

FSV 1094

**FIRE-RESISTANCE TEST ON A LOAD-BEARING
BLOCK WALL SYSTEM**

In confidence to

TIMBERCRETE PRODUCTS PTY LTD

11 February 2005



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**FIRE-RESISTANCE TEST ON A LOAD-BEARING
BLOCK WALL SYSTEM****SPONSORED INVESTIGATION No. FSV 1094****IDENTIFICATION
OF SPECIMEN:**

The sponsor identified the specimen as a load-bearing block wall system.

SPONSOR:Timbercrete Products Pty Ltd
2628 Bells Line Road
BILPIN NSW**MANUFACTURER:**Timbercrete Products Pty Ltd
2628 Bells Line Road
BILPIN NSW**TEST STANDARD:**

Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4-1997, Fire-resistance tests of elements of building construction.

TEST NUMBER:

FS 3717/2685

TESTED:

The fire-resistance test was conducted on 18 January 2005.

**DESCRIPTION
OF SPECIMEN:****GENERAL**

The specimen comprised a single leaf load-bearing block wall 2980-mm high x 3000-mm wide x 210-mm thick. The masonry wall was built using 395~415-mm long x 150~170-mm high x 190~210-mm wide blocks. The block sizes are nominal as they reflected a cobble stone shape. The blocks were made from compressed sawdust, sand and cement, and had a dry density of 1000 kg/m³.

The blocks were laid up in stretcher bond with fully ironed beds and perpend of approximate width of 10-30-mm, using a standard M3 Grade mortar mixture that comprised one part cement, one part lime and six parts of sand.

RESTRAINT

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



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LOAD

A total load of 300 kN was applied to the specimen for the duration of the test.

ORIENTATION

The wall system was symmetrical.

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:

Drawings numbered 01-05 Sheet 1 & 2, both dated 25 January 2005, by Timbercrete Products Pty Ltd.

Confidential information about the test specimen has been submitted and is retained at the Division of Manufacturing and Infrastructure Technology.

EQUIPMENT:**FURNACE**

The furnace has 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 1530.4-1997 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.

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 a theodolite and rule arrangement during the test.

MEASUREMENT SYSTEM

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



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AMBIENT**TEMPERATURE:** The temperature of the test area was 30°C at the commencement of the test.**DEPARTURE FROM****TEST STANDARD:** There were no departures from the requirements of AS 1530.4-1997.**TERMINATION****OF TEST:** The test was terminated at 241 minutes.**TEST RESULTS:****CRITICAL OBSERVATIONS**

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

- 35 minutes - A vertical, hairline crack has developed through the centre of the specimen (photograph 2).
- 45 minutes - Steam is being emitted from the crack noted at 35 minutes.
- 75 minutes - Moisture patches are starting to develop along the crack noted at 35 minutes (photograph 4).
- 120 minutes - Moisture patches are starting to develop along the mortar joints (photograph 5).
- 180 minutes - No apparent change to the specimen.
- 210 minutes - Moisture patches are starting to dry out.
- 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 wall.

Figure 3 shows the curve of maximum temperature versus time recorded on the mortar joints.

SPECIMEN DEFLECTION

Figure 4 shows the curve of maximum deflection versus time recorded at the centre of the wall.



PERFORMANCE

Performance observed in respect of the following AS 1530.4-1997 criteria:

Structural adequacy	-	no failure at 240 minutes
Integrity	-	no failure at 240 minutes
Insulation	-	no failure at 240 minutes

**FIRE-RESISTANCE
LEVEL (FRL):**

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

The fire-resistance level of the specimen is applicable when the system is exposed to fire from either side, as the specimen was symmetrical.

For the purposes of AS 1530.4-1997 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.

APPENDICES:**APPENDIX 1**

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APPENDIX 2

Figure 1. - FURNACE TEMPERATURE	Page 11
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Figure 4. - SPECIMEN DEFLECTION	Page 14



APPENDIX 3

Drawing numbered 01-05 Sheet 1, dated 25 January 2005, by Timbercrete Products Pty Ltd.....Pages 15

Drawing numbered 01-05 Sheet 2, dated 25 January 2005, by Timbercrete Products Pty Ltd.....Pages 16

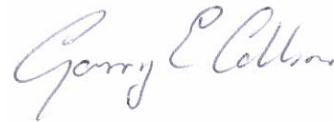
APPENDIX 4

A copy of Certificate of Test No. 1831 Page 17

TESTED BY:



Chris Wojcik
Testing Officer



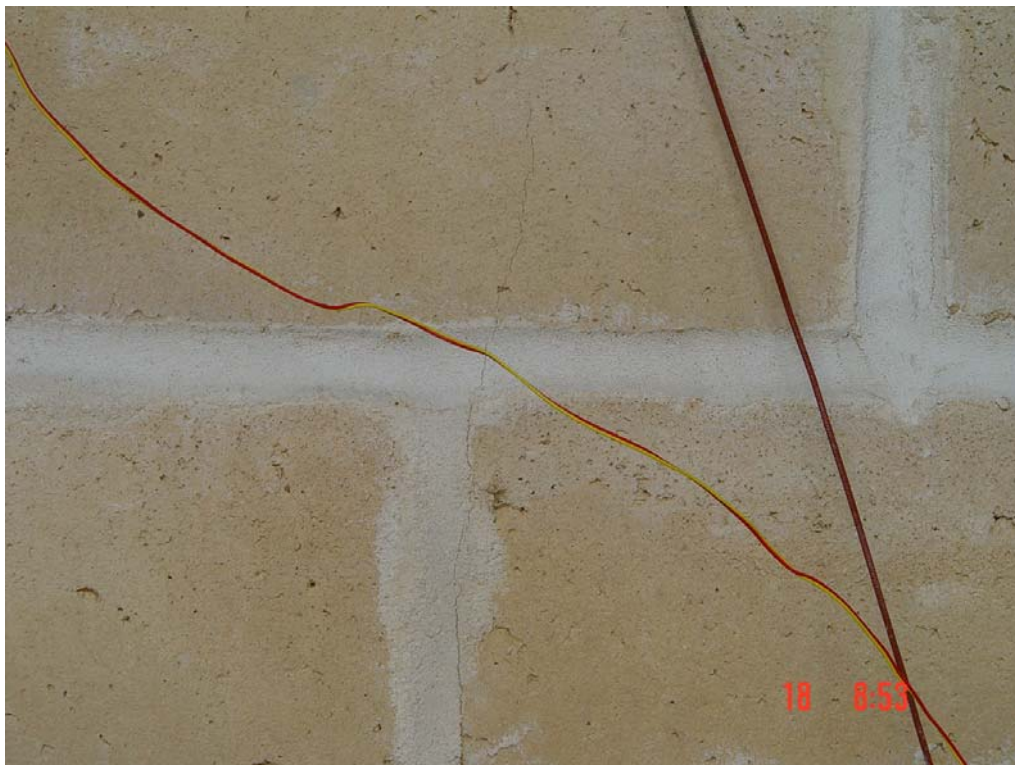
Garry E Collins
Manager, Fire Testing and Assessments

11 February 2005





Photograph 1 – Specimen prior to testing



Photograph 2 – Specimen at 37 minutes into the test



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Photograph 3 – Specimen at 60 minutes into the test



Photograph 4 – Specimen at 80 minutes into the test



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Photograph 5 – Specimen at 120 minutes into the test



Photograph 6 – Specimen at 188 minutes into the test



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Photograph 7 – Specimen at the completion of testing



Photograph 8 – Specimen (exposed side) after the completion of testing



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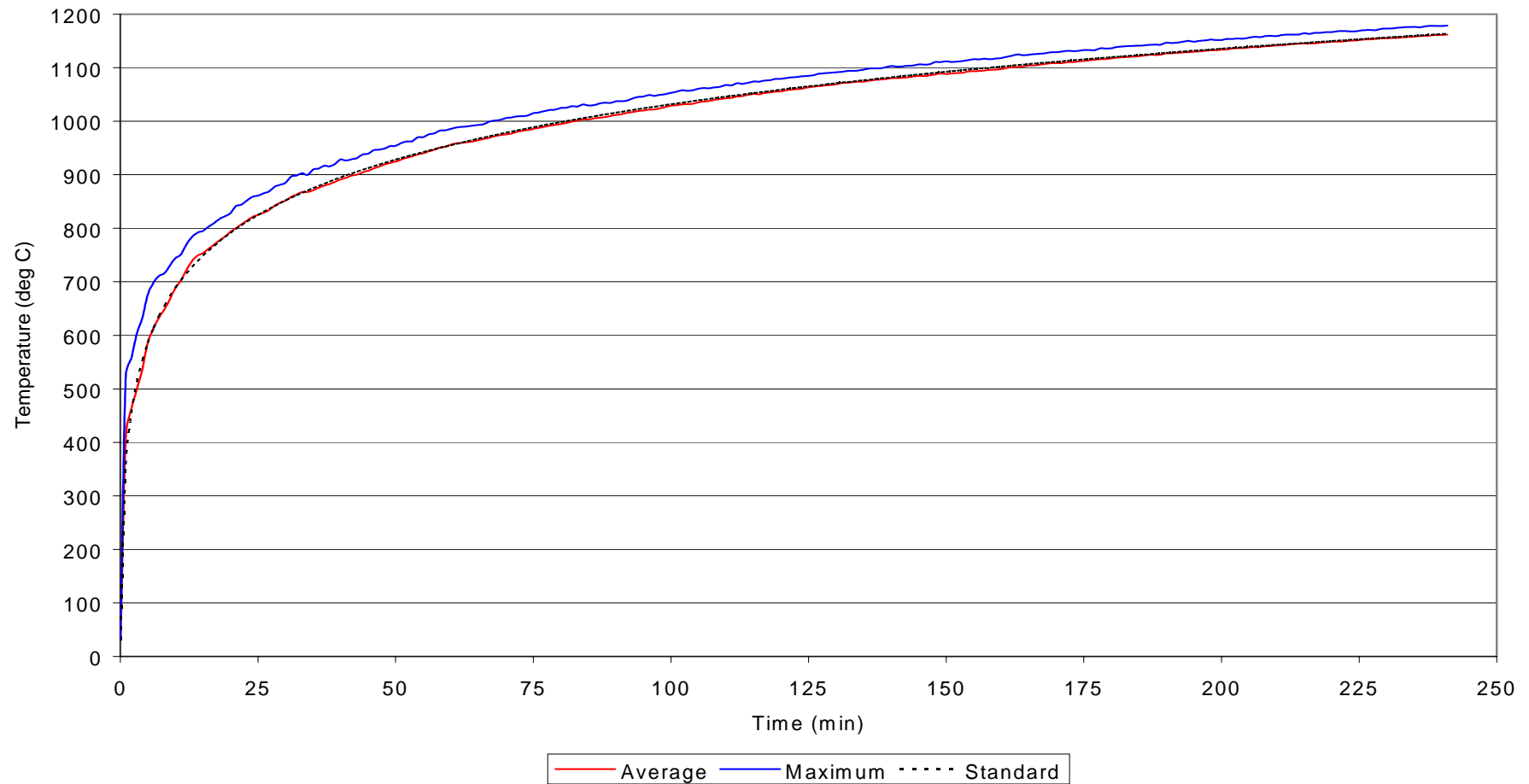


Fig. 1 – FURNACE TEMPERATURE



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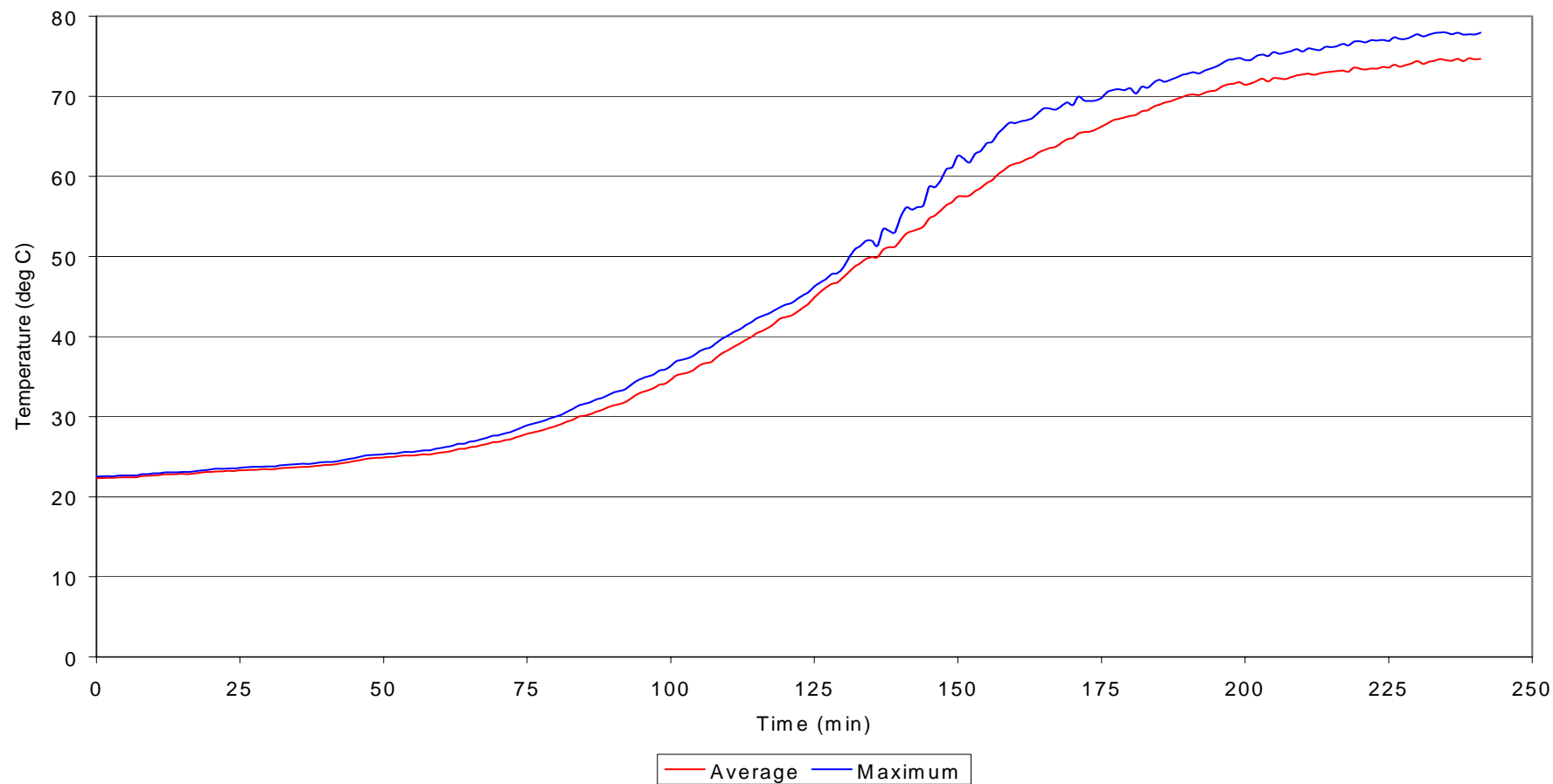


Fig. 2 – SPECIMEN TEMPERATURE
Unexposed face of the specimen



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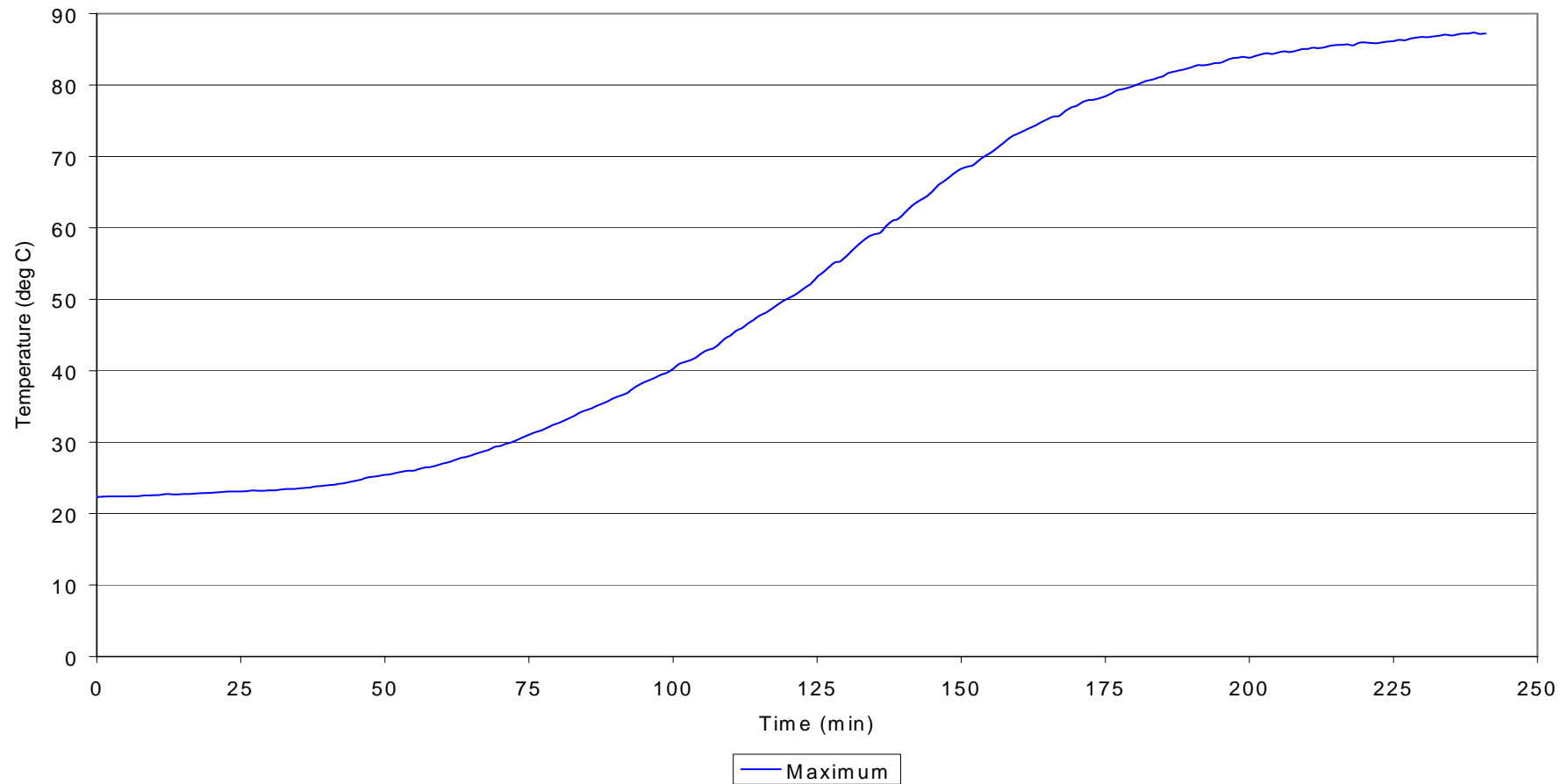


Fig. 3 – SPECIMEN TEMPERATURE
 Over mortar joints.



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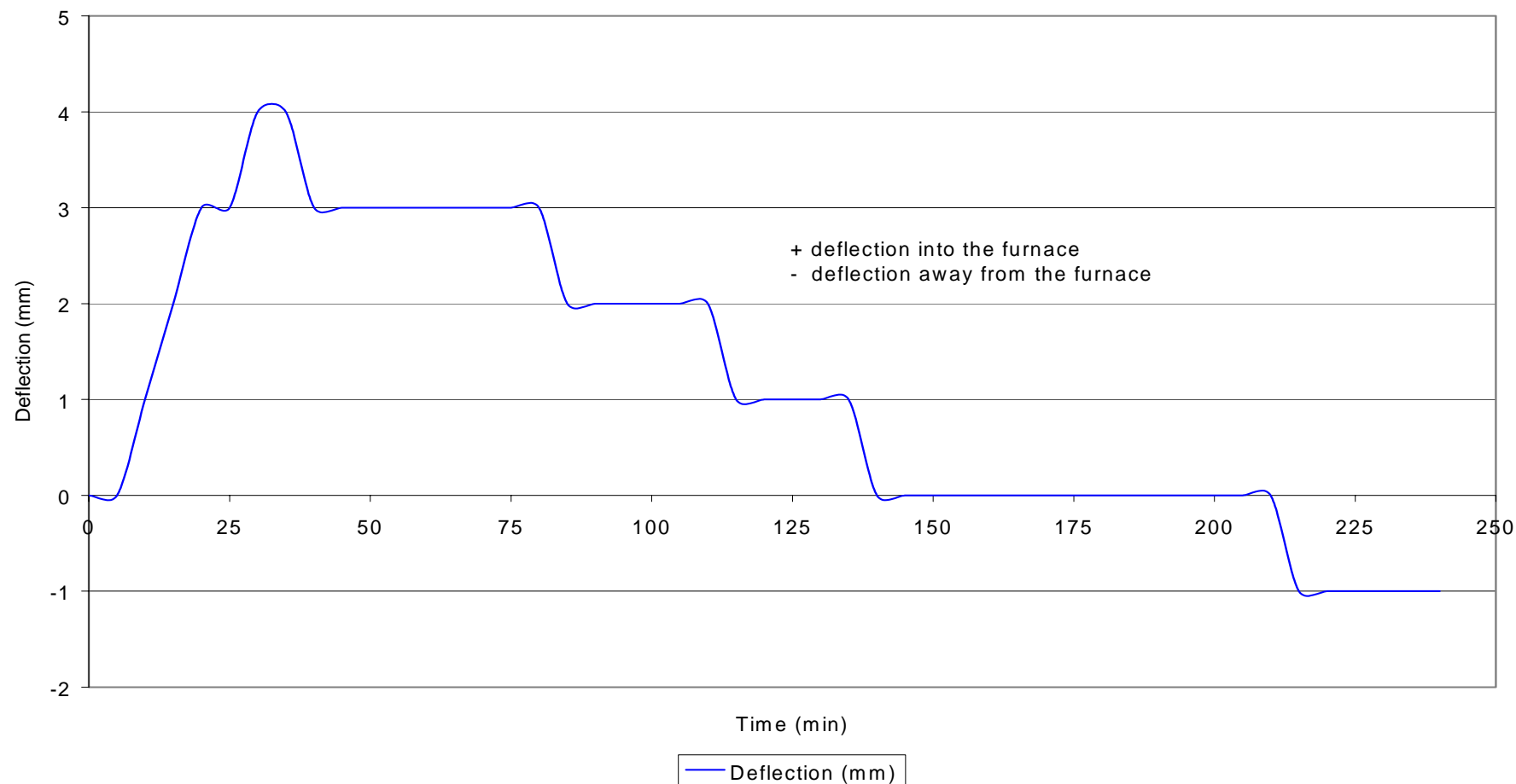


Fig. 4 – SPECIMEN DEFLECTION

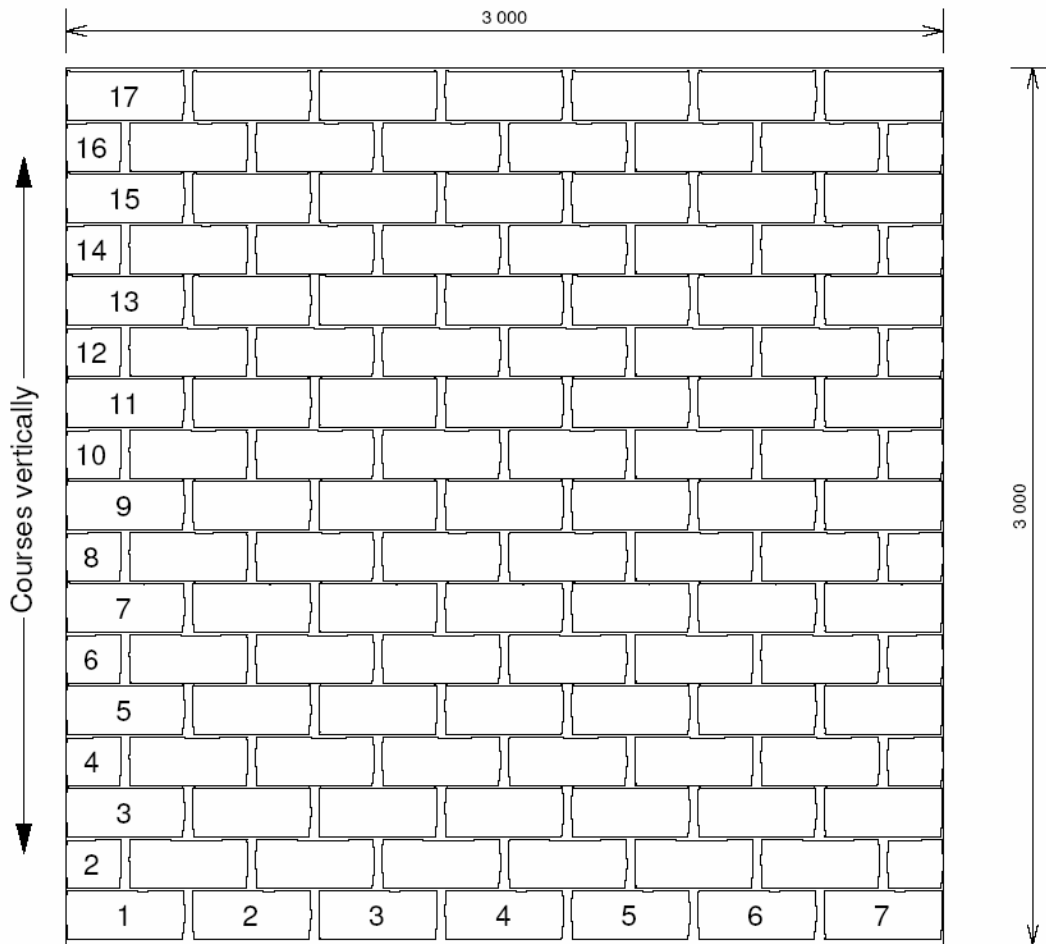


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TIMBERCRETE TEST WALL; 240/240/240 Fire Rating Test
Elevation - scale 1:20

BLOCK SPECIFICATIONS (normative)	
Density	1000kg/m ³
Compressive Strength	3.0 MPa
Weight	12kg
Block size	Length; 395-415mm Width; 190-210mm Height; 150-170mm

WALL ELEVATION Fire Test & Thermal Transmission; 240/240/240 CSIRO; North Ryde, Sydney	Scale: 1:20	Sheet: 1
	Drawn: SGW	Drawing Number 01-05
	Date: 25/1/2005	
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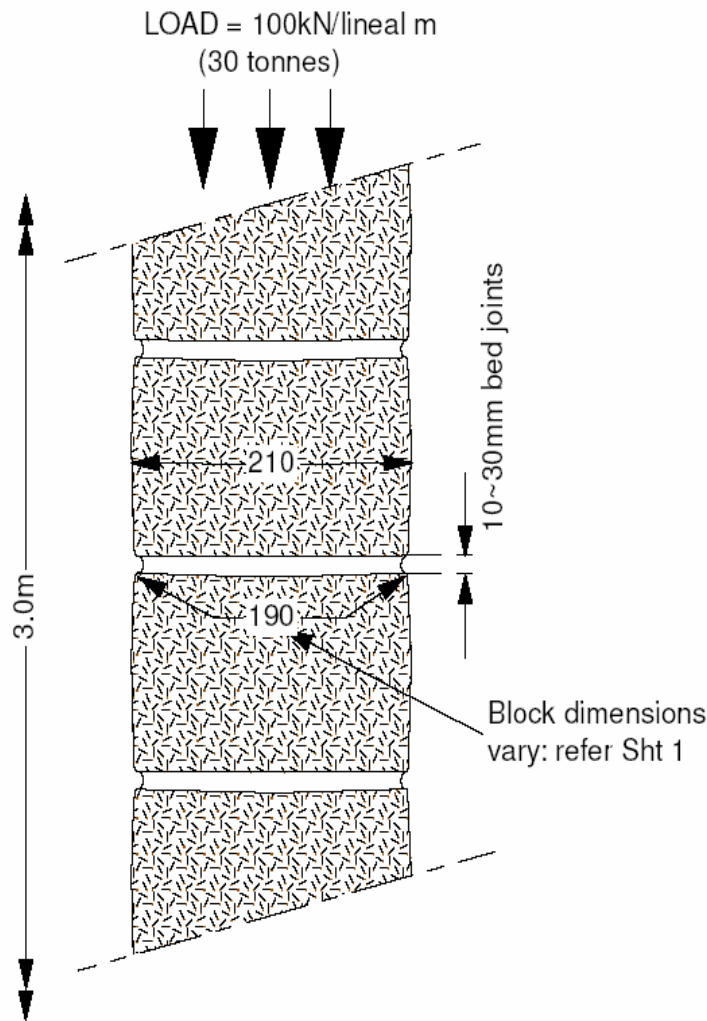


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CROSSECTION; WALL CONSTRUCTION
scale 1:5

WALL CROSSECTION Fire Test & Thermal Transmission; 240/240/240 CSIRO; North Ryde, Sydney	Scale:	Sheet: 2
	Drawn: SGW	Drawing Number 01-05
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BUILDING, CONSTRUCTION AND ENGINEERING

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Certificate of Test

No. 1831

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This is to certify that the element of construction described below was tested by the CSIRO Division of Manufacturing and Infrastructure Technology in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4-1997 on behalf of:

Timbercrete Products Pty Ltd
2628 Bells Line Road
BILPIN NSW

A full description of the test specimen and the complete test results are detailed in the Division's sponsored investigation report numbered FSV 1094.

Product Name: Timbercrete load-bearing block wall system.

Description: The specimen comprised a single leaf load-bearing block wall 2980-mm high x 3000-mm wide x 210-mm thick. The masonry wall was built using 395-415-mm long x 150-170-mm high x 190-210-mm wide blocks. The block sizes are nominal as they reflected a cobble stone shape. The blocks were made from compressed sawdust, sand and cement and had a dry density of 1000 kg/m³. The blocks were laid up in stretcher bond with fully ironed beds and perpends of approximate width of 10-30-mm, using a standard M3 Grade mortar mixture that comprised one part cement, one part lime and six parts of sand. The specimen was unrestrained on the vertical sides. The vertical gap between specimen frame and wall was filled with compressed ceramic fibre. A total load of 300 kN was applied to the specimen for the duration of the test. The wall system was symmetrical. Details of wall construction are shown in Drawings numbered 01-05 Sheet 1 & 2, both dated 25 January 2005, by Timbercrete Products Pty Ltd.

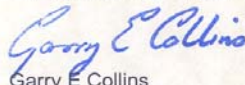
The element of construction described above satisfied the following criteria for fire-resistance for the period stated.

Structural Adequacy	-	no failure at 240 minutes
Integrity	-	no failure at 240 minutes
Insulation	-	no failure at 240 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of 240/240/240. The FRL is applicable for exposure to fire from either direction.

Testing Officer: Chris Wojcik Date of Test: 18 January 2005.

Issued on the 11th day of February 2005 without alterations or additions.



Garry E Collins
Manager, Fire Testing and Assessments



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