

# Fire resistance of various plastic pipes protected by various fire collars in accordance with AS 1530.4-2014 and assessed in accordance with AS 4072.1-2005

## Assessment Report

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**Client:** IG6 Pty Ltd

Commercial-in-confidence

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# 1 Introduction

This report is an assessment of fire resistance of various plastic pipes protected by various fire collars in accordance with AS 1530.4-2014 and assessed in accordance with AS 4072.1-2005.

This report is prepared for meeting the evidence of suitability requirements of NCC Vol 1 Schedule 5 clause 2(b) 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 A 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, validity and limitations of Section 7, 8 and 9.

# 2 Supporting Data

This assessment report refers to various test reports which shall be read in conjunction with to support the analysis and conclusions of this report. They are listed below;

**Table 1: Reference test data**

Report Reference	Test Standard	Outline of Test Specimen
FSP 1132 (specimen A)	AS 1530.4 - 1997	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by various Specimen A which comprised a 150-mm ID HDPE Geberit PE80 pipe, with 6.2-mm wall thickness protected by 150-mm Series 3 Cast-in FireShield Collar.
FSP 1144 (specimen A)	AS 1530.4 - 1997	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by Specimen A which comprised a 315-mm OD uPVC Vinidex stormwater pipe, protected by a cast-in Fireshield collar.
FSP 1146 (Specimen A)	AS 1530.4 - 1997	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by various services including Specimen A being a 50-mm HDPE Geberit PE80 pipe with a trap fitting and a plastic floor grate protected by 40/50-mm Series 2 Retro-fit FireShield Collar.
FSP 1339	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by seven gas pipes of various constructions protected by retro-fitted Snap Fire System fire collars.
FSP 1340	AS 1530.4 - 2005	A fire resistance test on a 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.
FSP 1341	AS 1530.4 - 2005	A fire resistance test on a plasterboard wall penetrated by six gas pipes of various constructions protected by retro-fitted Snap Fire System fire collars.
FSP 1359	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by six Aquatherm Fusiotherm polypropylene fibre pipes protected by cast-in Snap Fire System fire collars.
FSP 1360	AS 1530.4 - 2005	A fire resistance test on a plasterboard wall penetrated by six Aquatherm Fusiotherm polypropylene fibre pipes protected by retro-fitted Snap Fire System fire collars.

FSP 1366	AS 1530.4 - 2005	A fire resistance test on a plasterboard wall penetrated by six Polyethylene fibre pipes protected by retro-fitted Snap Fire System fire collars.
FSP 1367	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by six polyethylene pipes protected by cast-in Snap Fire System fire collars.
FSP 1564	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by five plastic pipes protected by cast-in Snap Fire System fire collars. Three of the penetrations were fitted with chromed brass floor grates.
FSP 1575A	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by five plastic pipes protected by cast-in Snap Fire System fire collars.
FSP 1576	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by five plastic pipes protected by cast-in Snap Fire System fire collars.
FSP 1577A	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by four floor waste systems and one stack pipe protected by cast-in Snap Fire System fire collars.
FSP 1592	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by four floor waste systems and one stack pipe protected by cast-in Snap Fire System fire collars.
FSP 1601A	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by two Plasticized Polyvinyl Chloride (uPVC) pipes and one Polyvinyl Chloride (PVC) pipe protected by cast-in and retrofit Snap Fire System fire collars.
FSP 1614	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by four Rehau Raupiano Plus pipes protected by cast-in Snap Fire System fire collars.
FSP 1615	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by four High-density polyethylene (HDPE) pipes and one Polyvinyl Chloride (PVC) pipe protected by cast-in Snap Fire System fire collars.
FSP 1634	AS 1530.4 - 2005	A fire resistance test on a plasterboard sheeting wall penetrated by nine (9) PEX (Cross-linked polyethylene) pipes protected by retro-fitted Snap Fire System fire collars.
FSP 1641	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by two P-Trap Floor wastes, one PVC Sandwich Construction (SC) stack and one HDPE stack pipe protected by cast-in Snap Fire System fire collars.
FSP 1648	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by one Akatherm dBlue Floorwaste and five Akatherm dBlue stack pipes protected by cast-in Snap Fire System fire collars.
FSP 1652A	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by one Valsir-TRIPLUS Floorwaste and five Valsir-TRIPLUS stack pipes protected by cast-in Snap Fire System fire collars.
FSP 1657	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by nine polypropylene homopolymer (PP-H) stack pipes protected by cast-in and retrofit Snap Fire System fire collars.
FSP 1658	AS 1530.4 - 2005	A fire resistance test on a plasterboard wall penetrated by eight (8) +GF+ Georg Fischer Progef Polypropylene PP-H stack pipe protected by retro-fitted Snap Fire Systems fire collars.
FSP 1659	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick CSR Hebel block wall penetrated by three Polyvinyl Chloride (PVC) stack pipes and one High Density Polyethylene (HDPE) stack pipes.
FSP 1668	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick CSR Hebel block wall penetrated by one Polyvinyl Chloride (PVC) stack pipe and one High Density Polyethylene (HDPE) stack pipe.

FSP 1673	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by two PVC floor waste systems and one PVC stack pipe protected by cast-in and retrofit Snap Fire System fire collars.
FSP 1686	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick Stramit Condeck HP composite steel and reinforced concrete slab penetrated by one HDPE floor waste pipe, one PVC floor waste pipe and one PVC stack pipe protected by cast-in and retrofit Snap Fire System fire collars.
FSP 1692	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by one HDPE stack pipe protected by retrofit Snap Fire System fire collars.
FSP 1696	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by three stack pipes and two floor wastes protected by retrofit Snap Fire System fire collars.
FSP 1700	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by one stack pipe and four floor wastes protected by retrofit and cast-in Snap Fire System fire collars.
FSP 1713	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by three floor waste systems and two stack pipes protected by Retrofit Snap Fire System fire collar.
FSP 1715	AS 1530.4 - 2005	A fire resistance test on a 420-mm thick concrete beam and slab penetrated by one Vinidex floor waste and one Vinidex stack pipe protected by cast-in Snap Fire System fire collars.
FSP 1716	AS 1530.4 - 2005	A fire resistance test on a plasterboard wall system penetrated by five stack pipes protected by retro-fitted Snap Fire Systems fire collars.
FSP 1723	AS 1530.4 - 2005	A fire resistance test on a plasterboard wall system penetrated by nine stack pipes protected by a retro-fitted Snap Fire Systems fire collar.
FSP 1735	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by four floor waste systems and one stack pipe protected by Cast-in Snap Fire System fire collar.
FSP 1736	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by three floor waste systems and one stack pipe protected by Cast-in and Retrofit Snap Fire System fire collar.
FSV 1731	AS 1530.4 - 2005	A fire resistance test on one fire damper installation, twelve pipe penetrations, one unsupported cable penetration and two cable tray penetrations, all installed in a Speedpanel panel wall system and protected by a combination of sealants, fire collars and cable tray fire stopping systems.

All the tests in the reports in Table 1 were undertaken by CSIRO North Ryde. Some of the reports in Table 1 were originally sponsored by and issued to Truss Holdings Pty Ltd, Snap Fire Systems Pty Ltd, and H.B. Fuller Company Australia Pty Ltd. The sponsors of these reports have confirmed CSIRO can use the above reports for this assessment.

### 3 Proposed Construction

Performance of the construction tested in the test referenced in Table 1 when tested in accordance with AS1530.4-2014 and no variations to the tested construction have been considered.

## 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, Section 10 as appropriate for service penetrations.
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 direct field of application of results in Section 6, the requirements of Section 7 the validity of Section 8 and limitations of Section 9.

## 6 Direct Field of Application of Results

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

## 7 Requirements

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

Any variations concerning 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 28th February 2026. 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 industry. The referenced assessment can therefore only relate 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. Summary of test evidence

Report Reference	Test Standard	Outline of Test Specimen
FSP 1132 (specimen A)	AS 1530.4 - 1997	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by various services including Specimen A that comprised a 150-mm ID HDPE Geberit PE80 pipe, with 6.2-mm wall thickness protected by 150-mm Series 3 Cast-in FireShield Collar.
FSP 1144 (specimen A)	AS 1530.4 - 1997	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by Specimen A that comprised a 315-mm OD uPVC Vinidex stormwater pipe, protected by a cast-in Fireshield collar.
FSP 1146 (Specimen A)	AS 1530.4 - 1997	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by various services including Specimen A being a 50-mm HDPE Geberit PE80 pipe with a trap fitting and a plastic floor grate protected by 40/50-mm Series 2 Retro-fit FireShield Collar.
FSP 1339	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by seven gas pipes of various constructions protected by retro-fitted Snap Fire System fire collars.
FSP 1340	AS 1530.4 - 2005	A fire resistance test on a 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.
FSP 1341	AS 1530.4 - 2005	A fire resistance test on a plasterboard wall penetrated by six gas pipes of various constructions protected by retro-fitted Snap Fire System fire collars.
FSP 1359	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by six Aquatherm Fusiotherm polypropylene fibre pipes protected by cast-in Snap Fire System fire collars.
FSP 1360	AS 1530.4 - 2005	A fire resistance test on a plasterboard wall penetrated by six Aquatherm Fusiotherm polypropylene fibre pipes protected by retro-fitted Snap Fire System fire collars.
FSP 1366	AS 1530.4 - 2005	A fire resistance test on a plasterboard wall penetrated by six Polyethylene fibre pipes protected by retro-fitted Snap Fire System fire collars.
FSP 1367	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by six polyethylene pipes protected by cast-in Snap Fire System fire collars.
FSP 1564	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by five plastic pipes protected by cast-in Snap Fire System fire collars. Three of the penetrations were fitted with chromed brass floor grates.
FSP 1575A	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by five plastic pipes protected by cast-in Snap Fire System fire collars.
FSP 1576	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by five plastic pipes protected by cast-in Snap Fire System fire collars.
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FSP 1601A	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by two Plasticized Polyvinyl Chloride (uPVC) pipes and one Polyvinyl Chloride (PVC) pipe protected by cast-in and retrofit Snap Fire System fire collars.
FSP 1614	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by four Rehau Raupiano Plus pipes protected by cast-in Snap Fire System fire collars.
FSP 1615	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by four High-density polyethylene (HDPE) pipes and one Polyvinyl Chloride (PVC) pipe protected by cast-in Snap Fire System fire collars.
FSP 1634	AS 1530.4 - 2005	A fire resistance test on a plasterboard sheeting wall penetrated by nine (9) PEX (Cross-linked polyethylene) pipes protected by retro-fitted Snap Fire System fire collars.
FSP 1641	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by two P-Trap Floor wastes, one PVC Sandwich Construction (SC) stack and one HDPE stack pipe protected by cast-in Snap Fire System fire collars.
FSP 1648	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by one Akatherm dBlue Floorwaste and five Akatherm dBlue stack pipes protected by cast-in Snap Fire System fire collars.
FSP 1652A	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by one Valsir-TRIPLUS Floorwaste and five Valsir-TRIPLUS stack pipes protected by cast-in Snap Fire System fire collars.
FSP 1657	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by nine polypropylene homopolymer (PP-H) stack pipes protected by cast-in and retrofit Snap Fire System fire collars.
FSP 1658	AS 1530.4 - 2005	A fire resistance test on a plasterboard wall penetrated by eight (8) +GF+ Georg Fischer Progef Polypropylene PP-H stack pipe protected by retro-fitted Snap Fire Systems fire collars.
FSP 1659	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick CSR Hebel block wall penetrated by three Polyvinyl Chloride (PVC) stack pipes and one High Density Polyethylene (HDPE) stack pipes.
FSP 1668	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick CSR Hebel block wall penetrated by one Polyvinyl Chloride (PVC) stack pipe and one High Density Polyethylene (HDPE) stack pipe.
FSP 1673	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by two PVC floor waste systems and one PVC stack pipe protected by cast-in and retrofit Snap Fire System fire collars.
FSP 1686	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick Stramit Condeck HP composite steel and reinforced concrete slab penetrated by one HDPE floor waste pipe, one PVC floor waste pipe and one PVC stack pipe protected by cast-in and retrofit Snap Fire System fire collars.
FSP 1692	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by one HDPE stack pipe protected by retrofit Snap Fire System fire collars.
FSP 1696	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by three stack pipes and two floor wastes protected by retrofit Snap Fire System fire collars.
FSP 1700	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by one stack pipe and four floor wastes protected by retrofit and cast-in Snap Fire System fire collars.

FSP 1713	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by three floor waste systems and two stack pipes protected by Retrofit Snap Fire System fire collar.
FSP 1715	AS 1530.4 - 2005	A fire resistance test on a 420-mm thick concrete beam and slab penetrated by one Vinidex floor waste and one Vinidex stack pipe protected by cast-in Snap Fire System fire collars.
FSP 1716	AS 1530.4 - 2005	A fire resistance test on a plasterboard wall system penetrated by five stack pipes protected by retro-fitted Snap Fire Systems fire collars.
FSP 1723	AS 1530.4 - 2005	A fire resistance test on a plasterboard wall system penetrated by nine stack pipes protected by a retro-fitted Snap Fire Systems fire collar.
FSP 1735	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by four floor waste systems and one stack pipe protected by Cast-in Snap Fire System fire collar.
FSP 1736	AS 1530.4 - 2005	A fire resistance test on a 150-mm thick reinforced concrete slab penetrated by three floor waste systems and one stack pipe protected by Cast-in and Retrofit Snap Fire System fire collar.
FSV 1731	AS 1530.4 - 2005	A fire resistance test on one fire damper installation, twelve pipe penetrations, one unsupported cable penetration and two cable tray penetrations, all installed in a Speedpanel panel wall system and protected by a combination of sealants, fire collars and cable tray fire stopping systems.

## A.2. Applicability of AS 1530.4 – 1997 test data to AS 1530.4 -2014

The referenced fire resistance tests FSP1132, FSP 1146 and FSP1144 were conducted in accordance with AS 1530.4–1997, which differs from AS 1530.4–2014. The specimens in the referenced tests considered in this assessment is FSP1132 Specimen A, FSP 1146 (Specimen A) and FSP1144 Specimen A. The variations in the test methods and their potential effect on the fire resistance performance of the referenced test specimens are discussed below.

### **Standard heating conditions**

The specified specimen heating rate in AS 1530.4–1997 is given by:

$$T_t - T_o = 345_{\log}(8t+1)$$

Where;

$T_t$  = Furnace temperature at time t, in degrees Celsius.

$T_o$  = Initial furnace temperature, in degrees Celsius, not less than 10°C nor more than 40°C.

t = Time into the test, measured from the ignition of the furnace, in minutes.

The furnace heating regime in fire resistance tests conducted in accordance with AS 1530.4–2014 follows the same trend as in AS 1530.4–1997.

### **Furnace Thermocouples**

The furnace thermocouples specified in AS 1530.4-2014 are type K, mineral insulated metal sheathed (MIMS) with a stainless steel sheath having a wire diameter less than 1.0mm and an overall diameter of 3mm. The measuring junction protrudes a minimum of 25mm from the supporting heat resistant tube.

The furnace thermocouples specified in AS 1530.4–1997 are one of the options specified in AS 1530.4-2014 and therefore meet its requirements.

### ***Furnace Pressure***

It is a requirement of AS 1530.4-2014 Section 2 that for horizontal elements, the furnace shall be operated such that a pressure of 20Pa is established at a position 100 mm below the underside of the test specimen above that of the laboratory atmosphere. The requirement of AS 1530.4-1997 is the same.

### ***Specimen size***

The specimen size requirement differs slightly between AS 1530.4-2014 and AS 1530.4-1997.

AS 1530.4-1997 requires other services except for cables and metal pipes to be mounted such that it protrudes no less than 2000mm away from the furnace and no less than 100mm into the furnace.

AS 1530.4-2014 requires plastic stack pipe penetrations services to be installed so that it projects a minimum of 500mm from the fireside of the supporting construction and 2000mm from the non-fire side.

In FSP 1132 (specimen A) and FSP 1144 (specimen A) the services projected vertically, approximately 2000-mm above the concrete slab on the non fire side and projected approximately 150-mm into the furnace chamber. The pipes were made from thermoplastics (such as PVC, HDPE) and when tested the pipe will quickly melt and its length will have no meaningful impact on the insulation, integrity, closing behaviour of the collar. As such it is considered this variation in size will not have an impact on the performance of the pipe if it was tested with the required 500mm extension into the furnace.

AS 1530.4-2014 requires plastic floor waste pipe penetrations services to be installed in a representative manner below slab with trap and is allowed to include water.

There are no specific requirements for floor wastes in AS 1530.4-1997, these are included in AS 4072.1-1992 and are not significantly different to AS 1530.4-2014.

### ***Specimen Thermocouples***

The specimen thermocouples positions for stack pipes differ slightly between AS 1530.4-2014 and AS 1530.4-1997. In addition to the thermocouples required by AS 1530.4-2014, the 1997 version requires additional thermocouples on the service (pipe) 400mm from the plane of the general surface of the penetrated element. For unlagged plastic pipes, this is never hotter than thermocouples positioned close to the separating element and as such the difference would not affect the insulation performance of the test if tested in accordance with AS 1530.4-2014.

The specimen thermocouples positions for floor waste applications differ slightly between AS 1530.4-2014 and AS 1530.4-1997 as they are not included in AS 1530.4-1997, rather they appear in AS 4072.1-1992. The requirements of AS 4072.1-1992 and those used in the reference test are the same as those required in AS1530.4-2014.

### ***Integrity Criteria***

The integrity criteria differ slightly between AS 1530.4-2014 and AS 1530.4-1997. For AS 1530.4-2014 the penetration shall be deemed to have failed the integrity when;

- a) Flaming occurs, or
- b) where gaps or fissures form in the specimen and ignite a cotton pad (defined as glowing or flaming).

The integrity criteria for AS 1530.4-1997 deems a penetration to have failed integrity upon development of cracks, fissures, or other openings through which flames or hot gases can pass.

Upon review of the results of the services considered in this report and tested in FSP 1132 Specimen A and FSP 1144 Specimen A, it was apparent that cracks or fissures or other openings did not develop around the pipe penetrations during the duration of the test that would warrant the application of the cotton pad at the penetration seals. Based on the above the differences in the integrity criteria were not relevant to the referenced tests.

It is confirmed that a cotton pad was not applied to FSP 1146 Specimen A and as such special consideration is required to verify if a cotton pad was required during the test.

In addition, testing experience with application of cotton pad in the first 5 minutes of a test with plastic pipes is that the furnace is filled with combusted plastic and the hot gasses emanating from the floor wastes at this time are soot laden and low in oxygen. This invariably results in the cotton pad becoming covered in soot and not igniting.

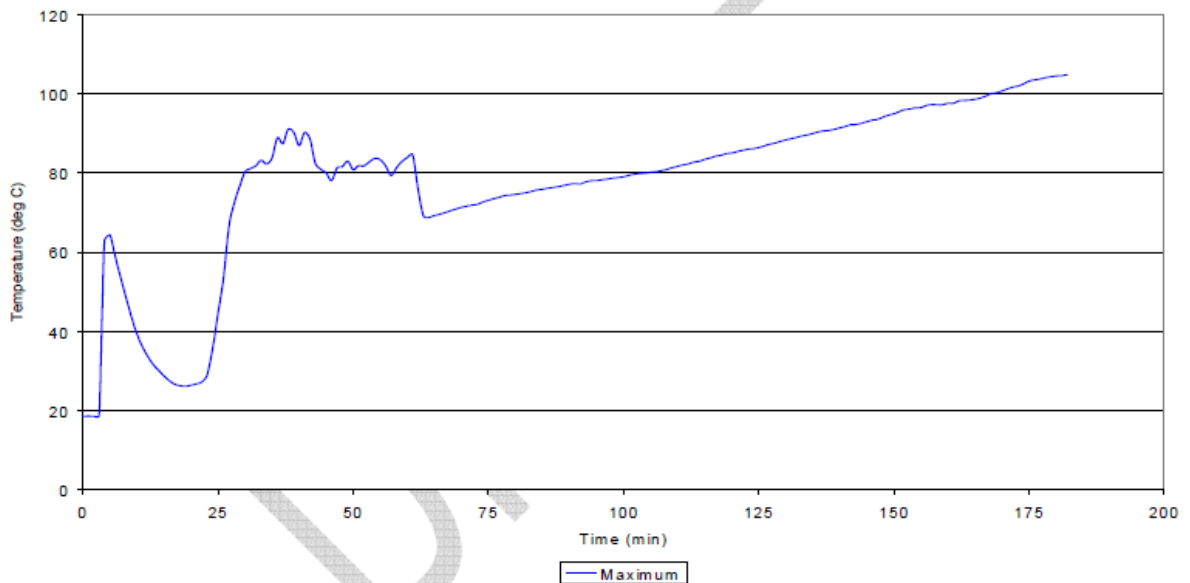


Fig. 2 – SPECIMEN TEMPERATURE  
Maximum temperature associated with Penetration A.

With reference to the temperatures measure on the floor grate up to 5 minutes it can be seen the temperatures only reached 60°C then dropped as the collar closed.

Based on the relatively low temperatures measured up to collar closer and the relatively early closure of the collar it is considered that had cotton pads been available to be applied, they would not have been applied before collar closure.

The temperatures measured on the grate for the 180 minute duration of the test were below 100C and there were no observations of an increase in smoke emanating from Specimen A for the 182 minute test duration.

On the basis of the above an in absence of formation of gaps after 5 minutes and flaming, it is considered the integrity performance of the FSP 1146 Specimen A would not be different if tested in accordance with AS 1530.4-2014.

### ***Insulation Criteria***

The insulation criteria for stack pipes specified in AS 1530.4–1997 is the same as in AS 1530.4-2014.

The insulation criteria for floor wastes specified in AS 4072.2-1992 and that undertaken in FSP 1146 Specimen A was the same as that specified in AS 1530.4-2014.

### ***Application of Test Data***

On the basis of the discussion above, it is considered that for the specimens referenced in this assessment the differences in the test methods will not change the fire resistance level if tested in accordance with AS 1530.4-2014.

### A.3. The relevance of tests in accordance with AS 1530.4-2005 to AS 1530.4-2014

For the tests referenced in Table 1 that were conducted in accordance with AS 1530.4– 2005, test method differs slightly from AS 1530.4–2014. These variations and their potential effect on the fire resistance performance of the referenced test specimens are discussed below.

#### ***Standard heating conditions***

The furnace heating regime in fire resistance tests conducted in accordance with AS 1530.4- 2014 follows the same trend to that in AS 1530.4-2005.

The parameters outlining the accuracy of control of the furnace temperature in AS 1530.4-2014 and AS 1530.4-2005 are not appreciably different.

#### ***Furnace Pressure***

The furnace pressure conditions for single and multiple penetrations sealing systems in AS 1530.4-2005 and AS 1530.4-2014 are not appreciably different. The parameters outlining the accuracy of control of the furnace pressure in AS 1530.4-2014 and AS 1530.4-2005 are not appreciably different.

#### ***Performance Criteria***

For penetration test in accordance with the Section 10 the failure criteria for integrity in AS 1530.4-2014 and AS 1530.4-2005 are not appreciably different.

#### ***Insulation***

The positions of the thermocouples and failure criteria for insulation in AS 1530.4-2014 and AS 1530.4-2005 are not appreciably different.

#### ***Application of Test Data***

Based on a detailed review of the minor variations in the testing requirements for Section 10 between the 2005 and 2014 versions it is considered that the tests referenced in Table 1 that were conducted in accordance with AS 1530.4–2005 would not have a different integrity or insulation performance when tested in accordance with AS 1530.4-2014.

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