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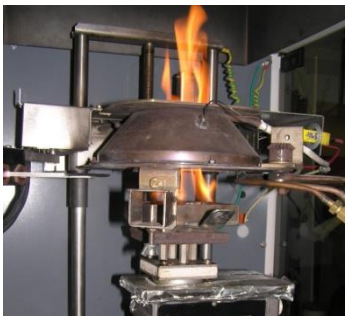

# FIRE TEST REPORT

# FH 5198

## CONE CALORIMETER TEST AND NZBC VERIFICATION METHOD C/VM2 APPENDIX A PERFORMANCE OF ECOPLUS ACOUSTIC PLUS RANGE

**CLIENT**
Ecoplus Systems Limited
136 Customs Street West
Auckland City 1010
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;

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

## Test sponsor

Ecoplus Systems Limited
136 Customs Street West
Auckland City 1010
New Zealand

## Description of test specimen

The products submitted by the client for testing were identified by the client as representative of the Acoustic Plus Ceiling Products range labelled, High Performance; Thermo Acoustic; Dual Bloc; and Sound Reflector.

## Date of test

13th and 26th June 2013

## Test results

For the purposes of compliance with the respective building code documents, the following classification is considered applicable to both of the materials as described in Section 1, and others as discussed in Section 6.

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

The above classifications are therefore considered applicable to the following products comprising the Acoustic Plus range of ceiling products.

| Ecoplus Acoustic Plus | Thickness (mm) | Composition | |
|---|---|---|---|
| | | Core | Facer |
| High Performance | 15 | Glass fibre | Glass mat, painted tissue |
| High Performance | 25 | | |
| Thermo Acoustic | 50 | | |
| Dual Bloc | 35 | Glass fibre/plasterboard composite | |
| Dual Bloc | 60 | | |
| Sound Reflector | 10 | plasterboard | |

# 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.

# CONTENTS



# FIGURES

# SIGNATORIES

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# DOCUMENT REVISION STATUS

| ISSUE NO. | DATE ISSUED | DESCRIPTION |
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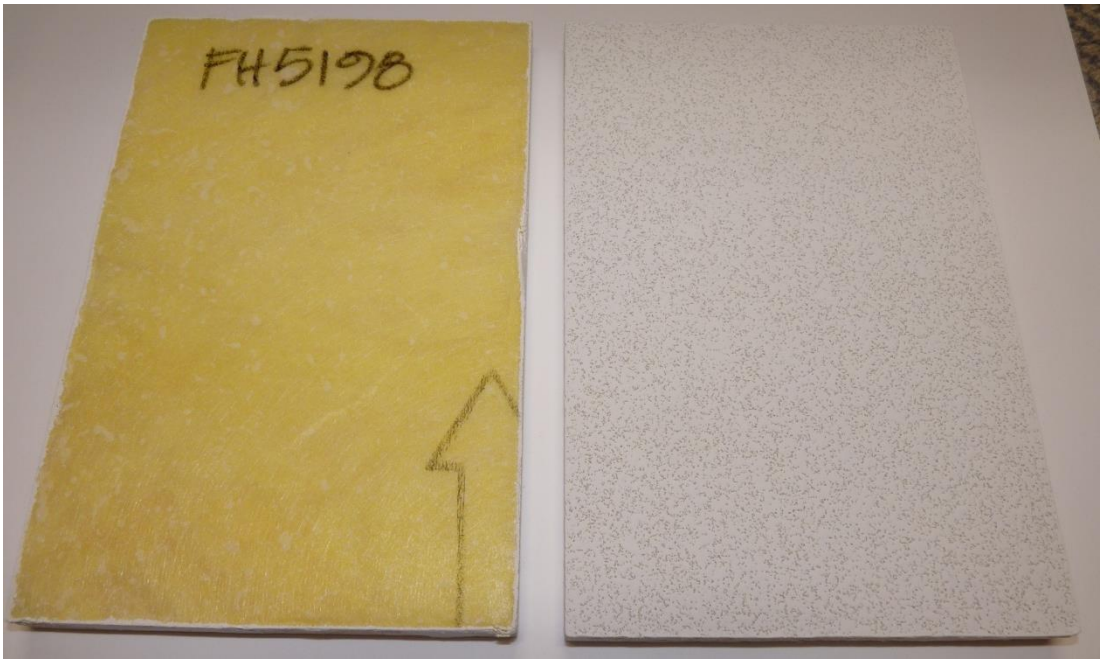
| 1 | 27 June 2013 | Initial Issue |

# 1. GENERAL

The product submitted by the client for a full test was identified by the client as Acoustic Plus High Performance 15 mm thick ceiling tile, comprising a yellow coloured glass fibre core (nominal density of 90 kg/m³) with a white painted glass fibre mat tissue facer (nominal weight 300 g/m²) on the exposed face. A range of products with essentially similar compositions were submitted to single indicative tests. Figure 1 illustrates a representative specimen of that tested in full.

**Figure 1 Representative specimen (back face - left, exposed face - 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/m³) |
|---|---|---|---|
| | Mass (g) | Mean thickness (mm) | |
| FH5198-50-1 | 15.4 | 14.7 | 105 |
| FH5198-50-2 | 19.4 | 14.7 | 132 |
| FH5198-50-3 | 20.2 | 15.4 | 131 |

# 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 13th and 26th June 2013 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 ± 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 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 m$^3$/s.

# 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 | | FH5198-50-1 | FH5198-50-2 | FH5198-50-3 | |
| Time to sustained flaming | s | 5 | 5 | 5 | 5 |
| Observations[a] | | - | - | - | |
| Test duration[b] | s | 862* | 900* | 916* | 893 |
| Mass remaining, mf | g | 14.1 | 17.9 | 17.8 | 16.6 |
| Mass pyrolyzed | % | 8.7% | 7.8% | 12.0% | 9.5% |
| Specimen mass loss[c] | kg/m$^2$ | 0.12 | 0.16 | 0.27 | 0.18 |
| Specimen mass loss rate[c] | g/m$^2$ .s | 0.1 | 0.2 | 0.2 | 0.2 |
| Heat release rate | | | | | |
| peak, $\dot{q}''_{\max}$ | kW/m$^2$ | 51.2 | 62.7 | 61.3 | 58.4 |
| average, $\dot{q}''_{avg}$ | | | | | |
| Over 60 s from ignition | kW/m$^2$ | 19.2 | 22.9 | 22.8 | 21.6 |
| Over 180 s from ignition | kW/m$^2$ | 12.4 | 14.5 | 14.4 | 13.8 |
| Over 300 s from ignition | kW/m$^2$ | 9.8 | 12.6 | 12.5 | 11.6 |
| Total heat released | MJ/m$^2$ | 3.2 | 4.4 | 4.2 | 3.9 |
| Average Specific Extinction Area | m$^2$/kg | 3.8 | 52.6 | 48.0 | 34.8 |
| Effective heat of combustion[d], $\Delta h_{c,eff}$ | MJ/kg | 20.9 | 25.7 | 15.4 | 20.7 |

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.

# 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.

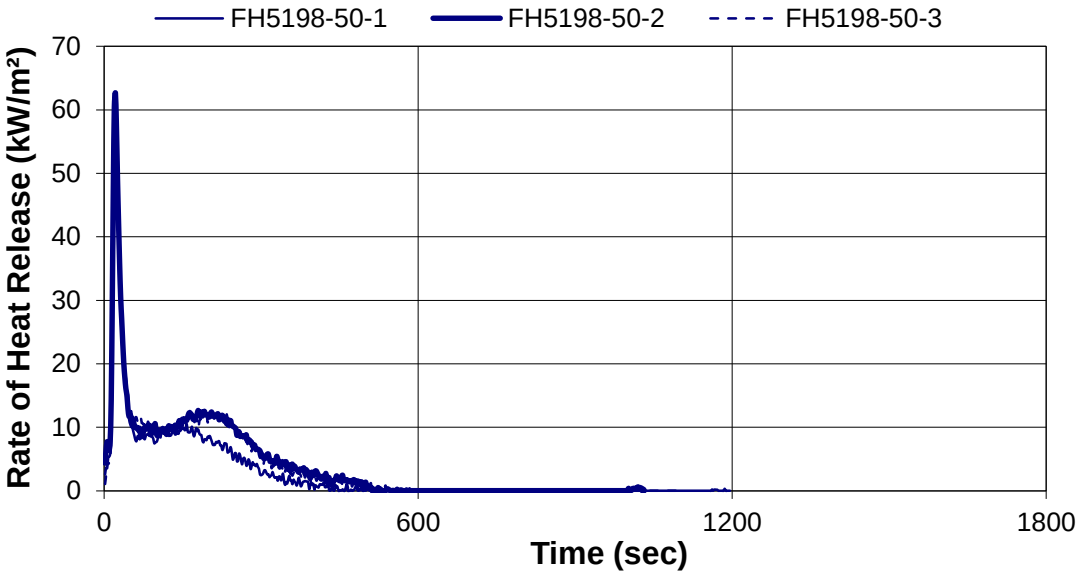
| Specimen ID | Average HRR over 180s from ignition | Arithmetic mean | % difference from the arithmetic mean |
|---|---|---|---|
| FH5198-50-1 | 12.4 | 13.8 | -9.9 |
| FH5198-50-2 | 14.5 | | 5.1 |
| FH5198-50-3 | 14.4 | | 4.8 |

The above table identifies all three of the 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$^2$) | Average Specific Extinction Area (m$^2$/kg) |
|---|---|---|---|---|
| 14.9 | 50 | 5 | 58.4 | 34.8 |

**Figure 2 Rate of heat release verses time**



# 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-S |

The tested sample recorded an average specific extinction area of 34.8 $m^2$/kg. 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 $m^2$/kg are identified with "S" post-script to the Group number.

# 6. DISCUSSION

The following Acoustic Plus Ceiling Products were submitted for testing and described by the client to each have an essentially similar composition of a painted glass fibre mat tissue facer over a glass fibre core on the exposed face and supplied with or without a plasterboard substrate.

| Ecoplus Acoustic Plus | Thickness (mm) | Composition | | BRANZ Test ID |
|---|---|---|---|---|
| | | Core | Facer | |
| High Performance | 15 | Glass fibre | Glass mat, painted tissue | FH 5198 |
| High Performance | 25 | | | * |
| Thermo Acoustic | 50 | | | FH 5247 |
| Dual Bloc | 35 | Glass fibre/plasterboard composite | | FH 5248 |
| Dual Bloc | 60 | | | * |
| Sound Reflector | 10 | plasterboard | | FH 5249 |

* variation of tested specimen – Group Classification performance considered to be same as for equivalent but thinner tested specimen.

**Figure 3 Representative specimen FH5247 (back face - left, exposed face - right)**

**Figure 4 Representative specimen FH5248 (back face - left, exposed face – middle, edge profile - right)**

**Figure 5 Representative specimen FH5249 (back face - left, exposed face - right)**

The products in the above table with BRANZ Test ID numbers were prepared as described in Section 2 and subjected to single indicative tests. High Performance 15 mm returned the highest peak heat release rate. On the basis of this, the specimen tested in full and reported herein was chosen to be High Performance 15 mm.

The results were analysed in accordance with Verification Method C/VM2 Appendix A achieving a Group 1 classification and specific extinction area less than the 250 $m^2$/kg limit.

The key results are summarised in the table below.

| Specimen ID | Number of specimens tested | Time to Ignition (s) | Peak Heat Release Rate ($kW/m^2$) | Average Specific Extinction Area ($m^2/kg$) | Indicated Group Number Classification |
|---|---|---|---|---|---|
| FH5198-50-1 | 3 | 5 | 51.2 | 4 | 1-S |
| FH5247-50-1 | 1 | 5 | 40.9 | 8 | 1-S |
| FH5248-50-1 | 1 | 7 | 48.6 | 4 | 1-S |
| FH5249-50-1 | 1 | 12 | 48.4 | 11 | 1-S |

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

It is therefore considered that any of the above listed Acoustic Plus Ceiling Products are unlikely to adversely affect the Group 1 classification or specific extinction area of less than the 250 $m^2$/kg limit achieved by the High Performance 15 mm 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 the materials as described in Section 1, and others as described in Section 6.

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