



TEST REPORT

An ad-hoc fire resistance test in general
accordance with AS 1530.4-2014 Section 2
and 12 of five pipe support systems protected
by Product X.

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1 CONSTRUCTION DETAILS

TEST ASSEMBLY

The test assembly comprised a nominal 1200mm wide × 1760mm long × 120mm thick concrete slab with pipe support frame screw fixed on the exposed side.

TEST SPECIMENS

Five different pipe support systems were then fixed to the centre beam of the pipe support frame at nominally 110mm centres. The pipe support system frame was not part of the protection system and it was insulated during the test.

The full description of the specimen is provided in Figures A1.1 to A1.5 and the 'Schedule of Components' in Section 2.

Pipe Support System	Pipe Support System Detail	Weight (kg)	Fire protection system detail
A	M12 Threaded Rod with Ø150mm pipe hanger.	100	Product X
B	M12 Threaded Rod	-	Product X
C	M12 Threaded Rod with Ø100mm pipe hanger.	64	Product X
D	M12 Threaded Rod	-	Product X
E	M12 Threaded Rod with Ø100mm pipe hanger.	6.5	Product X

ASSEMBLY AND INSTALLATION METHODS

The pipe support systems were constructed and installed by Diverse Fire Group on to the support frame before being shipped and delivered to EWFA on the 01 February 2017. The pipe support systems were then bolted to the concrete slab by representatives of EWFA.

ORIENTATION

The assembly was asymmetric due to the pipe support systems being supported on the exposed side.

2 SCHEDULE OF COMPONENTS

Item	Description	
SERVICE A		
1	Product	M12 Threaded Rod
	Material	Mild Steel
	Size	M12 x 380mm long
	Installation	One (1) per service, screwed fixed into the structure and secured in place with a M12 Hex Nut. A pipe hanger was attached at the bottom of the threaded rod and was secured to the threaded rod with two (2) M12 hex nut on either side of the pipe hanger.
2	Product	EF 500 Pear Band for Steel Pipe
	Material	Mild Steel
	Size	Pipe NB – Ø150mm
	Installation	One (1) screw fixed to the M12 threaded rod with (2) nuts, one on each side.
3	Product	Reinforcement Spring
	Material	Mild Steel
	Size	Ø3mm x 320mm long. Winding diameter: 35mm,
	Installation	Wrapped around the threaded rod and the top part of the pear shaped pipe hanger.
4	Product	Pipe
	Material	Grade 250
	Size	Ø150mm
	Installation	Installed across the pipe hanger with two sets of weights on each side of the pipe.
5	Product	M12 Hex Nut
	Material	Mild Steel
	Size	M12
	Installation	One (1) on the underside of the structure. Two (2) on either side of the pipe hanger.
6	Product	Location Clip
	Material	0.6mm Galvanised Sheet
	Size	Ø48mm overall size
	Installation	Installed just below the top hex nut.
7	Product	Weights
	Material	Mild Steel Grade 300
	Total Weight	100kg
	Installation	Welded to the pipes at each end to simulate the weight of the extended pipe.
8	Fire Protection	
	Product name	Product X

Item	Description	
	Installation	The fire protection was cast around the threaded rod using a Ø55mm x 500mm long PVC tube mould, while the fire protection material was cast around the pipe hanger using a 230mm wide x 110mm deep x 2mm thick mild steel sheet mould (provided by client).
SERVICE B		
9	Product	M12 Threaded Rod
	Material	Mild Steel
	Size	M12 x 400mm long
	Installation	One (1) per service, screwed fixed into the structure and secured in place with a M12 Hex Nut.
10	Product	M12 Hex Nut
	Material	Mild Steel
	Size	M12
	Installation	One (1) per threaded rod, on the underside of the structure.
11	Fire Protection	
	Product Name	Product X
	Installation	The fire protection was cast into a Ø55mm PVC pipe mould for the first 280mm of the threaded rod from the underside of the structure. The remaining threaded rod was protected by kao wool (not part of the specimen)
SERVICE C		
12	Product	M12 Threaded Rod
	Material	Mild Steel
	Size	M12 x 380mm long
	Installation	One (1) per service, screwed fixed into the structure and secured in place with a M12 Hex Nut. A pipe hanger was attached at the bottom of the threaded rod and was secured to the threaded rod with two (2) M12 hex nut on either side of the pipe hanger.
13	Product	EF 500 Pear Band for Steel Pipe
	Material	Mild Steel
	Size	Pipe NB – Ø100mm
	Installation	One (1) screw fixed to the M12 threaded rod with (2) nuts, one on each side.
14	Product	Reinforcement Spring
	Material	Mild Steel
	Size	Ø3mm x 320mm long. Winding diameter: 35mm,
	Installation	Wrapped around the threaded rod and the top part of the pear shaped pipe hanger.
15	Product	Pipe
	Material	Grade 250
	Size	Ø100mm
	Installation	Installed across the pipe hanger with two sets of weights on each side of the pipe to simulate the weight of the extended pipe.
16	Product	M12 Hex Nut

Item	Description	
	Material	Mild Steel
	Size	M12
	Installation	One (1) on the underside of the structure. Two (2) on either side of the pipe hanger.
17	Product	Location Clip
	Material	0.6mm Galvanised Sheet
	Size	Ø48mm overall size
	Installation	Installed just below the top hex nut.
18	Product	Weights
	Material	Mild Steel Grade 300
	Total Weight	64 kg
	Installation	Welded to the pipes at each end to simulate the weight of the extended pipe.
19	Fire Protection	
	Product name	Product X
	Installation	The fire protection was cast around the threaded rod using a Ø55mm x 500mm long PVC tube mould, while the fire protection was cast around the pipe hanger using a 230mm wide x 90mm deep x 2mm thick mild steel sheet mould (provided by client).
SERVICE D		
20	Product	M12 Threaded Rod
	Material	Mild Steel
	Size	M12 x 380mm long
	Installation	One (1) per service, screwed fixed into the structure and secured in place with a M12 Hex Nut.
21	Product	M12 Hex Nut
	Material	Mild Steel
	Size	M12
	Installation	One (1) per threaded rod, on the underside of the structure.
22	Fire Protection	
	Product Name	Product X
	Installation	The fire protection was cast into a Ø55mm PVC pipe mould for the first 265mm of the threaded rod from the underside of the structure. The remaining threaded rod was protected by kao wool (not part of the specimen)
SERVICE E		
23	Product	M12 Threaded Rod
	Material	Mild Steel
	Size	M12 x 200mm long
	Installation	One (1) per service, screwed fixed into the structure and secured in place with a M12 Hex Nut. A pipe hanger was attached at the bottom of the threaded rod and was secured to the threaded rod with two (2) M12 hex nut on either side of the pipe hanger.

Item	Description	
24	Product	EF 500 Pear Band for Steel Pipe
	Material	Mild Steel
	Size	Pipe NB – Ø100mm
	Installation	One (1) screw fixed to the M12 threaded rod with (2) nuts, one on each side.
25	Product	Reinforcement Spring
	Material	Mild Steel
	Size	Ø3mm x 180mm long. Winding diameter: 35mm
	Installation	Wrapped around the threaded rod and the top part of the pear shaped pipe hanger.
26	Product	Pipe
	Material	Grade 250
	Size	Ø100mm
	Installation	Installed across the pipe hanger with two sets of weights on each side of the pipe.
27	Product	M12 Hex Nut
	Material	Mild Steel
	Size	M12
	Installation	One (1) on the underside of the structure. Two (2) on either side of the pipe hanger.
28	Product	Location Clip
	Material	0.6mm Galvanised Sheet
	Size	Ø48mm overall size
	Installation	Installed just below the top hex nut.
29	Product	Weights
	Material	Mild Steel Grade 300
	Total Weight	6.5 kg
	Installation	Welded to the pipes at each end to simulate the weight of the extended pipe.
30	Fire Protection	
	Product name	Product X
	Installation	The fire protection was cast around the threaded rod using a Ø55mm x 500mm long PVC tube mould, while the fire protection was cast around the pipe hanger using a 230mm wide x 90mm deep x 2mm thick mild steel sheet mould (provided by client).

3 TEST PROCEDURE

STATEMENT OF COMPLIANCE

The test was performed in general accordance with the requirements of AS 1530.4-2014 Sections 2 & 12 and subject to the variations below.

VARIATIONS TO TEST METHOD

The pressure was 1Pa above the limits prescribed in the standard during the 10-15 minute period. The pressure and temperature were within the limits for rest of the test duration and due to the nature of the specimen this overpressure is unlikely to have affected the outcome of the test.

The specimens were pre-assembled so thermocouples could not be installed on the pipe support brackets on specimens A, C, and E. Instead, thermocouples were peened into the exposed end of the rod on specimen B and D, with the bare end subsequently covered with ceramic fibre wool.

PRE-TEST CONDITIONING

The construction of the specimen was delivered on the 1 February 2017 and was tested on 13 February 2017. During this period the test specimen was 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 23°C and varied between 23°C and 26°C during the test.

TEST DURATION

The test duration was 70 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 exposed side specimen temperature were measured by Type K MIMS thermocouples with 1.5mm diameter. The thermocouple positions are described in Table A3.1, and are shown on Figure A3.1 in Appendix 3.

The furnace pressure was measured at 100mm below the concrete slab.

4 TEST MEASUREMENTS

FURNACE TEMPERATURE AND PRESSURE MEASUREMENTS

Furnace temperature and pressure data are provided in Figure A4.1 and Table A4.1 in Appendix 4.

SPECIMEN TEMPERATURES

Specimen temperature data is provided in A 4.3 and **Error! Reference source not found.** in Appendix 4.

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 5.

5 TEST RESULTS

The specimens listed below achieved the following performance when tested in accordance with AS 1530.4-2014, Section 2 & 12 subject to the variations listed in Section 3.

Service	Heating regime to	Design Capacity	Time to operational failure	Average Temp. at failure °C	Max Temp. at failure °C	Mode of failure
A	AS 1530.4	100kg	No Failure	Not Measured	Not Measured	-
B	AS 1530.4	-	No Load	No Failure. 500°C @ 29:30	No Failure	-
C	AS 1530.4	65kg	No Failure	Not Measured	Not Measured	-
D	AS 1530.4	-	No Load	No Failure. 500°C @ 25:15	No Failure	-
E	AS 1530.4	6.5kg	No Failure	Not Measured	Not Measured	-

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 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 SPECIMEN

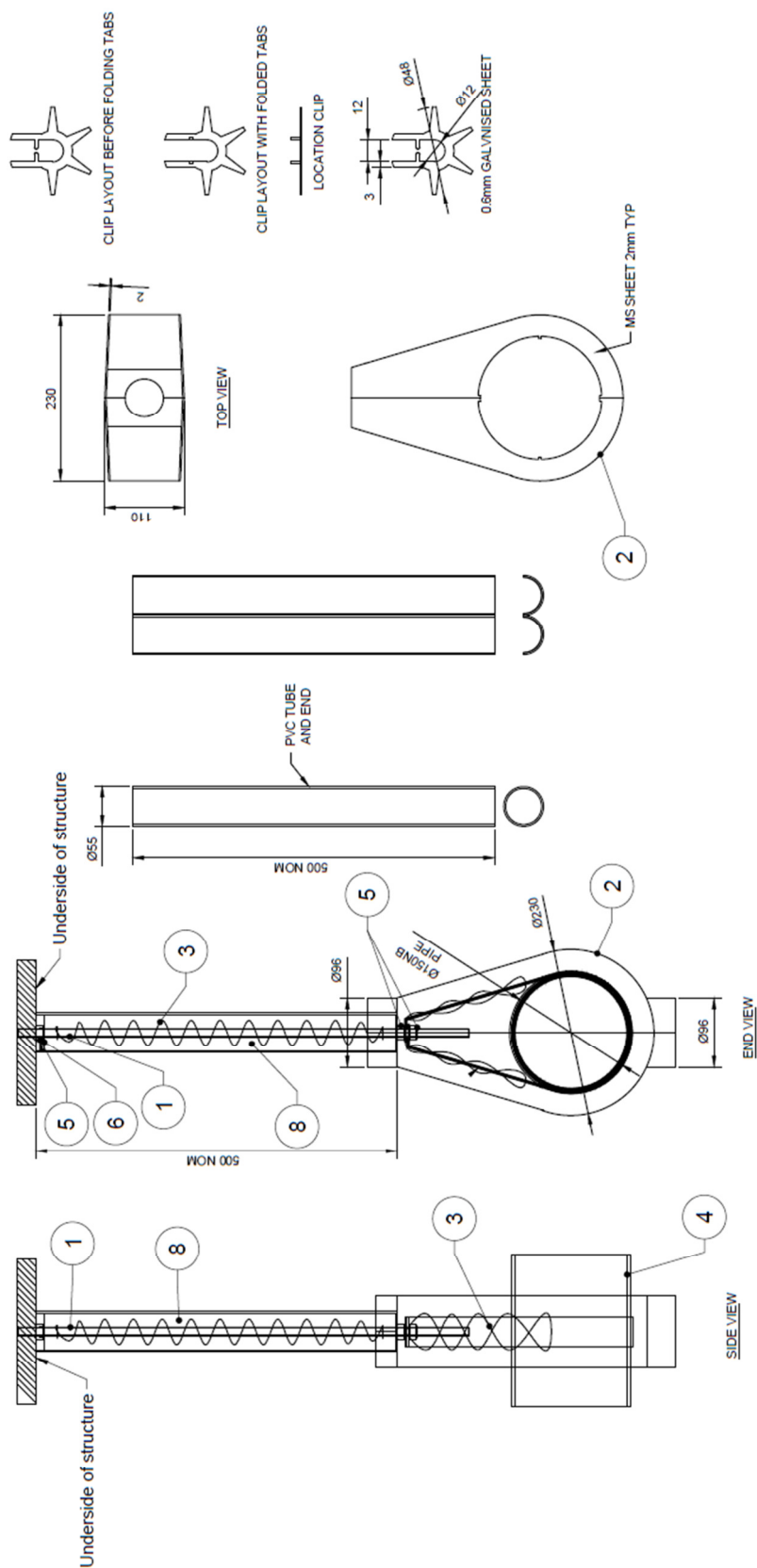


Figure A1.1: Specimen A (Provided by client)

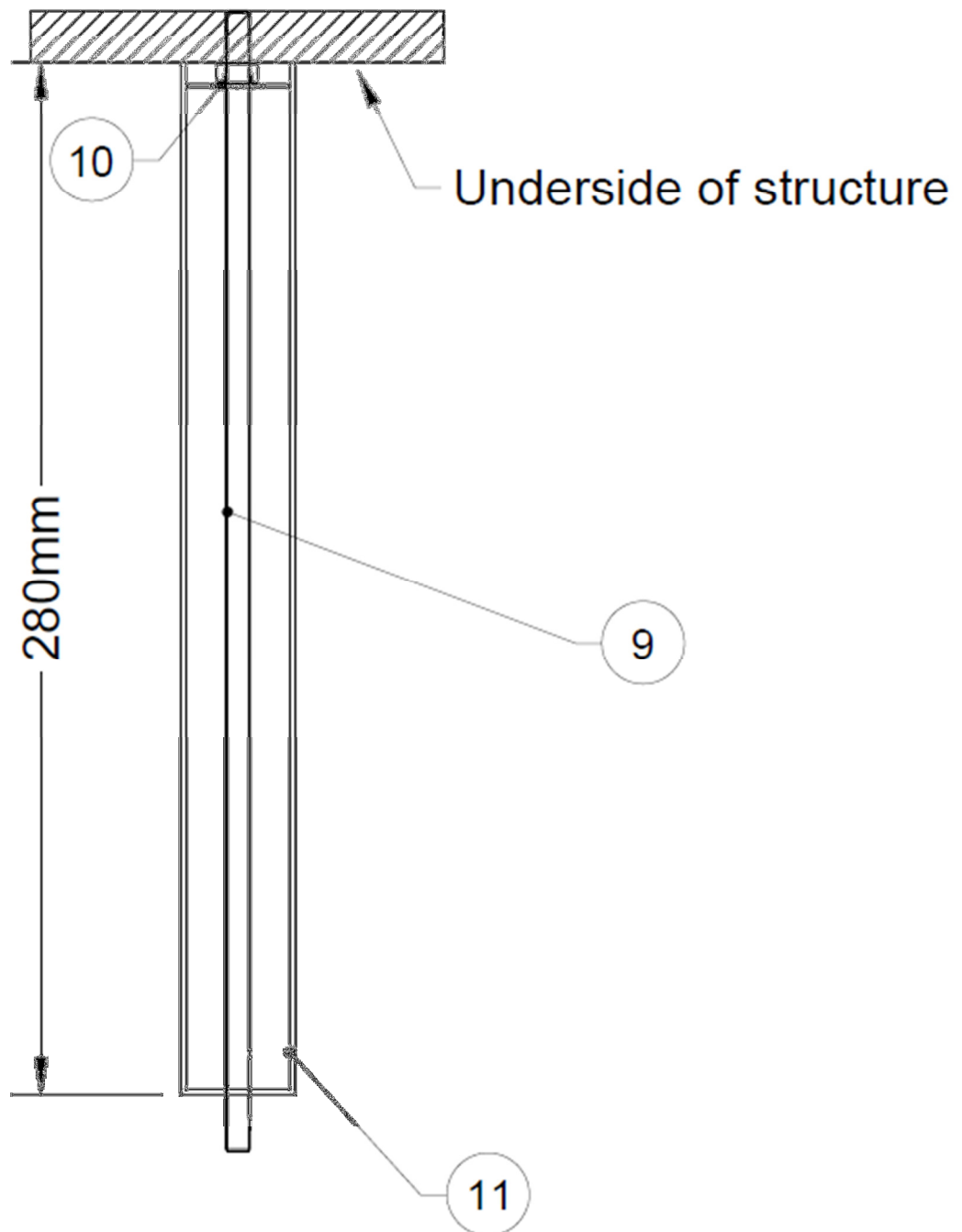


Figure A1.2: Specimen B

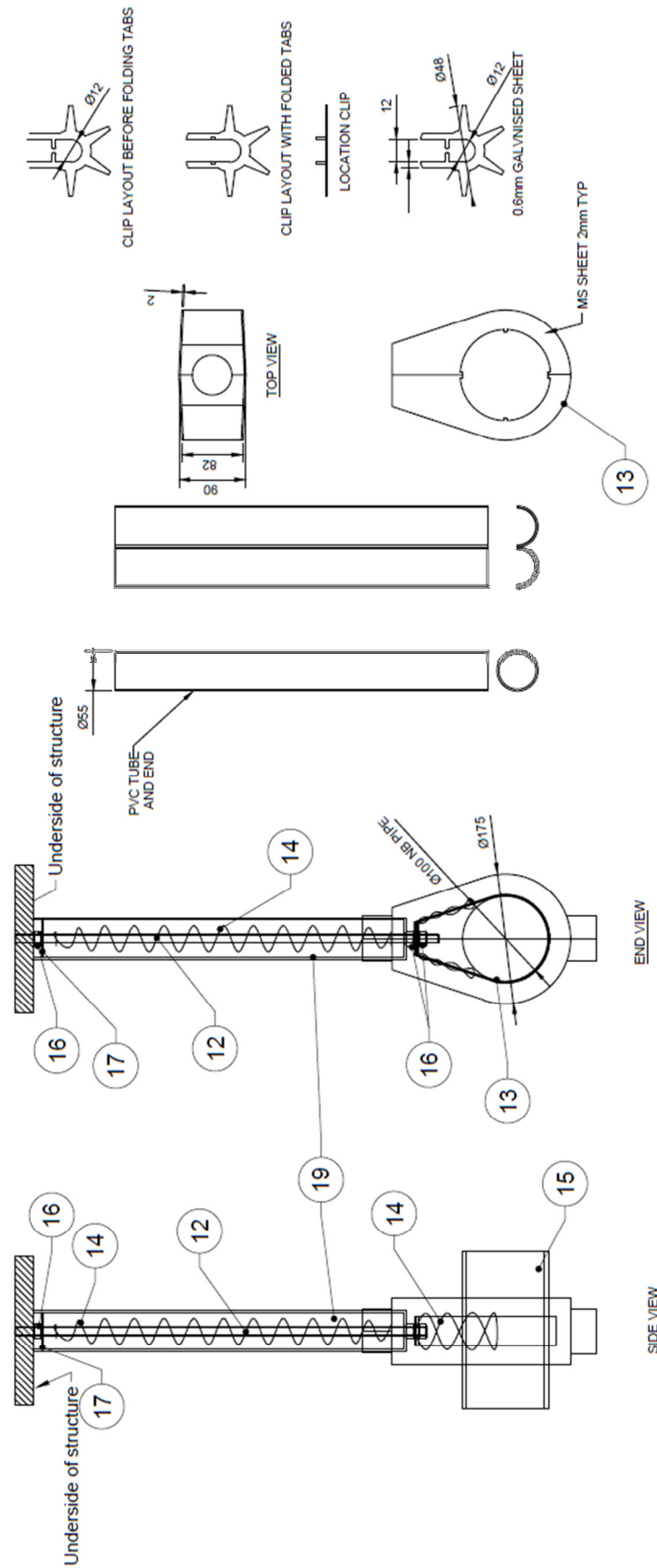


Figure A1.3: Specimen C (Provided by client)

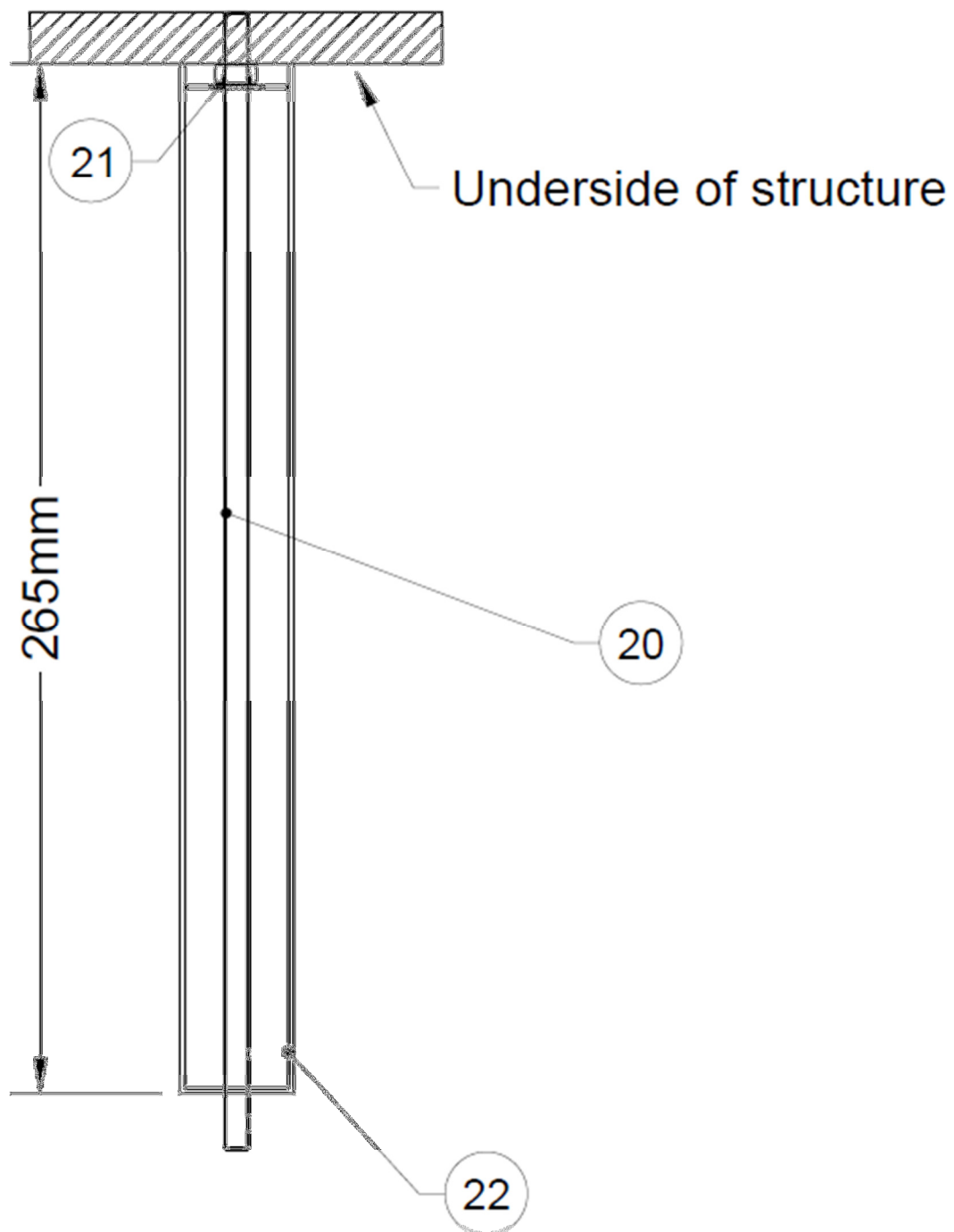


Figure A1.4: Specimen D

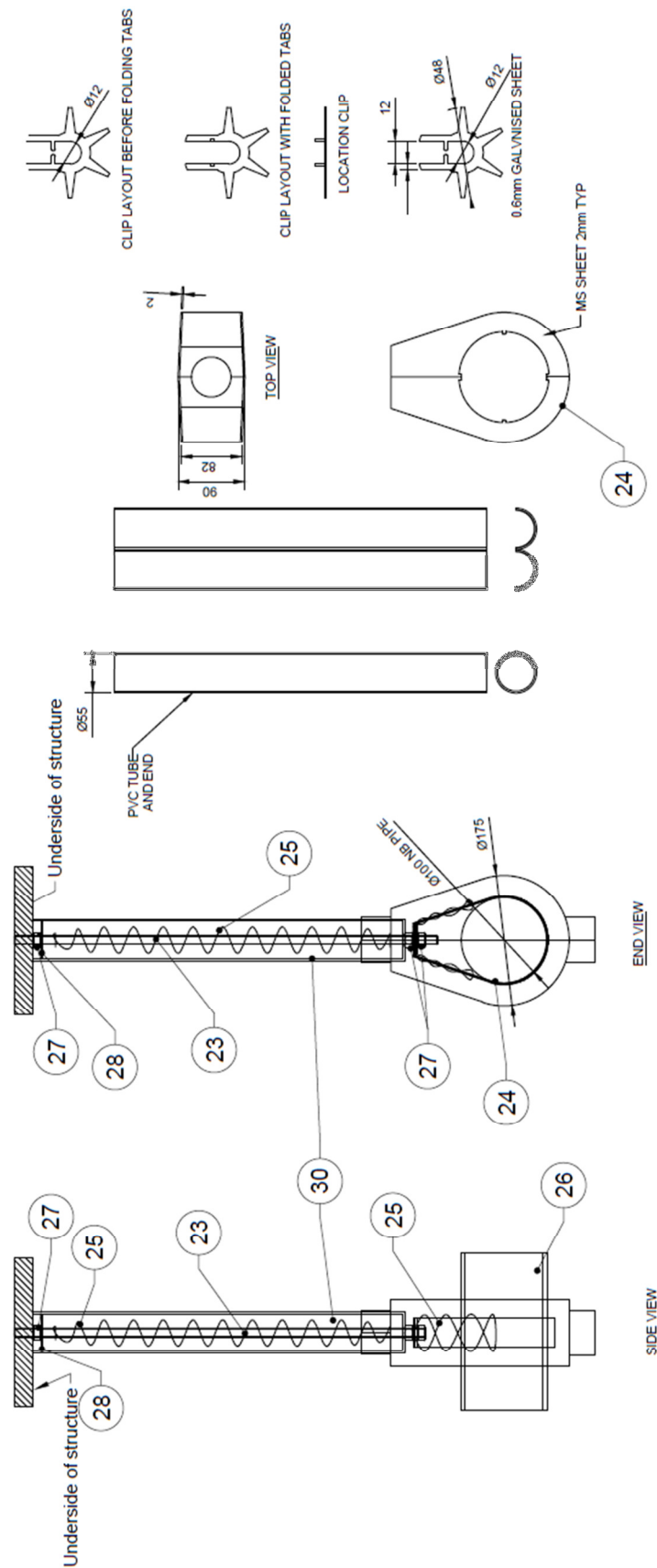


Figure A1.5: Specimen E (Provided by Client)

APPENDIX 2 TEST OBSERVATIONS

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

Time		Observations
min	sec	
0	00	Fire resistance test commenced and the ambient temperature was approximately 23°C
25	15	Thermocouple the on Specimen D rod reached 500°C.
29	30	Thermocouple the on Specimen B rod reached 500°C.
30	00	No signs of damage to the pipe support systems. There is no significant deflection in the specimen
45	00	No signs of damage to the pipe support systems. There is no significant deflection in the specimen
60	00	No signs of damage to the pipe support systems. There is no significant deflection in the specimen
70	00	Test terminated.

Post Test Observation:

- There appears to be cracks on the pipe support systems containing large masses.
- The three loaded specimens (A, C and E) continued to

APPENDIX 3 INSTRUMENTATION POSITIONS

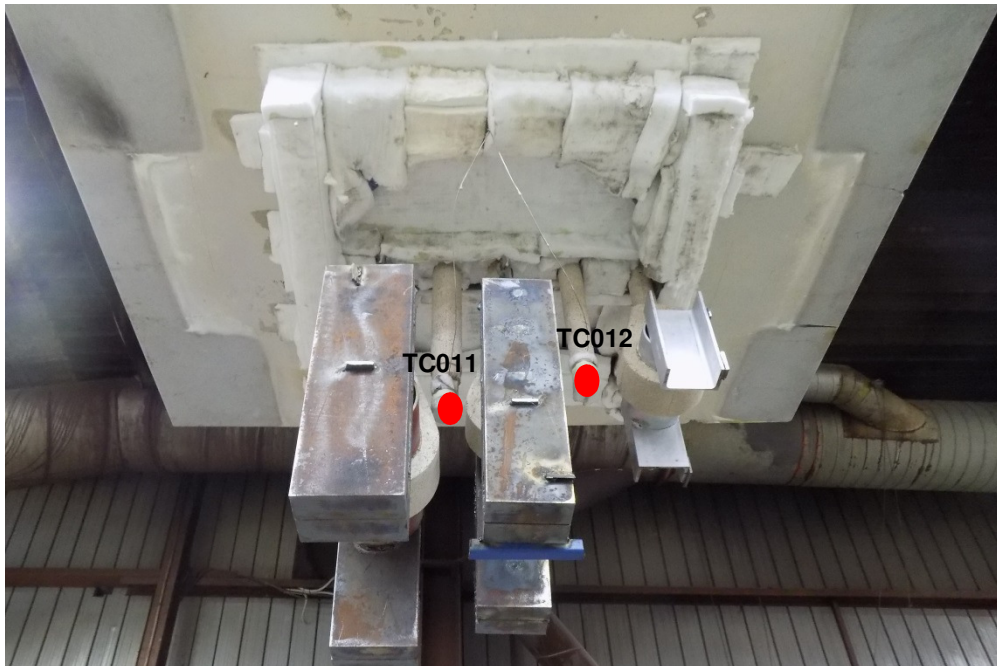


Figure A3.1: Internal thermocouple locations

Table A3.1: Thermocouple Locations

Service	T/C No.	Description
B	011	At the bottom of the pipe support.
D	012	At the bottom of the pipe support.

APPENDIX 4 TEST DATA

A 4.1 FURNACE TEMPERATURE

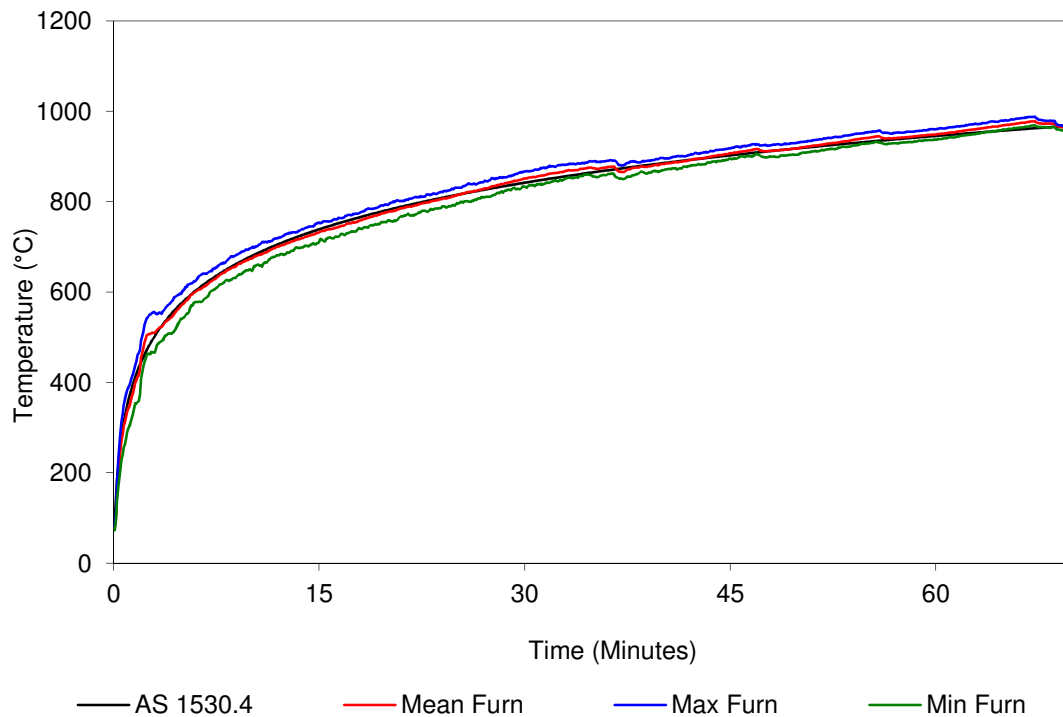


Figure A4.1: Furnace Temperatures vs. Time

A 4.2 FURNACE PRESSURE

The furnace pressure was measured 100mm below the slab.

Table A4.1: Pressure

Time (minutes)	Pressure (Pa) Avg.
5-10	22
10-15	24
15-20	23
20-25	21
25-30	21
30-35	20
35-40	20
40-45	21
45-50	21
50-55	22
55-60	20
60-65	21
65-70	19

A 4.3 SPECIMEN TEMPERATURES

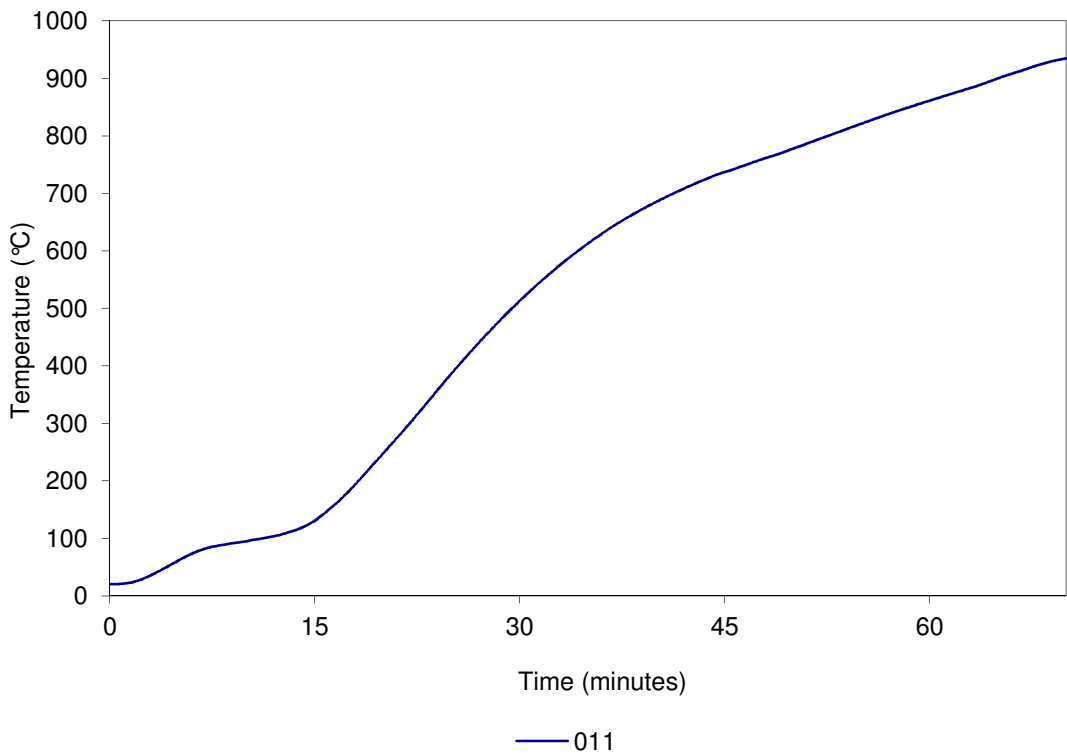


Figure A4.2: Service B. Temperatures vs. time

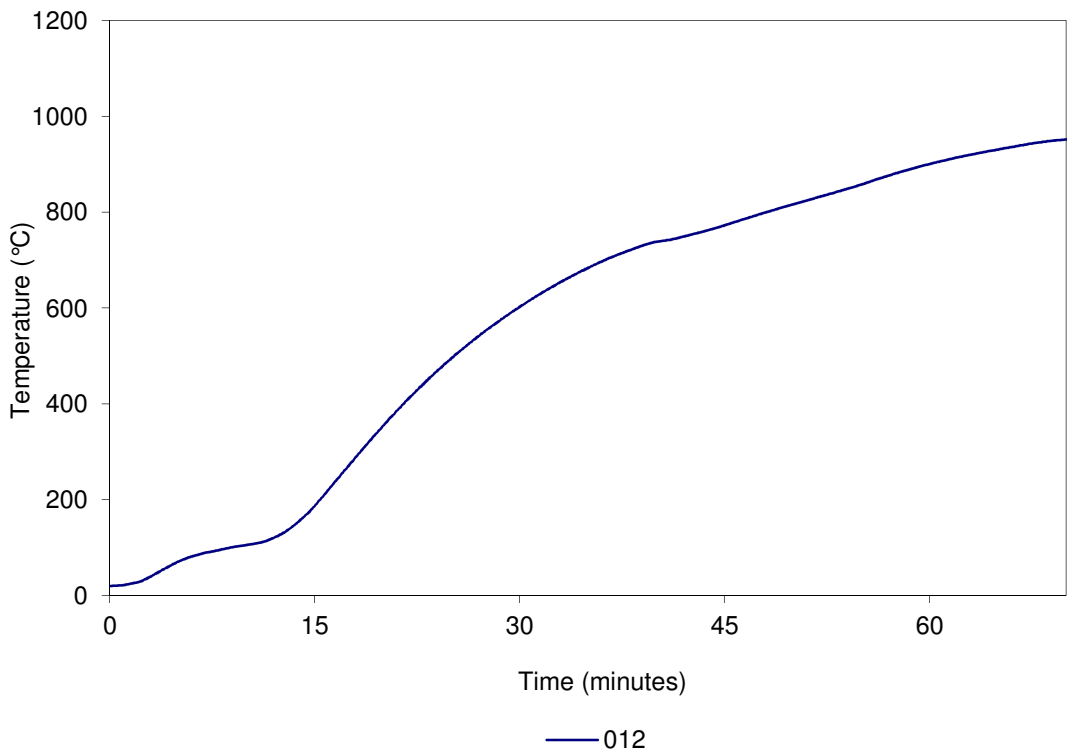


Figure A4.3: Service D. Temperatures vs. Time

A 4.4 DEFLECTIONS

Deflections were recorded four deflection points for the pipe support systems with masses while one deflection point was recorded for the pipe support systems without masses.

Table A4.2: Deflection

Point	Deflection (mm)				
	A	B	C	D	E
NE	20	-	17	-	4
NW	20	-	13	-	4
SW	26	-	16	-	0
SE	27	-	17	-	1
A	-	1	-	5	-

APPENDIX 5 PHOTOGRAPHS



Figure A5.1: Exposed face (side view) of specimen before commencement of the fire-resistance test



Figure A5.2: Exposed face (bottom view) of specimen before commencement of the fire-resistance test



Figure A5.3: Exposed face (side view) of specimen at the end of the test.