

Test Report No. 0719161179/2/YWA  
dated 20 Nov 2009



PSB Singapore

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**SUBJECT:**

Fire propagation test "GRM" material submitted by Latrade Pte Ltd on 11 Sep 2009.

**TESTED FOR:**

Latrade Pte Ltd  
18 Mandai Road  
#07-03  
Singapore 72991

Attn: Mr Sheo Shanker

**DATE OF TEST:**

13 Nov 2009

**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 "Method of test for fire propagation for products".

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



Laboratory:  
TÜV SÜD PSB Pte. Ltd.  
Testing Services  
No.1 Science Park Drive  
Singapore 118221

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LA-2007-0380-A-1  
LA-2007-0381-F  
LA-2007-0382-B  
LA-2007-0383-G  
LA-2007-0384-G  
LA-2007-0385-E  
LA-2007-0386-C

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**DESCRIPTION OF SPECIMENS:**

Six pieces of specimen, said to be "GRM" material comprising of PVC (32%), Chemical, Wood Powder (68%), each of nominal size of 225mm x 225mm were submitted. The thickness and overall bulk density of the sample were found to be approximately 5.0mm and 920kg/m<sup>3</sup> respectively.

**TEST PROCEDURE:**

Three specimens, backed with 25mm air gap calcium silicate spacer, were tested with the 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, and appendix B clause (b) 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.

Two handwritten signatures in black ink, one on the left and one on the right, positioned below the main text.



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:

Specimen	Sub-Indices			Index of Performance
	s <sub>1</sub>	s <sub>2</sub>	s <sub>3</sub>	S
A	7.7	10.3	1.3	19.3
B	6.1	8.9	1.9	16.9
C	6.2	8.0	2.1	16.2

**CONCLUSION:**

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

Index of overall performance, I = 17.5  
(Fire propagation index)

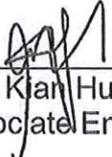
Sub-index, i<sub>1</sub> = 6.6

Sub-index, i<sub>2</sub> = 9.0

Sub-index, i<sub>3</sub> = 1.8

**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.

  
Ong Kian Huat  
Associate Engineer

  
Chan Lung Toa  
Product Manager  
(Fire Safety & Security Products)  
Mechanical Centre

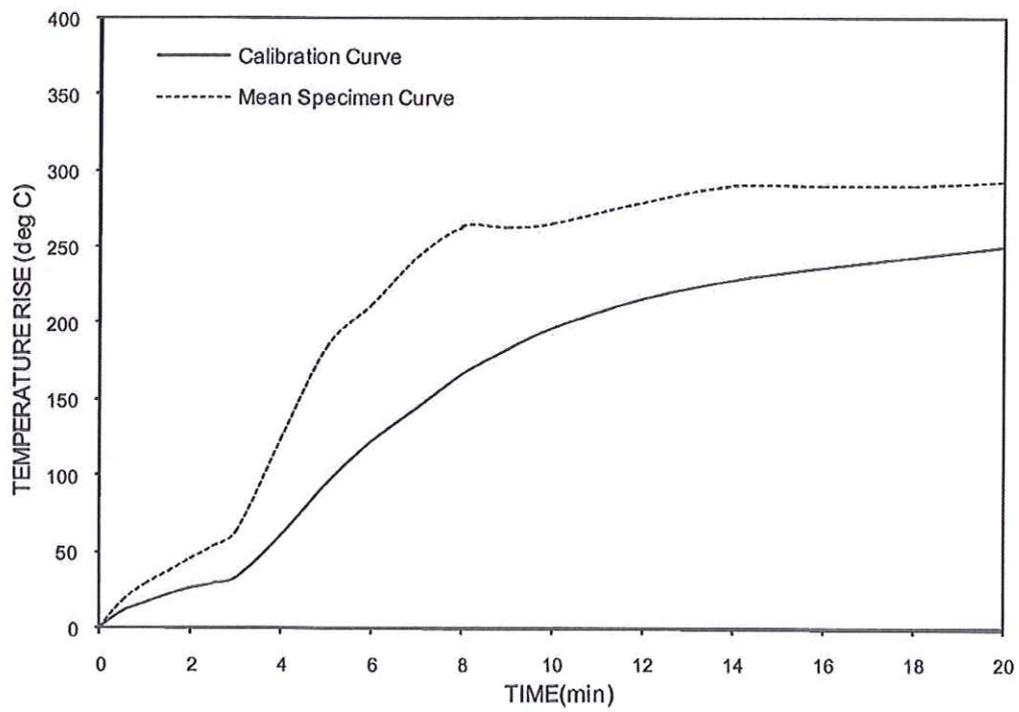


FIGURE 1 : COMPARISON OF MEAN SPECIMEN AND CALIBRATION CURVES

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March 2009

**Test Report No. 0719161179/1/OKH**  
dated 20 Nov 2009



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**SUBJECT:**

Large scale surface spread of flame test on "GRM" material submitted by Latrade Pte Ltd on 11 Sep 2009.

**TESTED FOR:**

Latrade Pte Ltd  
18 Mandai Road  
#07-03  
Singapore 729910

Attn: Mr Sheo Shanker

**DATE OF TEST:**

21 Oct 2009

**PURPOSE OF TEST:**

To determine the tendency of the surface of a material or a combination of materials to support the spread of flame across its surface and to classify the surface according to the test given in British Standard 476 : Part 7 : 1997.

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



Laboratory:  
TÜV SÜD PSB Pte. Ltd.  
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LA-2007-0382-B  
LA-2007-0383-G  
LA-2007-0384-G  
LA-2007-0385-E  
LA-2007-0386-C

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**DESCRIPTION OF SPECIMENS:**

Nine pieces of specimen, said to be "GRM" material comprising of PVC (32%), Chemical, Wood Powder (68%), each of nominal size of 885mm x 270mm were submitted. The thickness and overall bulk density of the sample were found to be approximately 5.0mm and 920kg/m<sup>3</sup> respectively.

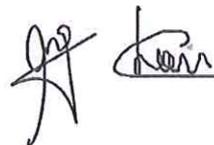
**TEST PROCEDURE:**

Prior to test, the specimens were prepared and conditioned in accordance with paragraphs 5.3 to 5.6 of the standard and secured to a specimen holder as described in paragraph 6.3.

Six specimens, backed with 25mm air gap calcium silicate spacer, were tested with the smooth face exposed to the specified thermal radiation from the apparatus described in paragraph 6.1 of the standard. The intensity of the radiated heat incident on the specimen varies with distance from the hotter end, so that when the specified calibration panel is mounted in the place to be occupied by the specimen, the irradiance of the radiometer is as given in Table 1. The test was terminated when the flame front reached the 825mm reference line, or after 10 minutes has elapsed, whichever is the shorter.

**Table 1 : Irradiance Along Horizontal Reference Line on the Calibration Board**

Distance along reference line from inside edge of specimen holder mm	Irradiance kW/m <sup>2</sup>		
	specified	min.	max.
75	32.5	32.0	33.0
225	21.0	20.5	21.5
375	14.5	14.0	15.0
525	10.0	9.5	10.5
675	7.0	6.5	7.5
825	5.0	4.5	5.5



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PSB Singapore

**RESULTS OF TEST:**

Specimen No.	1	2	3	4	5	6
Spread of flame at first 1½ minutes (mm)	0	0	0	0	0	0
Distance (mm)	Time of spread of flame to indicated distance (minutes • seconds)					
Start of flaming	1.53	2.01	2.24	2.14	2.25	1.33
75	1.54	2.02	2.25	2.15	2.25	1.34
165	-	4.26	4.08	4.30	-	2.54
190	-	4.33	4.10	4.52	-	2.55
215	-	4.45	-	5.11	-	-
240	-	-	-	-	-	-
265						
290						
375						
455						
500						
525						
600						
675						
710						
750						
785						
825						
865						
Time of maximum spread of flame (minutes • seconds)	2.48	10.00	8.53	10.00	2.33	3.01
Distance of maximum spread of flame (mm)	75-165	215-240	190-215	215-240	75-165	190-215
Comments	None					

*[Handwritten signatures]*



**Classification of Surface Spread of Flame**

Classification	Spread of flame at 1.5 min.		Final spread of flame	
	Limit (mm)	Limit for one specimen in sample (mm)	Limit (mm)	Limit for one specimen in sample (mm)
Class 1	165	165 + 25	165	165 + 25
Class 2	215	215 + 25	455	455 + 45
Class 3	265	265 + 25	710	710 + 75
Class 4	Exceeding the limits for class 3			

**CONCLUSION:**

In accordance with the class definitions specified in the Standard, the test results show that the sample tested has a Class Two Surface Spread of Flame.

**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.

  
Ong Kian Huat  
Associate Engineer

  
Chan Lung Toa  
Product Manager  
(Fire Safety & Security Products)  
Mechanical Centre

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March 2009