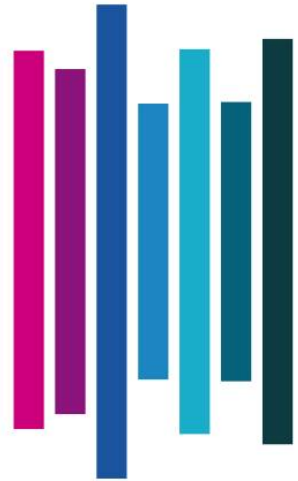


EXOVA
Warringtonfire



TEST REPORT

Fire resistance test in accordance with AS 1530.4- 2014 of 15-off pipes in a 103mm thick fire resistance wall system protected by various 3M fire protection systems.

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1 CONSTRUCTION DETAILS

TEST ASSEMBLY

The test assembly comprised of 15 different penetration systems penetrating through a nominal 1600mm wide x 1600mm high x 103mm thick wall system. One of these is contained in this report.

The wall was restrained at all edges.

TEST SPECIMENS

The wall system consisted of a 51mm thick 0.5BMT steel frame system clad with 2 layers of 13mm Gyprock Fyrchek fire-rated plasterboard on both the exposed and unexposed sides.

The penetration system consisted of the services as described below.

The full description of the specimen is provided in Figures A1.1 to A1.3 and the 'Schedule of Components' in Section 2.

Service	Services	Main fire stopping system	Core Hole size (mm)
A	25mm uPVC conduit	IC15WB+ Sealant	44

ASSEMBLY AND INSTALLATION METHODS

The wall system was constructed on the 5th October 2016.

ORIENTATION

The assembly was asymmetric due to the services being supported on the unexposed side only and the pipes being capped on the fire side except for service C which was installed asymmetrically.

2 SCHEDULE OF COMPONENTS

Item	Description	
	SERVICE A	
1	Pipe System	
	Product name	25 mm diameter uPVC conduit
	Pipe dimensions	Outside Diameter (OD) 26.7mm (measured) × 1.8 mm thick (measured) pipe that protruded nominally 530 mm on the exposed side and 2000 mm on the unexposed side. The pipe was capped on the exposed side to a depth of approximately 30 mm using KAO wool and sealant.
	Pipe Support	The pipe was supported on the unexposed side with metal pipe clamps at approximately 450 mm and 1500 mm from the unexposed face.
	Core hole diameter	Ø44 mm
2	Primary Penetration Protection	
	Product name	3M Fire Barrier Sealant IC 15WB+
	Installation	The sealant was applied in the annular gap (9 mm) between pipe and aperture on both sides of the separating element to a depth of 26 mm. See Figure A1.3 in Appendix 1 for more details.
Separating Element		
3	Product	13mm Gyprock Fyrcek fire-rated plasterboard
	Size	26 mm thick wall incorporating 2-off 13 mm thick sheets with 51 mm wide steel studs and 51 mm deflection head.
	Density	833 kg/m ³
	Specification	Perimeter studs and tracks were fixed to the concrete blockwork using Ø6.5mm × 55mm Sleeve Anchor Hex Head fasteners. Inner sheets were fixed to metal framing using 6g × 25mm, Bugle Head, Needle Point, Fine Thread, Zinc-Yellow screws at 300mm nominal centres. Outer sheets were fixed to metal framing using 6g × 40mm Bugle Head Needle Point Fine Thread Zinc-Yellow screws at nominal 300mm centres. Rockwool were installed in the spacing between the flanges of the studs and noggings.

3 TEST PROCEDURE

STATEMENT OF COMPLIANCE

The test was performed in accordance with the requirements of AS 1530.4-2014 Sections 2 & 10 subject to the variations below.

VARIATIONS TO TEST METHOD

None

PRE-TEST CONDITIONING

The construction of the specimens was finished on the 5th of October 2016 and were tested on 28th of October 2016. During this period the test specimens were subject to normal laboratory temperatures and relative humidity conditions.

SAMPLING / SPECIMEN SELECTION

The laboratory was not involved in the sampling or selection of the test specimen for the fire resistance test.

AMBIENT TEMPERATURE

The ambient temperature at the start of the test was 21°C and did not vary significantly throughout the duration the test.

TEST DURATION

The test duration was 180 minutes.

INSTRUMENTATION AND EQUIPMENT

The instrumentation was provided in accordance with AS 1530.4-2014 and as detailed below:
The furnace temperature was measured by 4-off mineral insulated metal sheathed Type K thermocouples with wire diameters not greater than 1mm and overall diameter of 3mm with the measuring junction insulated from the sheath. The thermocouples protruded a minimum of 25mm from steel supporting tubes.

The non-fire side specimen temperatures were measured by Type K thermocouples with wire diameters less than 0.5mm soldered to 12mm diameter x 0.2mm thick copper discs covered by 30mm x 30mm x 2.0 mm inorganic insulating pads. The thermocouple positions are described in Table A4.1, and are shown on Figure A4.1 in Appendix 4.

A roving thermocouple was available to measure temperatures at positions that appeared hotter than the positions monitored by the fixed thermocouples.

The furnace pressure was measured at the mid-height of lowest service.

Cotton pads were available during the test to assess the performance under the criteria for integrity.

4 TEST MEASUREMENTS

FURNACE TEMPERATURE AND PRESSURE MEASUREMENTS

Furnace temperature and pressure data are provided in Figure A5.1 and Table A5.1 in Appendix 5.

SPECIMEN TEMPERATURES

Specimen temperature data is provided in A 5.3 and Table A5.2 in Appendix 5.

OBSERVATIONS

A table that includes observations of the significant behaviour of the specimen and details of the occurrence of the various performance criteria specified in AS 1530.4-2014 is provided in Appendix 2. Photographs of the specimen are included in Appendix 6.

5 TEST RESULTS

The specimens listed below achieved the following performance when tested in accordance with AS 1530.4-2014, Section 2 & 10 subject to the variations listed in Section 3.

Service	Criteria	Result
A	Structural Adequacy	Not applicable
	Integrity	No failure at 180 minutes
	Insulation	Failure at 114 minutes
	FRL	-/180/90

6 APPLICATION OF TEST RESULTS

TEST LIMITATIONS

The results of this fire test may be used to directly assess fire hazard, but it should be recognized that a single test method will not provide a full assessment of fire hazard under all fire conditions. The results only relate to the behaviour of the specimen of the element of the construction under the particular conditions of the test; they are not intended to be the sole criteria for assessing the potential fire performance of the element in use nor do they necessarily reflect the actual behaviour in fires.

VARIATIONS FROM THE TESTED SPECIMENS

This report details the methods of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the general procedure outlined in AS1530.4. Any significant variation with respect to size, constructional details, loads, stresses, edge or end conditions, other than those allowed under the field of direct application in the relevant test method, is not addressed by this report. It is recommended that any proposed variation to the tested configuration other than as permitted under the field of direct application specified in Appendix 3 should be referred to the test sponsor in the first instance to obtain appropriate documentary evidence of compliance from Exova Warringtonfire Aus Pty Ltd or another Registered Testing Authority.

UNCERTAINTY OF MEASUREMENT

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

APPENDIX 1 DRAWINGS OF TEST ASSEMBLY

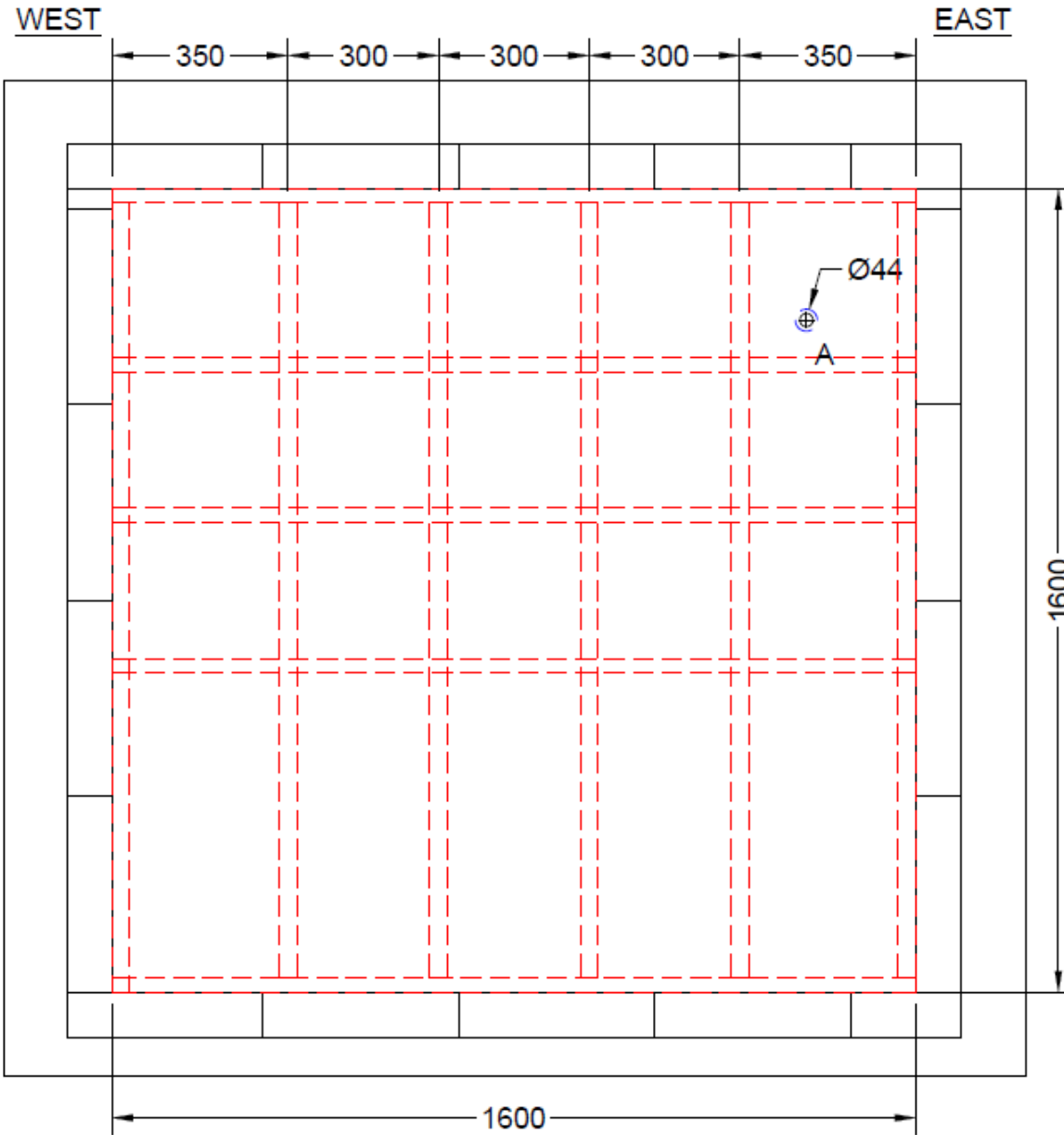


Figure A1.1: Elevation of Test Specimen (Core Hole)

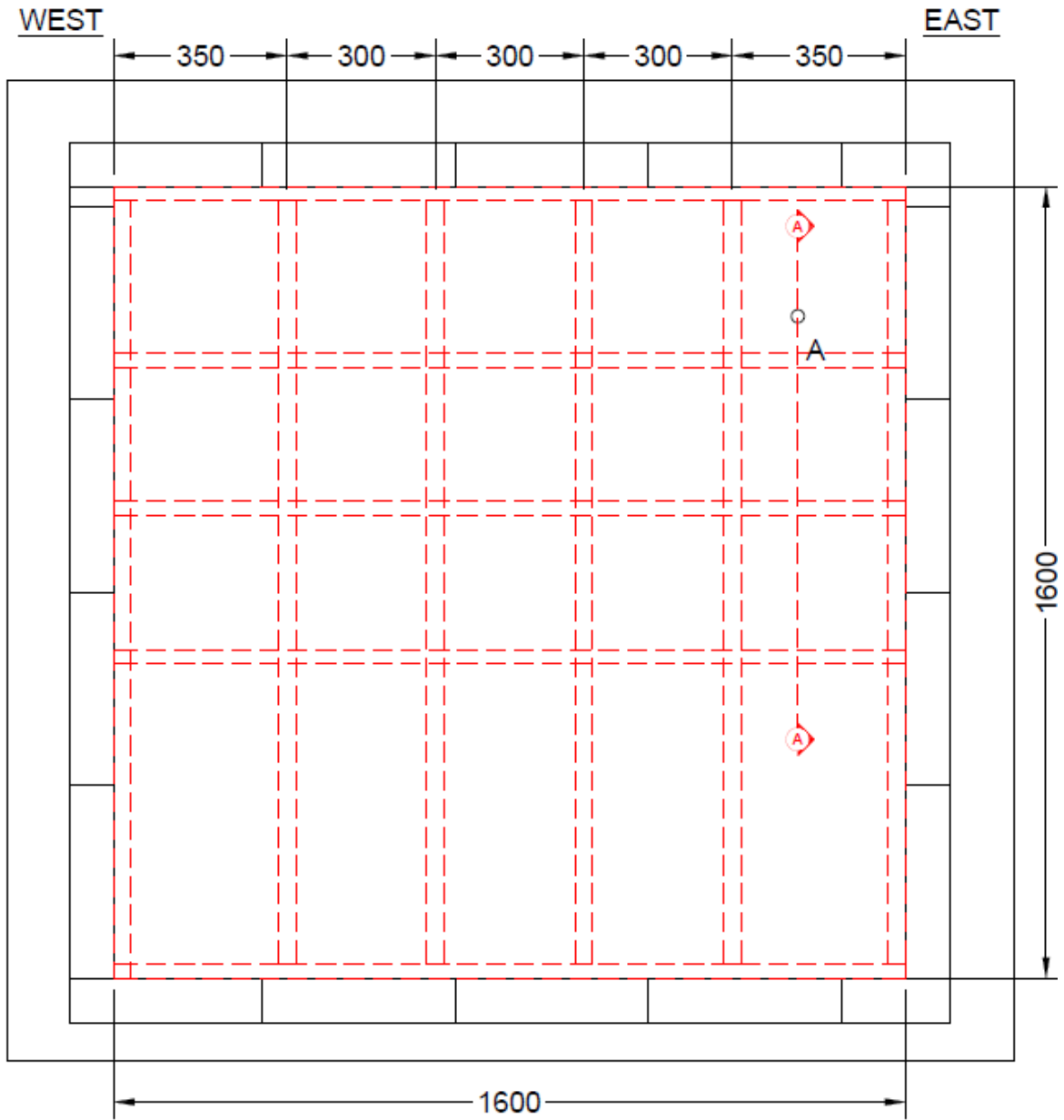


Figure A1.2: Elevation of Test Specimen (Plan)

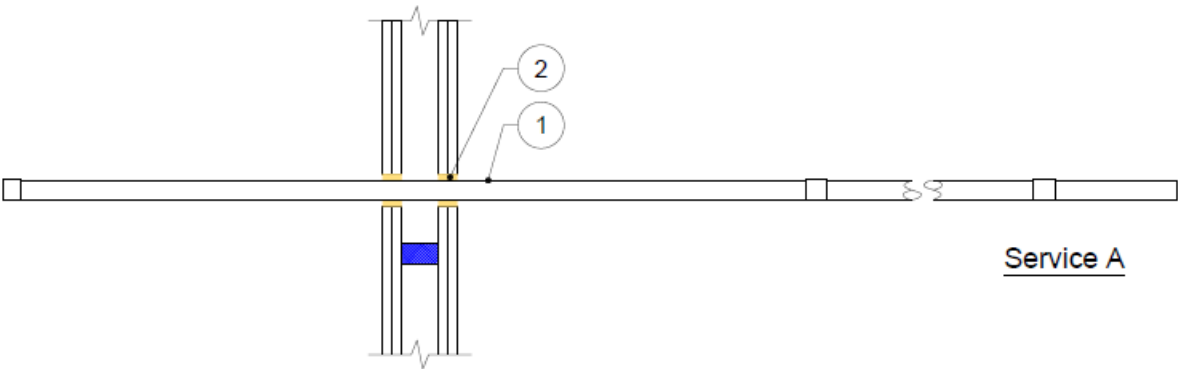


Figure A1.3: Vertical Cross-Section A-A

APPENDIX 2 TEST OBSERVATIONS

The following include observations of the significant behaviour of the specimen.

Time		Observations
min	sec	
Service A		
0	00	Fire resistance test commenced and the ambient temperature was approximately 21°C
25	00	Smoke emission appeared from the interface between the wall and the pipe.
26	30	The pipe had softened.
30	00	Specimen continued to maintain integrity and insulation in accordance with AS1530.4-2014.
31	39	The bottom part of the pipe was charring.
44	12	Dark colour liquid was leaking from the end of the pipe.
60	00	Specimen continued to maintain integrity and insulation in accordance with AS1530.4-2014.
69	25	The pipe had deformed.
114	05	TC 012 on the conduit, 25mm away from the wall recorded a temperature of 202°C. Failure of insulation in accordance with AS 1530.4-2014 clause 2.13.3(b), where the maximum temperature of Thermocouple TC 012 exceeded the initial temperature by more than 180°C.
120	00	Specimen continued to maintain integrity in accordance with AS1530.4-2014.
180	00	Specimen continued to maintain integrity in accordance with AS1530.4-2014.
181	00	Test stopped at the request of the sponsor.

APPENDIX 3 DIRECT FIELD OF APPLICATION

A 3.1 GENERAL

AS 1530.4- 2014 indicates that the results of the fire test contained in the test report are directly applicable without reference to the testing authority to similar constructions where one or more of the changes have been made:

A 3.2 SEPARATING ELEMENTS

Results obtained for sealing systems in various types of masonry and concrete construction may be applied as follows:

- a) For elements manufactured from similar types of concrete or masonry, the results of the prototype test may be applied to materials of density within $\pm 15\%$ of the tested specimen. For greater variations, the opinion of a registered testing authority shall be obtained.
- b) Test results obtained in conjunction with hollow concrete blocks may be used in a solid concrete element of the same overall thickness. The reverse does not apply.
- c) Results obtained from framed wall systems may be applied to the performance of a system in concrete, masonry or solid gypsum blocks of greater or equal thickness to that of the tested prototype. The reverse does not apply.
- d) Results obtained from framed wall systems may be applied to similar walls having studs of the same material with sizes greater than the tested prototype.
- e) Results obtained from a prototype test may be applied to framed wall systems of similar construction but having thicker facings of the same material applied to the studs.

A 3.3 PLASTICS PIPES

A 3.3.1 General

In addition to the requirements of Clause 10.12.2 of standard, test results may be directly applied to masonry and concrete elements thicker than the tested prototype when installed in accordance with Figure 10.12.5.1 (AS 1530.4).

Results obtained from a particular test shall not be applied to plastics pipes of different diameters, wall thicknesses or material types.

Results obtained from tests on penetrations through vertical separating elements shall not be used to assess performance in horizontal elements, and vice versa.

As penetration seals for plastics pipes are dependent for activation upon exposure to fire conditions, they shall always be installed with the same orientation and fire exposure as was established in the fire-resistance test.

A 3.3.2 Services not perpendicular to the fire separation

Penetrations not perpendicular to the plane of the element are acceptable, provided the fire-stopping system has similar exposure and dimensions to the tested prototype.