
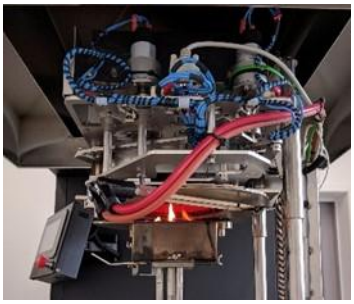


BRANZ Fire Test Report

FH20202-01-1

CONE CALORIMETER TEST OF HERADESIGN DB ACOUSTIC CEILING PANEL IN ACCORDANCE WITH ISO 5660

CLIENT

Armstrong Ceiling Solutions (Australia) Pty Ltd
75 Long Street
Smithfield
NSW 2164
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

To conduct cone calorimeter testing and reduce the data in accordance with:

- ISO 5660:2002 Parts 1 and 2
- ISO 5660:2015 Part 1

The testing was carried out to provide data for the Calculation of a Group Number in accordance with NZBC Verification Method C/VM2 Appendix A and AS 5637.1:2015.

Test sponsor

Armstrong Ceiling Solutions (Australia) Pty Ltd
75 Long Street
Smithfield
NSW 2164
Australia

Description of test specimen

The product is described by the client as Heradesign dB acoustic ceiling panels, a nominally 15 to 25 mm magnesite-bonded wood wool core with a painted face, adhered to a mineral fibre tile backer. The mineral fibre tiles are either a nominally 19 mm fine fissured (painted and perforated) or a nominally 24 mm dB (unpainted and perforated).

Date of tests

15th, 17th and 22nd October 2024

LIMITATION

The results reported here relate only to the item/s 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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(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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1. GENERAL

1.1 Sample description

The product submitted for testing was identified by the client as Heradesign dB acoustic ceiling panels, a nominally 15 to 25 mm magnesite-bonded wood wool core with a painted face, adhered to a mineral fibre tile backer. The mineral fibre tiles are either a nominally 19 mm fine fissured (painted and perforated) or a nominally 24 mm dB (unpainted and perforated). Figure 1-3 illustrate representative specimens of those tested.

Figure 1: Representative composite specimen (Exposed face on left, edge view centre, reverse face on right)

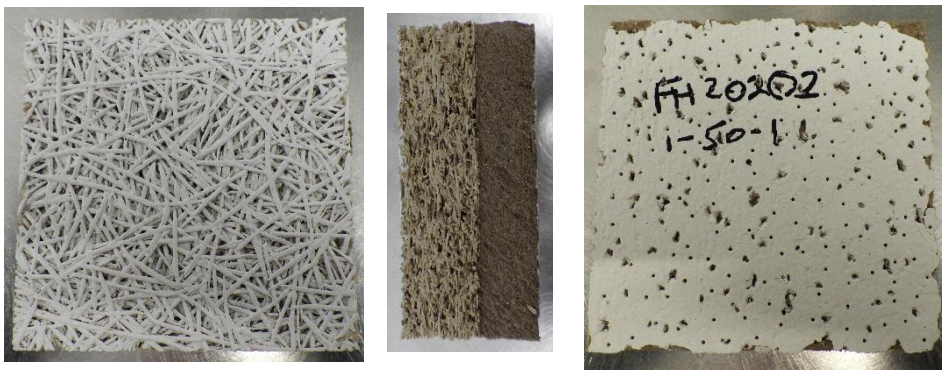

Figure 2: Representative Heradesign layer specimen (Exposed face on left, adhered face on right)

Figure 3: Representative 19 mm fine fissured mineral tile layer specimen (Exposed face on left, adhered face on right)

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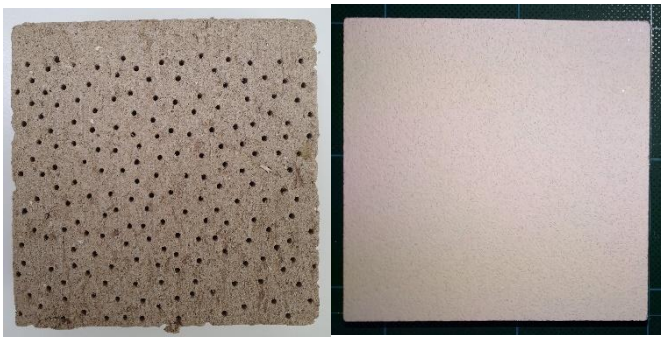
Figure 4: Representative dB Acoustic mineral tile layer specimens (24 mm perforated unpainted on left, FH6933 30 mm painted on right)



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1.2 Sample measurements

The following physical parameters were measured for each specimen prior to testing.

Table 1: Physical parameters

Client ID	Specimen ID	Initial properties		Overall apparent density (kg/m³)	Colour
		Mass (g)	Mean thickness (mm)		
Heradesign dB composite	FH20202-1-50-1	167.7	43.6	385	White
	FH20202-1-50-2	172.9	43.7	396	
	FH20202-1-50-3	171.5	43.8	392	
Heradesign Superfine 25mm white (painted face)	FH20202-2-50-1	125.9	25.5	494	White
Heradesign superfine 15mm white (painted face)	FH20202-3-50-1	76.1	15.0	507	White
Fine fissured 19mm tile (adhesive face)	FH20202-4-50-1	47.1	18.2	259	Brown
	FH20202-4-50-2	46.9	18.5	254	
	FH20202-4-50-3	46.0	18.5	249	
Fine fissured 19mm tile (painted face)	FH20202-5-50-1	48.1	18.6	259	White
Heradesign Superfine 25 mm (adhesive face)	FH20202-6-50-1	125.5	25.3	496	Brown
dB Acoustic 30 mm	FH6339-7-50-1	104.4	30.3	345	White
Heradesign Superfine 25mm beige	FH17983-3A-50-1	112.8	24.6	459	Beige
Heradesign Superfine 15mm beige	FH17983-3B-50-1	76.2	15.0	508	Beige

*Shaded rows – Data taken from reports FH6339-01 and FH17983-01 respectively

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2. EXPERIMENTAL PROCEDURE

2.1 Test standard

The tests were carried out and data reduced according to the test procedures described in ISO 5660 (2002 & 2015), Reaction-to-fire tests – Heat release, smoke production and mass loss – Part 1: Heat release rate, and Part 2: Smoke production rate; (the test standard). The sample preparation and test procedure were as described in 2.4 and 2.5.

2.2 Test date

The tests were conducted on 15th May 2018 by Mr Lukas Hersche and the 21st August 2023 and 15th, 17th and 22nd October 2024 by Ms Lisa Grant at BRANZ Limited laboratories, Judgeford, New Zealand.

2.3 Specimen conditioning

All specimens were conditioned to moisture equilibrium (constant weight), at a temperature of 23 ± 2°C and a relative humidity of 50 ± 5% immediately prior to testing.

2.4 Specimen wrapping and preparation

All tests were conducted and the specimens prepared in accordance with the test standard. The spark igniter and the stainless-steel retainer frame were used. All specimens were wrapped in a single layer of aluminium foil, covering the unexposed surfaces.

2.5 Test programme

The test program consisted of six indicative and a further four replicate specimens tested at an irradiance level of 50 kW/m². All tests were carried out with the specimen horizontal, and with a nominal duct flow rate of 0.024 m³/s. Test data from FH6339-7-50-1, FH17983-3A-50-1 and FH17983-3B-50-1 are also included in this report to cover a wider range of component variants.

2.6 Calculation of heat release without ignition

If a tested specimen does not display ignition, the average heat release rate values are to be calculated 180 seconds from the last negative heat release reading after the test begins.

If the last recorded negative heat release reading is not able to be established as there were multiple negative heat release readings over the course of the test, average values are calculated from the first positive heat release reading after the start of the test.

2.7 Specimen selection

BRANZ was not involved in the selection of the materials submitted for testing. The test materials used were supplied to the laboratory by the client.

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3. INDICATIVE TEST RESULTS

Indicative tests were conducted on specimens FH20202-1-50-1 to FH20202-6-50-1. In order to comply with AS 5637.1, samples FH20202-4-50-1 and FH20202-6-50-1 were tested with the adhesive from between the wood wool and mineral tile material layers present on the upper face.

Table 2: Indicative test results and reduced data

Specimen ID	Irradiance (kW/m^2)	Time to Ignition (s)	Peak Heat Release Rate (kW/m^2)	Total Heat Released (MJ/m^2)	Mean Average Specific Extinction Area (m^2/kg)
FH20202-1-50-1	50	45	63.9	23.1	0*
FH20202-2-50-1	50	54	63.5	22.1	14.2
FH20202-3-50-1	50	50	57.2	21.8	0*
FH20202-4-50-1	50	Did not ignite	15.3	6.4	108.8
FH20202-5-50-1	50	24	45.3	5.3	0
FH20202-6-50-1	50	35	40.8	18.8	0*
FH6339-7-50-1	50	20	59.0	12.0	23.1
FH17983-3A-50-1	50	37	57.5	24.7	0.8
FH17983-3B-50-1	50	24	55.2	22.5	0*

Note: Shaded rows - Specimen 1 result for replicate test samples.
*Negative result recorded as zero

As shown in Table 2 above, the composite specimen (FH20202-1-50-1) initially exhibited the highest peak heat release rate and was selected for replicate testing to determine a group number for the whole system. This is in accordance with AS 5637.1 (2015) which specifies that that multilayered specimens must have the combination of all layers and each individual layer tested separately, with the group number assigned to the product being based on the layer or combination that achieves the highest group number.

Additionally, the indicative specimen of the fine fissured tile with adhesive side facing the heat source (FH20202-4-50-1) displayed the highest Average Specific Extinction Area (ASEA). In accordance with AS 5637.1 (2015) this layer also had replicate testing carried out to determine the ASEA for the combination.

The data from FH6339 and FH17983 was included after testing of the FH20202 samples to represent the full product range. Their inclusion is discussed in Section 7.

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4. TEST RESULTS AND REDUCED DATA

4.1 Test results and reduced data – ISO 5660

The test results obtained for the Heradesign dB composite, as described in Section 1, are presented in Table 3 below. The data has been reduced in accordance with Section 2.1.

Table 3: Test results and reduced data – ISO 5660

Material		**Test specimens as described in Section 1 (in accordance with ISO 5660)**			**Mean**
Specimen test number		FH20202-1-50-1	FH20202-1-50-2	FH20202-1-50-3	
Test Date		11/10/2024	17/10/2024	17/10/2024	
C-Factor		0.0431	0.0428	0.0428	0.0429
Time to sustained flaming	s	45	50	50	48
Observations		Refer to Table 5			
Test duration[a]	s	1845*	1850*	1850*	1848
Mass remaining, m_f	g	121.8	128.1	126.2	125.4
Mass pyrolyzed	%	27.4	25.9	26.4	26.6
Specimen mass loss[b]	kg/m^2	5.1	5.0	5.0	5.0
Specimen mass loss rate[b]	g/m^2 s	2.8	2.8	2.8	2.8
Heat release rate					
peak, $\dot{q}''_{max}$	kW/m^2	63.9	59.4	61.2	61.5
average, $\dot{q}''_{avg}$					
Over 60 s from ignition[c]	kW/m^2	33.6	31.6	33.2	32.8
Over 180 s from ignition[c]	kW/m^2	23.5	22.4	23.2	23.0
Over 300 s from ignition[c]	kW/m^2	21.2	20.0	20.8	20.7
Total heat released	MJ/m^2	23.1	25.9	21.8	23.6
Average Specific Extinction Area	m^2/kg	0^	0^	0^	0^
Effective heat of combustion[c], $\Delta h_{c,eff}$	MJ/kg	4.4	5.1	4.3	4.6
Total smoke production					
Non-flaming $S_{A,1}$	m²/m²	7.6	8.1	10.3	8.7
Flaming $S_{A,2}$	m²/m²	126.7	78.5	51.5	85.5
Total $S_A = S_{A,1} + S_{A,2}$	m²/m²	134.3	86.6	61.8	94.2

Notes: [a] determined by *30 minutes after time to sustained flaming

[b] from ignition to end of test; [c] from the start of the test

^Negative result recorded as zero

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4.2 Test results and reduced data – ISO 5660

The test results obtained for the Fine fissured tile, as described in Section 1, are presented in Table 4 below. These tests were carried out in order to determine ASEA for the combination. The data has been reduced in accordance with Section 2.1.

Table 4: Test results and reduced data – ISO 5660

Material		**Test specimens as described in Section 1 (in accordance with ISO 5660)**			**Mean**
Specimen test number		FH20202-4-50-1	FH20202-4-50-2	FH20202-4-50-3	
Test Date		15/10/2024	22/10/2024	22/10/2024	
C-Factor		0.0427	0.0425	0.0425	0.0426
Time to sustained flaming	s	Did not ignite			
Observations		Refer to Table 5			
Test duration[a]	s	900	900	900	900
Mass remaining, m_f	g	41.7	41.4	40.7	41.3
Mass pyrolyzed	%	11.6	11.7	11.5	11.6
Specimen mass loss	kg/m^2	0.6	0.6	0.6	0.6
Specimen mass loss rate	g/m^2 s	0.7	0.7	0.7	0.7
Heat release rate					
peak, $\dot{q}''_{max}$	kW/m^2	15.3	19.9	20.0	18.4
average, $\dot{q}''_{avg}$					
Over 60 s from ignition[+]	kW/m^2	12.9	14.2	12.5	13.2
Over 180 s from ignition[+]	kW/m^2	11.0	11.5	11.4	11.3
Over 300 s from ignition[+]	kW/m^2	10.3	10.2	10.2	10.2
Total heat released	MJ/m^2	6.4	6.0	6.0	6.1
Average Specific Extinction Area	m^2/kg	108.8	0^	0^	0^
Effective heat of combustion[d], $\Delta h_{c,eff}$	MJ/kg	10.2	9.5	10.1	9.9
Total smoke production					
Non-flaming $S_{A,1}$	m²/m²	130.6	14.1	2.9	49.2
Flaming $S_{A,2}$	m²/m²	N/A	N/A	N/A	N/A
Total $S_A = S_{A,1} + S_{A,2}$	m²/m²	130.6	14.1	2.9	49.2

Notes: [a] determined by *X o_2 returns to the pretest value within 100 parts per million of oxygen concentration for 10 mins

[+]Recorded from first positive heat release

^Negative result recorded as zero

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4.3 Observations

Table 5: Observations and incidents recorded during testing

Sample ID	Time (s)	Description
FH20202-1-50-1	N/A	No significant observations
FH20202-2-50-1	N/A	No significant observations
FH20202-3-50-1	N/A	No significant observations
FH20202-4-50-1	15-18	Unsustained flaming across surface
FH20202-4-50-2	13-20	Unsustained flaming across surface
FH20202-4-50-3	13-19	Unsustained flaming across surface
FH20202-5-50-1	N/A	No significant observations
FH20202-6-50-1	N/A	No significant observations

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5. VARIABILITY ANALYSIS

The test standards require that the mean heat release rate (HRR) readings over the first 180 seconds from ignition for the three specimens should differ by no more than 10 % of the arithmetic mean of the three readings. In the event of this criterion not being met, a further three specimens are required to be tested. Specimens which do not ignite have values calculated as detailed in Section 2.6.

Table 6 presents the HRR results for each specimen and their comparison with the arithmetic mean:

Table 6: Heat release rate

Specimen ID	Average HRR over 180 s from ignition	Arithmetic mean	% difference from the arithmetic mean
FH20202-1-50-1	23.5	23.0	1.9
FH20202-1-50-2	22.4		-2.7
FH20202-1-50-3	23.2		0.8

Table 6 identifies that all of the specimens exposed to 50 kW/m² irradiance were within the acceptance criteria, and an additional set of tests was not required.

6. SUMMARY

The report summary for the specimens as described in Section **Error! Reference source not found.**, exposed to an irradiance of 50 kW/m² is given in Table 7 below with rates of heat release illustrated in Figure 5.

Table 7: Report summary

Mean Specimen thickness (mm)	Irradiance (kW/m^2)	Mean Time to Ignition (s)	Mean Peak Heat Release Rate (kW/m^2)	Total Heat Released (MJ/kg)	Average Specific Extinction Area (m^2/kg)*
43.7	50	48	61.5	23.6	0*

* ASEA is based on mean of specimens FH20202-4-50-1,2,3

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Figure 5: Rate of heat release versus time

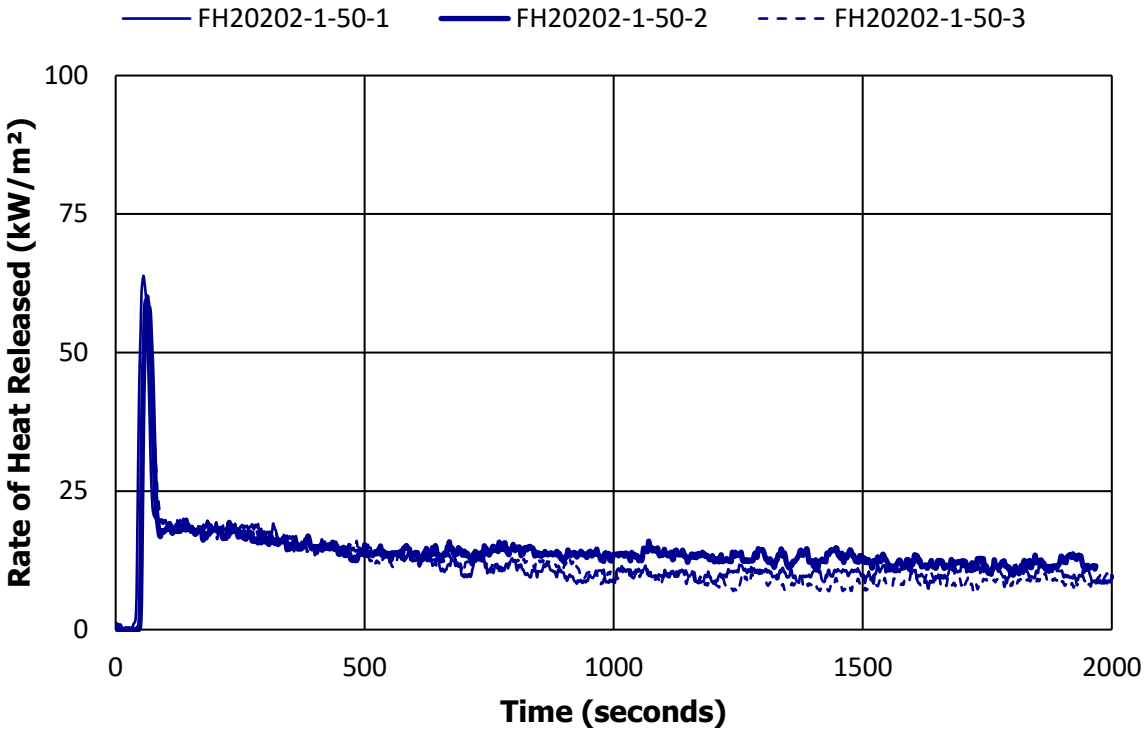

Figure 6: Rate of smoke production versus time (Composite specimen)

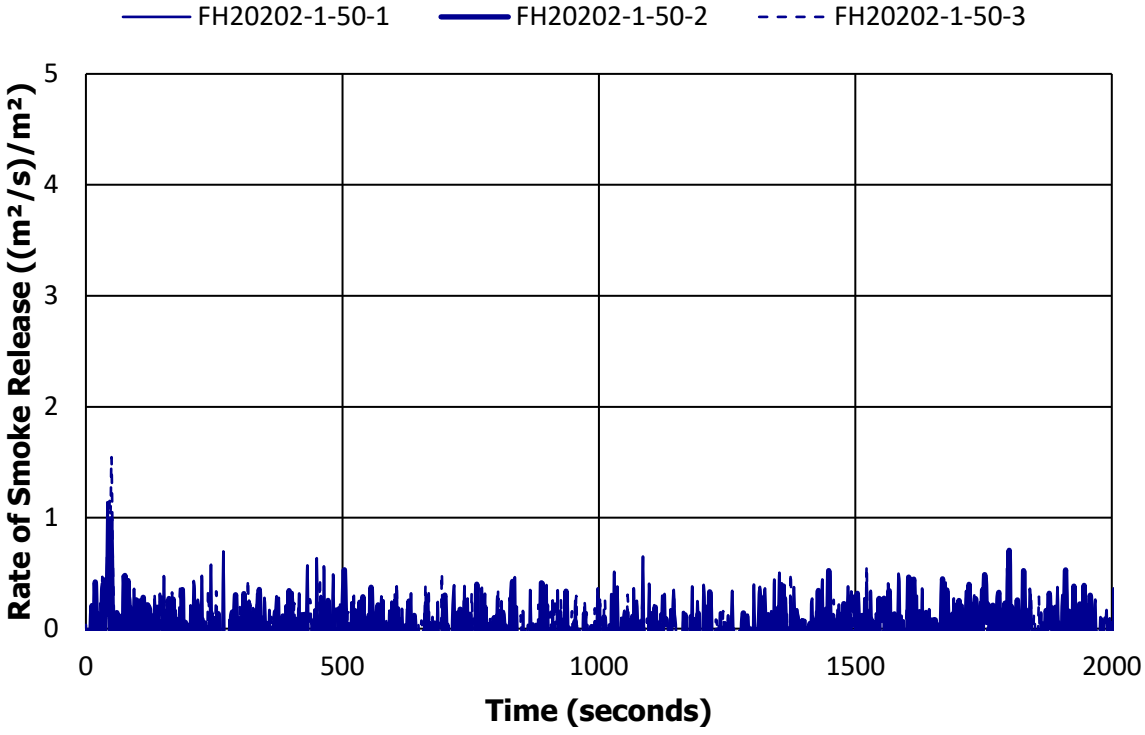

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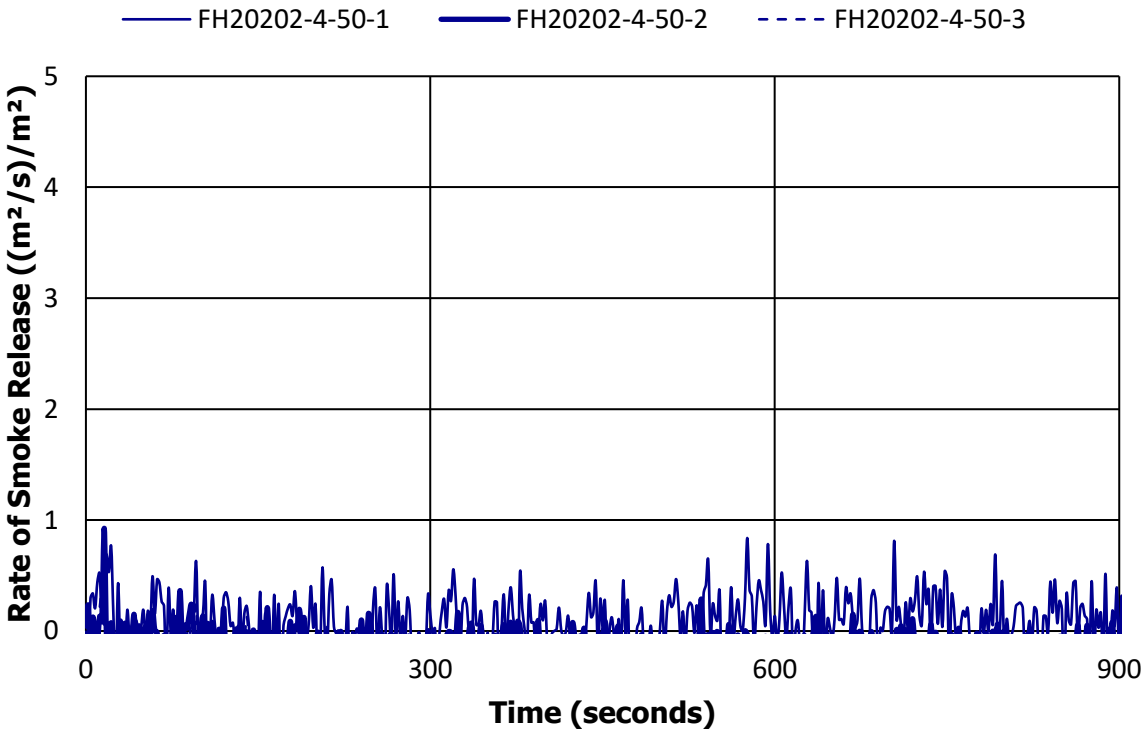
Figure 7: Rate of smoke production versus time (Layer used for ASEA determination)



7. DISCUSSION

AS 5637.1 requires the highest Group Number to be determined when testing a multi-layered product. Sample FH6339-7-50-1 indicative testing data is included in this report as representative of a painted example of the dB panel being tested at a 30 mm thickness. The peak and total heat release rates do not exceed that of the composite specimen and achieve the same Material Group Number as that of both the composite that was tested in full and the 19 mm fine fissured tile indicative test FH20202-5-50-1. As such, it is considered that the testing included is representative across thicknesses of mineral tile from 19-30 mm and testing of the unpainted 24 mm dB mineral tile component layer of the Heradesign dB product would not be expected to alter the classification.

Indicative test data for FH17983-3A-50-1 and FH17983-3B-50-1 is included to represent the Heradesign Superfine component in a beige colour. These variants also achieved the same Material Group Number as that of the white-painted composite that was tested in full. As such it is considered that additional testing of the composite product with the Heradesign layer in beige would also not be expected to alter the classification.

END OF TEST REPORT

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FH20202-01-1-C1
GROUP NUMBER ASSESSMENT

This is to certify that the specimens described below were tested by BRANZ in accordance with ISO 5660 for determination of Group Number classification

Test Sponsor

Armstrong Ceiling Solutions (Australia) Pty Ltd
75 Long Street
Smithfield
NSW 2164
Australia

Date of tests

15th, 17th and 22nd October 2024

Reference BRANZ Test Report

FH20202-01-1 – 19 November 2024

Test specimens as described by the client

Heradesign dB acoustic ceiling panels

A nominally 15 to 25 mm magnesite-bonded wood wool core with a painted face, adhered to a mineral fibre tile backer. The mineral fibre tiles are either a nominally 19 mm fine fissured (painted and perforated) or a nominally 24 mm dB (unpainted and perforated).

Specimen ID	Composition	Mean Values			Indicative Group Number (NZBC/NCC)
		Mass (g)	Thickness (mm)	Apparent Density (kg/m³)	
FH20202-1-50-1,2,3^*	Heradesign dB Complete composition^	170.7*	43.7*	391*	1-S/1
FH20202-2-50-1	Heradesign Superfine 25mm white (painted face)	125.9	25.5	494	1-S/1
FH20202-3-50-1	Heradesign superfine 15mm white (painted face)	76.1	15.0	507	1-S/1
FH20202-4-50-1,2,3+*	Fine fissured 19mm tile (adhesive face)	46.7	18.4	254	1-S/1
FH20202-5-50-1	Fine fissured 19mm tile (painted face)	48.1	18.6	259	1-S/1
FH20202-6-50-1	Heradesign Superfine 25 mm (adhesive face)	125.5	25.3	496	1-S/1
FH6639-7-50-1	dB Acoustic 30 mm tile (painted face)	104.4	30.3	345	1-S/1
FH17983-3A-50-1	Heradesign Superfine 25mm beige	112.8	24.6	459	1-S/1
FH17983-3B-50-1	Heradesign Superfine 15mm beige	76.2	15.0	508	1-S/1

*mean values for replicate specimens ^Determination of highest Group Number +Determination of highest ASEA

FH20202-01-1-C1
GROUP NUMBER ASSESSMENT

Discussion No significant variations were detected in the indicative testing of individual layers, including variants of the Heradesign Superfine panels in beige and the dB acoustic tile in 30 mm painted. The samples were designated the same classification. Heradesign dB composite specimens are available with a nominal thickness between 34 mm – 49 mm and include colour variants of the painted surface finish and differing thicknesses of both component layers. These would be expected to achieve an equivalent classification to the replicate test specimens as shown below.

Group Number Classification in accordance with the New Zealand Building Code and NCC Australia The specimens were deemed suitable for testing and calculations for establishing a Group Number were carried out in accordance with New Zealand Building Code (NZBC) Verification Method C/VM2 Appendix A.

Testing was performed in accordance with ISO 5660, cone calorimeter test, for the purposes of Group Number Classification as specified in the National Construction Code (NCC) Volume One, Specification 7, Clause S7C4. As per Section 9 (n) of AS 5637.1, It was deemed valid to test the particular material in the cone calorimeter for the determination of National Construction Code NCC group number. Classification for the sample as described above is given in the table below.

Building Code Document	Group Number Classification
NZBC Verification Method C/VM2, Amendment 7, Appendix A	1-S
NCC 2022 Volume One, Specification 7, Clause S7C4, determined in accordance with AS 5637.1:2015	1 The average specific extinction area was **less** than the 250 m2/kg limit

Issued by

L. M. Grant
Fire Testing Engineer
BRANZ

Issue Date

19 November 2024

Reviewed by

L. Q. Greive
Fire Testing Engineer
BRANZ

Authorised by

L. Q. Greive
Fire Testing Engineer
BRANZ

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