Fire resistance of SNAP fire collars protecting various pipes penetrating various plasterboard lined walls when tested in accordance with AS 1530.4-2014 and assessed in accordance with AS 4072.1-2005

Assessment Report

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Important disclaimer

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1 Introduction

This report is an assessment of the fire resistance of SNAP fire collars protecting various pipes penetrating various plasterboard lined walls when tested in accordance with AS 1530.4-2014 and assessed in accordance with AS 4072.1-2005.

This report is prepared for the purpose of meeting the evidence of suitability requirements of NCC Schedule 5 as appropriate for FRL.

This report reviews and confirms the extent to which the reference fire resistance tests listed in section 2 meet the requirements of the standard fire test standards listed in section 4 of the report. The proposed variations to the tested construction presented in section 3 are subject to an analysis in Appendix B, and the conclusions are presented in Section 5 of this report. The field of applicability of the results of this assessment report is presented in Section 6 and subject to the requirements of Section 7 and the Validity and Limitations of section 8 and 9.

2 Supporting Data

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

Report Reference	Test Standard	Outline of Test Specimen
FSP 1748	AS 1530.4-2014	Pilot scale fire resistance test of a wall penetrated by nine (9) pipes protected by a retro-fitted Snap Fire Systems fire collar.
FSP 1759	AS 1530.4-2014	Pilot scale fire resistance test of a wall penetrated by nine (9) pipes protected by a retro-fitted Snap Fire Systems fire collar.
FSP 1902	AS 1530.4-2014	Pilot scale fire resistance test of a wall penetrated by nine (9) pipes protected by a retro-fitted Snap Fire Systems fire collar.
FSP 1931	AS 1530.4-2014	Pilot scale fire resistance test of a wall penetrated by a single service and protected by a retro-fitted Snap Fire Systems fire collar.
FSP 1946	AS 1530.4-2014	Pilot scale fire resistance test of a wall penetrated by a single service and protected by a retro-fitted Snap Fire Systems fire collar.
FSP 1978	AS 1530.4-2014	Pilot scale fire resistance test of a wall penetrated by a single service and protected by a retro-fitted Snap Fire Systems fire collar.

The reports FSP 1748 and FSP 1759 were undertaken by CSIRO and sponsored by Snap Fire Systems who has provided permission for CSIRO to refer to these reports in this assessment.

The report FSP 1902, FSP 1931, FSP 1946 and FSP 1978 were undertaken by CSIRO and sponsored by IG6 Pty Ltd.

3 Proposed Variations

The proposed construction includes the pipes protected with the Snap fire collars as tested, test reports listed in Table 2 and subject to the following variations:

- The plasterboard wall system shall be varied to be any of the wall systems listed in Table 1 exposed to fire from either side.

Table 1 – Wall systems

Linings on side one	Framing	Linings on side two	Overall thickness (mm)
2 x 13 mm fire grade plasterboard	64CH stud	25 mm shaft liner	115
2 x 13 mm fire grade plasterboard	64 mm Steel stud	2 x 13 mm fire grade plasterboard	116

Table 2 – Services protected with SNAP collars

Report Reference	Service ID	Snap Collar On each side of the wall	Pipe Material	Nominal pipe diameter (mm)
FSP1748	2	50R	C-PVC	32
FSP1978	1	50R	C-PVC	50
FSP1902	1	50R	C-PVC	38
FSP1946	1	HP315R	HDPE	315
FSP1759	5	32GAS	Pexal	26
FSP1759	4	32GAS	Pexal	20
FSP1759	1	32GAS	Pexal	15
FSP1759	3	32R	Pexal	15
FSP1759	6	50GAS	Pexal	32
FSP1759	7	50GAS	Pexal	40
FSP1902	6	32R	Pex-b	2 x 20
FSP1748	8	32R	P-PVC	15
FSP1748	1	50R	P-PVC	32
FSP1902	2	50R	PVC	50
FSP1902	3	65-80R	PVC	65
FSP1978	2	HP250R-B	PVC	225
FSP1931	1	HP315R	PVC	315
FSP1748	3	32R	PVC Flexi Conduit	16
FSP1748	5	32R	PVC Rigid Conduit	25
FSP1748	4	32R	PVC Rigid Conduit	20
FSP1748	6	32R	PVC Rigid Conduit	25
FSP1748	7	32R	PVC Rigid Conduit	20
FSP1748	9	110R	PVC-SC	100
FSP1996	5	110R	PVC-SC	100
FSP1902	9	32R	Px/Al/Px + Pex-b	20 + 20
FSP1902	4	50R	Px/Al/Px + Pex-b	25 + 20
FSP1996	3	50R	Raupiano	40
FSP1996	4	110R	Raupiano	110
FSP1902	5	32R	Telstra PVC Conduit	20
FSP1996	2	50R	Triplus	40

4 Referenced Standards

AS 1530.4-2014	Methods for fire tests on building materials, components and structures Part 4: Fire resistance tests of elements of building construction.
AS 4072.1-2005	Components for the protection of openings in fire-resistant separating elements Part 1: Service penetrations and control joints

5 Conclusion

On the basis of the analysis presented in this report, it is the opinion of this Accredited Testing Laboratory that the tested prototypes described in Section 2 when varied as described in Section 3 will achieve the Fire Resistance stated below when submitted to a standard fire test in accordance with the test methods referenced in Section 4 and subject to the requirements of Section 7.

FRL: -/120/120

6 Direct Field of Application of Results

The results of this report are applicable to walls exposed to fire from either side.

7 Requirements

It is required that the supporting construction is tested or assessed to achieve the required FRL up to the required FRL based on the assessed design in accordance with AS 1530.4.

Any variations with respect to size, constructional details, loads, stresses, edge or end conditions that are other than those identified in this report, may invalidate the conclusions drawn in this report.

8 Term of Validity

This assessment report will lapse on 30th June 2024. Should you wish us to re-examine this report with a view to the possible extension of its term of validity, would you please apply to us three to four months before the date of expiry. This Division reserves the right at any time to amend or withdraw this assessment in the light of new knowledge.

9 Limitations

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

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

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

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

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

Appendix A Supporting Test Data

A.1. CSIRO Sponsored Investigation report numbered FSP 1748

On 2 May 2016, this Division conducted a fire-resistance test in accordance with AS 1530.4 -2014 on a Boral Firestop system with an established fire resistance level (FRL) of -/120/120. The wall was penetrated by nine (9) stack pipes protected by a retro-fitted Snap Fire Systems fire collar.

For the purpose of the test, the specimens were referenced as Penetrations # 1, 2, 3, 4, 5, 6, 7, 8 and 9. For the services relevant to this assessment the construction details of the services and performance achieved is summarised in Section A.7 below.

A.2. CSIRO Sponsored Investigation report numbered FSP 1759

On 20 July 2016, this Division conducted a fire-resistance test in accordance with AS 1530.4 -2014 on a Boral Firestop system with an established fire resistance level (FRL) of -/120/120. The wall was penetrated by nine (9) stack pipes protected by a retro-fitted Snap Fire Systems fire collar. For the purpose of the test, the specimens were referenced as Penetrations # 1, 2, 3, 4, 5, 6, 7, 8 and 9. For the services relevant to this assessment the construction details of the services and performance achieved is summarised in Section A.7 below.

A.3. CSIRO Sponsored Investigation report numbered FSP 1902

On 5 April 2018, this Division conducted a fire-resistance test in accordance with AS 1530.4 -2014 on a 116-mm thick plasterboard lined steel framed wall comprising two layers of 13-mm thick Fyrchek plasterboard on each side of 64-mm deep metal studs, with an established FRL of -/120/120 as detailed in BRANZ report reference FAR2539. The wall was penetrated by nine (9) services and protected by various first stopping systems. For the services relevant to this assessment the construction details of the services and performance achieved is summarised in Section A.7 below.

A.4. CSIRO Sponsored Investigation report numbered FSP 1931

On 26 September 2018, this Division conducted a fire-resistance test in accordance with AS 1530.4 -2014 on a 116-mm thick plasterboard lined steel framed wall comprising two layers of 13-mm thick Fyrchek plasterboard on each side of 64-mm deep metal studs, Boral reference SB120.1 with an established FRL of -/120/120. The wall was penetrated by a single service. For the services relevant to this assessment the construction details of the services and performance achieved is summarised in Section A.7 below.

A.5. CSIRO Sponsored Investigation report numbered FSP 1946

On 26 September 2018, this Division conducted a fire-resistance test in accordance with AS 1530.4 -2014 on a 116-mm thick plasterboard lined steel framed wall comprising two layers of 13-mm thick Boral Firestop plasterboard on each side of 64-mm deep metal studs, Boral reference SB120.1 with an established FRL of -/120/120. The wall was penetrated by a single service. For the services relevant to this assessment the construction details of the services and performance achieved is summarised in Section A.7 below.

A.6. CSIRO Sponsored Investigation report numbered FSP 1978

On 17 January 2019, this Division conducted a fire-resistance test in accordance with AS 1530.4 -2014 on a 116-mm thick plasterboard lined steel framed wall comprising two layers of 13-mm thick Firestop plasterboard on each side of 64-mm deep metal studs, Boral reference SB120.1 with an established FRL of -/120/120. For the services relevant to this assessment the construction details of the services and performance achieved is summarised in Section A.7 below.

A.7. Summary of test data

Report Reference	Pen. #	Snap collar on each side of the wall	Pipe Material	Nominal pipe diameter (mm)	Performance	
					Integrity	Insulation
FSP1748	2	50R	C-PVC	32	121	121
FSP1978	1	50R	C-PVC	50	181	157
FSP1902	1	50R	C-PVC	38	181	181
FSP1946	1	HP315R	HDPE	315	121	121
FSP1759	5	32GAS	Pexal	26	181	138
FSP1759	4	32GAS	Pexal	20	181	176
FSP1759	1	32GAS	Pexal	15	181	181
FSP1759	3	32R	Pexal	15	181	169
FSP1759	6	50GAS	Pexal	32	181	140
FSP1759	7	50GAS	Pexal	40	181	170
FSP1902	6	32R	Pex-b	2 x 20	181	167
FSP1748	8	32R	P-PVC	15	121	121
FSP1748	1	50R	P-PVC	32	121	121
FSP1902	2	50R	PVC	50	181	181
FSP1902	3	65-80R	PVC	65	181	181
FSP1978	2	HP250R-B	PVC	225	181	173
FSP1931	1	HP315R	PVC	315	181	179
FSP1748	3	32R	PVC (Flexi)	16	121	121
FSP1748	5	32R	PVC Conduit	25	121	121
FSP1748	4	32R	PVC Conduit	20	121	121
FSP1748	6	32R	PVC Conduit	25	121	121
FSP1748	7	32R	PVC Conduit	20	121	121
FSP1748	9	110R	PVC-SC	100	121	121
FSP1996	5	110R	PVC-SC	100	161	128
FSP1902	9	32R	Px/Al/Px + Pex-b	20 + 20	181	179
FSP1902	4	50R	Px/Al/Px + Pex-b	25 + 20	181	175
FSP1996	3	50R	Raupiano	40	161	123
FSP1996	4	110R	Raupiano	110	161	159
FSP1902	5	32R	Telstra PVC Conduit	20	181	170
FSP1996	2	50R	Triplus	40	161	134

Appendix B Analysis of Variations

B.1 Variation to wall construction

The proposed construction includes the pipes protected with the Snap fire collars as tested and detailed in the test reports listed in Table 2 and subject to the following variations:

- The plasterboard wall system shall be varied to be any of the wall systems listed in Table 1 exposed to fire from either side.

With reference to the construction of the tests listed in Table 2, it is confirmed the construction of the walls tested were all 64mm studs lined on each side with 2 layers of 13mm fire grade plasterboard and overall wall thickness of 116mm.

When tested the specimens listed in the reports in Table 2 achieved an integrity performance of 121 to 181 minutes without failure. In addition, the specimens achieved an insulation performance of at least 121 minutes with some margin over failure.

The proposed construction comprises a wall of shaftwall construction being 64mm CH studs (or deeper) lined on one side with at least 2 layers of 13mm fire grade plasterboard and on the other side with 25mm Shaftliner panel and an overall minimum thickness of 115mm.

The proposed variation comprises a variation in the thickness of the plaster on one side of the wall from 26mm to 25mm and the wall thickness from 116mm to 115mm. In theory reductions to the wall linings and overall wall thickness can reduce the insulation performance, and in extreme cases the integrity performance of services protected with fire collars.

In this case, however, the change of the linings from 2 x 13mm to 1 x 25mm, though a 1mm reduction in the thickness, the fireside behaviour will be improved as 25mm Shaftliner will not fall away before 120 minutes, whereas one of the 13mm layers of fire grade plasterboard can potentially fall away on the fireside before 120 minutes. The significance of this observation is that it is possible the performance of the penetration will be either unaffected or potentially improved on the fireside as a result of this variation.

Where the 25mm Shaftliner of slightly reduced thickness is on the non fire side, it is theoretically possible the linings will be slightly hotter than for the tested systems which could impact on the performance of the tested system if the temperature of the lining governed the performance of the service penetration rather than the temperature of the collar and the pipe.

When the performance of the tests referenced in Table 2 are reviewed it is confirmed in all cases for the test referenced in table 2 that, either the lining temperature did not govern the insulation performance of the service at 120 minutes, or, there was a significant margin over insulation failure at 120 minutes.

Based on the above discussion and lack of introduced integrity or insulation weakness, it is confirmed that the proposed construction will achieve 120 minutes integrity and insulation when tested in accordance with AS 1530.4-2014 and assessed in accordance with the requirements of AS 4072.1-2005.

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