

BRANZ **Type Test**

FH 5449 Issue 2

CONE CALORIMETER TEST OF FIBROUS PLASTER SHEET

CLIENT

NZ Fibrous Plasterers Association
115 Gracefield Road
Lower Hutt 5010
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 Parts 1 and 2

Test sponsor

NZ Fibrous Plasterers Association
115 Gracefield Road
Lower Hutt 5010
New Zealand

Description of test specimen

The product as described by the client as Fibrous Plaster Sheet, a plaster sheet reinforced with fibreglass. The sample has a smooth exposed face with a natural white plaster colour. The back side has exposed shredded fibreglass.

Date of tests

Initial testing: 12 February 2014

Revalidation: 16 September 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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TO WHOM IT MAY CONCERN

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* 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



Author

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
1	19 February 2014	19 February 2019	Initial issue
2	8 October 2020	8 October 2025	Addition of Section 5: Revalidation of Performance
			Additional specimen tested



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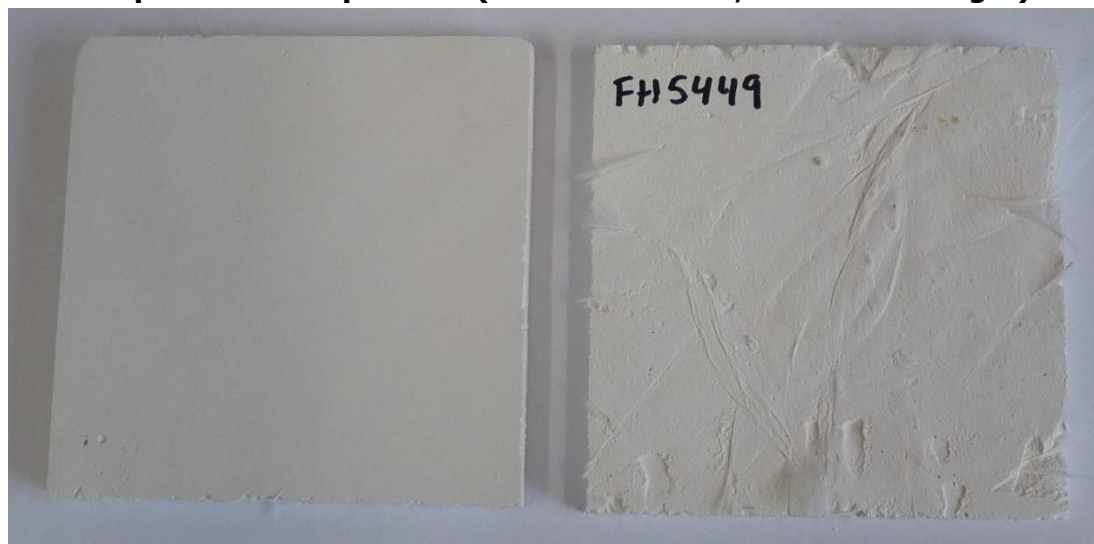
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1. GENERAL

The product submitted for testing was identified by the client as Fibrous Plaster Sheet, a plaster sheet reinforced with fibreglass. The sample has a smooth exposed face with a natural white plaster colour. The back side has exposed shredded fibreglass. 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)	Nominal thickness (mm)		
FH5449-1-50-1	104.4	10.5	994	12/2/2014
FH5449-1-50-2	101.2	10.5	964	12/2/2014
FH5449-1-50-3	96.1	10.5	915	12/2/2014
FH13091-1-50-1	115.4	10.3	1120	16/9/2020

Shaded row – indicative test for purposes of revalidation

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 12 February 2014 by Mr Lukas Hersche 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 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.

2.6 Revalidation

A single indicative specimen was tested for the purposes of revalidation on the 16 September 2020 by Mr James Stallinger as described in 2.4 and 2.5. Details of the performance are provided in Section 5.

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 – 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
	FH5449-1-50-1	FH5449-1-50-2	FH5449-1-50-3	
Specimen test number	FH5449-1-50-1	FH5449-1-50-2	FH5449-1-50-3	
Time to sustained flaming s	No Ignition	No Ignition	No Ignition	NA
Observations ^a	-	-	-	
Test duration ^b s	600*	618*	618*	612
Mass remaining, m_f g	85.8	81.8	77.1	81.6
Mass pyrolyzed %	17.8%	19.2%	19.8%	18.9%
Specimen mass loss ^c kg/m ²	2.1	2.2	2.1	2.1
Specimen mass loss rate ^c g/m ² .s	2.3	2.4	2.3	2.4
Heat release rate				
peak, \dot{q}''_{max} kW/m ²	3.0	7.6	7.9	6.2
average, \dot{q}''_{avg}				
Over 60 s from ignition kW/m ²	0.7	2.5	2.2	1.8
Over 180 s from ignition kW/m ²	0.2	1.0	0.9	0.7
Over 300 s from ignition kW/m ²	0.2	0.7	0.8	0.5
Total heat released MJ/m ²	0.1	0.5	0.5	0.4
Average Specific Extinction Area m ² /kg	0.7	NR	NR	0.7
Effective heat of combustion ^d , $\Delta h_{c,eff}$ MJ/kg	0.0	0.2	0.2	0.2

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 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 3: Heat release rate

Specimen ID	Average HRR over 180s from ignition	Arithmetic mean	% difference from the arithmetic mean
FH5449-1-50-1	0.2	0.7	-66.1%
FH5449-1-50-2	1.0		36.2%
FH5449-1-50-3	0.9		29.9%

Table 3 identifies all of the specimens exposed to 50 kW/m² irradiance exceeded the acceptance criteria. Although the specimens were outside of the variability criteria of the test standard, the same Group 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.

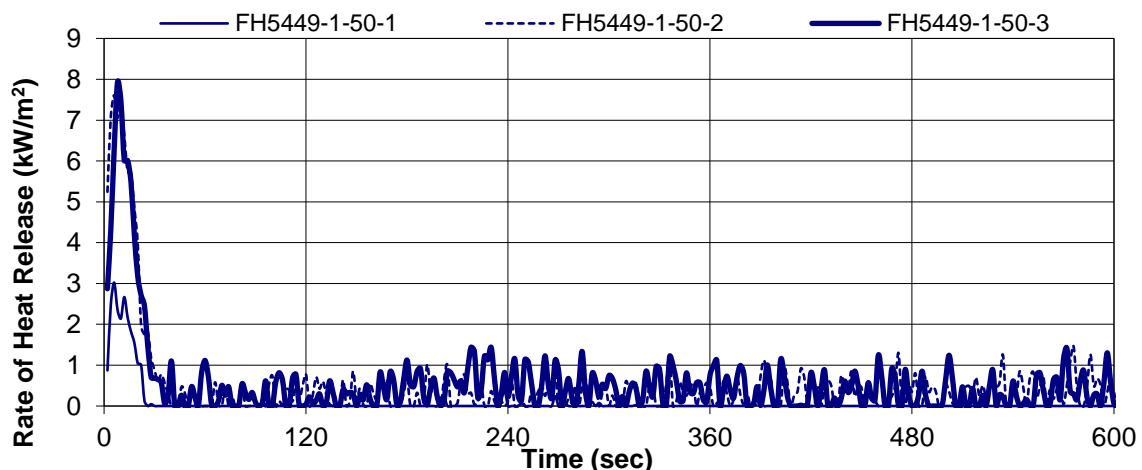
4. SUMMARY

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 4: 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)
10.5	50	No Ignition	6.2	0.7

Figure 2: Rate of heat release versus time



5. REVALIDATION OF PERFORMANCE

A single indicative test was undertaken on a client supplied sample for the purpose of revalidation of performance. The sample was tested to the conditions of Section 2 on 16 September 2020. The indicative test results are provided and compared to the mean results of the replicate samples tested in 2014 below.

Table 5 : Revaluation parameters and test results

Material		2014*	2020	Variance	
Test Method		ISO 5660	ISO 5660	-	
Specimen test number		FH5449-1-50-1,2,3	FH13091-1-50-1	-	
Time to sustained flaming	s	N/A	N/A	-	
Test Date		12/2/2014	16/9/2020	-	
Observations		-	-	-	
Test duration	s	612	600	-12	
Mass remaining, m_f	g	81.6	99.1	17.5	
Mass pyrolyzed	%	18.9%	14.1%	-4.7%	
Specimen mass loss	kg/m ²	2.1	1.8	-0.3	
Specimen mass loss rate	g/m ² .s	2.4	3.1	0.7	
Heat release rate					
	peak, \dot{q}_{max}''	kW/m ²	6.2	1.8	-4.4
	average, \dot{q}_{avg}''				
	Over 60 s from ignition	kW/m ²	1.8	0	-1.8
	Over 180 s from ignition	kW/m ²	0.7	0	-0.7
	Over 300 s from ignition	kW/m ²	0.5	0	-0.5
Total heat released	MJ/m ²	0.4	0	-0.4	
Average Specific Extinction Area	m ² /kg	0.7	0	1.3	
Effective heat of combustion $\Delta h_{c,eff}$	MJ/kg	0.2	0	-0.2	

* - mean results across three replicate specimens

No significant variations were detected in the revalidation test of sample FH13091-1-50-1. Further testing would not be expected to lead to an alteration of the classification determined in test report FH5449-TT[2014].



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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
NZ Fibrous Plasterers Association
115 Gracefield Road, Lower Hutt 5010, New Zealand

Date of tests
12 February 2014
16 September 2020
Reference BRANZ Test Report
FH 5449 Issue 2 – 8 October 2020

Test specimens as described by the client

Fibrous Plaster Sheet, a plaster sheet reinforced with fibreglass. The sample has a smooth exposed face with a natural white plaster colour. The back side has exposed shredded fibreglass.

Specimen Reference	Mass (g)	Thickness (mm)	Apparent Density (kg/m ³)	Date of Test	Indicative Group Number
FH5449-1-50-1	104.4	10.5	994	12/2/2014	1-S
FH5449-1-50-2	101.2	10.5	964	12/2/2014	1-S
FH5449-1-50-3	96.1	10.5	915	12/2/2014	1-S
FH13091-1-50-1	115.4	10.3	1120	16/9/2020	1-S

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

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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