

BRANZ Type Test

FH12227-001

CONE CALORIMETER TEST REPORT OF ALIBUILD A2 PLUS

CLIENT

Mulford Plastics
5 Arthur Brown Place
Mt Wellington
Auckland
New Zealand



IANZ
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

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

- ISO 5660 Parts 1 and 2
- AS 5637.1

Test sponsor

Mulford Plastics
5 Arthur Brown Place
Mt Wellington
Auckland
New Zealand

Description of test specimen

The product as described by the client as ALIBUILD A2 PLUS.

Date of tests

18 and 24 October, and 14 November 2019

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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TO WHOM IT MAY CONCERN

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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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DOCUMENT REVISION STATUS

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1	19/12/2019	19/12/2024	Initial Issue



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1. GENERAL

The product submitted by the client for testing was identified by the client as ALIBUILD A2 PLUS. A nominally 4 mm thick, black PVDF painted composite panel with 0.5mm aluminium skins on front and back faces bonded to an A2 core. Prior to testing the black front-facing aluminium face was removed and the core material exposed during testing. Figure 1 illustrates a representative specimen of that tested.

Figure 1: Representative specimen (specimen front face left, core material 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	Client Ref	Initial properties		Overall apparent density (kg/m ³)	Colour
		Mass (g)	Mean thickness (mm)		
FH12227-1-50-1	NBR 01508	69.5	3.6	1931	Beige
FH12227-1-50-2	NBR 01503	71.2	3.6	1978	Beige
FH12227-1-50-5	NBR 01505	69.3	3.6	1925	Beige
FH12227-1-50-6	NBR 01511	68.9	3.6	1914	Beige
FH12227-1-50-7	NBR 01505	69.4	3.6	1928	Beige
FH12227-1-50-10	NBR 01509	68.4	3.5	1954	Beige
FH12227-1-50-11	-	16.5	0.8	2200	Metal

Shaded row – indicative test, adhesive face of aluminium skin.

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 sample preparation and test procedure were as described in 2.4 and 2.5.

2.2 Test date

The tests were conducted on 18 and 24 October, and 14 November 2019 by Mr James Quilter 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 six replicate specimens tested at an irradiance level of 50 kW/m^2 and one indicative test of the underside of the front-facing aluminium skin. 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
	FH12227-1-50-1	FH12227-1-50-2	FH12227-1-50-5	
Specimen test number	FH12227-1-50-1	FH12227-1-50-2	FH12227-1-50-5	
Test Date	18/10/2019	18/10/2019	24/10/2019	
Time to sustained flaming	s	105	100	100
Observations ^a	-	-	-	
Test duration ^b	s	900***	900***	900
Mass remaining, m_f	g	60.3	61.8	60.1
Mass pyrolyzed	%	13.2%	13.2%	13.3%
Specimen mass loss ^c	kg/m ²	0.9	0.9	0.9
Specimen mass loss rate ^c	g/m ² s	1.9	1.9	2.1
Heat release rate				
peak, \dot{q}_{max}''	kW/m ²	90.6	91.5	98.1
average, \dot{q}_{avg}''				
Over 60 s from ignition	kW/m ²	71.0	64.5	78.5
Over 180 s from ignition	kW/m ²	39.4	43.5	45.3
Over 300 s from ignition	kW/m ²	28.0	31.0	31.9
Total heat released	MJ/m ²	9.5	10.5	10.7
Average Specific Extinction Area	m ² /kg	128.7	99.1	125.3
Effective heat of combustion ^d , $\Delta h_{c,eff}$	MJ/kg	9.2	9.8	10.1

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

*** 15 minutes test duration, no further signs of combustion observed

^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 Test results and reduced data – ISO 5660

Table 3: Test results and reduced data – ISO 5660

Material	Test specimens as described in Section 1 (in accordance with ISO 5660)			Mean
	FH12227-1-50-6	FH12227-1-50-7	FH12227-10-50-1	
Specimen test number	FH12227-1-50-6	FH12227-1-50-7	FH12227-10-50-1	
Test Date	24/10/2019	24/10/2019	14/11/2019	
Time to sustained flaming s	120	100	105	108
Observations ^a	-	-	-	
Test duration ^b s	900*	900*	900*	900
Mass remaining, m_f g	59.8	60.2	59.1	59.7
Mass pyrolyzed %	13.2%	13.2%	13.6%	13.4%
Specimen mass loss ^c kg/m ²	0.8	0.9	0.9	0.8
Specimen mass loss rate ^c g/m ² s	2.0	2.4	2.6	2.4
Heat release rate				
peak, \dot{q}_{max}'' kW/m ²	84.7	104.0	91.7	93.5
average, \dot{q}_{avg}'' kW/m ²				
Over 60 s from ignition kW/m ²	68.0	74.4	66.0	69.5
Over 180 s from ignition kW/m ²	51.5	53.5	53.3	52.8
Over 300 s from ignition kW/m ²	33.0	36.0	33.7	34.2
Total heat released MJ/m ²	10.0	11.2	9.4	10.2
Average Specific Extinction Area m ² /kg	106.4	125.6	75.1	102.4
Effective heat of combustion ^d , $\Delta h_{c,eff}$ MJ/kg	9.7	10.7	8.9	9.8

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

*** 15 minutes test duration, no further signs of combustion observed

^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



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3.3 Indicative test results – ISO 5660

Specimen ID	Irradiance (kW/m ²)	Mean Time to Ignition (s)	Peak Heat Release Rate (kW/m ²)	Total Heat Released (MJ/m ²)	Average Specific Extinction Area (m ² /kg)
FH12227-1-50-1	50	105	90.6	9.5	129
FH12227-1-50-11	50	27	183.7	2.3	218

Note: shaded row – Sample 1 of 6 replicate specimens tested.

4. SUMMARY

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
FH12227-1-50-1	39.4	45.3	-12.9%
FH12227-1-50-2	43.5		-3.8%
FH12227-1-50-5	52.8		16.7%

Table 4 identifies that two of the specimens exposed to 50 kW/m² irradiance exceeded the acceptance criteria. A further three specimens were tested as require by the test standard.

The report summary for the six replicate 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 for six replicate specimens

Mean Specimen thickness (mm)	Irradiance (kW/m ²)	Mean Time to Ignition (s)	Mean Peak Heat Release Rate (kW/m ²)	Average Specific Extinction Area (m ² /kg)
3.6	50	105	95.8	113.8



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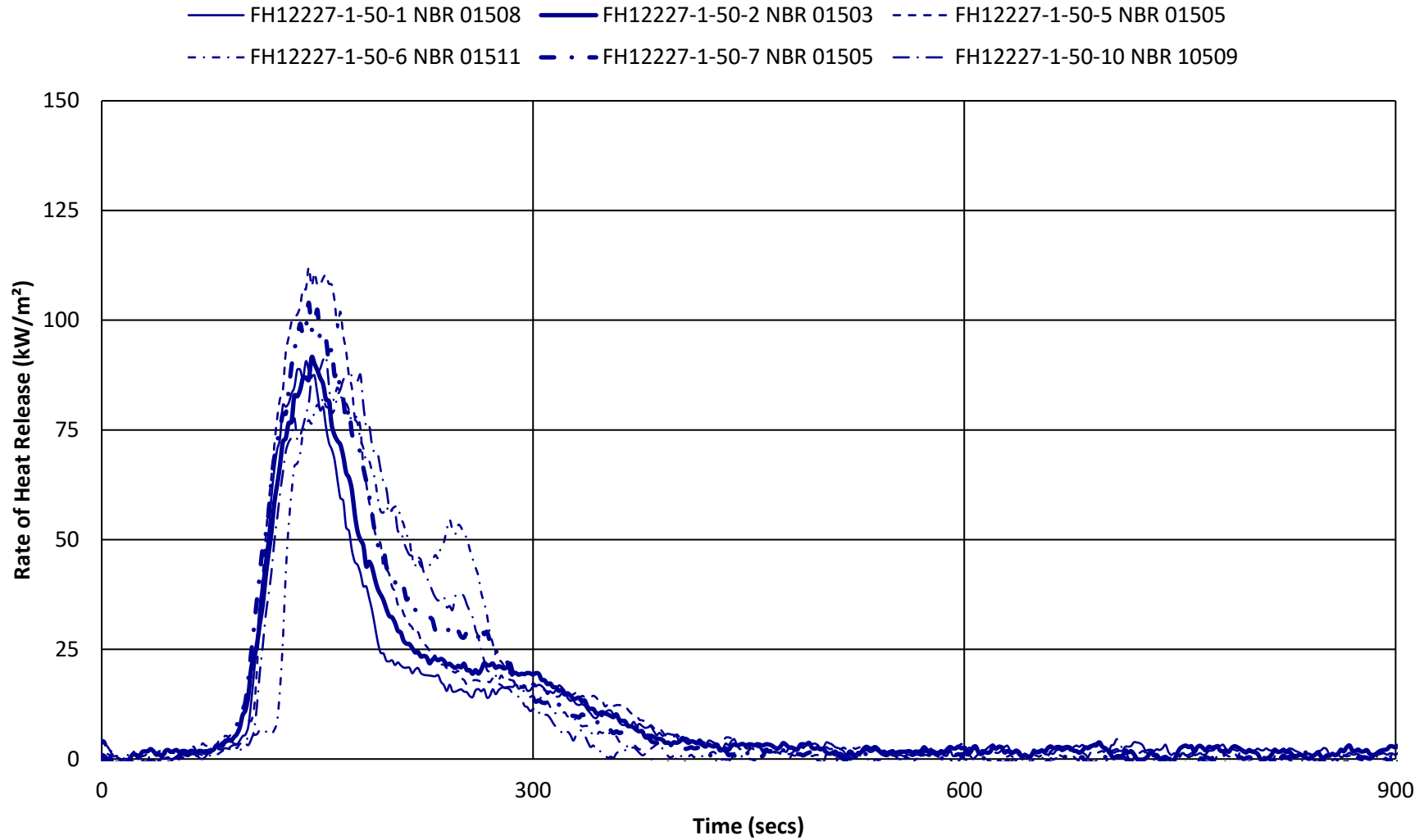
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Figure 2: Rate of heat release versus time



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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

Mulford Plastics
5 Arthur Brown Place
Mt Wellington, Auckland
New Zealand

Date of tests

18 and 24 October, and 14 November 2019

Reference BRANZ Test Report

FH12227-001 – 19 December 2019

Test specimens as described by the client

ALIBUILD A2 PLUS - A nominally 4 mm thick, black PVDF painted composite panel with 0.5mm aluminium skins on front and back faces bonded to an A2 core. Prior to testing the black front-facing aluminium face was removed and the core material exposed during testing.

Specimen Reference	Mass (g)	Thickness (mm)	Apparent Density (kg/m ³)	Core Colour
FH12227-1-50-1	69.5	3.6	1931	Beige

Note: sample 1 of 6 replicate specimens tested

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.

Group Number Classification in accordance with NCC Australia

Calculations were carried out according to AS 5637.1:2015. The Group Number Classification and Average Smoke Extinction Area 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 ISO 5660 for the purposes of Group Number Classification as specified in the NCC Volume One Specification C1.10 Clause 4.


A single indicative test of the outer layer of the multi-layered specimen was completed to determine the highest group number and average area of extinction result. The A2 core (with black front-facing aluminium skin removed) was determined to be the worst performing layer and replicate testing was completed of this layer for the determination of the following classification.

Building Code Document	Group Number Classification
NZBC Verification Method C/VM2 Appendix A	1-S
NCC Volume One Specification C1.10 Clause 4 determined in accordance with AS 5637.1:2015	1 The average specific extinction area was less than the 250 m ² /kg limit

Issued by


L. F. Hersche
Fire Testing Engineer
BRANZ

Reviewed by


P. C. R. Collier
Senior Fire Testing Engineer
IANZ Approved Signatory

Regulatory authorities are advised to examine test reports before approving any product.



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