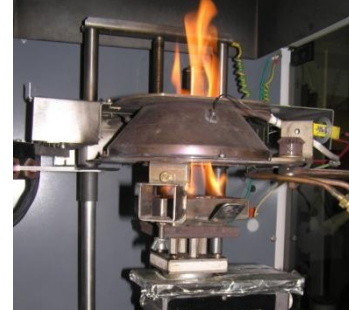




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FIRE TEST REPORT

FH 5119

CONE CALORIMETER TEST AND NZBC VERIFICATION METHOD C/VM2 APPENDIX A PERFORMANCE OF JUKEN NEW ZEALAND MANUFACTURED TIMBER PRODUCTS

CLIENT

Juken New Zealand Limited
Triboard Mill
Whangatane Drive
Kaitaia 0481
New Zealand



All tests reported herein 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 on client supplied specimens for the purposes of determination of the Group Classification in accordance with;

- New Zealand Building Code (NZBC) Verification Method C/VM2 Appendix A

Test sponsor

Juken New Zealand Limited
Triboard Mill
Whangatane Drive
Kaitaia 0481
New Zealand

Description of test specimen

The products submitted by the client for testing were identified by the client as 10 mm, 15 mm (standard and high density), and 36 mm Triboard, 9 mm 12 mm and 20 mm Strandboard.

Date of test

27th and 28th March and 3rd April 2013

Test results

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 and the variations as discussed in Section 6.

Building Code Document	Group Number Classification
NZBC Verification Method C/VM2 Appendix A	3



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The above classification is therefore considered applicable to the following products.

Product	Thickness (mm)	Density (kg/m ³)
Triboard	10	600
	15	775
	15	590
	36	610
Strandboard	9	685
	12	685
	20	685

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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1. GENERAL

The product submitted by the client for testing was identified by the client as a nominal 10 mm thick Triboard. Figure 1 illustrates a representative specimen of that tested.

Figure 1 Representative specimen (back face on left, exposed face on right)



1.1 Sample measurements

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

Specimen ID	Initial properties		Overall apparent density (kg/m ³)
	Mass (g)	Mean thickness (mm)	
FH5119-50-1	68.7	10.4	661
FH5119-50-2	66.0	10.2	647
FH5119-50-3	67.2	10.2	646

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 27th March and 3rd April 2013 by Mr Peter Collier 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 as identified in the above table, 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 $0.024 \text{ m}^3/\text{s}$.



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3. TEST RESULTS AND REDUCED DATA

3.1 Test results and reduced data – NZBC C/VM2

Material	Test specimens as described in Section 1 (in accordance with ISO 5660)			Mean	
	Specimen test number	FH5119-50-1	FH5119-50-2		FH5119-50-3
Time to sustained flaming	s	34	32	30	32
Observations ^a		-	-	-	
Test duration ^b	s	1834**	1832**	1830**	1832
Mass remaining, mf	g	0.0	-0.3	-0.2	-0.2
Mass pyrolyzed	%	100.0%	100.5%	100.3%	100.3%
Specimen mass loss ^c	kg/m ²	7.65	7.34	7.48	7.49
Specimen mass loss rate ^c	g/m ² .s	89.0	83.4	83.1	85.2
Heat release rate					
peak, \dot{q}''_{max}	kW/m ²	376.3	332.6	340.4	349.8
average, \dot{q}''_{avg}					
Over 60 s from ignition	kW/m ²	205.3	202.5	190.5	199.4
Over 180 s from ignition	kW/m ²	156.2	158.4	170.8	161.8
Over 300 s from ignition	kW/m ²	138.7	143.3	156.0	146.0
Total heat released	MJ/m ²	113.9	112.3	134.0	120.1
Average Specific Extinction Area	m ² /kg	61.1	62.6	62.0	61.9
Effective heat of combustion ^d , $\Delta h_{c,eff}$	MJ/kg	14.7	15.0	17.6	15.7

Notes :

^a no significant observations were recorded

^b determined by * X_{O2} returning to the pretest value within 100 ppm of oxygen concentration for 10 minutes
 ** 30 minutes after time to sustained flaming

^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 standards 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.

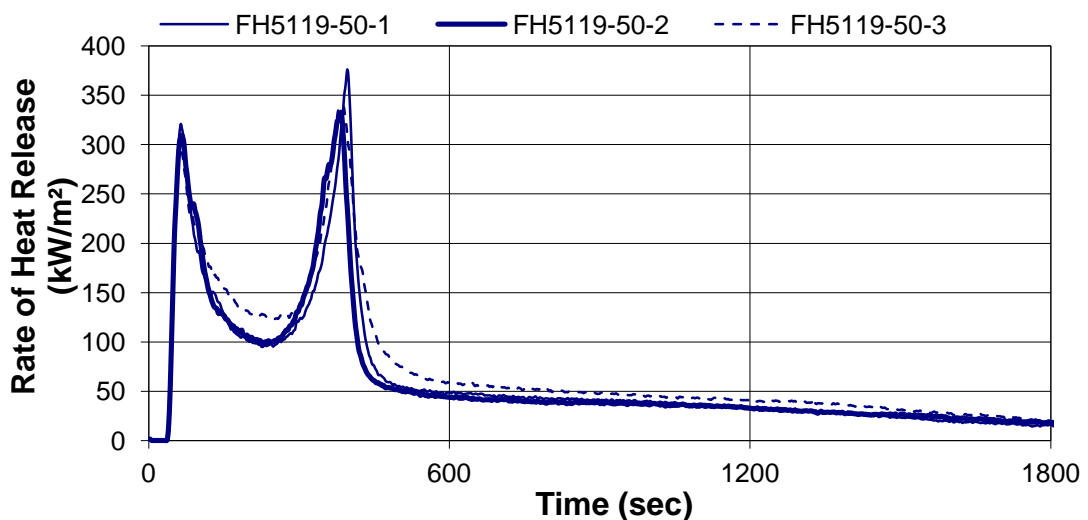
Specimen ID	Average HRR over 180s from ignition	Arithmetic mean	% difference from the arithmetic mean
FH5119-50-1	156.2	161.8	-3.5
FH5119-50-2	158.4		-2.1
FH5119-50-3	170.8		5.6

The above table identifies all of the specimens exposed to 50 kW/m² irradiance met the acceptance criteria.

The report summary for the specimens as described in Section 1, exposed to an irradiance of 50 kW/m² is:

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)
10.3	50	32	349.8	61.9

Figure 2 Rate of heat release verses time



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5. CLASSIFICATION IN ACCORDANCE WITH NZBC VERIFICATION METHOD C/VM2 APPENDIX A

The following classification has been assessed in accordance with the New Zealand Building Code Verification Method C/VM2 Appendix A: Establishing Group Numbers for lining materials. Calculations were carried out according to section A1.3 for predicting a material's group number for each specimen tested. It states that "If a different classification group is obtained for different specimens tested, then the highest (worst) classification for any specimen must be taken as the final classification for that material." The classification for the specimens as described in Section 1 is as follows:

	Sample 1	Sample 2	Sample 3	Classification
Group number Classification	3	3	3	3

6. DISCUSSION

Juken New Zealand manufactures a range of Triboard and Strandboard products in variety of thickness and density to the above tested specimens. A selection were prepared as described in Section 3 and each subjected to a single indicative test in accordance with the test standard.

The results were analysed in accordance with the Group Classification requirements, all achieving a Group Number 3 classification.

The alternative specimens comprised Triboard from 15 mm to 36 mm thick with two densities represented at 15 mm thick, and Strandboard ranging from 9 to 20 mm in thickness. The key test results are summarised in Section 8.

The results from the indicative testing illustrated that the variations between the products, across a range in thickness and density did not significantly alter the performance from that achieved by the full set of three replicate tests on the specimens reported above.

It is therefore considered that these variations would if tested in full achieve the same Group Number Classification as the specimens tested in full and reported herein.



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7. CONCLUSION

The cone calorimeter testing was carried out on the specimens as described in Sections 1 and 6. For the purposes of compliance with the NZBC Verification Method C/VM2 Appendix A, the following classification is considered applicable to the material as described in Section 1, and others as discussed in Section 6.

Group Number Classification	3
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8. SINGLE INDICATIVE TEST RESULTS

Test Ref. no	Client Identity code	Product name	Thickness (mm)	Density (kg/m ³)	Number of specimens tested	Time to Ignition (s)	Peak Heat Release Rate (kW/m ²)	Indicated Group No.
FH5119-50-1	007	Triboard	10	600	1	34	376.3	3
FH5120-50-1	011		15	775	1	39	256.4	3
FH5121-50-1	013		15	590	1	38	253.7	3
FH5122-50-1	033		36	610	1	35	219.7	3
FH5123-50-1	082	Strandboard	9	685	1	30	304.9	3
FH5124-50-1	084		12	685	1	29	258.4	3
FH5177-50-1	087		20	685	1	28	242.3	3

Shaded – Sample 1 results only, as reported in Section 3.

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