# BRANZ Type Test

## FI12737-001

**AS ISO 9705 & ISO 9705 FIRE TEST OF AIRE 50 MM**

**CLIENT**
Woven Image Pty Ltd
37-39 Chard Road
Brookvale 2100
NSW
Australia

All tests and procedures reported herein, unless indicated, have been performed in accordance with the laboratory's scope of accreditation




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# TEST SUMMARY

## Objective

The test was carried out in accordance with AS ISO 9705 – 2003 and ISO 9705:1993 for the purpose of determining the Group Number classification as required by the Building Codes of Australia and New Zealand respectively for the control of fire spread on interior wall and ceiling linings.

## Test sponsor

Woven Image Pty Ltd
37-39 Chard Road
Brookvale 2100
NSW
Australia

## Description of test specimen

The product originally submitted by the client for testing has been renamed by the client as AIRE 50 mm with nominal thickness 50 mm, and weight of 3.8 kg/m$^2$.

## Date of test

6 November 2019

## Test results

The peak rate of heat release did not exceed 1 MW up to 1200 seconds.

A maximum smoke production rate of 1.64 m$^2$/s was recorded at 639 seconds. The maximum 60 second running average smoke production rate (SPR60 peak) was determined to be 1.42 m$^2$/s at 1191 seconds.

# LIMITATION

The results reported here relate only to the items tested.

# TERMS AND CONDITIONS

This report is issued in accordance with the Terms and Conditions as detailed and agreed in the BRANZ Services Agreement for this work.




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**TO WHOM IT MAY CONCERN**

Both NATA (National Association of Testing Authorities, Australia) and IANZ (International Accreditation New Zealand) are signatories to the ILAC Mutual Recognition Arrangement. Under the terms of this arrangement, each signatory:

(i) recognises within its scope of recognition of this Arrangement the accreditation of an organisation by other signatories as being equivalent to an accreditation by its own organisation,

(ii) accepts, for its own purposes, endorsed* certificates or reports issued by organisations accredited by other signatories on the same basis as it accepts endorsed* certificates or reports issued by its own accredited organisations,

(iii) recommends and promotes the acceptance by users in its economy of endorsed* certificates and reports,

* *The word "endorsed" means a certificate or report bearing an Arrangement signatory's accreditation symbol (or mark) preferably combined with the ILAC-MRA Mark.*

Signed:

**Jennifer Evans**
**NATA CEO**

Date: 24 March 2014

**Dr Llewellyn Richards**
**IANZ CEO**

Date: 24th March 2014




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# SIGNATORIES

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Senior Fire Engineer/Fire Testing Team Leader
IANZ Approved Signatory

# DOCUMENT REVISION STATUS

| ISSUE NO. | DATE ISSUED | REVIEW DATE | DESCRIPTION |
|---|---|---|---|
| 01 | 21/02/2020 | 21/02/2025 | Initial Issue |




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# 1. TEST METHOD

The test was carried out in accordance with AS ISO 9705 – 2003 and ISO 9705:1993 (the standard) except as follows:

- Smoke measurement was carried out using a helium-neon laser instead of a white light system. This was not expected to adversely affect the results.
- Heat flux at the floor was not measured.

In the preface to AS ISO 9705 – 2003 it contains the following statement. “This Standard is identical with and has been reproduced from ISO 9705:1993, *Fire tests—Full-scale room test for surface products*.” This establishes that the two standards are identical and that therefore the results reported herein are applicable under both standards.

The test was undertaken to establish compliance with:

- The National Construction Code (NCC) Volume One Specification C1.10 of the Building Code of Australia (BCA) (AS 5637.1); in respect to the fire performance of wall and ceiling linings, through testing in accordance with AS ISO 9705.
- The New Zealand Building Code C/VM2 Appendix A (ISO 9705) in respect to the fire performance of wall and ceiling linings.




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# 2. DESCRIPTION OF THE TEST SPECIMEN

## 2.1 General

This test comprised three walls (excluding that containing the door) and the ceiling lined with the test specimen.

## 2.2 Specimen Selection

BRANZ was not involved in the selection of the materials submitted for testing.

The test materials used for construction of the test specimen were supplied to the laboratory by the client and the client was also responsible for the installation of the test specimen. The test materials were received on the 31 October 2019.

## 2.3 Description of Specimen

The product originally submitted by the client for testing has been renamed by the client as "AIRE 50 mm" comprising white coloured nominally 50 mm thick 100% thermally bonded polyester fibre sound absorptive panel with nominal weight of 3.8 kg/m² adhered to nominally 6 mm thick fibre cement sheet substrate.

The issue of this report has been made on the basis of evidence provided by the client sufficient for BRANZ to consider the original test results carried out in FI12158-001 remain representative of current product.

## 2.4 Installation of Specimen

A lightweight steel stud frame was installed against the three full walls and ceiling of the test room and lined on the interior face with nominally 50 mm thick "AIRE Panel 50 mm".

The panels were oriented with the thermally bonded polyester fibre panel facing the inside of the room. The panels were fixed by cauterizing a pilot hole through the polyester panel and secured the fibre cement substrate with standard grade screws at nominally 300 mm spacings along the width of each panel to the steel stud framing. Figure 1 shows the completed installation.

**Figure 1: Completed installation**

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## 2.5 Specimen Conditioning

The specimen was not subjected to any special conditioning.




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# 3. EXPERIMENTAL PROCEDURE

## 3.1 Test Standard

The test was carried out according to the test specifications and procedure described in AS ISO 9705-2003 and ISO 9705:1993 'Fire tests – Full-scale room test for surface products' (the test standard), with variations as noted in Section 1 above.

## 3.2 Test Date and Initial Conditions

The test was conducted on the 6th November 2019, supervised by Mr P Collier.

The initial conditions in the laboratory were 17.7 ºC, 64 % relative humidity and 100.86 kPa atmospheric pressure.

The horizontal wind speed at a horizontal distance of 1 m from the centre of the doorway did not exceed 0.5 m/s.

## 3.3 Fire Test Room

The fire test room consisted of four walls at right angles, a floor and ceiling with the following nominal dimensions – 3.6 m long x 2.4 m wide x 2.4 m high. A doorway was located in the centre of one of the 2.4 m x 2.4 m walls and this had nominal dimensions 2.0 m high x 0.8 m wide. The opening discharged into a steel hood for the collection of all combustion products connected to an exhaust system that allowed gas sampling and light obscuration measurements to be done.

The test room was constructed of nominally 150 mm thick, lightweight concrete panels with a density of 560 kg/m³.

## 3.4 Ignition Source

The ignition source was a propane gas sand diffusion burner with a square (0.17 x 0.17 m) top surface at a height of 0.35 m above floor level. The burner was placed on the floor in a corner opposite to the doorway opening and positioned as close as possible to the specimen in the corner wall. The test programme was to control the gas flow to the gas flow to the burner to generate a heat output of 100 kW for 10 minutes followed by 300 kW for a further 10 minutes after which the test would be stopped.

## 3.5 Gas Analysis

The products of combustion from the test room were collected in the hood and exhausted through a duct 0.4 m in diameter. Instrumentation in the duct included a sampling probe to take off gas samples for analysis.

Gas samples taken from the duct were analysed and the oxygen consumption was measured using an enhanced SERVOMEX 4100 paramagnetic oxygen analyser. The oxygen mole fraction was corrected for any changes in barometric pressure during the period of the test using output from an absolute pressure transducer. Carbon dioxide concentrations were also measured with an infrared $CO_2$ sensor fitted within the same chassis as the oxygen analyser.

## 3.6 Flow Volume Monitoring

The duct instrumentation section contained a bi-directional probe connected to a differential pressure transducer. A 1.5 mm type K thermocouple was located with its tip close to the open end of the bi-directional probe. This was used for volume flow monitoring.



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## 3.7 Optical Density

Smoke obscuration measurements of exhaust gases in the duct were taken using a 0.5 mW Helium-neon laser system with photometric detector fitted to a rigid cradle. The laser was aligned to fall on a photodetector system, on the opposite side of the duct. A compensating detector was situated on the laser side of the duct to act as a reference. A 1.5 mm type K thermocouple was located with its tip close to the laser beam. These were used for smoke obscuration and production measurements.

## 3.8 Heat Flux Instrumentation

Heat flux measurements were not recorded.

## 3.9 Data Recording

Data recording logging at 3-second intervals was commenced at least 2 minutes before ignition of the burner and continued (till after extinguishment).




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# 4. SYSTEM PERFORMANCE

## 4.1 Calibration

Prior to the product test, a calibration was performed with the burner positioned directly beneath the hood and output adjusted to 0 kW for 2 minutes, then 100 kW for 5 minutes, then 300 kW for 5 minutes, then 100 kW for 5 minutes and then 0 kW for 3 minutes. Data was collected at 3 second intervals. The ratio of the average mass flow per unit area to mass flow per unit area in the centre of the exhaust duct that resulted in the least difference in the heat release rate calculated from the measured oxygen consumption, and that calculated from the metered gas input was determined. This value ($k_t$=0.810) was then used in subsequent calculations of heat release rate for the actual product test.

At steady state conditions, the difference between the mean rate of heat release over 1 minute calculated from the measured oxygen consumption and that calculated from the metered gas input did not exceed ± 5% for the 100 kW and the 300 kW levels of heat output. The calibration results are shown in Figure 2.

**Figure 2: Calibration results for 100/300/100 kW burner output**

## 4.2 System Response

The time delay of the oxygen analyser, as determined by the time difference between a 2.5 K change in the duct temperature and a 0.05% change in the oxygen concentration, determined during the calibration procedure, was 15.75 seconds. The oxygen mole fractions were corrected on the basis of this delay time before calculating the heat release rate.

The response time of the oxygen analyser, found as the time between a 10% and 90% change in the measured oxygen concentration, determined during the calibration procedure, was 12.75 seconds.

The time delay of the $CO/CO_2$ analyser, as determined by the time difference between a 2.5 K change in the duct temperature and a 0.02% change in the carbon dioxide concentration, determined during the calibration procedure, was 12 seconds. The carbon dioxide and carbon monoxide mole fractions were corrected on the basis of this delay time before calculating the heat release rate.

The response time of the $CO/CO_2$ analyser, found as the time between a 10% and 90% change in the measured carbon dioxide concentration, determined during the calibration procedure, was 9 seconds.




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# 5. RESULTS

## 5.1 Observations

| Time Min:sec | Description |
|---|---|
| 0:00 | Test start |
| 0:45 | Melt back on the walls and ceiling had stabilised at a 300 mm radius from burner corner. Some flaming droplets had begun to fall from the ceiling and began to form a flaming pool on the floor. |
| 1:20 | The flame front increased to 400 mm radius. |
| 1:34 | Smoke layer was stable at 500 mm from ceiling. |
| 1:50 | Pool fire on floor stable at 200 mm radius. |
| 2:50 | Material on ceiling directly above the burner entirely melted exposing the fibre-cement substrate. No flaming of specimen. No change in smoke density or volume. |
| 3:15 | The pool fire began to reduce to 100 mm radius from burner corner. |
| 3:50 | No material remained on walls directly in the burner flame plume; nominally 400 mm from the corner. The fibre-cement substrate was exposed, and ceiling panels continued to drip down and collect on the floor. |
| 4:30 | Conditions stable. |
| 5:00 | Material continued to drip from the ceiling without signs of flaming. The pool fire on the floor had neared extinction. |
| 5:30 | The smoke layer was stable at 600 mm with an increased density. |
| 6:30 | Ceiling material had melted back to 400 mm radius from the burner corner. |
| 7:30 | Smoke density began to increase. |
| 8:30 | The polyester skin of the wall panel, directly adjacent to the burner, began to peel down from the top of the panel. The ceiling panel directly above the burner continued to melt and drip to the floor without flaming. |
| 9:30 | Outer layer on right-hand side wall panel peeled 500 mm down from the top of the wall. |
| 10:00 | Burner output increased to 300 kW and there was an immediate increase in melting and dripping of ceiling material. Some flaming droplets were observed although no pool fire formed. |
| 10:30 | Smoke layer had increased to 900 mm from ceiling. |
| 10:50 | Entire ceiling panel above burner was melting and dripping onto the floor, no flaming droplets. No spread of flame along wall panels. |
| 11:30 | The outer skin of the ceiling panel furthest from the burner began to melt, peel and fall to the floor. No liquid pool fire or flaming droplets was observed. |
| 12:00 | Wall panels directly exposed to the burner plume melted back 1200 mm along the wall at ceiling level. |
| 14:11 | Smoke layer receded to 500 mm from ceiling with improved visibility. |



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| | |
|---|---|
| 15:00 | Fibre-cement substrate began to crack and break away from the steel framing. |
| 16:30 | Smoke density increased. Outer skin on left-hand wall began to slump and peel down from the top of the wall panel. |
| 17:41 | Ceiling material continued to melt and fall to the floor. Nominally 70% of ceiling material had melted back. |
| 19:00 | No sustained flaming of the polyester. Smoke density increased. |
| 20:00 | End of test. No sustained flaming. |



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## 5.2 Test Results and Reduced Data

### 5.2.1 Duct flow

Time-volume flow in the exhaust duct is shown in Figure 3.

**Figure 3: Volume flow at 298 K in exhaust duct**

### 5.2.2 Total heat release

The total rate of heat release measured during the test and the contribution from the burner is shown in Figure 4. The peak rate of heat release did not exceed 1 MW up to 1200 seconds.

**Figure 4: Rate of Heat Release**

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### 5.2.3 $CO_2$ concentration

The concentration of carbon dioxide measured during the test is shown in Figure 5. The peak $CO_2$ concentration of 0.58% was recorded at 639 seconds.

**Figure 5: Carbon dioxide concentration**

### 5.2.4 Optical density

The rate of production of light-obscuring smoke measured during the test is shown in A maximum smoke production rate of 1.64 m²/s was recorded at 639 seconds. The maximum 60 second running average smoke production rate (SPR60 peak) was determined to be 1.42 $m^2/s$ at 1191 seconds.

Figure 6.

A maximum smoke production rate of 1.64 m²/s was recorded at 639 seconds. The maximum 60 second running average smoke production rate (SPR60 peak) was determined to be 1.42 $m^2/s$ at 1191 seconds.

**Figure 6: Smoke production rate**




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### 5.2.5 Heat flux

The heat flux was not measured.




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# 6. PHOTOGRAPHS

**Photograph 1: Prior to test**

**Photograph 2: At 30 seconds**

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**Photograph 3: At 60 seconds**

**Photograph 4: At 90 seconds**

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**Photograph 5: At 120 seconds**

**Photograph 6: At 150 seconds**

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**Photograph 7: At 180 seconds**

**Photograph 8: At 240 seconds**

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**Photograph 9: At 300 seconds**

**Photograph 10: At 362 seconds**

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**Photograph 11: At 420 seconds**

**Photograph 12: At 480 seconds**

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**Photograph 13: At 540 seconds**

**Photograph 14: At 570 seconds**

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**Photograph 15: At 600 seconds**

**Photograph 16: At 615 seconds**

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**Photograph 17: At 630 seconds**

**Photograph 18: At 660 seconds**

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**Photograph 19: At 720 seconds**

**Photograph 20: At 750 seconds**

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**Photograph 21: At 780 seconds**

**Photograph 22: At 840 seconds**

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**Photograph 23: At 900 seconds**

**Photograph 24: At 960 seconds**

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**Photograph 25: At 1020 seconds**

**Photograph 26: At 1080 seconds**

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**Photograph 27: At 1140 seconds**

**Photograph 28: At 1200 seconds – end of test**

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**Photograph 29: After test**

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# FI12737-001
# GROUP CLASSIFICATION NUMBER

This is to certify that the specimen described below was tested by BRANZ for determination of Group Number Classification and SMOGRA in accordance with AS ISO 9705 – 2003 and Group Number Classification and Smoke Production Rate in accordance with ISO 9705:1993.

**Test Sponsor**

Woven Image Pty Ltd
37-39 Chard Road
Brookvale 2100
NSW
Australia

**Date of test**

6 November 2019

**Reference BRANZ Test Report**

FI12737-001 – issued 21/02/2020

**Test specimen as described by the client**

The product submitted by the client for testing was identified by the client as AIRE 50 mm with nominal thickness of 50 mm, and nominal weight of 3.8 kg/m².

**Group Number Classification in accordance with NCC Australia**

Calculations were carried out as per AS 5637.1:2015. The Group Number Classification and $SMOGRA_{RC}$ for the sample as described above is given in the table below.

**Determination of Fire Hazard Properties**

The specimen was deemed suitable for testing in accordance with AS 5637.1:2015 and testing was performed in accordance with AS ISO 9705 – 2003 for the purposes of Group Number Classification as specified in the NCC Volume One Specification C1.10 Clause 4.

**Group Number Classification in accordance with the New Zealand Building Code**

Calculations were carried out according to NZBC Verification Method C/VM2 Appendix A. The classification for the sample as described above is given in the table below.

| Building Code Document | Group Number Classification |
|---|---|
| NCC Volume One Specification C1.10 Clause 4 determined in accordance with AS 5637.1:2015 | 1<br>The SMOGRA was 1.2 $m^2/s^2$ x 1000 and therefore within the 100 $m^2/s^2$ x 1000 limit |
| NZBC Verification Method C/VM2 Appendix A | 1-S<br>Average Smoke Production Rate was 0.6 $m^2/s$ and therefore within the 5 $m^2/s$ limit |

**Issued by**

L. F. Hersche
Fire Testing Engineer
BRANZ

**Reviewed by**

P. N. Whiting
Senior Fire Engineer/Fire Testing Team Leader
IANZ Approved Signatory

*Regulatory authorities are advised to examine test reports before approving any product.*

All tests and procedures reported herein, unless indicated, have been performed in accordance with the laboratory's scope of accreditation

**Issue Date**
21/02/2020

**Expiry Date**
21/02/2025