Test Report No. 7191190037-MEC18/1-JV
dated 19 July 2018

Note: This report is issued subject to the Testing and Certification Regulations of the TÜV SÜD Group and the General Terms and Conditions of Business of TÜV SÜD PSB Pte Ltd. In addition, this report is governed by the terms set out within this report.

SUBJECT:

Determination of the reaction to fire tests for building products excluding floorings, when exposed to the thermal attack by a single burning item on ‘Greenlam’ High Pressure Laminate Panel (12mm thick, density 17.34kg/m²) submitted by Greenlam Asia Pacific Pte Ltd on 02 Jul 2018.

TESTED FOR:

Greenlam Asia Pacific Pte Ltd
11 Sungei Kadut Crescent
Singapore 728683

DATE OF TEST:

05 to 06 Jul 2018

PURPOSE OF TEST:

To determine the reaction to fire performance of building products excluding floorings, when exposed to the thermal attack by a single burning item (SBI), according to EN 13823: 2010 (BS EN 13823:2010).

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

The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council. Inspections/Calibrations/Tests marked “Not SAC-SINGLAS Accredited” in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our inspection body/laboratory.

Laboratory:
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Co. Reg: 199002667R

Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
1 Science Park Drive, #02-01
Singapore 118221
DESCRIPTION OF SPECIMEN:

Five sets of specimen, said to be ‘Greenlam’ High Pressure Laminate Panel (12mm thick, density 17.34kg/m²), each of the following nominal size were received. The nominal overall area density and thickness of the specimen were found to be 18.3 kg/m² and 13mm respectively.

1. Panel of 1500mm x 1000mm
2. Panel of 1500mm x 495mm

Details of the product, as provided by the sponsor of test, are as follows:

<table>
<thead>
<tr>
<th>Product manufactured / supplied by:</th>
<th>Greenlam Industries Limited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Address</td>
<td>Dhami, Industrial Area</td>
</tr>
<tr>
<td></td>
<td>Behror, Rajasthan 301701</td>
</tr>
<tr>
<td></td>
<td>India</td>
</tr>
</tbody>
</table>

| Brand                              | Greenlam                    |
| Generic product name               | Greenlam                    |
| Material composition               | Paper                       |
| Nominal mass per unit area         | 17.34 kg/m²                 |
| Nominal thickness (mm)             | 12mm                        |
| Fire retardant                     | -                           |
TEST PRINCIPLE:

The principle behind the test is to evaluate the fire performance of the specimen over a duration of 20 minutes, by exposing the specimen to the flames of a sandbox burner placed at the bottom corner of two vertical wings constructed at right-angle. The performance parameters are: heat production, smoke production, lateral (horizontal) flame spread and falling flaming droplets and particles.

A short period before ignition of the main (primary) burner is used to measure the heat output and smoke development of the burner only, using an identical burner away from the specimen (the “auxiliary” (secondary burner”).

Some measurements are performed automatically, some are made by visual observation. The exhaust duct is equipped with sensors to measure the temperature, light attenuation, O₂ and CO₂ mole fraction and a flow induced pressure difference in the duct. These quantities are recorded automatically and used to calculate the volume flow, the heat release rate (HRR) and the smoke production rate (SPR).

TEST PROCEDURE:

Prior to test, the specimens were conditioned in accordance to EN 13238 and clause 6 and installed onto the test trolley in accordance with clause 5.3 of the standard.

The data calculations are calculated according to the formulations in Annex A and measuring sensors calibrated according to Annex C and D of the standard.

The test was conducted in accordance to clause 8 with data and observations recorded in accordance to clause 8.3 and 8.4 of the standard.

Additional information of the product is shown in the following Appendices, attached to this report:

- Appendix A: Graph of average:
  - HRR, THR & FIGRA values (zoom)
  - HRR, THR & FIGRA values
  - SPR, TSP & SMOGRA values

- Appendix B: Photographs of test
TEST RESULTS:

<table>
<thead>
<tr>
<th>Test Perimeters</th>
<th>Specimen</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>FIGRA_{0.2MJ} (W/s)</td>
<td>39.5</td>
<td>34.8</td>
</tr>
<tr>
<td>FIGRA_{0.4MJ} (W/s)</td>
<td>30.1</td>
<td>22.1</td>
</tr>
<tr>
<td>THR_{600s} (MJ)</td>
<td>2.6</td>
<td>2.3</td>
</tr>
<tr>
<td>LFS to edge (Yes / No)</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SMOGRA (cm²/s²)</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>TSP_{600s} (m²)</td>
<td>6.3</td>
<td>5.0</td>
</tr>
<tr>
<td>FDP flaming ≤ 10s (Yes / No)</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>FDP flaming &gt; 10s (Yes / No)</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**- denotes ‘threshold not reached’

REMARKS:

The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.
Appendix A: Graphs

Average HRR, THR and FIGRA values (Zoom)
Average HRR, THR and FIGRA values

Time (s)

kW or MJ

FIGRA (W/s)

HRR-Prod.

HRR(30)

THR

FIGRA
Average SPR, TSP and SMOGRA values
Appendix B: Photographs of test

Plate 1: At start of test

Plate 2: At 10 mins of test
Plate 3: At end of test
Please note that this Report is issued under the following terms:

1. This report applies to the sample of the specific product/equipment given at the time of its testing/calibration. The results are not used to indicate or imply that they are applicable to other similar items. In addition, such results must not be used to indicate or imply that TÜV SÜD PSB approves, recommends or endorses the manufacturer, supplier or user of such product/equipment, or that TÜV SÜD PSB in any way “guarantees” the later performance of the product/equipment. Unless otherwise stated in this report, no tests were conducted to determine long term effects of using the specific product/equipment.

2. The sample/s mentioned in this report is/are submitted/supplied/manufactured by the Client. TÜV SÜD PSB therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied.

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5. Unless otherwise stated, the tests were carried out in TÜV SÜD PSB Pte Ltd, No.1 Science Park Drive Singapore 118221.

July 2011