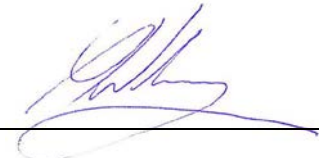


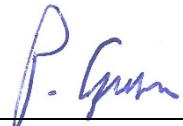
FAR 3528 Issue 3

"SNAP H 150" Service Penetration Collar with Variation to Material of Construction and Assessed across a Range of Different Plastic Pipe Types

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BRANZ's agreement with its Client in relation to this report contains the following terms and conditions in relation to **Liability and Indemnification**

- a. Limitation and Liability
- i. BRANZ undertakes to exercise due care and skill in the performance of the Services and accepts liability to the Client only in cases of proven negligence.
 - ii. Nothing in this Agreement shall exclude or limit BRANZ's liability to a Client for death or personal injury or for fraud or any other matter resulting from BRANZ's negligence for which it would be illegal to exclude or limit its liability.
 - iii. BRANZ is neither an insurer nor a guarantor and disclaims all liability in such capacity. Clients seeking a guarantee against loss or damage should obtain appropriate insurance.
 - iv. Neither BRANZ nor any of its officers, employees, agents or subcontractors shall be liable to the Client nor any third party for any actions taken or not taken on the basis of any Output nor for any incorrect results arising from unclear, erroneous, incomplete, misleading or false information provided to BRANZ.
 - v. BRANZ shall not be liable for any delayed, partial or total non-performance of the Services arising directly or indirectly from any event outside BRANZ's control including failure by the Client to comply with any of its obligations hereunder.
 - vi. The liability of BRANZ in respect of any claim for loss, damage or expense of any nature and howsoever arising shall in no circumstances exceed a total aggregate sum equal to 10 times the amount of the fee paid in respect of the specific service which gives rise to such claim or NZD\$50,000 (or its equivalent in local currency), whichever is the lesser.
 - vii. BRANZ shall have no liability for any indirect or consequential loss (including loss of profits).
 - viii. In the event of any claim the Client must give written notice to BRANZ within 30 days of discovery of the facts alleged to justify such claim and, in any case, BRANZ shall be discharged from all liability for all claims for loss, damage or expense unless legal proceedings are commenced in respect of the claim within one year from:
 - The date of performance by BRANZ of the service which gives rise to the claim; or
 - The date when the service should have been completed in the event of any alleged non-performance.
- b. Indemnification: The Client shall guarantee, hold harmless and indemnify BRANZ and its officers, employees, agents or subcontractors against all claims (actual or threatened) by any third party for loss, damage or expense of whatsoever nature including all legal expenses and related costs and howsoever arising relating to the performance, purported performance or non-performance, of any Services.
- c. Without limiting clause b above, the Client shall guarantee, hold harmless and indemnify BRANZ and its officers, employees, agents or subcontractors against all claims (actual or threatened) by any party for loss, damage or expense of whatsoever nature including all legal expenses and related costs arising out of:
- i. any failure by the Client to provide accurate and sufficient information to BRANZ to perform the Services;
 - ii. any misstatement or misrepresentation of the Outputs, including Public Outputs;
 - iii. any defects in the Products the subject of the Services; or
 - iv. any changes, modifications or alterations to the Products the subject of the Services.

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"SNAP H 150" Service Penetration Collar with Variation to Material of Construction and Assessed across a Range of Different Plastic Pipe Types

1. CLIENT

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2. INTRODUCTION

This report gives BRANZ's assessment of the fire resistance of a SNAP H 150 service penetration collar similar to the type tested in BRANZ fire resistance test FP 4428 with the collar case fabricated from polypropylene. The following pipe types are also considered with a four spring polypropylene case collar.

1. 150 mm DWV PVC with and without a PVC socket fitted within the collar.
2. 150 mm ID x 6.2 mm wall thickness HDPE PE80 Pipe.
3. 160 mm PPR-80 pipe.
4. 160 mm PE pipe

For the purposes of this assessment all the services are vertically oriented through a concrete floor slab either 150 mm or 170 mm thick and for convenience are stated as being "*cast in stack applications*".

3. BACKGROUND

3.1 BRANZ Test FP 4428

In BRANZ pilot fire resistance test FP 4428 a 150 mm PVC DWV pipe was installed through a 170 mm thick concrete slab. Two 90° PVC elbows were fitted in series at the exposed face, with the socket of one of the elbows inserted within the galvanised steel SNAP collar and the straight pipe fitted into the elbow socket. The collar was grouted into the floor with the base flush with the exposed face. The hole in the slab measured 330 mm diameter and was back grouted flush to the surface of the slab after the collar was installed.

The SNAP collar was a prototype model fabricated from 0.95 mm thick galvanised steel and fitted with four springs. The collar assembly measured a nominal 200 mm outside diameter (OD) x 115 mm high. A single layer of INTUMESH intumescent measuring 6 mm thick x 110 mm deep with a layer of fine stainless steel mesh measuring 0.25 mm thick stapled to one face of the intumescent was inserted into the body of the collar. An 0.6 mm thick electro galvanised steel ring with an internal diameter of 161 mm was located between the intumescent and collar at the top of the assembly. The ring was located at the top of the collar assembly sandwiched between the intumescent and the top edge of the collar body.

The PVC pipe measured 160 mm OD x 4.3 mm average wall thickness. The resulting gap between the pipe and the collar was sealed with fire rated sealant at the exposed face.


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The test was conducted in accordance with AS 1530.4-2005 with reference to AS 4072.1 - 2005 the result was as follows.

Integrity: 245 minutes No Failure (NF)
Insulation: 245 minutes NF

3.2 CSIRO Test FSP 1132

In CSIRO pilot fire resistance test FSP 1132 penetration "A" consisted of a nominal 150 mm ID HDPE PE80 pipe, penetration "B" consisted of a 100 mm uPVC pipe configured as a floor waste. Both specimens were installed through a 150 mm thick concrete slab. The collar assemblies were cast into the concrete slab with the base of the collar flush with the slab soffit.

Specimen A

The SNAP collar was a 150 mm Series 3 cast-in Fireshield Collar designation FS3S-150A. The collar consisted of a 1.2 mm thick steel case and measured a nominal 190 mm diameter x 130 mm high. The collar incorporated three springs equally spaced around the circumference of the case. The springs were located within pockets formed on the outer face of the casing. An intumescent wrap measuring 6 mm thick x 127 mm wide was located on the inner face of the collar case. The wrap had a stainless steel mesh measuring 0.35 mm thick on the outer face and on the inner face a 0.35mm thick x 100 mm wide Colan Type E fibreglass sleeve.

The HDPE PE80 pipe measured 150 mm nominal inside diameter (ID) x 6.2 mm wall thickness making the nominal outside diameter 162.4 mm OD.

The test was conducted in accordance with AS 1530.4-1997 with reference to AS 4072.1-1992 the result was as follows.

Integrity: 181 minutes NF
Insulation: 181 minutes NF

Specimen B

The SNAP collar was a 100 mm Series 2 cast-in Fireshield Collar designation FS2S-100A. The collar consisted of a 1.5 mm thick polypropylene case measuring a nominal 140 mm diameter x 95 mm high. The collar incorporated three springs equally spaced around the circumference of the case. The springs were located within pockets formed on the outer face of the casing. An intumescent wrap measuring 6 mm thick x 85 mm wide was located on the inner face of the collar case. The wrap was covered on the outside by a 0.35mm thick x 100 mm wide Colan Type E fibreglass sleeve.

The nominal 100 mm PVC pipe was installed through the collar's sleeve projecting vertically flush with the surface of the concrete slab. The pipe was fitted with a standard 100 mm plastic floor grate to the unexposed face. On the exposed face the pipe projected approximately 150 mm into the furnace and was fitted with a uPVC P-trap filled with water, the end of the trap was capped with a standard plastic cap fitting.

The test was conducted in accordance with AS 1530.4-1997 with reference to AS 4072.1-1992 the result was as follows.

Integrity: 181 minutes NF
Insulation: 181 minutes NF

3.3 CSIRO Test FSP 1359

In CSIRO pilot fire resistance test FSP 1359 a nominal 160 mm OD PPR-80 faser composite pipe of SDR7.4 was installed through a 150 mm thick concrete slab. The


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collar assembly was cast into the concrete slab with the base of the collar flush with the slab soffit.

The SNAP METAL 160 fire collar consisted of a 1.2 mm thick steel case and measured a nominal 190 mm diameter x 130 mm high. The collar incorporated four springs equally spaced around the circumference of the case. The springs were located within pockets formed on the outer face of the casing. An intumescent wrap measuring 6 mm thick x 127 mm wide was located on the inner face of the collar case.

The PPR-80 pipe measured 160 mm nominal OD x 23 mm wall thickness.

The test was conducted in accordance with AS 1530.4-2005 with reference to AS 4072.1 – 2005 the result was as follows.

Integrity:	241 minutes NF
Insulation:	223 minutes

3.4 CSIRO Test FSP 1367

In CSIRO pilot fire resistance test FSP 1367 a nominal 160 mm OD PE SDR7.4 pipe was installed through a 150 mm thick concrete slab. The collar assembly was cast into the concrete slab with the base of the collar flush with the slab soffit.

The SNAP METAL 160 fire collar consisted of a 1.2 mm thick steel case and measured a nominal 190 mm diameter x 130 mm high. The collar incorporated four springs equally spaced around the circumference of the case. The springs were located within pockets formed on the outer face of the casing. An intumescent wrap measuring 6 mm thick x 127 mm wide was located on the inner face of the collar case.

The PE pipe measured 160 mm nominal OD x 23 mm wall thickness.

The test was conducted in accordance with AS 1530.4-2005 with reference to AS 4072.1 – 2005 the result was as follows.

Integrity:	241 minutes NF
Insulation:	169 minutes

4. DISCUSSION

4.1 AS 1530.4-1997 VS. AS 1530.4-2005

A comparison between AS 1530.4-1997 and the 2005 version has been done in relation to pipe penetrations. The furnace and pressure conditions are considered to be sufficiently similar between versions to expect similar performance.

The main difference between the two versions of AS 1530.4 is the method used to determine Integrity failure. In AS 1530.4-1997 and AS 4072.1-1992 the integrity failure criterion is established when flames or hot furnace gases can pass to the unexposed side of the penetrated element, this is judged when-

- a gap forms which permits a line of site from the unexposed face of the specimen through to the furnace interior; or
- flaming takes place at the unexposed face of the specimen for a period exceeding 10 seconds duration.

In AS 1530.4-2005 the integrity criterion is deemed to have occurred upon development of cracks, fissures, or other openings through which flames or hot gases can pass. This is judged by glowing or flaming of a cotton pad or by the use of a 6 mm


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x 150 mm gap gauge or a 25 mm diameter gap gauge. Flaming in excess of 10 seconds also constitutes a failure of integrity.

Considering the differences between the two versions of the standard the AS 1530.4-1997 criteria is more onerous than the criteria specified in the AS 1530.4-2005 version. Therefore it is considered that a specimen that has been tested to the AS 1530.4-1997 standard would achieve at least the same level of integrity as if it had been tested to the AS 1530.4-2005 test standard.

4.2 SNAP Cast In Collar

SNAP cast in collars comprise a body manufactured from either galvanised steel or polypropylene with intumescent lining the inner circumference of the body. The standard collar comprises three equally spaced “spring” pockets located around the perimeter of the collar. The springs are positioned within the pockets with the spring legs held in a tension mode with a nylon thermal link with a nominal melting temperature of 75°C. When activated the springs assist with closing the intumescent into the penetration.

We are advised by the client that SNAP 150 mm and 160 mm are essentially the same size collar marketed under different sizes for different applications.

4.3 Steel to Plastic Collar Case

In CSIRO Test FSP 1132, specimen “B” the 100 mm uPVC pipe and floor waste demonstrated that the plastic collar case did not prejudice the performance of the collar when compared to similar snap collars tested. The SNAP “cast in” collar case is essentially used to house the intumescent and the spring mechanisms utilised in this type of collar system. The case has no impact on the performance of the collar assembly outside of this role. Although specimen B is smaller than the other tested steel collars it is considered testing a floor waste is a more severe test on the ability of the collar to close and maintain the test criteria. Specimen “B” did not fail the integrity or insulation criteria for the 181 minute duration of the test.

Based on the performance of the plastic collar it is considered that substituting the 150mm / 160 mm SNAP metal collar case with a similarly sized 1.5 mm thick polypropylene case would not prejudice the established fire resistance of the collars with the following plastic pipes installed through the collar with the following proviso. The same intumescent type detailed in the specific report for each pipe specimen is to be used and installation of the pipe remains the same as detailed in the relevant report.

Report No	Pipe Details	Floor Thickness	Assessed Performance
FP 4428	150 mm uPVC DWV with elbow socket fitted into the body of the collar	170 mm	-/240/240
FSP 1132	150 mm HDPE PE80	150 mm	-/180/180
FSP 1359	160 mm PPR 80 fazer composite SDR7.4	150 mm	-/240/180
FSP 1367	160 mm PE SDR7.4	150 mm	-/240/120

A drawing of the polypropylene case is included as Figure 1.

4.4 Collar Fitted with Four Springs

The fire resistance tests reported above indicate that the inclusion of an extra spring to four equally spaced springs does not adversely affect the fire resistance of the collar. It


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is further considered that once activated the fourth collar spring will assist with pushing the intumescent wrap into the penetration in a more even fashion. The inclusion of the extra spring would also assist with the thicker walled pipe specimens as demonstrated in CSIRO test FSP 1359 and BRANZ test FP 4428. The extra spring ensures that as the exposed end of the pipe melts away the intumescent and section of pipe located within the concrete slab seals the penetration before the temperature of the gases within the flue like pipe cause an integrity or insulation failure.

4.5 150 mm uPVC DWV Straight Pipe Stack

In BRANZ test FP 4428 a 150 mm uPVC DWV pipe was inserted into a 90°Elbow with the elbow socket fitted into a four spring collar installed into a 170 mm thick concrete floor. The collar successfully sealed the penetration and the specimen achieved 245 minutes Integrity and Insulation without failure. The combination of the uPVC DWV pipe and elbow socket is a more onerous situation than a straight section of uPVC DWV pipe due to the double thickness of plastic to close off.

It is therefore considered that a four spring SNAP H 150 collar with a polypropylene case fitted to a straight vertically oriented section of 150 mm uPVC DWV through a 150 mm thick concrete floor would not prejudice the fire resistance of the penetration before at least 180 minutes. Further more if the same specimen is installed within a concrete floor of 170 mm thick it would not prejudice the fire resistance of the penetration before at least 245 minutes.

5. CONCLUSION

It is considered that the SNAP H 150 cast in collar with a polypropylene case incorporating four springs would not prejudice the fire resistance of the pipe penetrations listed below before the times stated when tested in accordance with AS 1530.4 – 2005 with reference to AS 4072.1 – 2005, subject to the conditions listed below.

Report No/Note	Pipe Description	Floor Thickness	Assessed Performance
FP 4428	150 mm uPVC DWV with elbow socket fitted into the body of the collar	170 mm	-/240/240
See Note 2	150 mm uPVC DWV	170 mm 150 mm	-/240/240 -/180/180
FSP 1132	150 mm HDPE PE80	150 mm	-/180/180
FSP 1359	160 mm PPR 80 fazer composite SDR7.4	150 mm	-/240/180
FSP 1367	160 mm PE SDR7.4	150 mm	-/240/120

Conditions:

1. Installation of pipe penetration to conform to the methods utilised in the relevant test report, including the use of fire resistant sealant and the type and spacing of pipe clamps on the unexposed face.
2. Installation of the pipe as per the specimen in FP 4428 with extra fire resistant sealant filling the annular space between the collar and the pipe at both the exposed and unexposed face.
3. The collar intumescent type including the use of stainless steel mesh and Colan Type E fibreglass sleeves where relevant must be the same specification as the tested specimen for each pipe in question.


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6. LIMITATION

This assessment report is subject to the accuracy and completeness of the information supplied.

BRANZ reserves the right to amend or withdraw this report should additional information become available regarding the fire performance of the product assessed herein.

7. ATTACHMENTS

Figure 1 SNAP FIRE COLLAR 150 H COLLAR COMPONENT DETAIL


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