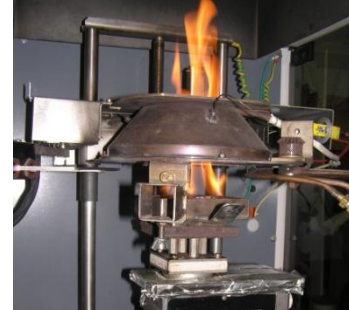




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FIRE TEST REPORT

FH 4965

CONE CALORIMETER TEST AND NZBC VERIFICATION METHOD C/VM2 APPENDIX A PERFORMANCE OF ROCKCOTE EARTHEN CLAY DECOR FINISHING SYSTEM

CLIENT

Rockcote Resene Ltd
Horlor Street
Naenae
Lower Hutt 5011
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 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

Rockcote Resene Ltd
Horlor Street
Naenae
Lower Hutt 5011
New Zealand

Description of test specimen

The product submitted by the client for testing was identified by the client as Rockcote Earthen Natural Clay Décor Finishing System plaster over plasterboard and concrete.

Date of test

11th September 2012

Test results

For the purposes of compliance with the relevant building code documents, the following classification is considered applicable to both of the materials as described in Section 1, and others in the same product range with the same fabrication, weight and thickness as the products tested.

Building Code Document	Group Number Classification
NZBC Verification Method C/VM2 Appendix A	1 - S Smoke less than 250 m ² /kg

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 a full test was identified by the client as Rockcote Earthen Natural Clay Décor Finishing System plaster applied over plasterboard. The Earthen Clay Décor was reported to comprise of natural earthen materials, washed and graded sands, various clays and proprietary additives. A similar product identified as Rockcote Earthen Natural Clay Décor Finishing System plaster over concrete was subjected to a single indicative test and was identified by the client to be of the same manufacture but with a fissured/perforated exposed face. Figure 1 illustrates a representative specimen of those tested.

Figure 1 Representative specimen (From left, back face, exposed face, and side profile)



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)	
FH4965-50-1	113.5	12.2	933
FH4965-50-2	118.5	12.1	979
FH4965-50-3	120.9	12.2	991

2. EXPERIMENTAL PROCEDURE

2.1 Test standard

The tests were carried out 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 11th September 2012 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 $23 \pm 2^{\circ}\text{C}$ 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
	FH4965-50-1	FH4965-50-2	FH4965-50-3	
Specimen test number	FH4965-50-1	FH4965-50-2	FH4965-50-3	
Time to sustained flaming s	No ignition	No ignition	No ignition	No ignition
Observations ^a	-	-	-	
Test duration ^b s	1800	766*	1800	1455
Mass remaining, mf g	91.0	97.0	98.6	95.5
Mass pyrolyzed %	19.9%	18.1%	18.4%	18.8%
Specimen mass loss ^c kg/m ²	2.55	2.43	2.52	2.50
Specimen mass loss rate ^c g/m ² .s	42.5	40.5	42.0	41.7
Heat release rate				
peak, \dot{q}''_{max} kW/m ²	9.2	10.0	9.9	9.7
average, \dot{q}''_{avg}				
Over 60 s from ignition kW/m ²	0.8	0.8	1.6	1.1
Over 180 s from ignition kW/m ²	1.8	2.5	3.1	2.5
Over 300 s from ignition kW/m ²	2.3	3.1	4.3	3.3
Total heat released MJ/m ²	5.2	6.9	9.4	7.2
Average Specific Extinction Area m ² /kg	-	-	-	#
Effective heat of combustion ^d , $\Delta h_{c,eff}$ MJ/kg	2.0	2.8	3.7	2.9

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.

not able to be calculated



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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.

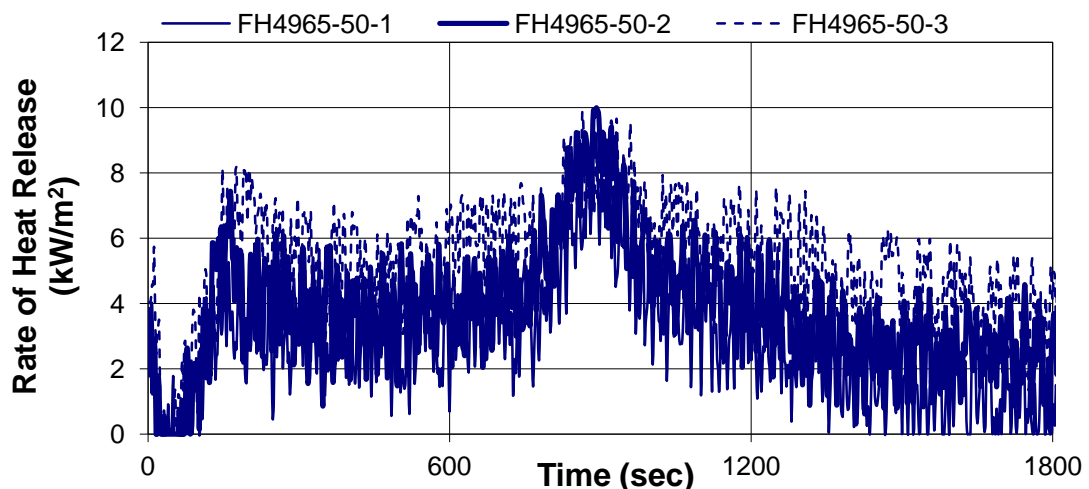
Specimen ID	Average HRR over 180s from ignition	Arithmetic mean	% difference from the arithmetic mean
FH4965-50-1	1.8	2.5	-26.9
FH4965-50-2	2.5		2.7
FH4965-50-3	3.1		24.2

The above table identifies two of the specimens exposed to 50 kW/m² irradiance exceeded the acceptance criteria. Although two of the specimens were outside of the variability criteria of the test standard, the same Group number 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.

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)	Mean Total Heat Released (MJ/m ²)
12.2	50	No ignition	9.7	7.2

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:

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

The specimen did not ignite and the average specific extinction area was unable to be recorded. In accordance with Verification Method C/VM2 Appendix A, samples achieving either a Group number classification 1 or 2, and with an average specific extinction area less than 250 m²/kg are identified with "S" post-script to the Group number.

6. DISCUSSION

The specimen tested in full and reported herein was Earthen Natural Clay Décor Finishing System over plasterboard. A sample of Earthen Natural Clay Décor Finishing System over concrete was prepared as described in Section 2 and subjected to a single indicative test in accordance with the test standard. The results were analysed in accordance with Verification Method C/VM2 Appendix A achieving a Group 1 classification and average specific extinction area less than the 250 m²/kg limit.

The key results are summarised in the table below.

Specimen	Number of tests	Time to Ignition (s)	Peak Heat Release Rate (kW/m ²)	Mean Total Heat Release (MJ/m ²)	Average Specific Extinction Area (m ² /kg)	Indicated Group Number Classification
FH4965-50-CON-1	1	No ignition	5.0	0.3	<250	1



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It is therefore considered that for the specimens described in Section 1, it is unlikely to adversely affect the Group 1 classification or specific extinction area of less than the 250 m²/kg limit achieved by the specimen as tested and reported herein.

7. CONCLUSION

The cone calorimeter testing was carried out on the specimens as described in Section 1. For the purposes of compliance with the NZBC Verification Method C/VM2 Appendix A, the following classification is considered applicable to both of the materials as described in Section 1, and others in the same product range with the same fabrication, weight and thickness as the products tested.

Group Number Classification	1 - S
The average specific extinction area was less than the 250 m ² /kg limit.	

8. LIMITATION

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



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