

**BUSHFIRE TEST ON A WINDOW
ROLLER SHUTTER**

**Report number FSZ 1444
CSIRO job number SZ3303
Date of issue 5 NOVEMBER 2010
Client
OZ ROLL PTY LTD**

Commercial-in-confidence



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SPONSORED INVESTIGATION No. FSZ 1444
BUSHFIRE TEST ON A WINDOW ROLLER SHUTTER

SUMMARY

IDENTIFICATION OF SPECIMEN:

The sponsor identified the specimen as a non-insulated aluminium window roller shutter assembly.

SPONSOR: OZ Roll Pty Ltd
174 B Cavan Road
DRY CREEK SA

MANUFACTURER: OZ Roll Pty Ltd
174 B Cavan Road
DRY CREEK SA

TEST STANDARD: Australian Standard 1530, Methods for fire tests on building materials, components and structures,

Part 8.1-2007: Tests on elements of construction for buildings exposed to simulated bushfire attack – Radiant heat and small flaming sources.

TEST NUMBER: FS 4163/3303

TEST DATE: The fire test was conducted on 11 October 2010.

DESCRIPTION OF SPECIMEN:

The specimen comprised an aluminium window roller shutter protecting an aluminium framed glass window mounted into a brick wall opening 1400-mm high x 1200-mm wide x 110-mm thick.

The roller shutter curtain comprised interlocking, extruded aluminium horizontal slats. The slats were of a hollow section and were left uninsulated. The curtain AE401 profile slats were nominally 1300-mm long x 40-mm wide x 9-mm thick. The curtain overlapped the opening in the brick wall by nominally 50-mm on each side.

The bottom of the curtain comprised of an aluminium bottom bar approximately 51-mm wide x 7.5-mm wide, fixed through the bottom slat using rivets.

The vertical and bottom guides were an extruded aluminium section 53-mm x 23-mm. The vertical guides were fixed to the wall masonry anchors spaced at maximum 300-mm centres. The bottom guide was riveted on an angle at each end of the vertical guides and fixed at mid-width with masonry anchors.

The BC45 Series head box comprised a two-part aluminium roll formed section designed to completely enclose the working parts of the roller shutter.

An aluminium framed glass window was mounted into the 1400-mm high x 1200-mm wide opening, as shown in Photograph 2, and protected by the roller shutter. The glass pane was 4-mm thick standard glass.

ORIENTATION

The roller shutter was tested with the barrel exposed to the radiant heat source.

CRIB SIZE

Crib size selected by the test sponsor was *Class B*, simulating a debris pile between 0.12 kg and 0.25 kg (approximately 200-mm wide x 400-mm deep x 100-mm high).

Two cribs were used, one located at the bottom corner of the curtain, and the other on top of the head box.

LEVEL OF RADIANT HEAT EXPOSURE

Level of radiant heat exposure selected by the test sponsor was Severe – 40 kW/m².

DOCUMENTATION:

Drawing titled ROLLER SHUTTER, by OZ Roll 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

The temperature in the furnace chamber was measured by nine type K, 3-mm diameter, 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.

RADIANT HEAT SOURCE

Radiant heat source consisted of a 3-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.

MEASUREMENT SYSTEM

The primary measurement system comprised of multiple-channel data loggers, scanning at two seconds intervals during the test.

AMBIENT TEMPERATURE:

The temperature of the test area was 17°C at the commencement of the test.

TERMINATION OF TEST:

The test was terminated at 60 minutes.

TEST RESULTS:

CRITICAL OBSERVATIONS

The following observations were made during the fire test:

- 0 minutes - Alight cribs placed in positions, one at the bottom corner and one on top of the drum cover of the roller shutter assembly.

- 0:30 minutes - Specimen moved in position – exposure to 40 kW/m².
- 2:30 minutes - Specimen moved in position – exposure to 24 kW/m²
Smoke in cavity between shutter and the window.
Paint is starting to blister at the centre of shutter curtain.
- 3:15 minutes - Top window pane cracked (Photograph 4).
- 3:20 minutes - Specimen moved in position – exposure to 16 kW/m²
- 4:15 minutes - Bottom glass pane cracked
- 4:20 minutes - Specimen moved in position – exposure to 12 kW/m²
- 5:20 minutes - Specimen moved in position – exposure to 8.5 kW/m²
- 6:20 minutes - Specimen moved in position – exposure to 7 kW/m²
- 7:30 minutes - Specimen moved in position – exposure to 5 kW/m²
- 8:30 minutes - Specimen moved in position – exposure to 4 kW/m²
- 9:30 minutes - Specimen moved in position – exposure to 3 kW/m²
- 13 minutes - Evidence of melted sealant on bricks below shutter.
Small amount of melted plastic visible from drip hole.
- 15 minutes - Specimen shielded from the radiant heat source.
- 16 minutes - Radiometer moved into position, 250-mm from the centre of the exposed face.
Top crib glowing but not flaming.
Bottom crib still burning.
- 18:30 minutes - Bottom crib out (still glowing).
- 24 minutes - Pilot flame applied along the bottom sill and vertical stiles on the exposed side of the assembly – no ignition observed.
- 28 minutes - Pilot flame applied – no ignition
- 45 minutes - Pilot flame applied – no ignition.
- 59 minutes - Pilot flame applied – no ignition
- 60 minutes - Test terminated – no flaming is observed.

RADIANT HEAT FLUX

Figure 1 shows the curves of target and incident radiation versus time and the actual curves of received radiation at 365-mm from the unexposed face and 250-mm from the exposed face versus time recorded during the test period.

Figure 2 shows the curve of received radiation versus time at 365-mm from the unexposed face of the specimen.

Figure 3 shows the curve of received radiation versus time at 250-mm from the exposed face of the specimen.

PERFORMANCE

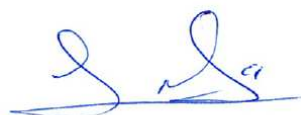
Performance observed in respect of Clause 14.4 of AS1530.8.1-2007 criteria:

Performance Criteria	Time to failure (min)	Position of failure
Formation of through gaps greater than 3-mm	No failure	-
Sustained flaming for 10 seconds on the non-fire side	No failure	-
Flaming on the fire-exposed side at the end of the 60 minutes test period	No failure	-
Radiant heat flux 365-mm from the non-fire side exceeding 15 kW/m ²	No failure	-
Mean and maximum temperature rises greater than 140 K and 180 K	Not applicable	-
Radiant heat flux 250-mm from the specimen, greater than 3 kW/m ² between 20 minutes and 60 minutes	No failure	-
Mean and maximum temperature of internal faces exceeding 250°C and 300°C respectively between 20 minutes and 60 minutes after commencement of test	Not applicable	-
Crib class	B	Peak heat flux
		40 kW/m²

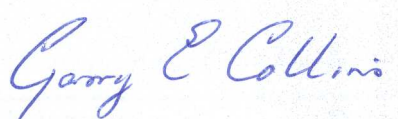
For the purpose of building regulations in Australia, the test specimen achieved a Bushfire Attack Level (BAL) of B40.

This report details methods of construction, the test conditions and the results obtained when the specific element of construction described herein was tested in accordance with AS 1530.8.1-2007.

TESTED BY:



Mario Lara
Testing Officer



Garry E Collins
Manager, Fire Testing and Assessments

5 November 2010

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 - Specimen at the start of the testing



Photograph 4 - Unexposed face of the specimen at 3:15 minutes into the test

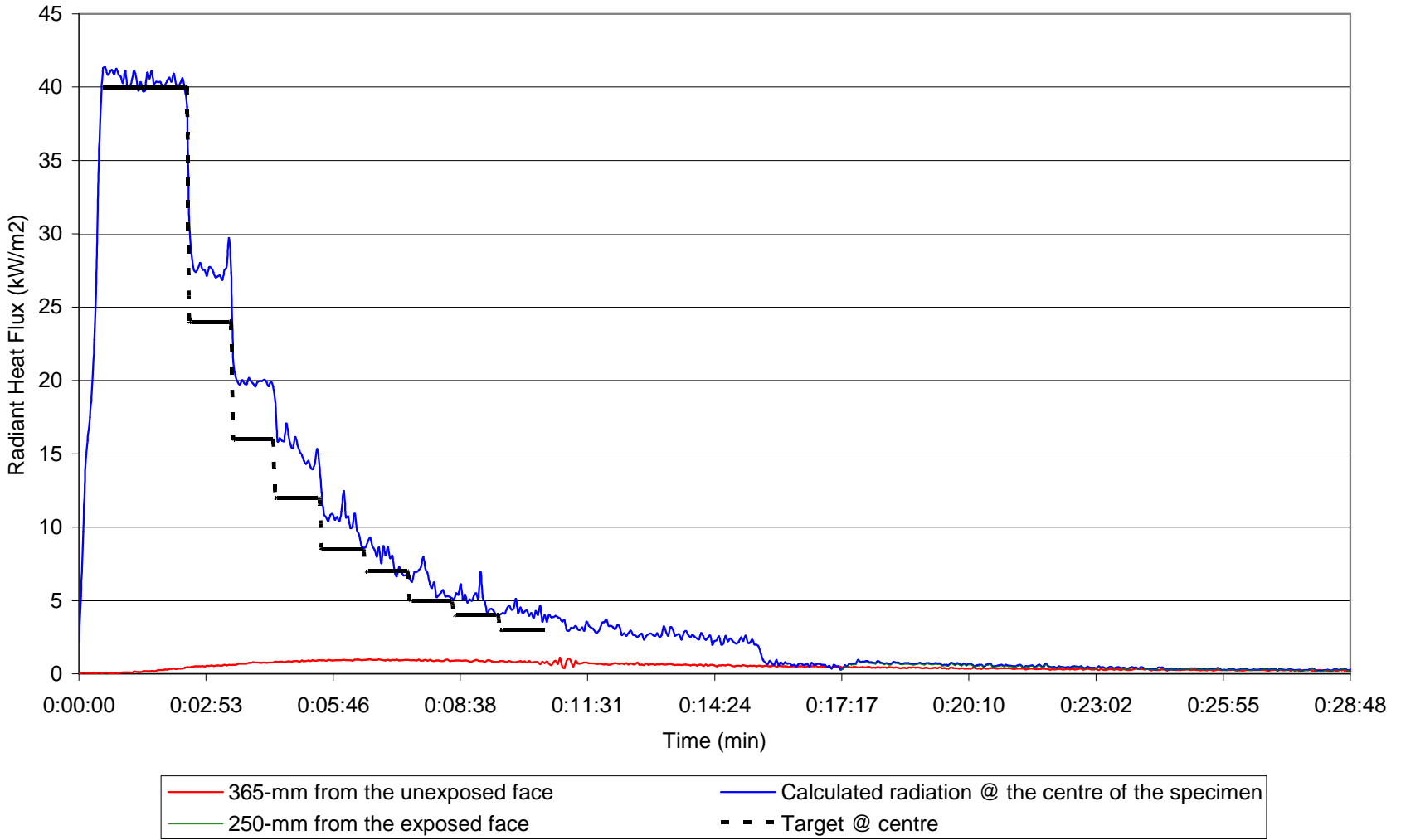


Photograph 5 - Exposed face of the specimen at the completion of testing



Photograph 6 - Unexposed face of the specimen at the completion of testing

Figure 1 - Radiant Heat Flux



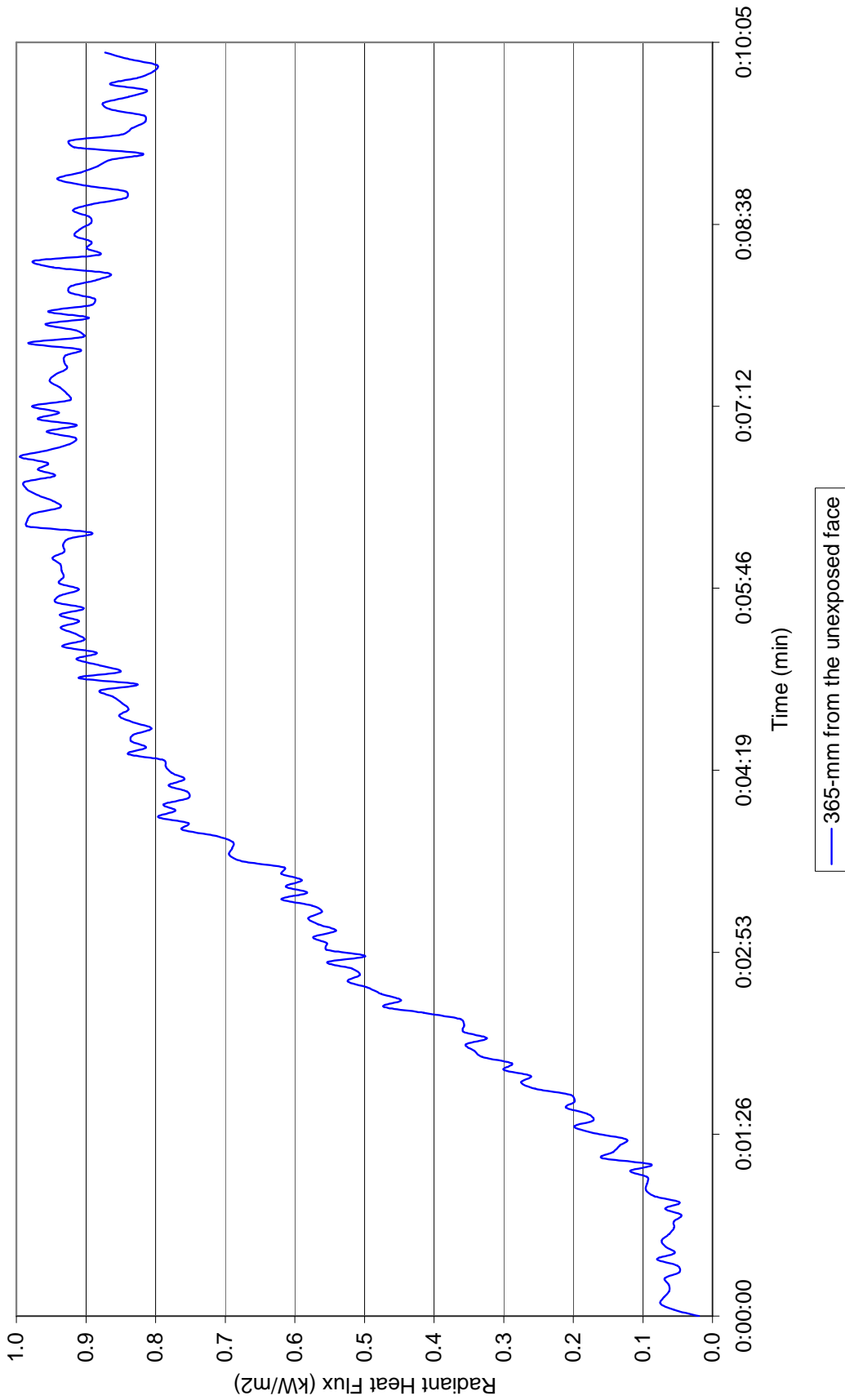


Figure 2 - Radiant Heat Flux received @ 365-mm from the unexposed face

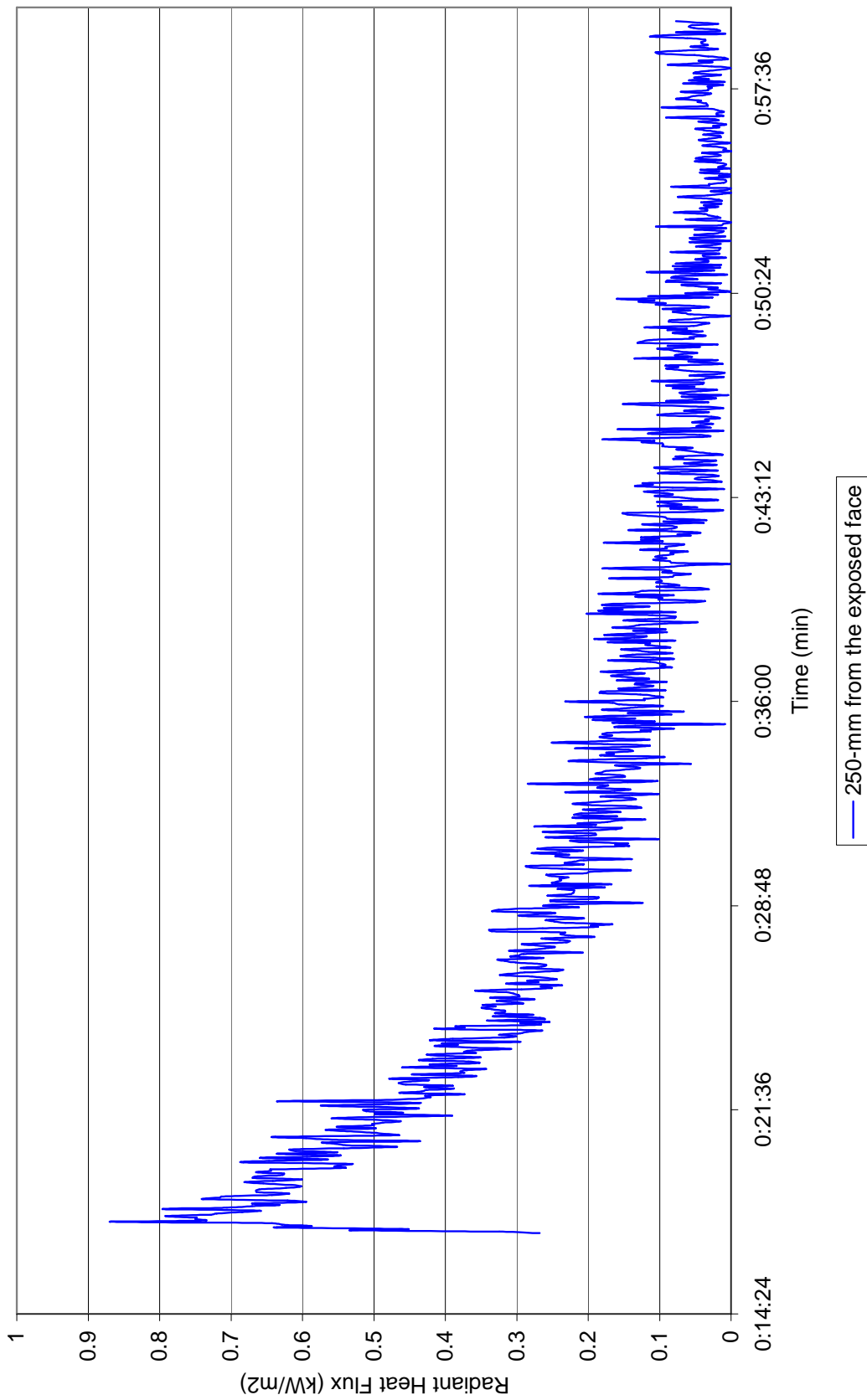
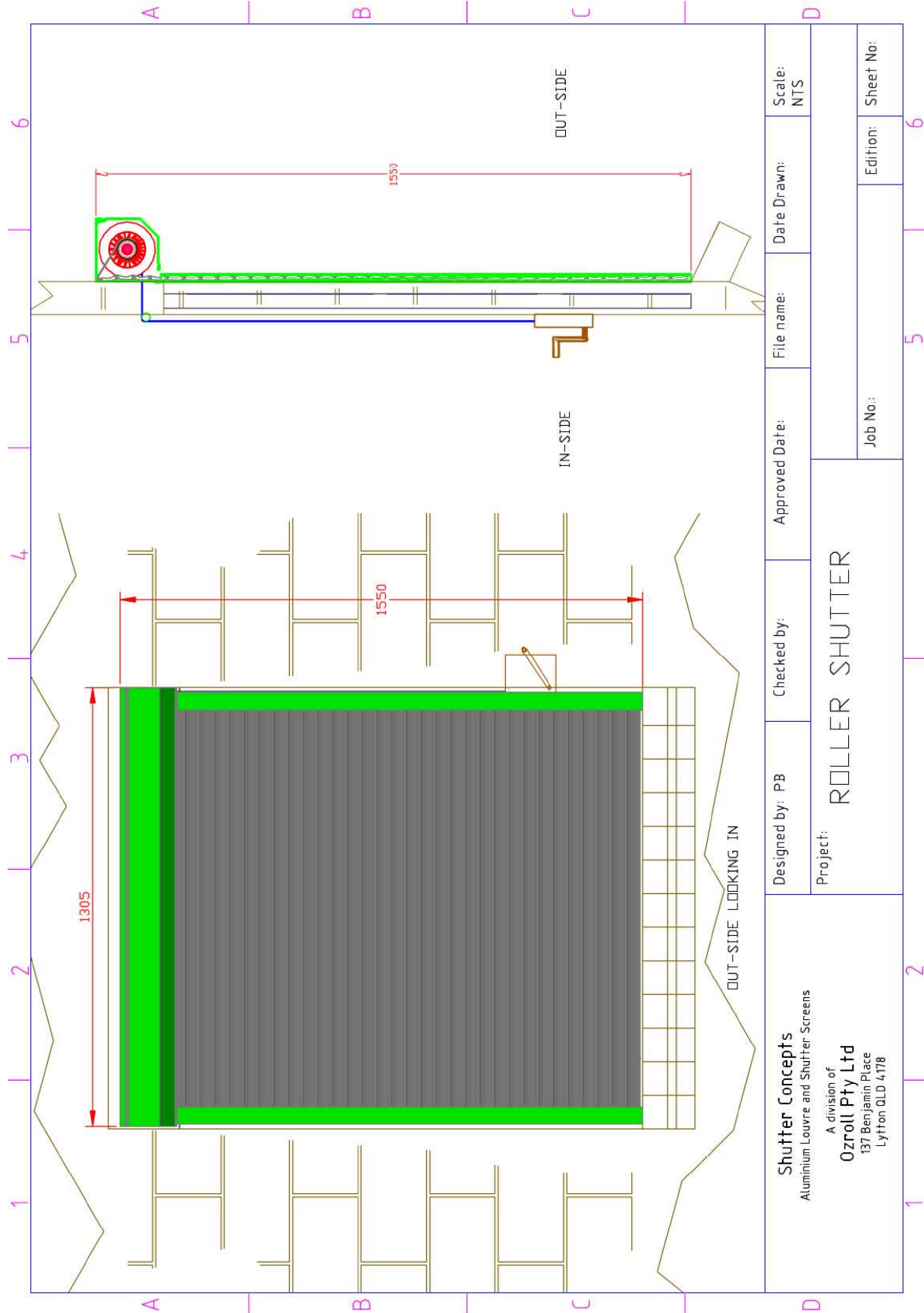


Figure 3 - Radiant Heat Flux received @ 250-mm from the exposed face

APPENDIX 3



Designed by: PB	Checked by:	Approved Date:	File name:	Date Drawn:	Scale: NTS
Project: ROLLER SHUTTER			Job No:	Edition:	Sheet No: 6
Shutter Concepts Aluminium Louvre and Shutter Screens A division of Ozroll Pty Ltd 137 Benjamin Place Lytton QLD 4178					

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