

BRANZ Type Test

FH12423-001 ISSUE 1

CONE CALORIMETER TEST OF ALPOLIC™ NC

CLIENT

PSP Limited
320 Rosedale Road
Albany
Auckland 0632
New Zealand



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

Test sponsor

PSP Limited
320 Rosedale Road
Albany
Auckland 0632
New Zealand

Description of test specimen

The product as described by the client as ALPOLIC™ NC, a white coloured nominally 4 mm thick composite panel comprised of 3 mm thick highly mineral filled core including aluminium tri-hydroxide and calcium carbonate, with a 0.5 mm coated aluminium alloy laminate on both sides.

Date of tests

11th and 28th November 2019 and 20th February 2020

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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SIGNATORIES



Author

J. R. Stallinger
Associate Fire Testing Engineer
BRANZ



Reviewer

L. F. Hersche
Fire Testing Engineer
IANZ Approved Signatory

DOCUMENT REVISION STATUS

ISSUE NO.	DATE ISSUED	EXPIRY DATE	DESCRIPTION
1	9/02/2021	9/02/2026	Initial Issue

1. GENERAL

The product submitted by the client for testing was identified by the client as ALPOLIC™ NC, a white coloured nominally 4 mm thick composite panel comprised of 3 mm thick highly mineral filled core including aluminium tri-hydroxide and calcium carbonate, with a 0.5 mm coated aluminium alloy laminate on both sides. Figure 1 illustrates a representative specimen of that tested.

Figure 1: Representative specimen (front face left, core centre, back face right)



1.1 Sample measurements

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

Table 1: Physical parameters

Specimen ID	Initial properties		Overall apparent density (kg/m ³)	Layer
	Mass (g)	Mean thickness (mm)		
FH12423-1-50-2	87.8	4.2	2091	Front Face
FH12423-1-50-3	89.2	4.2	2124	Front Face
FH12423-2-50-1	86.1	4.1	2100	Front Face
FH12423-3-50-1	71.6	3.8	1884	Exposed Core

Note: Shaded rows show sample tested in full herein.

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), 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 11th and 28th November 2019 and 20th February 2020 by Mr James Quilter and Mr James Stallinger at BRANZ Limited laboratories, Judgeford, New Zealand.

2.3 Specimen conditioning

All specimens were conditioned to moisture equilibrium (constant weight), at a temperature of $23 \pm 2^\circ\text{C}$ and a relative humidity of $50 \pm 5\%$ 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 three replicate specimens and one indicative specimen, tested at an irradiance level of 50 kW/m^2 . All tests were carried out with the specimen horizontal, and with a nominal duct flow rate of $0.024 \text{ m}^3/\text{s}$.

2.6 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. TEST RESULTS AND REDUCED DATA

3.1 Test results and reduced data – ISO 5660

Table 2: Test results and reduced data – ISO 5660

Material	Test specimens as described in Section 1 (in accordance with ISO 5660)			Mean	
	FH12423-1-50-2	FH12423-1-50-3	FH12423-2-50-1		
Specimen test number	FH12423-1-50-2	FH12423-1-50-3	FH12423-2-50-1		
Test Date	11/12/2019	11/12/2019	28/11/2019		
Time to sustained flaming	s	No ignition	No ignition	No ignition	-
Calibration constant	-	-	-		
Test duration ^b	s	982*	546*	1800**	1109
Mass remaining, m_f	g	73.5	78.1	70.4	74.0
Mass pyrolyzed	%	16.3%	12.4%	18.3%	15.7%
Specimen mass loss ^c	kg/m ²	1.6	1.3	1.8	1.6
Specimen mass loss rate ^c	g/m ² s	1.7	2.3	1.0	1.6
Heat release rate					
peak, \dot{q}_{max}''	kW/m ²	10.8	12.6	3.3	8.9
average, \dot{q}_{avg}''					
Over 60 s from ignition	kW/m ²	-0.6	-1.5	-1.5	-1.2
Over 180 s from ignition	kW/m ²	-0.6	0.6	-1.5	-0.5
Over 300 s from ignition	kW/m ²	-0.1	2.2	-1.2	0.3
Total heat released	MJ/m ²	0.3	1.3	1.4	1.0
Average Specific Extinction Area	m ² /kg	16.6	12.7	6.9	12.1
Effective heat of combustion ^d , $\Delta h_{c,eff}$	MJ/kg	0.2	1.0	0.8	0.7
Total smoke production					
Non-flaming $S_{A,1}$	m ² /m ²	0.0	0.0	0.0	0.0
Flaming $S_{A,2}$	m ² /m ²	28.0	17.0	27.2	24.1
Total $S_A = S_{A,1} + S_{A,2}$	m ² /m ²	28.0	17.0	27.2	24.1

Notes: ^a no significant observations were recorded

^b determined by * X_{O_2} returning to the pre-test value within 100 ppm of oxygen concentration for 10 minutes

** 30 minutes after time to sustained flaming or without ignition

^c from ignition to end of test;

^d from the start of the test

+ value calculated using data beyond the official end of test time according to the test standard.

NR not recorded

3.2 Indicative test result

Table 3: Indicative test results and reduced data

Specimen ID	Specimen thickness (mm)	Irradiance (kW/m ²)	Time to Ignition (s)	Peak Heat Release Rate (kW/m ²)	Total Heat Released (MJ/m ²)
FH12423-1-50-2	4.2	50	No ignition	10.8	0.3
FH12423-3-50-1	3.8	50	321	24.1	13.9

Shaded row – Sample 1 result for replicate test specimens

4. TEST VARIABILITY

The test standards require that the mean heat release rate (HRR) readings over the first 180s 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.

Table 4: Heat release rate

Specimen ID	Average HRR over 180 s from ignition	Arithmetic mean	% difference from the arithmetic mean
FH12423-1-50-2	-0.6	-0.5	15.5%
FH12423-1-50-3	0.6		-211.6%
FH12423-2-50-1	-1.5		196.1%

Table 4 identifies all the specimens exposed to 50 kW/m² irradiance exceeded the acceptance criteria. Although all the specimens were outside of the variability criteria of the test standard, the same Group Number classification was determined for each specimen. A further set of three tests as required by the test standard was deemed not to be necessary and would not be expected to lead to an alteration of the classification.

5. SUMMARY

The report summary for the specimens as described in Section 1, exposed to an irradiance of 50 kW/m² is given in Table 5 below with rates of heat release illustrated in Figure 2.

Table 5: Report summary

Mean Specimen thickness (mm)	Irradiance (kW/m ²)	Mean Time to Ignition (s)	Mean Peak Heat Release Rate (kW/m ²)	Mean Average Specific Extinction Area (m ² /kg)
4.2	50	No ignition	8.9	1.0



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Figure 2: Rate of heat release versus time

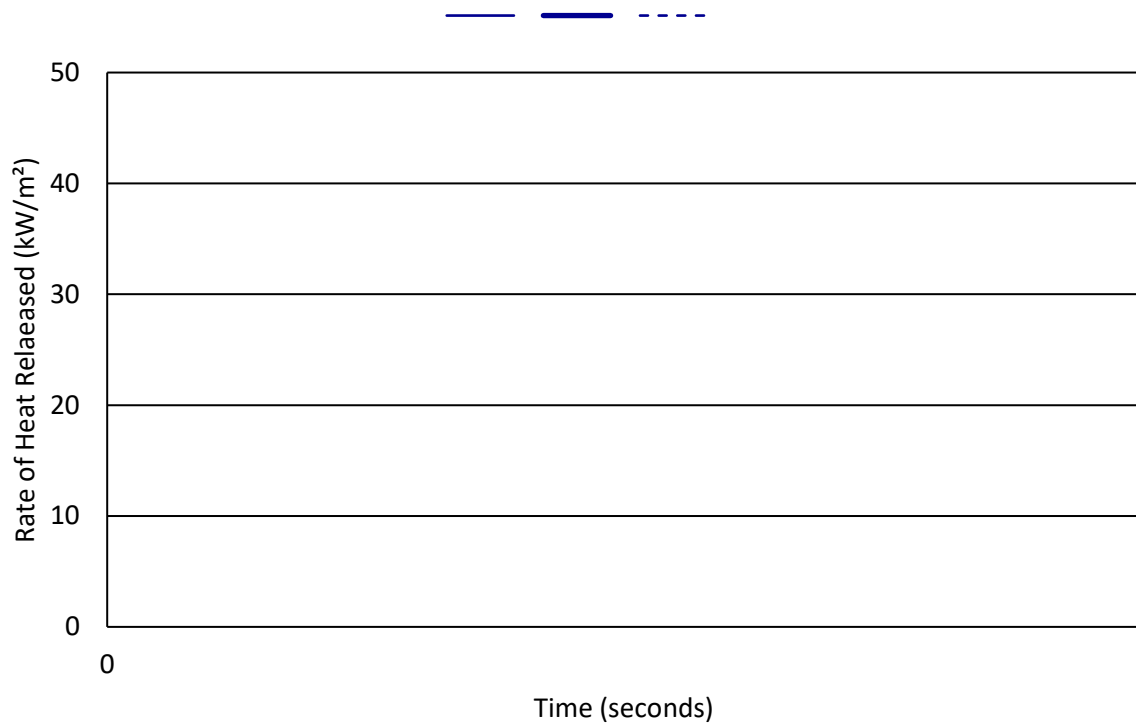
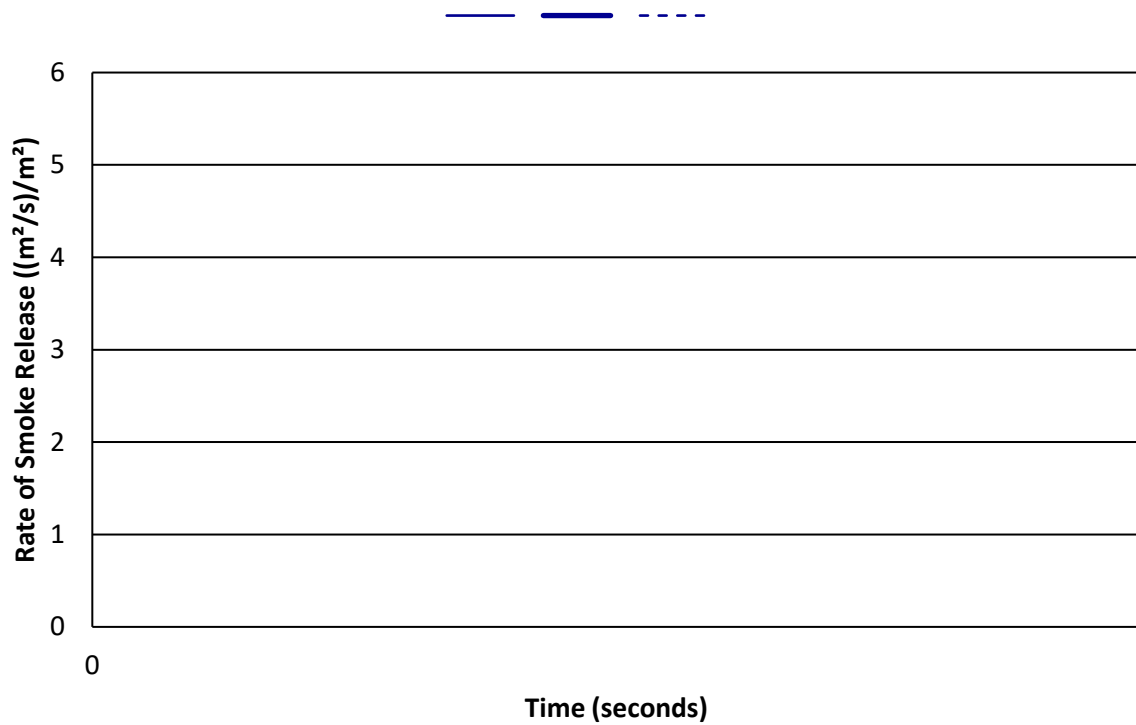


Figure 3: Rate of smoke production per unit area



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GROUP NUMBER CLASSIFICATION



This is to certify that the specimens described below were tested by BRANZ for determination of Group Number Classification and Average Specific Extinction Area in accordance with ISO 5660 Parts 1 and 2.

Test Sponsor
PSP Limited
320 Rosedale Road
Albany, Auckland 0632
New Zealand

Date of tests
11th and 28th November 2019 and 20th February
2020

Reference BRANZ Test Report
FH12423-001 Issue 1 – 9 February 2021

Test specimens as described by the client

ALPOLIC™ NC

A white coloured nominally 4 mm thick composite panel comprised of 3 mm thick highly mineral filled core including aluminium tri-hydroxide and calcium carbonate, with a 0.5 mm coated aluminium alloy laminate on both sides.

Specimen ID	Mass (g)	Thickness (mm)	Apparent Density (kg/m ³)	Layer	Indicative Result
FH12423-1-50-2	87.8	4.2	2090	Front Face	Group 1-S
FH12423-1-50-3	89.2	4.2	2124	Front Face	Group 1-S
FH12423-2-50-1	86.1	4.1	2100	Front Face	Group 1-S
FH12423-3-50-1	71.6	3.8	1884	Exposed Core	Group 1-S

Note: Shaded rows indicate sample tested in full within.

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
NZBC Verification Method C/VM2 Appendix A	1-S

Issued by


J. R. Stallinger
Associate Fire Testing
Engineer
BRANZ

Reviewed by


L. F. Hersche
Fire Testing Engineer
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

The National Association of Testing Authorities (NATA) and International Accreditation New Zealand (IANZ) are both signatories of the ILAC Mutual Recognition Agreement.