

BRANZ Type Test

FH 5159-TT ISSUE 2

CONE CALORIMETER TEST OF MUROS WALL PANELS

CLIENT

Muros International Limited
Suite 9, 349 Remuera Road
Remuera
Auckland 1050
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 5660-1:2002
- ISO 5660-2:2002
- AS 5637.1:2015
- AS/NZS 3837:1998

Test sponsor

Muros International Limited
Suite 9, 349 Remuera Road
Remuera
Auckland 1050
New Zealand

Description of test specimen

The product as described by the client as Muros FR Wall Panel.

Date of tests

Initial testing: 26 July 2013

Additional test: 2 July 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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- (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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J. R. Stallinger
Associate Fire Testing Engineer
BRANZ



Reviewer

E. Soja
Senior Fire Safety Engineer
IANZ Approved Signatory

DOCUMENT REVISION STATUS

ISSUE NO.	DATE ISSUED	EXPIRY DATE	DESCRIPTION
2	29 March 2021	29 March 2026	Additional specimen tested
			Report revalidated for an additional 5 years
1	12 May 2014	12 May 2019	Initial issue



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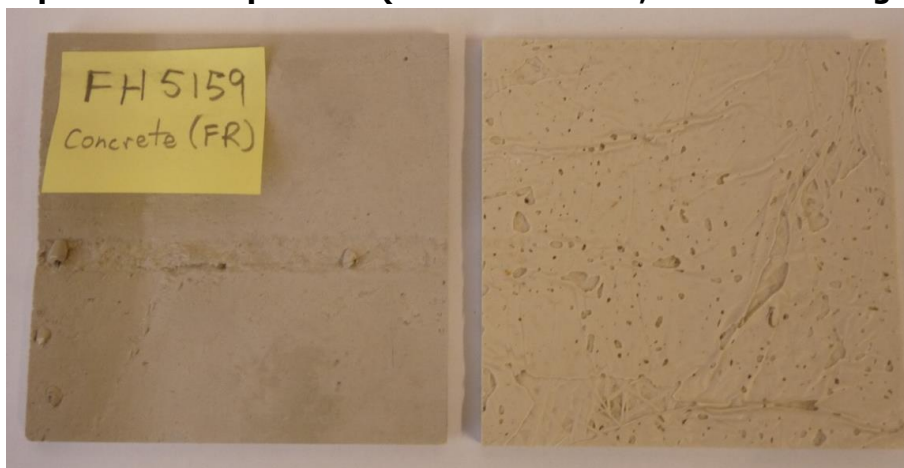
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1. GENERAL

The product submitted for testing was identified by the client as Muros Concrete (FR) wall panel, a decorative fibreglass-based panel comprising of a base of natural and mineral pigments and mixed with polyester resin and fibreglass. Indicative testing was also completed on Muros Brick wall panel, of the same construction. Figure 1 illustrates a representative specimen of that tested.

Figure 1: Representative specimen (front face on left, back face on 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)	Date of Test
	Mass (g)	Mean thickness (mm)		
FH5159-FR-50-1	93.2	6.0	1553	26/7/2013
FH5159-FR-50-2	87.2	5.0	1744	26/7/2013
FH5159-FR-50-3	97.8	6.0	1630	26/7/2013
FH12944-1-50-1	45.7	4.2	1080	2/7/2020

Shaded rows – replicate testing used to determine the group number.

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, and AS/NZS 3837:1998 'Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter'; (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 26 July 2013 by Mr Lukas Hersche and 2 July 2020 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 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
Specimen test number	FH5159-FR-50-1	FH5159-FR-50-2	FH5159-FR-50-3	
Time to sustained flaming s	37	34	30	34
Observations ^a	-	-	-	
Test duration ^b s	1837**	1834**	1830**	1834
Mass remaining, m_f g	56.5	52.1	59.8	56.1
Mass pyrolyzed %	39.3%	40.3%	38.9%	39.5%
Specimen mass loss ^c kg/m ²	4.1	3.9	4.3	4.1
Specimen mass loss rate ^c g/m ² .s	2.3	2.2	2.4	2.3
Heat release rate				
peak, \dot{q}_{max}'' kW/m ²	294.2	281.9	268.2	281.4
average, \dot{q}_{avg}''				
Over 60 s from ignition kW/m ²	150.0	156.4	153.3	153.2
Over 180 s from ignition kW/m ²	210.1	226.7	198.3	211.7
Over 300 s from ignition kW/m ²	226.0	212.0	220.6	219.5
Total heat released MJ/m ²	85.8	83.2	96.8	88.6
Average Specific Extinction Area m ² /kg	924.3	916.0	924.8	921.7
Effective heat of combustion ^d , $\Delta h_{c,eff}$ MJ/kg	20.7	20.9	22.5	21.4

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

3.2 Test results and reduced data – AS/NZS 3837

Table 3 Test results and reduced data – AS/NZS 3837

Material	Test specimens as described in Section 1 (in accordance with AS/NZS 3837)			Mean
Specimen test number	FH5159-FR-50-1	FH5159-FR-50-2	FH5159-FR-50-3	
Time to sustained flaming s	37	34	30	34
Observations ^a	-	-	-	
Test duration ^b s	697**	845**	1228**	923
Mass remaining, m _f g	60.3	54.3	61.0	58.5
Mass pyrolyzed %	35.3%	37.7%	37.6%	36.9%
Specimen mass loss ^c kg/m ²	3.7	3.7	4.1	3.8
Specimen mass loss rate ^c g/m ² .s	10.0	9.8	10.1	10.0
Heat release rate				
peak, \dot{q}_{\max}'' kW/m ²	294.2	281.9	268.2	281.4
average, \dot{q}_{avg}''				
Over 60 s from ignition kW/m ²	150.0	156.4	153.3	153.2
Over 180 s from ignition kW/m ²	210.1	226.7	198.3	211.7
Over 300 s from ignition kW/m ²	226.0	212.0	220.6	219.5
Total heat released MJ/m ²	79.0	78.8	93.2	83.7
Average Specific Extinction Area m ² /kg	1024.9	981.9	955.4	987.4
Effective heat of combustion ^d , $\Delta h_{c,\text{eff}}$ MJ/kg	21.2	21.2	22.4	21.6

Notes :

^a no significant observations were recorded

^b determined by * average mass loss over 1 minute dropped below 150 g/m²
 ** two minutes after flameout or other signs of combustion cease
 *** 60 minutes have elapsed or 10 minutes without ignition

^c from ignition to end of test;

^d from the start of the test



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Table 4: Indicative test results and reduced data – ISO 5660

Specimen ID	Irradiance (kW/m ²)	Time to Ignition (s)	Peak Heat Release Rate (kW/m ²)	Total Heat Released (MJ/m ²)	Average Specific Extinction Area (m ² /kg)
FH5159-FR-50-1	50	37	294.2	85.5	924.3
FH12944-1-50-1	50	30	271.0	39.5	592.9

3.3 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 5: Heat release rate

Specimen ID	Average HRR over 180s from ignition	Arithmetic mean	% difference from the arithmetic mean
FH5159-FR-50-1	210.1	211.7	-0.8%
FH5159-FR-50-2	226.7		7.1%
FH5159-FR-50-3	198.3		-6.3%

Table 5 identifies that the specimens exposed to 50 kW/m² irradiance meet the acceptance criteria.

4. SUMMARY

The report summary for the 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 6: Report summary

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)
5.7	50	34	281.4	921.7 (ISO) 987.4 (AS)

Figure 2: Rate of heat release versus time (replicates)

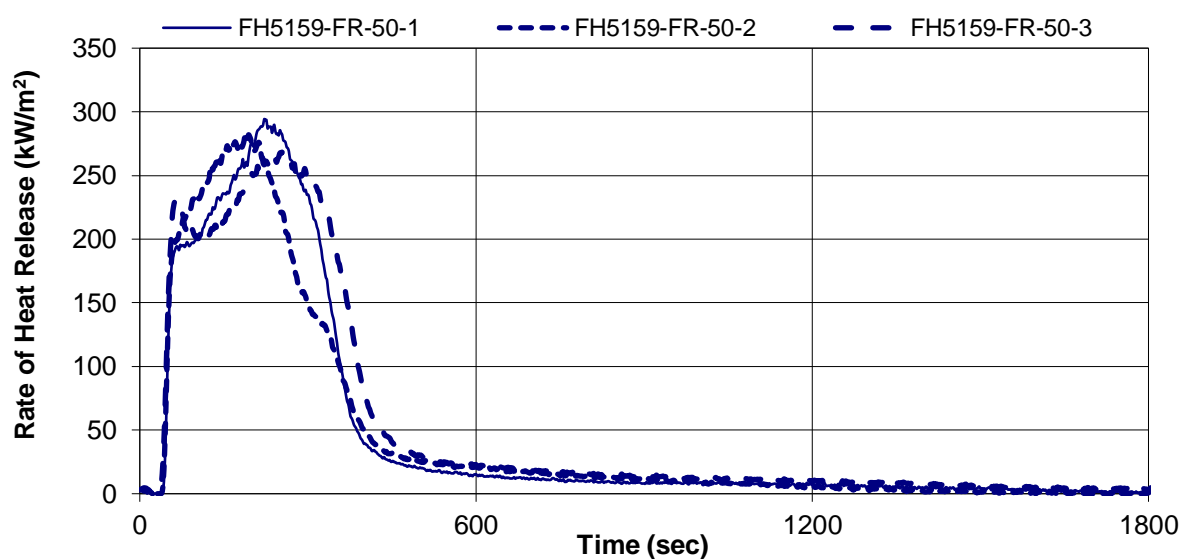
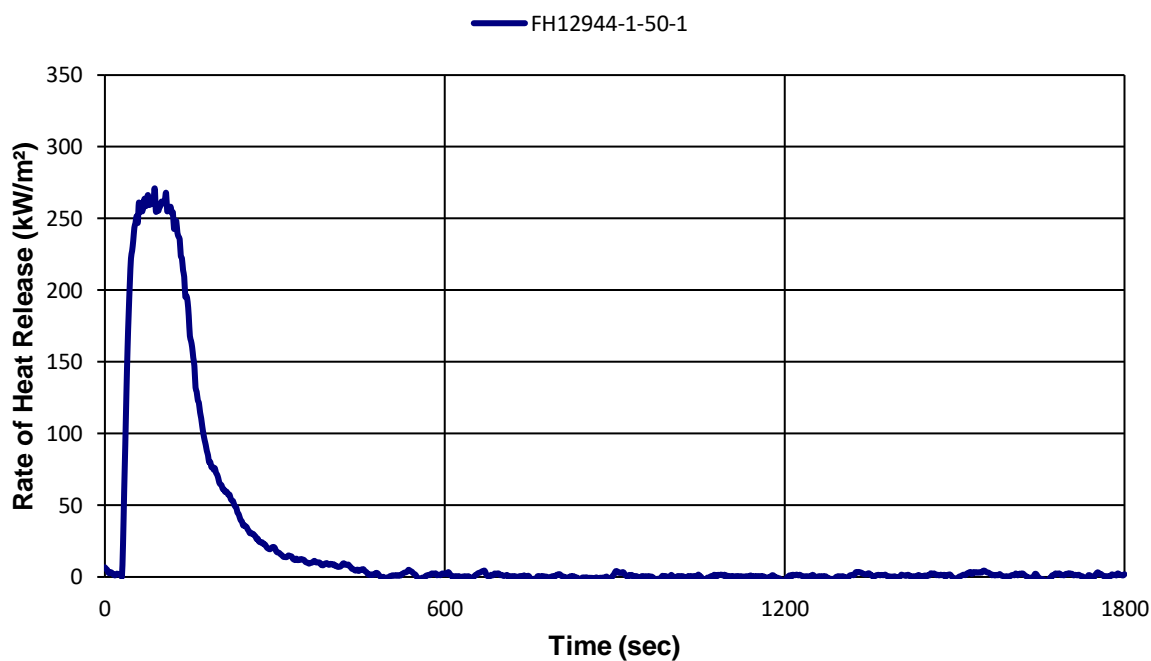


Figure 3: Rate of heat release versus time (indicative)



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GROUP NUMBER CLASSIFICATION



This is to certify that the specimens described below were tested by BRANZ in accordance with AS/NZS 3837:1998 and ISO 5660:2002 Parts 1 and 2 for determination of Group Number Classification and Average Specific Extinction Area.

Test Sponsor

Muros International Limited
Suite 9, 349 Remuera Road
Remuera
Auckland 1050
New Zealand

Date of tests

26 July 2013
2 July 2020

Reference BRANZ Test Report

FH 5159-TT ISSUE 2 – 29 March 2021

Test specimens as described by the client

Muros Concrete (FR) wall panel and Muros Brick wall panel, both are decorative fibreglass-based panels comprising of a base of natural and mineral pigments and mixed with polyester resin and fibreglass.

Specimen Reference	Mass (g)	Thickness (mm)	Apparent Density (kg/m ³)	Date of Test	Indicative Group Number
FH5159-FR-50-1	93.2	6.0	1553	26/7/2013	3
FH5159-FR-50-2	87.2	5.0	1744	26/7/2013	3
FH5159-FR-50-3	97.8	6.0	1630	26/7/2013	3
FH12944-1-50-1	45.7	4.2	1080	2/7/2020	3

Shaded row – samples used to determine group number.

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 AS 3837 for the purposes of Group Number Classification as specified in the NCC Volume One Specification C1.10 Clause 4.

Building Code Document	Group Number Classification
NZBC Verification Method C/VM2 Appendix A	3
NCC Volume One Specification C1.10 Clause 4 determined in accordance with AS 5637.1:2015	3 The average specific extinction area was greater than the 250 m ² /kg limit

Issued by


J. R. Stallinger
Associate Fire Testing
Engineer
BRANZ

Reviewed by


E. Soja
Senior Fire Safety Engineer
IANZ Approved Signatory

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



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