

Test Report No. 7191175467-MEC17/1-YWA
dated 07 Dec 2017

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SUBJECT:

Large scale surface spread of flame test on "JAS SERIES (JAS 380, JAS TILES, JAS PANELS, STANDING SEAM SS32/515)" Aluminium Roofing & Ceiling material submitted by JRP & Associates Pte Ltd on 20 Nov 2017.

TESTED FOR:

JRP & Associates Pte Ltd
71 Woodlands Industrial Park E9
#08-05 Wave 9
Singapore 757048

DATE OF TEST:

29 Nov 2017

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's fire test laboratory located at No. 10 Tuas Avenue 10, Singapore 639134.



LA-2007-0380-A
LA-2007-0381-F
LA-2007-0382-B
LA-2007-0383-G

LA-2007-0384-G
LA-2007-0385-E
LA-2007-0386-C
LA-2010-0464-D

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Laboratory:
TÜV SÜD PSB Pte. Ltd.
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E-mail: enquiries@tuv-sud-psb.sg
www.tuv-sud-psb.sg
Co. Reg : 199002667R

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



DESCRIPTION OF SPECIMENS:

Nine pieces of specimen, said to be "JAS SERIES (JAS 380, JAS TILES, JAS PANELS, STANDING SEAM SS32/515)" (0.7mm-3mm thick x 2.5kg/m²) Aluminium Roofing & Ceiling material comprising of Aluminium sheet with 15mm flange and coated with Top: Primer coat (8-10µm) / PVDF coating (25-28µm) / Bottom: Primer coat (8-10µm) / PE coating (18-20µm), each of nominal test size of 885mm x 270mm were received. The overall thickness and area bulk density of the specimen were found to be approximately 0.9mm thick and 2.7kg/m² 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 calcium silicate board, were tested with the PVDF coating 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	Irradiance kW/m ²		
	mm	specified	min.
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

Yuy



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	nil	nil	nil	nil	nil	nil
75	-	-	-	-	-	-
165						
190						
215						
240						
265						
290						
375						
455						
500						
525						
600						
675						
710						
750						
785						
825						
865						
Time of maximum spread of flame (minutes • seconds)	-	-	-	-	-	-
Distance of maximum spread of flame (mm)	0	0	0	0	0	0
Comments	None					

Yuy J



Classification of Surface Spread of Flame

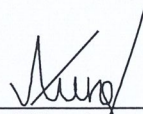
Classification	Spread of flame at 1.5 min.		Final spread of flame	
	Limit (mm)	Limit for one specimen in sample (mm)	Limit (mm)	Limit for one specimen in sample (mm)
Class 1	165	165 + 25	165	165 + 25
Class 2	215	215 + 25	455	455 + 45
Class 3	265	265 + 25	710	710 + 75
Class 4	Exceeding the limits for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

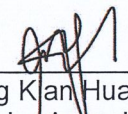
CONCLUSION:

In accordance with the class definitions specified in the Standard, the test results show that the sample tested has a Class 1 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.


Ye Wint Aung
Higher Associate Engineer


Ong Kian Huat
Senior Associate Engineer
Fire Property
Mechanical

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dated 07 Dec 2017

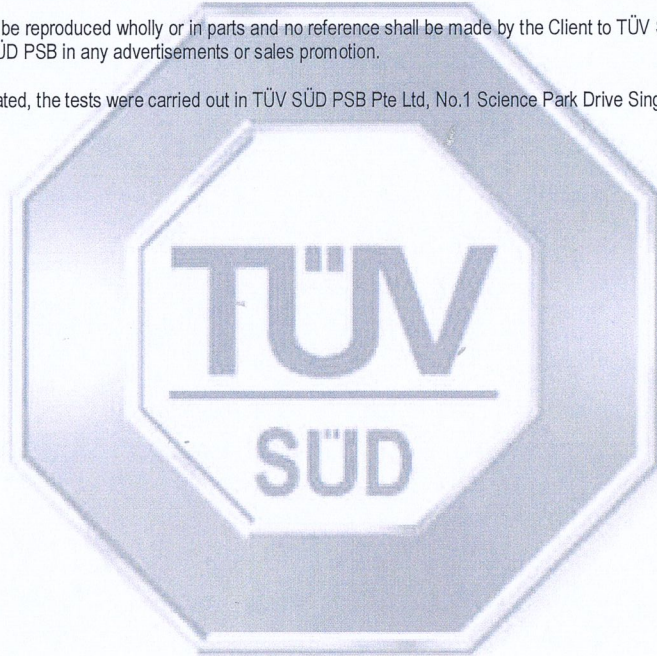


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July 2011



Test Report No. 7191175467-MEC17/2-YWA
dated 13 Dec 2017

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SUBJECT:

Fire propagation test on "JAS SERIES (JAS 380, JAS TILES, JAS PANELS, STANDING SEAM SS32/515)" Aluminium Roofing & Ceiling material submitted by JRP & Associates Pte Ltd on 20 Nov 2017.

TESTED FOR:

JRP & Associates Pte Ltd
71 Woodlands Industrial Park E9
#08-05 Wave 9
Singapore 757048

DATE OF TEST:

11 Dec 2017

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.



LA-2007-0380-A
LA-2007-0381-F
LA-2007-0382-B
LA-2007-0383-G

LA-2007-0384-G
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Laboratory:
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1 Science Park Drive, #02-01
Singapore 118221
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DESCRIPTION OF SPECIMENS:

Six pieces of specimen, said to be "JAS SERIES (JAS 380, JAS TILES, JAS PANELS, STANDING SEAM SS32/515)" (0.7mm-3mm thick x 2.5kg/m²) Aluminium Roofing & Ceiling material comprising of Aluminium sheet with 15mm flange and coated with Top: Primer coat (8-10µm) / PVDF coating (25-28µm) / Bottom: Primer coat (8-10µm) / PE coating (18-20µm), each of nominal test size of 225mm x 225mm were received. The overall thickness and area bulk density of the specimen were found to be approximately 0.9mm thick and 2.7kg/m² respectively.

TEST PROCEDURE:

Prior to test, the specimens were prepared and conditioned in accordance with paragraph 4.4 of the standard.

Three specimens, backed with calcium silicate board, were tested with the PVDF coating 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.

Yuy



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.

Θ_s = Temperature rise in deg. C for the specimen at time, t

Θ_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.

Ying He



RESULTS OF TEST:

The following test results were obtained for each specimen tested:

Specimen	Sub-Indices			Index of Performance
	s ₁	s ₂	s ₃	S
A	0.1	0.0	0.0	0.1
B	0.4	0.6	0.0	1.0
C	0.0	0.1	0.0	0.1

CONCLUSION:

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

Index of overall performance, I = 0.4
(Fire propagation index)

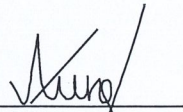
Sub-index, i₁ = 0.2

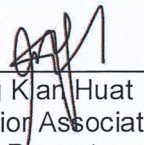
Sub-index, i₂ = 0.2

Sub-index, i₃ = 0.0

REMARKS:

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Ye Wint Aung
Higher Associate Engineer


Ong Kian Huat
Senior Associate Engineer
Fire Property
Mechanical

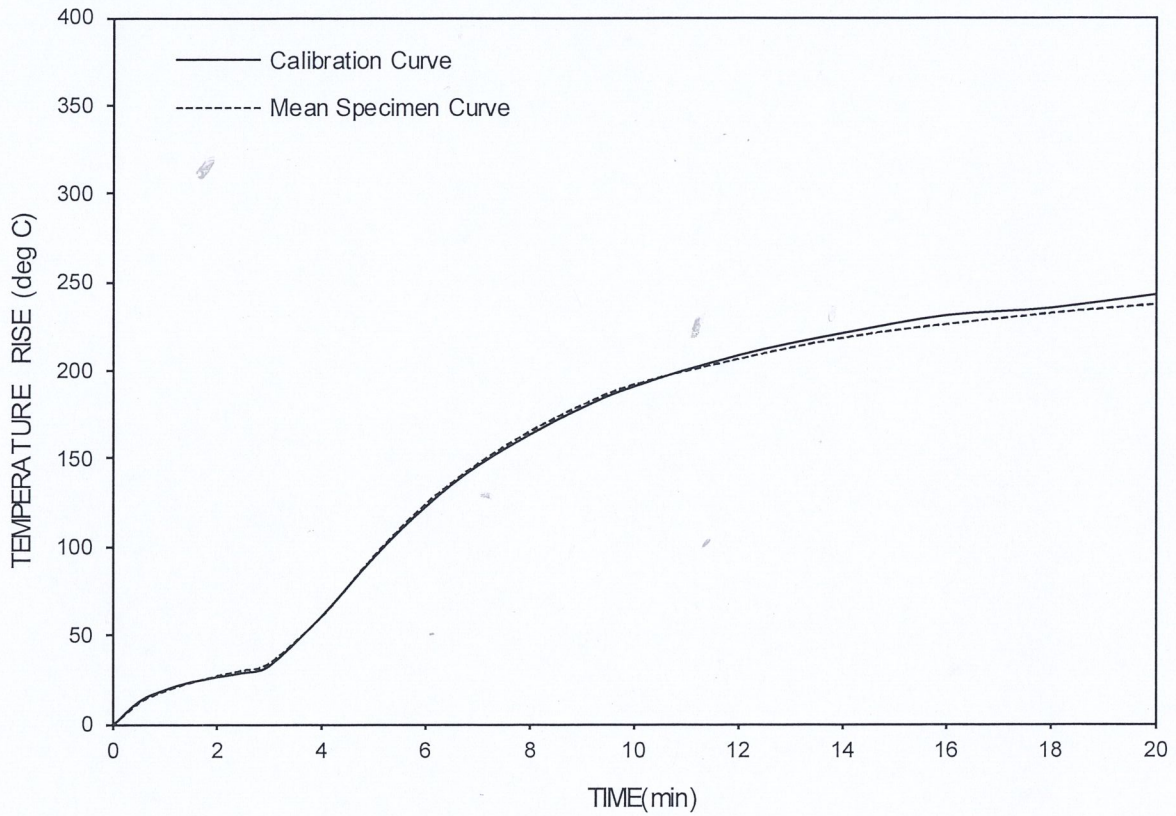


FIGURE 1 : COMPARISON OF MEAN SPECIMEN AND CALIBRATION CURVES

Ying Ho

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July 2011

