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# FIRE TEST REPORT

## FH 5255

### CONE CALORIMETER TEST AND NZBC VERIFICATION METHOD C/VM2 APPENDIX A FOR 3 TYPES OF CUSTOMWOOD MDF

#### CLIENT

Daiken New Zealand Ltd.  
Upper Sefton Road  
Ashley  
Rangiora 7477  
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 the:

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

## Test sponsor

Daiken New Zealand Ltd.  
Upper Sefton Road  
Ashley  
Rangiora 7477  
New Zealand

## Description of test specimen

The products submitted by the client for testing were identified by the client as:

| Sample   | Product Description                     |
|----------|---|
| FH5255-1 | Customwood MDF ProPanel 9 mm E1         |
| FH5255-2 | Customwood MDF ProPanel 18 mm E1        |
| FH5255-3 | Customwood MDF SuperFinish 18 mm MR/SE0 |

## Date of test

1<sup>st</sup> August 2013 and 6<sup>th</sup> August 2013

## Test results

For the purposes of compliance with the New Zealand Building Code Verification Method C/VM2 Appendix A, the following classification is considered applicable to the tested samples as described in Section 1.

| Product Description                     | NZBC C/VM2 Group Number Classification |
|---|--|
| Customwood MDF ProPanel 9 mm E1         | 3                                      |
| Customwood MDF ProPanel 18 mm E1        | 3                                      |
| Customwood MDF SuperFinish 18 mm MR/SE0 | 3                                      |

# LIMITATION

The results reported here relate only to the items tested.



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## SIGNATORIES



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## DOCUMENT REVISION STATUS

| ISSUE NO. | DATE ISSUED   | DESCRIPTION   |
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# 1. GENERAL

The products submitted by the client for testing were identified by the client as:

| Sample   | Product Description   |
|----------|---|
| FH5255-1 | Customwood MDF ProPanel 9 mm E1<br>9 mm thick Standard medium density fibreboard    |
| FH5255-2 | Customwood MDF ProPanel 18 mm E1<br>18 mm thick Standard medium density fibreboard  |
| FH5255-3 | Customwood MDF SuperFinish 18 mm MR/SE0<br>18 mm thick MR medium density fibreboard |

Figure 1 illustrates a representative specimen of that tested.

**Figure 1 Representative specimen**



## 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 <sup>3</sup> ) |
|---------------|--------------------|---------------------|---|
|               | Mass (g)           | Mean thickness (mm) |   |
| FH5255-1-50-1 | 63.6               | 9.1                 | 699   |
| FH5255-1-50-2 | 63.2               | 9.1                 | 695   |
| FH5255-1-50-3 | 61.7               | 9.1                 | 678   |
| FH5255-2-50-1 | 131.4              | 18.0                | 730   |
| FH5255-2-50-2 | 129.6              | 18.0                | 720   |
| FH5255-3-50-3 | 128.0              | 18.0                | 711   |
| FH5255-3-50-1 | 128.8              | 18.0                | 716   |
| FH5255-3-50-2 | 127.8              | 18.0                | 710   |
| FH5255-3-50-3 | 128.0              | 18.0                | 711   |

## 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 sample preparation and test procedure were as described in 2.4 and 2.5.

### 2.2 Test date

The tests were conducted on 1<sup>st</sup> and 8<sup>th</sup> August 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  $23 \pm 2^\circ\text{C}$  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  $50 \text{ kW/m}^2$ . 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<br>(in accordance with ISO 5660) |               |               | Mean   |               |
|--|---|---------------|---------------|--------|---------------|
|  | Specimen test number  | FH5255-1-50-1 | FH5255-1-50-2 |        | FH5255-1-50-3 |
| Time to sustained flaming                                      | s   | 25            | 24            | 22     | 24            |
| Observations <sup>a</sup>                                      |   | -             | -             | -      |               |
| Test duration <sup>b</sup>                                     | s   | 1825          | 1824          | 1822   | 1824          |
| Mass remaining, mf   | g   | 2.1           | -0.7          | -1.6   | -0.1          |
| Mass pyrolyzed   | %   | 96.7%         | 101.1%        | 102.7% | 100.2%        |
| Specimen mass loss <sup>c</sup>                                | kg/m <sup>2</sup>   | 6.9           | 7.2           | 7.1    | 7.0           |
| Specimen mass loss rate <sup>c</sup>                           | g/m <sup>2</sup> .s   | 3.8           | 4.3           | 5.0    | 4.4           |
| Heat release rate  |   |               |               |        |               |
| peak, $\dot{q}_{max}''$  | kW/m <sup>2</sup>   | 298.7         | 266.4         | 357.4  | 307.5         |
| average, $\dot{q}_{avg}''$                                     |   |               |               |        |               |
| Over 60 s from ignition  | kW/m <sup>2</sup>   | 166.4         | 163.3         | 164.8  | 164.8         |
| Over 180 s from ignition                                       | kW/m <sup>2</sup>   | 138.4         | 135.5         | 139.2  | 137.7         |
| Over 300 s from ignition                                       | kW/m <sup>2</sup>   | 141.1         | 141.6         | 146.8  | 143.2         |
| Total heat released  | MJ/m <sup>2</sup>   | 114.7         | 112.9         | 116.2  | 114.6         |
| Average Specific Extinction Area                               | m <sup>2</sup> /kg  | 85.3          | 81.0          | 72.1   | 79.5          |
| Effective heat of combustion <sup>d</sup> , $\Delta h_{c,eff}$ | MJ/kg   | 16.5          | 15.6          | 16.2   | 16.1          |

Notes :

<sup>a</sup> no significant observations were recorded

<sup>b</sup> determined by \* XO2 returning to the pretest value within 100 ppm of oxygen concentration for 10 minutes

\*\* 30 minutes after time to sustained flaming

<sup>c</sup> from ignition to end of test;

<sup>d</sup> from the start of the test

+ value calculated using data beyond the official end of test time according to the test standard.

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| Material   | Test specimens as described in Section 1<br>(in accordance with ISO 5660) |               |               | Mean  |               |
|--|---|---------------|---------------|-------|---------------|
|  | Specimen test number  | FH5255-2-50-1 | FH5255-2-50-2 |       | FH5255-3-50-3 |
| Time to sustained flaming                                      | s   | 30            | 32            | 24    | 29            |
| Observations <sup>a</sup>                                      |   | -             | -             | -     |               |
| Test duration <sup>b</sup>                                     | s   | 1830          | 1832          | 1824  | 1829          |
| Mass remaining, mf   | g   | 23.5          | 22.5          | 21.3  | 22.4          |
| Mass pyrolyzed   | %   | 82.1%         | 82.7%         | 83.4% | 82.7%         |
| Specimen mass loss <sup>c</sup>                                | kg/m <sup>2</sup>   | 12.1          | 12.0          | 12.0  | 12.0          |
| Specimen mass loss rate <sup>c</sup>                           | g/m <sup>2</sup> .s   | 6.7           | 6.7           | 6.7   | 6.7           |
| Heat release rate  |   |               |               |       |               |
| peak, $\dot{q}_{max}''$  | kW/m <sup>2</sup>   | 257.0         | 257.9         | 249.6 | 254.9         |
| average, $\dot{q}_{avg}''$                                     |   |               |               |       |               |
| Over 60 s from ignition  | kW/m <sup>2</sup>   | 178.2         | 184.5         | 163.0 | 175.3         |
| Over 180 s from ignition                                       | kW/m <sup>2</sup>   | 148.3         | 155.4         | 137.7 | 147.1         |
| Over 300 s from ignition                                       | kW/m <sup>2</sup>   | 128.4         | 134.1         | 120.7 | 127.7         |
| Total heat released  | MJ/m <sup>2</sup>   | 155.4         | 159.2         | 145.9 | 153.5         |
| Average Specific Extinction Area                               | m <sup>2</sup> /kg  | 49.8          | 66.4          | 34.9  | 50.4          |
| Effective heat of combustion <sup>d</sup> , $\Delta h_{c,eff}$ | MJ/kg   | 12.7          | 13.1          | 12.1  | 12.7          |

Notes :

<sup>a</sup> no significant observations were recorded

<sup>b</sup> determined by \* XO2 returning to the pretest value within 100 ppm of oxygen concentration for 10 minutes  
\*\* 30 minutes after time to sustained flaming

<sup>c</sup> from ignition to end of test;

<sup>d</sup> from the start of the test

+ value calculated using data beyond the official end of test time according to the test standard.

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| Material   | Test specimens as described in Section 1<br>(in accordance with ISO 5660) |               |               | Mean  |               |
|--|---|---------------|---------------|-------|---------------|
|  | Specimen test number  | FH5255-3-50-1 | FH5255-3-50-2 |       | FH5255-3-50-3 |
| Time to sustained flaming                                      | s   | 25            | 25            | 24    | 25            |
| Observations <sup>a</sup>                                      |   | -             | -             | -     |               |
| Test duration <sup>b</sup>                                     | s   | 1825          | 1825          | 1824  | 1825          |
| Mass remaining, mf   | g   | 23.3          | 19.0          | 21.3  | 21.2          |
| Mass pyrolyzed   | %   | 81.9%         | 85.2%         | 83.4% | 83.5%         |
| Specimen mass loss <sup>c</sup>                                | kg/m <sup>2</sup>   | 11.9          | 12.2          | 12.0  | 12.0          |
| Specimen mass loss rate <sup>c</sup>                           | g/m <sup>2</sup> .s   | 6.6           | 6.8           | 6.7   | 6.7           |
| Heat release rate  |   |               |               |       |               |
| peak, $\dot{q}_{max}''$  | kW/m <sup>2</sup>   | 247.6         | 245.9         | 249.6 | 247.7         |
| average, $\dot{q}_{avg}''$                                     |   |               |               |       |               |
| Over 60 s from ignition  | kW/m <sup>2</sup>   | 161.7         | 162.3         | 163.0 | 162.4         |
| Over 180 s from ignition                                       | kW/m <sup>2</sup>   | 134.6         | 138.0         | 137.7 | 136.7         |
| Over 300 s from ignition                                       | kW/m <sup>2</sup>   | 117.3         | 121.2         | 120.7 | 119.8         |
| Total heat released  | MJ/m <sup>2</sup>   | 156.5         | 151.9         | 145.9 | 151.4         |
| Average Specific Extinction Area                               | m <sup>2</sup> /kg  | 34.9          | 42.1          | 34.9  | 37.3          |
| Effective heat of combustion <sup>d</sup> , $\Delta h_{c,eff}$ | MJ/kg   | 13.1          | 12.3          | 12.1  | 12.5          |

Notes :

<sup>a</sup> no significant observations were recorded

<sup>b</sup> determined by \* XO2 returning to the pretest value within 100 ppm of oxygen concentration for 10 minutes  
\*\* 30 minutes after time to sustained flaming

<sup>c</sup> from ignition to end of test;

<sup>d</sup> from the start of the test

+ value calculated using data beyond the official end of test time according to the test standard.

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## 4. SUMMARY

ISO 5660 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 |
|---------------|-------------------------------------|-----------------|---------------------------------------|
| FH5255-1-50-1 | 138.4                               | 137.7           | 0.5%                                  |
| FH5255-1-50-2 | 135.5                               |                 | -1.6%                                 |
| FH5255-1-50-3 | 139.2                               |                 | 1.1%                                  |
| FH5255-2-50-1 | 148.3                               | 147.1           | 0.8%                                  |
| FH5255-2-50-2 | 155.4                               |                 | 5.6%                                  |
| FH5255-3-50-3 | 137.7                               |                 | -6.4%                                 |
| FH5255-3-50-1 | 134.6                               | 136.7           | -1.6%                                 |
| FH5255-3-50-2 | 138.0                               |                 | 0.9%                                  |
| FH5255-3-50-3 | 137.7                               |                 | 0.7%                                  |

The above table identifies all of the specimens exposed to 50 kW/m<sup>2</sup> irradiance met the acceptance criteria.

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

| Sample   | Mean Specimen thickness (mm) | Irradiance (kW/m <sup>2</sup> ) | Mean Time to Ignition (s) | Mean Peak Heat Release Rate (kW/m <sup>2</sup> ) | Average Specific Extinction Area (m <sup>2</sup> /kg) |
|----------|------------------------------|---------------------------------|---------------------------|--|---|
| FH5255-1 | 9.1                          | 50                              | 24                        | 307.5  | 79.5  |
| FH5255-2 | 18.0                         | 50                              | 29                        | 254.9  | 50.4  |
| FH5255-3 | 18.0                         | 50                              | 25                        | 247.7  | 37.3  |



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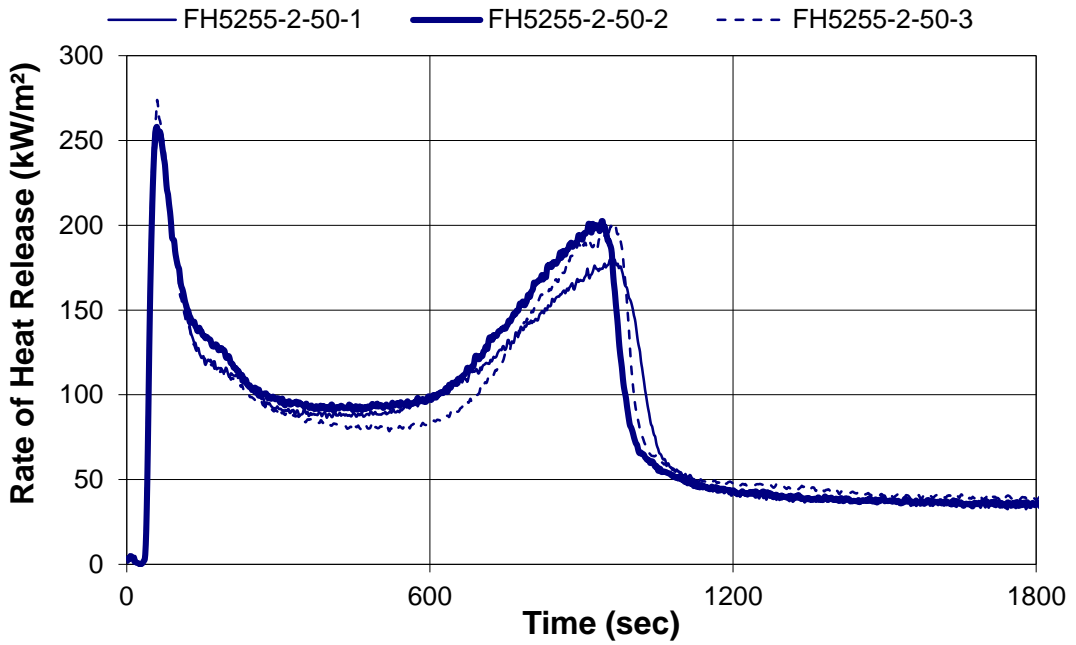
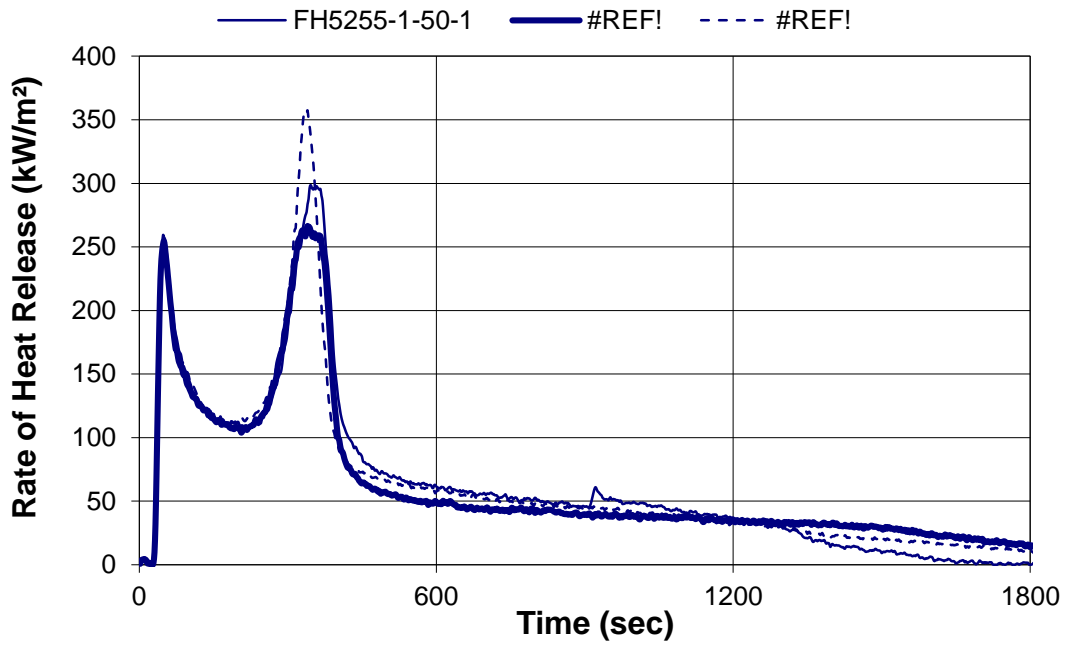
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Figure 2 Rate of heat release verses time



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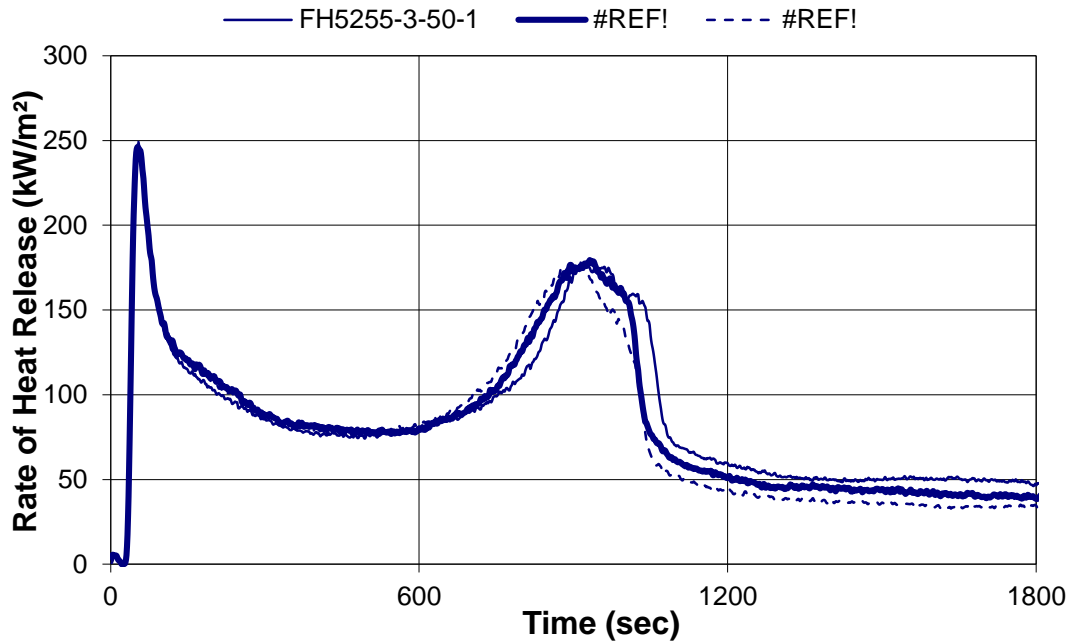
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## 5. CLASSIFICATION IN ACCORDANCE WITH NZBC VERIFICATION METHOD C/VM2 APPENDIX A

The following classification has been assessed in accordance with the New Zealand Building Code Verification Method C/VM2 Appendix A: Establishing Group Numbers for the 3 types of Customwood MDF. 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   | NZBC C/VM2 Group Number Classification |            |            |                |
|----------|--|------------|------------|----------------|
|          | Specimen 1                             | Specimen 2 | Specimen 3 | Classification |
| FH5255-1 | 3                                      | 3          | 3          | 3              |
| FH5255-2 | 3                                      | 3          | 3          | 3              |
| FH5255-3 | 3                                      | 3          | 3          | 3              |

In accordance with Verification Method C/VM2 Appendix A, samples achieving either a Group number classification 1 or 2, and with an average smoke extinction area less than 250 m<sup>2</sup>/kg are identified with "S" post-script to the Group number.

The samples achieved a Group number of 3, therefore no identifier is used.



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## 6. 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, and the NCC Specification C1.10 for the Classification of Fire Performance of Wall and Ceiling Lining Materials, the following classification is considered applicable to the material as described in Section 1.

| Product Description                     | NZBC C/VM2 Group Number Classification |
|---|--|
| Customwood MDF ProPanel 9 mm E1         | 3                                      |
| Customwood MDF ProPanel 18 mm E1        | 3                                      |
| Customwood MDF SuperFinish 18 mm MR/SE0 | 3                                      |

## 7. LIMITATION

The results reported here relate only to the items tested.



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