SUBJECT:

Fire propagation test on “GREENLAM” Type-F, HGF Building material submitted by Greenlam Asia Pacific Pte Ltd on 06 Jan 2014.

TESTED FOR:

Greenlam Asia Pacific Pte Ltd
11 Sungei Kadut Crescent
Singapore 728683

DATE OF TEST:

21 Jan 2014

PURPOSE OF TEST:

To determine the Index of Performance of the material when it is exposed to the conditions of the test specified in British Standard 476 : Part 6 : 1989 + A1 : 2009 “Method of test for fire propagation for products”.

The test was conducted at TÜV SÜD PSB’s fire test laboratory located at No. 10 Tuas Avenue 10, Singapore 639134.

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DESCRIPTION OF SPECIMENS:

Six pieces of specimen, said to be “GREENLAM” (0.8mm thick) Type-F, HGF Building material comprising of High Pressure Laminates, each of nominal size of 225mm x 225mm were submitted. The Adhesive and Additives used were said to be Phenol-formaldehyde and Die-ethyl Glucose (DEG) respectively. The Fire Retardant used was said to be Ammonium Bromide. The bulk density of the specimen was found to be approximately 1522kg/m$^3$. Nine pieces of specimen, each with “GREENLAM” Type-F, HGF Building material adhered onto one face of an approximately 6mm thick calcium silicate board, each of nominal test size of 225mm x 225mm were prepared.

TEST PROCEDURE:

Three specimens, backed with calcium silicate board, were tested with Laminate (smooth) face exposed to the specified heating conditions, in an apparatus conforming to paragraph 5 and illustrated in Figures 1 to 3 of the Standard.

The calibration and test procedures were as defined in paragraphs 8 and 9, respectively, of the specification. The apparatus was calibrated prior to test and the actual calibration curve obtained is shown in Figure 1 of this report.

The mean temperature rise above ambient obtained from three specimens is also shown in Figure 1 (i.e. with the actual calibration curve). The mean temperature readings for the material and the calibration curve were obtained at the following intervals from the start of the test: at 1/2 minute intervals up to 3 minutes, at 1 minute intervals from 4 to 10 minutes, and at 2 minutes intervals from 12 to 20 minutes.
From these readings, the index of performance for the material was determined as follows:

\[ s_1 = \sum_{t=0.5}^{t=3} \frac{\Theta_s - \Theta_c}{10t}; \quad s_2 = \sum_{t=4}^{t=10} \frac{\Theta_s - \Theta_c}{10t} \]

and \[ s_3 = \sum_{t=12}^{t=20} \frac{\Theta_s - \Theta_c}{10t} \]

\[ S = s_1 + s_2 + s_3 \]

where \( S \) = Index of performance for each of the specimens tested and \( s_1 \), \( s_2 \) and \( s_3 \) are sub-indices.

\( t \) = Time in minutes from the origin at which readings are taken.

\( \Theta_s \) = Temperature rise in deg. C for the specimen at time, \( t \)

\( \Theta_c \) = Temperature rise in deg. C for the calibration sheet at time, \( t \)

In computations only the positive value of \( \frac{\Theta_s - \Theta_c}{10t} \) was used.
RESULTS OF TEST:

The following test results were obtained for each specimen tested:

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Sub-Indices</th>
<th>Index of Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$s_1$</td>
<td>$s_2$</td>
</tr>
<tr>
<td>A</td>
<td>1.5</td>
<td>2.8</td>
</tr>
<tr>
<td>B</td>
<td>0.9</td>
<td>2.3</td>
</tr>
<tr>
<td>C</td>
<td>1.1</td>
<td>2.7</td>
</tr>
</tbody>
</table>

CONCLUSION:

The test results obtained, as an average of the 3 samples tested are as follows:

Index of overall performance, $I_1$ = 4.3  
(Fire propagation index)  
Sub-index, $i_1$ = 1.2  
Sub-index, $i_2$ = 2.6  
Sub-index, $i_3$ = 0.5

REMARKS:

The test results relate only to the behaviour of the test specimens of the product under the particular conditions of test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.
FIGURE 1: COMPARISON OF MEAN SPECIMEN AND CALIBRATION CURVES
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July 2011