



FIRE ASSESSMENT REPORT

FC10124-01 ISSUE 2

ASSESSMENT OF THE FIRE RESISTANCE OF SNAP METAL RETRO COLLARS APPLIED TO PROTECTING PENETRATIONS IN HEBEL WITH PVC PIPES

CLIENT

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ASSESSMENT OBJECTIVE

To assess the fire resistance of SNAP metal retro collars protecting penetrations with PVC pipes in a 75 mm thick Hebel panel wall.

CONCLUSION

It is considered that the SNAP collars fitted each side of a 75 mm thick Hebel panel wall protecting 40 mm to 160 mm diameter PVC straight pipes (including variants as listed), which may also include fittings within the collar, would achieve a FRL's of -/120/90 or -/120/120 as specified in the Table below, if tested in accordance with AS 1530.4:2014 and AS 4072.1-2005 (R2016).

Pipe Material	Pipe Diameter	Collar Code	Straight	With Fitting
PVC -SC	160	HP150R	-/120/120	-/120/120
PVC-SC	100	LP100R-D	-/120/90	-/120/90
PVC	100	LP100R-D	-/120/90	-/120/90
PVC	90	LP100R-D	-/120/90	-/120/90
PVC	80	LP100R-D	-/120/90	-/120/90
PVC	65	LP65R	-/120/90	-/120/90
PVC	50	LP65R	-/120/120	-/120/120
PVC	40	LP65R	-/120/120	-/120/120

LIMITATION

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BRANZ reserves the right to amend or withdraw this assessment if information becomes available which indicates the stated fire performance may not be achieved.

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1. INTRODUCTION

This report gives BRANZ's assessment on the fire resistance of a range of SNAP metal retrofit collars when installed in a 75 mm thick Hebel autoclaved aerated concrete (ACC) panel wall system.

2. BACKGROUND

This assessment is considered on the basis of the fire resistance performance of SNAP retrofit collars coded HP and LP installed in a 75 mm Hebel panel wall as established in CSIRO fire resistance tests FSP 1807 and FSP 1783 as summarised in Table 1.

Table 1: Summary of supporting test results of SNAP collars in a 75 mm thick Hebel panel wall

Test Report	Pen. #	Product	Penetration dia, mm	Pipe dia, mm	Pipe type	Fitting	FRL
FSP 1807	9	HP150R	168	160	PVC-SC	✓	-/120/120
FSP 1783	3	LP100R-D	114	100	PVC-SC	✓	-/120/90
FSP 1807	4	LP100R-D	89	80	PVC	✓	-/120/90
FSP 1783	5	LP65R	76	65	PVC	✓	-/120/90
FSP 1783	9	LP65R	64	50	PVC	✓	-/120/120
FSP 1783	4	LP65R	48	40	PVC	✓	-/120/120

Fittings are considered as a double thickness of PVC such as where a coupling or an elbow, fixed with a solvent based adhesive, is fitted to a straight pipe and it happens that the joint is within the collar.

3. DISCUSSION

For plastic pipes in penetrations, AS 4072.1-2005 (R2016) specifies that pipes in nominal sizes of 40 mm, 50 mm, 65 mm, 80 mm and 100 mm are required to be tested. In the case of PVC pipes this range is covered as shown in Table 1.

The pipe type designated PVC-SC is manufactured in a layered sandwich construction, rather than extruded. The performance in the test FSP 1807 and FSP 1783 did not indicate that the SC layering of the pipes noticeably impeded the closure of the pipes under the action of the collars when subjected to the fire test exposure. So, the PVC-SC pipe type is compared with the PVC in section 3.1.1.

The test results in Table 1 are considered in assessing the FRL of:

1. Two additional PVC pipe sizes of 90 and 100 mm with fittings.
2. Eight PVC pipe sizes ranging from 40 mm to 160 mm without fittings.

As the range of PVC pipes specified in AS 4072.1-2005 (R2016) has been tested and achieved a FRL of at least -/120/90, then the intermediate diameter pipes would also be expected to achieve at least an FRL -/120/90. The specified range of PVC pipes with fittings was tested with a fitting in the collar, therefore it is expected that the 90 mm and 100 mm PVC would achieve an FRL of -/120/90.

3.1 Assessments with fittings

In the pipes with fittings the premise is that it may make it more difficult for the intumescent in the collar to close the double thickness of pipe. It therefore follows that for the same pipe size and collar combinations the time of closure of the collars on the pipes, without fittings, will likely be similar or earlier and thus maintain the FRL as tested.

Table 2 shows the two required assessments. These are supported by the tested systems in Table 1 and fit in between the pipe sizes 80 and 100 mm. For the two intermediate pipe sizes whereby the larger and smaller pipe and collar combinations successfully seal off the pipes and achieve the required FRL, then pipes of the same material will similarly be closed and achieve the required FRL.

Table 2: Assessment with fittings as supported by the tested systems

Test Report	Pen. #	Product	Penetration dia, mm *	Pipe dia, mm	Pipe type	Fitting	FRL
FSP 1807	9	HP150R	168	160	PVC-SC	✓	-/120/120
FSP 1783	3	LP100R-D	114	100	PVC-SC	✓	-/120/90
Assessment	-	LP100R-D	-	100	PVC	✓	-/120/90
Assessment	-	LP100R-D	-	90	PVC	✓	-/120/90
FSP 1807	4	LP100R-D	89	80	PVC	✓	-/120/90
FSP 1783	5	LP65R	76	65	PVC	✓	-/120/90
FSP 1783	9	LP65R	64	50	PVC	✓	-/120/120
FSP 1783	4	LP65R	48	40	PVC	✓	-/120/120

* Where a penetration hole diameter is not specified for the assessed penetration, interpolation between those systems tested may be used to determine a maximum permitted diameter.

3.1.1 PVC-SC pipes

An examination of the CSIRO test reports FSP 1783 and FSP 1807 show consistent performance in the closing of the pipe collar combinations across the pipe sizes. From this it can be inferred that there is no difference between PVC and PVC-SC (sandwich construction) in terms of the timing of closing based on pipe temperature rises.

The only point of difference is that some of the FRL's show 90 minutes for Insulation as follows:

- FSP 1783 test was stopped at 121 min, Insulation failed at penetrations #5 and #3 at 102 to 117 minutes respectively on the wall above the collars.
- FSP 1807 test was stopped at 121 min, Insulation on penetration # 4 failed at 114 minutes on the wall above the collars.

The only exceptions to the trend of the Insulation failure are the smaller penetrations, and the largest one. The HP150R is a high-profile model with a collar 117 mm high as opposed to 65 mm for the other models of collar and 8 mm thickness of intumescent compared with 5 mm, so it follows that the Insulation performance is likely to be improved as it would need to be to counter the increased diameter. The benefit being that heat output (by convection) to the Hebel wall above is reduced.

To conclude it is likely that FRL's of -/120/90 will be achieved for 90 and 100 mm pipes with fittings and protected with LP100R-D collars each side of a 75 mm Hebel wall.

3.2 Assessments without fittings

Given that the presence of fittings is likely to reduce the rate of compression and closure of PVC pipes under the action of the SNAP collars, as tested and assessed in section 4.1 above, it follows that the absence of the fittings in the pipes and a consequent reduced resistance to closure is unlikely to prejudice the respective FRL's already tested or assessed.

To conclude it is likely that the FRL's of -/120/90 and -/120/120 as shown in Table 3 will be achieved for the straight PVC pipes ranging in diameter from 40 to 160 mm when protected with the listed SNAP collars each side of a 75 mm Hebel wall.

Table 3: Assessment without fittings as supported by the tested and assessed systems

Product	Pipe dia, mm	Pipe type	FRL
HP150R	160	PVC-SC	-/120/120
LP100R-D	100	PVC-SC	-/120/90
LP100R-D	100	PVC	-/120/90
LP100R-D	90	PVC	-/120/90
LP100R-D	80	PVC	-/120/90
LP65R	65	PVC	-/120/90
LP65R	50	PVC	-/120/120
LP65R	40	PVC	-/120/120



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4. CONCLUSION

It is considered that the SNAP collars fitted each side of a 75 mm thick Hebel panel wall protecting 40 mm to 160 mm diameter PVC straight pipes (including variants as listed), which may also include fittings within the collar, would achieve a FRL's of -/120/90 or -/120/120 as specified in Table 4, if tested in accordance with AS 1530.4:2014 and AS 4072.1-2005 (R2016).

Table 4: Summary Table for SNAP Collars – 75 mm Hebel panel wall

Pipe Material	Pipe Diameter	Collar Code	Straight	With Fitting
PVC -SC	160	HP150R	-/120/120	-/120/120
PVC-SC	100	LP100R-D	-/120/90	-/120/90
PVC	100	LP100R-D	-/120/90	-/120/90
PVC	90	LP100R-D	-/120/90	-/120/90
PVC	80	LP100R-D	-/120/90	-/120/90
PVC	65	LP65R	-/120/90	-/120/90
PVC	50	LP65R	-/120/120	-/120/120
PVC	40	LP65R	-/120/120	-/120/120