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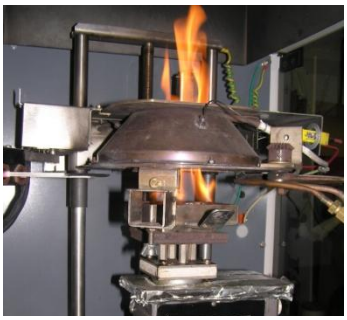

FIRE TEST REPORT

FH 4723

CONE CALORIMTER TEST AND NZBC PROPOSED ACCEPTABLE SOLUTION APPENDIX C4.1 PERFORMANCE OF WOOD FINISHING SUPPLIES OAK PLY

TEST STANDARD
ISO 5660 Reaction-to-fire tests — Heat release, smoke production and mass loss rate — Part 1: Heat release rate (cone calorimeter method), and Part 2: Smoke production rate (dynamic measurement).

DATE OF TEST
7 September 2011

CLIENT
Wood Finishing Supplies Ltd
117 Cryers Road
East Tamaki
Auckland
New Zealand

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation..

TEST SUMMARY

Objective

To conduct cone calorimeter testing in accordance with ISO 5660 on client supplied specimens for the purposes of determination of the Group Classification in accordance with proposed changes to the NZBC Acceptable Solutions Appendix C4.1.

Test sponsor

Wood Finishing Supplies Ltd
117 Cryers Road
East Tamaki
New Zealand

Description of test specimen

The product submitted by the client for testing was identified by the client as Oak ply nominally 5 mm thick coated in order with two coats of Becker Acroma Ceofond RPF 236-0022/5 sealer at 200 microns and one coat of Becker Acroma Ceomat RPF 216-0021 Topcoat at 150 microns (wet film gauge).

Date of tests

7 September 2011

Results – Group Classification

The cone calorimeter testing was carried out on Oak ply nominally 5 mm thick as described in Section 1. For the purposes of compliance with the "Proposed changes to the New Zealand Building Code Clause C1 (Fire Safety) Properties of Lining Materials", the following classification is considered applicable to the material as described below.

Product	Classification
Oak ply nominally 5 mm thick coated in order with two coats of Becker Acroma Ceofond RPF 236-0022/5 sealer at 200 microns and one coat of Becker Acroma Ceomat RPF 216-0021 Topcoat at 150 microns (wet film gauge).	Group 3

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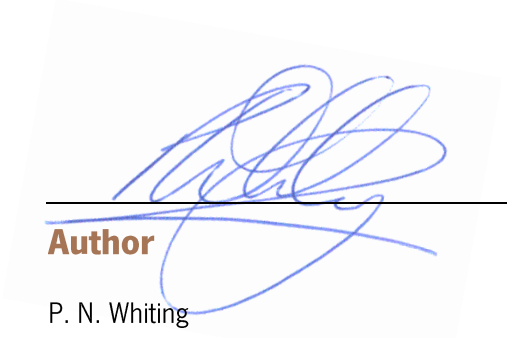

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DOCUMENT REVISION STATUS

DATE ISSUED	ISSUE NO.	DESCRIPTION
17 October 2011	FH 4723	Initial Issue

1 GENERAL

The product submitted by the client for testing was identified by the client as Oak ply nominally 5 mm thick coated in order with two coats of Becker Acroma Ceofond RPF 236-0022/5 sealer at 200 microns and one coat of Becker Acroma Ceomat RPF 216-0021 Topcoat at 150 microns (wet film gauge). Figure 1 illustrates representative specimen of those tested.

Figure 1 Representative specimen (exposed face)

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)	
FH4723-50-1	28.5	4.8	589
FH4723-50-2	28.0	4.9	573
FH4723-50-3	27.7	4.6	601

2 EXPERIMENTAL PROCEDURE

2.1 Test standard

The tests were carried out according to the test procedure described in ISO 5660 Reaction-to-fire tests — Heat release, smoke production and mass loss rate — Part 1: Heat release rate (cone calorimeter method), and Part 2: Smoke production rate (dynamic measurement), (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 7th September 2011 by Mr Paul Wong 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 Specimen wrapping and preparation

All tests were conducted and the samples 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 Specimen wrapping and preparation

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 m^3/s.

3 TEST RESULTS AND REDUCED DATA

Material		**Test specimens as described in Section Error! eference source not found.**			**Mean**
Specimen test number		FH4723-50-1	FH4723-50-2	FH4723-50-3	
Time to sustained flaming	s	22	21	23	22.0
Observations[a]		-	-	-	
Test duration[b]	s	1822**	1592*	1676*	1697
Mass remaining, m_f	g	-0.7	0.4	0.6	0.1
Mass pyrolyzed	%	102.3%	98.7%	97.8%	99.6%
Specimen mass loss[c]	kg/m^2	3.22	3.02	2.95	3.06
Specimen mass loss rate[c]	g/m^2 .s	13.0	11.5	11.9	12.1
Heat release rate					
peak, $\dot{q}''_{\max}$	kW/m^2	199.1	197.8	180.6	192.5
average, $\dot{q}''_{avg}$					
Over 60 s from ignition	kW/m^2	128.2	123.4	141.7	131.1
Over 180 s from ignition	kW/m^2	111.9	109.5	111.7	111.0
Over 300 s from ignition	kW/m^2	86.2	96.0	91.5	91.2
Total heat release[d]	MJ/m^2	45.2	45.4	43.9	44.9
Average Specific Extinction Area	m^2/kg	140.8	133.1	138.0	137.3
Effective heat of combustion[d], $\Delta h_{c,eff}$	MJ/kg	13.7	14.5	14.3	14.2

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.

4 SUMMARY

ISO 5660-1 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.

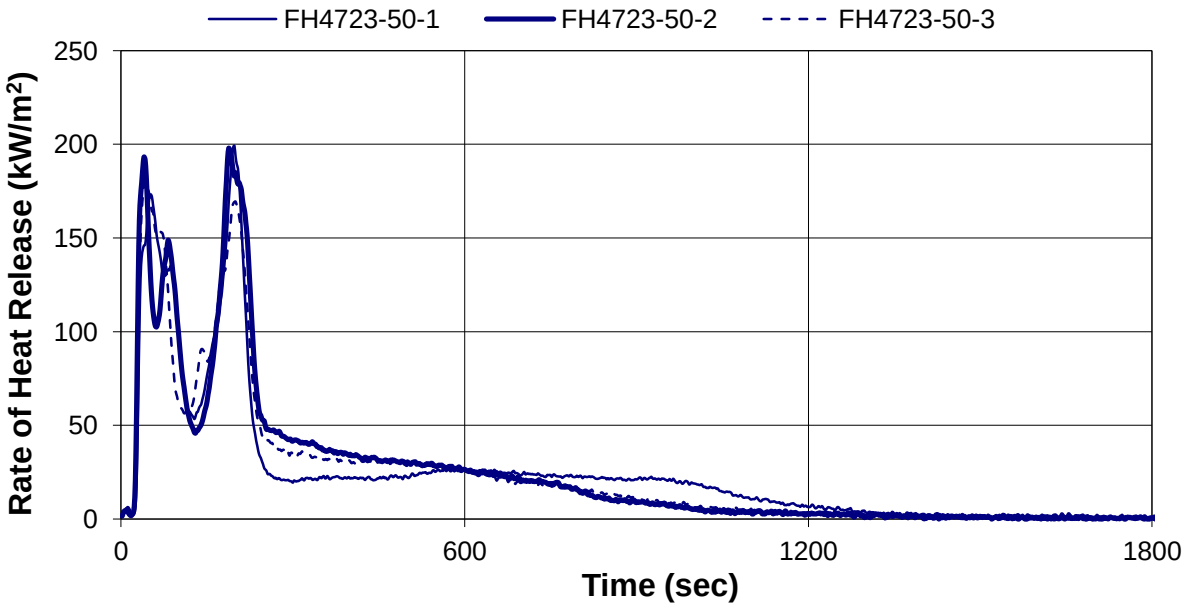
Specimen ID	Average HRR over 180s from ignition	Arithmetic mean	% difference from the arithmetic mean
FH4723-50-1	111.9	111.0	0.8
FH4723-50-2	109.5		-1.4
FH4723-50-3	111.7		0.6

The above table identifies all specimens exposed to 50 kW/m^2 irradiance were within the acceptance criteria.

The report summary for the specimens as described in Section 1, exposed to an irradiance of 50 kW/m^2 is:

Mean Specimen thickness (mm)	Irradiance (kW/m^2)	Mean Time to Ignition (s)	Mean Peak Heat Release Rate (kW/m^2)	Mean Total Heat Released (MJ/m^2)
4.8	50	22	192.5	44.9

Figure 2 Rate of heat release verses time



5 CLASSIFICATION IN ACCORDANCE WITH NZBC PROPOSED ACCEPTABLE SOLUTION APPENDIX C4.1

The following classification has been assessed in accordance with the "Proposed changes to the New Zealand Building Code Clause C1 (Fire Safety) and the associated Acceptable Solution, Appendix B Proposed Acceptable Solution: Part 10 – Appendix C4.1 Properties of Lining Materials". Calculations were carried out according to section C4.1.3 for predicting a material's group number for each specimen tested. The classification for the specimens as described in Section 1 is as follows:

	Sample 1	**Sample 2**	**Sample 3**	**Classification**
Classification	Group 3	Group 3	Group 3	Group 3

6 CONCLUSION

The cone calorimeter testing was carried out on nominally 5 mm thick oak ply finished as described in Section 1. For the purposes of compliance with the "Proposed changes to the New Zealand Building Code Clause C1 (Fire Safety) Properties of Lining Materials", the following classification is considered applicable to the material as described below.

Product	**Classification**
Oak ply nominally 5 mm thick coated in order with two coats of Becker Acroma Ceofond RPF 236-0022/5 sealer at 200 microns and one coat of Becker Acroma Ceomat RPF 216-0021 Topcoat at 150 microns (wet film gauge).	Group 3

7 LIMITATION

The results reported here relate only to the item/s tested.

ANNEX A – LIABILITY AND INDEMNIFICATION:

BRANZ's agreement with its Client in relation to this report contains the following terms and conditions in relation to Liability and Indemnification

a. Limitation and Liability

i. BRANZ undertakes to exercise due care and skill in the performance of the Services and accepts liability to the Client only in cases of proven negligence.

ii. Nothing in this Agreement shall exclude or limit BRANZ's liability to a Client for death or personal injury or for fraud or any other matter resulting from BRANZ's negligence for which it would be illegal to exclude or limit its liability.

iii. BRANZ is neither an insurer nor a guarantor and disclaims all liability in such capacity. Clients seeking a guarantee against loss or damage should obtain appropriate insurance.

iv. Neither BRANZ nor any of its officers, employees, agents or subcontractors shall be liable to the Client nor any third party for any actions taken or not taken on the basis of any Output nor for any incorrect results arising from unclear, erroneous, incomplete, misleading or false information provided to BRANZ.

v. BRANZ shall not be liable for any delayed, partial or total non-performance of the Services arising directly or indirectly from any event outside BRANZ's control including failure by the Client to comply with any of its obligations hereunder.

vi. The liability of BRANZ in respect of any claim for loss, damage or expense of any nature and howsoever arising shall in no circumstances exceed a total aggregate sum equal to 10 times the amount of the fee paid in respect of the specific service which gives rise to such claim or NZD$50,000 (or its equivalent in local currency), whichever is the lesser.

vii. BRANZ shall have no liability for any indirect or consequential loss (including loss of profits).

viii. In the event of any claim the Client must give written notice to BRANZ within 30 days of discovery of the facts alleged to justify such claim and, in any case, BRANZ shall be discharged from all liability for all claims for loss, damage or expense unless legal proceedings are commenced in respect of the claim within one year from:

The date of performance by BRANZ of the service which gives rise to the claim;

or

The date when the service should have been completed in the event of any alleged non-performance.

b. Indemnification: The Client shall guarantee, hold harmless and indemnify BRANZ and its officers, employees, agents or subcontractors against all claims (actual or threatened) by any third party for loss, damage or expense of whatsoever nature including all legal expenses and related costs and howsoever arising relating to the performance, purported performance or non-performance, of any Services.

c. Without limiting clause b above, the Client shall guarantee, hold harmless and indemnify BRANZ and its officers, employees, agents or subcontractors against all claims (actual or threatened) by any party for loss, damage or expense of whatsoever nature including all legal expenses and related costs arising out of:

i. any failure by the Client to provide accurate and sufficient information to BRANZ to perform the Services;

ii. any misstatement or misrepresentation of the Outputs, including Public Outputs;

iii. any defects in the Products the subject of the Services; or

iv. any changes, modifications or alterations to the Products the subject of the Services.