

FSV 0356

**FIRE-RESISTANCE TEST ON A
NON-LOADBEARING LIGHTWEIGHT
CONCRETE PANEL SYSTEM**

**IN CONFIDENCE TO
CSR HEBEL AUSTRALIA PTY LTD
FEBRUARY 1994**



DIVISION OF BUILDING, CONSTRUCTION AND ENGINEERING

**GATE 2, DELHI ROAD NORTH RYDE NSW
PO BOX 310 NORTH RYDE NSW 2113
AUSTRALIA**

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**FIRE-RESISTANCE TEST ON A
NON-LOADBEARING LIGHTWEIGHT CONCRETE PANEL SYSTEM**

SPONSORED INVESTIGATION No. FSV 0356

**IDENTIFICATION
OF SPECIMEN:**

The sponsor identified the specimen as 75 mm thick Hebel wall Powerpanels screw fixed to top hat sections screw fixed to a timber frame.

SPONSOR:

CSR Hebel Australia Pty Ltd
Level 2, 9 Help Street
CHATSWOOD NSW

MANUFACTURER:

CSR Hebel Australia Pty Ltd
Level 2, 9 Help Street
CHATSWOOD NSW

TEST STANDARD:

Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4-1990, Fire-resistance tests of elements of building construction.

TEST NUMBER:

NFBASV1182

TESTED:

The fire-resistance test was conducted on 22 February 1995.

**DESCRIPTION
OF SPECIMEN:**

GENERAL

The specimen comprised a timber frame of 70 mm X 35 mm F5 soft wood studs at 430 mm centres. The top plate was bolted to the specimen containing frame. The bottom plate was fixed with masonry anchors to the brick infill at the lower edge of the specimen. Steel top hat sections, BHP top span 22 ceiling baton, were fixed horizontally to the timber frame. The Powerpanels, 75 mm thick and 600 mm wide were fixed to the top hat section with fixed with 14 gauge - 10 X 65 hex. head type 17 class 3 screws. The individual panels were fixed with two screws through the top, three screws through the middle and two screws through the lower top hat section. The unexposed face was clad with 10 mm CSR plasterboard. Details of the frame construction were as shown in drawing numbered MJ-001 by CSR Hebel Pty Ltd.

DIMENSIONS

The specimen had total dimensions of 2700 mm in height and 3000 mm in width. The specimen was built on a 300 mm high brick infill wall.

RESTRAINT

The specimen was unrestrained on the vertical sides. The vertical gap between specimen frame and wall was filled with compressed ceramic fibre.

ORIENTATION

The specimen was tested with the Powerpanel system exposed to the furnace.

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

Drawing numbered MJ - 001, dated 31 January 1995, by CSR Hebel Australia Pty Ltd.

Confidential information about the composition of materials and/or manufacturing processes used in the test specimen has been submitted and is retained at the Division of Building, Construction and Engineering.

EQUIPMENT:**FURNACE**

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

The furnace is lined with refractory bricks and materials with the thermal properties as specified in AS 1530.4-1990 and is heated by combustion of a mixture of natural gas and air.

TEMPERATURE

The temperature in the furnace chamber was measured by nine K-type thermocouples housed in high-nickel steel tubes substantially sealed at the exposed end. Each wire was 0.8 mm in diameter and electrically insulated with ceramic insulators.

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.

DEFLECTION

Deflections of the element were measured by linear-displacement transducers operating on the potentiometric principle with a range of 300 mm. A spring-loaded probe, exerting a force of about 10 N, transmitted the deflections of the element to the transducers.

MEASUREMENT SYSTEM

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

After each scan the information was stored on magnetic disc by the computer controller.

AMBIENT

TEMPERATURE: The temperature of the test area was 22°C at the commencement of the test.

**DEPARTURE FROM
TEST STANDARD:**

There were no departures from the requirements of AS 1530.4-1990.

**TERMINATION
OF TEST:**

The test was terminated at 241 minutes by agreement with the sponsor.

TEST RESULTS:**CRITICAL OBSERVATIONS**

The following observations were made during the fire-resistance test:

- 60 minutes - A small amount of steam is being emitted from the top edge of the specimen. The joints of the exposed face have opened slightly with some horizontal cracking becoming visible.
- 80 minutes - A continuous horizontal crack has developed across the exposed panels 400 mm from the top of the specimen. Additional horizontal cracks are forming at mid height.
- 110minutes - The horizontal crack at mid height has become more distinct. The joints have continued to open.
- 189 minutes - Smoke is being emitted from the specimen.
- 212 minutes - The plasterboard is discolouring in the top half of the specimen in areas corresponding with the Hebel joints.
- 226 minutes - The plasterboard paper is starting to char.
- 232 minutes - Sustained flaming in the plasterboard paper on the unexposed face. Greater than 10 seconds.
- 234 minutes - Section of sheeting has fallen from the unexposed face, centre top half.
- 238 minutes - Deflection transducer removed.
- 241 minutes - Test terminated

FURNACE TEMPERATURE

Figure 1 shows the standard curves 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.

SPECIMEN TEMPERATURE

Figure 2 shows the curves of average and maximum temperature versus time recorded on the unexposed face of the specimen.

Figure 3 shows the curve of maximum temperature versus time recorded on the joints of the unexposed face of the specimen.

SPECIMEN DEFLECTION

Figure 4 shows the magnitude of deflections versus time recorded at the centre of the unexposed face.

PERFORMANCE

Performance observed in respect of the following criteria:

Structural adequacy	-	no failure at 241 minutes.
Integrity	-	232 minutes.
Insulation	-	217 minutes.

**FIRE-RESISTANCE
LEVEL:**

For the purpose of building regulations in Australia, the FRL of the test specimen was 240/180/180.

The fire-resistance level is applicable from the same direction as the test.

For the purposes of AS 1530.4-1990 the results of these fire tests may be used to directly assess fire hazard, but it should be noted that a single test method will not provide a full assessment of fire hazard under all fire conditions.

ATTACHMENTS:

Figure 1. - FURNACE TEMPERATURE

Figure 2. - SPECIMEN TEMPERATURE - On the unexposed face.

Figure 3. - SPECIMEN TEMPERATURE - Over the joints.

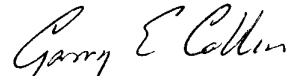
Figure 4. - SPECIMEN DEFLECTION - At the centre of the unexposed face.

Drawing numbered MJ-001, dated 31 January, by CSR Hebel Australia Pty Ltd.

A copy of Certificate of Test No. 595.

TESTED BY:

Clive Broadhead
Testing Officer



Garry E Collins
Senior Fire-Engineering Scientist
for Manager, Fire Technology

APRIL 1995

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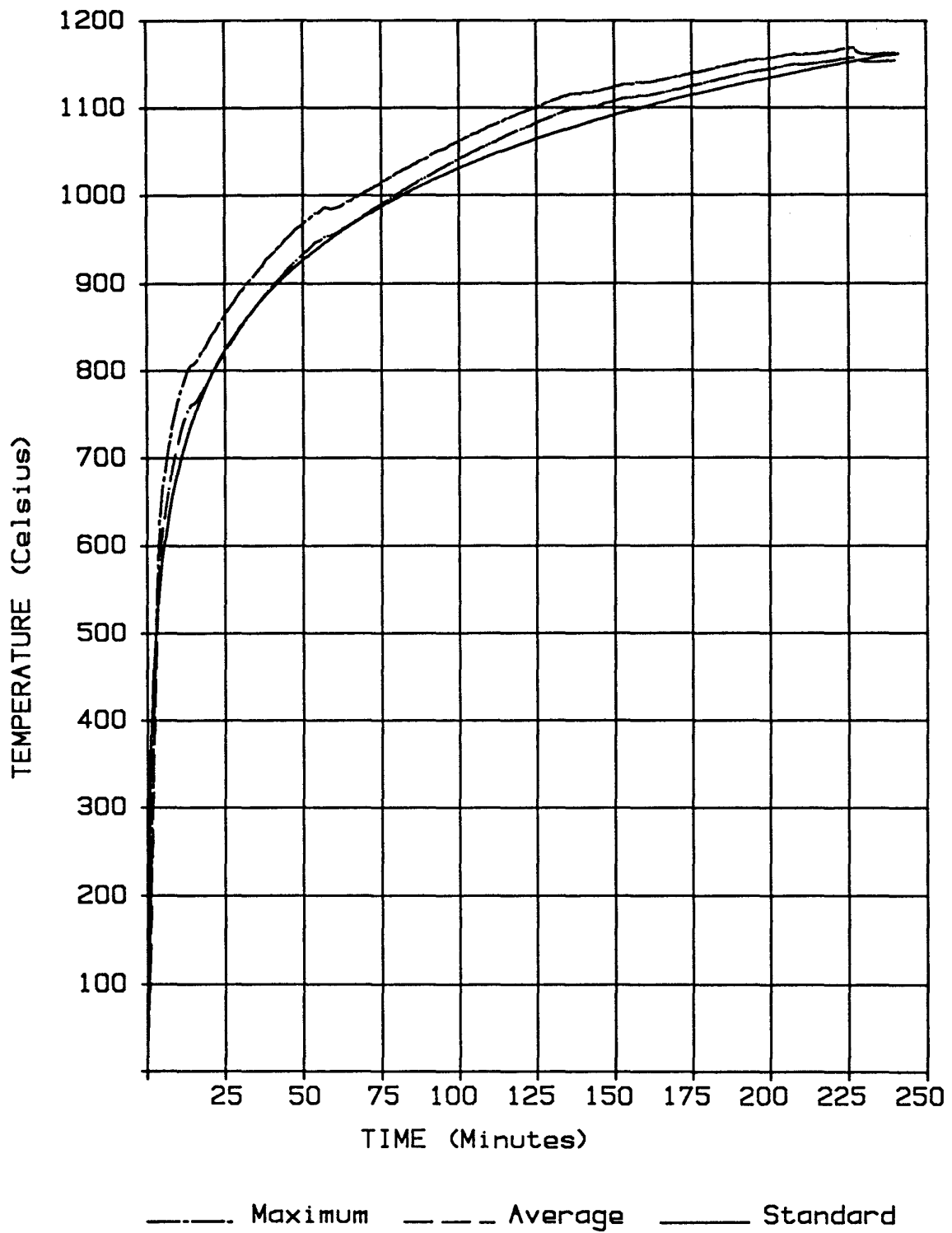


FIG. 1 - FURNACE TEMPERATURE



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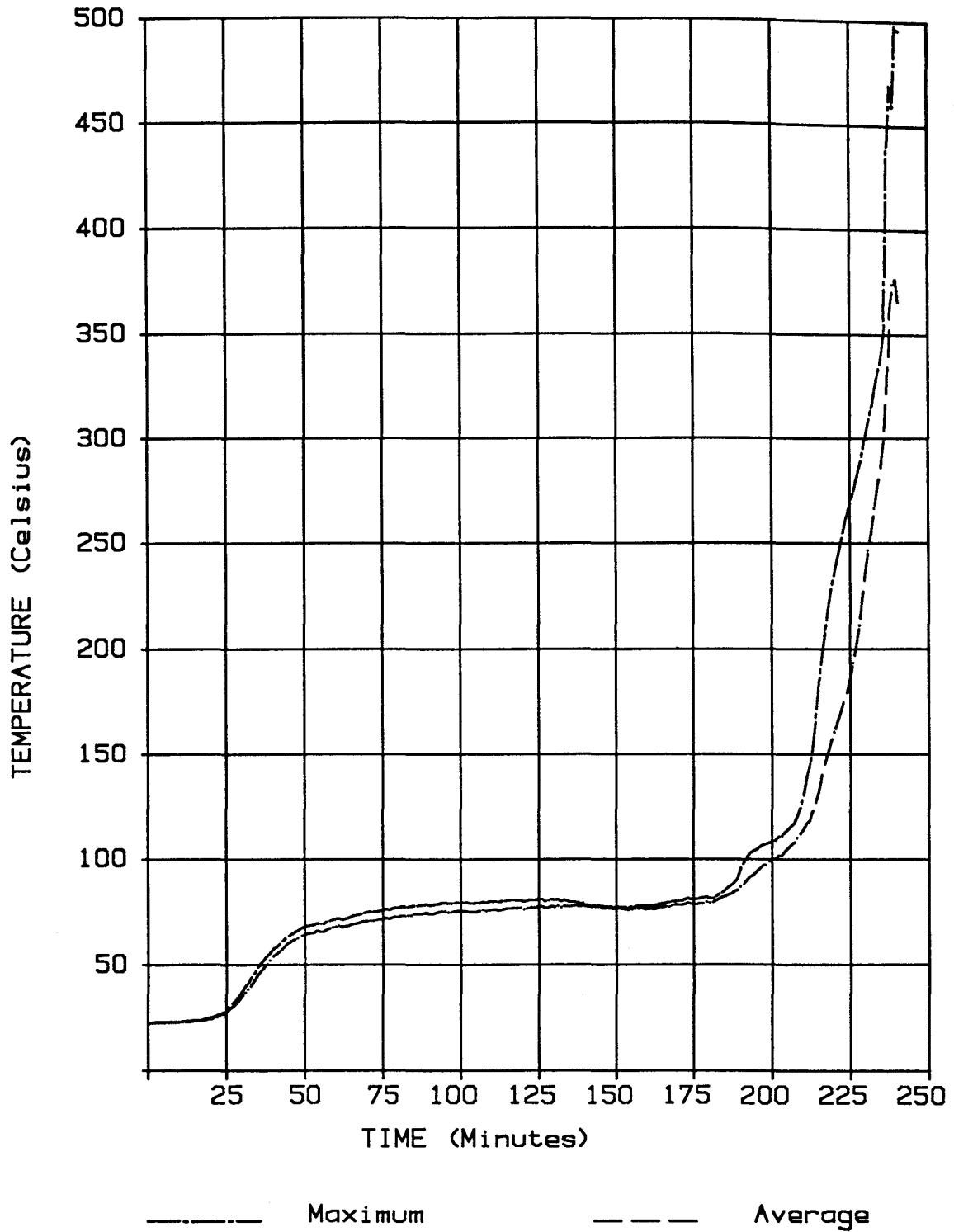


FIG. 2 - SPECIMEN TEMPERATURE
On the unexposed face.

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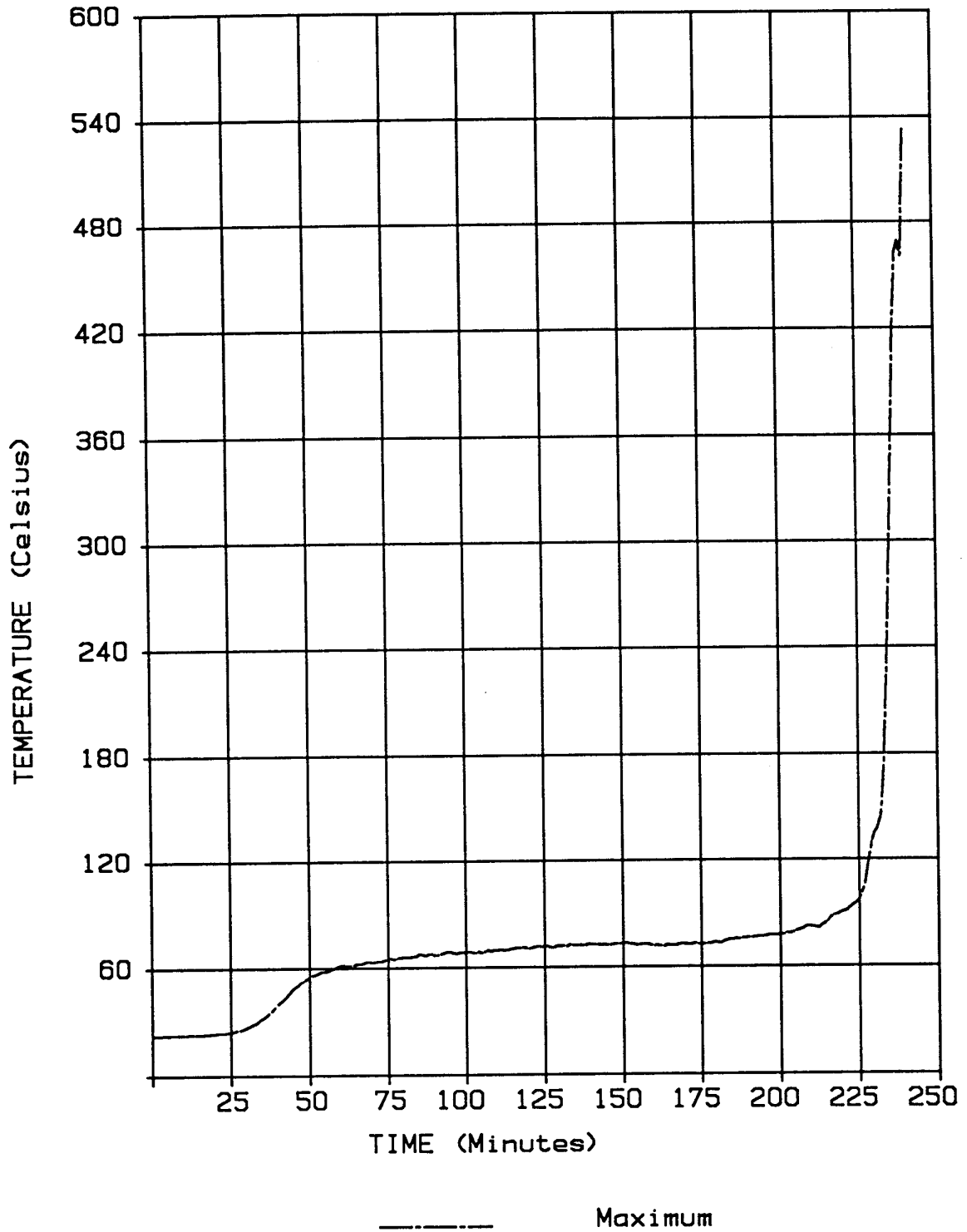


FIG. 3 - SPECIMEN TEMPERATURE
Over the joints.



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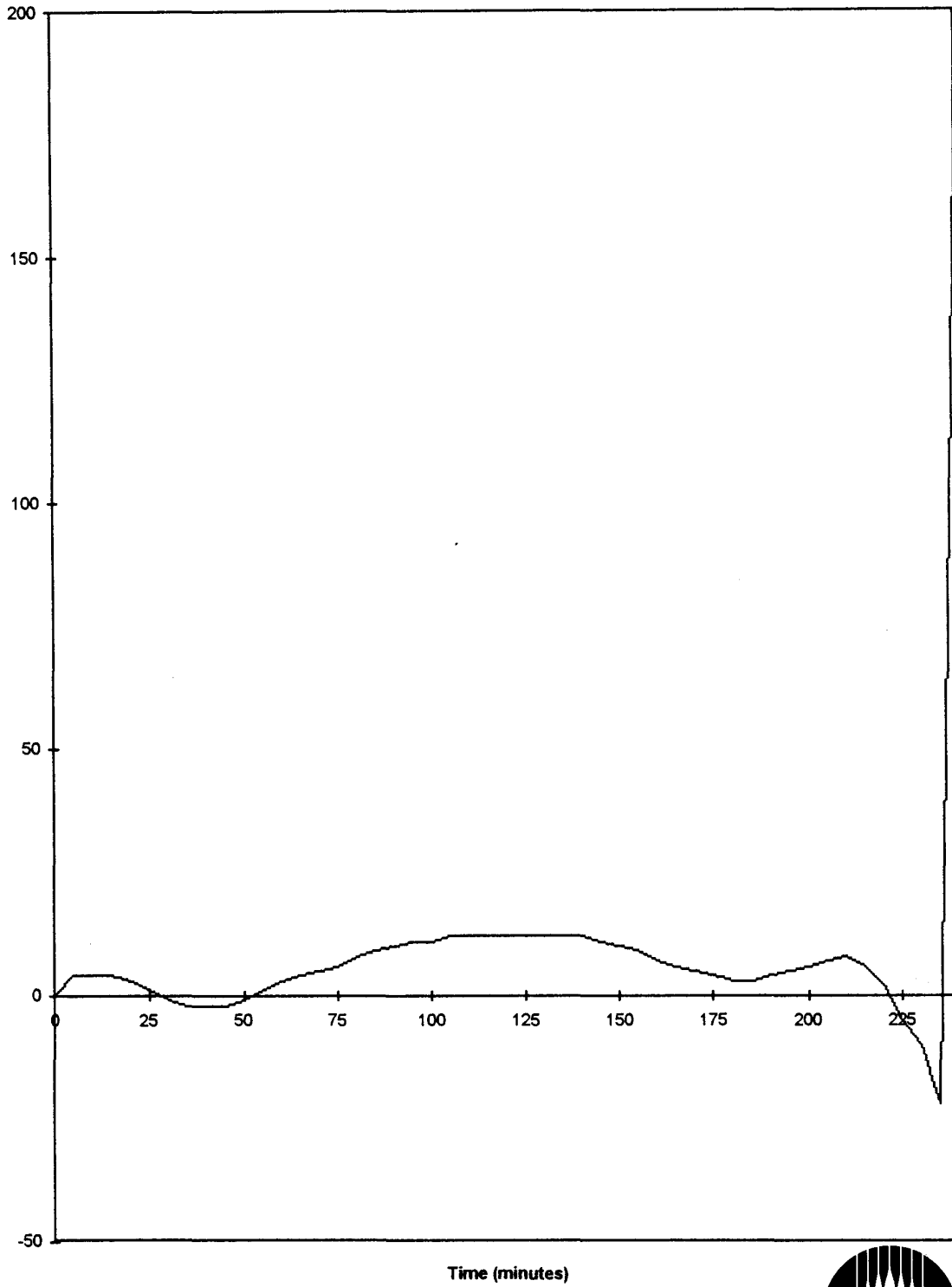


FIG. 4 - SPECIMEN DEFLECTION
At the centre of the unexposed face.





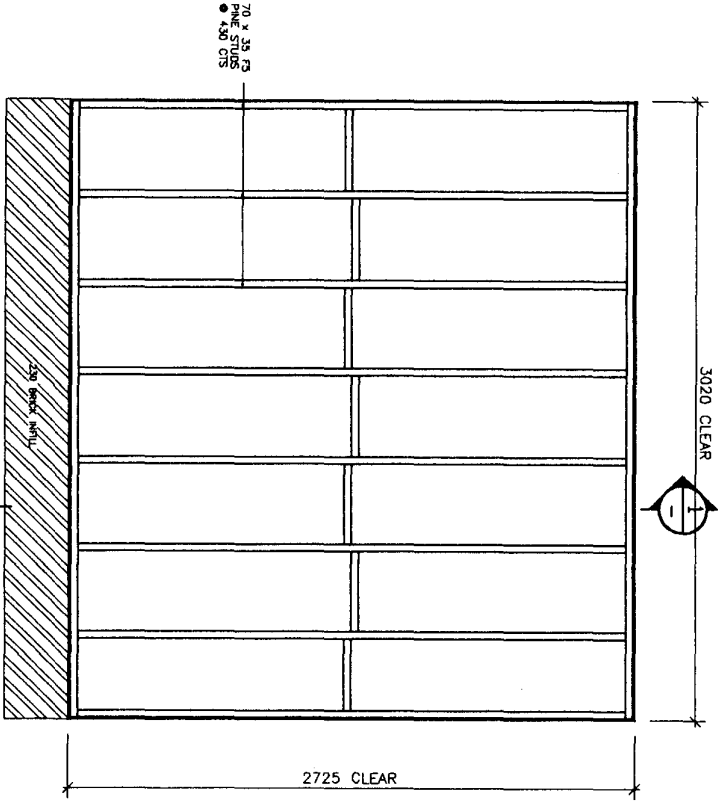
Hebel

500 Hebel Lane, #414
 UNIT 5, 9100 STREET,
 CHATHAMWOOD 2087
 Phone: (02)572 5400
 Fax: (02)572 5422

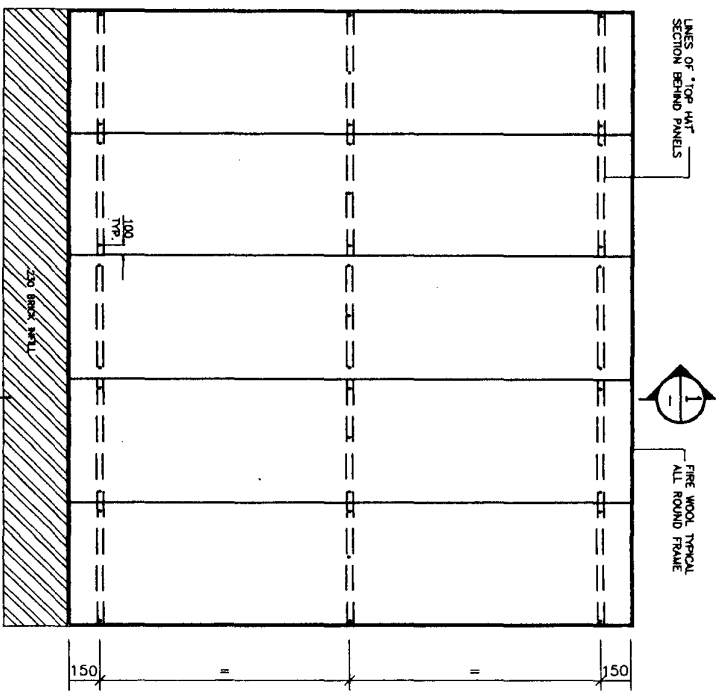
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CLIENT	NO.	DATE	REVISION	APPROV	NO.	DATE	REVISION	APPROV
TITLE			FIRE TEST FOR POWERPANEL AT THE CSIRO TEST FACILITIES.					
SCALE			DNS					
DRAWN			S.B			DWG. NO.		
DATE			31.01.95			MJ-001		
CHECKED			D.H			1 OF 1		
DATE			17/4/95			REVISION		
APPROVED			[Signature]					
DATE								

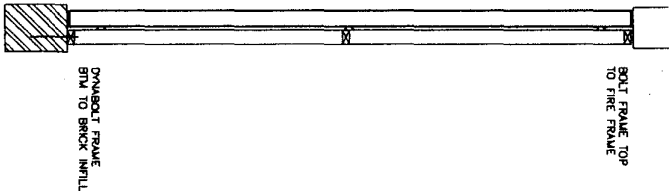
TIMBER FRAME



TOP HAT SUPPORT



SECTION I-I



Certificate of Test

No. 595

This is to certify that the element of construction described below was tested by the CSIRO Division of Building, Construction and Engineering in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4-1990, Fire-resistance tests of elements of building construction, on behalf of

CSR Hebel Australia Pty Ltd
Level 2, 9 Help Street
CHATSWOOD NSW

A full description of the test specimen and the complete test results are detailed in the Division's report FSV 0356

Product Name: Non-Loadbearing Concrete Panel System

Description: The specimen comprised a timber frame of 70 mm X 35 mm F5 soft wood studs at 430 mm centres. The top plate was bolted to the specimen containing frame. The bottom plate was fixed with masonry anchors to the brick infill at the lower edge of the specimen. Steel top hat sections, BHP top span 22 ceiling baton, were fixed horizontally to the timber frame. The Powerpanels, 75 mm thick and 600 mm wide were fixed to the top hat section with fixed with 14 gauge - 10 X 65 hex. head type 17 class 3 screws. The individual panels were fixed with two screws through the top, three screws through the middle and two screws through the lower top hat section. The unexposed face was clad with 10 mm CSR plasterboard. Details of the frame construction were as shown in drawing numbered MJ-001 by CSR Hebel Pty Ltd. The specimen had total dimensions of 2700 mm in height and 3000 mm in width. The specimen was built on a 300 mm high brick infill wall. The specimen was unrestrained on the vertical sides. The vertical gap between specimen frame and wall was filled with compressed ceramic fibre. The specimen was tested with the Powerpanel system exposed to the furnace.

Construction is detailed in the following:

- Drawing numbered MJ - 001, dated 31 January 1995, by CSR Hebel Australia Pty Ltd.

The element of construction described above satisfied the following criteria for fire-resistance for the period stated.

Structural Adequacy	-	no failure at 241 minutes.
Integrity	-	232 minutes.
Insulation	-	217 minutes.

and therefore for the purpose of Building Regulations in Australia achieved a FRL of 240/180/180. The fire-resistance level is applicable for exposure to fire from the same side as in the test.

Testing Officer: Clive Broadhead **Date of Test:** 22 February 1995

Issued on the 7th day of April 1995 without alterations or additions.


Gary E Collins
for Manager, Fire Technology

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