BRANZ Type Test

FI 6025 ISSUE 2

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

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 970~~5~~ 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.

Description of test specimen

The product submitted by the client for testing was identified by the client as Acoustipin 10mm, and is described as a non-woven needle punched polyester fabric laminated to a non-woven needle punched polyester base.

Date of test

31th October 2016

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 2.00 m^2/s was recorded at 1158 seconds. The maximum 60 second running average smoke production rate (SPR60 peak) was determined to be 1.81 m^2/s at 1185 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

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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IANZ Approved Signatory

DOCUMENT REVISION STATUS

ISSUE NO.	DATE ISSUED	EXPIRY DATE	DESCRIPTION
1	19 December 2016	19 December 2021	Initial Issue
2	8 November 2019	8 November 2024	Re-issued for a further 5 years on the basis of supporting evidence supplied by the client

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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.

2.3 Description of Specimen

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

- Product Name: Acoustipin 10mm
- Description: Non-woven needle punched polyester fabric laminated to a non-woven needle punched polyester base panel
- Construction: Nominal thickness 10 to 12mm, 1600 gsm.

The re-issue of this report as Issue 2 extends the review/expiry date for this report to remain publishable for the period identified in the report footer. The re-issue has been made on the basis of evidence provided by the client sufficient for BRANZ to consider the original test results 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 the nominally 6 mm fibre cement board screwed to the steel frame.

Adhesive fixed with spray adhesive to fibre cement board. Figure 1 shows a detail of the installed product.

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Figure 1: Completed installation

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 31th October 2016, supervised by Mr P Collier.

The initial conditions in the laboratory were 16.5ºC, 45% relative humidity and 101.09 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 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 CO2 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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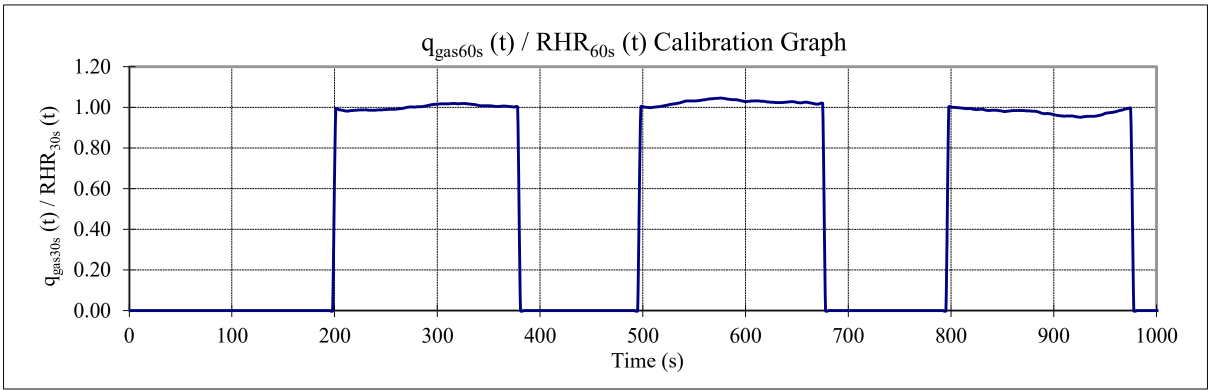
4. SYSTEM PERFORMANCE

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 calibration value (k_t=0.814) 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 20.25 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 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 16.5 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 13.5 seconds.

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5. RESULTS

5.1 Observations

Time Min:sec	Description
00:15	Burner plume was at the ceiling.
00:30	Small flaming droplets of the test specimen were falling from the ceiling and were extinguishing before landing on floor.
00:45	The burner plume had melted a hole through the Acoustipin on the ceiling approximately 250 mm across and droplets were running down the walls.
1:30	The hole in the ceiling had increased in size to a quarter circle with a radius of 300 mm from the corner. A vertical channel had formed in the corner about 200 mm wide each side of the corner. Black molten droplets were falling down but not igniting.
2:00	The hole in the ceiling had increased in size to a quarter circle with a radius of 600 mm from the corner accompanied by intense flaming on the perimeter. Some flaming had also developed on the walls on the boundary of the burner plume.
2:30	A small flaming pocket on the floor beside the burner approximately 100 mm across had developed.
3:30	The Acoustipin on the ceiling had melted back beyond the influence of the ceiling jet at about a 750 mm quarter circle radius. The flaming on the walls at the edges of the burner plume continued and the flaming droplets that had fallen to the floor continued to burn, over approximately 150 x 150 mm.
5:00	A small amount of flaming on the Acoustipin continued on the walls in the vicinity of the burner plume about 300 mm from the corner. Isolated pockets of burning material continued at the base of the burner.
7:30	A sheet of Acoustipin on the rear wall next to the burner had peeled off and dropped to the floor.
8:40	The sheet of Acoustipin on the ceiling closest to the door opening had begun peeling off the ceiling in the direction of the left wall.
9:45	The sheet of Acoustipin on the ceiling closest to the door opening had peeled of some more and was covering the top 600 mm of the doorway.
10:00	Burner increased to 300 kW and was rapidly followed by the hanging piece off ceiling lining closest to the doorway falling to the floor in the direction of the left wall.
10:15	The centre Acoustipin ceiling lining piece remained, but was melting as it was falling to the floor.
10:43	The remaining Acoustipin ceiling lining piece had fallen to the floor.
12:00	The Acoustipin on the right hand wall was peeling off and had dropped 1,500 mm above the floor.
15:00	All the Acoustipin had peeled off the walls and was below the hot layer zone in the room. A small fire on the floor in the vicinity of the burner had established.

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Time Min:sec	Description
19:00	The hot layer level in the room was stable at 1,500 mm above the floor and only a minimal amount of the lining was burning in the burner corner.
20:00	The small fire on the floor had continued to burn. End of test.

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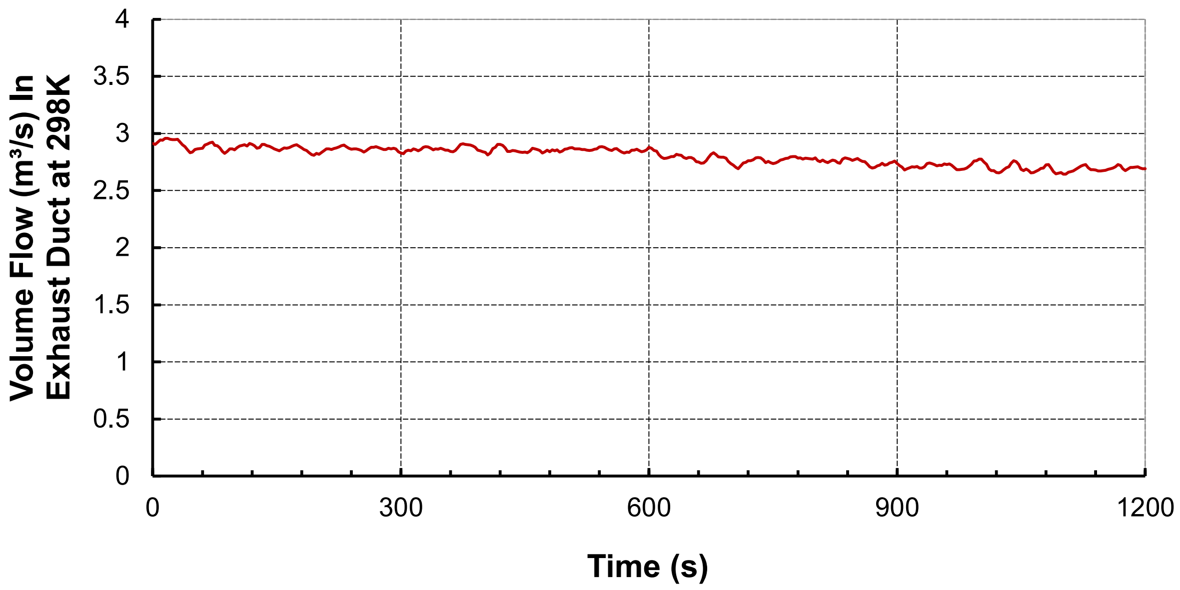
5.2 Test Results and Reduced Data

5.2.1 Duct flow

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

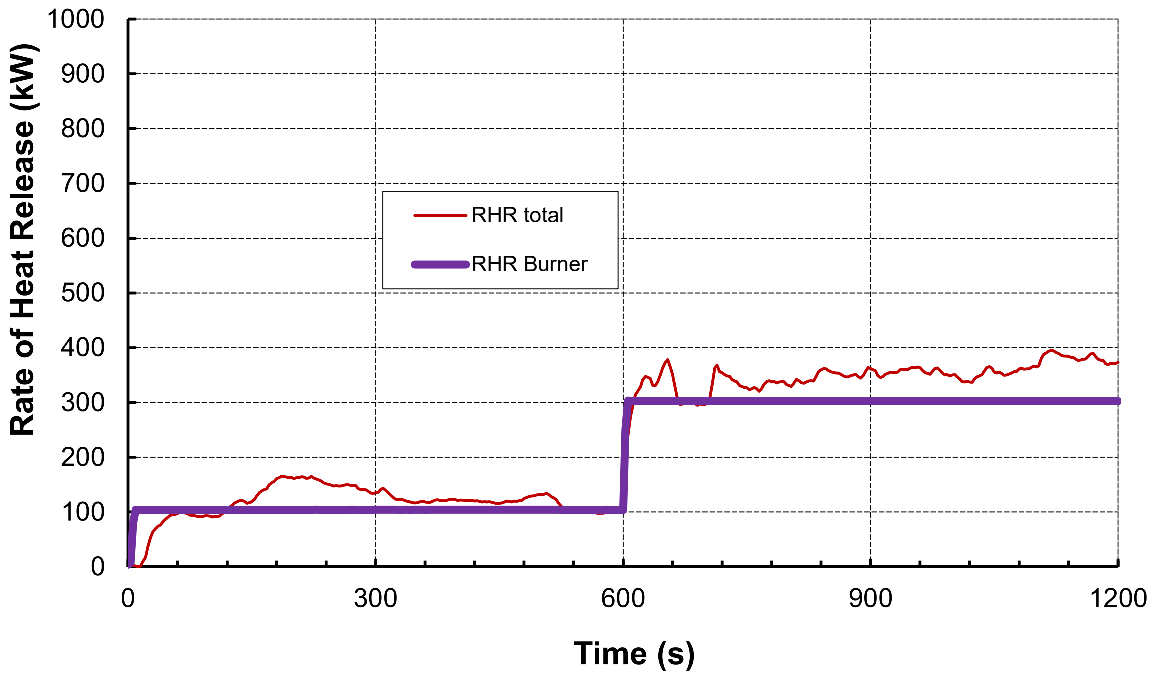
Figure 3: Volume flow at 298 K in exhaust duct



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 during the test.

Figure 4: Rate of Heat Release



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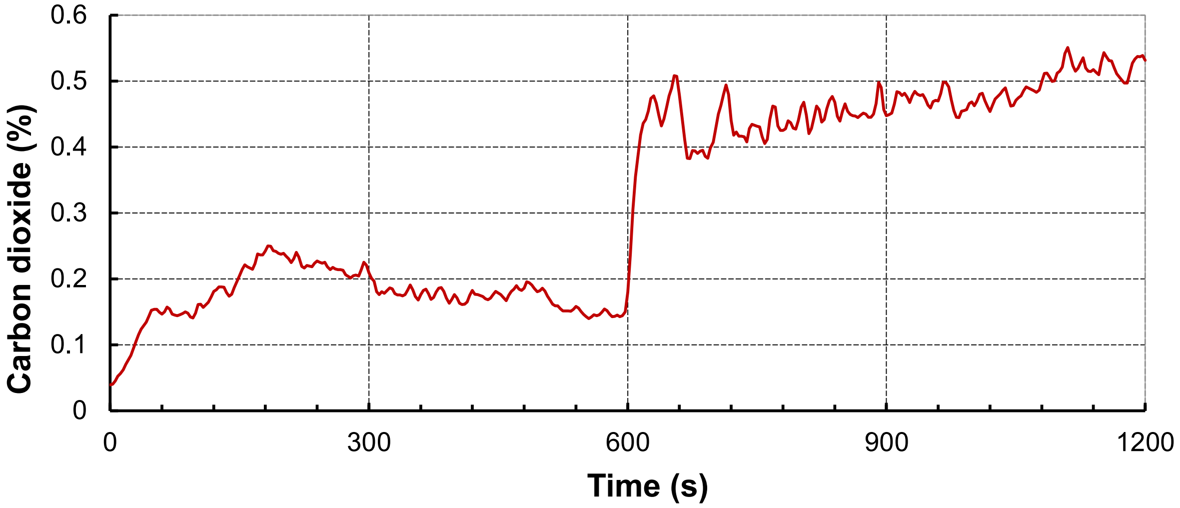
5.2.3 CO_2 concentration

The concentration of carbon dioxide measured during the test is shown in Figure 5. The peak CO_2 concentration of 0.53 % was recorded at 1110 seconds.

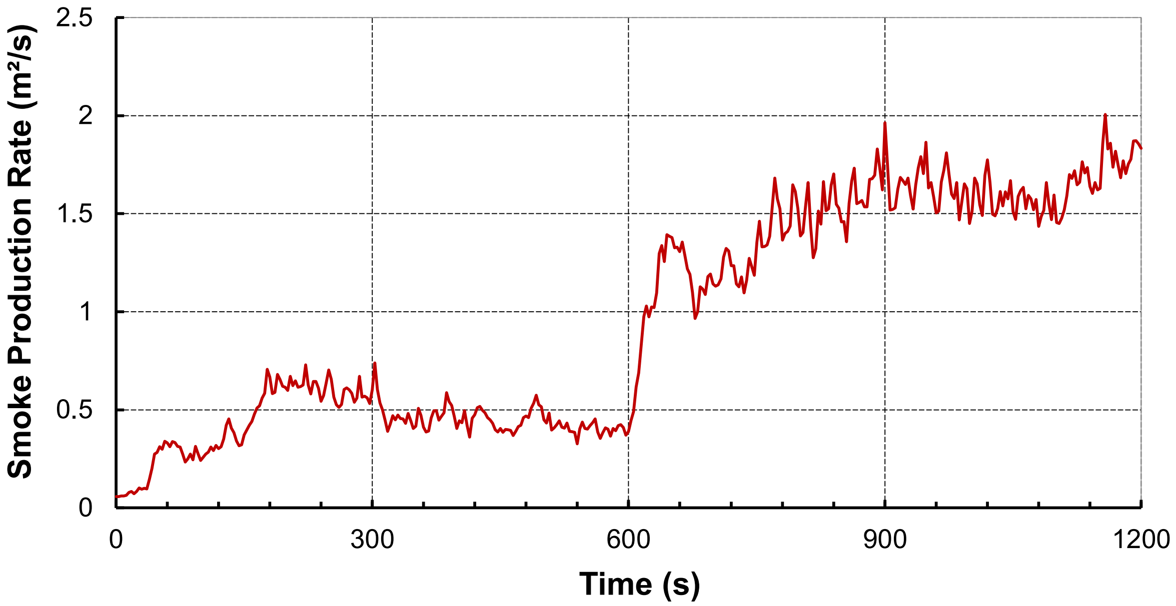
Figure 5: Carbon dioxide concentration



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 2.00 m²/s was recorded at 1158 seconds. The maximum 60 second running average smoke production rate (SPR60 peak) was determined to be 1.81 m^2/s at 1185 seconds.

Figure 6: Smoke production rate



5.2.5 Heat flux

The heat flux was not measured.

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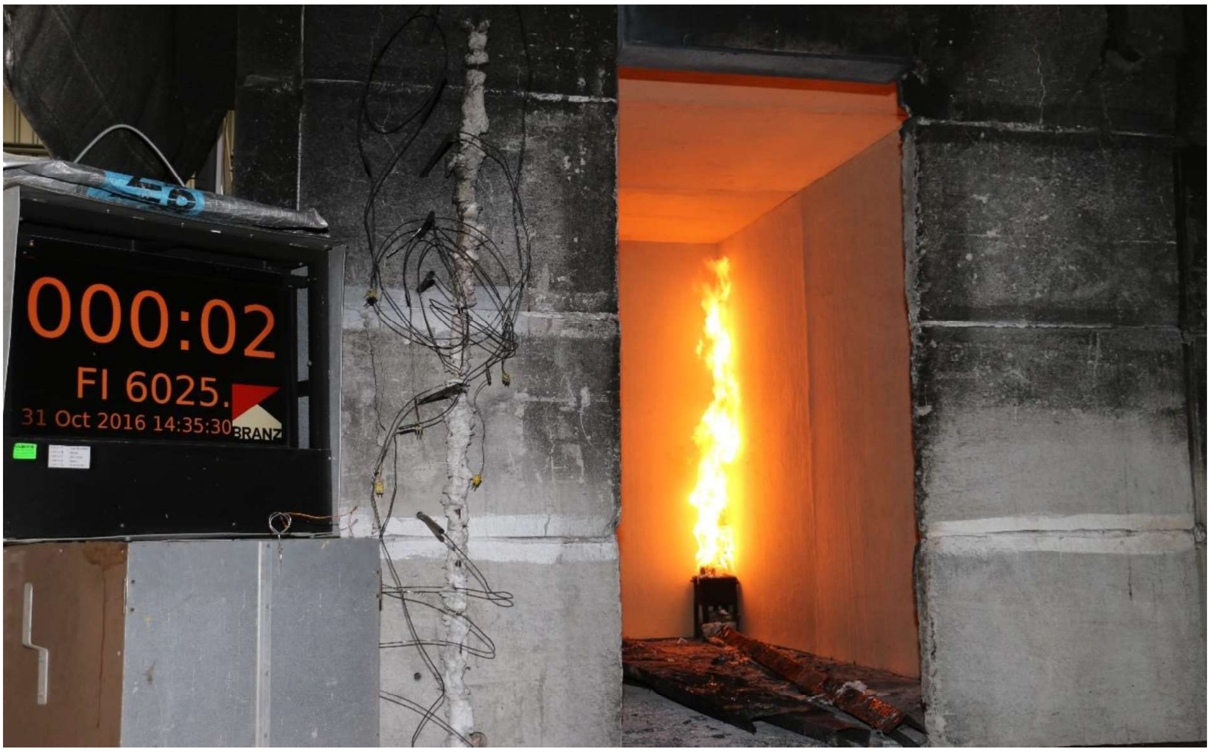
6. PHOTOGRAPHS

Photograph 1: Prior to test

Photograph 2: At 2 seconds



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Photograph 3: At 15 seconds.

Photograph 4: At 30 seconds

Photograph 5: At 45 seconds

Photograph 6: At 90 seconds

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Photograph 7: At 120 seconds

Photograph 8: At 210 seconds

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Photograph 9: At 300 seconds

Photograph 10: At 462 seconds

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Photograph 11: At 521 seconds

Photograph 12: At 585 seconds

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Photograph 13: At 615 seconds

Photograph 14: At 630 seconds

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Photograph 15: At 641 seconds

Photograph 16: At 645 seconds

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Photograph 17: At 720 seconds

Photograph 18: At 780 seconds

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Photograph 19: At 900 seconds

Photograph 20: At 1140 seconds

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Photograph 21: At 1200 seconds – End of test

Photograph 22: At 1220 seconds

Photograph 23: After test

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FI 6025 Issue 2
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.

Date of test

31st October 2016

Reference BRANZ Test Report

FI 6025 Issue 2 issued 8 November 2019 –

Test specimen as described by the client

The product submitted by the client for testing was identified by the client as Acoustipin 10mm, and is described as a non-woven needle punched polyester fabric laminated to a non-woven needle punched polyester base.

The polyester fibre has a nominal thickness of 10-12 mm and was adhered to the fibre cement sheet with a nominal thickness of 6 mm with spray adhesive making a total nominal thickness of 19 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 IOS 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 1.5 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 1.0 m^2/s and therefore within the 5 m^2/s limit

Issued by

P. C. R. Collier
Senior 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.

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
8 November 2019

Expiry Date
8 November 2024