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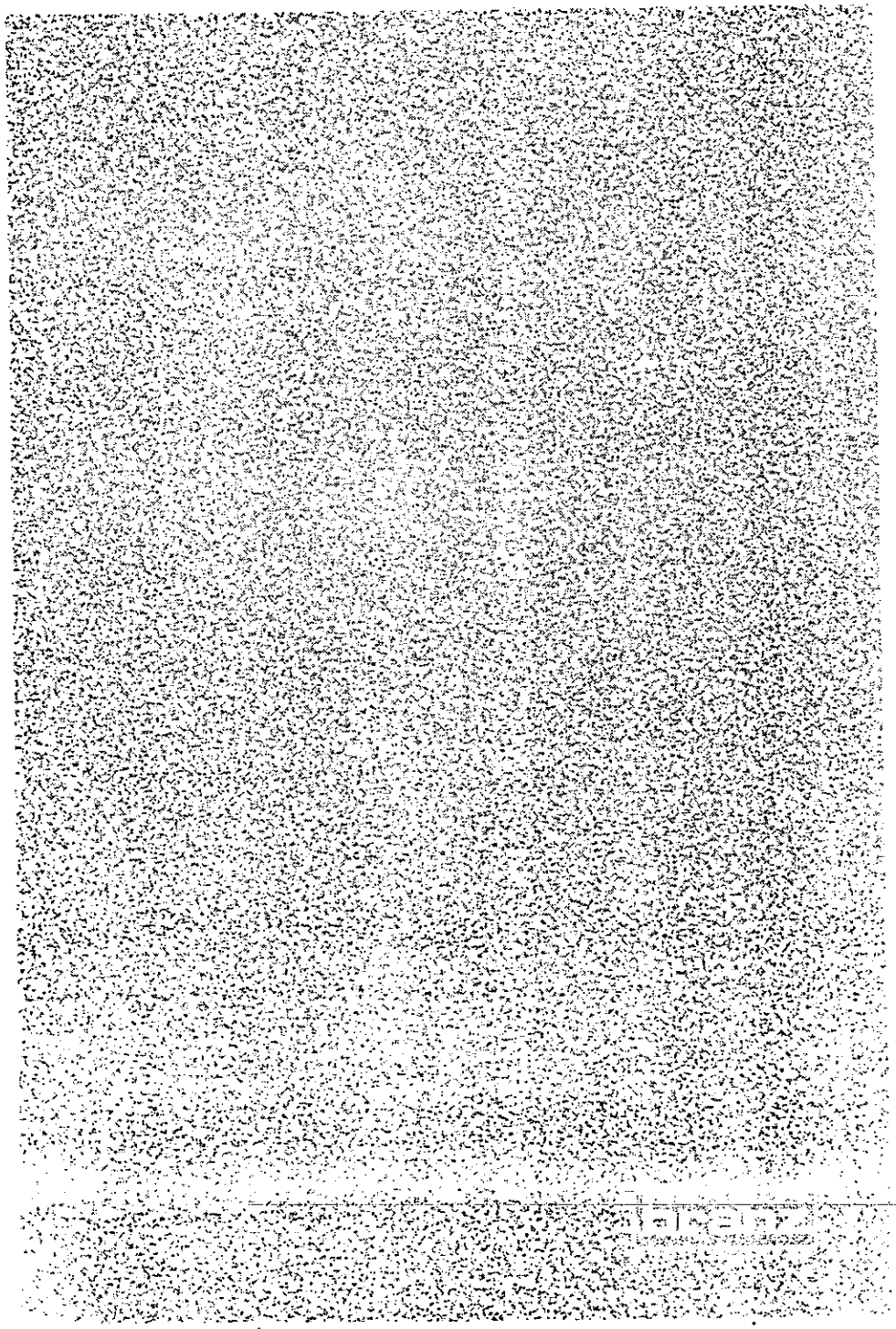
Telegrams. BRANZ. Wellington. Telex: NZ30256. Telephone: Wellington (04) 357600

BUILDING RESEARCH ASSOCIATION OF NEW ZEALAND

TEST REPORT

FR 1091
12 August 1985

REPORT ON THE FIRE RESISTANCE PROPERTIES OF A NON-LOADBEARING 18mm CUSTOMWOOD LINED TIMBER FRAMED PARTITION



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Building Research Assn. of N.Z.
Private Bag, Porirua

TEST REPORT

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REPORT ON THE FIRE RESISTANCE PROPERTIES OF A NON-LOADBEARING 18mm CUSTOMWOOD LINED, TIMBER FRAMED PARTITION

1. INTRODUCTION

1.1 Test Sponsor

Canterbury Timber Products Ltd
P O Box 154
RANGIORA

1.2 Test Specification

The test was in accordance with ISO 834 - 1975 Fire Resistance Tests - Elements of Building Construction. This states that the fire resistance of a non-loadbearing test specimen shall be the time, expressed in minutes, to failure under one or more of the following criteria:

1.2.1 Insulation

For elements of construction, such as partitions, which have the function of separating two parts of a building:

1. The average temperature of the unexposed face of the test specimen shall not exceed the initial temperature by more than 140°C.

2. The maximum temperature at any point on this face shall not exceed the initial temperature by more than 180°C, and shall not exceed 220°C irrespective of the initial temperature.

1.2.2 Integrity

"Initial integrity failure" is deemed to occur when either:

1. Cracks, holes or other openings are formed in the test specimen such that flames or hot gases can pass so as to cause ignition of a cotton pad, or

2. Sustained flaming, having a duration of at least ten seconds, appears on the unexposed face of the test specimen.

"Ultimate integrity failure" is deemed to occur when the partition collapses.

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2. DESCRIPTION OF TEST SPECIMEN

2.1 General

The test specimen was a section of a non-loadbearing timber framed wall nominally measuring 3m square by 130mm thick. The specimen was symmetrical between its faces and was restrained on all four edges.

2.2. Framing

The frame was constructed from nominal 100 x 50mm boric treated No 1 framing radiata pine, gauged on all four sides. The moisture content of the timber was measured to be between 16 and 20%. Top and bottom plates were each secured to the specimen holder using two bolts and a layer of 12mm 'Kaowool' was used as a gasket between the timber and specimen holder. Studs were set at 610mm centres, with the two end studs being secured to the specimen holder using 3 bolts and a 12mm 'Kaowool' gasket. Dwangs were fitted throughout at 610mm centres. The nails used in the framing were 100 x 4mm galvanised steel flatheads.

2.3 Lining

A single layer of 18mm "Customwood", being a medium density fibreboard manufactured by the sponsor, was attached to each side of the frame. The sheet size was 2.42 x 1.22m and this lead to the inclusion of both horizontal and vertical joints in the test specimen. Horizontal joints occurred on the exposed face over a dwang approximately 600mm down from the top edge and likewise on the unexposed face 600mm up from the bottom edge. The vertical joints were staggered between the exposed and unexposed faces over alternate studs. The "Customwood" sheets were cut back 25mm from the perimeter of the unexposed face.

2.4 Fixings

The lining was secured to the frame with 60 x 2.8mm galvanised flathead nails at 200mm centres at the sheet edges and 300mm within sheets over both dwangs and studs. The nail heads were not punched or stopped.

3. TEST PROCEDURE

3.1 The specimen was tested on 3 April 1985 at BRANZ laboratories, Judgeford, New Zealand, in the presence of a representative from the sponsoring company. The test terminated after 36 minutes from the commencement of the test.

3.2 The specimen-containing frame was sealed to the 4 m x 3 m furnace and the temperature and pressure conditions were controlled to the limits defined in ISO 834 - 1975.

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3.3 Furnace Temperature Measurement

Temperature measurement within the furnace was made using twelve chromel-alumel thermocouples uniformly distributed in a vertical plane approximately 100 mm back from the exposed face of the specimen.

3.4 Specimen Temperature Measurement

The temperature of the unexposed face of the wall was measured using five chromel-alumel thermocouples mounted on copper discs as defined in the test standard. In addition spot temperature measurements were taken with a portable thermocouple as required by the test standard.

3.5 Temperature Recording

With the exception of the portable thermocouple, the thermocouples described in section 3.3 and 3.4 were connected to a computer controlled data acquisition unit.

3.6 Pressure Measurement

As required by the test standard the differential pressure was controlled to be 10 $\pm$ 2 Pa above the laboratory atmosphere at a height of 2.25m. The differential pressure was monitored using a micromanometer connected to a continuously reading recorder.

3.7 Deflection Measurements

The deflection of the wall relative to the specimen holder was measured around the perimeter and across the surface at 10 minute internals throughout the test by the use of a theodolite and levelling staff.

4. OBSERVATIONS

4.1 Severity of the Test

A measurement of the severity of the fire resistance test can be established by comparison of the area beneath the time-temperature curve of the test with the area beneath the standard time-temperature curve for the same period. Figure 1 shows the standard time-temperature curve from the standard in relation to the actual mean furnace temperature. The fire severity of this test as calculated by the above comparison for 36 minutes was 100%.

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4.2 Insulation

Figure 2 shows the average and maximum temperature rises recorded by the five thermocouples on the wall. The average temperature rise did not exceed 140°C during the test. At 36 minutes the average temperature rise was 77°C.

The maximum temperature rise exceeded 180°C on a nail head adjacent a vertical joint of the unexposed sheathing at 33 minutes.

4.3 Integrity

After 30 minutes smoke began to issue from the upper section of the wall and the vertical joints in the sheathing. These areas were tested with cotton wool pads but no failure was recorded. At 35 minutes continuous flaming occurred along the top left hand edge of the wall and began to spread down the left hand edge. By 36 minutes the unexposed face, especially to the top and left, had blackened and begun to smoke.

4.4 Deflections

The unexposed surface of the wall became progressively convex as the test proceeded. By 30 minutes the out of plane movement had reached 11mm at the centre of the wall.

5. SUMMARY

The fire resistance, in minutes, achieved by the specimen was as follows:-

Insulation	33
Initial Integrity	36
Ultimate Integrity	36 (no failure)

Attachments:

Fig 1 Furnace Temperature Rise
Fig 2 Specimen Temperature Rise

K. Trotter
Fire Research Scientist

H.L. Baber
Assistant Director

FIG.1.FURNACE TEMPERATURE RISE

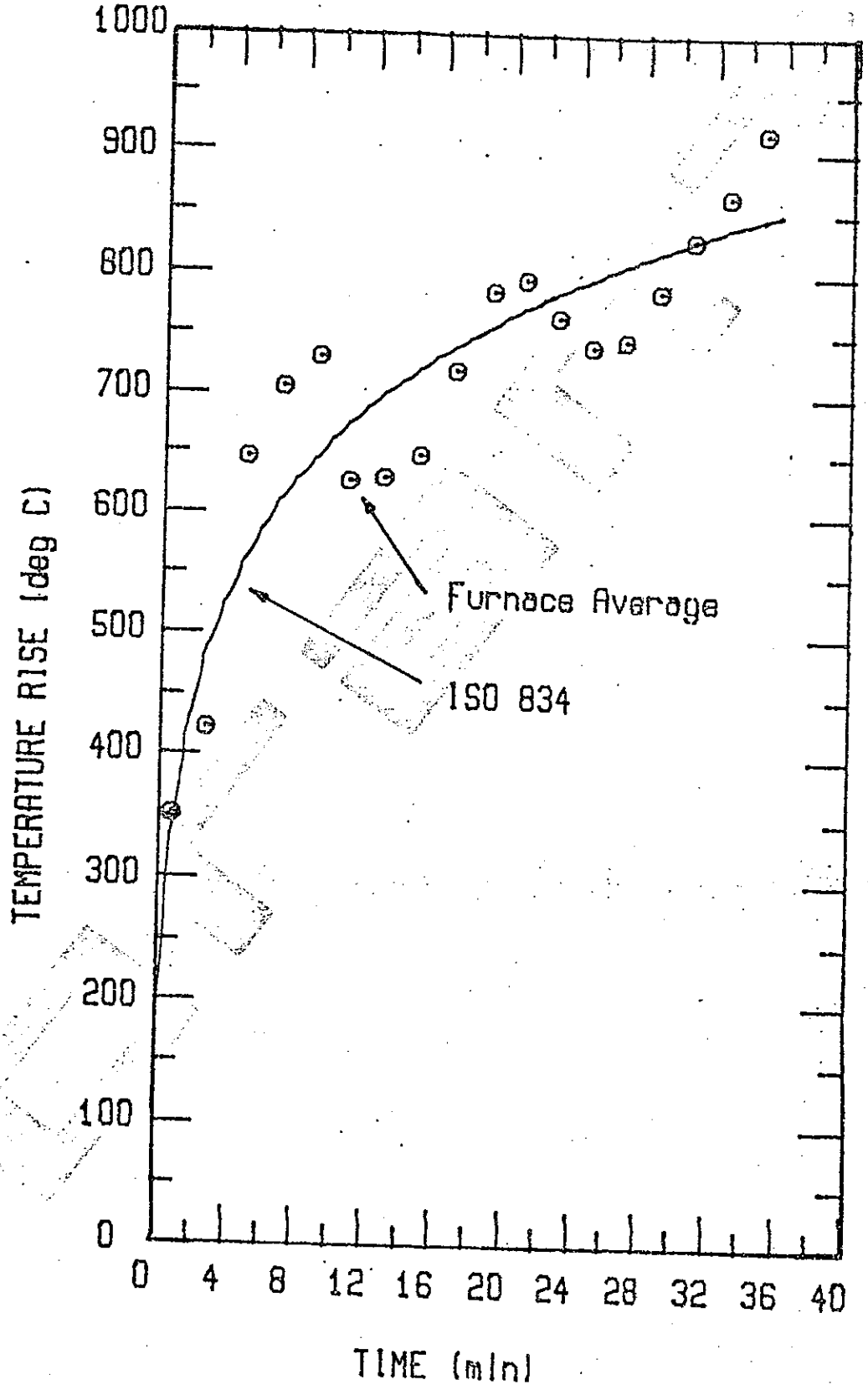

FIG.2. SPECIMEN TEMPERATURE RISE