WARRINGTONFIRE
AUSTRALIA
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Fire assessment report

Assessment of PROMARSEAL® CIL Collars protecting various plastic pipes in floors

Sponsor: Promat Australia

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			Prepared by	**Reviewed by**	**Authorised by**
	Expiry 30/04/2029	**Name**	Jack Piercy	Omar Saad	Omar Saad
					

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Executive summary

This report documents the findings of the assessment undertaken to determine the expected fire resistance level (FRL) of Promaseal CIL Collars in accordance with AS 1530.4:2014 and AS 4072.1:2005.

Promaseal® CIL fire collar is a pipe closure device used to form penetration seals where plastic pipes penetrate concrete floors.

The analysis in sections 5 to 12 of this report found that the proposed systems, together with the described variations, are capable of achieving the FRLs as shown in Table 1 – in accordance with AS 1530.4:2014.

The variations and outcome of this assessment are subject to the limitations and requirements described in sections 2, 3 and 14 of this report. The results of this report are valid until 30 April 2029.

Table 1 Variations and assessment outcome

Product	Reference test(s)	Variation	FRL
Promaseal® CIL equivalence to Promaseal® Green fire collars	A-07-513 A-07-516 A-08-555 A-10-696 A-11-737 EWFA 2729100.2 EWFA 2729101.2 EWFA 27884300.1 A-14-882 A-16-066 A-17-075A	Permit use of Promaseal® CIL instead of the tested Promaseal® Green fire collars.	Equivalent FRL to previously tested systems. As per Table 2 and Table 3.
uPVC pipes protected with Promaseal® CIL fire collars in various concrete slab thickness	FRT190093a R1.0	Show equivalence between Promaseal® CIL and Promaseal® CIH fire collars	As per Table 4.
uPVC pipes protected with Promaseal® CIL fire collars in KingFlor KF40	FSRG A-07-516	Include 50 mm, 65 mm and 80 mm uPVC pipe.	As per Table 5.
uPVC pipes protected with Promaseal® CIL fire collars in Fielders CF210	FSRG A-14-882	Include 50 mm, 65 mm and 80 mm uPVC pipe.	As per Table 8.
uPVC pipes protected with Promaseal® CIL fire collars in Slim Dek 210	FSRG A-17-075A	Include 40 mm, 50 mm, 65 mm and 80 mm uPVC pipe for -/120/120 FRL.	As per Table 8.
uPVC pipes protected with Promaseal® CIL fire collars with acoustic lagging on exposed side.	FSRG A-22-063	Include 40 mm, 50 mm, 65 mm and 80 mm uPVC pipe. Include 40 mm to 110 mm HDPE pipes.	As per Table 4.
uPVC pipes protected with Promaseal® CIL fire collars with top and bottom capped at slab level.	FSRG A-24-010	Include 40 mm, 50 mm, 65 mm and 80 mm uPVC pipe.	As per Table 4.
uPVC pipes protected with Promaseal® CIH fire collars with blank buildup of Promasil P1100 on exposed side	FSRG A-23-046B	Permit CIH results on CIL collars. Include 40 mm, 50 mm, 65 mm and 80 mm uPVC pipe.	As per Table 7.

Product	Reference test(s)	Variation	FRL
HDPE pipes protected with Promaseal Green fire collars through concrete beam	FSRG A-10-696	Include 65 mm and 80 mm HDPE pipe. Include 50 mm, 65 mm, 80 mm and 100 mm uPVC pipe.	As per Table 11 and Table 12.
Wavin Astolan pipes protected with Promaseal® CIL fire collars in 120 mm concrete slabs	EWFA 27884300	Include 65 mm and 80 mm Wavin Astolan pipe.	As per Table 9.
HDPE pipes protected with Promaseal® CIL fire collars in various concrete slab thickness	FSRG A-07-513 FSRG A-08-555	Include 65 mm, 70 mm, 90 mm for -/120/120 FRL. Include 65 mm, 70 mm, 90 mm and 110 mm for -/240/240 FRL	As per Table 10.

Table 2 Performance of REHAU RAUPIANO pipes protected with PROMASEAL® CIL collar penetrating 120mm slab

Nominal Pipe Diameter	Nominal collar size	FRL
40 mm	Promaseal® CIL 40	-/240/180
50 mm	Promaseal® CIL 50	-/240/180
75 mm*	Promaseal® CIL 80	-/240/240*
90 mm**	Promaseal® CIL 100	-/180/180
110 mm	Promaseal® CIL 100	-/180/180
Note: *Protected with PROMASEAL® CIL collar and PROMASEAL Grafitex Graf 4T		

Table 3 Performance of PEXa pipes protected with PROMASEAL® CIL collar and penetrating 120mm slab

Nominal Pipe Diameter (PEXa)	Nominal collar size	FRL
16 mm	Promaseal® CIL 40	-/240/120
20 mm	Promaseal® CIL 40	-/240/180
25 mm	Promaseal® CIL 40	-/120/120
32 mm	Promaseal® CIL 40	-/180/180

Table 4 Performance of uPVC pipes protected with PROMASEAL® CIL collar installed in concrete slabs; the slabs are as per AS 3600:2018

Nominal Pipe Diameter (uPVC)	Nominal collar size	FRL		
		120 mm slab	150 mm slab	175 mm slab
40 mm	Promaseal® CIL 40	-/120/120*#	-/180/180	-/240/240
50 mm	Promaseal® CIL 50	-/120/120*#	-/180/180	-/240/240
65 mm	Promaseal® CIL 65	-/120/120*#	-/180/180	-/240/240
80 mm	Promaseal® CIL 80	-/120/120*#	-/180/180	-/240/240
100 mm	Promaseal® CIL 100	-/120/120*#	-/180/180	-/240/240

Notes: FRL is applicable to configurations where pipe socket is located in collar.
Applicable FRL with PyroTek SoundLag on exposed side installed as tested in FSRG A-22-063
* Applicable FRL with pipe capped at top and bottom of slab installed as tested in FSRG A-24-010.

Table 5 Performance of uPVC pipes protected with PROMASEAL® CIL collar installed in minimum 120 mm thick concrete slab with KingFlor KF40 formwork

Nominal Pipe Diameter (uPVC)	Nominal collar size	FRL
40 mm	Promaseal® CIL 40	-/240/240
50 mm	Promaseal® CIL 50	-/240/120
65 mm	Promaseal® CIL 65	-/240/120
80 mm	Promaseal® CIL 80	-/120/120
100 mm	Promaseal® CIL 100	-/240/120
Note: FRL applicable when installed with manufacturer approved extension box sealed to deck with fire rated sealant.		

Table 6 Performance of uPVC floor waste pipes through PROMASEAL® CIL collar treated with Promasil 1100 board and FWR fire collar in 120 mm concrete slab

Nominal Pipe Diameter (uPVC)	Nominal collar size	FRL
100mm	Promaseal® CIL 100	-/120/120
Notes: • Promasil 1100 board to be installed as per the manufacturers recommendations. • Promat FWR100 fire collar to be installed as per the manufacturers recommendations.		

Table 7 Performance of uPVC pipes capped above 150 mm slab level through PROMASEAL® CIL collar with Promasil 1100 board build up on underside

Nominal Pipe Diameter (uPVC)	Nominal collar size	FRL
40mm	Promaseal® CIL 40	-/120/120
50mm	Promaseal® CIL 50	-/120/120
65mm	Promaseal® CIL 65	-/120/120
80mm	Promaseal® CIL 80	-/120/120
100mm	Promaseal® CIL 100	-/120/120

Table 8 Performance of uPVC pipes penetrating Fielders CF210 deck and SlimDek 210 and protected with PROMASEAL® CIL collar

Nominal Pipe Diameter(uPVC)	Nominal collar size	FRL	
		Fielders 80 mm CF210 Deck	SlimDek 95 mm CF210 Deck*
40 mm	Promaseal® CIL 40	-/90/60	-/120/120
50 mm	Promaseal® CIL 50	-/90/60	-/120/120**
65 mm	Promaseal® CIL 65	-/90/60	-/120/120**
100 mm	Promaseal® CIL 100	-/90/60	-/120/120**
Notes: • * Indicates FRL is applicable to configurations where pipe is in socket. • * Indicates Reinforcement mesh must be installed. • ** Indicates steel adapter plate required. • Gaps between steel decking and fire collar to be sealed with Fire Ban One fire rated sealant.			

Table 9 Performance of Wavin Astolan pipes protected with PROMASEAL® CIL collar penetrating 120mm concrete slab

Pipe Outer Diameter	Nominal collar size	FRL
56 mm	Promaseal® CIL 65	-/120/120
75 mm	Promaseal® CIL 80	-/120/120
90 mm	Promaseal® CIL 100	-/120/120
110 mm	Promaseal® CIL 100	-/120/120

Table 10 Performance of HDPE pipes protected with PROMASEAL®CIL collar penetrating concrete slabs

Pipe Outer Diameter (HDPE)	Nominal collar size	FRL		
		120 mm	150 mm	175 mm
40 mm	Promaseal® CIL 40	-/120/120#	-/180/180	-/240/240
50 mm	Promaseal® CIL 50	-/120/120#	-/180/180	-/240/240
56 mm	Promaseal® CIL 65	-/120/120#	-/180/180	-/240/240
65 mm	Promaseal® CIL 65	-/120/120#	-/180/180	-/240/240
70 mm	Promaseal® CIL 80	-/120/120#	-/180/180	-/240/240
90 mm	Promaseal® CIL 100	-/120/120#	-/180/180	-/240/240
110 mm	Promaseal® CIL 100	-/120/120#	-/180/180	-/240/240
Note: # Applicable FRL with PyroTek SoundLag on exposed side installed as tested in FSRG A-22-063				

Table 11 Performance of HDPE pipes through concrete beam (min 75 mm from underside of slab) protected with PROMASEAL® CIL collar

Nominal Pipe Diameter (HDPE)	Nominal collar size	FRL	
		120 mm slab	150 mm slab
56mm	Promaseal® CIL 50	-/120/120	-/180/180
65mm	Promaseal® CIL 65	-/120/120	-/180/180
80mm	Promaseal® CIL 80	-/120/120	-/180/180
110mm	Promaseal® CIL 100	-/120/120	-/180/180

Notes:

- FRL of concrete slab above must be calculated in accordance with AS 3600.
- Horizontal section of pipe in beam must not be less than 400 mm.
- Minimum distance from underside of beam 75 mm.

Table 12 Performance of uPVC pipes through concrete beam (min 75 mm from underside of slab) protected with PROMASEAL® CIL collar

Nominal Pipe Diameter (uPVC)	Nominal collar size	FRL	
		120 mm slab	150 mm slab
50mm	Promaseal® CIL 50	-/120/120	-/180/180
65mm	Promaseal® CIL 65	-/120/120	-/180/180
80mm	Promaseal® CIL 80	-/120/120	-/180/180
100mm	Promaseal® CIL 100	-/120/120	-/180/180

Nominal Pipe Diameter (uPVC)	Nominal collar size	FRL	
		120 mm slab	150 mm slab

Notes:

- The slab above must be designed in accordance with AS 3600 for the required FRL.
- Horizontal section of pipe in beam must not be less than 400 mm.
- Minimum distance from underside of beam 75 mm.

Table 13 Performance of uPVC pipes through 200 mm concrete slab with 300 mm horizontal section protected with PROMASEAL® CIL collar

Nominal Pipe Diameter (HDPE)	Nominal collar size	FRL
40mm	Promaseal® CIL 50	-/180/180
65mm	Promaseal® CIL 65	-/180/180

Notes:

- uPVC elbow must be installed inside fire collar.
- Horizontal section of pipe in column must not be less than 300 mm.
- Refer to FSRG A-23-021 for full details.

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1. Introduction

This report documents the findings of the assessment undertaken to determine the expected fire resistance level (FRL) of Promaseal CIL Collars in accordance with AS 1530.4:2014[1] and AS 4072.1:2005[2].

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

This assessment was carried out at the request of Promat Australia. The sponsor details are included in Table 14.

Table 14 Sponsor details

Sponsor	Address
Promat Australia	1 Scotland Road Mile End SA 5031 Australia

2. Framework for the assessment

2.1 Assessment approach

An assessment is a professional opinion about the expected performance of a component or element of structure subjected to a fire test.

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

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

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

Assessments can 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 and performance based on the tested constructions and performances obtained. The assessment is an evaluation of the potential fire resistance performance of the elements in accordance with AS 1530.4:2014.

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

This assessment has been written in accordance with the general principles outlined in EN 15725:2023[4] for extended application on the fire performance of construction products and building elements: Principle of EXAP standards and EXAP reports.

The expected performance of the systems with the variations documented in this assessment report has been determined by assessing the performance of tested systems against the expected impact of each variation. The systems tested in accordance with AS 1530.4:2014, and detailed within Appendix A, are generally considered to be comparable to the listed system variations which are generally expected to yield a performance equivalent to the tested systems.

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, 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 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 31 October 2023, Promat Australia confirmed that:

- To their knowledge, the variations to the component or element of structure, which is the subject of this assessment, have 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. Requirements and 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 expected in accordance with AS 1530.4:2014.
- This assessment applies to floor systems exposed to fire from below in accordance with the requirements of AS 1530.4:2014 where horizontal elements must be exposed to heat from the underside only.
- This assessment report has been prepared based on the fire resistance performance and condition of the systems at the time they were tested. Any deterioration of fire resistance

[4] European Committee for Standardization, 2023, Extended application on the fire performance of construction products and building elements: Principle of EXAP standards and EXAP reports, EN 15725:2023, European Committee for Standardization, Brussels, Belgium
[5] National Construction Code Volumes One and Two - Building Code of Australia 2022, Australian Building Codes Board, Australia

performance due to external factors including but not limited to passage of time and exposure to elements – is not considered in this report.

- This report is only valid for the assessed systems 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.
- This report has been prepared using information provided by others. Warringtonfire has not verified the accuracy and/or completeness of that information and will not be responsible for any errors or omissions that may have been 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 Description of assessed systems

This report presents an assessment of the fire resistant performance of Promaseal® CIL collars protecting various types of plastic pipes penetrating various configurations of slabs if tested in accordance with AS 1530.4:2014.

The Promaseal® Green cast in collars and Promaseal® CIL collars have been confirmed to have the same shell, base plate and intumescent by the manufacturer, with the difference being the pigment colour in the plastic shell. A number of test reports referenced in this assessment are based on test results from the Promaseal® Green cast in collars.

This assessment report has been prepared to assess uPVC plastic pipes between 40 mm and 100 mm in diameter and for other plastic pipes in this range while using baseline testing of all nominal uPVC pipe sizes in accordance with 4.6.4(d) of AS 4072.1:2005 for Promaseal® CIH fire collars.

4.2 Referenced test data

The assessment of the variation to the tested systems and the determination of the expected performance are based on the results of the fire tests documented in the reports summarised in Table 15. Further details of the tested systems are included in Appendix A.

Table 15 Referenced test data

Report number	Test sponsor	Test date	Testing authority
A-07-513	Promat Australia Pty Ltd.	12 October 2007	Fire Science Research Group
A-07-516	Promat Australia Pty Ltd.	26 October 2007	Fire Science Research Group
A-08-555	Promat Australia Pty Ltd.	15 August 2008	Fire Science Research Group
A-10-696	Promat Australia	21 October 2010	Fire Science Research Group
A-11-737	Promat Australia Pty Ltd.	19 August 2011	Fire Science Research Group
EWFA 2729100.2	Promat Australia Pty Ltd.	14 May 2012	Exova Warringtonfire
EWFA 2729101.2	Promat Australia Pty Ltd.	15 May 2012	Exova Warringtonfire
EWFA 27884300.1	Promat Australia Pty Ltd.	27 February 2014	Exova Warringtonfire
A-14-882	Promat Australia Pty Ltd.	19 May 2014	Fire Science Research Group
A-16-066	Promat Australia Pty Ltd.	13 January 2017	Fire Science Research Group
A-17-075A	Promat Australia Pty Ltd.	31 October 2017	Fire Science Research Group

Report number	Test sponsor	Test date	Testing authority
FRT190093a R1.0	Promat Australia Pty Ltd.	18 April 2019	Warringtonfire Australia
A-22-063	Promat Australia	27 October 2022	Fire Science Research Group
A-23-046B	Promat Australia	21 December 2023	Fire Science Research Group
A-24-010	Promat Australia	22 April 2024	Fire Science Research Group

4.3 Variations to the tested systems

The tested systems and variations to those tested systems – together with the referenced standard fire tests – are described in Table 16.

Table 16 Variations to tested systems

Item	Reference test	Description	Variations
Applicability of test results to AS 1530.4:2014	A-07-513 A-07-516 EWFA 27884300.1 A-11-737 EWFA 2729100.2 EWFA 2729101.2 A-14-882	Fire resistance test undertaken in accordance with AS 1530.4:2005.	Permit the use of AS 1530.4:2005 test results.
Promaseal® CIL equivalence to Promaseal® Green fire collars	A-07-513 A-07-516 A-08-555 A-10-696 A-11-737 EWFA 2729100.2 EWFA 2729101.2 EWFA 27884300.1 A-14-882 A-16-066 A-17-075A	Change in fire collar name and shell colour.	Permit use of Promaseal® CIL instead of the tested Promaseal® Green fire collars.
uPVC pipes protected with Promaseal® CIL fire collars in various concrete slab thickness	FRT190093a R1.0	40 mm and 100 mm uPVC pipe treated with Promaseal CIL fire collar fire collar cast into 150 mm slab. 40 mm to 100 mm uPVC pipe treated with Promaseal CIH fire collar cast into 150 mm slab. Achieved -/240/240 FRL.	Include 50 mm, 65 mm and 80 mm uPVC pipe for 120 mm, 150 mm and 175 mm slabs.
uPVC pipes protected with Promaseal® CIL fire collars in KingFlor KF40	FSRG A-07-516	40 mm and 100 mm uPVC pipes treated with Promaseal Green CIL fire collar cast into KingFlor KF40. Achieved -/240/120 FRL.	Include 50 mm, 65 mm and 80 mm uPVC pipe.
uPVC pipes protected with Promaseal® CIL fire collars in Fielders CF210	FSRG A-14-882	40 mm and 100 mm uPVC pipes treated with Promaseal Green CIL fire collar cast into Fielders CF210 (80 mm slab). Achieved -/90/60 FRL.	Include 50 mm, 65 mm and 80 mm uPVC pipe.

Item	Reference test	Description	Variations
uPVC pipes protected with Promaseal® CIL fire collars in Slim Dek 210	FSRG A-17-075A	40 mm and 100 mm uPVC pipes treated with Promaseal Green CIL fire collar cast into 95 mm Slim Dek. 40 mm achieved -/120/90 FRL 100 mm achieved -/120/120 FRL.	Include 40 mm, 50 mm, 65 mm and 80 mm uPVC pipe for -/120/120 FRL.
uPVC pipes capped top and bottom with uPVC cap protected with Promaseal® CIL fire collars	FSRG A-24-010	100 mm uPVC pipe penetration capped at the top and bottom of the 120 mm concrete slab treated with Promaseal CIL fire collar.	Include 40 mm, 50 mm, 65 mm and 80 mm uPVC pipe for 120 mm slabs.
HDPE and uPVC pipes protected with Promaseal® CIL fire collars with acoustic lagging on the exposed side	FSRG A-22-063	100 mm uPVC pipe penetration with external acoustic lagging on the exposed side treated with Promaseal CIL fire collar in 120 mm concrete slab. Achieving an FRL of -/120/120.	Include 40 mm, 50 mm, 65 mm and 80 mm uPVC pipe for 120 mm slabs. Include 40 mm to 110 mm HDPE pipes
uPVC pipe protected with Promaseal® CIH fire collar with and blank buildup of Promaseal 11 fire rated board on underside	FSRG A-23-046B	100 mm uPVC pipe penetration treated with Promaseal CIH fire collar and blank building up of Promasil 1100 fire rated board on the underside.	Permit use of Promaseal® CIH fire collar results on CIL and include 40 mm, 50 mm, 65 mm and 100 mm uPVC pipes.
HDPE pipe protected with Promaseal® green fire collar through side of concrete beam	FSRG A-10-696	56 mm HDPE and 110 mm HDPE penetration through side of concrete beam treated with Promaseal® green fire collar.	Permit the use of Promaseal® Green fire collar results on CIL. Include 65 mm and 80 mm HDPE pipes. Include 50 mm to 100 mm uPVC pipes.
Wavin Astolan pipes protected with Promaseal® CIL fire collars in 120 mm concrete slabs	EWFA 27884300	56 mm to 110 mm Wavin Astolan pipes treated with Promaseal Green CIL fire collar cast into 120 mm slab. Achieved -/120/120 FRL.	Include 65 mm and 80 mm Wavin Astolan pipe.
HDPE pipes protected with Promaseal® CIL fire collars in various concrete slab thickness	FSRG A-07-513	40 mm to 65 mm HDPE pipes treated with Promaseal Green CIL fire collar cast into 120 mm slab. 40 mm achieved -/240/120 FRL. 65 mm achieved -/240/180 FRL	Include 56 mm HDPE pipe. Include 40 mm, 56 mm and 65 mm for -/240/240 FRL.
	FSRG A-08-555	110 mm HDPE pipe treated with Promaseal Green CIL fire collar in 150 mm KingFlor KF70 slab. Achieved -/240/180 FRL.	Include 65 mm, 70 mm, 90 mm for -/120/120 FRL. Include 65 mm, 70 mm, 90 mm and 110 mm for -/240/240 FRL.

4.4 Schedule of components

Table 17 outlines the schedule of components for the assessed systems. We have based this schedule of component from the reference test reports shown in Table 15.

Table 17 Schedule of components of assessed systems

Item	Description	
Separating element		
1.	Item name	Concrete slab conforming to AS 3600:2018 incorporating Amendment 1
	Minimum thickness	120 mm to 175 mm
	Nominal density	2400 kg/m^3
2.	Item name	Concrete slab with KingFlor KF40 steel formwork
	Minimum thickness	120 mm
	Nominal density	2400 kg/m^3
3.	Item name	Concrete slab with Fielders CF210 steel formwork
	Minimum thickness	80 mm
	Nominal density	2400 kg/m^3
4.	Item name	Concrete slab with Slim Dek 210 steel formwork
	Minimum thickness	95 mm
	Nominal density	2400 kg/m^3
Services		
5.	Item name	uPVC pipe
	Nominal pipe diameter	40 mm to 100 mm
6.	Item name	HDPE pipe
	Nominal pipe diameter	56 mm to 110 mm
7.	Item name	PEXa
	Nominal pipe diameter	16 mm to 32 mm
8.	Item name	REHAU RAUPIANO
	Pipe material	Triple layer mineral re-enforced polypropylene (PP-MD)
	Nominal pipe diameter	40 mm, 50 mm, 90 mm and 110 mm
9.	Item name	REHAU RAUPIANO
	Pipe material	Triple layer mineral re-enforced polypropylene (PP-MD)
	Nominal pipe diameter	75 mm
10.	Item name	Wavin Astolan
	Pipe material	Polypropylene (PP)
	Nominal pipe diameter	56 mm to 110 mm
Fire stopping		
11.	Item name	PROMASEAL® CIL Collar
	Nominal collar size	40 to 100
	Intumescent density	878.5 kg/m^3 to 1017.7 kg/m^3
12.	Item name	Grafitex Graf 4T filling gaps between collar and service from underside
	Density	920 kg/m^3 to 1000 kg/m^3

Figure 1 and Figure 2 indicate the assessed systems.

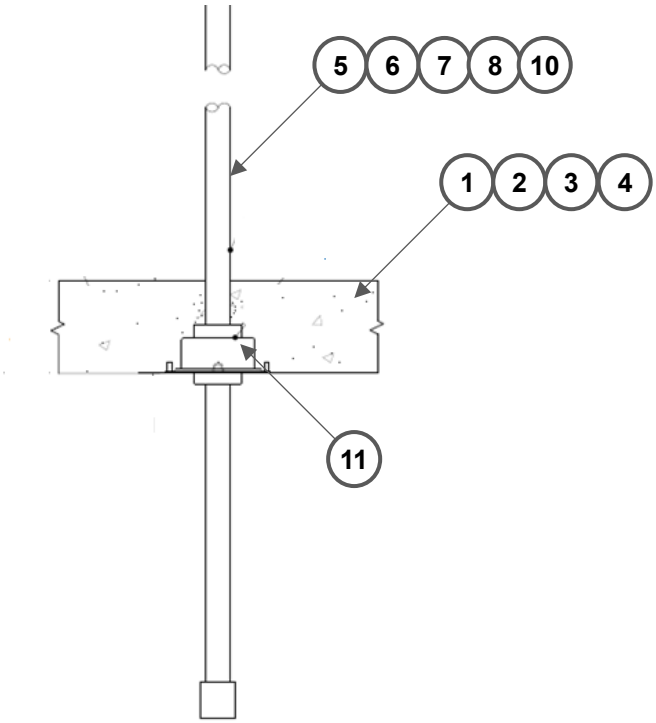

Figure 1 **Representative illustration of proposed system for uPVC, HDPE, PEXa, REHAU RAUPIANO (40 mm, 50 mm, 90 mm and 110 mm) and Wavin Astolan pipes**

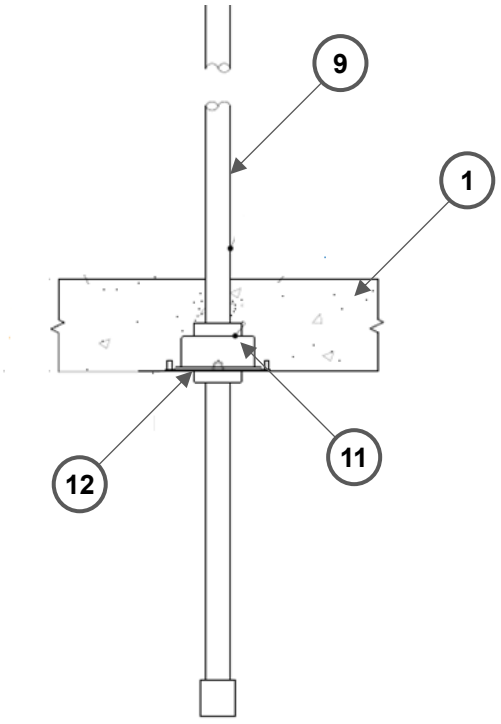

Figure 2 **Representative illustration of proposed system for RAUPIANO (75 mm) pipe**

5. Assessment 1 – AS 1530.4:2005 to AS 1530.4:2014

5.1 Description of variation

Fire resistance tests A-07-513, A-07-516, EWFA 27884300.1, A-11-737, EWFA 2729100.2, EWFA 2729101.2 and A-14-882 were conducted in accordance with AS 1530.4:2005 sections 2 and 10. The AS 1530.4:2005 standard differs to a minor degree from AS 1530.4:2014 and the effect these differences have on the fire resistance performance of the referenced test specimens is discussed below.

5.2 Methodology

The method of assessment used is summarised in Table 18.

Table 18 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Qualitative and comparative

5.3 Assessment

5.3.1 Furnace temperature

The same furnace heating regime is stipulated in both AS 1530.4:2005 and AS 1530.4:2014 and follows the below trend:

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

Where:

T = furnace temperature at time (t), in degrees centigrade

t = 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 also not appreciably different.

5.3.2 Furnace pressure

The furnace pressure conditions for single and multiple penetration sealing systems in the two standards are not appreciably different.

It must be noted that the wording has changed between the two versions of AS 1530.4, however both standards require that the following pressure conditions are met:

- A pressure of 15 ± 3 Pa must be established at the centre of a single horizontal penetration within a vertical separating element that has a maximum height of ≤ 1 m
- If a single horizontal penetration is tested in a vertical separating element that has a height more than 1 m, the pressure at the top of the separating element must be 20 ± 3 Pa and the services must be included in the zone where positive pressure exceeds 10 Pa.
- If more than one penetration sealing system is tested in a vertical separating element, the pressure conditions specified in item (a) or (b) must apply to the lowest penetration.
- For horizontal specimens, a pressure of 20 ± 3 Pa must be maintained 100 mm below the separating element.

The parameters outlining the accuracy of control of the furnace pressure in the two standards are also not appreciably different.

5.3.3 Performance criteria

AS 1530.4:2014 specifies the following performance criteria for penetrations:

- integrity
- insulation

5.3.4 Integrity

Both AS 1530.4:2014 and AS 1530.4:2005 define integrity failure has collapse, development of cracks, fissures, other openings and other relevant occurrences.

The measurement of the integrity of the test specimen must be made by a cotton pad, gap gauges or sustained flaming. A cotton pad is only suitable for insulated assemblies (except for service penetrations) and so is suitable for the ceiling systems discussed in this report.

There are no differences between the standards regarding the size and the way in which the cotton pad is applied. Both standards require a 20 mm thick × 100 mm square cotton pad weighing between 3 g and 4 g for all elements of construction – except when a smaller cotton pad (20 mm thick × 30 mm square) may be required for densely packed service penetrations.

However, AS 1530.4:2014 also defines when the application of the cotton pad should be discontinued. It states that 'except for penetration systems, the use of the cotton pad shall be discontinued over areas where the temperature exceeds 300 ºC measured by a thermocouple with the edge of the pad aligned with the edge of the gap.' This is not defined as a requirement in AS 1530.4:2005.

Other than the cotton pad test, integrity is also evaluated with the use of a 6 mm or 25 mm gap gauge – as applicable or when sustained flaming occurs for longer than 10 s on the surface of the unexposed face. These criteria are the same between the two standards.

5.3.5 Insulation

The failure criteria for insulation in AS 1530.4:2014 and AS 1530.4:2005 are not appreciably different. They are defined as:

- The average temperature on the unexposed face exceeds the initial temperature by more than 140 K or
- The temperature at any location on the unexposed face exceeds the initial temperature by more than 180 K.
- The location of the unexposed side thermocouples is also not appreciably different between the two standards.

5.3.6 Restraint

The application of restraint to the test specimen in AS 1530.4:2014 and AS 1530.4:2005 is not appreciably different.

5.3.7 Active fire suppression

Both AS 1530.4:2014 and AS 1530.4:2005, which are standards for fire resistance testing of elements of building construction, do not incorporate provisions for active fire suppression systems. Consequently, the FRL achieved by the prototype was attained without the aid of an active fire suppression system.

5.4 Conclusion

Based on the above discussion and in the 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 A-07-513, A-07-516, EWFA 27884300.1, A-11-737, EWFA 2729100.2, EWFA 2729101.2 and A-14-882 – can be used to assess the integrity and insulation performance in accordance with AS 1530.4:2014.

6. Assessment 2 – Comparison of Promaseal® CIL to Promaseal® Green cast in collar

6.1 Description of variation

It is proposed to consider the use of Promaseal® CIL fire collars as an equivalent fire stopping system to the Promaseal® Green cast in collars based on verification from the manufacturer and existing test reports for uPVC fire collars.

This assessment was done to determine the expected performance of the systems based on test reports A-07-513, A-07-516, A-08-555, A-10-696, A-11-737, EWFA 2729100.2, EWFA 2729101.2, EWFA 27884300.1, A-14-882, A-16-066, A-17-075A.

6.2 Methodology

The method of assessment used is summarised in Table 19.

Table 19 Method of assessment

Assessment method	
Level of complexity	Basic assessment
Type of assessment	Qualitative and comparative

6.3 Assessment

The collar manufacturer confirmed in writing that PROMASEAL® CIL collar is a renamed PROMASEAL® Green collar with the same shell, base plate and intumescent with the main difference being the colour of the collar.

This variation in colour is only due to the difference in pigment in the collar body. Moreover, Promat has confirmed that both collars are made from the same copolymer and have identical dimensions with the same quantity of intumescent.

As the colour pigment is not expected to have a significant influence on the intumescent protection system, the likely fire resistance performance is not considered to be affected if tested in accordance with AS 1530.4:2014 and assessed in general accordance with AS 4072.1:2005.

When considering the information above, it is expected that REHAU RAUPIANO pipes treated with Promaseal® Green fire collars in test A-11-737, EWFA 2729101.2 and PEXa pipes treated with Promaseal® Green fire collars in test EWFA 2729101 will achieve an equivalent fire resistance level if tested with a Promaseal® CIL fire collar.

Table 20 Performance of REHAU RAUPIANO pipes protected with PROMASEAL® CIL collar penetrating 120mm slab

Nominal Pipe Diameter	Nominal collar size	FRL
40mm	Promaseal® CIL 40	-/240/180
50mm	Promaseal® CIL 50	-/240/180
75mm*	Promaseal® CIL 80	-/240/240*
90mm*	Promaseal® CIL 100	-/180/180
110mm	Promaseal® CIL 100	-/180/180
Note: *Protected with PROMASEAL® CIL collar and PROMASEAL Grafitex Graf 4T		

Table 21 Performance of PEXa pipes protected with PROMASEAL® CIL collar and penetrating 120mm slab

Nominal Pipe Diameter (PEXa)	Nominal collar size	FRL
16 mm	Promaseal® CIL 40	-/240/120
20 mm	Promaseal® CIL 40	-/240/180
25 mm	Promaseal® CIL 40	-/120/120
32 mm	Promaseal® CIL 40	-/180/180

6.4 Conclusion

This assessment demonstrates that the Promaseal® CIL fire collars are expected to perform at least equivalently when installed in an otherwise identical system in accordance with AS 1530.4:2014.

7. Assessment 3 – uPVC pipes in concrete slabs with various thickness

7.1 Description of variation

It is proposed to consider assess uPVC pipe sizes between 40 mm and 100 mm in diameter, installed in concrete slabs in accordance with AS 3600:2018, with minimum thicknesses of 120 mm, 150 mm and 175 mm.

This assessment was done to determine the expected performance of the systems based on the test report FRT190093a R1.0 prepared by Warringtonfire.

7.2 Methodology

The method of assessment used is summarised in Table 22.

Table 22 Method of assessment

Assessment method	
Level of complexity	Basic assessment
Type of assessment	Qualitative and comparative

7.3 Assessment

7.3.1 UPVC pipes

The test FRT190093a R1.0 – tested to AS 1530.4:2014 – consisted of seven specimens, A to G, which were installed in a 150 mm concrete slab. Specimens A and E consisted of uPVC pipes with a nominal diameter of 40 mm and 100 mm, respectively, and were protected with Promaseal® CIL fire collars. The test considered the minimum and maximum uPVC pipe sizes that are permitted to be treated with a Promaseal CIL fire collar. The test went for a duration of 241 minutes before being terminated. Refer to Table 23 for the details of the tested specimen.

Table 23 FRT190093a R1.0 results

Specimen	Description	Structural adequacy	Integrity (minutes)	Insulation (minutes)	FRL
A	Promaseal® CIL 40 collar protecting nominal 40 mm uPVC pipe.	N/A	No failure at 241 minutes	No failure at 241 minutes	-/240/240
B	Promaseal® CIH 65 collar protecting nominal 65 mm uPVC pipe and Parfix Silicon sealant.	N/A	No failure at 241 minutes	No failure at 241 minutes	-/240/240

Specimen	Description	Structural adequacy	Integrity (minutes)	Insulation (minutes)	FRL
C	Promaseal® CIH 80 collar protecting nominal 80 mm uPVC pipe and Parfix Silicon sealant.	N/A	No failure at 241 minutes	No failure at 241 minutes	-/240/240
D	Promaseal® CIH 50 collar protecting nominal 50 mm uPVC pipe and Parfix Silicon sealant.	N/A	No failure at 241 minutes	No failure at 241 minutes	-/240/240
E	Promaseal® CIL 100 collar protecting nominal 100 mm uPVC pipe.	N/A	No failure at 241 minutes	No failure at 241 minutes	-/240/240
F	Promaseal® CIH 40 collar protecting nominal 40 mm uPVC pipe and Parfix Silicon sealant.	N/A	No failure at 241 minutes	No failure at 241 minutes	-/240/240
G	Promaseal® CIH 100 collar protecting nominal 100 mm uPVC pipe and Parfix Silicon sealant.	N/A	No failure at 241 minutes	No failure at 241 minutes	-/240/240

Over the course of the fire resistance test, the specimens were not deemed to fail the integrity and insulation criteria and achieved an FRL of -/240/240.

The test included Promaseal® CIH fire collars, which have been confirmed by the manufacturer to have an identical design with the addition of an extension piece. The extension piece is fitted to the top of the fire collar before the slab is poured to create a sleeve to install the pipe after the fact. The gap between the pipe and the slab is then sealed with fire-rated sealant. As the intumescent material and clearances in the fire collar are consistent, the collars are considered to provide equivalent protection. This is supported when considering specimens, A and F and E and G, where the 40 mm and 100 mm uPVC pipes were deemed to have equivalent fire resistance for both the Promaseal® CIL and Promaseal® CIH fire collars. When considering the equivalence of the fire collars, the requirements of 4.6.4(d) of AS 4072.1:2005 are considered to be met.

The concrete structures code AS 3600:2018 states in clause 5.5.1 the minimum slab thickness for prescribed insulation for fire resistance levels. Table 24 states that a slab with a thickness of 120 mm is expected to achieve an insulation criterion of 120 minutes.

Table 24 Minimum fire resistance for given slab thickness

Effective slab thickness	Maximum fire resistance
120 mm	120 minutes
150 mm	180 minutes
175 mm	240 minutes

When considering the design of the intumescent strip in the fire collar and that it does not change in height with respect to the slab, it can be expected that the integrity portion of the FRL will remain whether the overall height of the slab is increased or decreased.

The fire collar achieved a 240 minute insulation criterion in a 150 mm slab. When considering the maximum temperature recorded by the thermocouples for the specimens that were located on the unexposed side of the slab, which was a maximum of 142 °C for T/C012 for specimen A and 156 °C for T/C052 for specimen E, a reduction in the slab thickness is not expected to decrease the insulation criteria achieved by the system below 120 minutes.

Considering the above, it is expected that uPVC pipes between 40 mm and 100 mm treated with Promaseal® CIL collars is capable of achieving an FRL of -/180/180 in slabs with a thickness not less than 150 mm and -/240/240 in slabs with a thickness not less than 175 mm in accordance with AS 3600:2018.

7.3.2 Acoustic lagging

The test FSRG A-22-063 contained three specimens A, B and C, which were installed in a 120 mm concrete slab. Specimen A was a 100 mm uPVC pipe penetration with external acoustic lagging on

the exposed side protected with Promaseal® CIL fire collar. The test went for a duration of 182 minutes before being terminated, with the fire collar failing the integrity criteria at the 175th minute and achieving an FRL of -/120/120.

In the referenced test, thermocouples TCA1 and TCA2, located on the test specimen 25 mm from the separating element, had a sharp rise in temperature at the beginning until approximately 11 minutes which can be attributed to the end cap of the pipe consisting of the acoustic lagging rather than a uPVC pipe. Following the activation of the fire collar, the temperatures dropped to approximately 30 C and began to rise at a steady rate until the 175th minute. Based on the results of the 100 mm uPVC pipe in FRT190093a R1.1 and FSRG A-22-063, the inclusion of Pyrotek Soundlag 4525C was not shown to reduce the fire resistance of the system up to 120 minutes.

7.3.3 End caps

The test FSRG A-24-010 contained four specimens, A through D which, were installed in a 120 mm concrete slab. Specimen D was a 100 mm uPVC pipe penetration capped at the top and bottom of the concrete slab treated with Promaseal® CIL fire collar. The test went for a duration of 183 minutes before being terminated. The specimens in the test were not deemed to achieve an FRL due to the fire severity being outside the permissible limits prescribed in AS 1530.4:2014. The specimen was not deemed to fail the integrity criteria but was deemed to exceed the insulation criteria at the 160th minute. As the test conditions were considered to be more onerous than a standard AS 1530.4:2014 test, the FRL has been considered to be -/180/120 for specimen D. an indicative figure of the test specimen is shown in Figure 3.

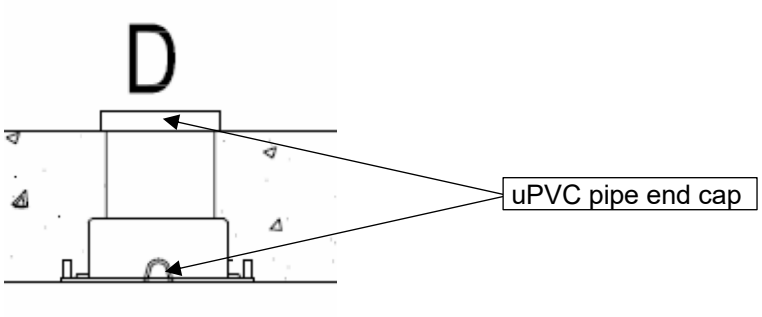

Figure 3 End capped uPVC pipe (From FSRG A-24-010)

In the referenced test, TCD1 and TCD2, located on the test specimen 25 mm from the separating element, had a sharp rise in temperature at the beginning until approximately 13th minute which is when the fire collar is expected to have activated and closed the opening in the slab. Following activation, the temperature was observed to reduce to approximately 80 C before steadily increasing as the test continued. The maximum temperature recorded on the specimen was 173.6 C at 183 minutes. The specimen was deemed to fail the insulation criteria on the separating element at 161 minutes.

If the slab were increased to a thickness of 150 mm in alignment with AS 3600 for a 180 minute separating element, it would be expected that the specimen would achieve an FRL of -/180/180. Based on the results of the 100 mm uPVC pipe in FRT190093a R1.1 and FSRG A-24-010, a pipe capped above and below the slab level was not shown to reduce the fire resistance of the system up to 180 minutes.

7.3.4 Promasil® 1100 build up

The test FSRG A-23-046B contained three specimens, A, B and C, which were installed in a 150 mm concrete slab. Specimen C was a 100 mm CIH fire collar with a uPVC insert with a uPVC cap on the topside. The underside was built up with Promasil® 1100 board as per manufacturers recommendations. The test went for a duration of 122 minutes and in this time, no insulation or integrity failure was recorded. An indicative figure of the specimen is shown in Figure 4

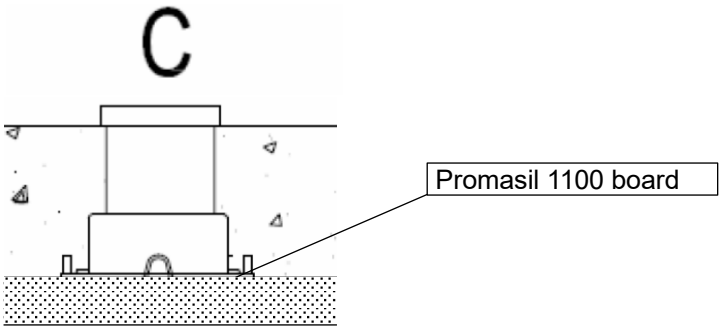

Figure 4 Promasil P1100 build up (From FSRG A-24-010 based on FSRG A-23-046B)

The equivalence between Promaseal CIH and Promaseal CIL fire collars has previously been established in section 7.3. When considering the performance of the Promasil 1100 board and CIH fire collar against a standard 100 mm CIL fire collar in FRT190093a R1.1, the performance of the system was not reduced across 120 minutes. Based on the results of FSRG A-23-046B it is considered that the buildup with Promasil® 1100 on the underside of a 150 mm concrete slab would not reduce the performance of the fire collar for uPVC pipes between 40 mm and 100 mm.

7.4 Conclusion

This assessment demonstrates that uPVC pipes protected with Promaseal® CIL fire collars and installed in concrete slabs are capable of achieving the FRLs prescribed in Table 25 in accordance with AS 1530.4:2014.

Table 25 Performance of uPVC pipes protected with PROMASEAL® CIL collar installed in concrete slabs as per AS 3600:2018

Nominal Pipe Diameter (uPVC)	Nominal collar size	FRL		
		120 mm slab	150 mm slab	175 mm slab
40 mm	Promaseal® CIL 40	-/120/120*#	-/180/180*	-/240/240
50 mm	Promaseal® CIL 50	-/120/120*#	-/180/180*	-/240/240
65 mm	Promaseal® CIL 65	-/120/120*#	-/180/180*	-/240/240
80 mm	Promaseal® CIL 80	-/120/120*#	-/180/180*	-/240/240
100 mm	Promaseal® CIL 100	-/120/120*#	-/180/180*	-/240/240

Notes: FRL is applicable to configurations where pipe socket is located in collar.
Applicable FRL with PyroTek SoundLag on exposed side installed as tested in FSRG A-22-063
* Applicable FRL with pipe capped at top and bottom of slab installed as tested in FSRG A-24-010.

8. Assessment 4 – uPVC pipes in concrete slab with KingFlor KF40 formwork

8.1 Description of variation

It is proposed to consider nominal uPVC pipe sizes between 40 mm and 100 mm in diameter, installed in minimum 120 mm thick concrete slab with KingFlor KF40 formwork. The original test was conducted with a Promaseal Green cast in fire collar to AS 1530.4:2005.

This assessment was done to determine the expected performance of the system based on the test report FSRG A-07-516 prepared by Fire Science Research Group.

8.2 Methodology

The method of assessment used is summarised in Table 26.

Table 26 Method of assessment

Assessment method	
Level of complexity	Basic assessment
Type of assessment	Qualitative and comparative

8.3 Assessment

The test FSRG A-07-516 contained four specimens, A to D, which were installed in a 120 mm thick concrete slab with KingFlor KF40 formwork. Specimens A and B were 100 mm and 40 mm uPVC pipes protected with Promaseal® Green fire collars. The test went for a duration of 242 minutes before being terminated. For specimen B, there was no integrity and insulation failure observed for the duration of the test. For specimen A there was no integrity failure; however, the insulation failure occurred at the 176 minute mark on TC 01 located 25 mm from the pipe on the unexposed side.

The manufacturer has confirmed the design of the Promaseal Green and CIL collars has not changed, with the exception of the pigment colour in the plastic surround, as previously discussed in section 6.

It is proposed to assess 50 mm, 65 mm and 80 mm uPVC pipes based on the results of specimens A (40 mm uPVC pipe) and B (100 mm uPVC pipe) of FSRG A-07-516. As noted previously, the 40 mm and 100 mm uPVC pipes protected with Promaseal® Green fire collars achieved an FRL of -/240/240 and -/240/120, respectively. Based on these results, 50 mm, 65 mm and 80 mm uPVC pipes protected with Promaseal CIL collars are expected to achieve an FRL of at least -/240/120.

8.4 Conclusion

This assessment demonstrates that uPVC pipes protected with Promaseal® CIL fire collars and installed in KingFlor KF40 slabs are capable of achieving the FRLs prescribed in Table 27 in accordance with AS 1530.4:2014.

Table 27 Performance of uPVC pipes protected with PROMASEAL® CIL collar installed in minimum 120 mm thick concrete slab with Kingflor KF40 formwork

Nominal Pipe Diameter (uPVC)	Nominal collar size	FRL
40 mm	Promaseal® CIL 40	-/240/240
50 mm	Promaseal® CIL 50	-/240/120
65 mm	Promaseal® CIL 65	-/240/120
80 mm	Promaseal® CIL 80	-/120/120
100 mm	Promaseal® CIL 100	-/240/120
Note: FRL applicable when installed with manufacturer approved extension box sealed to deck with fire rated sealant.		

9. Assessment 5 – uPVC pipes in concrete slab with Fielders CF210 formwork

9.1 Description of variation

It is proposed to consider nominal uPVC pipe sizes between 40 mm and 100 mm in diameter, installed in minimum 80 mm thick concrete slab with Fielders CF210 formwork. The original test was conducted with a Promaseal Green cast in fire collar. This assessment was done to determine the expected performance of the system based on the test report FSRG A-14-882 prepared by Fire Science Research Group in accordance with AS 1530.4:2014.

9.2 Methodology

The method of assessment used is summarised in Table 28.

Table 28 Method of assessment

Assessment method	
Level of complexity	Basic assessment
Type of assessment	Qualitative and comparative

9.3 Assessment

The test FSRG A-14-882 consisted of four specimens, A to D, which penetrated a 80 mm Fielders CF210 slab. Specimens C and D were 100 mm and 40 mm uPVC pipes protected with Promaseal® Green fire collars. The test went for a duration of 95 minutes before being terminated. Specimen C, the 100 mm uPVC pipe, was deemed to fail the insulation criteria at 73 minutes while specimen D, the 40 mm uPVC pipe, was deemed to fail at 84 minutes. Both specimens achieved a -/90/60 FRL.

The manufacturer has confirmed the design of the Promaseal Green and CIL collars has not changed, with the exception of the pigment colour in the plastic surround, as previously discussed in section 6.

It is proposed to assess 50 mm and 65 mm uPVC pipes based on the results of specimens D (40 mm uPVC pipe) and C (100 mm uPVC pipe) of FSRG A-14-882. As noted previously the 40 mm and 100 mm uPVC pipes protected with Promaseal® Green fire collars achieved an FRL of -/90/60. Based on these results, 50 mm and 65 mm uPVC pipes protected with Promaseal CIL collars can also be expected to achieve an FRL of at least -/90/60.

9.4 Conclusion

This assessment demonstrates that uPVC pipes protected with Promaseal® CIL fire collars in Fielders CF210 slabs are capable of achieving the FRLs prescribed in Table 29 in accordance with AS 1530.4:2014.

Table 29 Performance of uPVC pipes penetrating Fielders CF210 deck and protected with PROMASEAL® CIL collar

Nominal Pipe Diameter(uPVC)	Nominal collar size	FRL
40 mm	Promaseal® CIL 40	-/90/60
50 mm	Promaseal® CIL 50	-/90/60
65 mm	Promaseal® CIL 65	-/90/60
100 mm	Promaseal® CIL 100	-/90/60

10. Assessment 6 – uPVC pipes in concrete slab with Slim Dek 210 formwork

10.1 Description of variation

It is proposed to consider nominal uPVC pipe sizes between 40 mm and 100 mm in diameter installed in a 95 mm thick concrete slab with Slim Dek 210 formwork. The original test was conducted with a Promaseal Green cast in fire collar to AS 1530.4:2014.

This assessment was done to determine the expected performance of the system based on the test report FSRG A-17-075 prepared by Fire Science Research Group.

10.2 Methodology

The method of assessment used is summarised in Table 30.

Table 30 Method of assessment

Assessment method	
Level of complexity	Basic assessment

Assessment method	
Type of assessment	Qualitative and comparative

10.3 Assessment

The test FSRG A-17-075 – tested to AS 1530.4:2014 – contained three specimens, A to C, which were installed in a 95 mm thick concrete slab with Slim Dek 210 formwork. Specimen B and C were 100 mm and 40 mm uPVC pipes protected with Promaseal® Green fire collars. The test went for a duration of 123 minutes before being terminated. For specimen B, there was no integrity and insulation failure observed for the duration of the test. For specimen C, there was no integrity failure, ;however, the insulation failure occurred at the 119 minute mark on TC C3, located on the slab on the unexposed side 25 mm from the pipe.

Specimen C was located in close proximity to the edge of the separating element, and Table 5 of A-17-075A states that a horizontal crack began to propagate across the slab at 60 minutes. It has been confirmed from the testing laboratory that the separating element did not contain reinforcing steel. The failure of the insulation criteria was deemed to be located on the slab in close proximity to the area where the crack occurred.

When considering the performance of the 100 mm uPVC pipe, it is expected that with the inclusion of steel reinforcement in the slab, the 40 mm uPVC pipe is expected to achieve an FRL of -/120/120.

The manufacturer has confirmed the design of the Promaseal Green and CIL collars have not changed with exception of the pigment colour in the plastic surround as previously discussed in section 6.

It is proposed to assess 50 mm and 65 mm uPVC pipes based on the results of specimens C (40 mm uPVC pipe) and B (100 mm uPVC pipe) of FSRG A-17-075. As noted previously, the 40 mm and 100 mm uPVC pipes protected with Promaseal® Green fire collars can be expected to achieve an FRL of -/120/120, provided that the slab is provided with steel reinforcement. Based on these results, 50 mm and 65 mm uPVC pipes protected with Promaseal CIL collars can also be expected to achieve an FRL of at least -/120/120.

10.4 Conclusion

This assessment demonstrates that nominal uPVC pipe sizes between 40 mm and 100 mm in diameter installed in a 95 mm thick concrete slab with Slim Dek 210 formwork are capable of achieving the FRLs prescribed in Table 31 in accordance with AS 1530.4:2014.

Table 31 Performance of uPVC pipes penetrating SlimDek 210 deck and protected with PROMASEAL® CIL collar

Nominal Pipe Diameter(uPVC)	Nominal collar size	FRL
40mm	Promaseal® CIL 40	-/120/120
50mm*	Promaseal® CIL 50	-/120/120
65mm*	Promaseal® CIL 65	-/120/120
100mm*	Promaseal® CIL 100	-/120/120

Notes:

- FRL is applicable to configurations where pipe is in socket.
- Reinforcement mesh must be installed.
- * Indicates steel adapter plate required.
- Gaps between steel decking and fire collar to be sealed with Fire Ban One fire rated sealant.

11. Assessment 7 – Wavin Astolan pipes in concrete slab

11.1 Description of variation

It is proposed to consider nominal Wavin Astolan pipe sizes between 56 mm and 110 mm for concrete slabs with thicknesses of 120 mm. The original test was conducted with a Promaseal Green cast in fire collar to AS 1530.4:2005.

This assessment was done to determine the expected performance of the system based on the test report EWFA 27884300 prepared by Exova Warringtonfire Australia in accordance with AS 1530.4:2014.

11.2 Methodology

The method of assessment used is summarised in Table 32.

Table 32 Method of assessment

Assessment method	
Level of complexity	Basic assessment
Type of assessment	Qualitative and comparative

11.3 Assessment

The test EWFA 27884300 contained seven specimens, A to F which penetrated a 120 mm concrete slab. Specimen A and B were 100 mm and 56 mm Wavin Astolan pipes treated with Promaseal® Green fire collars. The test went for a duration of 121 minutes before being terminated. There was no integrity and insulation failure observed for specimens A and B for the duration of the test.

The manufacturer has confirmed the design of the Promaseal Green and CIL collars has not changed, with the exception of the pigment colour in the plastic surround, as previously discussed in section 6.

It is proposed to assess 75 mm and 90 mm Wavin Astolan pipes based on the results specimens B (56 mm pipe) and B (100 mm pipe) of EWFA 27884300. As noted previously, the 56 mm and 100 mm Wavin Astolan pipes protected with Promaseal® Green fire collars achieved an FRL of -/120/120. Based on these results, 75 mm and 90 mm Wavin Astolan pipes protected with Promaseal CIL collars can also be expected to achieve an FRL of at least -/120/120.

11.4 Conclusion

This assessment demonstrates that Wavin Astolan pipes treated with Promaseal® CIL in 120 minute concrete slabs are capable of achieving the FRLs prescribed in Table 33 in accordance with AS 1530.4:2014.

Table 33 Performance of Wavin Astolan pipes protected with PROMASEAL® CIL collar penetrating 120mm concrete slab

Pipe Outer Diameter	Nominal collar size	FRL
56 mm	Promaseal® CIL 65	-/120/120
75 mm	Promaseal® CIL 80	-/120/120
90 mm	Promaseal® CIL 100	-/120/120
110 mm	Promaseal® CIL 100	-/120/120

12. Assessment 8 – HDPE pipes in various concrete slabs

12.1 Description of variation

It is proposed to consider nominal HDPE pipe sizes between 40 mm and 110 mm for slabs in accordance with AS 3600:2018 with minimum thicknesses of 120 mm, 150 mm and 175 mm. The original tests were conducted with a Promaseal Green cast in fire collar to AS 1530.4:2005.

This assessment was done to determine the expected performance of the system based on the test reports FSRG A-05-513 and FSRG A-08-555 prepared by Fire Science Research Group in accordance with AS 1530.4:2014.

12.2 Methodology

The method of assessment used is summarised in Table 34.

Table 34 Method of assessment

Assessment method	
Level of complexity	Basic assessment
Type of assessment	Qualitative and comparative

12.3 Assessment

12.3.1 HDPE pipe range

The test FSRG A-07-513 consisted of four specimens, A to D, which were installed in a 120 mm concrete slab. Specimens B and D were 65 mm and 40 mm HDPE pipes treated with Promaseal® Green fire collars. The test went for a duration of 241 minutes before being terminated. For specimen B, there was no integrity failure; however, insulation failure occurred at the 181 minute mark on TC5, located 25 mm from the pipe on the unexposed size. For specimen D, there was no integrity failure; however, the insulation failure occurred at the 174 minute mark on TC13, located 25 mm from the pipe on the unexposed side.

In specimen B, the 65 mm HDPE pipe was provided with four thermocouples TC5, TC6, TC7 and TC8. TC5 and TC6 were located on the slab, while TC7 and TC8 were located on the specimen. It should be noted that the insulation failure that occurred at 181 minutes was at TC5, which was located on the slab 25 mm from the service. There was no failure in insulation observed on the pipe - ie on TC7 and TC8, for the duration of the test (241 minutes). If the thickness of the concrete slab is increased to 150 mm and 175 mm, the insulation performance at the slab can also be expected to improve to at least 180 minutes and 240 mm minutes, respectively, in accordance with AS 3600:2018. On this basis, the service, when installed through a 150 mm and 175 mm concrete slab, is considered capable of achieving an FRL of at least -/180/180 and -/240/240, respectively.

In specimen D, the 40 mm HDPE pipe was provided with four thermocouples, TC13, TC14, TC15 and TC16. TC13 and TC14 were located on the slab, while TC15 and TC16 were located on the pipe. Similar to specimen B above, the insulation failure occurred at the slab level on thermocouples TC13 and TC14 at approximately 174 minutes and 190 minutes, respectively. There was no failure in insulation observed on the pipe - ie on TC15 and TC16 for the duration of the test (241 minutes). As discussed previously, for specimen B, when installed through a 150 mm and 175 mm concrete slab, is considered capable of achieving an FRL of at least -/180/180 and -/240/240, respectively.

The test FSRG A-08-555 – tested to AS 1530.4:2005 as previously discussed – contained four specimens, A to D, which penetrated a 150 mm KingFlor KF70 concrete slab. Specimen A was a 110 mm HDPE pipe (outer diameter 111 mm) treated with Promaseal® Green fire collars. The test went for a duration of 254 minutes before being terminated. The specimen was deemed to fail the insulation criteria at 189 minutes when the thermocouples located on the slab (TC A1 and TCA2) exceeded a temperature rise of 180 K. The thermocouples on the specimen (TC A3 and TC A4) did not record a temperature greater than 85° C.

KingFlor KF70 is a permanent steel formwork system that is filled with concrete. The separating element consists of a normal weight concrete poured into a formwork system that stays in place once the element has cured. The fire collar is fixed directly to the deck with a mounting adaptor plate. As the lining is conductive, the test completed in the steel formwork is considered to be more onerous than a test completed in a standard slab.

Specimen A was deemed to fail the insulation criteria based on the transfer of heat through the separating element. Whether the fire collar is installed in a 120 mm concrete slab or 150 mm KingFlor KF70 slab, the intumescent material remains the same and it is expected that integrity would be retained. Based on the low temperatures of the thermocouples located on the pipe and the failure occurred on thermocouples on the slab, it is expected that a reduction of slab thickness in a conventional slab will achieve an insulation criteria of 120 minutes. It is also expected that an increase in slab thickness, in alignment with AS 3600, would achieve an insulation criteria of 240 minutes for a slab thickness of 175 mm.

Based on the test evidence and discussion provided for 40 mm, 65 mm and 100 mm HDPE pipes, the full range of HDPE pipes between 40 mm and 110 mm can be positively assessed as per clause 4.6.4(a) of AS 4072.1:2005.

12.3.2 Acoustic lagging

The test FSRG A-22-063 contained three specimens A, B and C which were installed in a 120 mm concrete slab. Specimen A was a 100 mm uPVC pipe penetration with external acoustic lagging on the exposed side treated with Promaseal® CIL fire collar. The test went for a duration of 182 minutes before being terminated, with the fire collar failing the integrity criteria at the 175th minute and achieving an FRL of -/120/120.

TCA1 and TCA2, located on the test specimen 25 mm from the separating element, had a sharp rise in temperature until approximately 11 minutes which can be attributed to the end cap of the pipe consisting of the acoustic lagging rather than a uPVC pipe. Following the activation of the fire collar, the temperatures dropped to approximately 30 C and began to rise at a steady rate until the 175th minute. Based on the results of the 100 mm uPVC pipe in FRT190093a R1.1 and FSRG A-22-063, the inclusion of Pyrotek Soundlag 4525C was not shown to reduce the fire resistance of the system up to 120 minutes. Based on the performance of the uPVC pipe and the previously established performance of HDPE pipes protected by Promaseal® CIL fire collars, the addition of acoustic lagging is not considered to reduce the performance of the fire collar up to 120 minutes.

12.4 Conclusion

This assessment demonstrates that 40 mm to 110 mm HDPE pipes are capable of achieving the FRL prescribed in Table 35 in accordance with AS 1530.4:2014.

Table 35 Performance of HDPE pipes protected with PROMASEAL®CIL collar penetrating concrete slabs

Pipe Outer Diameter (HDPE)	Nominal collar size	FRL		
		120 mm	150 mm	175 mm
40 mm	Promaseal® CIL 40	-/120/120#	-/180/180	-/240/240
50 mm	Promaseal® CIL 50	-/120/120#	-/180/180	-/240/240
56 mm	Promaseal® CIL 65	-/120/120#	-/180/180	-/240/240
65 mm	Promaseal® CIL 65	-/120/120#	-/180/180	-/240/240
70 mm	Promaseal® CIL 80	-/120/120#	-/180/180	-/240/240
90 mm	Promaseal® CIL 100	-/120/120#	-/180/180	-/240/240
110 mm	Promaseal® CIL 100	-/120/120#	-/180/180	-/240/240
Note: # Applicable FRL with PyroTek SoundLag on exposed side installed as tested in FSRG A-22-063				

13. Assessment 9 – Plastic pipes through concrete beams

13.1 Description of variation / background

It is proposed to consider nominal HDPE pipes between 56 mm and 110 mm and uPVC pipes between 50 mm and 100 mm through the side of concrete beams extended down from a concrete slab that has a thickness in accordance with AS 3600. The original test was conducted with a Promaseal® Green cast in fire collar with 56 mm and 110 mm HDPE pipes to AS 1530.4:2014.

This assessment was done to determine the performance of the system based on the test FSRG A-10-696 prepared by Fire Science Research Group in accordance with AS 1530.4:2014.

13.2 Methodology

The method of assessment used is summarised in Table 22.

Table 36 Method of assessment

Assessment method	
Level of complexity	Basic assessment
NCC procedure for determining FRL	Differs in only a minor degree from a tested prototype S1C2(c)
Type of assessment	Qualitative and comparative

13.3 Assessment

The test FSRG A-10-696 consisted of three specimens A, B and C which, were installed in the side of a beam constructed of Hebel panels with a Hebel topping slab with concrete infill used to seat the collars in place. Rather than a Hebel separating element, the system will be installed into a concrete substrate in accordance with AS 3600. As the proposed separating element has a density greater than the Hebel substrate, it would not be considered to reduce the performance of the system.

The fire collars were located 75 mm below the underside of the slab and the pipe extended a minimum of 400 mm into the beam before turning upwards and penetrating the topping slab. Specimen B consisted of a 56 mm HDPE pipe penetration protected with a Promaseal® Green fire collar, while specimen C consisted of a 110 mm HDPE pipe protected with a Promaseal® Green fire collar.

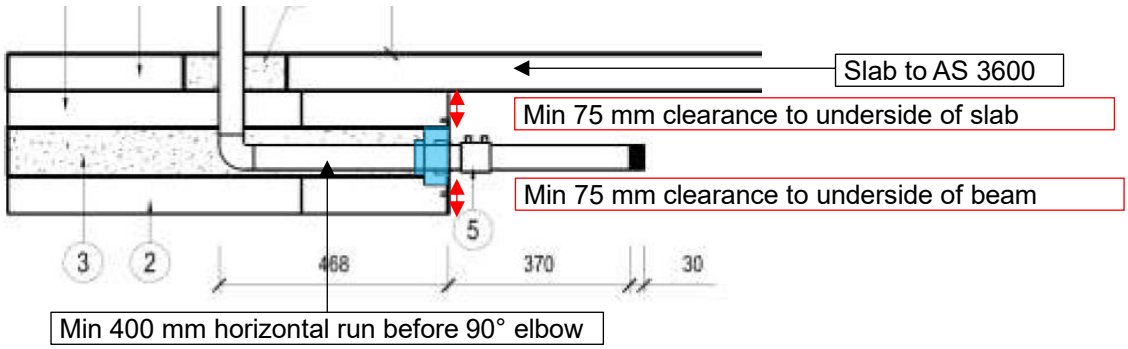

Figure 5 Fire collar installed on side of concrete beam (from FSRG A-10-696)

Thermocouples B3 and B4 were located on specimen B, which recorded a temperature rise to approximately 134°C at the 10th minute where it was evident that the fire collar activated and closed the opening in the beam. The temperature then reduced to approximately 35°C and maintained a steady increase in temperature until approximately 173 minutes, where the temperature began to rise and failed the insulation criteria at the 187th minute.

Thermocouples C3 and C4 were located on specimen C, which recorded a maximum temperature rise of 168°C at the 16th minute where it was evident that the fire collar activated and closed the opening in the beam. The temperature reduced until the 60th minute, where it reached a minimum of 57.2°C and steadily rose until it exceeded the permissible temperature at 204 minutes.

The equivalence between Promaseal® Green and CIL fire collars has previously been established in section 6. The performance of HDPE pipes has previously been established in section 12 and based off the results of FSRG A-10-696, incorporating a CIL fire collar in the side of a concrete beam with not less than 75 mm between the top of the fire collar and the underside of a concrete slab in accordance with AS 3600 with a horizontal section not less than 400 mm would be considered to achieve an equivalent FRL for slabs up to 150 mm thick.

13.4 Conclusion

This assessment demonstrates that HDPE and uPVC pipes are capable of achieving the FRLs prescribed in Table 37 and Table 38 respectively in accordance with AS 1530.4:2014.

Table 37 Performance of HDPE pipes through concrete beam (min 75 mm from underside of slab) protected with PROMASEAL® CIL collar

Nominal Pipe Diameter (HDPE)	Nominal collar size	FRL	
		120 mm slab	150 mm slab
56mm	Promaseal® CIL 50	-/120/120	-/180/180
65mm	Promaseal® CIL 65	-/120/120	-/180/180
80mm	Promaseal® CIL 80	-/120/120	-/180/180
110mm	Promaseal® CIL 100	-/120/120	-/180/180

Notes:

- The slab above must be designed in accordance with AS 3600 for the required FRL.
- Horizontal section of pipe in beam must not be less than 400 mm.
- Minimum distance from underside of beam 75 mm.

Table 38 Performance of uPVC pipes through concrete beam (min 75 mm from underside of slab) protected with PROMASEAL® CIL collar

Nominal Pipe Diameter (uPVC)	Nominal collar size	FRL	
		120 mm slab	150 mm slab
50mm	Promaseal® CIL 50	-/120/120	-/180/180
65mm	Promaseal® CIL 65	-/120/120	-/180/180
80mm	Promaseal® CIL 80	-/120/120	-/180/180
100mm	Promaseal® CIL 100	-/120/120	-/180/180

Notes:

- The slab above must be designed in accordance with AS 3600 for the required FRL.
- Horizontal section of pipe in beam must not be less than 400 mm.
- Minimum distance from underside of beam 75 mm.

14. Validity

Warringtonfire does not endorse the tested or assessed products and systems 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 sponsor is responsible for formally notifying Warringtonfire of any additional testing performed on their product/system. This obligation applies regardless of where the test was conducted, the results of the test, or whether it was initially considered part of Warringtonfire's ongoing assessment. The primary goal of this notification is to allow Warringtonfire to review the changes and determine whether they require re-evaluation or re-testing to determine whether the changes have affected the product's performance. It is important that the client promptly notify Warringtonfire if any such changes are implemented.

The procedures for the conduct of tests and the assessment of test results are subject to constant review and improvement. The sponsor 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 that is expected to be demonstrated when subjected to test conditions in accordance with AS 1530.4:2014, based on the evidence referred to in this report.

This assessment is provided to Promat Australia 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 Summary of supporting test data

A.1 Test report – A-07-513

Table 39 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Fire Science Research Group, 1 Scotland Road, Mile End, South Adelaide, South Australia 5301, Australia.
Test date	The fire resistance test was done on 12 October 2007.
Test standards	The test was done in accordance with AS 1530.4:2005 and AS 4072.1:2005.
Variation to test standards	1. Departed from clause 10.8.2(d) as pressures were below minimum (-2 Pa) for short periods. Stages in test where furnace was over pressured. 2. Slab had previously been exposed to a fire test but collars were cast into new concrete backfill.
General description of tested specimen	Promaseal® Green Collars protecting uPVC & HDPE services in a 120 mm thick horizontal concrete slab.
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 40.

Table 40 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
B	65 mm HDPE	Promaseal® Green 65 fire collar	-/240/120	TC5 on slab at 181 minutes
D	40 mm HDPE	Promaseal® Green 40 fire collar	-/240/120	TC13 on slab at 174 minutes

A.2 Test report – A-07-516

Table 41 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Fire Science Research Group, 1 Scotland Road, Mile End, South Adelaide, South Australia 5301, Australia.
Test date	The fire resistance test was done on 26 October 2007.
Test standards	The test was done in accordance with AS 1530.4:2005 and AS 4072.1:2005.
Variation to test standards	None
General description of tested specimen	Promaseal® Green & Promaseal® Hi-Blu Collars protecting uPVC, HDPE & PP-R services within a 120 mm thick horizontal concrete slab containing KingFlor KF40 decking.
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 42.

Table 42 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
A	100mm uPVC	Promaseal® Green 100 fire collar	-/240/120	TC1 on slab at 176 minutes
B	40mm uPVC	Promaseal® Green 40 fire collar	-/240/240	No failure recorded.

A.3 Test report – A-08-555

Table 43 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Fire Science Research Group, 1 Scotland Road, Mile End, South Adelaide, South Australia 5301, Australia.
Test date	The fire resistance test was done on 15 August 2008.
Test standards	The test was done in accordance with AS 1530.4:2005 and AS 4072.1:2005.
Variation to test standards	None
General description of tested specimen	Promaseal® Green and Promaseal® Hi-Blu cast in collars protecting HDPE, PP-R and uPVC stacks of various sizes in a 150 mm thick concrete slab cast on KingFlor KF70 steel formwork.
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 44.

Table 44 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
A	100 mm HDPE	Promaseal® Green 100 fire collar	-/240/180	TC A2 on slab at 189 minutes

A.4 Test report – A-10-696

Table 45 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Fire Science Research Group, 1 Scotland Road, Mile End, South Adelaide, South Australia 5301, Australia.
Test date	The fire resistance test was done on 21 October 2010.
Test standards	The test was done in accordance with AS 1530.4:2005 and AS 4072.1:2005.
Variation to test standards	None
General description of tested specimen	Promaseal® Green and Promaseal® FCS protecting HDPE service penetrations of various sizes within a 325 mm thick lightweight concrete slab constructed from CSR Hebel panels.
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 46.

Table 46 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
B	56 mm HDPE	Promaseal® Green 50 fire collar	-/240/180	TC B3 on specimen at 186 minutes
C	100 mm HDPE	Promaseal® Green 100 fire collar	-/240/180	TC C4 on specimen at 204 minutes

A.5 Test report – A-11-737

Table 47 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Fire Science Research Group, 1 Scotland Road, Mile End, South Adelaide, South Australia 5301, Australia.
Test date	The fire resistance test was done on 19 August 2011.
Test standards	The test was done in accordance with AS 1530.4:2005 and AS 4072.1:2005.
Variation to test standards	1. Pressure consistency was not maintained during the test. Deemed by laboratory to not effect result in a positive manner. 2. Thermocouples F1and F2 were not calibrated according to AS 1530.4:2005. These thermocouples are not subject to specimens assessed in this assessment.
General description of tested specimen	Promaseal® CFC32 collars and Promaseal® Green 40 collars protecting various sizes of REHAU PEXa service penetrations within 120 mm thick concrete slab.
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 48.

Table 48 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
A	16 mm REHAU PEXa	Promaseal® Green 40 fire collar	-/180/120	Sustained flaming greater than 10 seconds recoded at 217 minutes TC A1 on specimen at 156 minutes
B	20 mm REHAU PEXa	Promaseal® Green 40 fire collar	-/240/180	TC B1 on specimen at 188 minutes
C	25 mm REHAU PEXa	Promaseal® Green 40 fire collar	-/120/120	Sustained flaming greater than 10 seconds recoded at 142 minutes TC B4 on specimen at 134 minutes
E	30 mm REHAU PEXa	Promaseal® Green 40 fire collar	-/180/180	Sustained flaming greater than 10 seconds recoded at 195 minutes TC C3 on slab at 182 minutes

A.6 Test report – EWFA 2729100.2

Table 49 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Exova Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was done on 14 May 2012.
Test standards	The test was done in accordance with AS 1530.4:2005.
Variation to test standards	Furnace pressure below 20 Pa between 40-45, 110-115 and 125-130 minutes. Deemed to not affect the performance of pipe systems.
General description of tested specimen	Fire resistance test of various Promat fire collars protecting various RAUPIANO PLUS pipe services penetrating a 120 mm thick concrete slab.
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 50.

Table 50 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
A	90 mm REHAU RAUPIANO PLUS	Promaseal® Green 100 fire collar	-/180/180	Sustained flaming greater than 10 seconds recoded at 218 minutes
C	50 mm REHAU RAUPIANO PLUS	Promaseal® Green 50 fire collar	-/240/180	TC33 on slab at 193 minutes
D	40 mm REHAU RAUPIANO PLUS	Promaseal® Green 40 fire collar	-/240/180	TC44 on slab at 214 minutes

A.7 Test report – EWFA 2729101.2

Table 51 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Exova Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was done on 15 May 2012.
Test standards	The test was done in accordance with AS 1530.4:2005.
Variation to test standards	None
General description of tested specimen	Fire resistance test of various Promat fire collars protecting various RAUPIANO PLUS pipe services penetrating a 120 mm thick concrete slab.
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 52.

Table 52 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
A	110 mm REHAU RAUPIANO PLUS	Promaseal® Green 100 fire collar	-/180/180	Sustained flaming greater than 10 seconds recoded at 187 minutes

A.8 Test report – EWFA 27884300.1

Table 53 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Fire Science Research Group, 1 Scotland Road, Mile End, South Adelaide, South Australia 5301, Australia.
Test date	The fire resistance test was done on 27 February 2014.
Test standards	The test was done in accordance with AS 1530.4:2005.
Variation to test standards	Furnace pressure exceeded the limits stated in the test standard between 5-10 minutes by +3 Pa and 45-50 minutes by -2 Pa.
General description of tested specimen	Fire-resistance test of various Wavin pipe services protected by various Promat fire collars penetrating a 120 mm thick concrete slab.
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 54.

Table 54 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
A	110 mm Wavin Astolan®	Promaseal® Green 100 fire collar	-/120/120	No failure recorded.
B	56 mm Wavin Astolan®	Promaseal® Green 65 fire collar	-/120/120	No failure recorded.

A.9 Test report – A-14-882

Table 55 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Fire Science Research Group, 1 Scotland Road, Mile End, South Adelaide, South Australia 5301, Australia.
Test date	The fire resistance test was done on 19 May 2014.
Test standards	The test was done in accordance with AS 1530.4:2005.
Variation to test standards	None
General description of tested specimen	A fire test was conducted to determine the fire performance of various penetrations through an 80 mm thick concrete slab with Fielders CF210 steel formwork.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2005.

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

Table 56 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
C	100 mm uPVC	Promaseal® Green 100 fire collar	-/90/60	TC C4 on slab at 73 minutes
D	40 mm uPVC	Promaseal® Green 40 fire collar	-/90/60	TC D4 on slab at 84 minutes

A.10 Test report – A-16-066

Table 57 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Fire Science Research Group, 1 Scotland Road, Mile End, South Adelaide, South Australia 5301, Australia.
Test date	The fire resistance test was done on 13 January 2017.
Test standards	The test was done in accordance with AS 1530.4:2014 and AS 4072.1:2005.
Variation to test standards	None
General description of tested specimen	Promaseal® Floor Waste Collar FCW100 protecting uPVC floor waste pipes and Promaseal® Green 80 protecting a 75 mm REHAU Raupiano stack pipe through a 150 mm thick concrete 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 58.

Table 58 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
A	80 mm REHAU RAUPIANO PLUS	Promaseal® Green 80 fire collar with Grafitex Graf 4T	-/240/240	No failure recorded.

A.11 Test report – A-17-075A

Table 59 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Fire Science Research Group, 1 Scotland Road, Mile End, South Adelaide, South Australia 5301, Australia.
Test date	The fire resistance test was done on 31 October 2017.
Test standards	The test was done in accordance with AS 1530.4:2014 and AS 4072.1:2005.
Variation to test standards	Furnace thermocouples were 220 mm away from the test specimens due to the separating element setup.
General description of tested specimen	Promaseal® Floor Waste Collar FCW100 protecting uPVC floor waste pipe and Promaseal® Green cast in collars protecting uPVC stack pipes through a 95 mm thick concrete slab with SlimDek 210 steel formwork.
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 60.

Table 60 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
B	100 mm uPVC	Promaseal® Green 100 fire collar	-/120/120	No failure recorded.
C	40 mm uPVC	Promaseal® Green 40 fire collar	-/120/90	T/C C3 on slab at 119 minutes

A.12 Test report – FRT190093a R1.0

Table 61 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was done on 18 April 2019.
Test standards	The test was done in accordance with AS 1530.4:2014.
Variation to test standards	None
General description of tested specimen	Various Promaseal® cast in collars protecting uPVC stack pipes through a 120 mm thick concrete 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 62.

Table 62 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
A	40 mm uPVC	Promaseal® CIL 40 fire collar	-/240/240	No failure recorded.
B	65 mm uPVC	Promaseal® CIH 65 fire collar with Parfix Silicon Sealant	-/240/240	No failure recorded.
C	80 mm uPVC	Promaseal® CIH 80 fire collar with Parfix Silicon Sealant	-/240/240	No failure recorded.
D	50 mm uPVC	Promaseal® CIH 50 fire collar with Parfix Silicon Sealant	-/240/240	No failure recorded.
E	100 mm uPVC	Promaseal® CIL 100 fire collar	-/240/240	No failure recorded.
F	40 mm uPVC	Promaseal® CIH 40 fire collar with Parfix Silicon Sealant	-/240/240	No failure recorded.
G	100 mm uPVC	Promaseal® CIH 100 fire collar with Parfix Silicon Sealant	-/240/240	No failure recorded.

A.13 Test report – A-22-063

Table 63 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Fire Science Research Group, 1 Scotland Road, Mile End, South Adelaide, South Australia 5301, Australia.
Test date	The fire resistance test was done on 27 October 2022.
Test standards	The test was done in accordance with AS 1530.4:2014 and AS 4072.1:2005.
Variation to test standards	None.
General description of tested specimen	Promaseal® CIL and FC fire collars on 100 mm uPVC pipes with acoustic lagging on the exposed side and 150 mm copper pipe treated with Promaseal IBS and Promaseal A sealant through a 120 mm concrete 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 60.

Table 64 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
A	100 mm uPVC	Promaseal® CIL 100 fire collar	-/120/120	No failure recorded.

A.14 Test report – A-23-021B

Table 65 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Fire Science Research Group, 1 Scotland Road, Mile End, South Adelaide, South Australia 5301, Australia.
Test date	The fire resistance test was done on 21 July 2023.
Test standards	The test was done in accordance with AS 1530.4:2014 and AS 4072.1:2005.
Variation to test standards	None.
General description of tested specimen	uPVC pipes protected with modified Promaseal® CIL fire collars with top flange cut away incorporating a 300 mm horizontal section cast into the slab which had an overall thickness of 200 mm.
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 60.

Table 66 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
A	40 mm uPVC	Modified Promaseal® CIL40 with top flange cut away to accommodate a pipe elbow	-/180/180	No failure recorded.

Specimen	Service	Local fire stopping protection	FRL	Position of failure
B	65 mm uPVC	Modified Promaseal® CIL65 with top flange cut away to accommodate a pipe elbow	-/180/180	No failure recorded.

A.15 Test report – A-23-046B

Table 67 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Fire Science Research Group, 1 Scotland Road, Mile End, South Adelaide, South Australia 5301, Australia.
Test date	The fire resistance test was done on 21 December 2023
Test standards	The test was done in accordance with AS 1530.4:2014 and AS 4072.1:2005.
Variation to test standards	None.
General description of tested specimen	Redundant CIL penetration with uPVC pipe capped on top with Promasil P1100 board on the underside, 100 mm uPVC floor waste through a CIL fire collar treated with Promasil P1100 and a FWR100 fire collar, steel and plastic conduits treated with Promaseal AG and P1100 board through 150 mm concrete 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 60.

Table 68 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
B	100 mm uPVC	Promaseal® CIL 100 fire collar and Promasil 1100 board on underside	-/120/120	No failure recorded.
C	100 mm uPVC floor waste	Promaseal® CIL 100 fire collar with Promasil 1100 board on underside and Promat FWR fire collar	-/120/120	No failure recorded.

A.16 Test report – A-24-010

Table 69 Information about test report

Item	Information about test report
Report sponsor	Promat Australia, 1 Scotland Road, Mile End, SA 5031, Australia
Test laboratory	Fire Science Research Group, 1 Scotland Road, Mile End, South Adelaide, South Australia 5301, Australia.
Test date	The fire resistance test was done on 22 April 2024.
Test standards	The test was done in accordance with AS 1530.4:2014 and AS 4072.1:2005.
Variation to test standards	The temperature severity exceeded the permissible limits of AS 1530.4:2014.
General description of tested specimen	Promaseal® CIH fire collars on 90mm and 150mm HDPE pipes, 100 mm uPVC pipe capped above and below the slab treated with Promaseal® CIL fire collar and FWR100 fire collar on 80 mm uPVC pipe through 120 mm concrete 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 60.

Table 70 Results summary for this test report

Specimen	Service	Local fire stopping protection	FRL	Position of failure
D	100 mm uPVC capped above and below the slab.	Promaseal® CIL 100 fire collar	-/180/120	TC D4 on slab at 161 minutes.

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