RADIATION TEST ON A WINDOW SCREEN

Sponsored Investigation Report No. FSZ 1552a

CSIRO job number SV3572
Date of issue 25 SEPTEMBER 2013
(this report supersedes issue dated 5 September 2012)

Client
GERSHWIN PTY LTD
Trading as Prowler Proof

Commercial-in-confidence

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SPONSORED INVESTIGATION REPORT No. FSZ 1552a

RADIATION TEST ON A SECURITY WINDOW SCREEN

IDENTIFICATION OF SPECIMEN:

The sponsor identified the test specimen as ForceField window screen.

SPONSOR: Gershwin Pty Ltd
trading as Prowler Proof
122 Buchanan Road
BANYO QLD

MANUFACTURER: Gershwin Pty Ltd
trading as Prowler Proof
122 Buchanan Road
BANYO QLD

TEST METHOD:

Test method as specified by the sponsor:

"The specimen shall be exposed to peak radiant heat flux level of 60 kW/m^2 for a minimum of 60 minutes.

Received radiant heat flux to be measured at 1000-mm from the unexposed face of the specimen.

TEST NUMBER: FS 4302/3572

TEST DATE: The radiation test was conducted on 2 August 2012.

DESCRIPTION OF SPECIMEN:

GENERAL

The specimen comprised a metal screen window protecting a 1000-mm x 1000-mm opening in a brick wall.

The ForceField window screen comprised a 0.8-mm thick stainless steel mesh fixed to a FFW9 aluminium frame by ForceField glue and PVC ForceField retainer, as shown in drawing titled "Fire Attenuation Test" sheet 3 of 4, dated 16 March 2012, by Gershwin Pty Ltd.

A steel support perimeter frame, made out of 40-mm x 40-mm x 1.6-mm thick steel sections, was fixed to the brick opening flush with the exposed face of the wall by M8 X 75-mm dynabolts at 400-mm centres. The ForceField screen window was then fixed to the exposed face of the steel support perimeter frame by 25-mm long Pan Head screws at

300-mm centres as shown in drawing titled “Fire Attenuation Test” sheet 4 of 4, dated 16 March 2012, by Gershwin Pty Ltd.

ORIENTATION

The window screen was positioned with the aluminium perimeter frame exposed to the radiant heat source.

DOCUMENTATION:

The following documents were supplied or referenced by the sponsor as a complete description of the specimen and should be read in conjunction with this report:

Drawings titled “Fire Attenuation Test” sheet 1 to 4, dated 16 March 2012, by Gershwin Pty Ltd.

Confidential information about the test specimen has been submitted and is retained at CSIRO Materials Science and Engineering.

EQUIPMENT:

FURNACE

The furnace had a nominal opening of 3000-mm x 3000-mm for attachment of vertical specimens.

The furnace was lined with refractory bricks and materials with the thermal properties as specified in AS 1530.4-2005 and was heated by combustion of a mixture of natural gas and air.

TEMPERATURE MEASUREMENT

The temperature in the furnace chamber was measured by eight type K, 3-mm diameter, and 310 stainless steel Mineral Insulated Metal Sheathed (MIMS) thermocouples. Each thermocouple was housed in high-nickel steel tubes opened at the exposed end.

The temperatures of the specimen were measured by glass-fibre insulated and sheathed K-type thermocouples with a wire diameter of 0.5-mm

PRESSURE

The furnace pressure was measured by a differential low-pressure transducer with a range of ± 50 Pa.

The pressure probe was located approximately 1000-mm above the sill of the furnace.

RADIANT HEAT SOURCE

Radiant heat source consisted of a 1.5-mm thick black steel sheet mounted into a refractory frame in two sections with a vertical joint at its centre. The frame housing the steel sheet was positioned and sealed up against the front of the furnace aperture.

RADIANT HEAT FLUX CALIBRATION

Prior to the test, positions of the specimen (relative to the radiant heat source) were established that corresponded to the required radiant heat flux levels.

Radiation distribution was also established by measuring radiant heat flux levels at the centre and the centre of each quarter section of the specimen in a plane approximating to the intended position of the specimen such that the central value will be approximately equal to the rest of the radiant heat flux.

During the calibration, it was established that at the position of the radiometer (located 1000-mm away from the screen specimen), the measured radiant heat flux level was 29 kW/m^2.

MEASUREMENT SYSTEM

The primary measurement system comprised a multiple-channel data logger, scanning at one minute intervals during the test.

AMBIENT TEMPERATURE:

The temperature of the test area was 11°C at the commencement of the test.

TERMINATION OF TEST:

The test was terminated at 91 minutes by the agreement with the sponsor.

TEST RESULTS:

CRITICAL OBSERVATIONS

The following observations were made during the fire test:

7 minutes -	Smoke is being emitted from the exposed face of the window screen.
10 minutes -	Smoke emitted from the specimen is increasing.
12 minutes -	Aluminium frame has started to deform (photograph # 3).
23 minutes -	Smoke emitted has decreased.
25 minutes -	Screen is deflecting away from the perimeter frame.
33 minutes -	Screen has deflected away from the perimeter frame developing a 5-mm thick see through gap (photograph #5).
60 minutes -	No apparent change to the specimen.
90 minutes -	Screen remains in position.
91 minutes -	Test terminated.

RADIANT HEAT FLUX

Figure 1 shows the curve of received radiation versus time at exposed face of the specimen.

Figure 2 shows the curve of received radiation versus time at 1000-mm from the unexposed face of the specimen.

SPECIMEN TEMPERATURE

Figure 3 shows the curves of maximum temperature versus time on the centre of unexposed face of the specimen.

FURNACE TEMPERATURE

Figure 4 shows the standard curve of temperature versus time for heating the furnace chamber and the actual curves of average and maximum temperature versus time recorded during the heating period.

TESTED BY:

Mario Lara
Testing Officer

Brett Roddy
Team Leader, Fire Testing

25 September 2013
(this report supersedes issue dated 5 September 2012)

APPENDICES

APPENDIX 1

Photograph 1 - Exposed face of the specimen prior to testing

Photograph 2 - Unexposed face of the specimen prior to testing

Photograph 3 - Exposed face of the specimen at 12 minutes into the test

Photograph 4 - Specimen at 30 minutes into the test

Photograph 5 - Exposed face of the specimen at 34 minutes into the test

Photograph 6 - Specimen at 60 minutes into the test

Photograph 7 - Specimen at 90 minutes into the test

Photograph 8 - Exposed face of the specimen at the completion of testing

APPENDIX 2

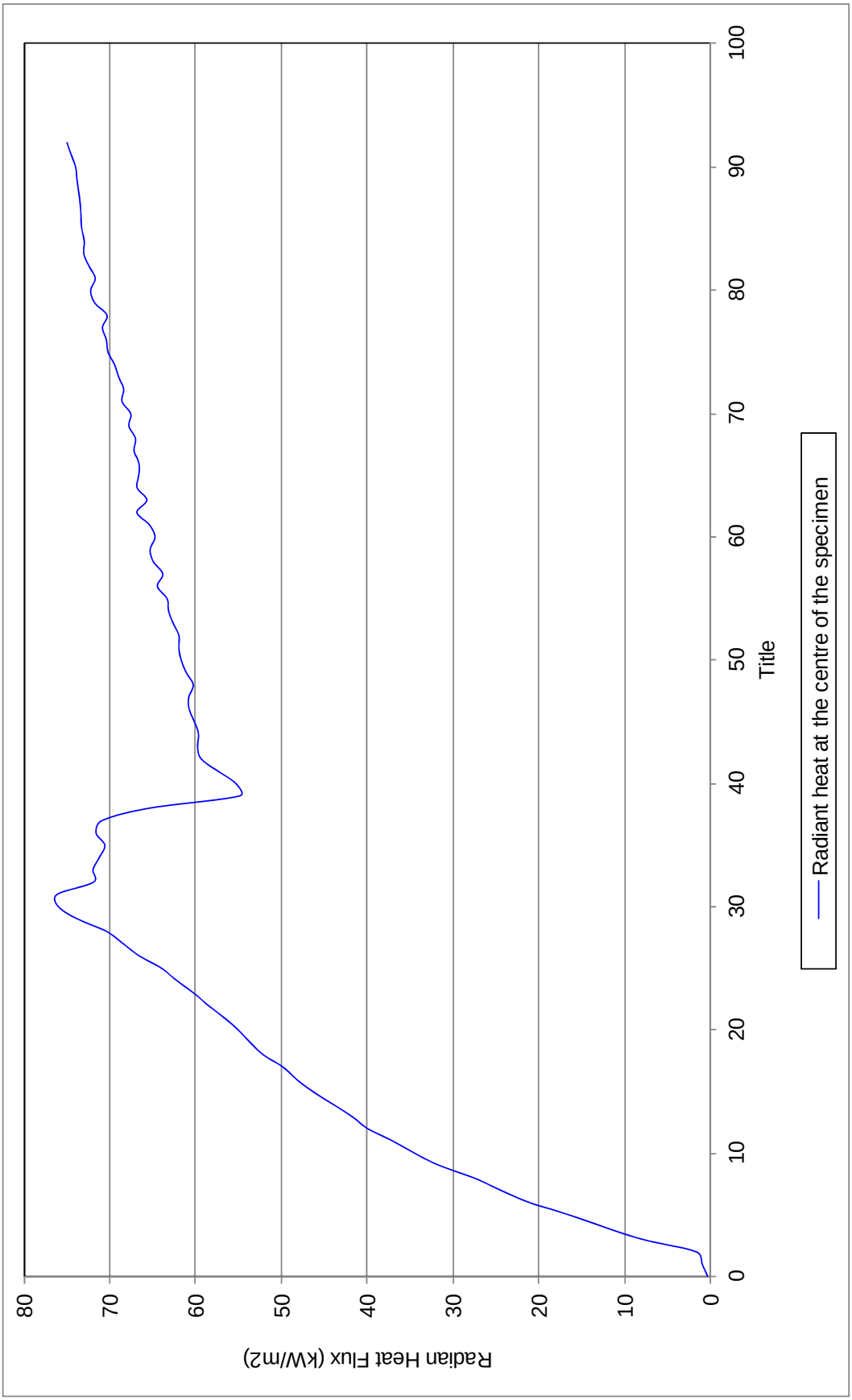


Figure 1 - Radiant Heat Flux

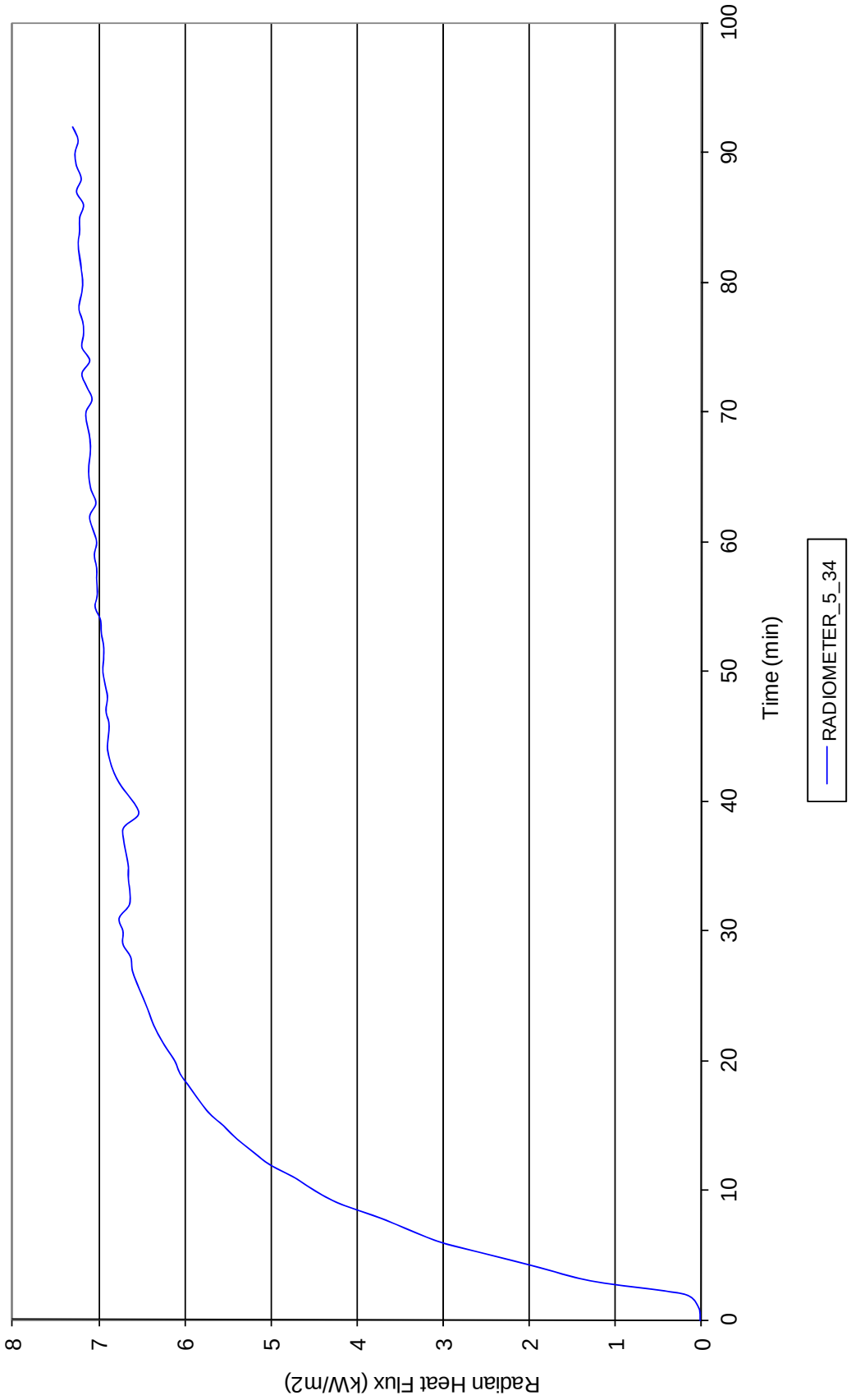


Figure 2 - Radiant Heat Flux received @ 1000-mm from the unexposed face

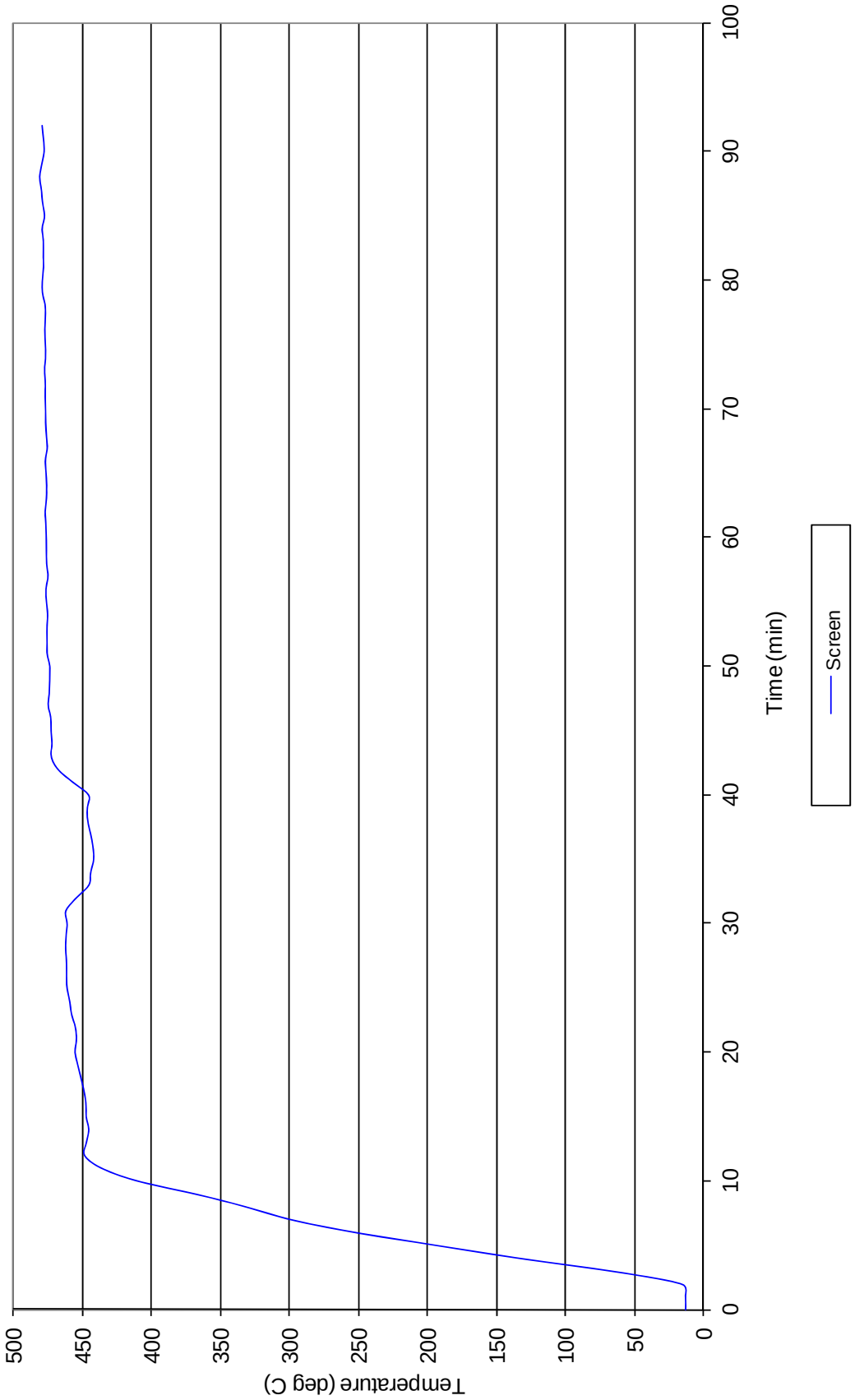


Figure 3 - Unexposed face of the specimen

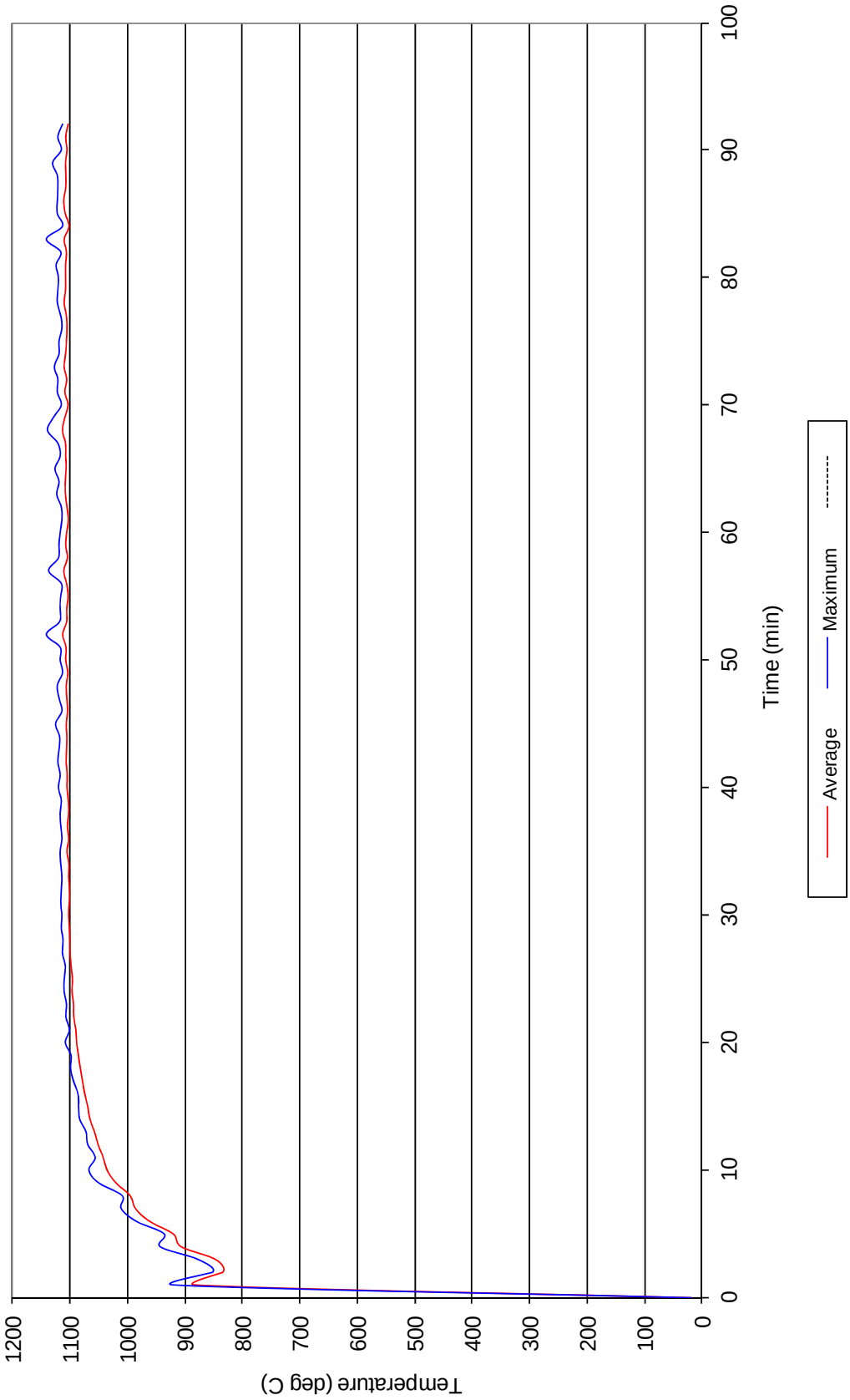
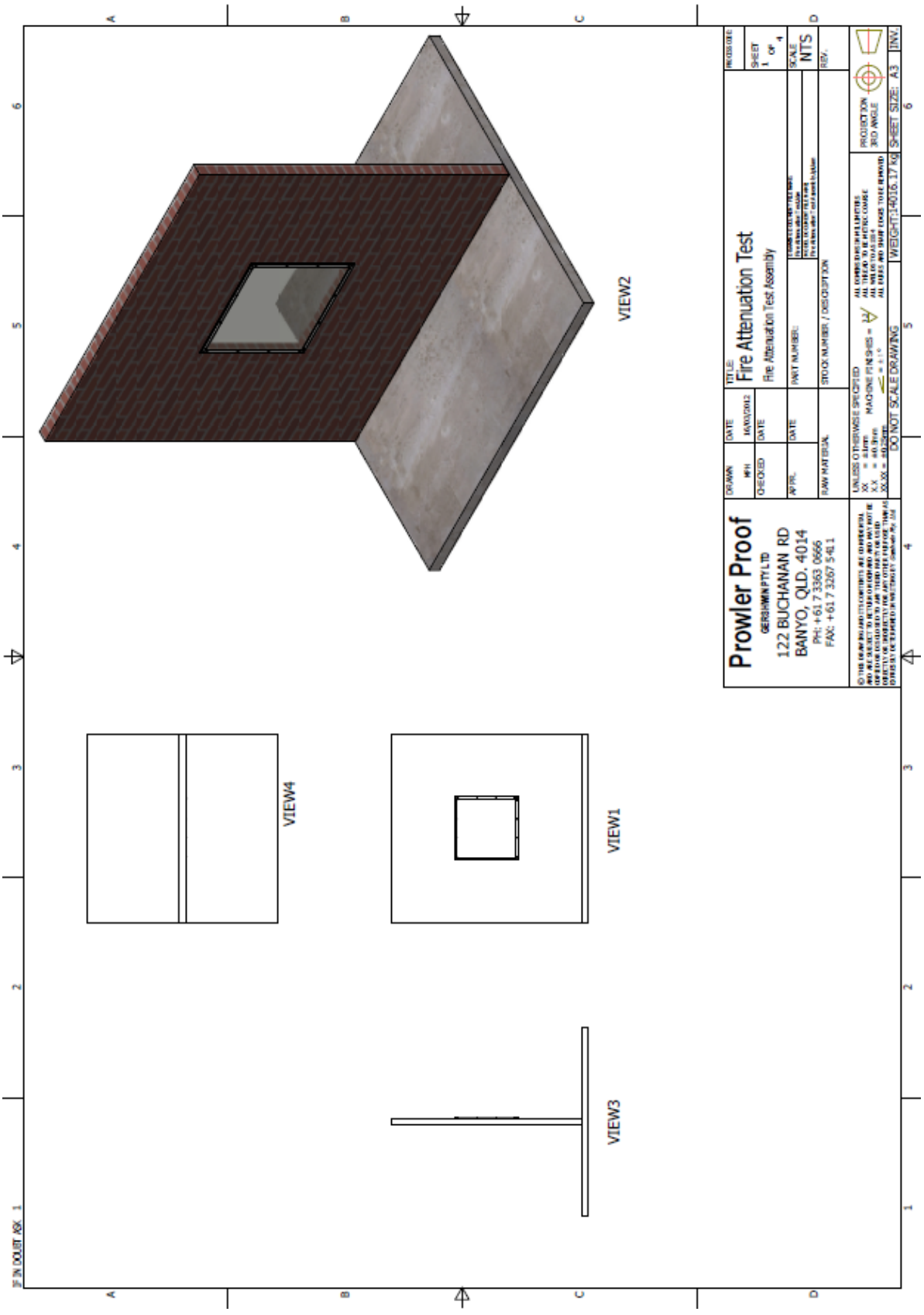
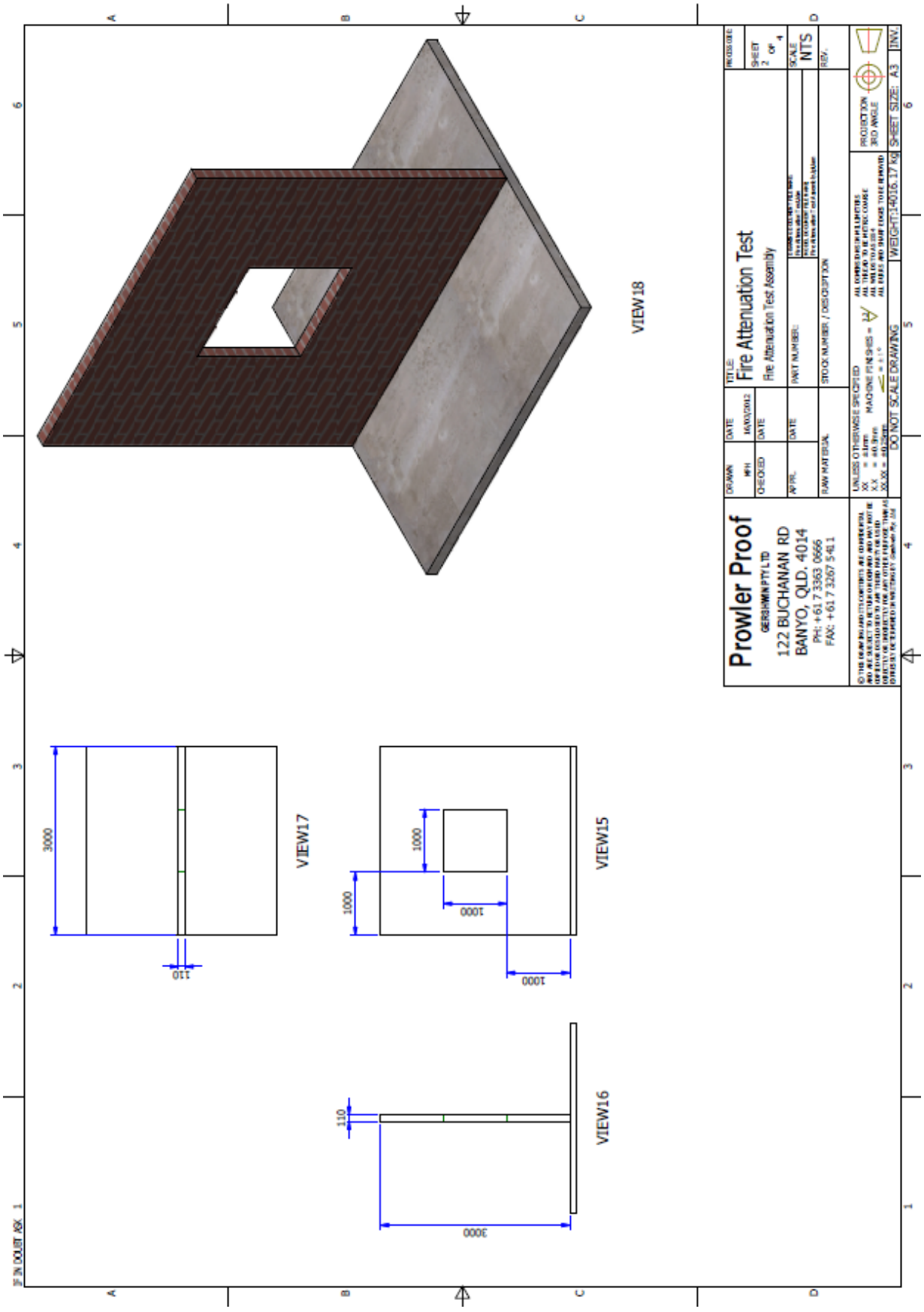


Figure 4 - Furnace temperature

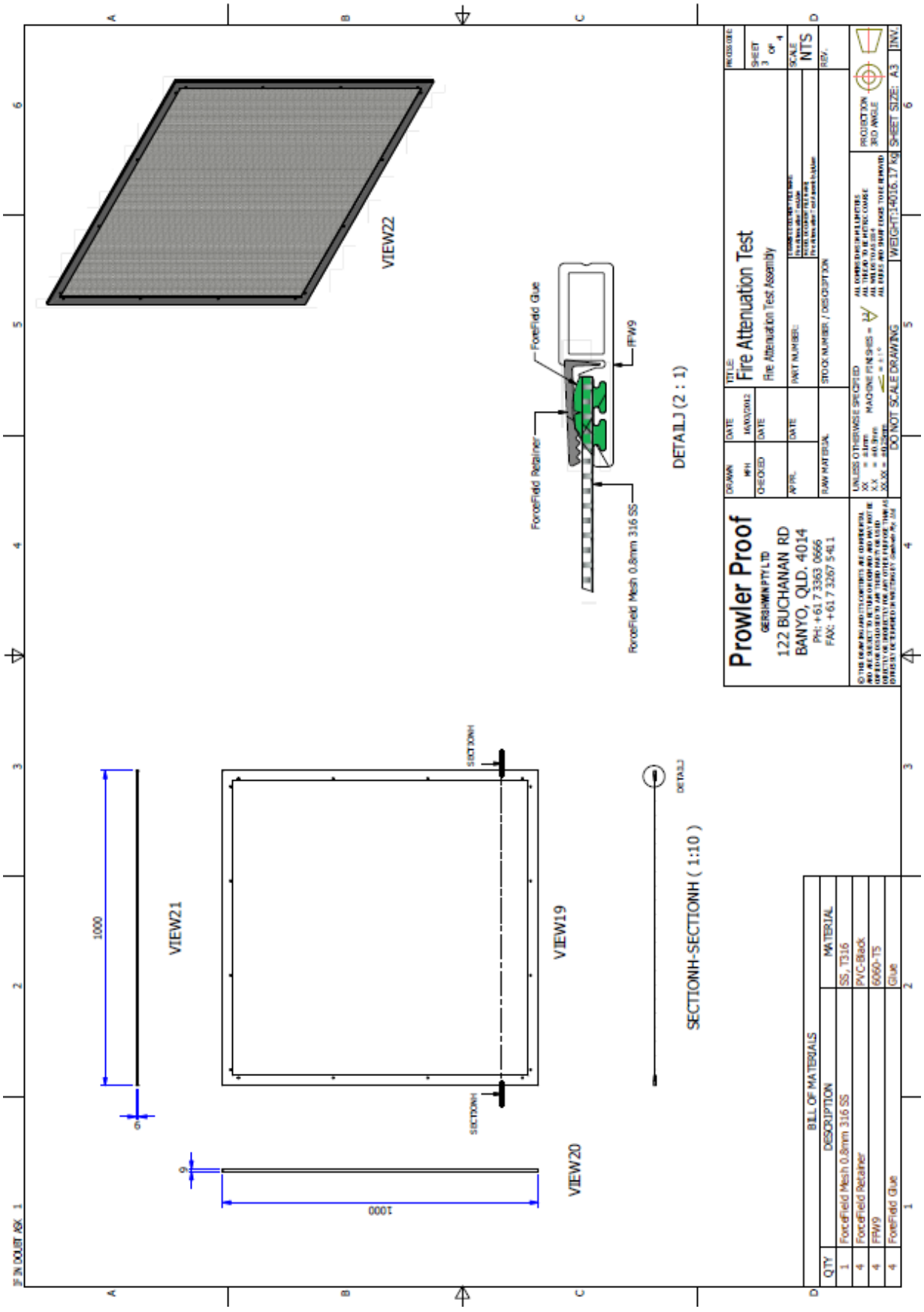
APPENDIX 3



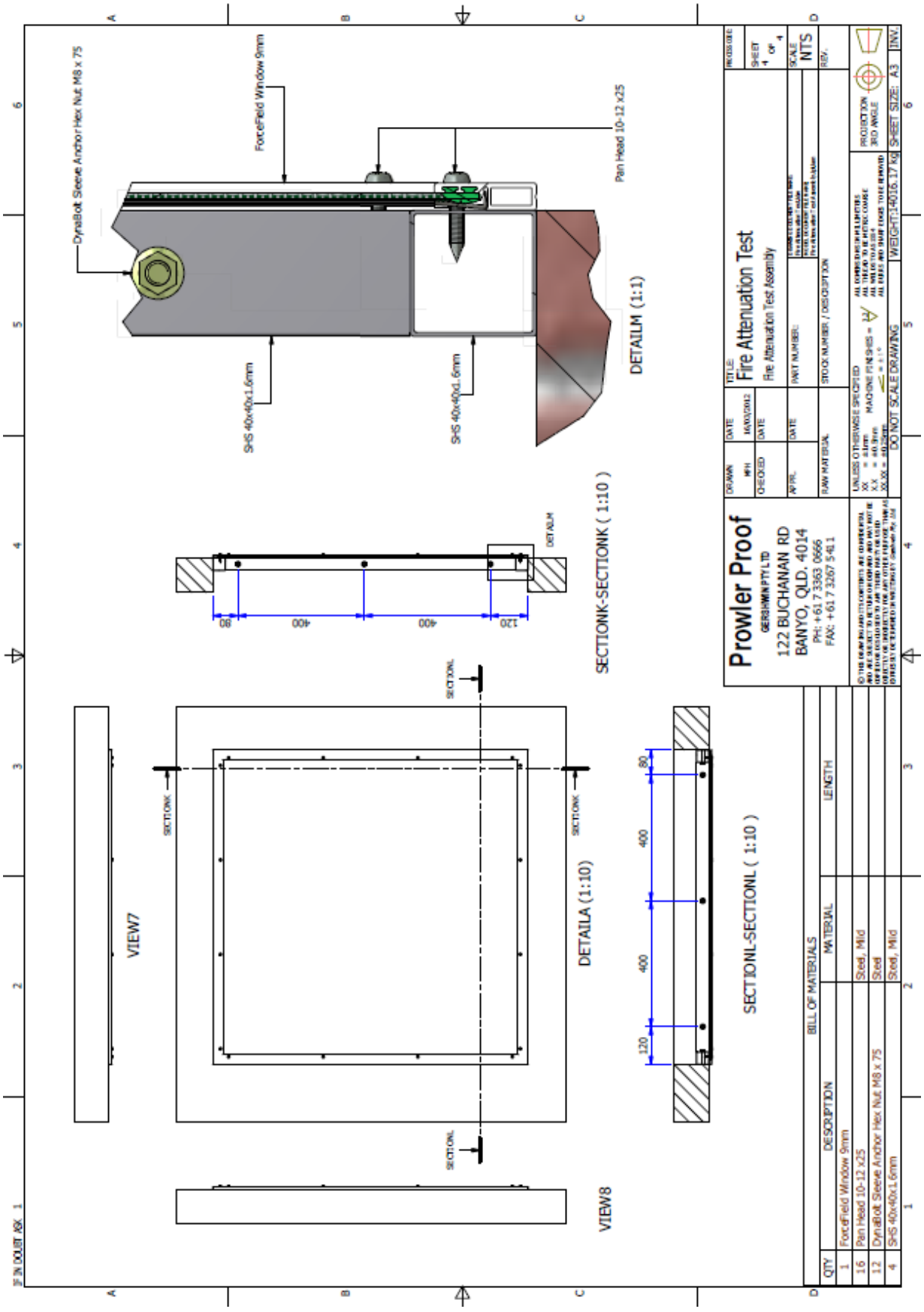
Drawing titled “Fire Attenuation Test” sheet 1 of 4, dated 16 March 2012, by Gershwin Pty Ltd.



Drawing titled “Fire Attenuation Test” sheet 2 of 4, dated 16 March 2012, by Gershwin Pty Ltd.



Drawing titled “Fire Attenuation Test” sheet 3 of 4, dated 16 March 2012, by Gershwin Pty Ltd.



Drawing titled “Fire Attenuation Test” sheet 4 of 4, dated 16 March 2012, by Gershwin Pty Ltd.