  

BRANZ Type Test

FI12482-001

AS ISO 9705 & ISO 9705 FIRE TEST AND NCC SPECIFICATION C1.10 AND NZBC VERIFICATION METHOD C/VM2 APPENDIX A PERFORMANCE OF AIRE 25 MM

CLIENT
Woven Image Pty Ltd
37-30 Chard Road
Brookvale 2100
NSW
Australia

ACCREDITED LABORATORY

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
37-30 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 25 mm and is described as a 100% polyester fibre adhered to a fibre cement wallboard with FR spray adhesive.

Date of test

4th June 2014

Test results

The peak rate of heat release did not exceed 1 MW during the 1,200 seconds of the test.

A maximum smoke production rate of 1.19 m^2/s was recorded at 1,017 seconds. The maximum 60 second running average smoke production rate (SPR60 peak) was determined to be 1.1 m^2/s at 1,200 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.

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	Dr Llewellyn Richards IANZ CEO
Date: 24 March 2014	Date: 24th March 2014

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SIGNATORIES

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DOCUMENT REVISION STATUS

ISSUE NO.	DATE ISSUED	EXPIRY DATE	DESCRIPTION
1	5 February 2020	5 February 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.

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.

2.3 Description of Specimen

The product originally submitted by the client for testing has been renamed by the client as:

- AIRE 25 mm
- Description: 100% polyester fibre adhered to a fibre cement wallboard with FR spray adhesive
- Construction: The polyester fibre has a nominal thickness of 25 mm and the wallboard has a nominal thickness of 6 mm a total nominal thickness of 31 mm.

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 FI5540-TT remain representative of current product.

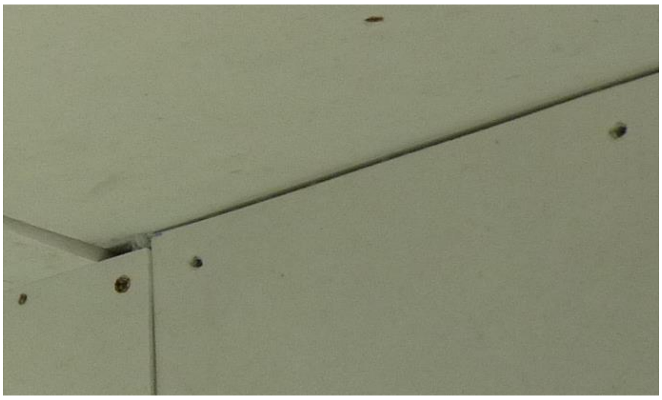
2.4 Installation of Specimen

The polyester fibre had a nominal thickness of 25 mm and was adhered to the fibre sheet with a nominal thickness of 6 mm with spray adhesive making a total nominal thickness of 31 mm.

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 the nominally 25 mm thick Woven Image AIRE Panels.

The panels were orientated with the polyester facing the inside of the room. The panels were fixed by cauterizing a pilot hole and secured with standard grade screws. Figure 1 shows a detail of the installed product.

Figure 1: Completed installation



2.5 Specimen Conditioning

The specimen was not subjected to any special conditioning.

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 4th June 2014, supervised by Mr P Collier.

The initial conditions in the laboratory were 16.3ºC, 69% relative humidity and 102.68 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 gas flow to the burner was controlled to generate a heat output of 100 kW for 10 minutes followed by 300 kW for a further 10 minutes after which the test was 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).

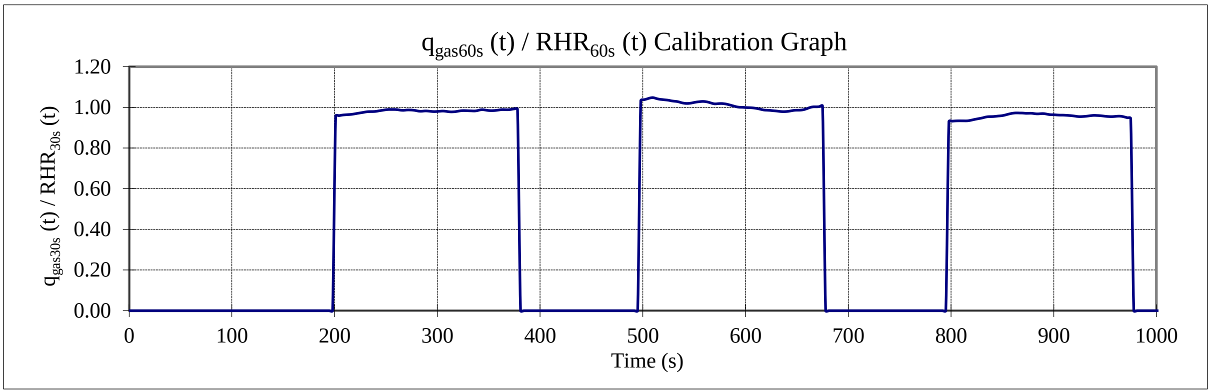
4. SYSTEM PERFORMANCE

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 calibration value (k_t=0.780) 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 first 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 17.25 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 9.75 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 8.25 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 15.75 seconds.

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5. RESULTS

5.1 Observations

Time Min:sec	Description
0:15	Flames had reached ceiling.
0:30	The polyester facing had melted back approximately 200 mm from the burner corner on the edge of the flame plume and in a 400 mm radius from the corner at the ceiling.
1:00	The melting had progressed to 250 to 300 mm from the corner.
1:50	The polyester was dripping down the walls at the edge of the flame plume and was pooling and burning at the base of the burner.
3:00	The melting of the polyester in the burner corner had progressed outwards and the radius of the melting on the ceiling was about 400 mm from the corner and tapered down to about 200 mm at floor level. Some peeling back of the product had occurred on the walls 200 to 300 mm back from the plume.
4:30	Stable conditions had established where melt back of the product had appeared to have ceased on the walls. Some separation of the product from the ceiling had commenced.
4:52	A large piece of the ceiling product at 0 to 1200 mm from the rear wall had peeled off and dropped to the floor.
6:00	Some minimal flaming had established on the burner plume to product interface on the right hand wall only, otherwise stable conditions had established with a small build-up of smoke within the compartment that was exiting in the upper portion of the doorway.
7:30	The polyester on the right hand wall from the burner to 1200 mm towards the door had started to peel downwards a distance of 300 to 600 mm.
9:00	The product on the ceiling a distance of 1200 mm from the rear wall had started peeling off slowly towards the door.
10:00	HRR increased to 300 kW.
10:30	A crack was heard indicating the fibre cement board had cracked (unseen) and the product on the ceiling between 1200 and 2400 mm from the back wall had peeled off. The product on the walls had melted and dripped to a distance of 600 to 800 mm below the ceiling in the back 2400mm of the room.
11:23	The final ceiling piece closest to the door (2400 to 3600 mm) had dropped to the floor and what was left on the ceiling was raining downwards over the majority of the room. The lining on the walls had peeled off between 600 and 800 mm below the ceiling.
12:30	Some of the fibre cement board on the right hand side had loosened at the top and was oscillating 10 to 20 mm. The polyester on the right hand side wall close to the burner had peeled off to the extent that the free end had touched the floor. Raining polyester continued over the entire room.
16:00	Slow and gradual melting of the product on the walls continued.

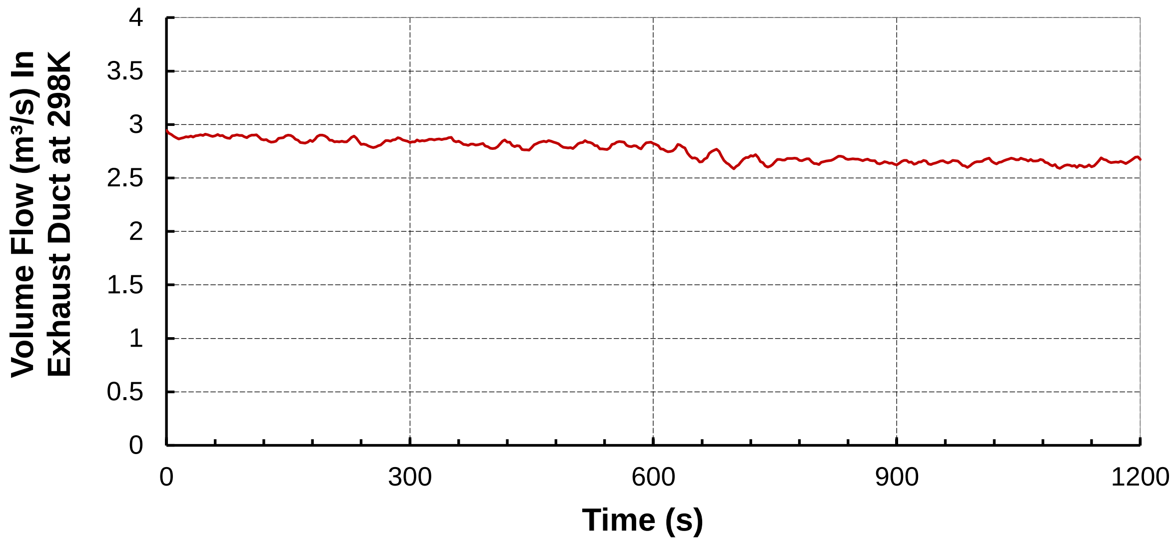
Time Min:sec	Description
18:30	Minimal burning continued between the burner plume and the residual polyester continued plus a small burning pool at base of burner, raining from the ceiling had ceased.
19:20	Intermittent flaming on the back wall continued.
19:50	Flaming on the back wall had ceased.
20:00	Test finished, burner extinguished minimal flaming continued on floor below burner and on burner gauze.

5.2 Test Results and Reduced Data

5.2.1 Duct flow

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

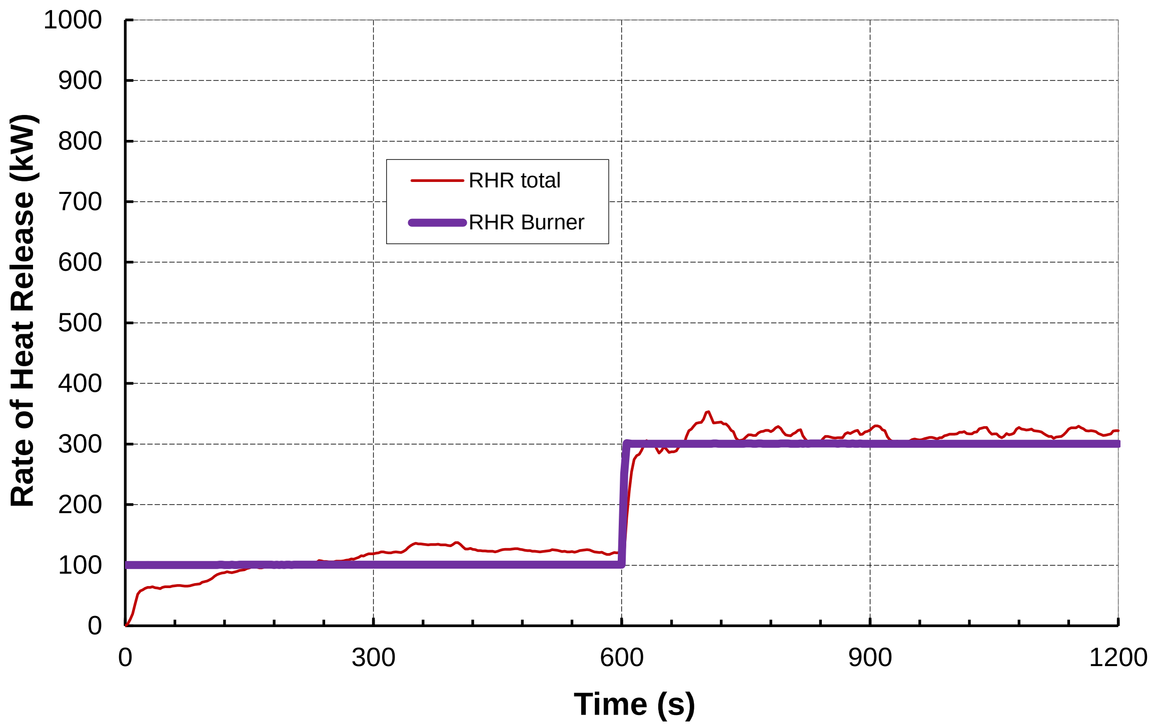
Figure 3: Volume flow at 298 K in exhaust duct



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 during the test.

Figure 4: Rate of Heat Release



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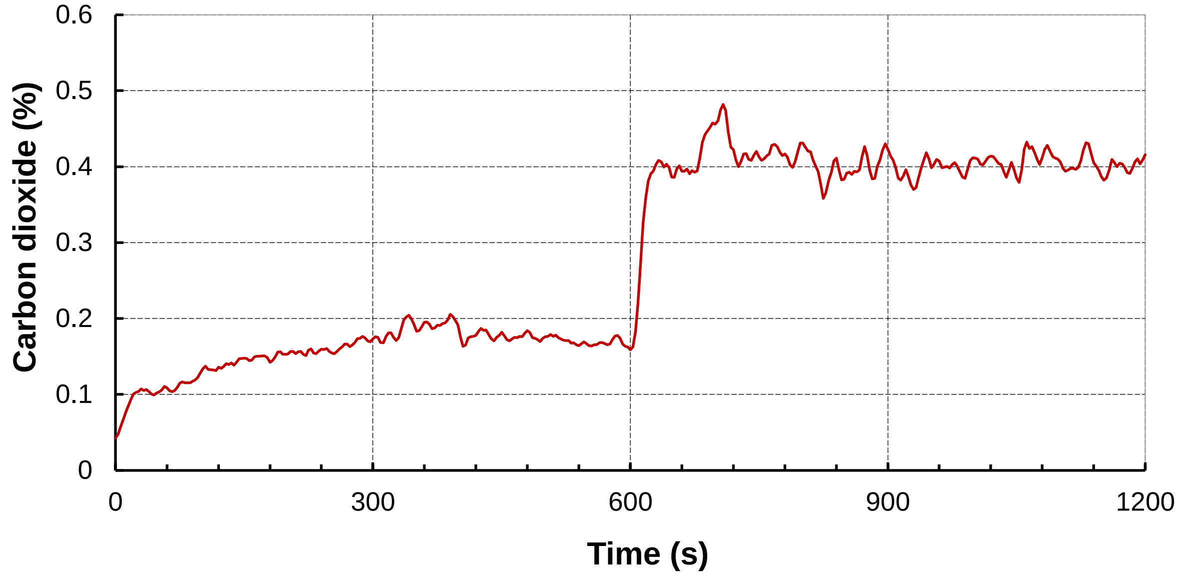
5.2.3 CO_2 concentration

The concentration of carbon dioxide measured during the test is shown in Figure 4. The peak CO_2 concentration of 0.48 % was recorded at 708 seconds.

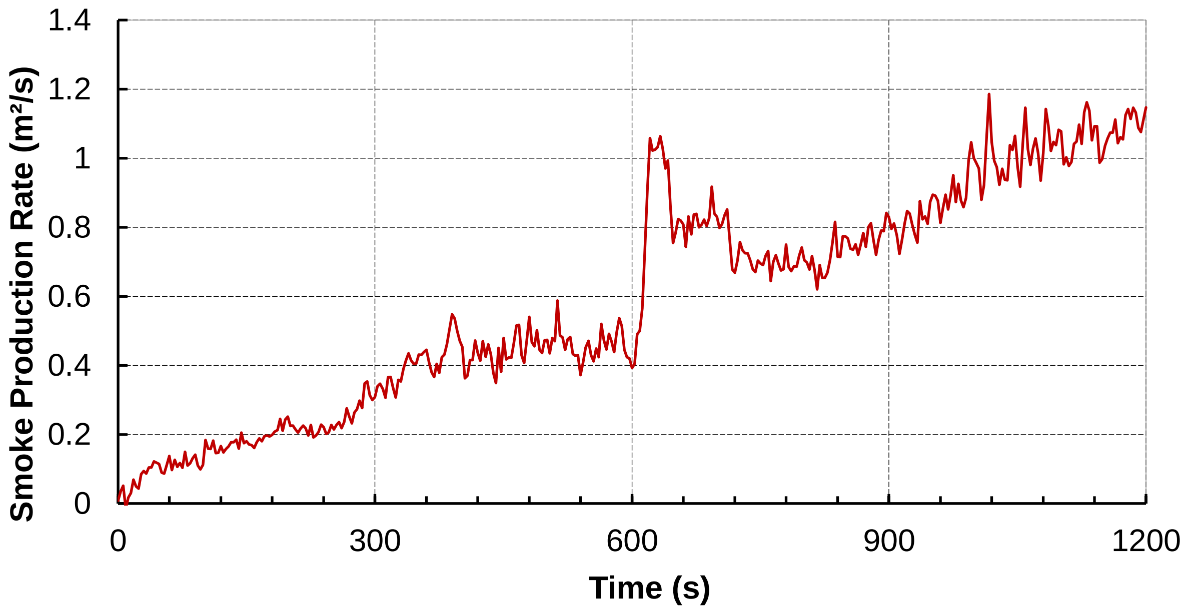
Figure 5: Carbon dioxide concentration



5.2.4 Optical density

The rate of production of light-obscuring smoke measured during the test is shown in Figure 6. A maximum smoke production rate of 1.19 m^2/s was recorded at 1,017 seconds. The maximum 60 second running average smoke production rate (SPR60 peak) was determined to be 1.1 m^2/s at 1,200 seconds.

Figure 6: Smoke production rate



5.2.5 Heat flux

The heat flux was not measured.

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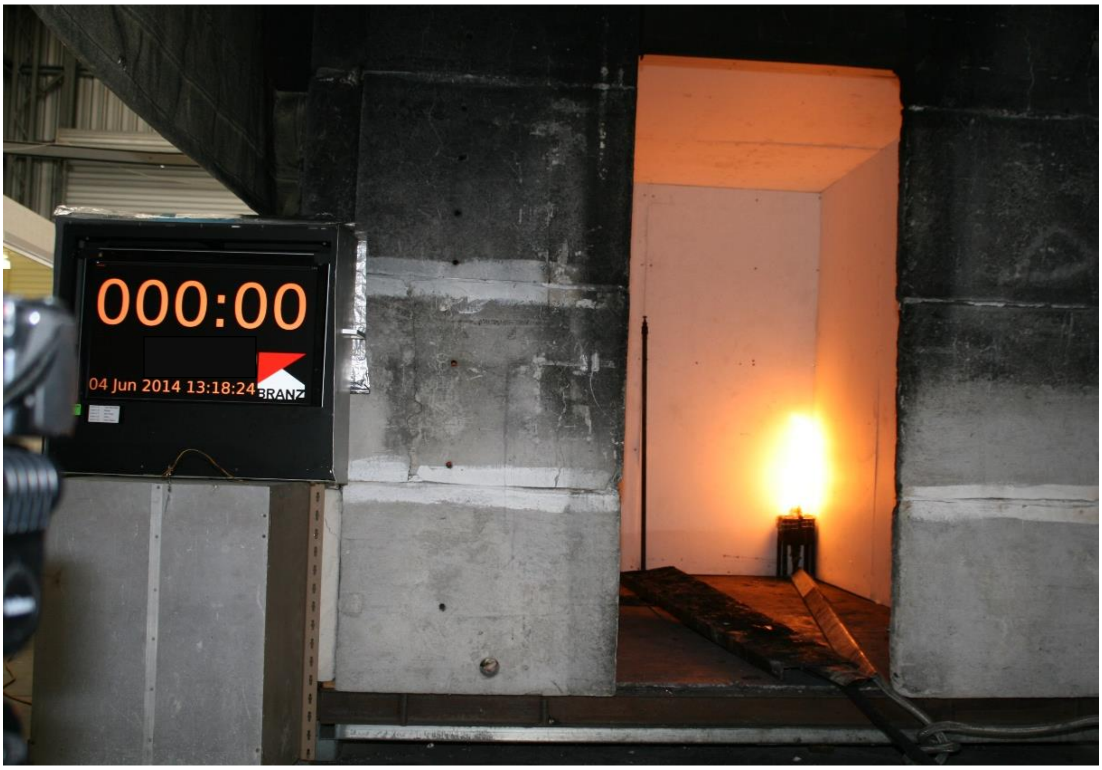
6. PHOTOGRAPHS

Photograph 1: Assembled panels prior to test

Photograph 2: At 0 seconds start of test



Photograph 3: At 71 seconds – note melting at edge of flaming region

Photograph 4: At 290 seconds

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Photograph 5: At 558 seconds

Photograph 6: At 636 seconds – burner had increased to 300 kW, flaming droplets observed falling to the floor

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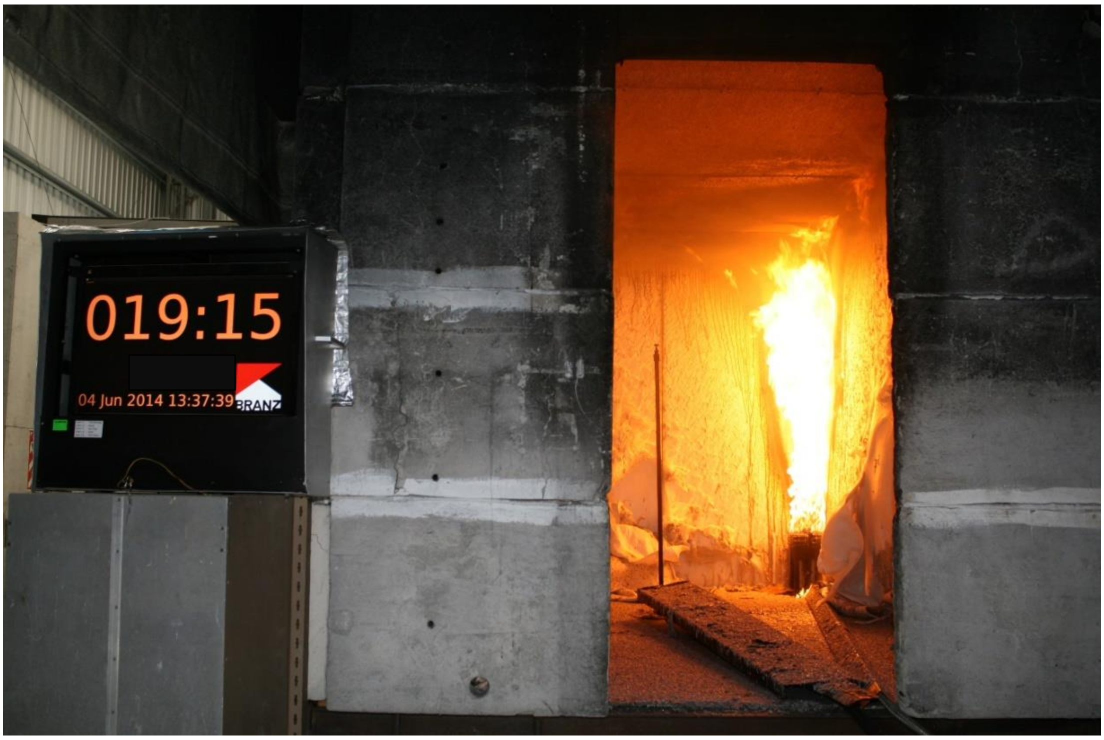
Photograph 7: At 776 seconds

Photograph 8: At 909 seconds

Photograph 9: At 1155 seconds



Photograph 10: At 1200 seconds end of test

Photograph 11: After end of test

FI12482-001
GROUP CLASSIFICATION NUMBER

BRANZ

This is to certify that the specimen described below was tested by BRANZ in accordance with AS ISO 9705 and ISO 9705 for determination of Group Number Classification and SMOGRA in accordance with AS 5637.1- 2015 and Group Number Classification and Smoke Production Rate in accordance with NZBC Verification Method C/VM2 Appendix A.

Test Sponsor

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

Date of test

4 June 2014

Reference BRANZ Test Report

FI12482-001 – issued 5 February 2020

Test specimen as described by the client

The product submitted by the client for testing has been renamed by the client as AIRE 25 mm and is described as a 100% polyester fibre adhered to a fibre cement Wallboard with FR spray adhesive.

The polyester fibre has a nominal thickness of 25 mm and the wallboard has a nominal thickness of 6 mm a total nominal thickness of 31 mm.

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

The specimen was tested in accordance with ISO 9705:1993 and 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 The SMOGRA was 0.9 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 Average Smoke Production Rate was 1.1 m^2/s and therefore within the 5 m^2/s limit

Issued by

L. F. Hersche
Fire Testing Engineer
IANZ Approved Signatory

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.

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

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