
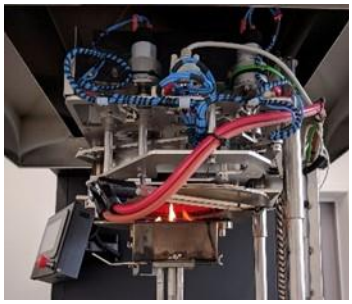
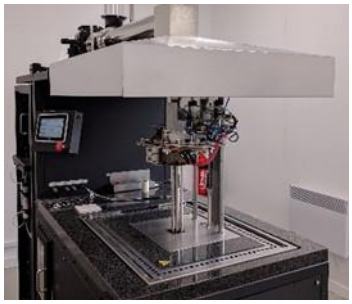

BRANZ Type Test

FH11975-001

CONE CALORIMETER TEST REPORT AND NZBC ACCEPTABLE SOLUTIONS SECTION 5.8.1 PERFORMANCE OF DINCEL STRUCTURAL WALLING SYSTEM

CLIENT
Dincel Construction System Pty Ltd
101 Quarry Road
Erskine Park 2759
New South Wales
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) as specified in New Zealand Building Code (NZBC) Acceptable Solutions Appendix C 7.1, on client supplied specimens for the purposes of determination of the Exterior Surface Finishes performance in accordance with

- NZBC Acceptable Solutions Section 5.8.1. a) and b)

Test sponsor

Dincel Construction System Pty Ltd
101 Quarry Road
Erskine Park 2759
New South Wales
Australia

Description of test specimen

The product as described by the client as Dincel Structural Walling System.

Date of tests

11, 14, and 16 October 2019

Test results

For the purposes of compliance with the relevant building code documents, the following classification is considered applicable to the tested samples as described in Section 1.

Building Code Document		Performance
NZBC Acceptable Solutions Section 5.8.1	a)	Satisfied
	b)	Satisfied

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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DOCUMENT REVISION STATUS

ISSUE NO.	DATE ISSUED	EXPIRY DATE	DESCRIPTION
1	1/11/2019	1/11/2024	Initial Issue

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1. GENERAL

The product submitted by the client for testing was identified by the client as Dincel Structural Walling System. A permanent formwork which is filled with concrete for walls and columns. The representative test specimen was comprised of a nominally 2.5 mm PVC polymer skin attached to a 45 mm thick concrete substrate with 4 x 10 mm head diameter cast-in screws at 75 mm spacings. Figure 1 illustrates representative specimens of those tested.

Figure 1: Representative specimens (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/m³)	Colour (front face)
	Mass (g)	Mean thickness (mm)		
FH11975-1-50-1	1022.4	46.0	2244	White
FH11975-1-50-2	1008.0	45.0	2240	White
FH11975-1-50-3	1035.0	46.0	2250	White

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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), 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 are as described in 2.4 and 2.5.

2.2 Test date

The tests were conducted on the 11, 14, and 16 October 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 ± 2°C and a relative humidity of 50 ± 5% immediately prior to testing.

2.4 Special weathering

According to Acceptable Solutions Appendix C 7.1.3, timber claddings which have a fire-retardant treatment incorporated in or applied to them are required to be subjected to the regime of accelerated weathering described in ASTM D 2898 Method B with the water flow rate from Method A before testing. The tested specimens were not timber claddings and therefore were not subjected to the accelerated weathering.

2.5 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 during testing. All specimens were wrapped in a single layer of aluminium foil, covering the unexposed surfaces.

2.6 Test programme

The test programme consisted of three replicate specimens as identified in the Table 1, 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.

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. TEST RESULTS AND REDUCED DATA

3.1 Test results and reduced data – NZBC Acceptable Solutions Appendix C7.1

Table 2: Test results and reduced data in accordance with ISO 5660

Material		Test specimens as described in Section 1			Mean
Specimen test number		FH11975-1-50-1	FH11975-1-50-2	FH11975-1-50-3	
Test Date		11/10/2019	14/10/2019	16/10/2019	
Time to sustained flaming	s	90	90	95	92
Observations[a]		NR	NR	NR	
Test duration[b]	s	900*	900*	900*	900
Mass remaining, m_f	g	1002.0	977.8	1005.6	995.1
Mass pyrolyzed	%	2.9%	3.0%	2.8%	2.9%
Specimen mass loss[c]	kg/m^2	2.9	2.9	2.8	2.9
Specimen mass loss rate[c]	g/m^2 .s	3.6	3.5	3.5	3.5
Heat release rate					
peak, $\dot{q}''_{max}$	kW/m^2	39.3	39.2	37.4	38.6
average, $\dot{q}''_{avg}$					
Over 60 s from ignition	kW/m^2	25.9	22.6	21.3	23.3
Over 180 s from ignition	kW/m^2	15.6	14.6	13.4	14.5
Over 300 s from ignition	kW/m^2	15.2	14.0	13.7	14.3
Total heat released	MJ/m^2	14.7	13.8	13.5	14.0
Average Specific Extinction Area	m^2/kg	147.5	150.9	162.3	153.5
Effective heat of combustion[d], $\Delta h_{c,eff}$	MJ/kg	4.3	4.0	4.1	4.1

Notes:

[a] no significant observations were recorded

[b] determined by * test duration of 15 minutes as specified in NZBC Acceptable Solutions Appendix C 7.1.2

[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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4. SUMMARY

The test standard requires that the mean heat release rate (HRR) readings over the first 180 s 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 3: Heat release rate

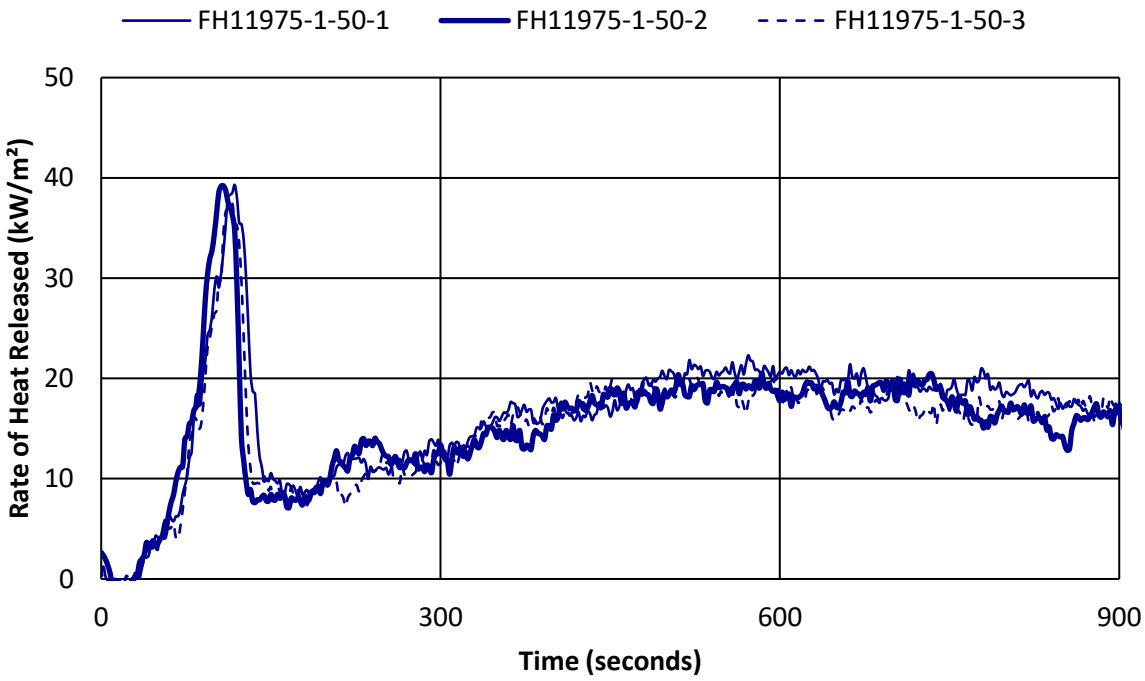
Specimen ID	Average HRR over 180 s from ignition	Arithmetic mean	% difference from the arithmetic mean
FH11975-1-50-1	15.6	14.5	7.2%
FH11975-1-50-2	14.6		0.4%
FH11975-1-50-3	13.4		-7.6%

Table 3 identifies the specimens exposed to 50 kW/m² irradiance meet the acceptance criteria.

Table 4: Report summary

Mean Specimen thickness (mm)	Irradiance (kW/m²)	Mean Time to Ignition (s)	Mean Peak Heat Release Rate (kW/m²)	Mean Total Heat Released (MJ/m²)
45.7	50	92	38.6	14.0

Figure 2: Rate of heat release versus time



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5. RESULTS FOR NZBC ACCEPTABLE SOLUTIONS SECTION 5.8.1

In accordance with NZBC Acceptable Solutions Section 5.8.1 a) and b) for external walls the mean test results must not exceed the Peak Heat Release rate and Total Heat Release shown in Table 5.

Table 5: NZBC Acceptable Solutions Section 5.8.1 a) and b) requirements

	NZBC Acceptable Solutions Section 5.8.1 Requirement – values shall not exceed	
	(a)	(b)
Peak Heat Release rate (kW/m²)	100	150
Total Heat Release (MJ/m²)	25	50

The samples as described in Section 1 had the following results when reduced over the 15-minute (900 s) period as specified in Appendix C 7.1.2 as shown in Table 6.

Table 6: Peak Heat Release Rate and Total Heat Released

	Sample 1	**Sample 2**	**Sample 3**	**Performance**
Peak Heat Release rate (kW/m²)	39.3	39.2	37.4	Meets a) and b)
Total Heat Release (MJ/m²)	14.7	13.8	13.5	Meets a) and b)

The tested samples recorded a mean Peak Heat Release of 38.6 KW/m^2 and a mean Total Heat Release of 14.0 MJ/m^2 and it is therefore considered to satisfy the requirements of NZBC Acceptable Solutions Section 5.8.1 a) and b).

6. NZBC CONCLUSION

For the purposes of compliance with the relevant building code documents, the following classification is considered applicable to the tested sample as described in Section 1.

Building Code Document		**Performance**
NZBC Acceptable Solutions Section 5.8.1	a)	Satisfied
	b)	Satisfied

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FH11975-001
NZBC CLASSIFICATION

This is to certify that the specimen described below was tested by BRANZ in accordance with ISO 5660 Parts 1 and 2.

Test Sponsor

Dincel Construction System Pty Ltd
101 Quarry Road
Erskine Park 2759
New South Wales Australia

Date of tests

11, 14, and 16 October 2019

Reference BRANZ Test Report

FH11975-001 – issued 1/11/2019

Test specimen as described by the client

Dincel Structural Walling System. A permanent formwork which is filled with concrete for walls and columns.

Specimen Reference	Mass (g)	Thickness (mm)	Apparent Density (kg/m³)	Colour
FH11975-1-50-1	1022.4	46.0	2244	White
FH11975-1-50-2	1008.0	45.0	2240	White
FH11975-1-50-3	1035.0	46.0	2250	White

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		Performance
NZBC Acceptable Solutions Section 5.8.1	a)	Satisfied
	b)	Satisfied

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.

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

Issue Date
1/11/2019

Expiry Date
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