INFRASTRUCTURE TECHNOLOGIES
www.csiro.au

Likely performance of SNAP fire collars protecting GASPEX, WATERPEX, HEATPEX and CHILLPEX pipe penetrations through concrete slabs, masonry/concrete walls and plasterboard walls

Assessment Report

Author: Mario Lara-Ledermann
Report number: FCO-2719 (This report supersedes issue dated 6 March 2009)
Date: 23 April 2015

Client: SNAP Fire Systems Pty Ltd

Inquiries should be address to:

Fire Testing and Assessments	Author	The Client
Infrastructure Technologies 14 Julius Avenue North Ryde, NSW 2113 Telephone +61 2 9490 5444	Infrastructure Technologies 14 Julius Avenue North Ryde, NSW 2113 Telephone +61 2 9490 5500	SNAP Fire Systems Pty Ltd Unit 2/160 Redland Bay Road Capalaba QLD Telephone +61 7 3245 2133

Report Details:

Report CSIRO Reference number: FCO-2719/4522

Report Status and Revision History:

VERSION	STATUS	DATE	DISTRIBUTION	ISSUE NUMBER
Revision A	Final for issue	23 April 2015	CSIRO/CLIENT	FCO-2719

Report Authorization:

AUTHOR	REVIEWED BY	AUTHORISED BY
Mario Lara-Ledermann	Brett Roddy	Brett Roddy
		
23 April 2015	23 April 2015	23 April 2015

Copyright and disclaimer

Important disclaimer

This assessment report will lapse on 30 April 2020. 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.

CSIRO advises that the information contained in this publication comprises general statements based on scientific research. The reader is advised and needs to be aware that such information may be incomplete or unable to be used in any specific situation. No reliance or actions must therefore be made on that information without seeking prior expert professional, scientific and technical advice. To the extent permitted by law, CSIRO (including its employees and consultants) excludes all liability to any person for any consequences, including but not limited to all losses, damages, costs, expenses and any other compensation, arising directly or indirectly from using this publication (in part or in whole) and any information or material contained in it.

Contents

Executive summary

This report provides the assessment of this Division on the likely performance of the SNAP fire collars protecting GASPEX, WATERPEX, HEATPEX and CHILLPEX pipe penetrations through concrete slabs, masonry/concrete walls and plasterboard walls when tested in accordance with AS 1530.4-2005.

It is the opinion of this Division that the systems tabulated below comprising GASPEX, WATERPEX, HEATPEX and CHILLPEX PEX-AL-PEX composite gas pipes would be capable of achieving the designated fire-resistance levels if tested in accordance with AS 1530.4-2005.

Collar	Pipes Size				FRL	System	Element
SNAP32GAS	16	20	25	32	-/240/240	Retro-fit	Concrete**
SNAP50GAS	32	40	50		-/240/240	Retro-fit	Concrete**
SNAP50GAS	32				-/240/240	Cast-in	Concrete**
SNAP50GAS		40	50		-/240/180	Cast-in	Concrete**
SNAP63GAS	63				-/240/240	Retro-fit	Concrete**
SNAP32GAS	16	20	25	32	-/120/120	Retro-fit	Plasterboard*
SNAP50GAS	32	40	50		-/120/120	Retro-fit	Plasterboard*
SNAP32GAS	16	20	25	32	-/180/180	Retro-fit	Plasterboard*
SNAP50GAS	32	40	50		-/180/120	Retro-fit	Plasterboard*
SNAP32GAS	16	20	25	32	-/180/180	Retro-fit	Masonry***
SNAP50GAS	32	40	50		-/180/120	Retro-fit	Masonry***

* The Designated FRL is where the system is installed into a plasterboard lined framed wall system with an FRL of either -/120/120 or -/180/180. The FRLs of the penetration system are altered to match that of the wall system.

** The Designated FRL is where the system is installed into a concrete slab with an FRL of 240/240/240. For slabs systems with lower FRLs the FRLs of the penetration systems are lowered to match that of the slab.

*** The Designated FRL is where the system is installed into a masonry or concrete wall with an FRL of either -/180/180 or 180/180/180. For masonry or concrete walls systems with lower FRLs the FRLs of the penetration systems are lowered to match that of the slab.

Note: Products described herein as WATERPEX, HEATPEX and CHILLPEX are the same as the tested product known as GASPEX differing only in colour.

Likely performance of SNAP fire collars protecting GASPEX, WATERPEX, HEATPEX and CHILLPEX pipe penetrations through concrete slabs, masonry/concrete walls and plasterboard walls

1 Introduction

This report provides the assessment of this Division on the likely performance of the SNAP fire collars protecting GASPEX, WATERPEX, HEATPEX and CHILLPEX pipe penetrations through concrete slabs, masonry/concrete walls and plasterboard walls when tested in accordance with AS 1530.4-2005.

2 Supporting Data

Several fire-resistance tests have been conducted on various ratios of PE, PEX and Aluminium core material. The reports on these tests are described in Appendix A.

3 Proposal

To protect GASPEX, WATERPEX, HEATPEX and CHILLPEX pipes with SNAP GAS fire collars when penetrating concrete slabs, masonry/concrete walls and plasterboard walls.

4 Analysis

The test configurations listed in Appendix A incorporate various ratios of PE, PEX and Aluminium core material. The test series was designed to incorporate the full range of the GASPEX, WATERPEX, HEATPEX and CHILLPEX gas pipes and thus provides direct test evidence as to the fire performance through concrete slabs and plasterboard wall system. All of the retrofit slab systems and all of the wall systems achieved consistent performances of -/240/240 and -/120/120 respectively. The larger cast-in penetration system demonstrated lesser performances.

5 Conclusion

It is the opinion of this Division that the systems tabulated below comprising GASPEX, WATERPEX, HEATPEX and CHILLPEX PEX-AL-PEX composite gas pipes would be capable of achieving the designated fire-resistance levels if tested in accordance with AS 1530.4-2005.

Collar	Pipes Size				FRL	System	Element
SNAP32GAS	16	20	25	32	-/240/240	Retro-fit	Concrete**
SNAP50GAS	32	40	50		-/240/240	Retro-fit	Concrete**
SNAP50GAS	32				-/240/240	Cast-in	Concrete**
SNAP50GAS		40	50		-/240/180	Cast-in	Concrete**
SNAP63GAS	63				-/240/240	Retro-fit	Concrete**
SNAP32GAS	16	20	25	32	-/120/120	Retro-fit	Plasterboard*
SNAP50GAS	32	40	50		-/120/120	Retro-fit	Plasterboard*
SNAP32GAS	16	20	25	32	-/180/180	Retro-fit	Plasterboard*
SNAP50GAS	32	40	50		-/180/120	Retro-fit	Plasterboard*
SNAP32GAS	16	20	25	32	-/180/180	Retro-fit	Masonry***
SNAP50GAS	32	40	50		-/180/120	Retro-fit	Masonry***

* The Designated FRL is where the system is installed into a plasterboard lined framed wall system with an FRL of either -/120/120 or -/180/180. The FRLs of the penetration system are altered to match that of the wall system.

** The Designated FRL is where the system is installed into a concrete slab with an FRL of 240/240/240. For slabs systems with lower FRLs the FRLs of the penetration systems are lowered to match that of the slab.

*** The Designated FRL is where the system is installed into a masonry or concrete wall with an FRL of either -/180/180 or 180/180/180. For masonry or concrete walls systems with lower FRLs the FRLs of the penetration systems are lowered to match that of the slab.

6 Term of validity

This assessment report will lapse on 30 April 2020. 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.

Appendix A - Supporting Data

CSIRO Sponsored Investigation report numbered FSP 1339

On 13 November 2008 CSIRO conducted a full-scale fire-resistance test on a specimen comprising a 1150-mm x 1150-mm x 150-mm thick reinforced concrete slab penetrated by seven gas pipe of various constructions protected by retro-fitted Snap Fire System fire collars. The fire collars were fixed to the underside of the existing reinforced concrete slab by mechanical anchors. For the purpose of the test, the specimens were referenced as Penetrations 1, 2, 3, 4, 5, 6, and 7.

Penetration 1 – Retrofit SNAP32GAS fire collar protecting a nominal 16-mm PE-AL-PE gas pipe

The SNAP32GAS, fire collar consisted of a galvanised steel case 54-mm diameter x 63-mm high, with a single spring pocket and a 90-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 57-mm wide x 130-mm long. Between the wraps was a layer 0.15-mm thick x 57-mm wide of stainless steel mesh. The collar was fixed to the underside of the concrete slab with 6-mm diameter mechanical anchors fitted through 6.5-mm diameter holes in three brackets screw fixed to the case of the collar.

The penetrating service comprised a nominally 16-mm PE-AL-PE gas pipe penetrating an oversized hole cored through the concrete slab. Once the pipe was fitted through the hole and restrained, the resulting gap around the pipe was backfilled flush with both sides of the concrete slab using quick drying cement. The pipe projected vertically, approximately 2000-mm above the concrete slab and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 2 – Retrofit SNAP32GAS fire collar protecting a nominal 32-mm PEX-AL-PE gas pipe

The SNAP32GAS, fire collar consisted of a galvanised steel case 54-mm diameter x 63-mm high, with a single spring pocket and a 90-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 57-mm wide x 130-mm long. Between the wraps was a layer 0.15-mm thick x 57-mm wide of stainless steel mesh. The collar was fixed to the underside of the concrete slab with 6-mm diameter mechanical anchors fitted through 6.5-mm diameter holes in three brackets screw fixed to the case of the collar.

The penetrating service comprised a nominally 32-mm PEX-AL-PE gas pipe penetrating an oversized hole cored through the concrete slab. Once the pipe was fitted through the hole and restrained, the resulting gap around the pipe was backfilled flush with both sides of the concrete slab using quick drying cement. The pipe projected vertically, approximately 2000-mm above the concrete slab and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 3 – Retrofit SNAP50GAS fire collar protecting a nominal 32-mm GASPEX PEX-AL-PEX gas pipe

The SNAP50GAS, fire collar consisted of a galvanised steel case 82-mm diameter x 90-mm high, with a single spring pocket and a 115-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4- mm thick x 85-mm wide and 200-mm long. Between the wraps was a layer 0.15-mm thick x 85-mm wide of stainless steel mesh. The collar was fixed to the underside of the concrete slab with 6-mm diameter mechanical anchors fitted through 8-mm diameter holes in four brackets screw fixed to the case of the collar.

The penetrating service comprised a nominally 32-mm GASPEX PEX-AL-PEX gas pipe penetrating an oversized hole cored through the concrete slab. Once the pipe was fitted through the hole and restrained, the resulting gap around the pipe was backfilled flush with both sides of the concrete slab using quick drying cement. The pipe projected vertically, approximately 2000-mm above the concrete slab and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 4 – Retrofit SNAP32GAS fire collar protecting a nominal 32-mm GASPEXPEX-AL-PEX gas pipe

The SNAP32GAS, fire collar consisted of a galvanised steel case 54-mm diameter x 63-mm high, with a single spring pocket and a 90-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 57-mm wide x 130-mm long. Between the wraps was a layer 0.15-mm thick x 57-mm wide of stainless steel mesh. The collar was fixed to the underside of the concrete slab with 6-mm diameter mechanical anchors fitted through 6.5-mm diameter holes in three brackets screw fixed to the case of the collar.

The penetrating service comprised a nominally 32-mm GASPEX PEX-AL-PEX gas pipe penetrating an oversized hole cored through the concrete slab. Once the pipe was fitted through the hole and restrained, the resulting gap around the pipe was backfilled flush with both sides of the concrete slab using quick drying cement. The pipe projected vertically, approximately 2000-mm above the concrete slab and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 5 – Retrofit SNAP32GAS fire collar protecting a nominal 16-mm GASPEX PEX-AL-PEX gas pipe

The SNAP32GAS, fire collar consisted of a galvanised steel case 54-mm diameter x 63-mm high, with a single spring pocket and a 90-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 57-mm wide x 130-mm long. Between the wraps was a layer 0.15-mm thick x 57-mm wide of stainless steel mesh. The collar was fixed to the underside of the concrete slab with 6-mm diameter mechanical anchors fitted through 6.5-mm diameter holes in three brackets screw fixed to the case of the collar.

The penetrating service comprised a nominally 16-mm GASPEX PEX-AL-PEX gas pipe penetrating an oversized hole cored through the concrete slab. Once the pipe was fitted through the hole and restrained, the resulting gap around the pipe was backfilled flush with both sides of the concrete slab using quick drying cement. The pipe projected vertically, approximately 2000-mm above the concrete slab and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 6 – Retrofit SNAP32GAS fire collar protecting a nominal 32-mm PE-AL-PE gas pipe

The SNAP32GAS, fire collar consisted of a galvanised steel case 54-mm diameter x 63-mm high, with a single spring pocket and a 90-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 57-mm wide x 130-mm long. Between the wraps was a layer 0.15-mm thick x 57-mm wide of stainless steel mesh. The collar was fixed to the underside of the concrete slab with 6-mm diameter mechanical anchors fitted through 6.5-mm diameter holes in three brackets screw fixed to the case of the collar.

The penetrating service comprised a nominally 32-mm PE-AL-PE gas pipe penetrating an oversized hole cored through the concrete slab. Once the pipe was fitted through the hole and restrained, the resulting gap around the pipe was backfilled flush with both sides of the concrete slab using quick drying cement. The pipe projected vertically, approximately 2000-mm above the concrete slab and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 7 – Retrofit SNAP50GAS fire collar protecting a nominal 50-mm PE-AL-PE gas pipe

The SNAP50GAS, fire collar consisted of a galvanised steel case 82-mm diameter x 90-mm high, with a single spring pocket and a 115-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 85-mm wide and 200-mm long. Between the wraps was a layer 0.15-mm thick x 85-mm wide of stainless steel mesh. The collar was fixed to the underside of the concrete slab with 6-mm diameter mechanical anchors fitted through 8-mm diameter holes in four brackets screw fixed to the case of the collar.

The penetrating service comprised a nominally 50-mm PEX-AL-PEX gas pipe penetrating an oversized hole cored through the concrete slab. Once the pipe was fitted through the hole and restrained, the resulting gap around the pipe was backfilled flush with both sides of the concrete slab using quick drying cement. The pipe projected vertically, approximately 2000-mm above the concrete slab and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

All of these systems achieved Fire-Resistance Levels (FRL) of -/240/240.

CSIRO Sponsored Investigation report numbered FSP 1340

On 11 November 2008 CSIRO conducted a full-scale fire-resistance test on a specimen comprising a 1150-mm x 1150-mm x 150-mm thick reinforced concrete slab penetrated by seven gas pipes of various constructions protected by retro-fitted and cast-in Snap Fire System fire collars. The fire collars were fixed to the underside of the existing reinforced concrete slab by mechanical anchors. For the purpose of the test, the specimens were referenced as Penetrations 1, 2, 3, 4, 5, 6, and 7.

Penetration 1 – Cast-in SNAP50GAS fire collar protecting a nominal 40-mm PEX-AL-PE gas pipe

The SNAP50GAS, fire collar consisted of a galvanised steel case 82-mm diameter x 90-mm high, with a single spring pocket and a 115-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 85-mm wide and 200-mm long. Between the wraps was a layer 0.15-mm thick x 85-mm wide of stainless steel mesh. The cast-in collar had a plastic hightop making the overall height of the collar 205-mm high. The collar was cast into the concrete slab with its base flush with the underside.

The penetrating service comprised a nominally 40-mm PEX-AL-PE gas pipe penetrating the concrete slab through the cast in collar. The pipe projected vertically, approximately 2000-mm above the concrete slab and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 2 – Retrofit SNAP50GAS fire collar protecting a nominal 40-mm PEX-AL-PE gas pipe

The SNAP50GAS, fire collar consisted of a galvanised steel case 82-mm diameter x 90-mm high, with a single spring. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 85-mm wide and 200-mm long. Between the wraps was a layer 0.15-mm thick x 85-mm wide of stainless steel mesh. The collar was fixed to the underside of the concrete slab with 6-mm diameter mechanical anchors fitted through 8-mm diameter holes in four brackets screw fixed to the case of the collar.

The penetrating service comprised a nominally 40-mm PEX-AL-PE gas pipe penetrating an oversized hole cored through the concrete slab. Once the pipe was fitted through the hole and restrained, the resulting gap around the pipe was backfilled flush with both sides of the concrete slab using quick drying cement. The pipe projected vertically, approximately 2000-mm above the concrete slab and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 3 – Cast-in SNAP50GAS fire collar protecting a nominal 50-mm PE-AL-PE gas pipe

The SNAP50GAS, fire collar consisted of a galvanised steel case 82-mm diameter x 90-mm high, with a single spring pocket and a 115-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 85-mm wide and 200-mm long. Between the wraps was a layer 0.15-mm thick x 85-mm wide of stainless steel mesh. The cast-in collar had a plastic hightop making the overall height of the collar 205-mm high. The collar was cast into the concrete slab with its base flush with the underside.

The penetrating service comprised a nominally 50-mm PE-AL-PE gas pipe gas pipe penetrating the concrete slab through the cast in collar. The pipe projected vertically, approximately 2000-mm above the concrete slab and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 4 – Cast-in SNAP50GAS fire collar protecting a nominal 32-mm PE-AL-PE gas pipe

The SNAP50GAS, fire collar consisted of a galvanised steel case 82-mm diameter x 90-mm high, with a single spring pocket and a 115-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 85-mm wide and 200-mm long. Between the wraps was a layer 0.15-mm thick x 85-mm wide of stainless steel mesh. The cast-in collar had a plastic hightop making the overall height of the collar 205-mm high. The collar was cast into the concrete slab with its base flush with the underside.

The penetrating service comprised a nominally 32-mm PE-AL-PE gas pipe gas pipe penetrating the concrete slab through the cast in collar. The pipe projected vertically, approximately 2000-mm above the concrete slab and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 5 – Retrofit SNAP63GAS fire collar protecting a nominal 63-mm GASPEX PEX-AL-PEX gas pipe

The SNAP63GAS, fire collar consisted of a galvanised steel case 95-mm diameter 95-mm high, with a single spring pocket and a 125-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius Three soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 85-mm wide. Between the wraps were two layers of 0.15-mm thick x 85-mm wide Stainless steel mesh. The collar was fixed to the underside of the concrete slab with 6-mm diameter mechanical anchors fitted through 8-mm diameter holes in four brackets screw fixed to the case of the collar.

The penetrating service comprised a nominally 63-mm GASPEX PEX-AL-PEX gas pipe penetrating an oversized hole cored through the concrete slab. Once the pipe was fitted through the hole and restrained, the resulting gap around the pipe was backfilled flush with both sides of the concrete slab using quick drying cement. The pipe projected vertically, approximately 2000-mm above the concrete slab and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 6 – Cast-in SNAP50GAS fire collar protecting a nominal 32-mm GASPEX PEX-AL-PEX gas pipe

The SNAP50GAS, fire collar consisted of a galvanised steel case 82-mm diameter x 90-mm high, with a single spring pocket and a 115-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 85-mm wide and 200-mm long. Between the wraps was a layer 0.15-mm thick x 85-mm wide of stainless steel mesh. The cast-in collar had a plastic hightop making the overall height of the collar 205-mm high. The collar was cast into the concrete slab with its base flush with the underside.

The penetrating service comprised a nominally 32-mm GASPEX PEX-AL-PEX gas pipe gas pipe penetrating the concrete slab through the cast in collar. The pipe projected vertically, approximately 2000-mm above the concrete slab and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 7 – Cast-in SNAP50GAS fire collar protecting a nominal 50-mm GASPEX PEX-AL-PEX gas pipe

The SNAP50GAS, fire collar consisted of a galvanised steel case 82-mm diameter x 90-mm high, with a single spring pocket and a 115-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 85-mm wide and 200-mm long. Between the wraps was a layer 0.15-mm thick x 85-mm wide of stainless steel mesh. The cast-in collar had a plastic hightop making the overall height of the collar 205-mm high. The collar was cast into the concrete slab with its base flush with the underside.

The penetrating service comprised a nominally 50-mm GASPEX PEX-AL-PEX gas pipe gas pipe penetrating the concrete slab through the cast in collar. The pipe projected vertically, approximately 2000-mm above the concrete slab and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetrations 2, 4, 5 and 6 achieved FRLs of -/240/240, Penetrations 1 and 7 achieved FRL of -/240/180 and Penetration 3 achieved an FRL of -/240/0.

CSIRO Sponsored Investigation report numbered FSP 1341

On 20 November 2008 CSIRO conducted a full-scale fire-resistance test on a specimen comprising a wall system was constructed in accordance with CSR wall system with an established fire resistance level (FRL) of -/120/120. Construction comprised 64-mm x 0.75-mm steel studs and noggins installed at nominally 600-mm centres, lined on each side with two layers of 16-mm thick CSR Gyprock Fyrchek plasterboard sheets. The plasterboard sheeting was screw fixed to the steel studs using plasterboard screws at nominally 200-mm centres. The wall was penetrated by six gas pipes of various constructions protected by retro-fitted Snap Fire System fire collars. For the purpose of the test, the specimens were referenced as Penetrations 1, 2, 3, 4, 5, and 6.

Penetration 1 – Retrofit SNAP32GAS fire collar protecting a nominal 16-mm PEX-AL-PE gas pipe

The SNAP32GAS, fire collar consisted of a galvanised steel case 54-mm diameter x 63-mm high, with a single spring pocket and a 90-mm diameter base plate screw fixed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 57-mm wide x 130-mm long. Between the wraps was a layer 0.15-mm thick x 57-mm wide of stainless steel mesh. One collar was fixed to each side of the plasterboard wall in a back-to-back configuration using three 6-mm diameter threaded rods fixed through the wall and the holes in the base plates of the two collars and fastened with nuts.

The penetrating service comprised a nominally 16-mm PEX-AL-PE gas pipe penetrating the plasterboard wall through a cut-out hole closest in size to the size of the pipe. The pipe projected horizontally, approximately 2000-mm away from the unexposed face of the plasterboard wall and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the plasterboard wall. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 2 – Retrofit SNAP32GAS fire collar protecting a nominal 32-mm PE-AL-PE gas pipe

The SNAP32GAS, fire collar consisted of a galvanised steel case 54-mm diameter x 63-mm high, with a single spring pocket and a 90-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 57-mm wide x 130-mm long. Between the wraps was a layer 0.15-mm thick x 57-mm wide of stainless steel mesh. One collar was fixed to each side of the plasterboard wall in a back-to-back configuration using three 6-mm diameter threaded rods fixed through the wall and the holes in the base plates of the two collars and fastened with nuts.

The penetrating service comprised a nominally 32-mm PE-AL-PE gas pipe penetrating the plasterboard wall through a cut-out hole closest to the size of the pipe. The pipe projected horizontally, approximately 2000-mm above the plasterboard and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the plasterboard wall. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 3 – Retrofit SNAP50GAS fire collar protecting a nominal 40-mm PEX-AL-PE gas pipe

The SNAP50GAS, fire collar consisted of a galvanised steel case 82-mm diameter x 90-mm high, with a single spring pocket. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 85-mm wide and 200-mm long. Between the wraps was a layer 0.15-mm thick x 85-mm wide of stainless steel mesh.

One collar was fixed to each side of the plasterboard wall in a back-to-back configuration using four 6-mm diameter threaded rods fixed through the wall and the holes in the base plate (collar on the unexposed face) and brackets (collar on the exposed face) of the two collars and fastened with nuts.

The penetrating service comprised a nominally 40-mm PEX-AL-PE gas pipe penetrating the plasterboard wall through a cut-out hole closest to the size of the pipe. The pipe projected horizontally, approximately 2000-mm above the plasterboard and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the plasterboard. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 4 – Retrofit SNAP50GAS fire collar protecting a nominal 50-mm PE-AL-PE gas pipe

The SNAP50GAS, fire collar consisted of a galvanised steel case 82-mm diameter x 90-mm high, with a single spring pocket and a 115-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 85-mm wide and 200-mm long. Between the wraps was a layer 0.15-mm thick x 85-mm wide of stainless steel mesh. One collar was fixed to each side of the plasterboard wall in a back-to-back configuration using four 6-mm diameter threaded rods fixed through the wall and the holes in the base plates of the two collars and fastened with nuts.

The penetrating service comprised a nominally 50-mm PE-AL-PE gas pipe penetrating the plasterboard wall through a cut-out hole closest to the size of the pipe. The pipe projected horizontally, approximately 2000-mm above the plasterboard and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the plasterboard. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 5 – Retrofit SNAP50GAS fire collar protecting a nominal 32-mm GASPEX PEX-AL-PEX gas pipe

The SNAP50GAS, fire collar consisted of a galvanised steel case 82-mm diameter x 90-mm high with a single spring pocket and a 115-mm diameter base plate screwed to the case. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 85-mm wide and 200-mm long. Between the wraps was a layer 0.15-mm thick x 85-mm wide of stainless steel mesh. One collar was fixed to each side of the plasterboard wall in a back-to-back configuration using four 6-mm diameter threaded rods fixed through the wall and the holes in the base plates of the two collars and fastened with nuts.

The penetrating service comprised a nominally 32-mm GASPEX PEX-AL-PEX gas pipe penetrating the plasterboard wall through a cut-out hole closest to the size of the pipe. The pipe projected horizontally, approximately 2000-mm above the plasterboard and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the plasterboard. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

Penetration 6 – Retrofit SNAP32GAS fire collar protecting a nominal 16-mm PE-AL-PE gas pipe

The SNAP32GAS, fire collar consisted of a galvanised steel case 54-mm diameter x 63-mm high, with a single spring pocket. The single spring is pivoted at the top of the spring cavity and restrained by a nylon fusible link with a melting temperature of 75 degrees Celsius. Two soft intumescent wraps lined the internal circumference of the collar. The wraps were 4-mm thick x 57-mm wide x 130-mm long. Between the wraps was a layer 0.15-mm thick x 57-mm wide of Stainless steel mesh. One collar was fixed to each side of the plasterboard wall in a back-to-back configuration using three 6-mm diameter threaded rods fixed through the wall and the holes in the base plate (collar on the unexposed face) and brackets (collar on the exposed face) of the two collars and fastened with nuts.

The penetrating service comprised a nominally 16-mm PE-AL-PE gas pipe penetrating the plasterboard wall through a cut-out hole closest to the size of the pipe. The pipe projected horizontally, approximately 2000-mm above the plasterboard and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 1000-mm from the unexposed face of the plasterboard. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre plug.

All of the tested systems achieved fire-resistance levels (FRL) of -/120/120.

References

The following informative documents are referred to in this Report:

AS 1530.4-2005	Methods for fire tests on building materials, components and structures Part 4: Fire-resistance tests of elements of construction.
FSP 1339	CSIRO Sponsored Investigation report on full scale fire-resistance test on pipe penetration systems conducted on 13 November 2008.
FSV 1340	CSIRO Sponsored Investigation report on full scale fire-resistance test on pipe penetration systems conducted on 11 November 2008.
FSV 1341	CSIRO Sponsored Investigation report on full scale fire-resistance test on pipe penetration systems conducted on 20 November 2008.

CONTACT US

t 1300 363 400
+61 3 9545 2176
e enquiries@csiro.au
w www.csiro.au

YOUR CSIRO

Australia is founding its future on science and innovation. Its national science agency, CSIRO, is a powerhouse of ideas, technologies and skills for building prosperity, growth, health and sustainability. It serves governments, industries, business and communities across the nation.

FOR FURTHER INFORMATION

Infrastructure Technologies
Mario Lara-Ledermann
Senior Fire Resistance and Assessments Engineer
t +61 2 94905500
e mario.lara@csiro.au
w www.csiro.au/Organisation-Structure/Divisions/CMSE/Infrastructure-Technologies/Fire-safety.aspx

Infrastructure Technologies
Brett Roddy
Manager, Fire Testing and Assessments
t +61 2 94905449
e brett.roddy@csiro.au
w www.csiro.au/Organisation-Structure/Divisions/CMSE/Infrastructure-Technologies/Fire-safety.aspx