

Testing. Advising. Assuring.

Test report no. 2011-1146

issued 24.02.2011

Applicant: Bluestar Silicones
55 avenue des Frères Perret
69192 SAINT – FONTS Cedex
France

Date of order: 31.01.2011
Date of sampling: No official taking out of the samples from
a representative of the Exova Brandhaus
Date of delivery: 31.01.2011
Date of tests: 03. + 04.02.2011

Order

1. Testing the flame spread of building products in vertical configuration according to ISO 5658-2
2. Testing the heat release-, smoke production- and mass loss rate of a material according to DIN ISO 5660 (Cone-Calorimeter).
3. Testing the smoke density and toxicity of a material in the test chamber according to EN ISO 5659-2 (NBS-Box)
4. Classification according to new railway standard CEN/TS 45545-2 - 2009

Description / designation of the test object

Silicone Heat Cure Rubber FR 8760 E

Description of the relevant test procedure

ISO 5658-2 - 2006

ISO 5660-1 - 2002

EN ISO 5659-2 - 2007

CEN/TS 45545-2 - 2009

1. Description of the test material

1.1 Details of the customer:

Silicone Heat Cure Rubber

Name of the product: FR 8760 E
Trial number reference: PAO 2788
Sample thickness: 2 mm
Colour: white cream
Intended end use: fire resistance application

1.2 By the specimen preparation in Exova Brandhaus determined values:

Rubber panelsGummiplatten

Colour: white - cream
Thickness: 2 mm (average)
Square weight: 3,0 Kg/m² (average)

Testing after climatic storage at 23°C and 50 % humidity for at least 48 hours.

2. Test results

2.1.1 Test paper according to ISO 5658-2 – 2006:

Specimen no.		1	2	3	4	5
Test results:						
Ignition after	[s]	10	10	10		
Reaching the 50 mm station after	[s]	15	20	20		
the 100 mm station after	[s]	60	70	60		
the 150 mm station after	[s]	65	75	75		
the 200 mm station after	[s]	80	85	90		
the 250 mm station after	[s]	100	105	105		
the 300 mm station after	[s]	120	135	130		
the 350 mm station after	[s]	230	-	250		
the 400 mm station after	[s]	-	-	-		
the 450 mm station after	[s]	-	-	-		
the 500 mm station after	[s]	-	-	-		
the 550 mm station after	[s]	-	-	-		
the 600 mm station after	[s]	-	-	-		
the 650 mm station after	[s]	-	-	-		
the 700 mm station after	[s]	-	-	-		
the 750 mm station after	[s]	-	-	-		
Flames extinguish after	[s]	600	540	490		
Final spread of flame up to	[mm]	350	330	370		
Total duration of the test	[s]	1200	1200	1200		
Specimen drips off / pieces fall off	No burning after	[s]	-	-	-	
	Burning after	[s]	-	-	-	
Smoke generation after	[s]	10	10	10		
Charring / discolouring / melting after	[s]	10	10	10		
Charring / discolouring / melting up to	[mm]	410	380	420		
Further remarks:		Curve out of the material.				

2.1.2 Determined burning characteristic:

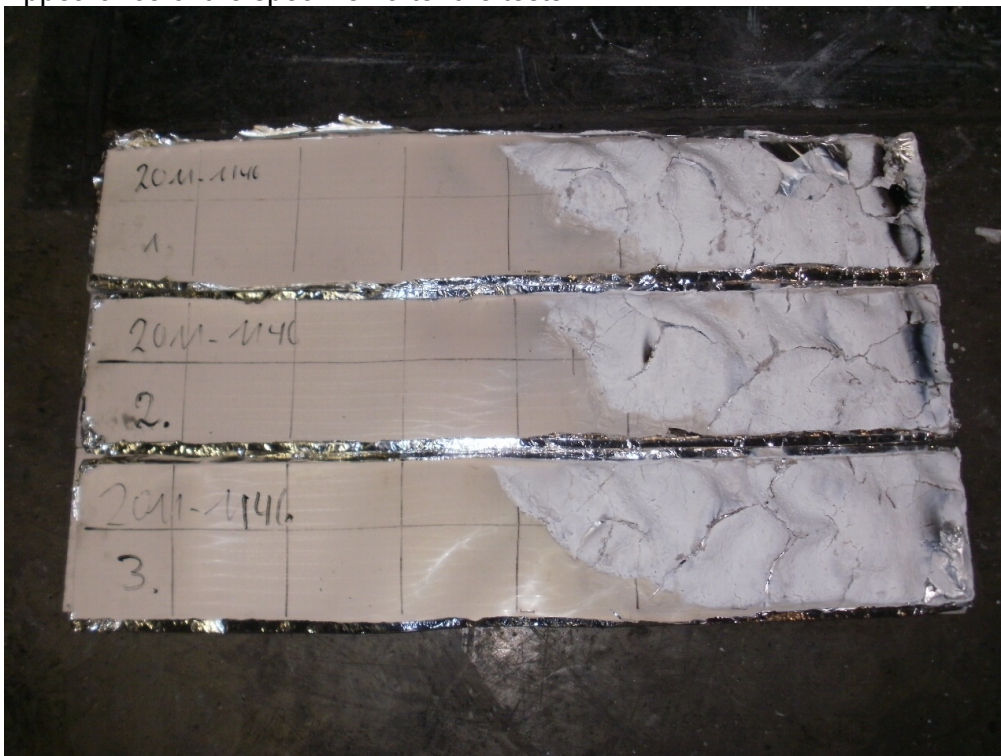
specimen no..	Q_{sb} MJ/m ²	CFE kW/m ²
1	3,90	23,9
2	3,83	25,6
3	4,27	21,4
4		
5		
average	4,0	23,6

n.d. = not determinable because 150 mm mark not reached.

Q_{sb} = Heat for sustained burning

CFE = Critical flux at extinguishment

Appearance of the specimen after the tests:



2.2.1 Test results

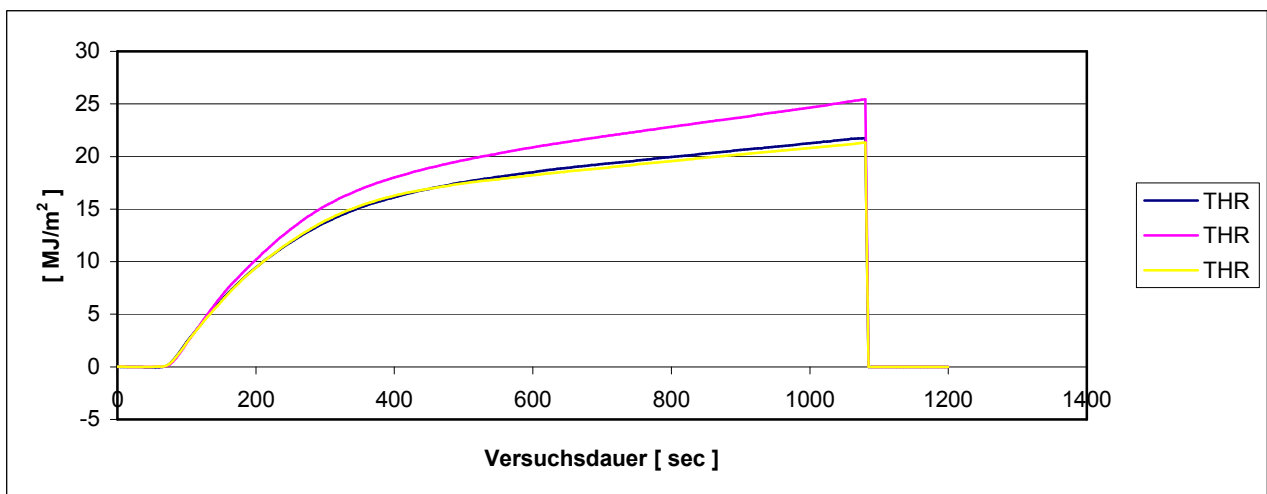
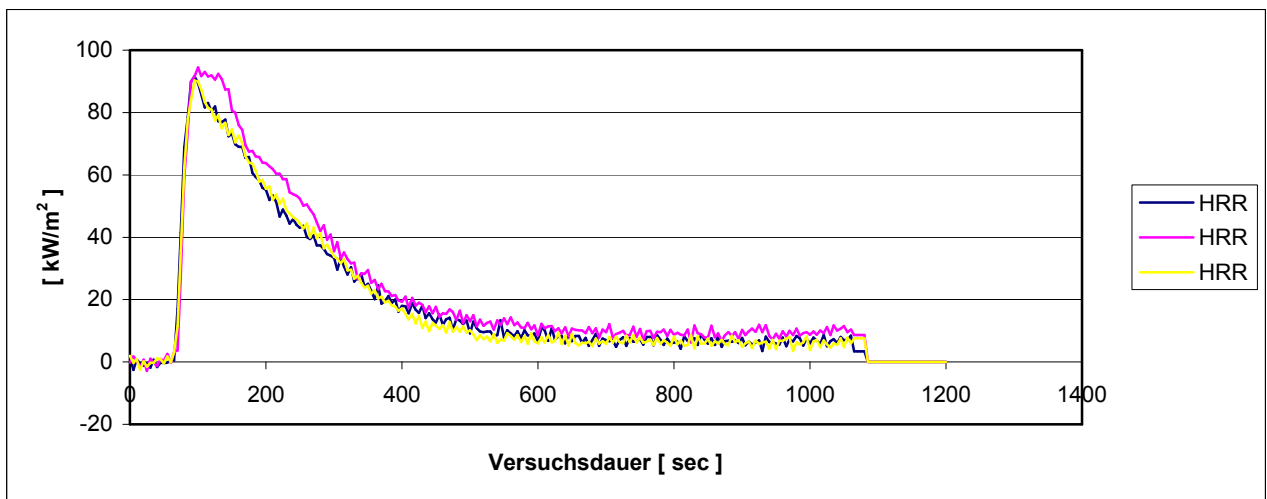
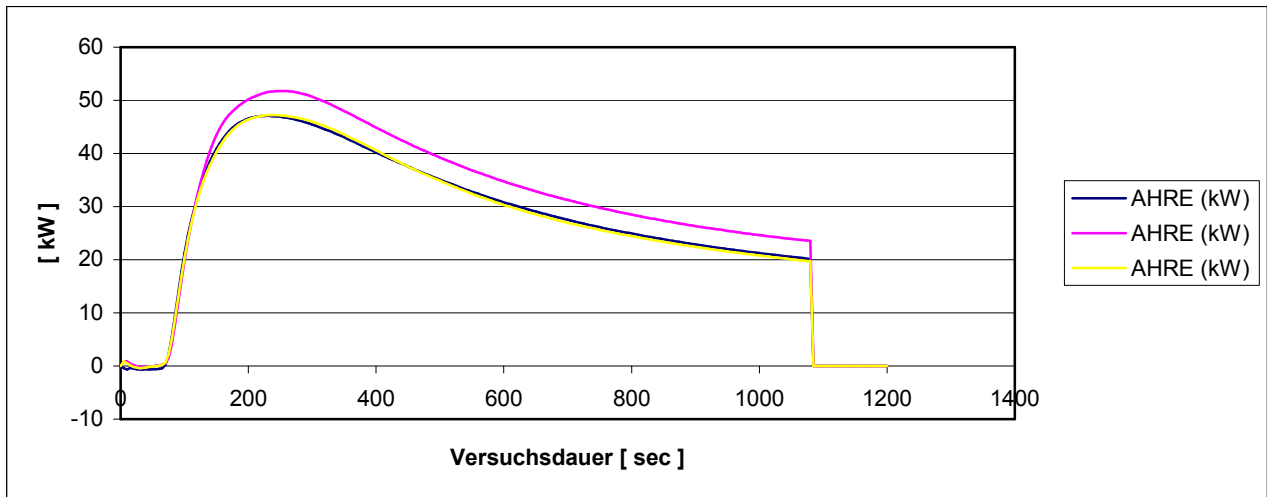
Test results Cone-Calorimeter according to ISO 5660

Clima storage (23°C/50%r.F.):	>24h
Nominal heat flux [KW/m ²]:	50
Heat flux calibration constant C:	0,04
Testroom temperature / -humidity:	21°C / 40% rel. LF

Single test results of 3 tests:

		Specimen 1	Specimen 2	Specimen 3	Average
Time to ignition	[s]	68	70	69	69
Mass of specimen	[g]	31	30,60	29,60	30,40
Mass loss rate	[g/m ² s]	1,11	1,27	0,87	1,08
Mass loss	[g]	4,29	5,37	4,77	4,81
Marhe after start	[KW/m ²]	47,08	51,77	47,25	48,70
Heat release rate (180 s)	[KW/m ²]	62,86	70,35	64,22	65,81
Heat release rate (300 s)	[KW/m ²]	51,08	57,23	51,90	53,40
Heat release rate (top)	[KW/m ²]	91,59	94,48	90,28	92,12
Effective heat of combustion	[MJ/Kg]	44,71	41,63	39,30	41,88
Total heat release THR	THR	21,75	25,43	21,33	22,84
Specific extinction area	[m ² /Kg]	773,87	720,93	812,54	769,11
Carbon monoxid	[g/g]	0,18	0,09	0,16	0,14
Carbon dioxid	[g/g]	2,34	2,26	1,90	2,17
Total smoke production	TSP	397,63	461,97	462,61	440,74
End of test	[s]	1200	1200	1200	1200

2.2.2 Diagrams:



2.3.1 Test results NBS-Box according to ISO 5659

Clima storage (23°C/50%r.F.): >24h
 Testmodus: 50 KW/m²
Test duration: 1200 s
Testroom temperature/humidity: 21°C / 40% rel. LF

Single test results of 3 tests:

		Specimen 1	Specimen 2	Specimen 3	Average
Initial mass	[g]	17,7	17,1	17,1	17,3
Final mass	[g]	15,8	15	15,3	15,37
Mass loss	[g]	1,9	2,1	1,8	1,93
Mass loss	[%]	10,7	12,3	10,5	13,67
Max. spec. opt. density up to 4 minutes	DS	69,15	65,9	63,43	66,16
Max. spec. opt. density	DS	130,62	119,29	122,44	120,38
Time to max. opt. density	[s]	921	1100	874	965
Valeur obscurcissement fumée	VOF4 [min]	103,44	112,32	109,85	108,54
Conventional Index of Toxicity	(CIT) 4 min	0,0115	0,0136	0,0115	0,0122
Conventional Index of Toxicity	(CIT) 8 min	0,0291	0,0377	0,0391	0,0353
Time to ignition	[s]	-	-	-	
Time to extinguishing	[s]	-	-	-	

Remarks: none.

2.3.2 Measurement of the smoke density:

specimen	weight [g]	ignition [s]	extinguish [s]
1	17,7	-	-
2	17,1	-	-
3	17.1	-	-

minutes	DS specimen	DS specimen	DS specimen
	1	2	3
1	1	1	2
2	18	24	25
3	50	54	51
4	69	66	63
5	83	74	74
6	95	81	7084
7	103	87	92
8	110	92	100
9	115	96	107
10	120	101	113
11	124	106	117
12	127	109	120
13	129	112	121
14	129	115	122
15	130	116	122
16	130	118	120
17	130	119	120
18	128	119	119
19	127	119	116
20	125	118	114
DS max 4 minutes	69	66	63
VOF4	104	112	110

2.3.3 Measurement of the toxicity:

Analytic procedure:	Measurement of the toxicity with FTIR at 50 kW/m ² , flaming						
	Temperature sample extraction point: <40 °C						
Clima (23°C/50%r.F.):	>48	h	Testroom temperature / humidity	23	°C	50	%

Specimen no.	gas	conc. after 4 min ppm	conc. after 8 min ppm
1	Carbon	895	1001
2	Dioxid	1044	1196
3	CO ₂	976	1116
	average	972	1104
1	Carbon	87	279
2	Monoxide	115	405
3	CO	109	404
	average	104	363
1	Hydrogen	0	0
2	Fluoride	0	0
3	HF	0	0
	average	0	0
1	Hydrogen	0	0
2	Chloride	0	0
3	HCl	0	0
	average	0	0
1	Hydrogen	0	0
2	Cyanide	0	0
3	HCN	0	0
	average	0	0
1	Nitrous Gases	0	0
2	NO-NO ₂	0	0
3		0	0
	average	0	0
1	Suflor Dioxide	5	11
2	Hydrogen Sulfide	5	11
3	SO ₂ -H ₂ S	3	13
	average	4	12
1		0	0
2		0	0
3	HBR	0	0
	average	0	0

Assessment

The in chapter 1 described material fulfills after the tests the requirements of the class HL 3 according to CEN TS 45545-2_2009 for R1 - and R6 - material.

Table 7 – Set of material requirements, R1

Test method reference	Parameter Unit	Requirement Definition	HL 1	HL 2	HL 3
T02 ISO 5658-2	CFE KW/m ²	Minimum	20	20	20
T03.01 ISO 5660-1: 50 KW/m ²	Marhe KW/m ²	Maximum	-	90	60
T10.01 EN ISO 5659-2: 50 kW/m ²	D _s (4) dimensionless	Maximum	600	300	150
T10.02 EN ISO 5659-2: 50 kW/m ²	VOF4 min	Maximum	1200	600	300
T11.01 EN ISO 5659-2: 50 kW/m ²	CIT _G dimensionless	Maximum	1,2	0,9	0,75

Table 7 – Set of material requirements, R6

Test method reference	Parameter Unit	Requirement Definition	HL 1	HL 2	HL 3
T02 ISO 5658-2	CFE KW/m ²	Minimum	20	20	20
T03.01 ISO 5660-1: 50 KW/m ²	Marhe KW/m ²	Maximum	-	90	60
T10.01 EN ISO 5659-2: 50 kW/m ²	D _s max dimensionless	Maximum	-	600	300
T11.01 EN ISO 5659-2: 50 kW/m ²	CIT _G dimensionless	Maximum	-	1,8	1,5

Special comment

The fire test result is valid for the in section 1 described material.
 In the composition with other materials (for example coatings, deposits) the burning behaviour could be influenced unfavourable so that the classification above is not valid any longer.
 The burning behaviour in composition with other materials has to be tested separately.

Frankfurt, the 24.02.2011



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