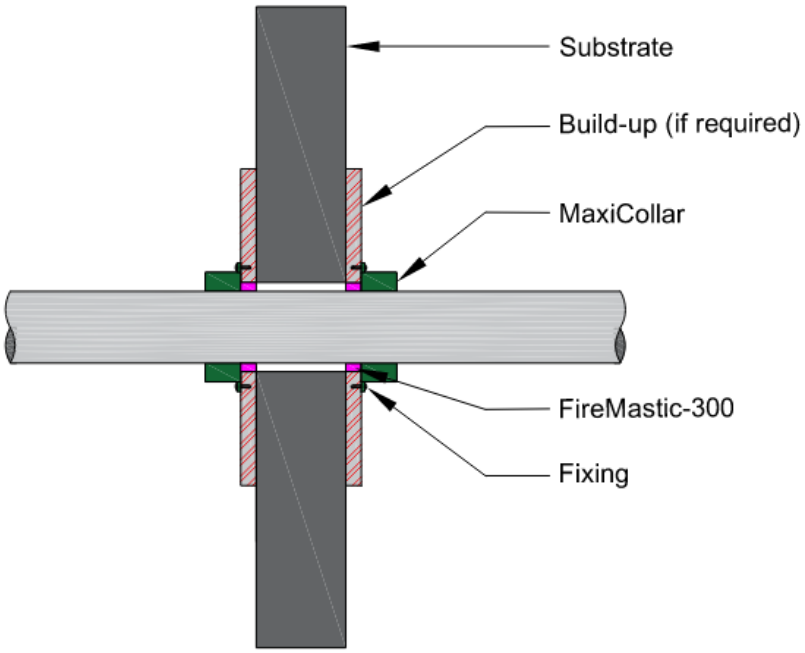

Figure 13 Typical installation through locally thickened separating element with BOSS MaxiCollar™ on both faces

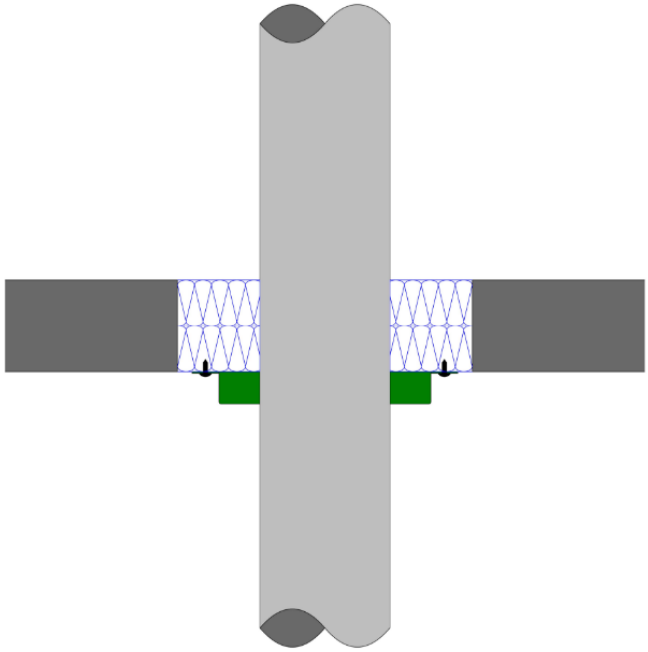

Figure 14 Typical installation of pipes fitted perpendicular through a batt sealing aperture in a floor system with BOSS MaxiCollar™ installed on the exposed face with 0 annular gap

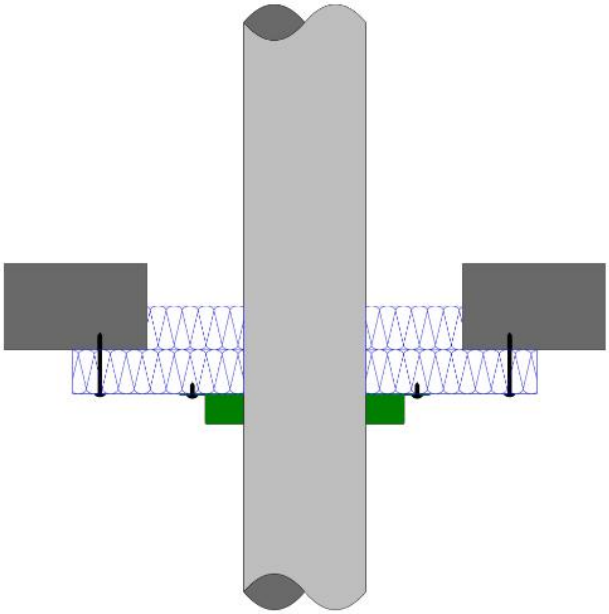

Figure 15 Pipes fitted perpendicular to floor with aperture fitted with one layer of Batt friction fitted and one pattress fitted on the exposed side only and BOSS MaxiCollar™ installed on the exposed face with 0 annular gap

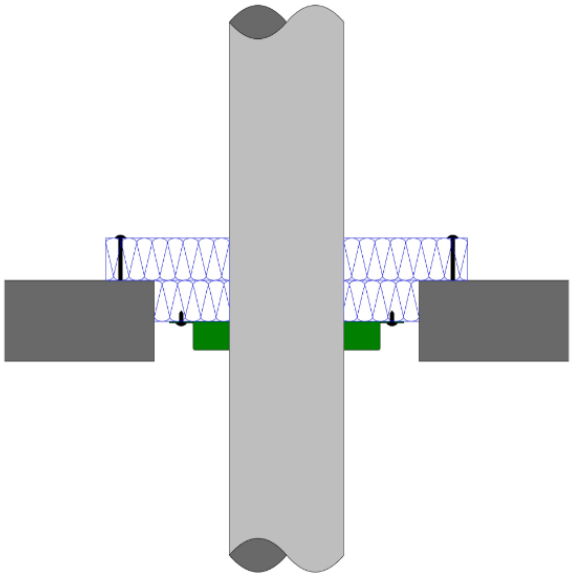

Figure 16 Pipes fitted perpendicular to floor with aperture fitted with one layer of Batt friction fitted and one pattress fitted on the unexposed side only and BOSS MaxiCollar™ installed on the exposed face with 0 annular gap

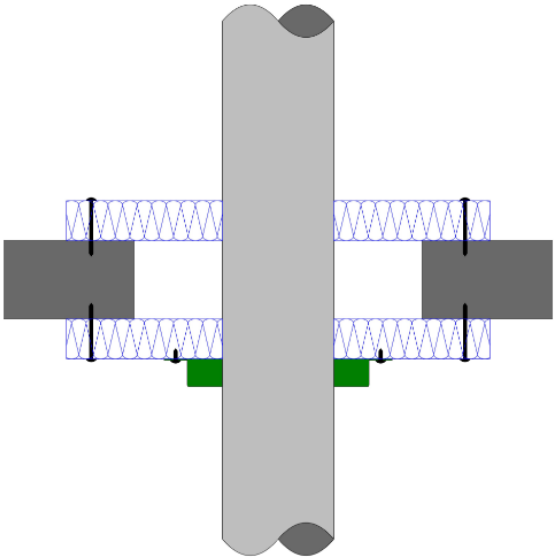

Figure 17 Pipes fitted perpendicular to floor with aperture fitted with one layer of Batt on each side and BOSS MaxiCollar™ installed on the exposed face with 0 annular gap

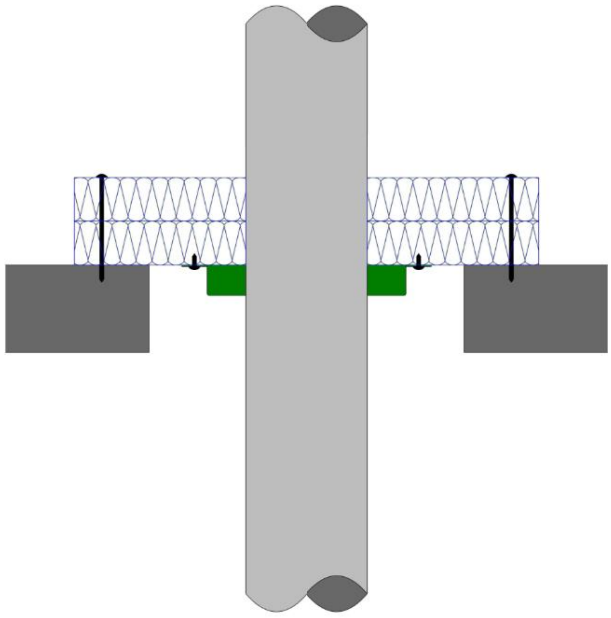

Figure 18 **Pipes fitted perpendicular to floor with aperture fitted with two layers of Batt pattress fitted on the unexposed side only and BOSS MaxiCollar™ installed on the exposed face with 0 annular gap**

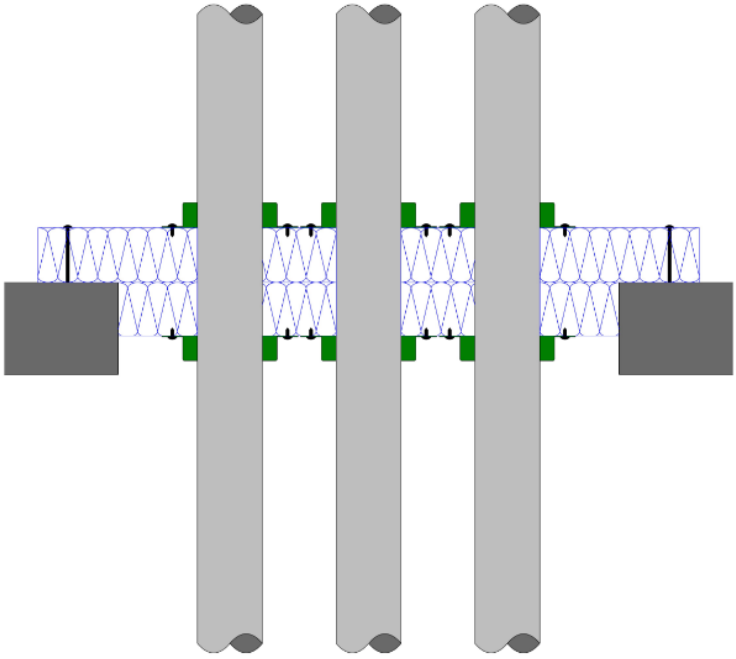

Figure 19 **Typical floor multi penetration fitted perpendicular to floor with aperture fitted with one layer of Batt friction fitted and one pattress fitted on the unexposed side only and BOSS MaxiCollar™ installed on both sides with 0 annular gap**

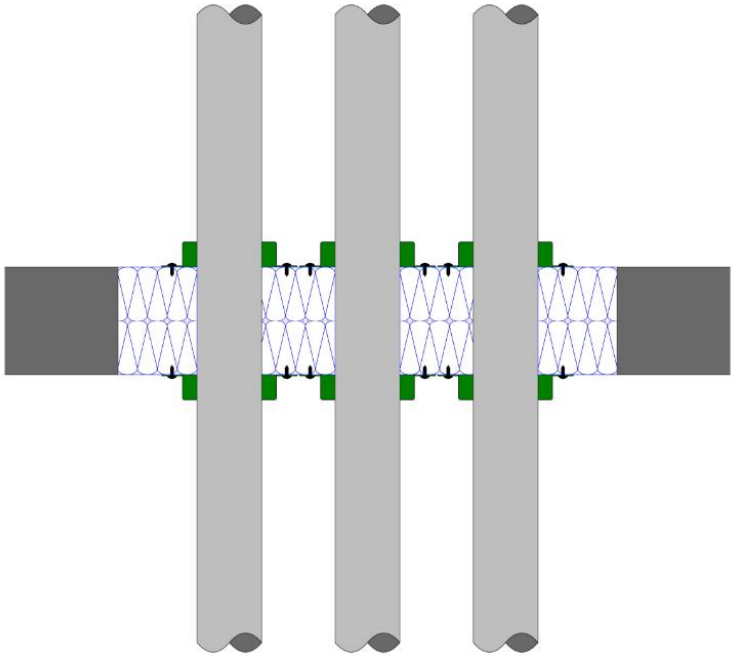

Figure 20 **Typical floor multi penetration fitted perpendicular to floor with aperture fitted with two layers of Batt friction fitted in the aperture and BOSS MaxiCollar™ installed on both sides with 0 annular gap**

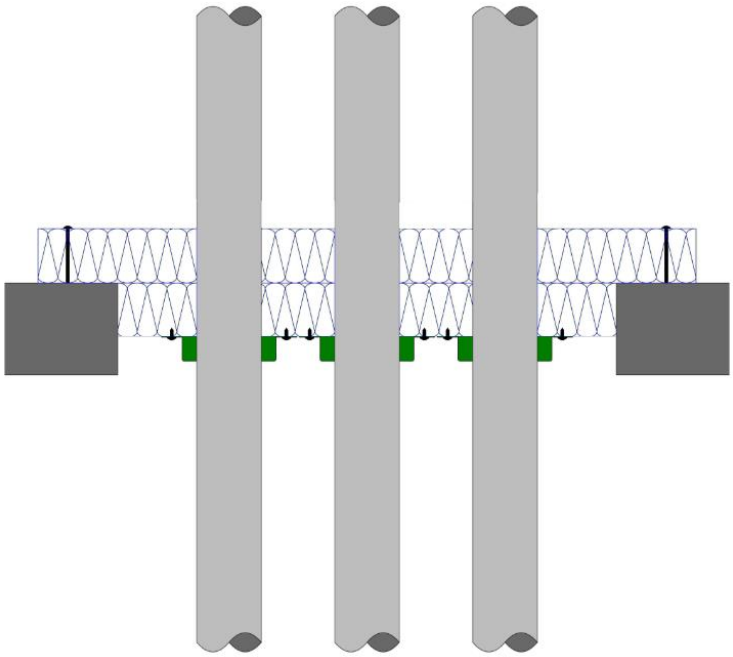

Figure 21 **Typical floor multi penetration fitted perpendicular to floor with aperture fitted with one layer of Batt friction fitted and the other one pattress fitted to the aperture and BOSS MaxiCollar™ installed on on the exposed side only with 0 annular gap**

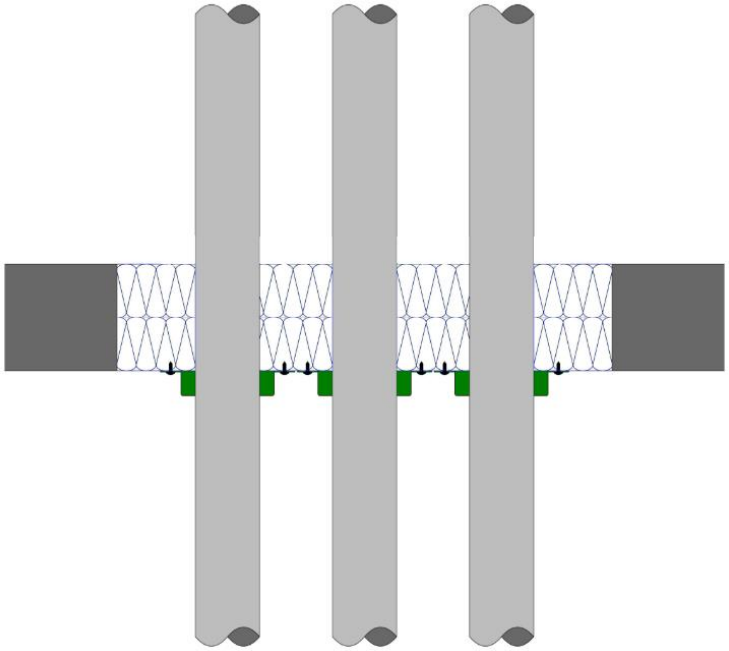

Figure 22 **Typical floor multi penetration fitted perpendicular to floor with aperture fitted with two layers of Batt friction fitted in the aperture and BOSS MaxiCollar™ installed on the exposed side only with 0 annular gap**

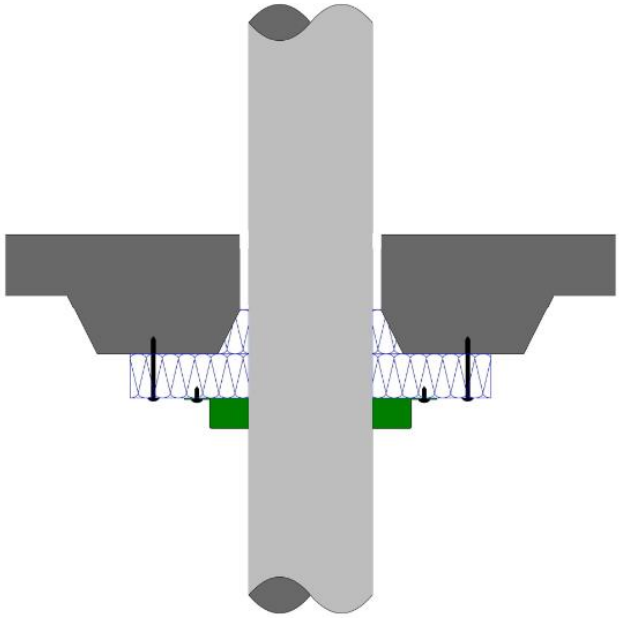

Figure 23 **Typical floor penetration fitted perpendicular to composite floor with aperture fitted with one layer of Batt friction fitted and one pattress fitted in the aperture and BOSS MaxiCollar™ installed on the exposed side.**

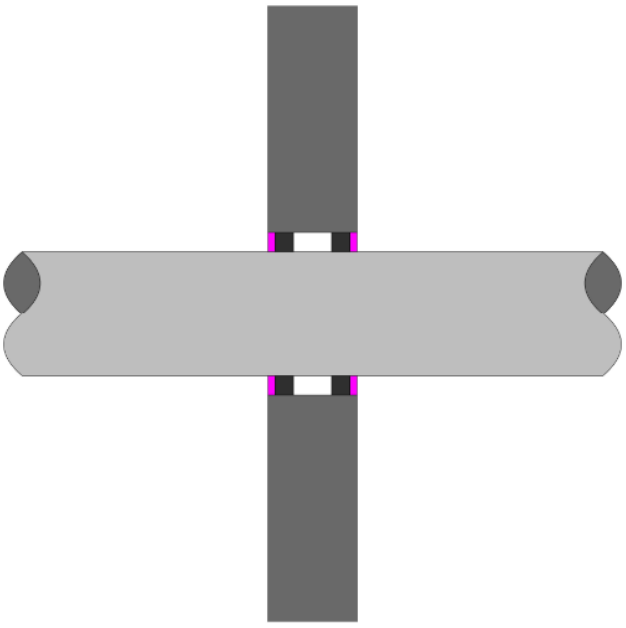

Figure 24 Typical installation of pipes fitted perpendicular to wall with BOSS UniWrap on both faces

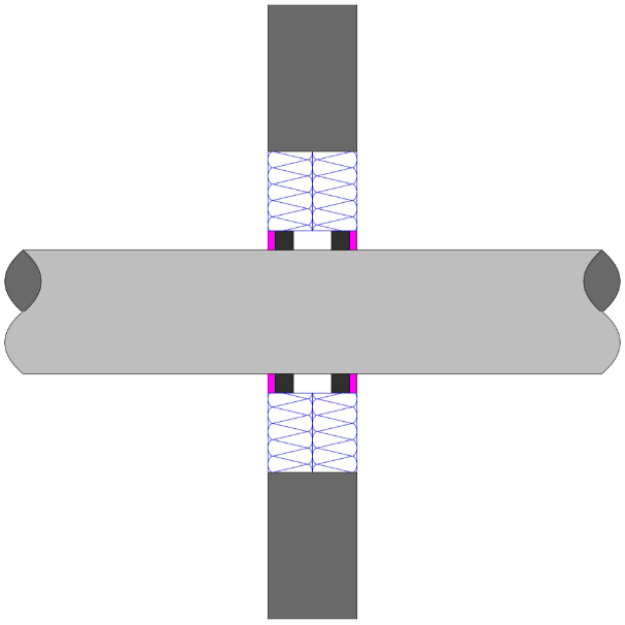

Figure 25 Typical installation of pipes fitted perpendicular to Batt sealing an aperture in a wall with BOSS UniWrap on both faces

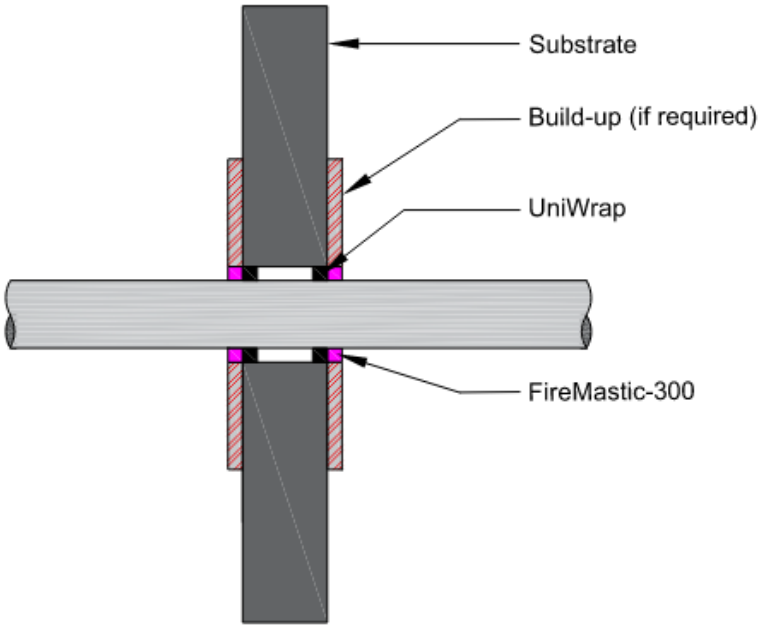

Figure 26 Typical installation of pipes fitted perpendicular to wall with build-up and BOSS UniWrap on both faces

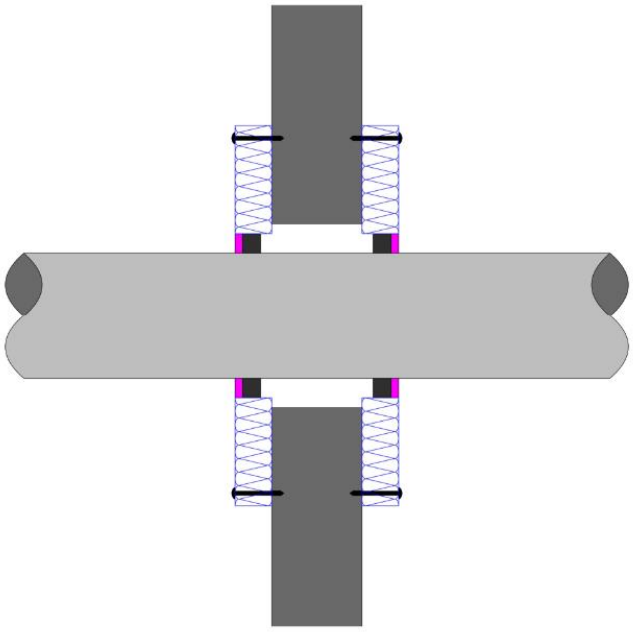

Figure 27 Typical installation of pipes fitted perpendicular to wall with two layers of BOSS Batts pattress-fitted in aperture and BOSS UniWrap on both faces

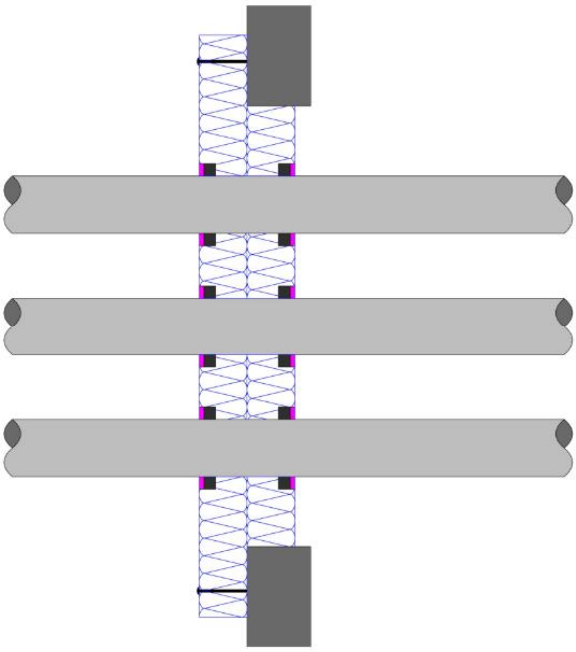

Figure 28 **Typical installation of multiple pipes with UniWrap in walls fitted perpendicular to one layer of BOSS Batt friction-fitted in aperture and one layer of BOSS Batt pattress-fitted to the aperture.**

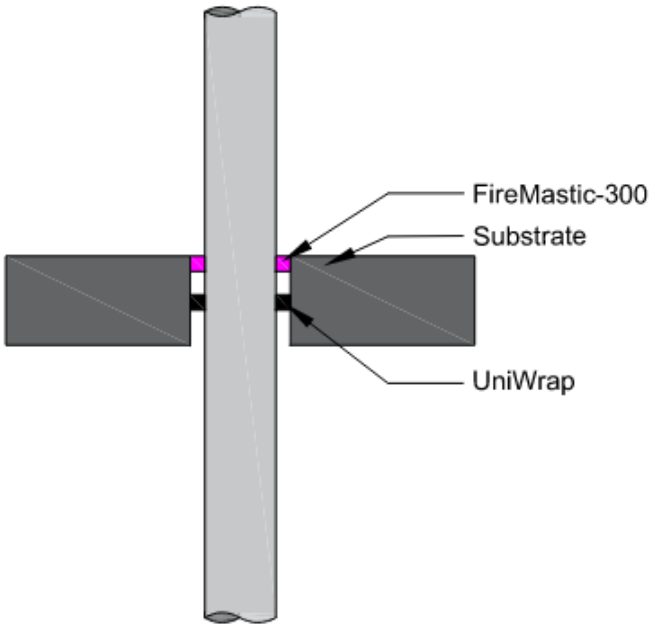

Figure 29 **Typical installation of Pipes fitted perpendicular to floor with BOSS UniWrap at mid-depth**

5. resistance performance of services protected with BOSS MaxiCollar™

5.1 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, CPVC and acoustic 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.
- Minimum 110 mm thick CLT wall.
- Minimum 100 mm thick Boss Batt friction fitted in the aperture, or pattress fitted or a combination of friction fit and pattress fit in a rigid wall system. The pattress fitted layer must overlap the separating element.

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)
- Minimum 150 mm thick aerated concrete floor with a minimum nominal density of 650 kg/m^3.
- 120 mm thick concrete floor with a minimum nominal density of 2400 kg/m^3.
- 225 mm thick ceiling system with established FRL.
- Minimum 110 mm thick CLT slab with a minimum nominal density of 400 kg/m^3.

5.2 Methodology

The method of assessment used is summarised in Table 52.

Table 8 Method of assessment

Assessment method	
Level of complexity	Complex assessment
Type of assessment	Qualitative

5.3 Fire resistance performance of BOSS MaxiCollars™ in walls

5.3.1 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, FRT180473 R1.0, 148597 R3.0, 147113, 147008 and PF23030 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.

Two layer test services may be installed in single layer system 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 50 mm to a stud, the cavity must be closed between the penetration seal and the stud, and minimum 50 mm of insulation confirmed to be deemed non-combustible in accordance with AS 1530.1 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.

Timber walls must have a minimum thickness of 110 mm and consist of cross-laminated timber (CLT). The density must be minimum 400 kg/m^3.

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 chosen fixings must be approved and appropriate for both the substrate and the build-up. This report specifies the approved fixing with a minimum embedment depth

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.

5.3.2 Large apertures protected with BOSS sealing systems

Where specified, services penetrating single or double layers of 50 mm thick BOSS batts (density 140 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 suitable fixings to the substrate with minimum 20 mm embedment. 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 or ablative coating 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. Additionally, each vertical and horizontal cut of the batt must be sealed with BOSS FireMastic-300 sealant or ablative coating 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 23.

5.3.3 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 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 10 to Table 23.

The minimum spacing between multiple services protected with BOSS MaxiCollars™ passing through BOSS Batts or substrate with density greater than 140 Kg/m^3 in wall system can be 0 mm. Collars must be fixed to both faces and sealant must be applied into the annular gap around the pipe for a the depth specified in the outcome tables 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 23.

Minimum 90 mm thick flexible[1] or rigid walls

Table 9 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[2]	FRL
uPVC DWV	Up to 32	2	7.5	40 mm MaxiCollar™	FM300 to a depth of 5 mm	-/60/60 C/U with adding minimum 10 mm of an approved build up (5 mm each side) to achieve a 100 mm thick wall
						-/60/45 C/U
	Up to 40	2	7.5	40 mm MaxiCollar™		-/60/60 C/U with adding minimum 10 mm of an approved build up (5 mm each side) to achieve a 100 mm thick wall
						-/60/45 C/U
	Up to 50	2.7	7.5	50 mm MaxiCollar™		-/60/60 C/U with adding minimum 10 mm of an approved build up (5 mm each side) to achieve a 100 mm thick wall

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[2]	FRL
						-/60/45 C/U
	Up to 65	2.7	7.5	80 mm MaxiCollar™		-/60/60 C/U
	Up to 80	2.9	7.5	80 mm MaxiCollar™		-/60/60 C/U
	Up to 100	3	7.5	100 mm MaxiCollar™		-/60/60 C/U with adding minimum 10 mm of an approved build up (5 mm each side) to achieve a 100 mm thick wall
						-/60/45 C/U
	Up to 150	5	7.5	150 mm MaxiCollar™		-/60/60 C/U with adding minimum 10 mm of an approved build up (5 mm each side) to achieve a 100 mm thick wall
						-/60/45 C/U
HDPE	Up to 32	3.1	4.0	40 mm MaxiCollar™		-/60/60 C/U
	Up to 125	11.75	2.0	125 mm MaxiCollar™		-/30/30 C/U
	125 - 160	7.5	4.0	MaxiCollar™ size to fit		-/45/45 C/U
	40 - 160	4.9 – 9.5	10.0	150 mm MaxiCollar™	FM300 to a depth of 12.5 mm	-/60/60 C/U with adding minimum 10 mm of an approved build up (5 mm each side) to achieve a 100 mm thick wall

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[2]	FRL
PPR	Up to 32	2.9	10.0	32 mm MaxiCollar™	FM300 to a depth of 5 mm	-/60/45 C/U
	32 - 125	2.7	10.0	110 mm MaxiCollar™	FM300 to a depth of 10 mm	-/60/60 C/U with adding minimum 10 mm of an approved build up (5 mm each side) to achieve a 100 mm thick wall
						-/60/45 C/U
	Up to 125	11.4	10.0	125 mm MaxiCollar™	FM300 to a depth of 5 mm	-/60/45 C/U

[1] 34 mm steel stud lined with one layer of 13 mm thick fire rated plasterboard on each side. The system must have an established FRL via testing or assessment by an ATL
[2] Sealant applied behind the collar between the pipe and the aperture on both the exposed and unexposed sides

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)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[2]	FRL
PE	Up to 50	3 – 4.6	10.0	50 mm MaxiCollar™	FM300 to a depth of 10 mm	-/120/120 U/U
	Up to 110	10.0	10.0	110 mm MaxiCollar™		-/60/60 U/U[3]
		2.7	10.0	110 mm MaxiCollar™		-/120/60 U/U
		2.7 – 10.0	10.0	110 mm MaxiCollar™		-/60/60 U/U
	Up to 125	3.1	10.0	125 mm MaxiCollar™		-/120/120 U/U
		3.1 – 11.4	10.0	125 mm MaxiCollar™		-/90/90 U/U
	Up to 160	4.0	10.0	160 mm MaxiCollar™		-/120/120 U/U[3]
	Up to 125	3.1	10.0	125 mm MaxiCollar™	FM300 to a depth of 12.5 mm	-/120/120 U/U
PP / PP-R	Up to 32	2.9	10.0	32 mm MaxiCollar™	FM300 to a depth of 5 mm	-/60/45 C/U

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[2]	FRL
	Up to 50	2.0	10.0	50 mm MaxiCollar™	FM300 to a depth of 10 mm	-/120/90 U/U
		2.0 – 6.9	10.0	50 mm MaxiCollar™		-/120/60 U/U
		2.9	10.0	50 mm MaxiCollar™	FM300 to a depth of 12.5 mm	-/120/120 U/C
	Up to 110	2.7	10.0	110 mm MaxiCollar™	FM300 to a depth of 10 mm	-/120/90 U/U
		2.7 – 10.0	10.0	110 mm MaxiCollar™		-/90/90 U/U
		2.7 – 10.0	10.0	110 mm MaxiCollar™	FM300 to a depth of 12.5 mm	-/120/120 U/C
	32 - 125	2.7 – 10.0	10.0	110 mm MaxiCollar™	FM300 to a depth of 10 mm	-/60/60 C/U
	Up to 125	3.1	10.0	125 mm MaxiCollar™	FM300 to a depth of 10 mm	-/120/90 U/U
		3.1	10.0	125 mm MaxiCollar™	FM300 to a depth of 12.5 mm	-/120/120 U/C
		3.1 – 17.1	10.0	125 mm MaxiCollar™	FM300 to a depth of 10 mm	-/60/60 U/U[3]
	Up to 160	4.0	10.0	160 mm MaxiCollar™	FM300 to a depth of 10 mm	-/90/90 U/U
		4.0 - 9.1	10.0	160 mm MaxiCollar™	FM300 to a depth of 10 mm	-/15/15 U/U[3]
		4.0 - 14.6	10.0	160 mm MaxiCollar™	FM300 to a depth of 12.5 mm	-/120/120 U/C
		9.1	10.0	160 mm MaxiCollar™	FM300 to a depth of 10 mm	-/15/15 U/U
PVC	Up to 50	1.8	10.0	50 mm MaxiCollar™	FM300 to a depth of 12.5 mm	-/120/120 U/C
		1.8 – 3.7	10.0	50 mm MaxiCollar™	FM300 to a depth of 10 mm	-/120/90 U/U
	Up to 110	4.2	10.0	110 mm MaxiCollar™		-/120/120 U/C
		4.2 – 7.4	10.0	110 mm MaxiCollar™	FM300 to a depth of 12.5 mm	-/120/120 U/C
		4.2 – 6.6	10.0	110 mm MaxiCollar™	FM300 to a depth of 10 mm	-/120/120 U/U
	Up to 125	7.4	10.0	125 mm MaxiCollar™		-/120/90 U/U
		4.8 – 7.4	10.0	125 mm MaxiCollar™		-/90/90 U/U
		6.0	10.0	125 mm MaxiCollar™	FM300 to a depth of 12.5 mm	-/120/120 U/C
	Up to 160	6.2 – 9.5	10.0	160 mm MaxiCollar™	FM300 to a depth of 10 mm	-/120/120 U/U
		6.2 – 9.5	10.0	160 mm MaxiCollar™	FM300 to a depth of 12.5 mm	-/120/120 U/C
HDPE	Up to 32	3.1	10.0	40 mm MaxiCollar™	FM300 to a depth of 5 mm	-/60/60 C/U
	Up to 50	2.9	10.0	50 mm MaxiCollar™	FM300 to a depth of 12.5 mm	-/120/120 U/C

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[2]	FRL
	Up to 110	2.7 – 10.0	10.0	110 mm MaxiCollar™	FM300 to a depth of 12.5 mm	-/120/120 U/C
	40 – 120	3.2 – 11.4	10.0	MaxiCollar™ Size to fit	FM300 to a depth of 5 mm	-/60/45 C/U
	120 -150	11.4 – 14.5	10.0	MaxiCollar™ Size to fit	FM300 to a depth of 5 mm	-/45/45 C/U
	Up to 160	4.9 – 9.5	10.0	160 mm MaxiCollar™	FM300 to a depth of 12.5 mm	-/120/120 U/C
	40 - 160	3.2 – 14.5	10.0	MaxiCollar™ Size to fit	FM300 to a depth of 5 mm	-/60/60 C/U
uPVC	Up to 32	2	7.5	40 mm MaxiCollar™	FM300 to a depth of 5 mm	-/60/60 C/U
	Up to 40	2	7.5	40 mm MaxiCollar™	FM300 to a depth of 5 mm	-/60/60 C/U
	Up to 50	2.7	7.5	50 mm MaxiCollar™	FM300 to a depth of 5 mm	-/60/60 C/U
	Up to 65	2.7	7.5	80 mm MaxiCollar™	FM300 to a depth of 5 mm	-/60/60 C/U
	Up to 80	2.9	7.5	80 mm MaxiCollar™	FM300 to a depth of 5 mm	-/60/60 C/U
	Up to 100	3	7.5	100 mm MaxiCollar™	FM300 to a depth of 5 mm	-/60/60 C/U
	Up to 150	5	7.5	150 mm MaxiCollar™	FM300 to a depth of 5 mm	-/60/60 C/U
	Up to 160	2.8	20.0	80 mm MaxiCollar™	12 mm thick armaflex lagging	-/120/120 C/U

[1] 50 mm steel stud lined with two layers of 12.5 mm thick fire rated plasterboard on each side. The system must have an established FRL via testing or assessment by an ATL

[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)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
PP / PP-R	Up to 32	5.8	3	32 mm MaxiCollar™	FireMastic-HPE in the gap between the collar and pipe	-/60/60 C/U
uPVC	Up to 40	5.0	5	40 mm MaxiCollar™		-/60/60 C/U
	Up to 50	4.5	5	50 mm MaxiCollar™		-/60/60 C/U

	Up to 80	6.4	5	80 mm MaxiCollar™		-/60/60 C/U
	Up to 32	2	9.0	40 mm MaxiCollar™	FM300 to depth of 10 mm	-/60/60 C/U
	Up to 40	2	9.0	40 mm MaxiCollar™	FM300 to depth of 10 mm	-/60/60 C/U
	Up to 50	2.7	9.0	50 mm MaxiCollar™	FM300 to depth of 10 mm	-/60/60 C/U
	Up to 65	2.7	9.0	80 mm MaxiCollar™	FM300 to depth of 5 mm	-/60/60 C/U
	Up to 80	2.9	9.0	80 mm MaxiCollar™	FM300 to depth of 5 mm	-/60/60 C/U
	Up to 100	3	9.0	100 mm MaxiCollar™	FM300 to depth of 10 mm	-/60/60 C/U
	Up to 150	5.2	9.0	150 mm MaxiCollar™	FM300 to depth of 5 mm	-/60/60 C/U With a local build up
	Up to 150	5.2	9.0	150 mm MaxiCollar™	FM300 to depth of 5 mm	-/60/45
CPVC	Up to 50	10.1	5	50 mm MaxiCollar™	FireMastic-HPE in the gap between the collar and pipe	-/60/30 C/U
HDPE	Up to 160	4.9 – 9.5	10.0	150 mm MaxiCollar™	FM300 to depth of 12.5 mm	-/60/60
PEX	Up to 25	3.2	3-4.5	32 mm MaxiCollar™	FireMastic-HPE to depth of 13 mm	-/60/60[3]
PEX-AL-PEX	Up to 25	3	3-4	32 mm MaxiCollar™	FireMastic-HPE to depth of 13 mm	-/60/45[3]
uPVC (1-way penetration)	Up to 40mm	2	5	40 mm MaxiCollar™	FM300 to depth of 5 mm	-/60/60

[1] 92 mm steel stud lined with one layer of 13 mm thick fire rated plasterboard on each side. The system must have an established FRL via testing or assessment by an ATL

[2] Sealant applied behind the collar between the pipe and the aperture on both the exposed and unexposed sides

[3] The wall cavity must be insulated

Minimum 116 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)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[2]	FRL
uPVC	Up to 32	2	9.0	40 mm MaxiCollar™	FM300 to depth of 5 mm	-/120/120 C/U
	Up to 40	2	9.0	40 mm MaxiCollar™	FM300 to depth of 10 mm	-/120/120 C/U
	Up to 50	2.7	9.0	50 mm MaxiCollar™	FM300 to depth of 5 mm	-/120/120 C/U
	Up to 65	2.7	9.0	80 mm MaxiCollar™	FM300 to depth of 5 mm	-/120/120 C/U
	Up to 80	2.9	9.0	80 mm MaxiCollar™	FM300 to depth of 5 mm	-/120/120 C/U
	Up to 100	3	9.0	100 mm MaxiCollar™	FM300 to depth of 10 mm	-/120/120 C/U
	Up to 150	5.2	9.0	150 mm MaxiCollar™	FM300 to depth of 5 mm	-/120/120 C/U
HDPE	Up to 32	3.1	4.0	40 mm MaxiCollar™		-/120/120 C/U
	Up to 125	11.75	2.0	125 mm MaxiCollar™		-/120/45 C/U
	Up to 160	14.5	2.5	160 mm MaxiCollar™		-/60/60 C/U
	40-150	14.5	9.0	MaxiCollar™ size to fit	FM300 to depth of 12.5 mm	-/60/60 C/U
	150 - 160	14.5	9.0	160 mm MaxiCollar™	FM300 to depth of 12.5 mm	-/120/120 C/C
PPR	Up to 32	2.9	1.5	40 mm MaxiCollar™	FM300 to depth of 5 mm	-/120/120 C/U
	Up to 110	2.7	10.0	110 mm MaxiCollar™	FM300 to a depth of 10 mm	-/120/90 U/U
		2.7 – 10.0	10.0	110 mm MaxiCollar™		-/90/90 U/U
		2.7 – 10.0	10.0	110 mm MaxiCollar™	FM300 to a depth of 12.5 mm	-/120/120 U/C
	110 - 125	11.4	2.0	125 mm MaxiCollar™	FM300 to depth of 5 mm	-/30/30 C/U
	125-160	11.4	10.0	MaxiCollar™size to fit	FM300 to a depth of 10 mm	-/90/90 C/U
uPVC (1-way penetration)	Up to 40mm	2.7	9.0	40 mm MaxiCollar™	FM300 to depth of 5 mm	-/90/90[3]

[1] 64 mm steel stud lined with two layers of 13 mm thick fire rated plasterboard on each side. The system must have an established FRL via testing or assessment by an ATL
[2] Sealant applied behind the collar between the pipe and the aperture on both the exposed and unexposed sides
[3] The wall cavity must be insulated

Minimum 144 mm thick flexible[1] or rigid walls

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

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC (sandwich core)	100	3.2	5	100 mm MaxiCollar™	-	-/120/120 C/U
[1] 92 mm steel stud lined with two layers of 13 mm thick fire rated plasterboard on each side. The system must have an established FRL via testing or assessment by an ATL						

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

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

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	Up to 40	3.0	15.0	40 mm MaxiCollar™	FM300 to a depth of 5 mm	-/120/90 C/U
	Up to 50	2.6	13.0	50 mm MaxiCollar™		-/120/120 C/U
	Up to 80	3.4	11.0	80 mm MaxiCollar™		-/120/120 C/U
uPVC (sandwich core)	Up to 100	3.8	10.5	100 mm MaxiCollar™		-/120/- C/U
[1] Sealant applied behind the collar between the pipe and the aperture on both the exposed and unexposed sides [2] 75 mm thick AAC wall with minimum nominal density of 38.8 kg/m^2. The system must have an established FRL via testing or assessment by an ATL.						

Minimum 100 mm thick AAC block wall or solid masonry wall

Table 15 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[1]	FRL
PP / PP-R	Up to 110	2.7	10.0	110 mm MaxiCollar™	FM300 to a depth of 10 mm	-/120/120 U/U, U/C

						-/60/30 C/U
						-/120/120 C/U[2]
	Up to 160	4.0	10.0	160 mm MaxiCollar™		-/120/120 U/U
						-/120/120 C/U
						-/120/120 C/U[2]
	Up to 250	6.2	10.0	250 mm MaxiCollar™		-/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
[3] 100 mm thick AAC block wall must have an established FRL via testing or assessment by an ATL

Table 16 Pipes fitted with 90º U-bend with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[1]	FRL
PP / PP-R	110	2.7	10.0	110 mm MaxiCollar™	FM300 to a depth of 10 mm	-/120/120 C/U[2]
	160	4.0	10.0	160 mm MaxiCollar™		-/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 17 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

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

[2] 150 mm thick AAC block wall tested or assessed by an ATL

120 mm thick rigid wall

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

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	Up to 32	2	11	40 mm MaxiCollar™		-/120/120

	Up to 40	2	11	40 mm MaxiCollar™	FM300 on both sides to depth of 5 mm	-/120/120
	Up to 50	2.7	11	50 mm MaxiCollar™		-/120/120
	Up to 65	2.7	11	80 mm MaxiCollar™		-/120/120
	Up to 80	2.9	11	80 mm MaxiCollar™		-/120/120
	Up to 100	3	11	100 mm MaxiCollar™		-/120/120
	Up to 150	5.2	11	150 mm MaxiCollar™		-/120/120
PP/PP-MD-PP (Acoustic pipes)	Up to 40	2.2	3.5	40 mm MaxiCollar™		-/120/120
	Up to 110	5	6	150 mm MaxiCollar™		-/120/120
[1] The 120 mm thick rigid wall must have an established FRL via testing or assessment or designed for fire resistance in accordance with AS3600 or AS3700 or equivalent New Zealand standard such as NZS 3101 or NZS 4230.						

175 mm thick rigid wall

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

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	Up to 32	2	11	40 mm MaxiCollar™	FM300 on both sides to depth of 5 mm	-/240/240
	Up to 40	2	11	40 mm MaxiCollar™		-/240/240
	Up to 50	2.7	11	50 mm MaxiCollar™		-/240/240
	Up to 65	2.7	11	80 mm MaxiCollar™		-/240/240
	Up to 80	2.9	11	80 mm MaxiCollar™		-/240/240
	Up to 100	3	11	100 mm MaxiCollar™		-/240/240
	Up to 150	5.2	11	150 mm MaxiCollar™		-/240/240
PP/PP-MD-PP (Acoustic pipes)	Up to 40	2.2	3.5	40 mm MaxiCollar™		-/240/240
	Up to 110	5	6	150 mm MaxiCollar™		-/240/240
[1] The 175 mm thick rigid wall must have an established FRL via testing or assessment or designed for fire resistance in accordance with AS3600 or AS3700 or equivalent New Zealand standard such as NZS 3101 or NZS 4230.						

Large apertures sealed with 50 mm thick BOSS Batt bulkheads

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

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC Sandwich core	Up to 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 MaxiCollar™	-/120/120 C/U

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

Table 21 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

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

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

Table 22 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	Up to 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 MaxiCollar™	-/120/120
PE	Up to 110	2.7	0		110 mm MaxiCollar™	-/120/120
PP / PP-R	Up to 50	2.9	0		50 mm MaxiCollar™	-/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 23 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL

uPVC	Up to 110	6.6	0	PyroSeal 2K Expanding Sealaer (2-component polyurethane foam) in 500 mm × 500 mm × 100 mm aperture	110 mm MaxiCollar™	-/120/90 U/C
PE	Up to 110	2.7	0		110 mm MaxiCollar™	-/120/120 U/C
PP / PP-R	Up to 50	2.9	0		50 mm MaxiCollar™	-/120/120 U/C
Note: Spacing between pipes was tested at 0 mm.						

110 mm CLT wall

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

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC DWV	Up to 32	2	12.5	40 mm MaxiCollar™ installed on both sides	FM300 on exposed and unexposed side to minimum depth of 5 mm and finished flush with the surface.	-/60/60
	Up to 40	2	12.5	40 mm MaxiCollar™ installed on both sides		-/60/60
	Up to 50	2.7	12.5	50 mm MaxiCollar™ installed on both sides		-/60/60
	Up to 65	2.7	12.5	80 mm MaxiCollar™ installed on both sides		-/60/60
	Up to 80	2.9	12.5	80 mm MaxiCollar™ installed on both sides		-/60/60
	Up to 100	3	12.5	100 mm MaxiCollar™ installed on both sides		-/60/60
	Up to 125	7.6	12.5	125 mm MaxiCollar™ installed on both sides		-/60/60
HDPE	Up to 32	3.1	12.5	32 mm MaxiCollar™ installed on both sides	FM300 on exposed and unexposed side to minimum depth of 5 mm and finished flush with the surface.	-/60/60
	Up to 125	11.75	12.5	125 mm MaxiCollar™ installed on both sides		-/60/60
	40 - 100	2.9 – 11.4	12.5	MaxiCollar™ size to fit	FM300 on exposed and unexposed side to minimum depth of 5 mm and finished flush with the surface.	-/60/60

200 mm CLT wall

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC DWV	Up to 32	2	12.5	40 mm MaxiCollar™ -exposed side	FM300 on the unexposed side to minimum depth of 5 mm and finished flush with the surface. FireMastic-HPE on the exposed side to minimum depth of 5 mm and finished flush with the surface.	-/120/120
	Up to 40	2	12.5	40 mm MaxiCollar™ -exposed side		-/120/120
	Up to 50	2.7	12.5	50 mm MaxiCollar™-exposed side		-/120/120
	Up to 65	2.7	12.5	80 mm MaxiCollar™ -exposed side		-/120/120
	Up to 80	2.9	12.5	80 mm MaxiCollar™ -exposed side		-/120/120
	Up to 100	3	12.5	100 mm MaxiCollar™ -exposed side		-/90/90
	Up to 100	3	12.5	100 mm MaxiCollar™ in BOSS Batt Patress		-/120/120
	Up to 125	7.6	12.5	125 mm MaxiCollar™ -exposed side		-/120/120
HDPE	Up to 32	3.1	12.5	32 mm MaxiCollar™ -exposed side	FM300 on the unexposed side to minimum depth of 5 mm and finished flush with the surface. FireMastic-HPE on the exposed side to minimum depth of 5 mm and finished flush with the surface.	-/60/60
	Up to 125	11.75	12.5	125 mm MaxiCollar™ -exposed side		-/60/60

5.3.4 Oversized BOSS MaxiCollars™ in walls

The fire resistance performance of oversized BOSS MaxiCollars™ in walls are assessed as given in Table 25 to Table 30.

Minimum 100 mm thick flexible[1] or rigid walls

Table 25 Pipes fitted at a 30º angle to the wall with BOSS Maxi Collar installed on both sides

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

[1] 50 mm steel stud lined with two layers of 13 mm thick fire rated plasterboard on each side. The system must have an established FRL via testing or assessment by an ATL
[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 26 Pipes fitted perpendicular to wall with BOSS Maxi Collar installed on unexposed side

Pipe	Nominal pipe diameter (mm)	Maximum 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 MaxiCollar™	-	-/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 MaxiCollar™	-	-/120/120 C/U

Minimum 116 mm thick flexible[1] or rigid walls

Table 27 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

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

[1] 64 mm steel stud lined with two layers of 13 mm thick fire rated plasterboard on each side. The system must have an established FRL via testing or assessment by an ATL

Minimum 118 mm thick flexible[1] or rigid walls

Table 28 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
PP / PP-R	Up to 20	4.6	6	32 mm MaxiCollar™	FireMastic-HPE in the gap between the collar and pipe on both sides	-/60/60 C/U
PEX	Up to 20	6.3	10	32 mm MaxiCollar™		-/60/30 C/U
	Up to 25	6.2	2.5	40 mm MaxiCollar™		-/60/30 C/U
PEX-AL	Up to 25	5.3	2.5	32 mm MaxiCollar™		-/60/30 C/U
[1] 92 mm steel stud lined with one layer of 13 mm thick fire rated plasterboard on each side. The system must have an established FRL via testing or assessment by an ATL						

Minimum 144 mm thick flexible or rigid walls

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

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
PEX	Up to 25	3.1	3.5	32 mm MaxiCollar™	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. The system must have an established FRL via testing or assessment by an ATL						

Minimum 78 mm thick Speedpanel walls

Table 30 Pipes fitted perpendicular to the wall with BOSS Maxi Collar installed on both sides

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC DWV	Up to 110	3.5	2.5	150 mm MaxiCollar™	FM300 applied 10 mm deep behind the collars on both sides and FireMastic-HPE applied as a 5 mm fillet on the joint between collar and panel on both sides.	-/240/60 C/U
					FM300 on the joint between collar and panel on both sides.	-/120/90 C/U
PVC-C	Up to 160	7.7	6.0	205 mm MaxiCollar™	FM300 applied 10 mm deep behind the collars on both sides	-/240/120 C/U

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
[1] The wall system must have an established FRL via testing or assessment by an ATL						

5.4 Fire resistance performance of BOSS MaxiCollars™ in floors

5.4.1 The separating element

Test reports FRT18137 R2.0, BMT/FEI/F15008, WF350704, WF350177, WF361932, WF367689, WF416496, 147943 R2.3, 147941 R2.2, 147942 R2.1, 148693 R2.1.1 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.

Timber walls must have a minimum thickness of 110 mm and consist of cross-laminated timber (CLT). The density must be minimum 400 kg/m^3.

5.4.2 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 37.

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 41. 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.

5.4.3 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 7). BOSS FireMastic-HPE or BOSS FireMastic-300 must be cartridge gunned into the annular gap around the pipe to the depth specified in Table 31 to Table 37 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 31 to Table 37.

ComFlor® 60

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

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC DWV	Up to 100	3.3	13.5	100 mm MaxiCollar™	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	Up to 75	3.5	8.5	75 mm MaxiCollar™	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

[1] The minimum thickness of the ComFlor® 60 is 70 mm, and the maximum thickness is 130 mm. The floor system must have an established FRL via testing or assessment by an ATL or designed for fire resistance in accordance with AS 2327.

120 mm thick rigid floor slab

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

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	Up to 32	2	11	40 mm MaxiCollar™ - exposed side	FM300 on both sides to depth of 5 mm	-/120/120
	Up to 40	2	11	40 mm MaxiCollar™ - exposed side		-/120/120
	Up to 50	2.7	11	50 mm MaxiCollar™- exposed side		-/120/120
	Up to 65	2.7	11	80 mm MaxiCollar™ - exposed side		-/120/120
	Up to 80	2.9	11	80 mm MaxiCollar™ - exposed side		-/120/120
	Up to 100	3	11	100 mm MaxiCollar™ - exposed side		-/120/120
	Up to 150	5	11	150 mm MaxiCollar™ - exposed side		-/120/120
PP/PP-MD-PP	Up to 40	2.2	3.5	40 mm MaxiCollar™ - exposed side		-/120/120
	Up to 110	3.7	6	150 mm MaxiCollar™ - exposed side		-/120/120
[1] The floor system must have an established FRL via testing or assessment by an ATL						

Minimum 150 mm thick AAC or normal weight concrete floor

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

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[1]	FRL
PP / PP-R	Up to 40*	2.2	3.5	40 mm MaxiCollar™ - exposed side	FM300 on both sides to depth of 5 mm	-/120/120
	Up to 50	2.9	10.0	50 mm MaxiCollar™	FM300 to a depth of 5 mm on unexposed face only	-/240/240 U/C

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[1]	FRL
		1.8 – 6.9	11.0	55 mm MaxiCollar™	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
	Up to 110	2.7	11.0	110 mm MaxiCollar™	FM300 to a depth of 10 mm	-/60/60 U/U
		2.7 – 10.0	11.0	110 mm MaxiCollar™	FM300 to a depth of 5 mm	-/15/15 U/U
		2.7 – 10.0	10.0	110 mm MaxiCollar™	FM300 to a depth of 5 mm on unexposed face only	-/240/240 U/C
	Up to 125	3.1	10.0	125 mm MaxiCollar™	FM300 to a depth of 5 mm on unexposed face only	-/240/240 U/C
	Up to 160	4.0 – 14.6	10.0	160 mm MaxiCollar™	FM300 to a depth of 5 mm on unexposed face only	-/240/240 U/C
PE	Up to 50	3.0	11.0	55 mm MaxiCollar™	FM300 to a depth of 10 mm applied behind the collar between the pipe and the aperture on both the exposed and unexposed sides	-/60/60 U/U
		3.0 – 4.6	11.0			-/45/45 U/U
	Up to 110	2.7	10.0	110 mm MaxiCollar™	FM300 to a depth of 5 mm	-/240/240 U/C
		2.7	11.0	110 mm MaxiCollar™	FM300 to a depth of 10 mm	-/30/30 U/U
		2.7 – 10.0	11.0	110 mm MaxiCollar™	FM300 to a depth of 10 mm	-/15/15 U/U
	Up to 125	3.1	10.0	125 mm MaxiCollar™	FM300 to a depth of 5 mm	-/240/240 U/C
uPVC	Up to 32*	2	11.0	40 mm MaxiCollar™ - exposed side	FM300 on both sides to depth of 5 mm	-/120/120
	Up to 40*	2	11.0	40 mm MaxiCollar™ - exposed side	FM300 on both sides to depth of 5 mm	-/120/120
	Up to 50	1.8	10.0	50 mm MaxiCollar™	FM300 to a depth of 5 mm	-/240/240 U/C
		2.4	11.0	55 mm MaxiCollar™	FM300 to a depth of 10 mm applied behind the collar between the pipe and the aperture on both the exposed and unexposed sides	-/90/60 U/U

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[1]	FRL
	Up to 65*	2.7	11.0	80 mm MaxiCollar™ - exposed side	FM300 on both sides to depth of 5 mm	-/120/120
	Up to 80*	2.9	11.0	80 mm MaxiCollar™ - exposed side	FM300 on both sides to depth of 5 mm	-/120/120
	Up to 110	4.2 – 7.3	10.0	110 mm MaxiCollar™	FM300 to a depth of 5 mm	-/240/240 U/C
	Up to 110	4.2 – 6.6	11.0	110 mm MaxiCollar™	FM300 to a depth of 10 mm	-/30/30 U/U
	Up to 125	6.0	10.0	125 mm MaxiCollar™	FM300 to a depth of 5 mm	-/240/240 U/C
	Up to 150*	5	11.0	150 mm MaxiCollar™ - exposed side	FM300 on both sides to depth of 5 mm	-/120/120
	Up to 160	6.2 – 9.5	10.0	160 mm MaxiCollar™	FM300 to a depth of 5 mm	-/240/240 U/C
HDPE	Up to 50	2.9	10.0	50 mm MaxiCollar™	FM300 to a depth of 5 mm	-/240/240 U/C
	Up to 110	10.0	10.0	110 mm MaxiCollar™	FM300 to a depth of 5 mm	-/240/240 U/C
	Up to 160	4.9 – 9.5	10.0	160 mm MaxiCollar™	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

[2] The floor system must have an established FRL via testing or assessment by an ATL

*This service is permitted for 150 mm thick normal weight concrete slab only and not the 150 mm thick AAC floor

Table 34 Pipes fitted perpendicular to the 150 mm thick concrete or AAC floor with BOSS Maxi Collar installed on both sides

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

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[1]	FRL
[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 [3] The floor system must have an established FRL via testing or assessment by an ATL						

Table 35 Pipes fitted with 90º U-bend with BOSS Maxi Collar installed on both sides of a 150 mm thick concrete or AAC slab

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection[1]	FRL
PP / PP-R	Up to 110	2.7	10.0	110 mm MaxiCollar™	FM300 to a depth of 10 mm	-/120/120 C/U[2]
	Up to 160	4.0	10.0	160 mm MaxiCollar™		-/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 [3] The floor system must have an established FRL via testing or assessment by an ATL						

Minimum 235 mm thick ceiling or ceiling-floor with 2 × 13 mm plasterboard layers on exposed face or Minimum 225 mm thick ceiling or ceiling-floor with 1 × 16 mm plasterboard layers on exposed face

Table 36 Pipes fitted perpendicular to the ceiling with BOSS Maxi Collar installed on the exposed side

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC DWV	Up to 32	2.3	6.0	40 mm MaxiCollar™	FM300 on unexposed side to the depth of the particleboard flooring and finished flush with the surface	-/60/60 C/U
						-/90/90 C/U* RISF 48 min
	Up to 50	2.7	6.0	50 mm MaxiCollar™	FM300 on exposed and unexposed side to minimum depth of 5 mm and finished flush with the surface.	-/60/60 C/U
	Up to 65	2.7	6.0	80 mm MaxiCollar™		-/60/60 C/U
	Up to 80	2.9	6.0	80 mm MaxiCollar™		-/60/60 C/U
	Up to 100	3	6.0	100 mm MaxiCollar™		-/60/60 C/U
uPVC conduit	Up to 25	2.0	23.5 13.0	80 mm MaxiCollar™	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	-/60/60 C/U
						-/90/90 C/U* RISF 53 min
				65 mm MaxiCollar™		-/60/60 C/U
						-/90/90 C/U* RISF 24 min

[1] The ceiling system must have an established FRL via testing or assessment by an ATL

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

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

Table 37 Pipes fitted perpendicular to the floor with BOSS Maxi Collar installed on the exposed side

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
PE	Up to 110	4.2	0		110 mm MaxiCollar™	-/120/120 U/C

	Up to 160	9.5	0	Gypsum based mortar identical to BOSS FireMortar-360 in 1400 mm × 700 mm × 100 mm aperture	160 mm MaxiCollar™	-/120/120 U/C
uPVC	Up to 160	9.5	0		160 mm MaxiCollar™	-/120/120 U/C

110 mm CLT floor

Table 38 Pipes fitted perpendicular to floor with BOSS MaxiCollar™ installed on the exposed side

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC DWV	Up to 32	2	12.5	40 mm MaxiCollar™ -exposed side	FM300 on exposed and unexposed side to minimum depth of 5 mm and finished flush with the surface.	-/60/60
	Up to 40	2	12.5	40 mm MaxiCollar™ -exposed side		-/60/60
	Up to 50	2.7	12.5	50 mm MaxiCollar™-exposed side		-/60/60
	Up to 65	2.7	12.5	80 mm MaxiCollar™ -exposed side		-/60/60
	Up to 80	2.9	12.5	80 mm MaxiCollar™ -exposed side		-/60/60
	Up to 100	3	12.5	100 mm MaxiCollar™ -exposed side		-/60/60
	Up to 125	7.6	12.5	125 mm MaxiCollar™ -exposed side		-/60/60
HDPE	Up to 32	2.9	12.5	32 mm MaxiCollar™ -exposed side	FM300 on exposed and unexposed side to minimum depth of 5 mm and finished flush with the surface.	-/60/60
	40 - 125	3.2 – 11.4	12.5	MaxiCollar™ size to fit		-/30/30
[1] The floor system must have an established FRL via testing or assessment by an ATL						

200 mm CLT floor

Table 39 Pipes fitted perpendicular to floor with BOSS MaxiCollar™ installed on the exposed side

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC DWV	Up to 32	2	12.5	40 mm MaxiCollar™ - exposed side	FM300 on the unexposed side to minimum depth of 5 mm and finished flush with the surface. FireMastic-HPE on the exposed side to minimum depth of 5 mm and finished flush with the surface.	-/120/120
	Up to 40	2	12.5	40 mm MaxiCollar™ - exposed side		-/120/120
	Up to 50	2.7	12.5	50 mm MaxiCollar™- exposed side		-/120/120
	Up to 65	2.7	12.5	80 mm MaxiCollar™ - exposed side		-/120/120
	Up to 80	2.9	12.5	80 mm MaxiCollar™ - exposed side		-/120/120
	Up to 100	3	12.5	100 mm MaxiCollar™ - exposed side		-/90/90
	Up to 125	7.6	12.5	125 mm MaxiCollar™ - exposed side		-/120/120
HDPE	Up to 32	2.9	12.5	32 mm MaxiCollar™ - exposed side	FM300 on the unexposed side to minimum depth of 5 mm and finished flush with the surface. FireMastic-HPE on the exposed side to minimum depth of 5 mm and finished flush with the surface.	-/60/60
	Up to 125	11.75	12.5	125 mm MaxiCollar™ - exposed side		-/60/60

[1] The floor system must have an established FRL via testing or assessment by an ATL

5.4.4 Oversized BOSS MaxiCollars™ in floors

The fire resistance performance of oversized BOSS MaxiCollars™ in floors are assessed as given in Table 40 and **Error! Reference source not found.**.

ComFlor® 60

Table 40 Pipes fitted perpendicular to the floor with BOSS Maxi Collar installed on the exposed side

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	Up to 25	2.2	5.0	32 mm MaxiCollar™	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. [1] The floor system must have an established FRL via testing or assessment by an ATL or designed for fire resistance in accordance with AS 2327						

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

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

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	Up to 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 MaxiCollar™	-/120/120 C/U
	Up to 160	9.5	0		200 mm MaxiCollar™	-/120/120 C/U
PE	Up to 160	9.5	0		200 mm MaxiCollar™	-/120/120 C/U

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

6.1 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.

6.2 Methodology

The method of assessment used is summarised in Table 42.

Table 42 Method of assessment

Assessment method	
Level of complexity	Complex assessment
Type of assessment	Qualitative

6.3 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.

6.4 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.

6.5 Conclusion

Based on the discussion in sections 6.3 and 6.4, it is expected that BOSS MaxiCollar™-IW 100 mm Prototype B will achieve the FRLs given in Table 43 below with the limitations also specified in Table 43.

Table 43 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.							

7. Fire resistance performance of services protected with BOSS UniWrap

7.1 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, CPVC and acoustic 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)

7.2 Methodology

The method of assessment used is summarised in Table 52.

Table 44 Method of assessment

Assessment method	
Level of complexity	Complex assessment
Type of assessment	Qualitative

7.3 Fire resistance performance of BOSS UniWrap in walls

7.3.1 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.

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 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.

7.3.3 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 45 to Table 49 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 45 to Table 49.

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 45 to Table 49.

Minimum 100 mm thick flexible[1] or rigid walls

Table 45 Ducts fitted perpendicular to the wall with BOSS UniWrap installed on both sides

Pipe	Nominal pipe diameter (mm)	Maximum 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. The system must have an established FRL via testing or assessment by an ATL						

Table 46 Pipes fitted perpendicular to the wall with BOSS UniWrap installed on both sides

Pipe	Nominal pipe diameter (mm)	Maximum 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. The floor system must have an established FRL via testing or assessment by an ATL						

Minimum 116 mm thick flexible[1] or rigid walls

Table 47 Pipes fitted perpendicular to the wall with BOSS UniWrap installed on both sides

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	Up to 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
	Up to 50	3.5	10.0	UniWrap in metal sleeve × 2 layers		-/120/120 C/U
	Up to 80	3.4	11.0	UniWrap in metal sleeve × 2 layers		-/120/- C/U
CPVC	Up to 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
	Up to 48.3	3.8	4.85	UniWrap in metal sleeve × 2 layers		-/120/90 C/U
	Up to 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. The floor system must have an established FRL via testing or assessment by an ATL

Minimum 118 mm thick flexible or rigid walls

Table 48 Pipes fitted perpendicular to the wall with BOSS UniWrap installed on both sides

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
PEX	Up to 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. The floor system must have an established FRL via testing or assessment by an ATL

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

Table 49 Pipe fitted perpendicular to the wall with BOSS UniWrap installed on both sides

Pipe	Nominal pipe diameter (mm)	Maximum pipe wall thickness (mm)	Maximum annular gap (mm)	Primary protection	Secondary protection	FRL
uPVC	Up to 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
	Up to 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
	Up to 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	Up to 120	3.6	6.0			-/90/90 C/U
PE	Up to 126	3.4	6.0			-/90/90 C/U

7.4 Fire resistance performance of BOSS UniWrap in floors

7.4.1 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.

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 UniWrap installed at mid-depth of the floor are expected to achieve the FRLs given in Table 37.

7.4.3 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 50 to Table 51.

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 50 to Table 51.

Minimum 150 mm thick AAC floor

Table 50 Pipes fitted perpendicular to the wall with BOSS UniWrap installed mid-depth of floor

Pipe	Nominal pipe diameter (mm)	Maximum 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

[2] The floor system must have an established FRL via testing or assessment by an ATL

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

Pipe	Nominal pipe diameter (mm)	Maximum 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.

7.5 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 45 to Table 51 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 50) 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.

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

8.1 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[10] and EN 1363-1:1999[11]. This standard differs from AS 1530.4:2014 and the significance of these differences is discussed below.

8.2 Methodology

The method of assessment used is summarised in Table 52.

Table 52 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Qualitative

8.3 Assessment

8.3.1 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.

8.3.2 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.

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.

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

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.

8.3.3 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.

8.3.4 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.

8.3.5 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.

8.3.6 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.

8.3.7 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 5 to 7. 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.

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

9.1 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.

9.2 Methodology

The method of assessment used is summarised in Table 53.

Table 53 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Qualitative

9.3 Assessment

9.3.1 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:

$$\mathrm{T} = 345log_{10}(8t + 1) + 20$$

Where:

T = 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.

9.3.2 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.

9.3.3 Performance criteria

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

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

9.3.4 Integrity

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

9.3.5 Insulation

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

9.3.6 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.

10. Validity

Jensen Hughes 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 54 Details of drawings

Figure no.	Provided by	Date
Figure 1 and Figure 29	Boss Products Australia Pty Ltd	16 May 2022

Appendix B Summary of supporting test data

B.1 Test report – EWFA 49527300.2

Table 55 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	Jensen Hughes (formerly T/A Exova Jensen Hughes), 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 56.
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 56.

Table 56 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

Specimen	Aperture (mm)	Primary protection	Secondary protection	FRL
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
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 57 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	Jensen Hughes, 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 58.
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 58.

Table 58 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 59 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Jensen Hughes 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 60.

Table 60 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	50 mm × 96 mm oval aperture	Oversized 110 mm diameter Pipe collar identical to BOSS	Fire-resistant sealant identical to FM300 cartridge	-/90/90

Specimen	Aperture (mm)	Primary protection	Secondary protection	FRL
a wall thickness of 2.9 mm		MaxiCollar™ on both faces	gunner into the 10 mm annular gap around the pipe for a depth of 10 mm behind the collar at each face	
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
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 61 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	Jensen Hughes, 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 62.

Table 62 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 63 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	Jensen Hughes, 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-off different 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 64.

Table 64 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 65 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	Jensen Hughes, 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 66.

Table 66 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 67 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
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 68.

Table 68 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

Specimen	Service	Primary protection	Integrity	Insulation
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 69 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Jensen Hughes 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 70.

Table 70 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

Specimen	Service	Primary protection	Integrity	Insulation
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 71 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
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 72.

Table 72 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 73 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Jensen Hughes 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 74.

Table 74 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 75 Information about test report

Item	Information about test report
Report sponsor	BOSS Fire & Safety P/L
Test laboratory	Jensen Hughes, 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 76.

Table 76 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 77 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
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 78.

Table 78 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 79 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Jensen Hughes 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 80.

Table 80 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

Specimen	Service	Primary protection	Integrity	Insulation
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
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 81 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Jensen Hughes 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 82.

Table 82 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

Specimen	Service	Primary protection	Integrity	Insulation
O	Ø160 mm PVC pipe-6.2 mm thick wall		No failure at 150 minutes	No failure at 150 minutes
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 83 Information about test report

Item	Information about test report
Report sponsor	BOSS Fire & Safety P/L
Test laboratory	Jensen Hughes, 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 84.

Table 84 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 85 Information about test report

Item	Information about test report
Report sponsor	BOSS Fire & Safety P/L
Test laboratory	Jensen Hughes, 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 86.

Table 86 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 87 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Exova Jensen Hughes, 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 88.

Table 88 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 89 Information about test report

Item	Information about test report
Report sponsor	BOSS Products (Australia) Pty Ltd
Test laboratory	Jensen Hughes, 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 90.
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 90.

Table 90 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 91 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 92.

Table 92 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 93 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Jensen Hughes 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 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	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	Pipe collar identical to BOSS MaxiCollar™	66*	66*	66*	66*

Specimen	Service	Aperture	Primary protection	Secondary protection	Integrity (minutes)			Insulation (minutes)
					Cotton pad	Sustained flaming	Gap gauge	
	Ø110 mm PE pipe with a wall thickness of 2.7 mm		bedded within the aperture using a fire-rated sealant identical to BOSS FireMastic-300.	fixed to each face				
	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 95 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Jensen Hughes 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 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	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	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	62 mm		264*	264*	264*	264*

Specimen	Service	Aperture	Primary protection	Integrity (minutes)			Insulation (minutes)
				Cotton pad	Sustained flaming	Gap gauge	
	thickness of 4.6 mm		the unexposed face of the floor.				
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
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	224 mm		70	71#	71	70

Specimen	Service	Aperture	Primary protection	Integrity (minutes)			Insulation (minutes)
				Cotton pad	Sustained flaming	Gap gauge	
	thickness of 7.7 mm						
*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 97 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
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 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	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

Specimen	Service	Aperture	Primary protection	Secondary protection	Integrity (minutes)	Insulation (minutes)
3a	Ø42 mm Copper pipe with a wall thickness of 1.1 mm + 25mm thick kingspan Tarec lagging	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
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 99 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Jensen Hughes 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 100.
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 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	
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#

Specimen	Service	Aperture	Primary protection	Secondary protection	Integrity (minutes)			Insulation (minutes)
					Cotton pad	Sustained flaming	Gap gauge	
*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 101 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Jensen Hughes 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 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	
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

Specimen	Service	Aperture	Primary protection	Integrity (minutes)			Insulation (minutes)
				Cotton pad	Sustained flaming	Gap gauge	
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
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 103 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Jensen Hughes 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 104.
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 104.

Table 104 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 105 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Jensen Hughes 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 106.
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 106.

Table 106 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 107 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Jensen Hughes 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 108.
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 108.

Table 108 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	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	identical to BOSS batt	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 109 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Jensen Hughes 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 110.
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 110.

Table 110 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 111 Information about test report

Item	Information about test report
Report sponsor	Boss Products Australia and Speedpanel Australia
Test laboratory	Jensen Hughes, 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 56.

Table 112 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 113 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Exova Jensen Hughes, 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 114.

Table 114 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 115 Information about test report

Item	Information about test report
Report sponsor	Report sponsor known to Jensen Hughes
Test laboratory	Exova Jensen Hughes, 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 116.

Table 116 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 stop seal coating and was friction fitted within the aperture.	79 minutes	63 minutes	-/60/60

B.32 Test report – 147008

Table 117 Information about test report

Item	Information about test report
Report sponsor	BOSS Passive Fire
Test laboratory	Holmes Solutions, Level 2, 254 Montreal Street Christchurch City Centre, Christchurrch 8013, New Zealand.
Test date	The fire resistance test was done on 17 January 2024.
Test standards	The test was done in accordance with AS 1530.4:2014
Variation to test standards	None
General description of tested specimen	The substrate used was 2 × 13mm fire rated plasterboard sheets on each side of 64 mm steel studs. The substrate was designed to achieve an FRL of -/120/120. The test was run for a duration of 140 minutes.
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 116.

Table 118 Results summary for this test report

Specimen	Integrity	Insulation	FRL
160 mm HDPE	63	62	-/60/60
150 mm uPVC	140	129	-/120/120
125 mm HDPE	140	54	-/120/45
125 mm PRP Aquatherm	37	37	-/30/30
100 mm uPVC	140	92	-/120/90
80 mm uPVC	140	128	-/120/120
65 mm uPVC	140	105	-/120/90
50 mm uPVC DWV	140	126	-/120/120
32 PRP Aquatherm	140	126	-/120/120
40 mm uPVC DWV	140	119	-/120/90
32 mm uPVC DWV	140	136	-/120/120
32 mm HDPE DWV	140	138	-/120/120

B.33 Test report – 148693

Table 119 Information about test report

Item	Information about test report
Report sponsor	BOSS Passive Fire
Test laboratory	Holmes Solutions, Level 2, 254 Montreal Street Christchurch City Centre, Christchurrch 8013, New Zealand.
Test date	The fire resistance test was done on 7 November 2024.

Item	Information about test report
Test standards	The test was done in accordance with AS 1530.4:2014
Variation to test standards	None
General description of tested specimen	The substrate used was a 120 mm thick reinforced concrete floor slab.
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 116.

Table 120 Results summary for this test report

Specimen	Integrity	Insulation	FRL
32 mm uPVC DWV	245	206	-/240/180
40 mm uPVC DWV	245	188	-/240/180
50 mm uPVC DWV	245	188	-/240/180
65 mm uPVC DWV	245	189	-/240/180
80 mm uPVC DWV	245	194	-/240/180
100 mm uPVC DWV	245	205	-/240/180
150 mm uPVC DWV	245	198	-/240/180
uPVC conduit bundle with 2× 20 mm and 1 × 25 mm	245	181	-/240/180
uPVC conduit bundle with 1 × 20 mm, 1 × 25 mm and 1 × 32 mm	245	212	-/240/210
uPVC conduit bundle with 2 × 20 mm, 2 × 25 mm and 2 × 32 mm			-/240/150
40 mm Valsir Triplus pipe	245	152	-/240/150
110 mm Valsir Triplus pipe	245	161	-/240/180

B.34 Test report – 147113

Table 121 Information about test report

Item	Information about test report
Report sponsor	BOSS Passive Fire
Test laboratory	Holmes Solutions, Level 2, 254 Montreal Street Christchurch City Centre, Christchurrch 8013, New Zealand.
Test date	The fire resistance test was done on 13 February 2024.
Test standards	The test was done in accordance with AS 1530.4:2014
Variation to test standards	None
General description of tested specimen	The substrate used was 13 mm fire rated plasterboard wall with 64 mm steel studs. The substrate was designed to achieve an FRL of -/60/60. The test was run for duration of 64 minutes
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 116.

Table 122 Results summary for this test report

Specimen	Integrity	Insulation	FRL
32 mm HDPE Pipe	64	62	-/60
32 mm uPVC DWV	64	54	-/60/45
40 mm uPVC DWV	64	50	-/60/45
50 mm uPVC DWV	64	52	-/60/45
65 mm uPVC DWV	64	45	-/60/45
80 mm uPVC DWV	64	49	-/60/45
100 mm uPVC DWV	43	43	-/30/30
150 mm uPVC DWV	64	55	-/60/45
125 mm HDPE pipe	36	36	-/30/30
160 mm HDPE pipe	49	49	-/45/45
32 mm Aquatherm PPR	64	52	-/60/45
125 mm Aquatherm PPR	39	39	-/30/30

B.35 Test report – 147941

Table 123 Information about test report

Item	Information about test report
Report sponsor	BOSS Passive Fire
Test laboratory	Holmes Solutions, Level 2, 254 Montreal Street Christchurch City Centre, Christchurrch 8013, New Zealand.
Test date	The fire resistance test was done on 21 June 2024.
Test standards	The test was done in accordance with AS 1530.4:2014
Variation to test standards	None
General description of tested specimen	The substrate used was an unlined (bare) 110mm thick 3 lamela Cross Laminated Timber (CLT) floor slab. The substrate was designed to achieve an FRL of -/60/60. The test was run for a duration of 65 minutes.
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 116.

Table 124 Results summary for this test report

Specimen	Integrity	Insulation	FRL
32 mm HDPE Pipe	65	65	-/60/60
32 mm uPVC DWV	65	65	-/60/60
40 mm uPVC DWV	65	65	-/60/60
50 mm uPVC DWV	65	65	-/60/60
65 mm uPVC DWV	65	65	-/60/60
80 mm uPVC DWV	65	65	-/60/60
100 mm uPVC DWV	65	65	-/60/60

Specimen	Integrity	Insulation	FRL
125 mm HDPE pipe	65	65	-/60/60
125 mm HDPE pipe	40	31	-/30/30
BOSS batt (50 mm) blank seal	65	61	-/60/60

B.36 Test report – 147943

Table 125 Information about test report

Item	Information about test report
Report sponsor	BOSS Passive Fire
Test laboratory	Holmes Solutions, Level 2, 254 Montreal Street Christchurch City Centre, Christchurrch 8013, New Zealand.
Test date	The fire resistance test was done on 27 March 2024.
Test standards	The test was done in accordance with AS 1530.4:2014
Variation to test standards	None
General description of tested specimen	The substrate tested was a lightweight timber floor system. The flooring frame consisted of 190 mm × 45 mm timber framing. The ceiling lining on the exposed side consisted of one layer of 16 mm fire rated plasterboard and was fastened with 61 mm × 7g plasterboard screws at 300 mm spacing. The floor lining on the unexposed side was a single layer of 19 mm particle bard secured to the timber frame with 51 mm × 7g timber screws at 300 mm spacing. The total system thickness was 225 mm. The substrate was designed to achieve an FRL of -/60/60.
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 116.

Table 126 Results summary for this test report

Specimen	Integrity	Insulation	FRL
BFB-150	75	75	-/60/60
50 mm BOSS Batt	75	74	-/60/60
FireMastic 300 Blank Seal	75	75	-/60/60
50 mm uPVC DWV	75	75	-/60/60
65 mm uPVC DWV	75	75	-/60/60
80 mm uPVC DWV	75	75	-/60/60
100 mm uPVC DWV	75	75	-/60/60
100 mm Steel pipe	75	49	-/60/45
32 mm Steel Pipe	75	75	-/60/60
Fire alarm x 4	75	75	-/60/60
COAX x 4	75	75	-/60/60
ALX75 Strip	75	21	-/60/15

B.37 Test report – 147942

Table 127 Information about test report

Item	Information about test report
Report sponsor	BOSS Passive Fire
Test laboratory	Holmes Solutions, Level 2, 254 Montreal Street Christchurch City Centre, Christchurrch 8013, New Zealand.
Test date	The fire resistance test was done on 27 March 2024.
Test standards	The test was done in accordance with AS 1530.4:2014
Variation to test standards	None
General description of tested specimen	The substrate used was on XLAM unlined (bare) 200 mm thick 5 lamella cross laminated timber (CLT) floor slab. The substrate was designed to achieve an FRL of -/120/120. The test was run for a duration of 122 minutes
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 116.

Table 128 Results summary for this test report

Specimen	Integrity	Insulation	FRL
32 mm HDPE pipe	86	85	-/60/60
125 mm HDPE pipe	61	61	-/60/60
32 mm uPVC DWV	122	122	-/120/120
40 mm uPVC DWV	122	122	-/120/120
50 mm uPVC DWV	122	122	-/120/120
65 mm uPVC DWV	122	122	-/120/120
80 mm uPVC DWV	122	122	-/120/120
100 mm uPVC DWV	103	101	-/90/90
125 mm PVC pipe	122	122	-/120/120
BOSS Batt (60 mm) Blank seal	122	122	-/120/120
BOSS FyreBox 300	122	106	-/120/90
Services through BOSS FyreBox 300: 1×100 mm uPVC and 1× mm steel pipe	122	91	-/120/90
50 mm core hole with cable bundle (bundle included 5 × CAT6, 5× TPS, 5× Fire alarm)	122	122	-/120/120

B.38 Test report – 148815

Table 129 Information about test report

Item	Information about test report
Report sponsor	BOSS Passive Fire
Test laboratory	Holmes Solutions, Level 2, 254 Montreal Street Christchurch City Centre, Christchurrch 8013, New Zealand.
Test date	The fire resistance test was done on 5 December 2024.
Test standards	The test was done in accordance with AS 1530.4:2014
Variation to test standards	None
General description of tested specimen	The separating element was a lightweight 64 mm steel formed wall, with 2× 13 mm fire rated plasterboard to each side of the 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 116.

Table 130 Results summary for this test report

Specimen	Integrity	Insulation	FRL
BOSS FyreBox (BFB-300) including uPVC (20,25,32,100 mm diameter), PEX-A pipe (32 mm), Polybutylene pipe (28 mm, PVC flexible conduit (25 and 32 mm) and Aluminium power cable (25, 35, 70, 95 mm^2)	120	-	-/120/-
65 mm uPVC DWV	120	120	-/120/120
80 mm uPVC DWV	120	102	-/120/90
100 mm uPVC DWV	120	100	-/120/90
20 mm dia. Copper pipe with 19 mm nitrile rubber insulation, 32 mm dia. Copper pipe with 24 mm nitile rubber insulation and 40 mm dia. Copper pipe with 38 mm nitrile rubber insulation	120	50	-/120/45
3 × 32 mm dia. Copper pipe with 38 mm nitile rubber insulation	120	96	-/120/90
3 × 32 mm dia. Copper pipe with 25 mm nitile rubber insulation	120	58	-/120/45
2× 19.05 mm and 9.52 mm dia. Copper pipe with 19 mm nitrile rubber insulation	120	90	-/120/90
15 mm dia. Copper pipe with 38 mm nitrile rubber insulation	120	119	-/120/90

Specimen	Integrity	Insulation	FRL
60 mm dia. Copper pipe with 38 mm nitrile rubber insulation	120	107	-/120/90

B.39 Test report – 148597

Table 131 Information about test report

Item	Information about test report
Report sponsor	BOSS Passive Fire
Test laboratory	Holmes Solutions, Level 2, 254 Montreal Street Christchurch City Centre, Christchurrch 8013, New Zealand.
Test date	The fire resistance test was done on 18 September 2024.
Test standards	The test was done in accordance with AS 1530.4:2014
Variation to test standards	None
General description of tested specimen	The lower portion of the separating element was a lightweight 64 mm steel framed wall, with 1x13 mm fire rated plasterboard to each side of the wall. The upper portion of the separating element was a 50 mm thick BOSS Batt wall slotted within 64 mm steel frame to all sides.
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 116.

Table 132 Results summary for this test report

Specimen	Integrity	Insulation	FRL
32 mm uPVC DWV	70	57	-/60/45
40 mm uPVC DWV	70	57	-/60/45
50mm uPVC DWV	70	58	-/60/45
65 mm uPVC DWV	70	60	-/60/60
80 mm uPVC DWV	70	64	-/60/60
100 mm uPVC DWV	70	59	-/60/45
90 mm × 45 mm Timber stud (linear seal)	70	70	-/60/60
64 mm steel stud – coated (linear seal)	70	32	-/60/30
64 mm steel stud – uncoated (linear seal)	70	20	-/60/15
Flush Box exposed side	70	59	-/60/45
Flush Box unexposed side	70	70	-/60/60
Flush Box exposed and unexposed side	70	70	-/60/60