

Test Report No. 7191225252-MEC19/2-YWA
dated 16 Dec 2019
(221418029)



PSB Singapore

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SUBJECT:

Fire propagation test on Brand: "K-FLEX TITAN", Model: "K-FLEX TITAN" Nitrile Butadiene Rubber Elastomeric Foam with Co-extruded UV Resistant Jacketing for Outdoor / exposed HVAC systems for weather resistant application submitted by K-FLEX MALAYSIA SBN BHD on 11 Nov 2019.

TESTED FOR:

K-FLEX MALAYSIA SBN BHD
Lot 2752, Jalan Raja Nong
Taman Klang Jaya
41200 Klang
Selangor Darul Ehsan
Malaysia

DATE OF TEST:

09 Dec 2019

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

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:
TÜV SÜD PSB Pte. Ltd.
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Co. Reg : 199002667R

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

DESCRIPTION OF SPECIMENS:

Six pieces of specimen, said to be Brand: "K-FLEX TITAN", Model: "K-FLEX TITAN" " Nitrile Butadiene Rubber Elastomeric Foam with Co-extruded UV Resistant Jacketing for Outdoor / exposed HVAC systems for weather resistant application, each of nominal test size of 225mm x 225mm were received. The nominal thickness of the Lead Free Flexible Plastic Compound was measured to be 0.7mm. The nominal thickness of the Nitrile Butadiene Rubber Elastomeric Foam was measured to be approximately 28mm. The nominal thickness and bulk density of the steel sheet were measured to be 1.4mm and 7595kg/m³ respectively. The nominal thickness and bulk density of the specimen were measured to be 28.3mm and 77kg/m³ respectively.

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

Brand	"K-FLEX TITAN"
Model reference	"K-FLEX TITAN"
Generic product name	K-FLEX TITAN
Material composition	Lead Free Flexible Plastic Compound With UV Resistant / Nitrile Butadiene Rubber (NBR) Elastomeric Foam / Backing Material – Steel sheet
Country of Origin	Malaysia
Nominal thickness	-
Nominal bulk density	-
Fire retardant	Zinc Borate / ATH





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

<p>Exterior Face: (Fire side)</p> <p>Brand – Material – Country of Origin – Nominal thickness – Nominal density – Color reference – Fire retardant –</p>	<p>“PK” Lead Free Flexible Plastic Compound With UV Resistant - - 120kg/m³ Black Zinc Borate</p>
<p>Core Material</p> <p>Brand – Material – Country of Origin – Nominal thickness – Nominal density – Color reference – Fire retardant –</p>	<p>“K-Flex ST” Nitrile Butadiene Rubber (NBR) Elastomeric Foam Malaysia - 70kg/m³ Black ATH</p>
<p>Backing Material</p> <p>Brand – Material – Country of Origin – Nominal thickness – Nominal density – Color reference – Fire retardant –</p>	<p>- Steel sheet - - - - -</p>
<p>Adhesive:</p> <p>Brand – Material –</p> <p>Country of Origin – Nominal thickness – Nominal density – Fire retardant –</p>	<p>N A - - - - -</p>



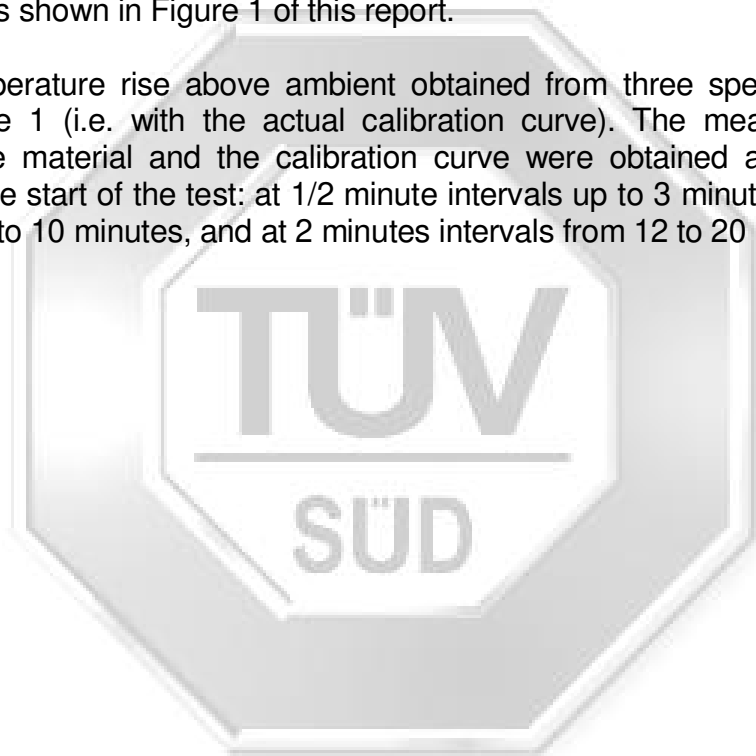
TEST PROCEDURE:

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 Lead Free Flexible Plastic Compound 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.



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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	3.8	5.5	0.4	9.7
B	1.7	5.1	0.8	7.6
C	2.6	4.9	0.4	7.9

CONCLUSION:

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

Index of overall performance, I = 8.4
(Fire propagation index)

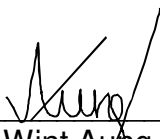
Sub-index, i₁ = 2.7

Sub-index, i₂ = 5.2

Sub-index, i₃ = 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.


Ye Wint Aung
Higher Associate Engineer


Ong Kian Huat
Assistant Manager
Fire Property
Mechanical

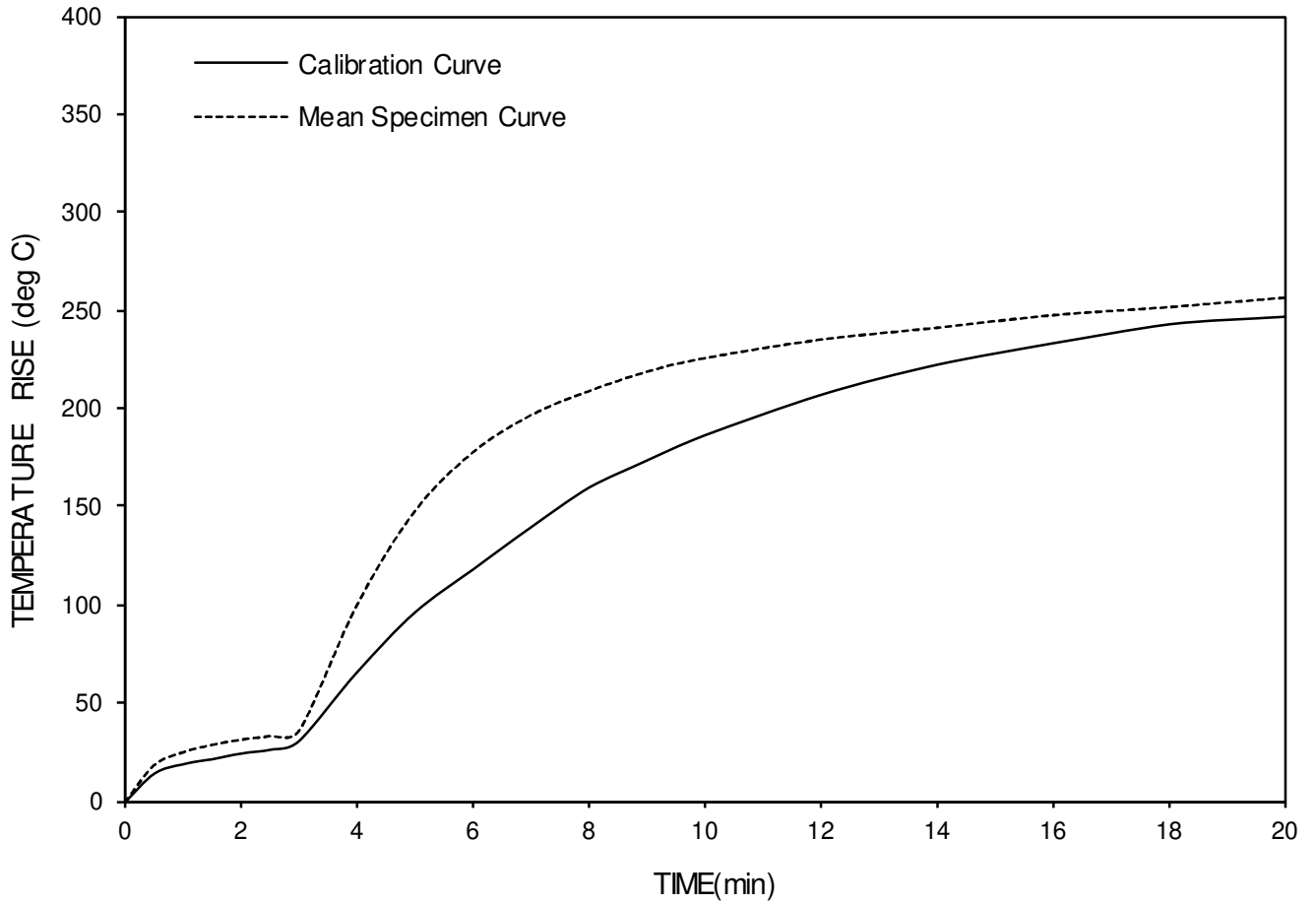


FIGURE 1 : COMPARISON OF MEAN SPECIMEN AND CALIBRATION CURVES

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July 2011

