Durkflex®

Elastomeric Thermal Insulation Material

Test and Certificate Report

Durkee (Wuhan) Insulation Material Co., Ltd

July, 2019

Contents

Test

Certificate

1. Surface Burning Characteristics ASTM E84

intertek
Total Quality. Assured.

Durkee (Wuhan) Insulation Material Co., Ltd

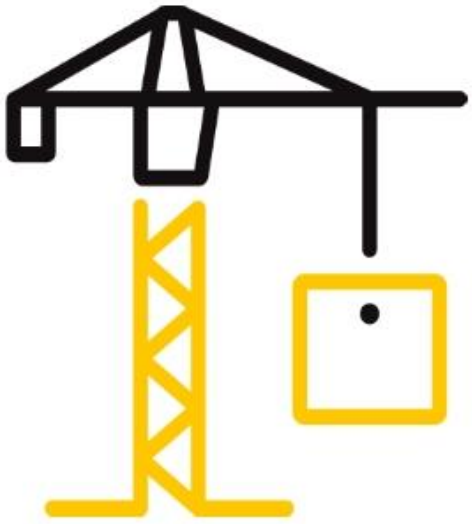
TEST REPORT

REPORT NUMBER
190425005HF-001

ISSUE DATE
2019/5/16

PAGES
4

DOCUMENT CONTROL NUMBER
LFT-APAC-SHF-OP-10k



Intertek Testing Services Shenzhen Ltd. Shanghai Fengxian Branch
Plant 5, No. 6958 Daye Road, Fengxian District, Shanghai, China
Tel: 021-61136116 Fax: 021-61189921
Website: www.intertek.com

Test Report

Issue Date: 2019/5/16 Intertek Report No. 190425005HF-001

Applicant: Durkee (Wuhan) Insulation Material Co., Ltd

Applicant Address: No.8 West Renmin Road, Gedian Development Zone, Ezhou, 436070, China

Attn: Leona Zhang

SUBJECT: Performance testing
Durkflex Elastomeric Insulation Material

Dear Sir,
This test report represents the results of our evaluation of the above referenced product(s) to the requirements contained in the following standards:

TEST METHODS AND STANDARDS
Refer to the next following Pages.

SAMPLE ID	MODEL	SPECIFICATION
S190425005SHF.001	/	/

SAMPLE RECEIEVED: 2019/4/25
TESTED FROM: 2019/4/25 TO 2019/5/16

intertek
Total Quality. Assured.

Test Report

Issue Date: 2019/5/16 Intertek Report No. 190425005HF-001

Test Items, Method and Results:

Test Method: ASTM E84-19a Standard Test Method for Surface Burning Characteristics of Building Materials

Specimen Mounting Method:

The 24.00-ft. long test specimen consisted of one 24.00-ft. long x 20.47-in. wide x 0.98-in. thick "Durkflex Elastomeric Insulation Material".

The specimen was same in both sides.

The specimen was supported with 0.25-in. diamerter metal rods that were spaced approximately every two feet and 20-gage, 2-in. hexagonal galvanized steel netting at the request of the sponsor.

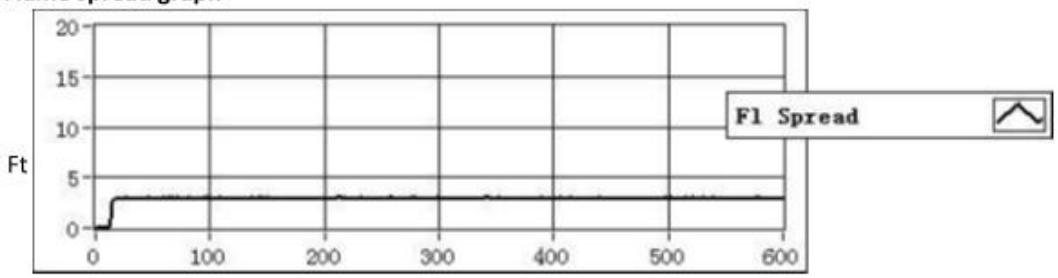
Test Observation (min:sec)

Melting	Blistering	Transient Ignition	Steady Ignition	Flaming drops
/	/	/	0:07	/
Delamination	Sagging	Shrinkage	Falling	Floor Flame
/	/	/	/	/

Test Result

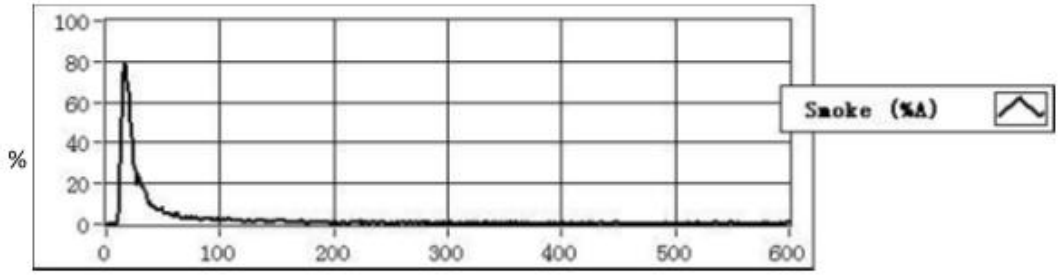
Flame Spread Index (FSI)	15	Smoke Developed Index(SDI)	40

Flame spread graph



Time (Sec)

Smoke developed graph



Time (Sec)

intertek
Total Quality. Assured.

Test Report

Issue Date: 2019/5/16 Intertek Report No. 190425005HF-001

REPORT AUTHORIZED

When signed with physical or electronic signature, the contents of this report have been prepared and approved per Intertek's quality process in accordance with ISO 17025.

Jason Xu Young Zheng

Name: Jason Xu Name: Young Zheng

Title: Reviewer Title: Project Engineer

Revision:

NO.	DATE	CHANGES	AUTHOR	REVIEWER
190425005HF-001	2019/5/16	First issue	Young Zheng	Jason Xu

2. Surface Spread of Flame BS476 Part 7(25mm)

Test Report No. 7191032780-MEC12/1-OKH
dated 26 May 2012

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

Choose certainty.
Add value.

SUBJECT:

Large scale surface spread of flame test on "Durkflex FG" Closed-cell Elastomeric Thermal Insulation material submitted by Durkee (Wuhan) Insulation Material Co., Ltd. on 30 Apr 2012.

TESTED FOR:

Durkee (Wuhan) Insulation Material Co., Ltd.
No. 8 Renmin Xi Road
Gedian Economic & Technical Development Zone
Ezhou City
Hubei Province
436070
China

Attn: Ms Vera Guo

DATE OF TEST:

16 May 2012

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.

TÜV SÜD PSB

ilac-MRA
ACCREDITED LABORATORY SAC-SINGLAS

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

The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme. Tests/Calibrations marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our laboratory.

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

Phone : +65-6885 1333
Fax : +65-6776 8670
E-mail: testing@tuv-sud-psb.sg
www.tuv-sud-psb.sg
Co. Reg : 199002667R

Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
3 Science Park Drive, #04-01/05
The Franklin, Singapore 118223

DESCRIPTION OF SPECIMENS:

Nine pieces of specimen, said to be "Durkflex FG" (25mm thick x 50kg/m^3 to 65kg/m^3) Closed-cell Elastomeric Thermal Insulation material comprising of Nitrile Butadiene Rubber, each of nominal test size of 885mm x 270mm were submitted. The overall bulk density of the specimen was found to be approximately 56kg/m^3.

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 either 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.	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

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					

PSB Singapore

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 One 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 Kiam Huat
Higher Associate Engineer

Chan Lung Toa
Product Manager
(Fire Property)
Mechanical Centre

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.

3. Nothing in this report shall be interpreted to mean that TÜV SÜD PSB has verified or ascertained any endorsement or marks from any other testing authority or bodies that may be found on that sample.

4. This report shall not be reproduced wholly or in parts and no reference shall be made by the Client to TÜV SÜD PSB or to the report or results furnished by TÜV SÜD PSB in any advertisements or sales promotion.

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

July 2011

3. Fire Propagation BS476 Part 6(25mm)

Test Report No. 7191032780-MEC12/2-YWA
dated 26 May 2012

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

Choose certainty.
Add value.

SUBJECT:

Fire propagation test on "Durkflex FG" Closed-cell Elastomeric Thermal Insulation material submitted by Durkee (Wuhan) Insulation Material Co., Ltd. on 30 Apr 2012.

TESTED FOR:

Durkee (Wuhan) Insulation Material Co., Ltd.
No. 8 Renmin Xi Road
Gedian Economic & Technical Development Zone
Ezhou City
Hubei Province
436070
China

Attn: Ms Vera Guo

DATE OF TEST:

24 May 2012

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.

TÜV SÜD PSB

ilac-MRA ACCREDITED LABORATORY SAC-SINGLAS

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

The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme. Tests/Calibrations marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our laboratory.

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

Phone : +65-6885 1333
Fax : +65-6776 8670
E-mail: testing@tuv-sud-psb.sg
www.tuv-sud-psb.sg
Co. Reg : 199002667R

Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
3 Science Park Drive, #04-01/05
The Franklin, Singapore 118223

DESCRIPTION OF SPECIMENS:

Six pieces of specimen, said to be "Durkflex FG" (25mm thick x 50kg/m^3 to 65kg/m^3) Closed-cell Elastomeric Thermal Insulation material comprising of Nitrile Butadiene Rubber, each of nominal test size of 225mm x 225mm were submitted. The overall bulk density of the specimen was found to be approximately 56kg/m^3.

TEST PROCEDURE:

Three specimens, backed with calcium silicate board, were tested with either 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	3.2	3.7	0.8	7.7
B	3.4	3.5	0.8	7.7
C	3.3	3.8	0.9	8.0

CONCLUSION:

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

Index of overall performance, I = 7.8
(Fire propagation index)

Sub-index, i_1 = 3.3

Sub-index, i_2 = 3.8

Sub-index, i_3 = 0.8

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
Higher Associate Engineer

Chan Lung Toa
Product Manager
(Fire Property)
Mechanical Centre

PSB Singapore

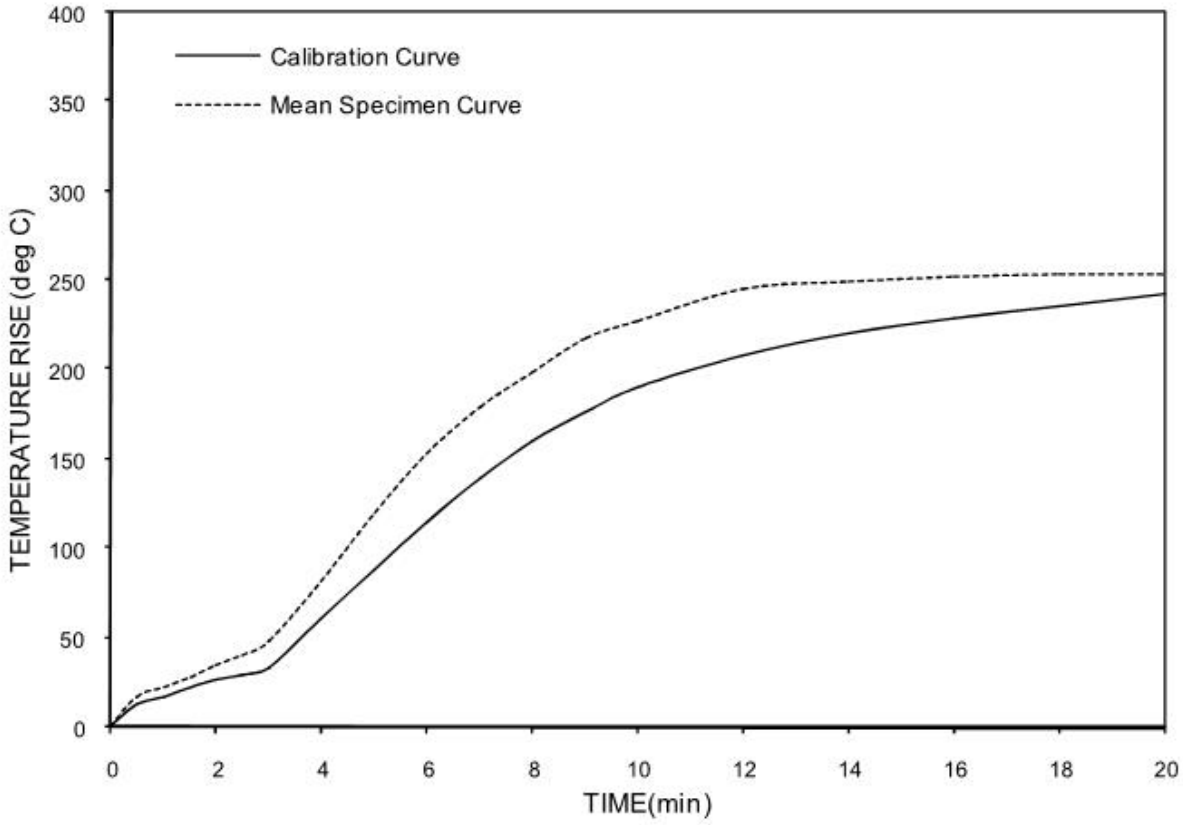


FIGURE 1 : COMPARISON OF MEAN SPECIMEN AND CALIBRATION CURVES

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.

3. Nothing in this report shall be interpreted to mean that TÜV SÜD PSB has verified or ascertained any endorsement or marks from any other testing authority or bodies that may be found on that sample.

4. This report shall not be reproduced wholly or in parts and no reference shall be made by the Client to TÜV SÜD PSB or to the report or results furnished by TÜV SÜD PSB in any advertisements or sales promotion.

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

July 2011

4. Fire Classification EN13501-1

Test Report **No. SDFS1904001940FF** **Date: Apr.30, 2019** **Page 1 of 4**

DURKEE (WUHAN) INSULATION MATERIAL CO., LTD
NO.8 WEST RENMIN ROAD,GEDIAN DEVELOPMENT ZONE, EZHOU, 436070, CHINA

The following sample(s) was / were submitted and identified on behalf of the client as:

Sample Description	:	DURKFLEX ELASTOMERIC THERMAL INSULATION MATERIAL
SGS Ref. No.	:	WHIN1904001206SC
Product specification	:	DURKFLEX FG
Sample Receiving Date	:	Apr.23, 2019
Test Performing Date	:	Apr.23, 2019 to Apr.30, 2019

Test Result Summary

Test(s) Requested	Result(s)
EN 13501-1:2018 Fire classification of construction products and building elements-Part 1: Classification using data from reaction to fire tests	Classification: B_{fl}-s1

Summary:

1. For further details, please refer to the following page(s).

Signed for and on behalf of
Shunde Branch
SGS-CSTC Co., Ltd.

Irvette Zhang
Approved signatory

1F, Building, European Industrial Park, No.1 Shunde South Road, Wusha Section, Daliang Town, Shunde, Foshan, Guangdong, China 528333 t (86-757)22805888 f (86-757)22805858 www.sgsgroup.com.cn
中国·广东·佛山市顺德区大良街道办事处五沙顺和南路1号欧洲工业园一号厂房首层 邮编: 528333 t (86-757)22805888 f (86-757)22805858 e sgs.china@sgs.com

TESTS AND RESULTS

Test Conducted:

This test is conducted as per EN 13501-1:2018 Fire classification of construction products and building elements-Part 1: Classification using data from reaction to fire tests.

And the test methods as following:

1. EN ISO 9239-1:2010 Reaction to fire tests for floorings-Part 1: Determination of the burning behaviour using a radiant heat source.
2. EN ISO 11925-2:2010+AC:2011 Reaction to fire tests-Ignitability of building products subjected to direct impingement of flame-Part 2: Single-flame source test.

Mounting and fixing (For EN ISO 9239-1:2010):

Fibre cement board, with its density about 1800kg/m^3, thickness about 8mm, is as the substrate.
The specimens were fixed mechanically to the substrate.

Test Results:

Test method	Parameter	Number of tests	Results
EN ISO 9239-1:2010	The mean value for the critical heat flux (CHF) from the same orientation	3	≥ 11 kW/m^2
	Smoking measurement Integrated smoke value		378.4 %×min
	Comments and Observation		Charring
EN ISO 11925-2:2010+AC:2011 Exposure = 15 s	*Fs* ≤ 150 mm within 20 s	3	Yes

Remark:

1). Specimens that do not ignite or which spread flame less than 110 mm have a critical heat flux ≥ 11kW/m^2

2). Above value is the mean value for the critical flux (CHF and/or HF-30) from the three same orientation specimens.

Classification and direct field of application

This classification has been carried out in accordance with **EN 13501-1:2018**

Classification:

Fire behaviour		Smoke production	
B_{fl}	—	s	1

Remark:

The classes with their corresponding fire performance are given in Table 2.

Reaction to fire classification is based on the 7-step scale of $A1_{fl}$ to F_{fl}, where $A1_{fl}$ is good and F_{fl} is bad.

Statement:

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.

Warning:
This classification report does not represent type approval or certification of the product.
The test laboratory has, therefore, play no part in sampling the product for the test, although it holds appropriate references to the manufacturer's factory production control that is aimed to be relevant to the samples tested and that will provide for their traceability.

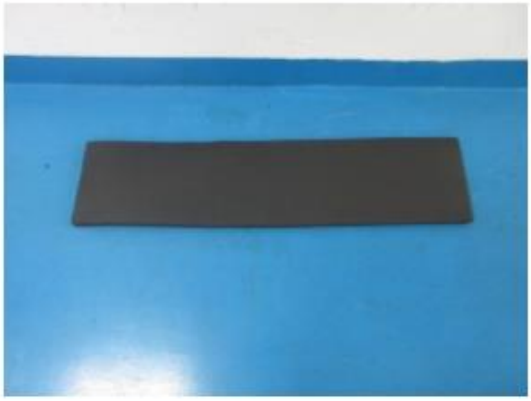
Table 2-Classes of reaction to fire performance for floorings

Class	Test method(s)	Classification criteria	Additional classification
$A1_{fl}$	EN ISO 1182 [a] and	$\Delta T \leq 30$ °C; and $\Delta m \leq 50$ %; and $t_f = 0$ (i.e. no sustained flaming)	-
	EN ISO 1716	$PCS \leq 2{,}0$ MJ/kg [a] and $PCS \leq 2{,}0$ MJ/kg [b] and $PCS \leq 1{,}4$ MJ/m^2 [c] and $PCS \leq 2{,}0$ MJ/kg [d]	-
$A2_{fl}$	EN ISO 1182 [a] or	$\Delta T \leq 50$ °C and $\Delta m \leq 50$ % and $t_f \leq 20$ s	-
	EN ISO 1716 and	$PCS \leq 3{,}0$ MJ/kg [a] and $PCS \leq 4{,}0$ MJ/m^2 [b] and $PCS \leq 4{,}0$ MJ/m^2 [c] and $PCS \leq 3{,}0$ MJ/kg [d]	-
	EN ISO 9239-1 [e]	Critical flux [f] ≥ 8,0 kW/m^2	Smoke production [g]
B_{fl}	EN ISO 9239-1 [e] and	Critical flux [f] ≥ 8,0 kW/m^2	Smoke production [g]
	EN ISO 11925-2 [h]: Exposure = 15 s	$Fs \leq 150$ mm within 20 s	-
C_{fl}	EN ISO 9239-1 [e] and	Critical flux [f] ≥ 4,5 kW/m^2	Smoke production [g]
	EN ISO 11925-2 [h]: Exposure = 15 s	$Fs \leq 150$ mm within 20 s	-
D_{fl}	EN ISO 9239-1 [e] and	Critical flux [f] ≥ 3,0 kW/m^2	Smoke production [g]
	EN ISO 11925-2 [h]: Exposure = 15 s	$Fs \leq 150$mm within 20 s	-
E_{fl}	EN ISO 11925-2 [h]: Exposure = 15 s	Fs ≤ 150 mm within 20 s	-
F_{fl}	EN ISO 11925-2 [h]: Exposure = 15 s	Fs > 150 mm within 20 s	-

[a] For homogeneous products and substantial components of non-homogeneous products.
[b] For any external non-substantial component of non-homogeneous products.
[c] For any internal non-substantial component of non-homogeneous products.
[d] For the product as a whole.
[e] Test duration = 30 min.
[f] Critical flux is defined as the radiant flux at which the flame extinguishes or the radiant flux after a test period of 30 min, whichever is the lower (i.e. the flux corresponding with the furthest extent of spread of flame).
[g] **s1** = Smoke ≤ 750 % minutes;
s2 = not s1.
[h] Under conditions of surface flame attack and, if appropriate to the end use application of the product, edge flame attack

SAMPLE INFORMATION AND PICTURES

Thickness: About 25 mm
Mass per unit area: About 1.23kg/m²



End of Report

SGS-CSTC Standards Technical Services Co., Ltd. Shunde Branch Foshan
1F,1st Building,European Industrial Park,No.1 Shunhe South Road,Wusha Section,Daliang Town,Shunde,Foshan,Guangdong,China 528333 t (86-757)22805888 f (86-757)22805858 www.sgsgroup.com.cn
中国·广东·佛山市顺德区大良街道办事处五沙顺和南路1号欧洲工业园一号厂房首层 邮编: 528333 t (86-757)22805888 f (86-757)22805858 e sgs.china@sgs.com

5. Fire Performance UL 94

QMFZ2.E353997
Plastics - Component

For enhanced search functionality, please visit UL's iQ™ Family of Databases.
Click on a product designation for complete information.

Page Bottom

Plastics - Component

See General Information for Plastics - Component

DURKEE (WUHAN) INSULATION MATERIAL CO LTD E353997
8 RENMIN XI RD
GEDIAN DEVELOPMENT ZONE
EZHOU, HUBEI 436070 CHINA

									H	D	
		Min.		H	H	R T I			V	4	C
		Thk	Flame	W	A	Elec	Mech		T	9	T
Material Dsg	**Color**	**mm**	**Class**	**I**	**I**		**Imp**	**Str**	**R**	**5**	**I**
Nitrile Rubber/Polyvinylchloride (NBR/PVC), furnished as sheets or tubes.											
Durkflex FG [density range: 40-58 kg/m^3]	BK	3.5	V-0,5VA	0	0	50	50	50	-	-	-
		6.0	V-0,5VA	0	0	50	50	50			

Marking: Company name and material designation on container, wrapper or finished part.

Last Updated on 2018-08-09

Questions? Print this page Terms of Use Page Top

6. Fire Protection on Railway Vehicles EN45545-2:2013 R1

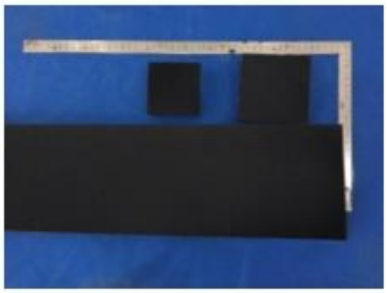
Report No. TC.18.12.007385

Date of Issue 12/18/2018

Applicant: Durkee (Wuhan) Insulation Material Co.,Ltd

Applicant address: No.8 Renmin Xi Road, Gedian Economic & Technical Development Zone, 436070 Ezhou City, China

Description of the test subject:

Sample	Description	Photo
001	Sample Description: Durkflex Closed-cell Elastomeric Thermal Insulation Material Style No.: 25mm Manufacturer: Durkee (Wuhan) Insulation Material Co.,Ltd	

Receipt Date of Sample: 12/11/2018

Date of Testing: From 12/11/2018 to 12/18/2018

Sample submitted: The sample(s) was (were) submitted by applicant and identified.

Conclusion:

Test Items			R1		
No.	Items	Standard	HL1	HL2	HL3
1	Test for spread of flame	EN 45545-2:2013+A1:2015 ISO 5658-2:2006+A1:2011	Pass	Pass	Pass
2	Heat release rate testing	EN 45545-2:2013+A1:2015 ISO 5660-1:2015	*	Pass	Pass
3	Smoke density testing	EN 45545-2:2013+A1:2015 EN ISO 5659-2:2012	Pass	Pass	Pass
4	Smoke toxicity testing	EN 45545-2:2013+A1:2015 EN ISO 5659-2:2012	Pass	Pass	Pass

Note: *=Standards are not required
Remark: Data of the report is quoted in TC.18.12.007384.

Changzhou Jinbiao Railway Transportation Technical Service Co.,Ltd.
Phone: +86/ (0) 519-8123-9872
Fax: +86/ (0) 519-8123-9872 ext.123
E-mail: hui.shen@tuv-sud.cn
www.tuv-sud.cn
No. 164, Wuyi Road ,Lucheng Street, Wujin District, Changzhou city, Jiangsu Province, 213015 P.R. China

Report No. TC.18.12.007385

Date of Issue 12/18/2018

Test Results

EN 45545-2:2013+A1:2015 Railway applications-Fire protection on railway vehicles Part2: Requirements for fire behaviour of materials and components

1. ISO 5658-2:2006+A1:2011 Reaction to fire tests-Spread of flame-Part: 2 Lateral spread on building and transport products in vertical configuration

1.1 Sample details

Specimen size	800mm×155mm
Thickness	About 25 mm

Precondition	Temperature	Relative humidity	Duration
	23±2°C	50±5%R.H.	24h

1.2 Test results

Specimen	1	2	3	4	5	6	Average
Ignition time (s)	32	22	19	26	25	25	25
Extinction time(s)	62	61	59	63	58	62	61
Length of terminate the test(mm)	340	330	360	340	370	360	350
Average heat for sustained burning(Qsb) (MJ/m^2)	1.273	1.130	1.382	1.216	1.582	1.375	1.326
CFE (kw/ m^2)	25.300	26.700	22.760	25.300	21.620	22.760	24.073
droplets/particles (Y/N)	N	N	N	N	N	N	--
droplets/particles burning time, s	--	--	--	--	--	--	--

Conclusion: CFE: **24.073** kw/m^2.

2. ISO 5660-1:2015 Reaction-to-fire tests — Heat release, smoke production and mass loss rate —Part 1: Heat release rate (cone calorimeter method).

2.1 Sample details:

Specimen size:	100mm x 100mm
Thickness:	About 25 mm
Extraction flow	24L/s

Changzhou Jinbiao Railway Transportation Technical Service Co.,Ltd.
Phone: +86/ (0) 519-8123-9872
Fax: +86/ (0) 519-8123-9872 ext.123
E-mail: hui.shen@tuv-sud.cn
www.tuv-sud.cn
No. 164, Wuyi Road ,Lucheng Street, Wujin District, Changzhou city, Jiangsu Province, 213015 P.R. China

Heat flux:	50 kW/m²
Orientation:	Horizontal

Precondition	Temperature (°C)	Humidity (%)	Duration (h)
	23±2	50±5	24

2.2 Test results:

Parameter		Specimens			Average
		1	2	3	
Sample exposed area	(m^2)	0.0088	0.0088	0.0088	0.0088
Time to ignition	(s)	7	9	11	9
Time to extinction	(s)	154	87	97	113
Time of flashing or transitory flaming	(s)	--	--	--	--
Re-Insert and power the igniter [a)]	(Yes/No)	Yes	Yes	Yes	--
End of test time	(s)	1200	1200	1200	1200
Initial mass	(g)	17.91	21.70	19.07	19.56
Total mass loss	(g)	10.5	12.8	13.2	12.2
Average rate of specimen mass loss	(g/s)	0.010	0.012	0.012	0.011
Total heat released	(MJ/m^2)	24.8	22.6	18.8	22.1
Average heat release rate	(kW/m^2)	21.59	19.98	16.69	19.42
Maximum heat release rate	(kW/m^2)	105.19	94.33	110.71	103.41
Average effective heat of combustion	(MJ/kg)	3.55	3.48	5.87	4.30
MARHE	(kW/m^2)	60.6	56.8	53.2	56.9
Heat released rate 180 s after ignition	(kW/m^2)	35.36	33.32	31.07	33.25
Heat released rate 300 s after ignition	(kW/m^2)	32.23	31.21	27.59	30.34
Total smoke production	(m^2)	5.8	2.6	1.2	3.2
Any observations during the test[b)]		Swell slightly			

Changzhou Jinbiao Railway Transportation Technical Service Co.,Ltd.

Phone: +86/ (0) 519-8123-9872
Fax: +86/ (0) 519-8123-9872 ext.123
E-mail: hui.shen@tuv-sud.cn
www.tuv-sud.cn

No. 164, Wuyi Road ,Lucheng Street, Wujin District, Changzhou city, Jiangsu Province, 213015 P.R. China

Special mounting procedures[c)]	See remark c-6

Conclusion: the MARHE value is __56.9__ kW/m^2.

Remark:

MARHE = maximum average rate of heat emission during the time

a) If the flame extinguishes in less than 60s after turning the spark, re-insert the spark igniter and turn on the spark within 5s, do not remove the spark until the entire test is completed.

b) Observe and record physical changes to the sample such as melting, swelling, and cracking.

c) Any special mounting procedures were used:

1. Samples that intumesce or deform so that they contact the spark plug prior to ignition, or the underside of the cone heater after ignition, shall be tested with the separation of 60mm between the base plate of the cone heater and the upper surface of specimen. In this case the heater calibration shall be performed with the heat flux meter positioned 60mm below the cone heater base plate.

2.Other dimensionally unstable products, for example products that warp or shrink during testing, shall be restrained against excessive movement. This shall be accomplished with four tie wines. A tie wire is then looped around the sample holder and retainer frame assembly, so that it is parallel to any approximately 20mm away from one of the four sides of the assembly. The ends of the wire are twisted together such that the wire is pulled firmly against the retainer frame. Excess wire is trimmed from the twisted section before testing. The three remaining wires shall be fitted around the specimen holder and retainer frame assembly in a similar manner, parallel to the three remaining sides.

3. Materials that distort so extensively that they cannot be held by 4 wires should be tested using the fine wire grid made of (0.8±0.1) mm with wire spacing of (20±2) mm.

4. Materials that intumesce in a fluid phase such that molten materials overflows the edge frame or seep between the edge frame and the specimen holder invalidate the test. Therefore, such materials should be tested without the edge frame and should be housed in 0.1mm thick aluminium tray wrappings which extends 10mm above the top edge of the test specimen.

5. Materials, such as fibers, which need to be both physically restrained or compressed to be tested at installed densities should be tested in a wire cage structure made of (1.0±0.1) mm steel wire with (9±1) mm spacing, which provides appropriate artificial boundaries to enable the materials to be tested.

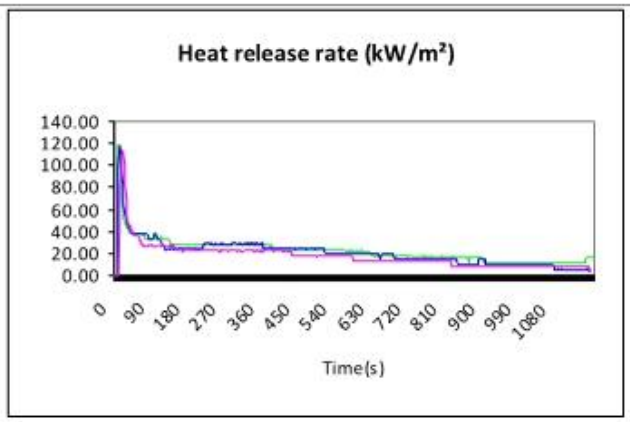
6. No any special mounting procedures were used:

Changzhou Jinbiao Railway Transportation Technical Service Co.,Ltd.

Phone: +86/ (0) 519-8123-9872
Fax: +86/ (0) 519-8123-9872 ext.123
E-mail: hui.shen@tuv-sud.cn
www.tuv-sud.cn

No. 164, Wuyi Road ,Lucheng Street, Wujin District, Changzhou city, Jiangsu Province, 213015 P.R. China

Graphs:



3. EN ISO 5659-2:2012 Plastics — Smoke generation —Part 2: Determination of optical density by a single-chamber test

3.1 Sample details:

Specimen size	75 mm×75 mm， 3 pcs
Thickness:	About__25__ mm

Precondition	Temperature （℃）	Humidity （%）	Duration (h)
	23±2	50±5	24

3.2 Test results

Test mode	The heat flux was 50 kW/m² **without** pilot flame

Item	Specimens			Average
	1	2	3	
Ds(1.5)	57.1	83.8	96.7	79.2
Ds(4)	60.8	94.9	85.6	80.4
Ds(10)	75.1	98.3	84.6	86.0
Ds(max)	75.1	100.6	96.8	90.8
VOF4	201.4	287.2	299.8	262.8

Changzhou Jinbiao Railway Transportation Technical Service Co.,Ltd.

Phone: +86/ (0) 519-8123-9872
Fax: +86/ (0) 519-8123-9872 ext.123
E-mail: hui.shen@tuv-sud.cn
www.tuv-sud.cn

No. 164, Wuyi Road ,Lucheng Street, Wujin District, Changzhou city, Jiangsu Province, 213015 P.R. China

T(Ds max), s	600	424	91	372

Note:
Ds(n): Specific optical density of smoke where n is the elapsed time since the start of testing in minutes.
VOF4: $VOF4 = Ds(1) + Ds(2) + Ds(3) + \frac{Ds(4)}{2}$
Ds(max): For each specimen, produce a graph of light transmission against time and determine the minimum percentage transmission T_{min}. Covert T_{min} to the maximum specific density D_{smax} by calculation to two significant figures using the following equation. $Dsmax = 132\log 10\frac{100}{Tmin}$ Test duration is 10min.
T (Ds max): The time of the start of test at which the Ds(max) was made.

Conclusion:

Ds(4)	VOF4
80.4	262.8

4. EN 45545-2:2013+A1:2015 Annex C: Annex C (normative) Testing methods for determination of toxic gases from railway products-Method 1 EN ISO 5659-2.

4.1 Sample details:

Specimen size	75 mm×75 mm , 3 pcs
Thickness:	About__25__mm

Precondition	Temperature （℃）	Humidity （%）	Duration (h)
	23±2	50±5	24

4.2 Test results

Test mode	The heat flux was 50 kW/m^2 **without** pilot flame.

1) 4 min after the test started

Gas	Sample 1	Sample 2	Sample 3	Average
Carbon Dioxide (CO_2)	1907.0	1843.5	2031.6	1927.4
Carbon Monoxide (CO)	397.1	347.7	400.9	381.9
Hydrogen Fluoride (HF)	ND	ND	ND	ND
Hydrogen Chloride (HCl)	ND	ND	ND	ND
Hydrogen Bromide (HBr)	ND	ND	ND	ND

Changzhou Jinbiao Railway Transportation Technical Service Co.,Ltd.
Phone: +86/ (0) 519-8123-9872
Fax: +86/ (0) 519-8123-9872 ext.123
E-mail: hui.shen@tuv-sud.cn
www.tuv-sud.cn
No. 164, Wuyi Road ,Lucheng Street, Wujin District, Changzhou city, Jiangsu Province, 213015 P.R. China

Hydrogen Cyanide (HCN)	48.3	49.9	49.1	49.1
Nitrogen Oxides (NO_2)	ND	ND	ND	ND
Sulphur Dioxide (SO_2)	31.0	28.4	28.8	29.4

2) 8 min after the test started

Gas	Sample 1	Sample 2	Sample 3	Average
Carbon Dioxide (CO_2)	4144.2	3702.1	4147.9	3998.1
Carbon Monoxide (CO)	611.6	602.1	644.1	619.3
Hydrogen Fluoride (HF)	ND	ND	ND	ND
Hydrogen Chloride (HCl)	ND	ND	ND	ND
Hydrogen Bromide (HBr)	ND	ND	ND	ND
Hydrogen Cyanide (HCN)	60.0	64.5	64.8	63.1
Nitrogen Oxides (NO_2)	ND	ND	ND	ND
Sulphur Dioxide (SO_2)	43.9	46.4	45.0	45.1

Note: All values given are in ppm.
Where ND indicates Non-detected.

Calculate the CIT_G

Gas	Reference concentration; mg/m^3	Reference concentration; p.p.m
Carbon Dioxide (CO_2)	72000	40000
Carbon Monoxide (CO)	1380	1200
Hydrogen Fluoride (HF)	25	30
Hydrogen Chloride (HCl)	75	50
Hydrogen Bromide (HBr)	99	30
Hydrogen Cyanide (HCN)	55	50
Nitrogen Oxides (NO_2)	38	20
Sulphur Dioxide (SO_2)	262	100

Changzhou Jinbiao Railway Transportation Technical Service Co.,Ltd.

Phone: +86/ (0) 519-8123-9872
Fax: +86/ (0) 519-8123-9872 ext.123
E-mail: hui.shen@tuv-sud.cn
www.tuv-sud.cn

No. 164, Wuyi Road ,Lucheng Street, Wujin District, Changzhou city, Jiangsu Province, 213015 P.R. China

$$CIT = 0.0805 \times \sum_{i=1}^{i=8} \frac{c_i}{C_i}$$

Where,

CIT — Conventional Index of Toxicity;

c_i — Concentration of the i[th] gas;

C_i — Reference concentration of the i[th] gas.

CIT_4, CIT_8 - the value of CIT 4 min or 8 min after the test started;

CIT_4	0.133
CIT_8	0.188

Conclusion: the maximum CIT_G value is 0.188.

Requirement EN 45545-2:2013+A1:2015 R1:

Items	Items	Parameter	HL1	HL2	HL3
Test for spread of flame	EN 45545-2:2013+A1:2015 ISO 5658-2:2006+A1:2011	CFE(minimum), KW/m^2	20	20	20
Heat release rate testing	EN 45545-2:2013+A1:2015 ISO 5660-1:2015	MARHE(maximum) , KW/m^2	*	90	60
Smoke density testing	EN 45545-2:2013+A1:2015 EN ISO 5659-2:2012	Ds4(maximum);	600	300	150
		VOF4 (maximum)	1200	600	300
Smoke toxicity testing	EN 45545-2:2013+A1:2015 EN ISO 5659-2:2012	CIT_G(maximum),	1.2	0.9	0.75

Conclusion:

Items	Parameter	Record	HL1	HL2	HL3
Test for spread of flame	CFE(minimum), KW/m^2	24.073	Pass	Pass	Pass
Heat release rate testing	MARHE(maximum), KW/m^2	56.9	*	Pass	Pass
Smoke density testing	Ds4(maximum);	80.4	Pass	Pass	Pass
	VOF4 (maximum)	262.8			

Changzhou Jinbiao Railway Transportation Technical Service Co.,Ltd.

Phone: +86/ (0) 519-8123-9872
Fax: +86/ (0) 519-8123-9872 ext.123
E-mail: hui.shen@tuv-sud.cn
www.tuv-sud.cn

No. 164, Wuyi Road ,Lucheng Street, Wujin District, Changzhou city, Jiangsu Province, 213015 P.R. China

Report No. **TC.18.12.007385**

Date of Issue **12/18/2018**

Smoke toxicity testing	CIT_G(maximum),	0.188	Pass	Pass	Pass

Statement: 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 the sole criterion for assessing the potential smoke and toxicity hazard of the product in use.

Changzhou Jinbiao Railway Transportation Technical Service Co., Ltd.

Drafted by: Approved by:

Lynn liu Shen hui

-End of Report-

Changzhou Jinbiao Railway Transportation Technical Service Co.,Ltd.

Phone: +86/ (0) 519-8123-9872
Fax: +86/ (0) 519-8123-9872 ext.123
E-mail: hui.shen@tuv-sud.cn
www.tuv-sud.cn

No. 164, Wuyi Road ,Lucheng Street, Wujin District, Changzhou city, Jiangsu Province, 213015 P.R. China

7. Thermal Conductivity & Resistance ASTM C518-17

SGS

TEST REPORT

No. : WHIN1907002269SC
Date : Aug 01, 2019
Page: 1 of 3

CUSTOMER NAME:		DURKEE (WUHAN) INSULATION MATERIAL CO., LTD
ADDRESS:		NO.8, WEST RENMIN RD., GEDIAN DEVELOPMENT ZONE, HUBEI
Sample Name	:	Durkflex Elastomeric Thermal Insulation Material
Product Specification	:	FG

Above information and sample(s) was/were submitted and confirmed by the client. SGS, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client.

****

Test Required	:	Thermal Conductivity
SGS Ref. No.	:	SHIN1907052876CM
Date of Receipt	:	Jul 12, 2019
Testing Start Date	:	Jul 12, 2019
Testing End Date	:	Aug 01, 2019
Test result(s)	:	For further details, please refer to the following page(s) (Unless otherwise stated the results shown in this test report refer only to the sample(s) tested)

Signed for
SGS-CSTC Standards Technical
Services Co., Ltd. Wuhan Branch

Sim Wang
Authorized signatory

Building 5, Zone B, The Private-enterprise Science and Technology Industrial Park, Zhuanyang Avenue, Wuhan Economic and Technological Development Zone, Wuhan, China www.sgsgroup.com.cn
中国·武汉·经济技术开发区沌阳街民营科技工业园六区5号厂房邮编：430064 t (86-27) 59330000 sgs.china@sgs.com

TEST REPORT

No. : WHIN1907002269SC
Date : Aug 01, 2019

Summary of Results:

No.	Test Item	Test Method	Result	Conclusion
1	Thermal Conductivity	ASTM C518-17	0.032 W/(m·K)	/

Note: Pass : Meet the requirements;
Fail : Does not meet the requirements;
/ : Not Apply to the judgment.

TEST REPORT

No. : WHIN1907002269SC
Date : Aug 01, 2019

Test Item: Thermal Conductivity

Test Method: ASTM C518-17

Test Condition:

Specimen: 312mm×306mm×24.6mm, 1pc

Density: about 48.9kg/m^3

Mean temperature: 20℃

Temperature difference: 20℃

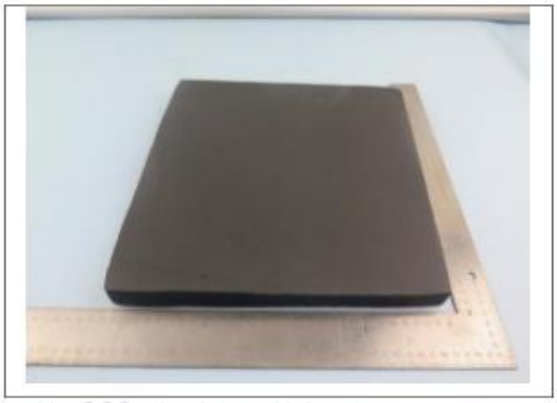
Lab Environmental Condition: 23±2℃, 50±5%RH

Test Result:

Test Item	Test Result
Thermal Conductivity	0.032 W/(m·K)

Note: The test result can not be compared with other results obtained from different test conditions, and should not be cited to the use condition directly.

Specimen Photo(s):



Note:The test was performed by SGS other internal laboratory.

******** End of report********

In the territory of the People's Republic of China, the test method is not in CMA accredited scope, the test report shall only be used for client scientific research, teaching, internal quality control, product research and development, etc…and just for client internal reference.

Building 5, Zone B, The Private-enterprise Science and Technology Industrial Park, Zhuanyang Avenue, Wuhan Economic and Technological Development Zone, Wuhan, China www.sgsgroup.com.cn
中国·武汉·经济技术开发区沌阳街民营科技工业园六区5号厂房邮编：430064 t (86-27) 59330000 sgs.china@sgs.com

8. Water Vapor Permeability ASTM E96

intertek
Total Quality. Assured.

DURKEE (WUHAN) INSULATION MATERIAL CO., LTD

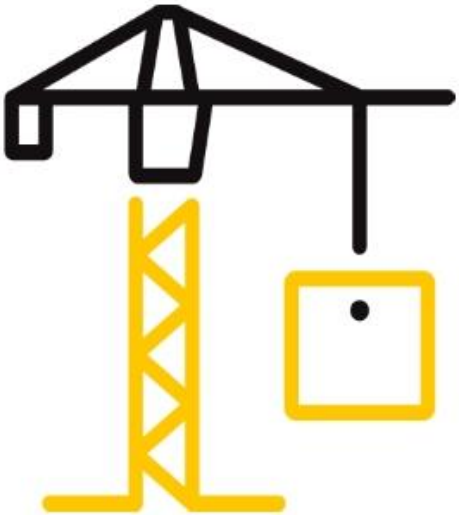
TEST REPORT

REPORT NUMBER
171221006SHF-BP-1

ISSUE DATE
2018-01-12

PAGES
4

DOCUMENT CONTROL NUMBER
LFT-APAC-SHF-OP-10a



Intertek Testing Services Ltd., Shanghai
No.7 Building, No. 6958 Daye Road, Fengxian District, Shanghai, China
Tel: 021-61136116 Fax: 021-61189921
Website: www.intertek.com

Test Report

Issue Date: 2018-01-12 Intertek Report No. 171221006SHF-BP-1

Applicant: DURKEE (WUHAN) INSULATION MATERIAL CO., LTD

Applicant Address: NO.8 WEST RENMIN ROAD, GEDIAN DEVELOPMENT ZONE, EZHOU, 436070, CN

Attn: Lu Yuan

SUBJECT: Performance testing
Durkflex Elastomeric Thermal Insulation Material

Dear Sir,
This test report for represents the results of our evaluation of the above referenced product(s) to the requirements contained in the following standards:

TEST METHODS AND STANDARDS
Refer to the next following Pages.

SAMPLE ID	MODEL	SPECIFICATION
S171221006SHF.001	/	/

SAMPLE RECEIEVED: 2017-12-08
TESTED FROM: 2017-12-21 TO 2018-01-12

intertek
Total Quality. Assured.

Test Report

Issue Date: 2018-01-12 Intertek Report No. 171221006SHF-BP-1

Test Items, Method and Results:

Test Iem: Water Vapor Transmission

Test Standard: ASTM E96/E96M - 16

Test Sample: 25 mm thickness homogeneous materials

Test Method: Desiccant Method

Test Temperature: 23 °C

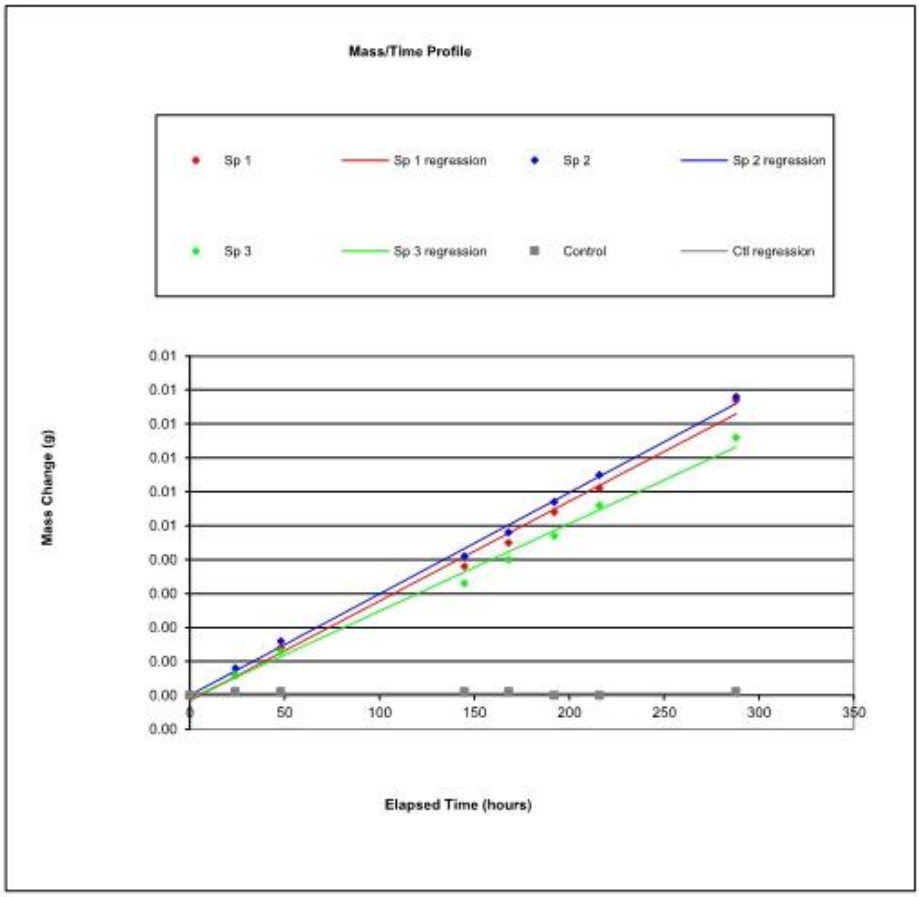
Relative Humidity in Test Chamber: 50 %R.H.

Face to Higher Vapor pressure: No specified by applicant.

Cup Size: 80 mm internal diameter

Test Item	Test Results	
Water Vapour Transmission:	Mean value:	0.01 g/hr·m²
Water Vapour Permeance:	Mean value:	1.1 ng/Pa·s·m²

Graphic Analysis Curve

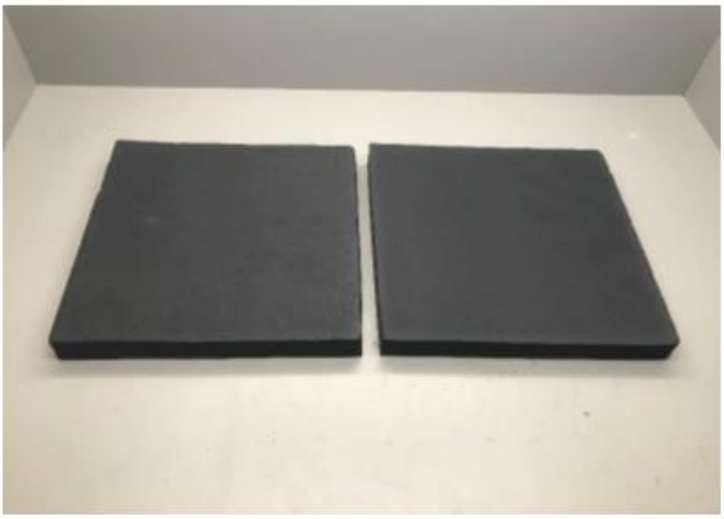


intertek
Total Quality. Assured.

Test Report

Issue Date: 2018-01-12 Intertek Report No. 171221006SHF-BP-1

APPENDIX: SAMPLE RECEIVED PHOTO



REPORT AUTHORIZED

When signed with physical or electronic signature, the contents of this report have been prepared and approved per Intertek's quality process in accordance with ISO 17025.

Name: Sally Xie	Name: Daniel Zhang	Name: Tod Qian
Title: Approver	Title: Reviewer	Title: Project Engineer

Revision:

NO.	DATE	CHANGES	AUTHOR	REVIEWER
171221006SHF-BP-1	2018-01-12	First issue	Tod Qian	Daniel Zhang

9. Water Absorption ASTM C209-15

SGS

TEST REPORT

No. : GZIN1908041740MR
Date : Aug 15, 2019
Page: 1 of 3

CUSTOMER NAME:		DURKEE (WUHAN) INSULATION MATERIAL CO., LTD
ADDRESS:		NO.8, WEST RENMIN RD., GEDIAN DEVELOPMENT ZONE, HUBEI
Sample Name	:	DURKFLEX ELASTOMERIC THERMAL INSULATION MATERIAL
Product Specification	:	FG

Above information and sample(s) was/were submitted and confirmed by the client. SGS, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client.

****

SGS Ref. No.	:	WHIN1908002536PS
Date of Receipt	:	Aug 07, 2019
Testing Start Date	:	Aug 07, 2019
Testing End Date	:	Aug 15, 2019
Test result(s)	:	For further details, please refer to the following page(s) (Unless otherwise stated the results shown in this test report refer only to the sample(s) tested)

Signed for
SGS-CSTC Standards Technical Services Co., Ltd. GZ Branch Testing Center

Gary Bai
Authorized signatory

198 Kezhu Road, Scientech Park Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075188 www.sgsgroup.com.cn
中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075188 e sgs.china@sgs.com

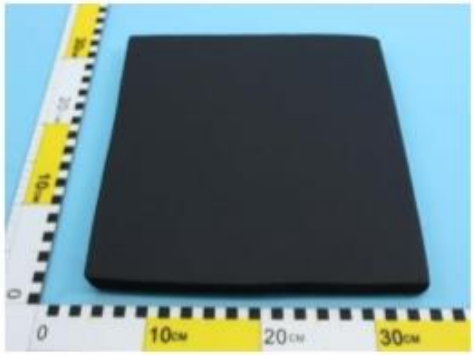
TEST REPORT

Summary of Results:

No.	Test Item	Test Method	Result	Conclusion
1	Water Absorption	ASTM C209-15 Section 14	0.08%	/

Note: Pass : Meet the requirements;
Fail : Does not meet the requirements;
/ : Not Apply to the judgment.

Original Sample Photo:



Sample A

SGS-CSTC Standard Technical Services Co., Ltd. Guangzhou Branch Testing Center of Electrical & Reliability Laboratory
198 Kezhu Road, Scientech Park Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075188 www.sgsgroup.com.cn
中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075188 e sgs.china@sgs.com

TEST REPORT

No. : GZIN1908041740MR
Date : Aug 15, 2019
Page: 3 of 3

Test Item: Water Absorption

Sample Description: Foam

Test Method: ASTM C209-15 Section 14

Test Condition:

Specimen: 305mm×304mm×25.2mm

Immersion condition: 23 ℃, 2 h

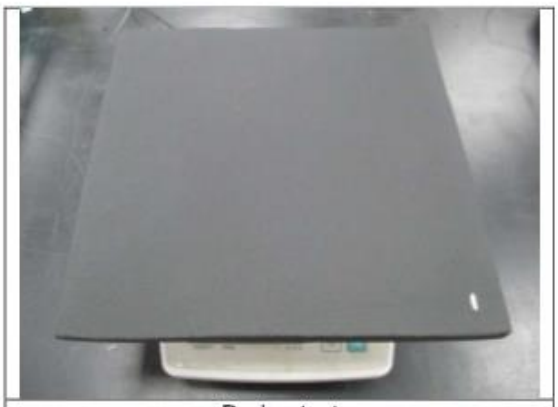
Lab Environmental Condition: 23 ± 2 ℃, 50 ± 5 % RH

Test Result:

Test Item	Test Result
Water Absorption	0.08%

Note: Water Absorption, % $=V_{\text{Water absorption}} / V_{\text{Specimen before immersion}} \times 100$

Test Photo:



During test

Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Electron Balance	JJ8000A	GZMR-PL-E079	2018-10-09	2019-10-08

******** End of report********

10.Linear Shrinkage ASTM C534

intertek
Total Quality. Assured.

DURKEE (WUHAN) INSULATION MATERIAL CO., LTD

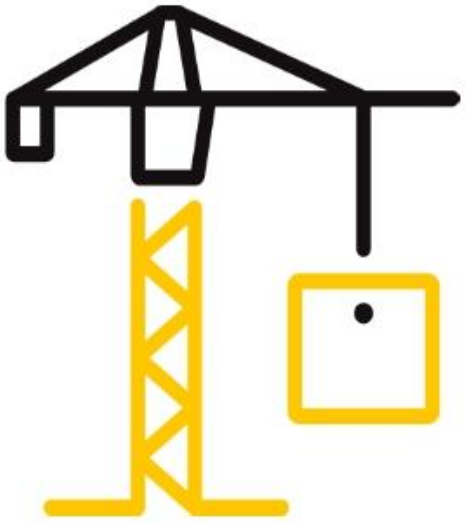
TEST REPORT

REPORT NUMBER
180408003SHF-BP-2

ISSUE DATE
2018/4/29

PAGES
4

DOCUMENT CONTROL NUMBER
LFT-APAC-SHF-OP-10a



Intertek Testing Services Ltd., Shanghai
Plant 5, No. 6958 Daye Road, Fengxian District, Shanghai, China
Tel: 021-61136116 Fax: 021-61189921
Website: www.intertek.com

Test Report

Issue Date: 2018/4/29 Intertek Report No. 180408003SHF-BP-2

Applicant: DURKEE (WUHAN) INSULATION MATERIAL CO., LTD

Applicant Address: NO.8 WEST RENMIN ROAD, GEDIAN DEVELOPMENT ZONE, EZHOU, 436070, CN

Manufacturer: DURKEE (WUHAN) INSULATION MATERIAL CO., LTD
Manufacturer Address: NO.8 WEST RENMIN ROAD, GEDIAN DEVELOPMENT ZONE, EZHOU, 436070, CN
Attn: Liang Chen

SUBJECT: Performance testing
Durkflex® FG Elastomeric Thermal Insulation Material

Dear Sir,
This test report represents the results of our evaluation of the above referenced product(s) to the requirements contained in the following standards:

TEST METHODS AND STANDARDS
Refer to the next following Pages.

SAMPLE ID	MODEL	SPECIFICATION
S180408003SHF.002	/	/

SAMPLE RECEIEVED: 2018/4/10
TESTED FROM: 2018/4/10 TO 2018/4/29

intertek
Total Quality. Assured.

Test Report

Issue Date: 2018/4/29 Intertek Report No. 180408003SHF-BP-2

Test Items, Method and Results:

Test Item: Linear Shrinkage
Test Method: With reference to ASTM C534/C534M-16, Section 11.4
Test Temperature: 105±3°C

Test Result:

Test Item	Test Requirement	Test Result	Verdict
Linear Shrinkage	≤ 7.0 %	Mean value: -1.6 %	Pass

Note:

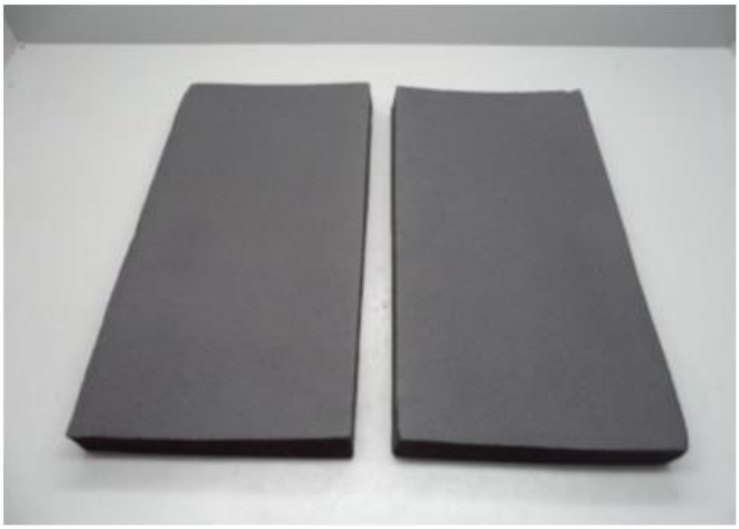
1. Test requirement was cited from ASTM C534/C534M-16, Table 1.
2. Test temperature was 105±3°C, which is different from ASTM C534/C534M-16.
3. Test specimen was Type II, sheet material, grade II, which was claimed by the application.

intertek
Total Quality. Assured.

Test Report

Issue Date: 2018/4/29 Intertek Report No. 180408003SHF-BP-2

APPENDIX: SAMPLE RECEIVED PHOTO



REPORT AUTHORIZED

When signed with physical or electronic signature, the contents of this report have been prepared and approved per Intertek's quality process in accordance with ISO 17025.

Daniel Zhang
Name: Daniel Zhang
Title: Reviewer

Tod Qian
Name: Tod Qian
Title: Project Engineer

Revision:

NO.	DATE	CHANGES	AUTHOR	REVIEWER
180408003SHF-BP-2	2018/4/29	First issue	Tod Qian	Daniel Zhang

11.Antimicrobial Activity ASTM E2180

Test Report

Report No: ASH18-030680-01 **Issue Date: Jul 09 2018**

Client name:	DURKEE(WUHAN) INSULATION MATERIAL CO.,LTD
Client address:	NO.8 WEST RENMIN RD,GEDIAN ECONOMIC DEVELOPMENT ZONE,EZHOU,CHINA
Sample name:	Durkflex FG
Sample Batch No.:	/
Product Date:	/
Manufacturer:	/
Sample other information:	Product specification:Sheet/Tube

Above information and sample(s) was/were submitted and certified by the client, SGS quoted the information with no responsibility as to the accuracy, adequacy and/or completeness.

SGS Sample No.:	ASH18-030680.001
SGS reference No.:	WHIN1806002248ML
Date of sample received:	Jun 29 2018
Testing period:	Jun 29 2018 ~ Jul 09 2018

TEST(S) REQUESTED:
Selected test(s) as requested by applicant:
Assessment of Antimicrobial activity

TEST METHOD(S):
Please refer to the next page(s)

TEST RESULT(S):
Please refer to the next page(s)

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested, and for clients internal use only, not to the society has the proof function. This document cannot be used for publicity, without prior written approval of the SGS.

SGS Authorized Signature

SGS-CSTC Standards Technical Services (Shanghai) Co.,Ltd.
Page 1 of 2

3rd Building,No.889,Yishan Road,Shanghai,China 200233 t 400-691-0488 f (86-21) 6140 2547 www.sgsgroup.com.cn
中国·上海·宜山路889号3号楼 邮编:200233 t 400-691-0488 f (86-21) 6140 2547 e sgs.china@sgs.com

TEST METHOD(S):
ASTM E 2180-07 (Reapproved 2012) Standard test method for determining the activity of Incorporated antimicrobial agent(s) in polymeric or hydrophobic materials

TEST ORGANISM(S):
Staphylococcus aureus ATCC 6538, *Pseudomonas aeruginosa* ATCC 15442, *Klebsiella pneumoniae* ATCC 4352

TEST RESULT(S):

Name of test bacteria (Strain number)	Concentration of bacteria (cells/mL)	/	The antilog of the geometric mean of the number of organisms recovered from "0h" (cfu/mL)	The antilog of the geometric mean of the number of organisms recovered from "24h" (cfu/mL)	Reduction (%)
Staphylococcus aureus ATCC 6538	$4.6x10^6$	Sample	/	5.5	>99.9
		Control Sample	$2.2x10^5$	$8.3x10^6$	
Klebsiella pneumoniae ATCC 4352	$4.7x10^6$	Sample	/	5.5	>99.9
		Control Sample	$2.2x10^5$	$1.5x10^7$	
Pseudomonas aeruginosa ATCC 15442	$4.6x10^6$	Sample	/	5.5	>99.9
		Control Sample	$2.2x10^5$	$7.8x10^6$	

REMARK: The control sample is plastic film without antimicrobial activity, provided by SGS laboratory.

SAMPLE DESCRIPTION: sample in bag

*** End ***

3rd Building,No.889,Yishan Road,Shanghai,China 200233 t 400-691-0488 f (86-21) 6140 2547 www.sgsgroup.com.cn
中国·上海·宜山路889号3号楼 邮编:200233 t 400-691-0488 f (86-21) 6140 2547 e sgs.china@sgs.com

12.Fungi Resistance ASTM G21-13

Test Report **Report No: WHAFO140901969R** **Date: November 3, 2014**

Client name:	DURKEE (WUHAN) INSULATION MATERIAL CO., LTD
Client address:	NO.8 RENMIN XI RD., GEDIAN DIST, EZHOU, HUBEI, CHINA
Sample name:	DURKFLEX
Sample Batch No.:	/
Product Date:	/
Manufacturer:	/
Sample other information:	/

Above information and sample(s) was/were submitted and certified by the client, SGS quoted the information with no responsibility as to the accuracy, adequacy and/or completeness.

SGS Sample No.:	WHAFO140901969R
SGS reference No.:	ASH14-028515.001/ WHIN1409000081ML
Date of sample received:	Sep 16 2014
Testing period:	Sep 16 2014 ~ Oct 31 2014

TEST(S) REQUESTED:
Selected test(s) as requested by the applicant
Antimicrobial activity test

TEST METHOD(S):
ASTM G 21-13 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

TEST ORGANISM(S):
Aspergillus niger ATCC 9642, *Penicillium pinophilum* ATCC 11797, *Aureobasidium pullulans* ATCC 15233, *Chaetomium globosum* ATCC 6205, *Gliocladium virens* ATCC 9645

TEST RESULT(S):
Please refer to the next page(s)

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested. This document cannot be used for publicity, without prior written approval of the SGS.

Signed for and on behalf of SGS

SGS-CSTC CONSUMER TESTING SERVICES SGS FOOD WITHIN

Authorized Signature

TEST RESULT(S):

Test Sample	Concentration of spores (spores /mL)	Level (after 28 days)
Aspergillus niger ATCC 9642	$1.0x10^6$	0 Grade*
Penicillium pinophilum ATCC 11797		
Aureobasidium pullulans ATCC 15233		
Chaetomium globosum ATCC 6205		
Gliocladium virens ATCC 9645		

Note: According to ASTM G 21-13 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi, observed fungi growth rating on the specimens include:
0 –None
1 –Traces of growth (less than 10%)
2 –Light growth (10 to 30%)
3 –Medium growth (30 to 60%)
4 –Heavy growth (60% to complete coverage)

* The microscope (50 X) was used to confirm the observation.

SAMPLE DESCRIPTION: 1 box, ca.300g, solid in box

WHAFO140901969R

*** End of Report***

13.Sound Absorption Coefficients ISO354 & ISO11654

intertek
Total Quality. Assured.

DURKEE (WUHAN) INSULATION MATERIAL CO., LTD

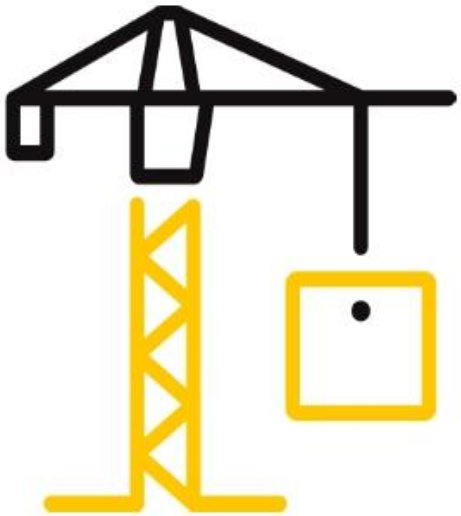
TEST REPORT

REPORT NUMBER
180408003SHF-BP-1

ISSUE DATE
2018/4/25

PAGES
5

DOCUMENT CONTROL NUMBER
LFT-APAC-SHF-OP-10a



Intertek Testing Services Ltd., Shanghai
Plant 5, No. 6958 Daye Road, Fengxian District, Shanghai, China
Tel: 021-61136116 Fax: 021-61189921
Website: www.intertek.com

Test Report

Issue Date: 2018/4/25 Intertek Report No. 180408003SHF-BP-1

Applicant: DURKEE (WUHAN) INSULATION MATERIAL CO., LTD

Applicant Address: NO.8 WEST RENMIN ROAD, GEDIAN DEVELOPMENT ZONE, EZHOU, 436070, CN

Attn: Chen Liang

Manufacturer: DURKEE (WUHAN) INSULATION MATERIAL CO., LTD

Manufacturer Address: NO.8 WEST RENMIN ROAD, GEDIAN DEVELOPMENT ZONE, EZHOU, 436070, CN

SUBJECT: Performance testing
Durkflex® FG Elastomeric Thermal Insulation Material

Dear Sir,
This test report represents the results of our evaluation of the above referenced product(s) to the requirements contained in the following standards:

TEST METHODS AND STANDARDS
Refer to the next following Pages.

SAMPLE ID	MODEL	SPECIFICATION
S180408003SHF.001	/	/

SAMPLE RECEIEVED: 2018/4/8
TESTED FROM: 2018/4/8 TO 2018/4/25

intertek
Total Quality. Assured.

Test Report

Issue Date: 2018/4/25 Intertek Report No. 180408003SHF-BP-1

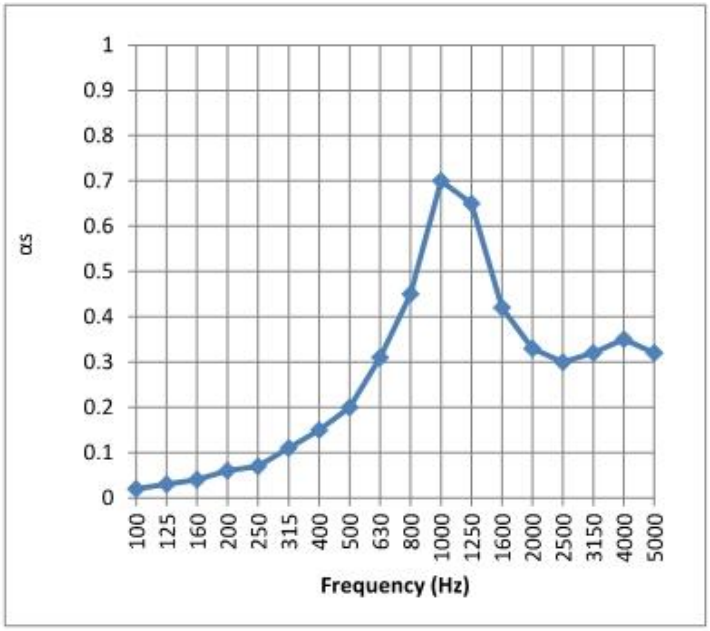
Test Items, Method and Results:

Test Method: ISO 354: 2003 Sound Absorption Coefficients

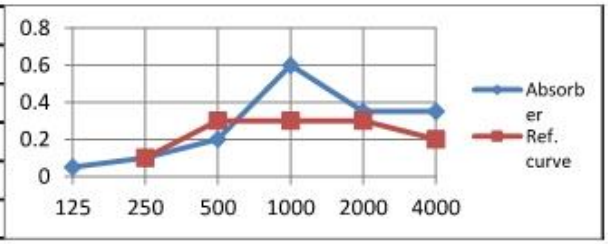
Volume of the reverberation room	Vs, m^3	240	Installation Type:	Type A
Room temperature	t1, ºC	16	t2, ºC	16
Relative humidity of test rooms	H1,%	70	H2,%	70

Sample size (width*length),mm	992x992	thickness, mm	25.0
Edge treatment	/	Mass, kg/m^2	1.33
Test Area, m^2	10.8		

Frequency (Hz)	αs
100	0.02
125	0.03
160	0.04
200	0.06
250	0.07
315	0.11
400	0.15
500	0.20
630	0.31
800	0.45
1000	0.70
1250	0.65
1600	0.42
2000	0.33
2500	0.30
3150	0.32
4000	0.35
5000	0.32



Rating according to ISO 11654: 1997 Weighted sound absorption coefficient, αw = 0.30(M) Sound absorption class: Class D	F (Hz)	αp
	250	0.10
	500	0.20
	1000	0.60
	2000	0.35
	4000	0.35



Test Report

Issue Date: 2018/4/25 Intertek Report No. 180408003SHF-BP-1

Test Photo:

Test set up

intertek
Total Quality. Assured.

Test Report

Issue Date: 2018/4/25 Intertek Report No. 180408003SHF-BP-1

APPENDIX: SAMPLE RECEIVED PHOTO

REPORT AUTHORIZED

When signed with physical or electronic signature, the contents of this report have been prepared and approved per Intertek's quality process in accordance with ISO 17025.

Jodie Zhou Evyn Cui

Name: Jodie Zhou Name: Evyn Cui

Title: Reviewer Title: Project Engineer

Revision:

NO.	DATE	CHANGES	AUTHOR	REVIEWER
180408003SHF-BP-1	2018/4/25	First issue	Evyn Cui	Jodie Zhou

14.Outgassing of TVOC UL2812 & DIN ISO 16000-6

Released by ULE Guangzhou Laboratory
Date Issued: May 29, 2018
Product ID #: 1000428495-1596077
Test Report #: 1000428495-1596077

GREENGUARD CERTIFICATION PROGRAM PROFILE STUDY TEST REPORT					
Product Description	S2 - DURKFLEX SHEET WITH THICKNESS 50MM				
Category	INSULATION				
SUMMARY		**Environment**	**TVOC**	**Formaldehyde**	**Total Aldehydes**
	GREENGUARD	Office	✓	✓	✓
	GREENGUARD Gold	Office	✓	✓	✓
		Classroom	✓	✓	✓
	✓ - meets criteria; ✓* - meets within 25%; X - over by more than 25% of criteria				

Customer Information	DURKEE (WUHAN) INSULATION MATERIAL CO LTD MARTIN CHEN NO.8 WEST RENMIN ROAD GEDIAN DEVELOPMENT ZONE HUBEI, 436070 CHINA
Laboratory Approval	 Baud Qiu Operations Manager Greater China

SAMPLE INFORMATION	
Testing Laboratory Location	ULE Guangzhou Laboratory 1F-3F, Building A1, Nansha Science and Technology Innovation Center No. 25 South Huanshi Avenue, Nansha District, Guangzhou, CHINA
Test Description	The product was received by ULE Guangzhou Laboratory as packaged and shipped by the customer. The package was visually inspected and stored in a controlled environment immediately following sample check-in. Just prior to loading, the product was unpackaged and prepared for the required loading to expose the finished surfaces only. The sample was placed inside the environmental chamber, and tested according to the specified protocol.
Date Received	May 10, 2018
Test Period	May 21, 2018 - May 22, 2018
Area	one-sided area = 0.0861 m²
Chamber Volume	0.0878 m³
Product Loading	0.98 m²/m³
Test Conditions	1.00 ± 0.05 ACH 50% RH ± 5% RH 23° C ± 1° C

RESULTS				
Analyte	24 Hour Emission Factor (µg/m²•hr)	168 Hour Predicted Concentration		
		GREENGUARD	GREENGUARD Gold	
			Office	Classroom
TVOC	779	0.10 mg/m³	0.10 mg/m³	0.078 mg/m³
Formaldehyde	BQL	< 0.001 ppm	< 0.001 ppm	< 0.001 ppm
Total Aldehydes	4.5	< 0.001 ppm	< 0.001 ppm	< 0.001 ppm

MODELING PREDICTED CONCENTRATION PARAMETERS								
Certification Program	Environment Basis	Product Usage	Surface Area (m²)	Room Volume (m³)	ACH (1/hr)	Assumed Decay Parameters		
						k_T	k_F	k_A
GREENGUARD and GREENGUARD Gold Office	CDPH/EHLB/Standard Method	Duct and pipe wrap	5.5	30.6	0.68	0.005	0.005	0.005
GREENGUARD Gold Classroom	CDPH/EHLB/Standard Method	Duct and pipe wrap	39.1	231	0.82	0.005	0.005	0.005

IDENTIFIED INDIVIDUAL VOLATILE ORGANIC COMPOUNDS AT 24 ELAPSED EXPOSURE HOURS		
CAS Number	Compound	Emission Factor (µg/m²•hr)
75-12-7	Formamide (Methanamide)	321
68-12-2	Formamide, N,N-dimethyl†	188
141-78-6	Acetate, ethyl	66.5
104-76-7	1-Hexanol, 2-ethyl†	35.4
108-88-3	Toluene (Methylbenzene)†	30.8
598-94-7	Urea, N,N-dimethyl*	27.7
1530-87-6	1-Piperidinecarbonitrile*	26.4
2591-86-8	1-Piperidinecarboxaldehyde*	22.2
3333-52-6	Tetramethylbutanedinitrile†	13.5
76441-79-7	4-Undecene, 7-methyl*	12.1
1467-79-4	Cyanamide, dimethyl-*	11.8
1436-44-8	Isoquinaldamide*	9.9
74630-38-9	1-Undecene, 5-methyl*	9.4
821-97-6	3-Undecene, (Z)-*	9.3
764-97-6	5-Undecene, (E)*	9.3
1746-23-2	Benzene, 1-(1,1-dimethylethyl)-4-ethenyl-*	7.1
1330-20-7	Xylenes (Total)†	7.1
74630-39-0	1-Undecene, 4-methyl-*	7.0
5285-87-0	Thiocyanic acid, phenyl ester*	7.0

IDENTIFIED INDIVIDUAL VOLATILE ORGANIC COMPOUNDS AT 24 ELAPSED EXPOSURE HOURS		
CAS Number	**Compound**	**Emission Factor (µg/m²•hr)**
1129-29-9	Benzene, 1-(1-methylethenyl)-3-(1-methylethyl)*	6.9
821-98-7	4-Undecene, (Z)-*	6.7
99-62-7	Benzene, 1,3-diisopropyl*	6.1
629-59-4	Tetradecane†	5.9
62016-33-5	Octane, 2,3,6-trimethyl*	5.8
74630-42-5	1-Undecene, 7-methyl*	5.4
13151-29-6	1-Decene, 4-methyl*	4.6
124-13-0	Octanal†	4.5
632-22-4	Urea, tetramethyl*	4.3
100-45-8	4-Cyanocyclohexene*	3.8
141-32-2	Butyl acrylate (2-Propenoic Acid, butyl ester)	3.8
112-40-3	Dodecane	3.6
127-19-5	Acetamide, N,N-dimethyl-*	3.5
31613-73-7	5-Undecene, 5-methyl*	3.4
100-18-5	Benzene, 1,4-bis(1-methylethyl)-*	3.2
2177-45-9	1H-Indene, 1,1,3-trimethyl-*	3.1
7206-15-7	4-Dodecene, (E)*	3.0
645-13-6	Ethanone, 1-[4-(1-methylethyl)phenyl]-*	2.9
123-05-7	Hexanal, 2-ethyl	2.9
111-76-2	Ethanol, 2-butoxy†	2.8
100-41-4	Benzene, ethyl†	2.7
629-50-5	Tridecane	2.7
2855-27-8	Cyclohexane, 1,2,4-triethenyl*	2.3
142-60-9	Propanoic acid, octyl ester*	2.3

*Indicates NIST/EPA/NIH best library match only based on retention time and mass spectral characteristics.
†Denotes quantified using multipoint authentic standard curve. Other VOCs quantified relative to toluene.

TARGET LIST ALDEHYDES AT 24 ELAPSED EXPOSURE HOURS		
CAS Number	**Compound**	**Emission Factor (µg/m²•hr)**
4170-30-3	2-Butenal	BQL
75-07-0	Acetaldehyde	BQL
100-52-7	Benzaldehyde	BQL
5779-94-2	Benzaldehyde, 2,5-dimethyl	BQL
529-20-4	Benzaldehyde, 2-methyl	BQL
620-23-5 /104-87-0	Benzaldehyde, 3- and/or 4-methyl	BQL
123-72-8	Butanal	BQL

TARGET LIST ALDEHYDES AT 24 ELAPSED EXPOSURE HOURS		
CAS Number	**Compound**	**Emission Factor (µg/m²•hr)**
590-86-3	Butanal, 3-methyl	BQL
50-00-0	Formaldehyde	BQL
66-25-1	Hexanal	BQL
110-62-3	Pentanal	BQL
123-38-6	Propanal	BQL

Analyses based on EPA Compendium Method TO-17 and ASTM D 6196 for VOCs by thermal desorption followed by gas chromatography/mass spectrometry (TD/GC/MS), and EPA Method TO-11A and ASTM D 5197 for selected aldehydes by high performance liquid chromatography (HPLC).

BQL denotes below quantifiable level of 0.04 µg based on a standard 18 L air collection volume for TVOC and individual VOCs and 0.1 µg based on a standard 45 L air collection volume for formaldehyde and total aldehydes.

This test data is provided for general informational purposes only. The data indicate the level of emissions from the designated product and how they compare to the emission criteria of the GREENGUARD and GREENGUARD Gold standards. This data does not imply that the product has been qualified to meet the requirements of the GREENGUARD Certification program nor does it imply that the product is or is not certified by the GREENGUARD Certification program.

Testing followed UL 2821, "GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions From Building Materials, Finishes and Furnishings Using Dynamic Environmental Chambers" 2013.

This test is accredited under the laboratory's ISO/IEC 17025 accreditation issued by International Accreditation Service. Refer to certificate and scope of accreditation TL-441.

M+W GROUP

Material Outgassing Certificate

Hereby we confirm that the material

Durkflex

Manufactured by

Durkee China
Durkee Insulation Material Co.,Ltd.

was tested according to M+W Products standard outgassing procedure and
fulfills the M+W Products specifications for semiconductor cleanrooms
in the category Insulating Material for above 50% coverage of the net cleanroom area.
This certificate is valid for a period of three years from date of issue.

Outgassing Results

TVOCs	[µg/g]	9.0
SVOCs	[µg/g]	18.5
Amines	[µg/g]	0.1
Organophosphates [µg/g]	[µg/g]	< 0.1

Detailed information can be obtained from M+W Products test report number 130305ae.
May 15.2013

Executed by

Rubén López-Trigo

Approved by

Dr. Michael Franzke

TÜVRheinland CERT ISO 9001

M+W Products GmbH Lotterbergstraße 30 70499 Stuttgart Germany www.mwgroup.net

TEST REPORT: 7191035571-CHM12-LZX_CR1

Date: 26 JUN 2012 Tel: +65 68851335 Fax: +65 67784301

Client's Ref: Email: Sihai.Li@tuv-sud-psb.sg

SUBJECT

Evalution of a "closed-cell Elastomeric Thermal Insulation" used for wrapping cleanroom air-conditioner

CLIENT

Durkee(Wuhan) Insulation Material Co Ltd
No. 8 Renmin Xi Road
Gedian Economic & Technical
Development Zone
Ezhou City
436070 Hubei
China

Attn : Ms Vera Guo

SAMPLE SUBMISSION DATE

20 Jun 2012

DESCRIPTION OF SAMPLE

One "closed-cell Elastomeric Thermal Insulation" sample labelled as follows was received.

1. 25mm Durkflex FG Class 0 FM sheet
   Manufacturer: Durkee (Wuhan) Insulation Material Co., Ltd

DATE OF ANALYSIS

21 Jun 2012 – 26 Jun 2012

METHOD OF TEST

The sample was purged with Nitrogen in an enclosed container at ambient temperature 22℃±3℃ for 4 hours. The gases were trapped in a aqueous solution at a flow rate of 0.5L/min. The solution was then analysed by Ion Chromatography.

TÜV SÜD PSB

Laboratory:
TÜV SÜD PSB Pte. Ltd.
No.1 Science Park Drive

Phone : +65-6885 1333
Fax : +65-6776 8670
E-mail: testing@tuv-sud-psb.sg

Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
3 Science Park Drive, #04-01/05

PSB Singapore

RESULTS:

Table 1 : The Ionic Analysis Results for Foam Sample

Test	"25mm Durkflex FG class 0 FM Sheet Unit: ug/cm^2"
1. Ammonia as Ammoium	<0.02
2. SO_x as Sulphate	<0.02

*The results were calculated based on total surface area of 2100cm^2

AMENDMENTS

Description of sample was changed as per client instructions.

MR LIU ZHIXIANG
TECHNICAL EXECUTIVE

for **DR LI SIHAI**
AVP / SENIOR CHEMIST
MICROCONTAMINATION DIAGNOSIS
CHEMICAL & MATERIALS

PSB Singapore

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.

3. Nothing in this report shall be interpreted to mean that TÜV SÜD PSB has verified or ascertained any endorsement or marks from any other testing authority or bodies that may be found on that sample.

4. This report shall not be reproduced wholly or in parts and no reference shall be made by the Client to TÜV SÜD PSB or to the report or results furnished by TÜV SÜD PSB in any advertisements or sales promotion.

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

July 2011

FM APPROVED

Certificate of Compliance

This certificate is issued for the following:

Durkflex Sheet Insulation, Durkflex Tube Pipe Insulation and
Durkblex Sheet Insulation

Prepared for:

Durkee Insulation Material Co Ltd
#8 Renmin Xi Rd
Durkee(Wuhan)Insulation MaterialCo Ltd
Gedian Economic & Tech Devlp Zone
Ezhou, Hubei, 436070
China

FM Approvals Class: 4924

Approval Identification: 3061347 Approval Granted: 5/8/2017

To verify the availability of the Approved product, please refer to www.approvalguide.com

Said Approval is subject to satisfactory field performance, continuing Surveillance Audits, and strict conformity to the constructions as shown in the Approval Guide, an online resource of FM Approvals.

Cynthia E Frank

Cynthia Frank
VP - Manager of Materials
FM Approvals
1151 Boston-Providence Turnpike
Norwood, MA 02062

FM Approvals®

Member of the FM Global Group

16.Singapore COC Class 0 Certificate

PSB Singapore

CERTIFICATE OF CONFORMITY

No. CLS2 081347 0010 Rev. 01

Initial No. CLS2 12 06 81347 002

Certificate Holder:	**Durkee (Wuhan) Insulation Material Co.Ltd** No.8 Renmin Xi Road, Gedian Economic & Technical Development Zone 436070 Ezhou City PEOPLE'S REPUBLIC OF CHINA
Product:	Thermal Insulation Materials
Brand Name:	Durkflex
Model(s):	FG
Product Details:	Rating: Class 0 Thickness: 9mm; 13mm; 19mm; 25mm; 32mm; 40mm; 50mm Bulk Density: 53kg/m^3; 55kg/m^3; 56kg/m^3; 57kg/m3; 62kg/m^3; 63kg/m^3 Refer to following page(s)
Standard(s):	BS 476-6:1989/A1:2009 BS 476-7:1997
Country of Origin:	People's Republic of China
Test Report(s):	Refer to following page(s)
Valid until:	2023-06-19

Page 1 of 2

Issued on: 2019-04-24

Vice-President (Certification Department)
TÜV SÜD PSB

Accredited Certification Body SAC PD-2002-01

This Certificate is part of a full report and should be read in conjunction with it. This Certificate remains the property of TÜV SÜD PSB Pte Ltd and shall be returned upon request. The use of this Certificate is subjected to TÜV SÜD Group Testing and Certification Regulations, TÜV SÜD PSB Pte Ltd (PSB) General Terms and Conditions of Business and PSB Product Listing Scheme (PLS) Application Fact Sheet. The manufacturer is solely responsible for compliance of any product that has the same designation as the product type-tested. Persons relying on this Certificate should verify its validity by checking TÜV SÜD PSB's website at www.tuv-sud-psb.sg.

TÜV SÜD PSB Pte Ltd • 1 Science Park Drive • Singapore 118221

TÜV®

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

A4 / 07.17

PSB Singapore

CERTIFICATE OF CONFORMITY

No. CLS2 081347 0010 Rev. 01

Initial No. CLS2 12 06 81347 002

Test Report(s):

7191032780-MEC12/1-OKH
7191032780-MEC12/2-YWA
7191043949-MEC12/1-OKH
7191043949-MEC12/2-YWA
7191048579-MEC12/A1-OKH
7191048579-MEC12/B1-OKH
7191053971-MEC13-YWA
7191056956-MEC13-YWA
7191200024-MEC18/1-YWA
7191200024-MEC18/2-YWA
7191197131-MEC19/1-YWA
7191197131-MEC19/2-YWA
7191203390-MEC19/1-YWA
7191203390-MEC19/2-YWA

Product Details:
Product details as per table below

Thickness (mm)	Bulk Density (kg/m^3)
9	62
13	63
19	53
25	56
32	55
40	55
50	53

Issued on: 2019-04-24

Vice-President (Certification Department)
TÜV SÜD PSB

Accredited Certification Body SAC PD-2002-01

TÜV SÜD PSB Pte Ltd • 1 Science Park Drive • Singapore 118221

17.HK FSD Certificate (19mm~40mm)

消 防 處
牌 照 及 審 批 總 區
通 風 系 統 課
九龍尖沙嘴康莊道一號
消防局總部大樓五樓

FIRE SERVICES DEPARTMENT
LICENSING & CERTIFICATION COMMAND
Ventilation Division
5/F, Fire Services Headquarters Building,
1 Hong Chong Road, Tsim Sha Tsui East, Kowloon

本處檔號 Our Ref.: FP (LC) 316/14
來函檔號 Your Ref.:
圖文傳真 Fax: 2367 3206
電 話 Tel. No.: 2733 1557

19 January 2016

Durkee (Wuhan) Insulation Material Co., Ltd.
No.8 Renmin Xi Road
Gedian Economic & Technical Development Zone
Ezhou City, Hubei Province, 436070
China

(Attn.: Mr. Blake YU)

Dear Sir,

"Durkflex ® FG" Closed Cell Nitrile Rubber Insulation

I refer to your letters and supplementary information received by this Department on 6.11.2015, 10.12.2015 and 18.12.2015 enclosing a set of catalogue, test reports and a quality management certificate with respect to the captioned material.

I have no objection in principle to the use of "Durkflex® FG" closed cell elastomeric nitrile rubber insulation material for ventilating system in Hong Kong subject to compliance with the requirements stipulated in Part XI of FSD Circular Letter No. 4/96 and according to the following details:

Manufacturer	:	Durkee (Wuhan) Insulation Material Co., Ltd, P.R.C.
Brand Name	:	"Durkflex® FG"
Material	:	Black coloured closed-cell elastomeric thermal insulation material comprising of Nitrile Butadiene rubber
Thickness and Density	:	19 mm and 52kg/m^3 approximately
Test Reports	:	By TUV SUD PSB Pte. Ltd: a) Report No. 7191091990-PIC14/A2-YWA of 8.9.2014 b) Report No. 7191091990-PIC14/A1-OKH of 8.9.2014

2...

Test Standard and Results	:	a) BS476: Part 6: 1989 + A1:2009 – Fire Propagation Index For the specimens : $I <= 12$, $i_1 <= 6$ b) BS476: Part 7: 1997 – Surface Spread of Flame For the specimens : Class 1Y
Application	:	For external and internal insulation material of ductwork and pipework in ventilating system
Quality Assurance System	:	The manufacturer operates a quality management system to ISO 9001:2008, Certificate No. 0405053 of 9.3.2015 issued by Intertek Certification Limited
Remarks	:	a) No assessment was made on the density and toxicity of smoke generated by the material under fire conditions. b) The product shall bear the marking "Durkflex® FG" as a means of identification. c) This assessment is subject to review by January 2021.

Yours faithfully,

(LAM Sui-hang)
for Director of Fire Services

SHL/MM
FileCode: durkee durkflex fg 19mm 20160119.doc

REF NUMBER AND DATE SHOULD BE QUOTED IN REFERENCE TO THIS LETTER
凡提及本信時請引述編號及日期

消 防 處
牌 照 及 審 批 總 區
通 風 系 統 課
香港九龍九龍灣常悅道 11 號
新明大廈 2 樓

FIRE SERVICES DEPARTMENT
LICENSING & CERTIFICATION COMMAND
Ventilation Division
2/F, Centre Parc, 11 Sheung Yuet Road,
Kowloon Bay, Kowloon,
Hong Kong

本處檔號	Our Ref.:	FP(LC) 316/14
來函檔號	Your Ref.:	DW101120 & DW101121
圖文傳真	Fax:	2367 3206
電 話	Tel. No.:	3961 5299

COPY

4 September 2018

Durkee (Wuhan) Insulation Material Co., Ltd.
No. 8 Renmin Road
Gedian Development Park
Wuhan, Hubei,
China

(Attn. Mr. Sam CHEUNG)

Dear Sir,

<u>"Durkflex® FG" Nitrile Rubber Insulation Material</u>

I refer to your letter received by this Department on 23.3.2018 enclosing a set of catalogue, test reports and quality management certificates with respect to the captioned material for our assessment.

We have no objection in principle to the use of "Durkflex® FG" closed cell elastomeric nitrile rubber insulation material for ventilating system in Hong Kong subject to compliance with the requirements stipulated in Part XI of FSD Circular Letter No. 4/96 and according to the following details:

Manufacturer	:	Durkee (Wuhan) Insulation Material Co., Ltd, P.R.C.
Brand Name	:	"Durkflex® FG"
Material	:	Black coloured closed cell elastomeric thermal insulation material comprising of nitrile butadiene rubber
Thickness and Density	:	25 mm, between 50 - 65kg/m^3 32mm, between 50 - 65kg/m^3 40 mm, between 45 - 60kg/m^3 50 mm, between 45 - 60kg/m^3
Test Reports	:	By TÜV SÜD PSB Pte. Ltd. Singapore: a) No. 7191032780-MEC12/2-YWA of 26.5.2012 b) No. 7191032780-MEC12/1-OKH of 26.5.2012

/2...

c) No. 7191043949-MEC12/2-YWA of 30.10.2012
d) No. 7191043949-MEC12/1-OKH of 10.10.2012
e) No. 7191053971-MEC13-YWA of 7.3.2013
f) No. 7191048579-MEC12/A1-OKH of 31.12.2012
g) No. 7191056956-MEC13-YWA of 8.4.2013
h) No. 7191048579-MEC12/B1-OKH of 31.12.2012

Test Results : a) BS476: Part 6: 1989 + A1:2009 – Fire Propagation Index
For the specimens : $I <= 12$, $i_1 <= 6$

b) BS476: Part 7: 1997 – Surface Spread of Flame
For the specimens : Class One

Application : For use as external and internal insulation material in ventilating system

Quality Assurance System : The manufacturer operates a quality management system certificate to GB/T 19001-2008/ISO 9001:2008,

a) No. 02016Q20231R0M of 21.1.2016
b) No. ANAB16Q20043R0M of 21.1.2016

issued by Beijing ZhongDaHua Yuan Certification Center

Remarks :
a) No assessment was made on the density and toxicity of smoke generated by the product under fire conditions as that are not our requirements.
b) The product shall bear the marking "Durkflex® FG" as a means of identification.
c) This assessment letter supersedes our previous one of the same series dated 30.4.2013
d) This assessment is subject to review by April 2022.

Yours faithfully,

(LEUNG Kam-man)
for Director of Fire Services

KML/wlc
FileCode: durkee durkflex fg 20180904.doc

REF. NUMBER AND DATE SHOULD BE QUOTED IN REFERENCE TO THIS LETTER
凡提及本信時請引述編號及日期

18.KS M6962 Certificate

Certificate

인증번호 : 제 12-1305 호

제 품 인 증 서

1. 제 조 업 체 명 : 두긍신재료(무한)그룹주식유한공사
2. 대 표 자 성 명 : 로표
3. 공 장 소 재 지 : 중국 호북성 무한시 갈점 경제개발구
4. 인 증 제 품
   - 가. 표 준 명 : 고무 발포 단열재
   - 나. 표 준 번 호 : KS M 6962
   - 다. 종류 · 등급 · 호칭 또는 모델 :
     1종, 2종. 끝.

「산업표준화법」 제17조 제1항에 따른 인증심사를 실시한 결과 한국산업표준(KS)과 인증심사기준에 적합하므로, 「산업표준화법」 제15조 및 같은 법 시행규칙 제10조 제1항에 따라 위와 같이 한국산업표준(KS)에 적합함을 인증합니다.

2018 년 09 월 19 일

한국표준협회장

1. 최초 인증일 : 2012-05-30
2. 차기심사 완료기한 : 2021-08-15
3. 최종 변경일 : 2018-09-19 정기심사 합격

Certificate

KS CERTIFICATE

This is to certify that the Korean Standard Mark(KS mark) of :

Durkee Hi-Tech Material(Wuhan) Group Co.,Ltd.
Gedian Economic & Technical Development Zone, Wuhan City, Hubei Province, China
Lu Biao

has been approved by Korean Standards Association
to the following Korean Standard :

KS M 6962
Standard specification for elastomeric foam thermal insulation material
Type 1, Type 2. End

in accordance with the Korean Industrial Standardization Act.

Certificate number : 12-1305

Date certified : 2012-05-30
Expiry date : 2021-08-15
Date issued : 2018-09-19

Certified by

Chairman & CEO

KOREAN STANDARDS ASSOCIATION

305, Teheran-Ro, Gangnam-Gu, Seoul, Korea

19.Singapore Green Building Product (SGBP)

SINGAPORE GREEN BUILDING COUNCIL

SINGAPORE GREEN BUILDING PRODUCT CERTIFICATE

AWARDED TO

Durkee (Wuhan) Insulation Material Co., Ltd

No. 8, Renmin Xi Road, Gedian Econnomic & Technical Develolpment Zone, Ezhou City, Hubei Province China 436070

FOR THE PRODUCT

Thermal Insulation

PRODUCT BRAND

Durkflex

PRODUCT MODEL

FG Series

THE PRODUCT HAS BEEN ASSESSED ACCORDING TO THE ASSESSMENT CRITERIA OF THE SINGAPORE GREEN BUILDING PRODUCT CERTIFICATION SCHEME. IT HAS BEEN AWARDED THE RATING :

SINGAPORE GREEN BUILDING PRODUCT SGBC ✓✓ VERY GOOD

Director
SGBC Pte Ltd

Certificate Number	Original Issue Date	Last Revision Date	Valid Till
SGBP 2019-2093	11th January 2019	-	10th January 2021

✓Good ✓✓ Very Good ✓✓✓ Excellent ✓✓✓✓ Leader

The use and reliance on this certificate is subject to the terms and conditions of the Singapore Green Building Product Certification Scheme. Revised certificates may also be issued at the discretion of the Council. The certification status may be verified at the Singapore Green Building Council website (www.sgbc.sg).

CERTIFICATE
OF COMPLIANCE

GREENGUARD

PRODUCT CERTIFIED FOR
LOW CHEMICAL EMISSIONS
UL.COM/GG
UL 2818

Durkflex

See product list below

UL 2818 - 2013 Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

Products tested in accordance with UL 2821 test method to show compliance to emission limits in UL 2818, Section 7.1.
Furniture and furnishings are tested in accordance with ANSI/BIFMA M7.1-2011 and determined to comply with ANSI/BIFMA X7.1-2011 and ANSI/BIFMA e3-2014e Credit 7.6.1. Panel based workstations are modeled in the open plan environment. Casegood systems and individual furniture items are modeled in the private office environment. Seating products are modeled in the seating environment.

CERTIFICATE
OF COMPLIANCE

UL GREENGUARD Certified Products Listing

Product Name	Certification	Status	Certificate Number	Certification Period	Restrictions
Durkflex	GREENGUARD Certified	Certified	126869-410	07/02/2018-07/02/2020	

Please refer to current certificates on ul.com/spg for complete compliance information.

CERTIFICATE
OF COMPLIANCE

GREENGUARD

PRODUCT CERTIFIED FOR
LOW CHEMICAL EMISSIONS
UL.COM/GG
UL 2818

GOLD

Durkflex

See product list below

UL 2818 - 2013 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

Product tested in accordance with UL 2821 test method to show compliance to emission limits on UL 2818. Sectoprn 7.1 and 7.2.
Commercial furniture and furnishings are tested in accordance with ANSI/BIFMA M7.1-2011 and determined to comply with ANSI/BIFMA X7.1-2011 and ANSI/BIFMA e3-2014e Credit 7.6.1, 7.6.2, and 7.6.3. Panel based workstations are modeled in the open plan environment. Casegood systems and individual furniture items are modeled in the private office environment. Seating products are modeled in the seating environment. Classroom furniture is modeled using the standard classroom model in the California Department of Public Health (CDPH) Standard Method v1.2.

Building Products are determined compliant in accordance with California Department of Public Health (CDPH) Standard Method V1.1-2010, using the applicable exporsure scenario.

UL investigated representative samples of the identified Product(s) to the identified Standard(s) or other requirements in accordance with the agreements and any applicable program service terms in place between UL and the Certificate Holder (collectively "Agreement"). The Certificate Holder is authorized to use the UL Mark for the identified Product(s) manufactured at the production site(s) covered by the UL Test Report, in accordance with the terms of the Agreement. This Certificate is valid for the identified dates unless there is non-compliance with the Agreement.

CERTIFICATE
OF COMPLIANCE

UL GREENGUARD Certified Products Listing

Product Name	Certification	Status	Certificate Number	Certification Period	Restrictions
Durkflex	GREENGUARD Gold Certified	Certified	126869-420	07/02/2018- 07/02/2020	

Please refer to current certificates on ul.com/spg for complete compliance information.

UL investigated representative samples of the identified Product(s) to the identified Standard(s) or other requirements in accordance with the agreements and any applicable program service terms in place between UL and the Certificate Holder (collectively "Agreement"). The Certificate Holder is authorized to use the UL Mark for the identified Product(s) manufactured at the production site(s) covered by the UL Test Report, in accordance with the terms of the Agreement. This Certificate is valid for the identified dates unless there is non-compliance with the Agreement.

22.Eco Label-Korea Certificate

제 13741 호

환경표지 인증서

1. 상　　호 : (주)아성냉기
2. 사 업 자 등 록 번 호 : 114-86-52650
3. 소　　재　　지 : 서울특별시 서초구 서초대로60길 9-6(서초동,아성빌딩4층)
4. 공장 · 사업장소재지 : No.3,2nd Dan Road,8th HongQi Zone, Zhongluotan Town,Baiyun District Guangzhou,Guangdong,Province,P.R.CHINA
5. 대 표 자 성 명 : 이정수
6. 대 상 제 품 : EL243,보온 · 단열재
7. 상표명/용도 · 제공서비스 : 별첨이기
8. 인 증 기 간 : 2019.08.05 부터 2021.05.18 까지
9. 인 증 사 유 : "자원순환성 향상, 에너지 절약"

「환경기술 및 환경산업 지원법」 제17조제3항, 같은 법 시행령 제23조제2항 및 같은 법 시행규칙 제34조제2항에 따라 환경표지대상제품의 인증기준에 적합하므로 환경표지의 사용을 인증합니다.

※ 최 초 교 부 : 2015.05.19

2019년 08월 06일

한국환경산업기술원장

※ 한국환경산업기술원은 「환경기술 및 환경산업 지원법」 제31조제2항 및 같은 법 시행령 제33조제8항에 따라 환경부장관으로부터 환경표지 인증에 관한 업무를 위탁받은 기관입니다.

사실확인 : 1577-7360

[별첨]1 / 1

제 13741 호

기본상표명	파생상표명	용도·제공서비스
더키플렉스 보온판(DURKFLEX SHEET) 1종		고무 발포 단열재(단열판, 1종)
더키플렉스 보온통(DURKFLEX TUBE) 1종		고무 발포 단열재(단열통, 1종)