

TEST REPORT

No. : SZIN1803003832SC-01

Date : Aug 06, 2018

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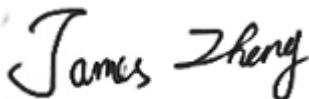
CUSTOMER NAME: DONGGUAN GUANG MAI ELECTRONIC TECHNOLOGY CO., LTD
ADDRESS: 16 B BUILDING, INTERNATIONAL FINANCE IT RESEARCH AND DEVELOPMENT CENTER, NO.5 KE JI TEN ROAD, SONGSHAN LAKE HIGH-TECH INDUSTRIAL DEVELOPMENT ZONE, DONGGUAN CITY, CHINA

General Description : A CELLULAR SILICONE FOAM
Trade Name : MICROESTM
Products Reference : GM-100/GM-200/GM-300/GM-400/GM-500/GM-600/GM-10/GM-20/GM-30/GM-40/GM-50/GM-60/JP-350
Thicknesses : 0.8,1.59,2.38,3.18,4.76,6.35,9.53,12.7
Material : POLYDIMETHYLSILOXANE FOAM
Manufacturer : DONGGUAN GUANGMAI ELECTRONIC TECHNOLOGY CO., LTD
Colour : GREY
Other Information : LIQUID CAST AND CURING OF FOAM

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. : AJFS1804002799FF
Date of Receipt : Mar 29, 2018
Testing Start Date : Mar 29, 2018
Testing End Date : May 17, 2018
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. Shenzhen Branch
Testing Center



James Zheng
Authorized signatory



SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch Testing Center - Materials Laboratory

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Test Requested:

BS 6853:1999 *Incorporating Amendment No.1:2002*—Code of practice for fire precautions in the design and construction of passenger carrying trains, Clause 6.2 Control of reaction to fire, Table 7—Interior minor use materials of mass 100g to 500g and Table 8—Exterior minor use materials of mass 400g to 2000g

I. Sample details

Sample Description	Grey Foam		
Color	Gray		
Specimen size	BS EN ISO 4589-2:	About 150mm×10mm×10mm	
	BS 6853 Annex D 8.3:	About 140mm×60mm×3mm	
	BS 6853 Annex B.1:	1 st 1.0004g	2 nd 0.9988g

II. Test conducted

BS 6853:1999 *Incorporating Amendment No.1:2002*—Code of practice for fire precautions in the design and construction of passenger carrying trains, Clause 6.2 Control of reaction to fire, Table 7—Interior minor use materials of mass 100g to 500g and Table 8—Exterior minor use materials of mass 400g to 2000g. The tests were carried out to the following standards:

- 1). BS EN ISO 4589-2:2017 “ Plastics—Determination of burning behaviour by oxygen index—Part 2: Ambient- temperature test”;
- 2). BS 6853:1999 *Incorporating Amendment No.1:2002* Annex B.1 (information)—Determination of weighted summation of toxic fume, R, Mass based test method (NF X 70-100).
- 3). BS 6853:1999 *Incorporating Amendment No.1:2002* Annex D8.3—Methods for measuring smoke density —Small-scale Test.



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III. Summary of test results

Test method	Parameter	Test results *
BS EN ISO 4589-2	Oxygen index (OI) (min)	32.1%
Annex D Small-scale test	A ₀ (max)	0.038
Annex B.1	R (max)	0.12

* For the test details, please see the appendix of this test report.

Test criteria, Specified in BS 6853:1999 *Incorporating Amendment No.1:2002*

Table 7

Test method	Parameter	Vehicle Category		
		I _a	I _b	II
BS EN ISO 4589-2	Oxygen index (OI) (min)	34% (V/V)	34% (V/V)	28% (V/V)
Annex D Small-scale test	A ₀ (max.)	0.017	0.027	0.061
See Annex B	R (max.)	1.0	1.6	3.6



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Table 8

Test method	Parameter	Vehicle Category		
		I _a	I _b	II
BS EN ISO 4589-2	Oxygen index (OI) (min)	34% (V/V)	34% (V/V)	28% (V/V)
Annex D Small-scale test	A ₀ (max.)	0.029	0.046	nc
See Annex B	R (max.)	1.7	2.7	nc
nc: no criterion				

Conclusion: According to the test results, the submitted sample **meets** the requirements for vehicle category II for Interior minor use materials of mass 100g to 500g (Table 7) and Exterior minor use materials of mass 400g to 2000g (Table 8) defined in BS 6853:1999 Incorporating *Amendment No.1:2002*.

Statements:

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.

The test results relate only to the specimens of the product in the form in which were tested. Small differences in the composition or thickness of the product may significantly affect the performance during the test and may therefore invalidate the test results. Care should be taken to ensure that any product, which is supplied or used, is fully represented by the specimens, which were tested.

The specimen was supplied by the sponsor and SGS-CSTC ANJI Branch was not involved in any selection or sampling procedure.



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APPENDIX 1_ BS EN ISO 4589-2:2017

I. Test conducted

This test was performed in accordance with the procedure specified in BS EN ISO 4589-2:2017

“ Plastics —Determination of burning behaviour by oxygen index—Part 2: Ambient- temperature test ”.

II. Test details

Conditioning of specimens:	Each specimen was conditioned for at least 88h at 23 ± 2 °C, and (50 ± 5) % relative humidity immediately prior to use.
Type:	III
Ignition method:	Top surface ignition

III. Test results

- 1) Select initial oxygen concentration (in accordance with 8.1.3): 33%
- 2) Determining the Preliminary Oxygen Concentration (Till pair of oxygen concentrations which gives opposite response differs by ≤1%, in accordance with 8.5)

Oxygen concentration, % (V/V)	33	32					
Length burnt (mm)	>50	<50					
Response, (“X” or “O”)	X	O					

Oxygen concentration of the “O” response for the pair =32.0 % (this is the concentration to be used again for the first measurement in section below)



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3) Determination of the oxygen index (in accordance with 8.6)

Step size to be used for successive changes d in oxygen concentration = 0.2% [Initially to be 0.2% (V/V), unless otherwise instructed]

Parameter	N _T series measurements										
	NL series measurements (8.6.1 and 8.6.2)						(According to the 8.6.3)				
Oxygen concentration, % (V/V)	32.0	32.2				--	32.2	32.0	32.2	32.0	32.2
Length burnt (mm)	<50	>50				--	>50	<50	>50	<50	>50
Response ("X" or "O")	O	X				→	X	O	X	O	X
	Column (2, 3, 4 or 5): 2						Row (1 to 16): 6				
	k value from table below: -0.50										
	Hence k= -0.50										



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$$\begin{aligned}
 OI &= C_f + kd = 32.2 + (-0.50 \times 0.2) \\
 &= \underline{32.1} \% \text{ (to one decimal place, for reporting OI)} \\
 &= \underline{32.10} \% \text{ (to two decimal places, for calculation of and verification of d as required)}
 \end{aligned}$$

4) Determination of K value

Table 4-Values of k for calculating the oxygen index concentration from determinations made by Dixon's 'up-and-down' method

1	2	3	4	5	6	
Responses for the last five measurements	Values of k for which the first NL determinations are					
	a) O	OO	OOO	OOOO		
XOOOO	-0.55	-0.55	-0.55	-0.55	OXXXX	
XOOOX	-1.25	-1.25	-1.25	-1.25	OXXXO	
XOOXO	0.37	0.38	0.38	0.38	OXXOX	
XOOXX	-0.17	-0.14	-0.14	-0.14	OXXOO	
XOXOO	0.02	0.04	0.04	0.04	OXOXX	
XOXOX	-0.50	-0.46	-0.45	-0.45	OXOXO	
XOXXO	1.17	1.24	1.25	1.25	OXOOX	
XOXXX	0.61	0.73	0.76	0.76	OXOOO	
XXOOO	-0.30	-0.27	-0.26	-0.26	OXXXX	
XXOOX	-0.83	-0.76	-0.75	-0.75	OXXOX	
XXOXO	0.83	0.94	0.95	0.95	OOXOX	
XXOXX	0.30	0.46	0.50	0.50	OOXOO	
XXXOO	0.50	0.65	0.68	0.68	OOOXX	
XXXOX	-0.04	0.19	0.24	0.25	OOOXO	
XXXXO	1.60	1.92	2.00	2.01	OOOOX	
XXXXX	0.89	1.33	1.47	1.50	OOOOO	
	Values of k for which the first NL determinations are					Responses for the last five measurements
	b) X	XX	XXX	XXXX		
	Are as given in the above table opposite the appropriate response in column 6, but with the sign of k reversed Hence, $OI = C_f - kd$ (see 9.1)					



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5) Verification of step size d % oxygen concentration (in accordance with 8.6.4 and 9.3)

Last six results	Oxygen concentration, % (V/V)			
	C_i	OI	$C_i - OI$	$(C_i - OI)^2$
1	32.2	32.10	0.10	0.01
2	32.0		-0.10	0.01
3	32.2		0.10	0.01
4	32.0		-0.10	0.01
5	32.2		0.10	0.01
6	32.0		-0.10	0.01
$\sum(C_i - OI)^2$				0.06

a Column C_i contains the oxygen concentrations used for the measurements of C_f and for each of the 5 preceding measurements, for $n = 6$

Estimation of standard deviation:

If $2\sigma^*/3 < d < 3\sigma^*/2$ or $0.2 = d > 3\sigma^*/2$, the OI is valid.

$$\sigma^* = [\sum (C_i - OI)^2 / (n-1)]^{(1/2)} = 0.110$$

$$2\sigma^*/3 = 0.073$$

$$3\sigma^*/2 = 0.164$$

OI is 32.1% (V/V).



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APPENDIX 2_BS 6853 ANNEX D8.3

I. Test conducted

This test was conducted in accordance with the procedure specified in BS 6853:1999 *Incorporating Amendment No.1:2002*— Code of practice for fire precautions in the design and construction of passenger carrying trains, Annex D 8.3—Methods for measuring smoke density — Small-scale Test.

II. Test details

Conditioning of specimens:	Prior to testing, the sample was conditioned, By maintaining them in door ambient conditions for at least 72 hours and then for at least 16 hours at 23±2 °C and at a relative humidity of 50±5%	
Exposed Face:	One face of the specimen	
Ignition source:	Fire source No.1	
Specimen mass:	1. 11.88g	2. 11.96g
Test duration:	40 min	

III. Test results

Calculate the A_0 , according to the following equation: $A_0 = A_m \times V / (K \times l)$

Where,

A_m - is the optical density measured in the cube;

V - is the volume of the cube, in cubic meters, 27 m³

l - is the length of the optical path between the windows, in meters, 3 meters;

k - is the number of units of material consisting the test specimen, the mass (g) of specimen for small scale test.

Specimen No.	A_m	V	k	l	A_0
1 st	0.048	27	11.88	3	0.036
2 nd	0.052	27	11.96	3	0.039
AVG					0.038



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APPENDIX 3_ BS 6853 Annex B.1

I. Test conducted

This test was conducted in accordance with the procedure specified in BS 6853:1999 *Incorporating Amendment No.1:2002*—Code of practice for fire precautions in the design and construction of passenger carrying trains, Annex B.1 (information), Determination of weighted summation of toxic fume, R, Mass based test method (NF X 70-100).

The test methods are accordance with the procedure specified in NF X70-100:2006 at a temperature of 600 °C and this report should be read in conjunction with that standard.

II. Test detail

Conditioning of specimens:	Prior to testing, the sample was conditioned, at least 24 hours at temperatures of 23±2°C and at a relative humidity of 50±5%.
Test temperature:	600 °C
Test duration	20min

III. Test results

Gas	1 st	2 nd	3 rd	Average
Carbon Dioxide (CO ₂)	522.36	557.18	539.77	539.77
Carbon Monoxide (CO)	23.49	24.38	21.05	22.97
Hydrogen Fluoride (HF)	ND	ND	ND	--
Hydrogen Chloride (HCl)	ND	ND	ND	--
Hydrogen Bromide (HBr)	ND	ND	ND	--
Hydrogen Cyanide (HCN)	ND	ND	ND	--
Nitrogen Dioxide (NO ₂)	ND	ND	ND	--
Sulphur Dioxide (SO ₂)	ND	ND	ND	--

Where, ND indicates Non-detected.

Note: All values given are in mg/g.



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Calculate the Weighted Summation Index of Toxic Fume. R

The test results obtained for toxicity measurements were used to calculate the weighted summation index, R, as described in BS 6853, Clause B.4.2 and the reference values for gases is showed in the following table.

$$r_x = C_x / f_x, \quad R = \sum r$$

Where,

C_x , is the emission of the x^{th} species, in the appropriate units;

f_x , is the reference value for the x^{th} species;

r_x , is the individual index for the x^{th} species.

Gas	Reference value, f mg/g, or g/m ²
Carbon Dioxide (CO ₂)	14 000
Carbon Monoxide (CO)	280
Hydrogen Fluoride (HF)	4.9
Hydrogen Chloride (HCl)	15
Hydrogen Bromide (HBr)	20
Hydrogen Cyanide (HCN)	11
Nitrogen Dioxide (NO ₂)	7.6
Sulphur Dioxide (SO ₂)	53

The R Value determined was **0.12**

Note: This R value must only be used to demonstrate compliance against the requirements specified in Table 7 & 8 (minor materials), Table 11 (textiles) and Table 13 & 14 (cables) of BS 6853. Should an R value be required to demonstrate compliance against any other table in BS 6853, then a test in accordance with BS 6853 Annex B.2 must be performed.



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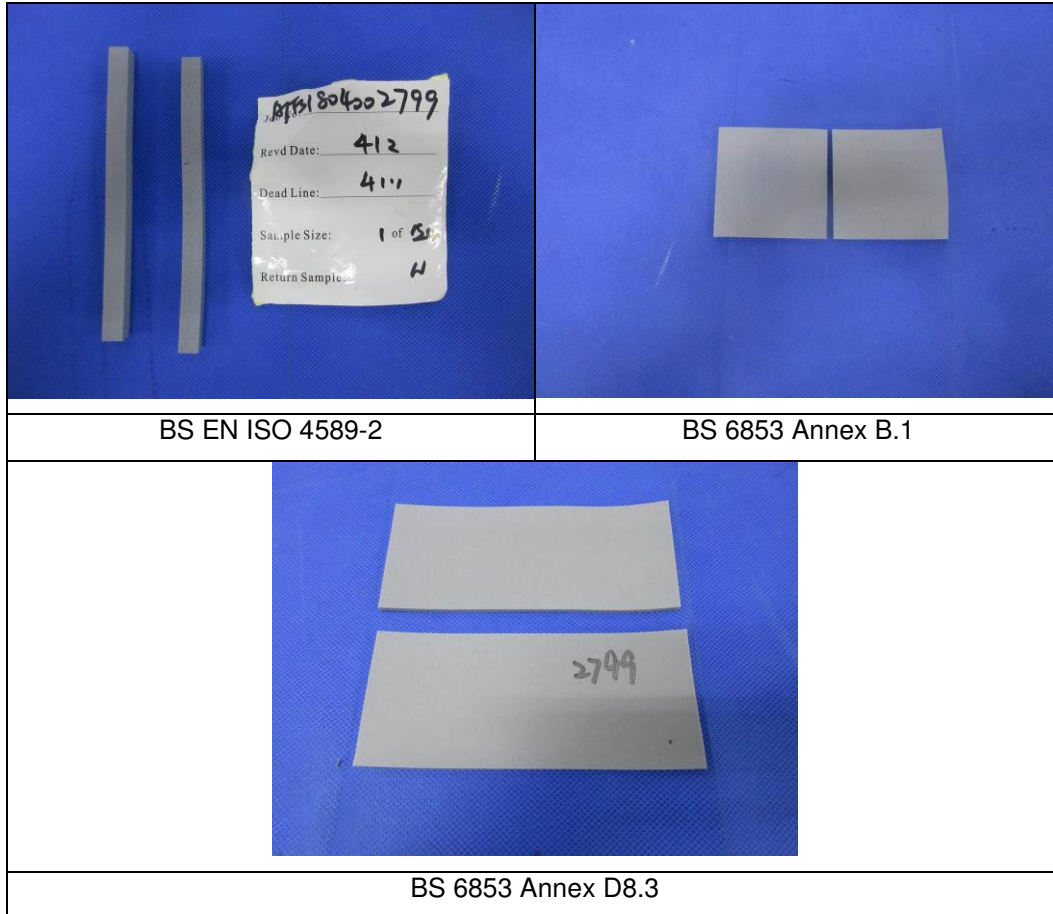
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Photo Appendix:



Appendix information:

1. The above tests were carried out by SGS-CSTC Standards Technical Services Co., Ltd. AnJi Branch.
2. This report cancels and supersedes the report No. SZIN1803003832SC.

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



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