

Test Report No. 7191312076-MEC23-YWA
dated 02 Aug 2023

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.



PSB Singapore

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SUBJECT:

Fire propagation test on Brand: "PalDuct PIR Panel Product Code: 1010", Model: "1010", PalDuct PIR Panel submitted by Kingspan Insulation LLC on 26 Jun 2023.

TESTED FOR:

Kingspan Insulation LLC
Building 41, Street 74, Community 597
Dubai Investment Park 2, PO Box 113826
Dubai, United Arab Emirates

DATE OF TEST:

31 Jul 2023

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-2007-0386-C
LA-2007-0381-F LA-2010-0464-D
LA-2007-0382-B LA-2018-0702-B
LA-2007-0383-G LA-2018-0703-G
LA-2007-0384-G LA-2020-0747-L
LA-2007-0385-E

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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Regional Head Office:
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TÜV SÜD @ IBP
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TÜV®

DESCRIPTION OF SPECIMENS:

Six pieces of specimen, said to be Brand: "PalDuct PIR Panel Product Code: 1010", Model: "1010", PalDuct PIR Panel, each of nominal test size of 225mm x 225mm were received. The overall thickness, mass per unit area and bulk density of the specimen were measured to be 20mm, 0.97kg/m² and 48kg/m³ respectively.

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

Brand	PalDuct PIR Panel Product Code: 1010
Model	1010
Generic product name	PalDuct PIR Panel
Material composition	Fibre-free high performance rigid thermoset polyisocyanurate (PIR) insulation core, faced on both sides with an embossed aluminum foil
Country of Origin	United Arab Emirates
Batch code	L2S220062023
Production Date	20 Jun 2023
Nominal thickness	20mm
Nominal mass per unit area	0.9kg/m ²
Nominal density	N/A
Fire retardant	N/A



Details of the product, as provided by the sponsor of test, are as follows: (Cont'd)

Exterior Face: (Fire side)	Embossed aluminum foil
Brand –	*
Material –	Aluminum Foil
Nominal thickness –	*
Nominal density –	*
Country of Origin –	*
Color reference –	Aluminum
Fire retardant –	N/A
Core material:	Polyisocyanurate (PIR) insulation core
Brand –	Kingspan PalDuct PIR
Material –	CFC and HCFC free polyisocyanurate foam board
Nominal thickness –	20mm
Nominal mass per unit area –	*
Color reference –	Off White
Fire retardant –	*
Exterior Face: (Fire side)	Embossed aluminum foil
Brand –	*
Material –	Aluminum Foil
Nominal thickness –	*
Nominal density –	*
Country of Origin –	*
Color reference –	Aluminum
Fire retardant –	N/A
Adhesive:	N/A The foil facings are thermally bonded to the foam insulation board during the manufacturing process.

*- Indicate confidential information



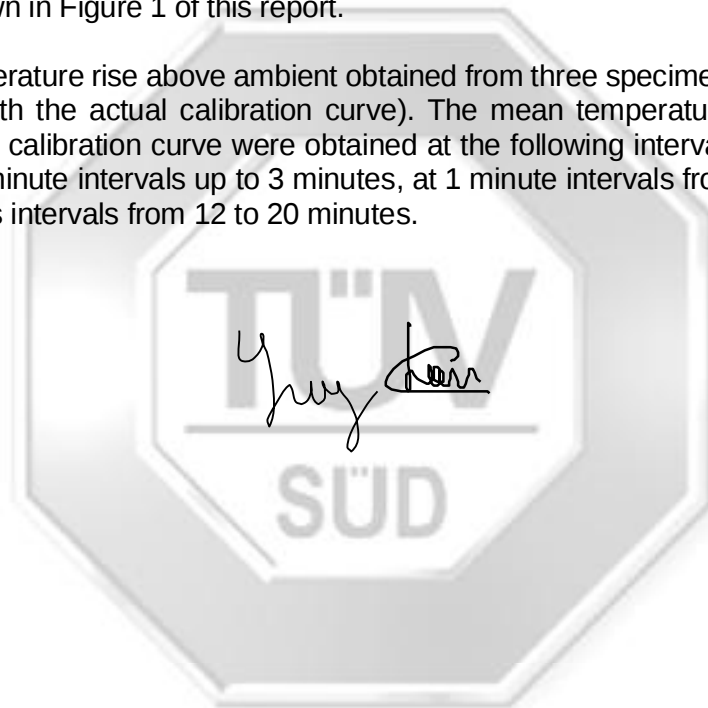
TEST PROCEDURE:

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

Three specimens, backed with non-combustible board, were tested with the embossed aluminium foil 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.

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.



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	2.1	2.9	0.7	5.7
B	1.2	4.6	0.7	6.5
C	2.5	4.5	0.2	7.2

CONCLUSION:

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

Index of overall performance, I = 6.5
(Fire propagation index)

Sub-index, i₁ = 1.9

Sub-index, i₂ = 4.0

Sub-index, i₃ = 0.5

REMARKS:

1. 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.
2. Photograph of specimen is shown in Plate 1.



Ye Wint Aung
Higher Associate Engineer



Chan Lung Toa
Assistant Vice President
Fire Testing
Mechanical Centre

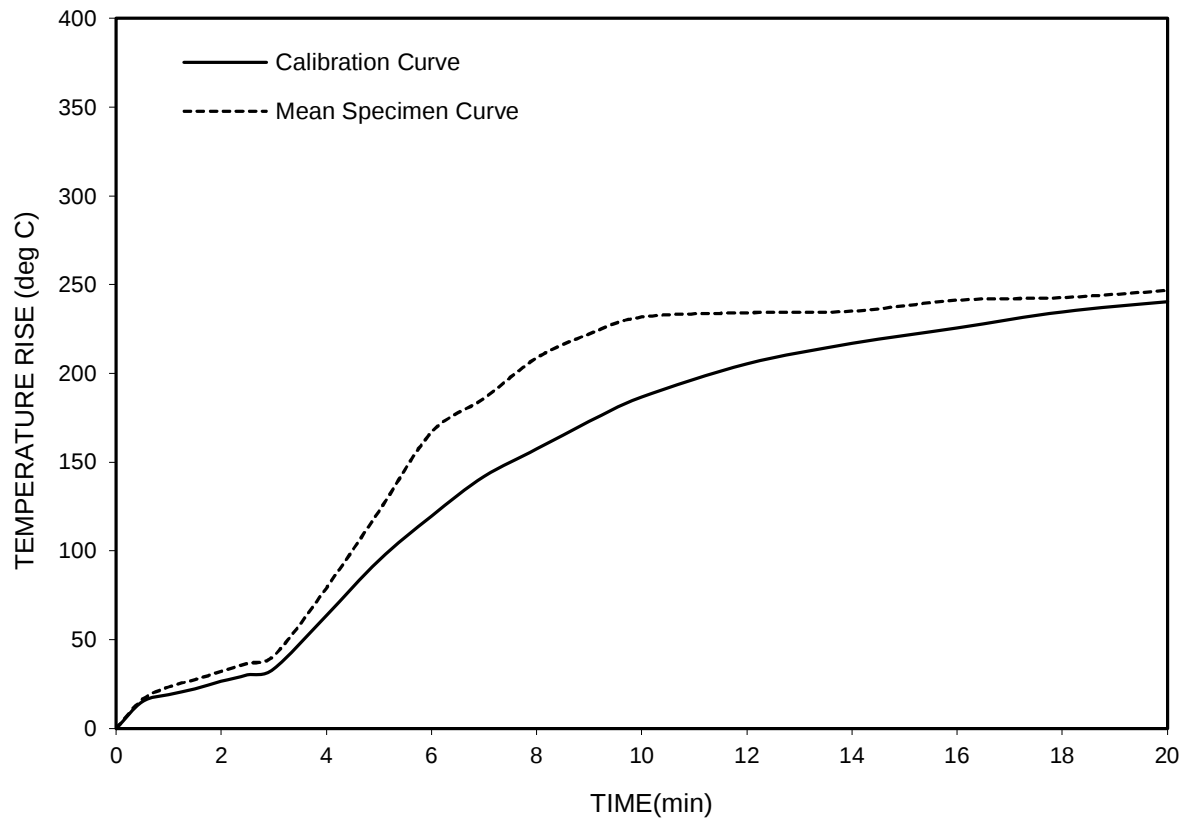


FIGURE 1 : COMPARISON OF MEAN SPECIMEN AND CALIBRATION CURVES





Plate 1: Photograph of specimen

Yuy Han

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PSB Singapore

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Effective 26 January 2021

