

BRANZ Type Test

FI12432-001

AS ISO 9705 & ISO 9705 FIRE TEST OF WOVEN IMAGE ECHOPANEL®

CLIENT
Woven Image Pty Ltd
37-39 Chard Road
Brookvale 2100
New South Wales
Australia

ACCREDITED LABORATORY

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

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
New South Wales
Australia

Description of test specimen

The product submitted by the client for testing was identified by the client as:

EchoPanel® 100% PET (60% recycled) polyester fibre wall panel with nominal thickness of 24 mm and nominal weight of 3000 gsm.

Date of test

23 December 2019

Test results

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

A maximum smoke production rate of 4.54 m^2/s was recorded at 900 seconds. The maximum 60 second running average smoke production rate (SPR60 peak) was determined to be 4.24 m^2/s at 918 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.

NATA IANZ

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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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IANZ Approved Signatory

DOCUMENT REVISION STATUS

ISSUE NO.	DATE ISSUED	REVIEW DATE	DESCRIPTION
01	28/02/2020	28/02/2025	Initial Issue

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 10th December 2019 and installed on the 12th December 2019.

2.3 Description of Specimen

The product submitted by the client for testing was identified by the client as:

EchoPanel® 100% PET (60% recycled) polyester fibre wall panel with nominal thickness of 24 mm and nominal weight of 3 kg/m².

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 6 mm fibre cement.

The test specimen was supplied in panels measuring 2400 mm long x 1820 mm wide x 25 mm thick. Full-sized panels were adhered horizontally along their 2400 mm edge on the lower position of three walls and across the width of the ceiling. Along the remaining upper gap of each wall a 400 mm wide strip of the test material was cut to fit.

All panels were adhered to the fibre cement substrate with H.B. Fuller Max Bond Fast Grip. The adhesive was applied in straight lines to the unexposed face of the test specimen at 200 mm spacings. Adhesive was applied around the entire perimeter of each panel 20 mm from the outer edge. Figure 1 shows the completed installation.

2.5 Specimen Conditioning

The specimen was not subjected to any special conditioning.

Figure 1: Completed installation

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 23rd December 2019, supervised by Mr L. Hersche.

The initial conditions in the laboratory were 15.5 ºC, 68 % relative humidity and 100.70 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/m^3.

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.

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).

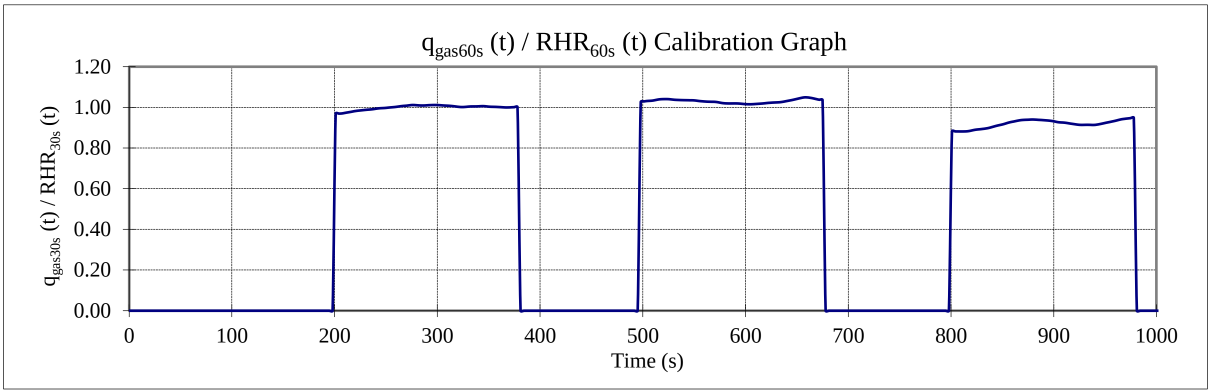
4. SYSTEM PERFORMANCE

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 value (k_t=0.855) 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 18 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 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 6.75 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 17.25 seconds.

5. RESULTS

5.1 Observations

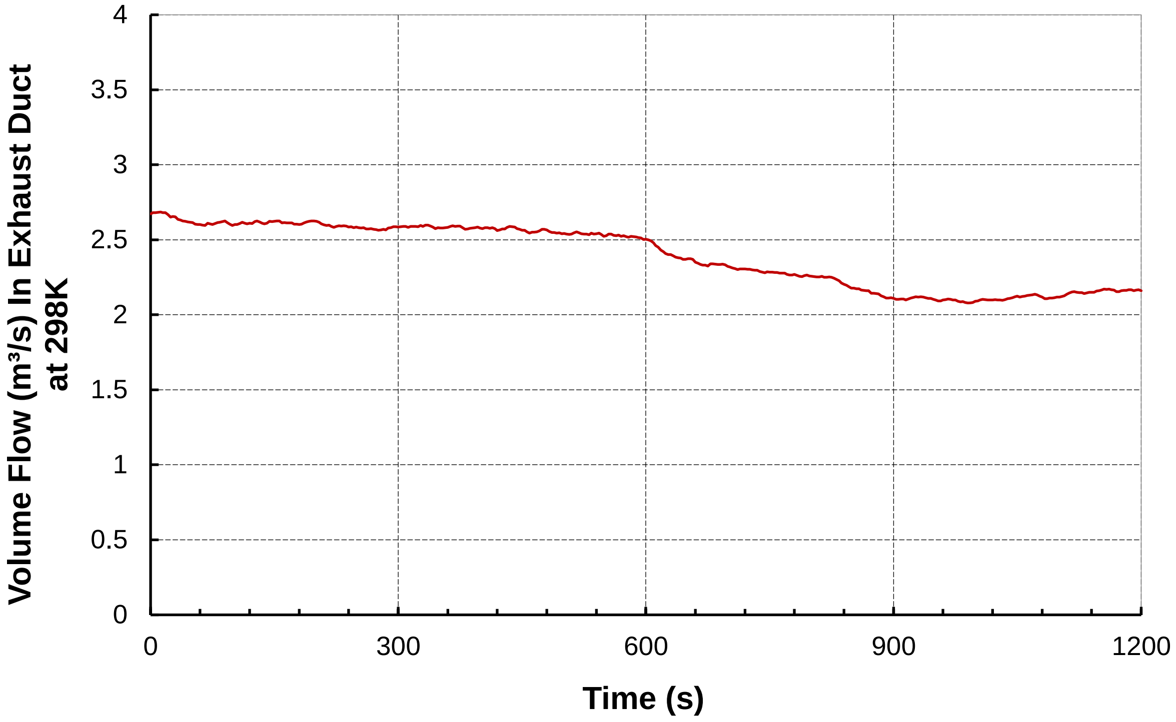
Time Min:sec	Description
0:30	Flaming droplets fell from the ceiling panel, directly above the burner
2:15	The specimen began to melt back within the burner plume.
3:12	A liquid pool fire approximately 0.2 m in diameter began to burn on the test room floor below the burner.
3:47	A thick smoke layer had formed to 0.4 m below the ceiling.
4:00	The ceiling had melted back approximately 0.5 m from the burner corner. Flaming droplets had stopping falling from the ceiling. The fibre cement substrate was exposed.
5:35	Smoke began to flow at floor level from below the centre of the back-wall panel.
6:00	Material on the walls had melted back approximately 0.8 m from the corner exposing the fibre cement substrate. Molten material was dripping down the edge of the remaining material.
6:50	Molten material on the back-wall panel ignited and began to climb up the edge of the remining panel. A secondary liquid pool fire began to develop at the base of the back-wall panel.
7:41	All panels unaffected by direct exposure to the burner plume remained in place.
8:14	Initial liquid pool fire on the floor increased to 0.4 m diameter.
8:30	Smoke density and layer thickness increased to 0.5 m from ceiling.
9:00	Smoke layer thickness increased to 0.6 m from ceiling.
10:00	Burner was increased to 300 kW.
10:49	Melt back on ceiling had increased, material falling without flaming.
11:16	The entire ceiling panel at the far end of the room had melted back and was dripping onto the floor. The edge of the panel, adjacent to the second ceiling panel, began to peel and fall down. The liquid pool fire on the floor below the burner increased to 0.8 m diameter.
12:00	Smoke layer descended approximately 0.8 m from ceiling.
12:34	Large quantity of melted material dropping down from the ceiling without flaming.
14:30	Smoke layer increased to approximately 1.1 m below ceiling
15:00	The liquid pool fire fuelled by melting wall panels on either side of the burner continued to increase.
16:00	Density of the smoke layer had increased. Part of the fibre cement substrate above the burner fell down into the liquid pool fire.
16:45	Left-hand wall panel had melted and slumped down over itself, onto the floor.
19:00	Liquid pool fire on floor increased to approximately 1.2 m, no flaming of the material on the walls.
20:00	End of Test.

5.2 Test Results and Reduced Data

5.2.1 Duct flow

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

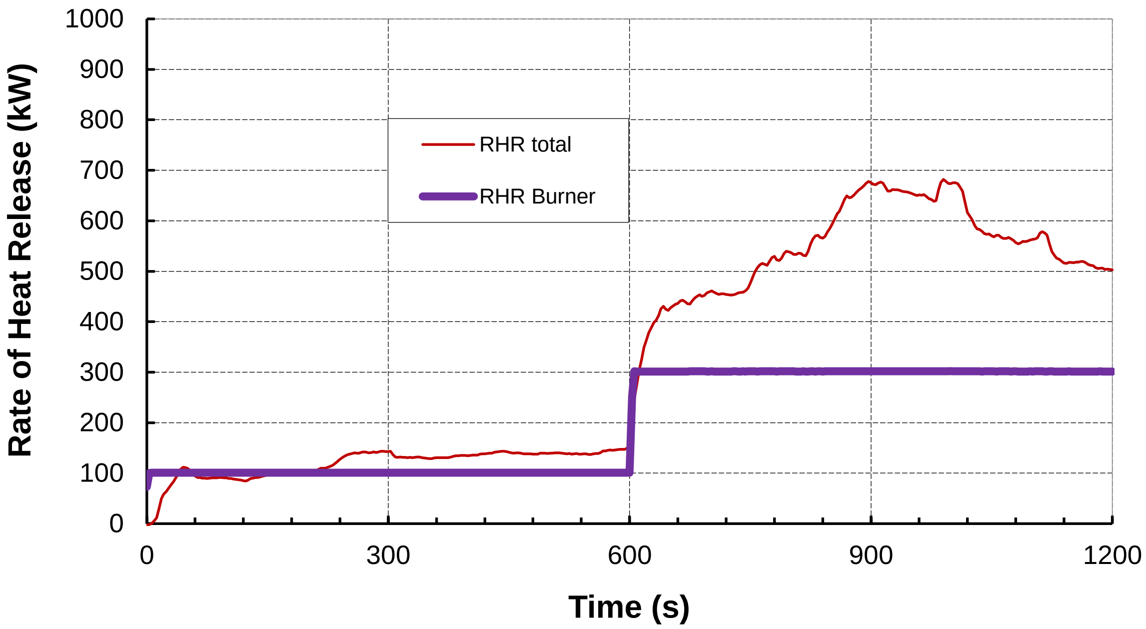
Figure 3: Volume flow at 298 K in exhaust duct



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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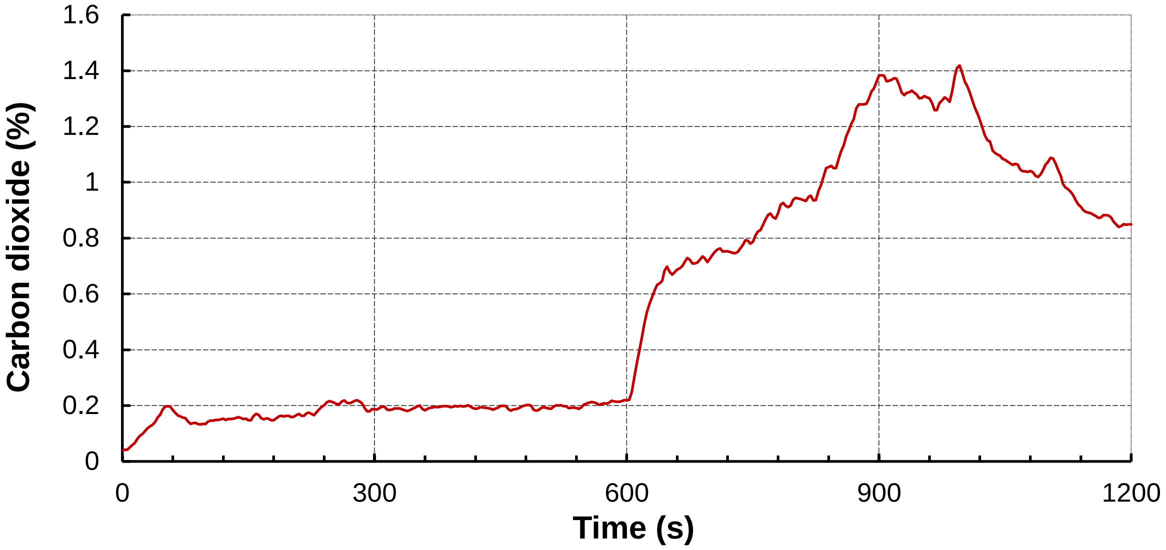
5.2.3 CO_2 concentration

The concentration of carbon dioxide measured during the test is shown in Figure 5. The peak CO_2 concentration of 1.42% was recorded at 996 seconds.

Figure 5: Carbon dioxide concentration

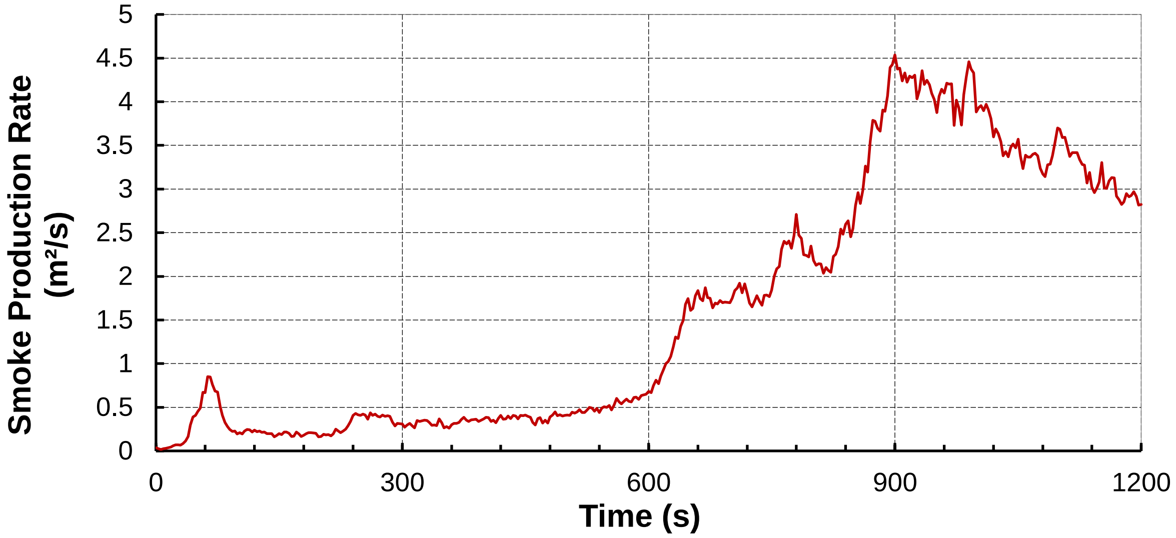


5.2.4 Optical density

The rate of production of light-obscuring smoke measured during the test is shown in Figure 6.

A maximum smoke production rate of 4.54 m^2/s was recorded at 900 seconds. The maximum 60 second running average smoke production rate (SPR60 peak) was determined to be 4.24 m^2/s at 918 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: Prior to test

Photograph 2: At 30 seconds

Photograph 3: At 60 seconds

Photograph 4: At 90 seconds

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Photograph 5: At 120 seconds

Photograph 6: At 150 seconds

Photograph 7: At 180 seconds

Photograph 8: At 240 seconds

Photograph 9: At 300 seconds

Photograph 10: At 360 seconds

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Photograph 11: At 420 seconds

Photograph 12: At 480 seconds

Photograph 13: At 540 seconds

Photograph 14: At 570 seconds

Photograph 15: At 601 seconds

Photograph 16: At 616 seconds

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Photograph 17: At 630 seconds

Photograph 18: At 660 seconds

Photograph 19: At 720 seconds

Photograph 20: At 749 seconds

Photograph 21: At 780 seconds

Photograph 22: At 840 seconds

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Photograph 23: At 900 seconds

Photograph 24: At 960 seconds

Photograph 25: At 1020 seconds

Photograph 26: At 1080 seconds

Photograph 27: At 1140 seconds

Photograph 28: At 1200 seconds – end of test

Photograph 29: After test

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FI12432-001
GROUP CLASSIFICATION NUMBER

BRANZ

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
New South Wales
Australia

Date of test

23 December 2019

Reference BRANZ Test Report

FI12432-001 – issued 28/02/2020

Test specimen as described by the client

The product submitted by the client for testing was identified by the client as EchoPanel® 100% PET (60% recycled) polyester fibre wall panel with nominal thickness of 24 mm and nominal weight of 3000 gsm. The product was tested adhered to a nominally 6 mm fibre-cement substrate.

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 The SMOGRA was 4.6 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 1.6 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.

ilac-MRA IANZ ACCREDITED LABORATORY

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

Issue Date
28/02/2020

Expiry Date
28/02/2025