

Testing. Advising. Assuring.

Test report no. 2011-1145

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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 8775 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 8775 E
Trial number reference: PAO 2787
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: 2,8 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]	20	20	20		
the 100 mm station after	[s]	45	50	50		
the 150 mm station after	[s]	55	55	55		
the 200 mm station after	[s]	65	80	75		
the 250 mm station after	[s]	80	85	100		
the 300 mm station after	[s]	105	105	120		
the 350 mm station after	[s]	160	155	150		
the 400 mm station after	[s]	280	270	-		
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]	420	410	450		
Final spread of flame up to	[mm]	400	400	350		
Total duration of the test	[s]	1200	1200	1200		
Specimen drips off / pieces fall off	No burning after	[s]	160	180	150	
	Burning after	[s]	-	-	-	
Smoke generation after	[s]	10	10	10		
Charring / discolouring / melting after	[s]	10	10	10		
Charring / discolouring / melting up to	[mm]	430	450	390		
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	4,01	18,2
2	3,52	18,2
3	3,38	23,9
4		
5		
average	3,63	20,1

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

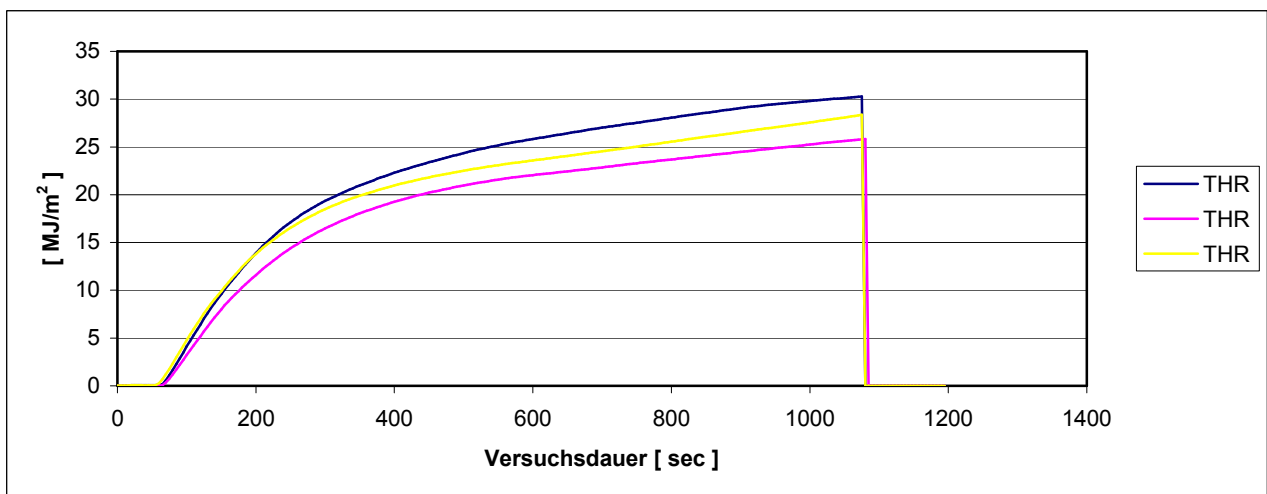
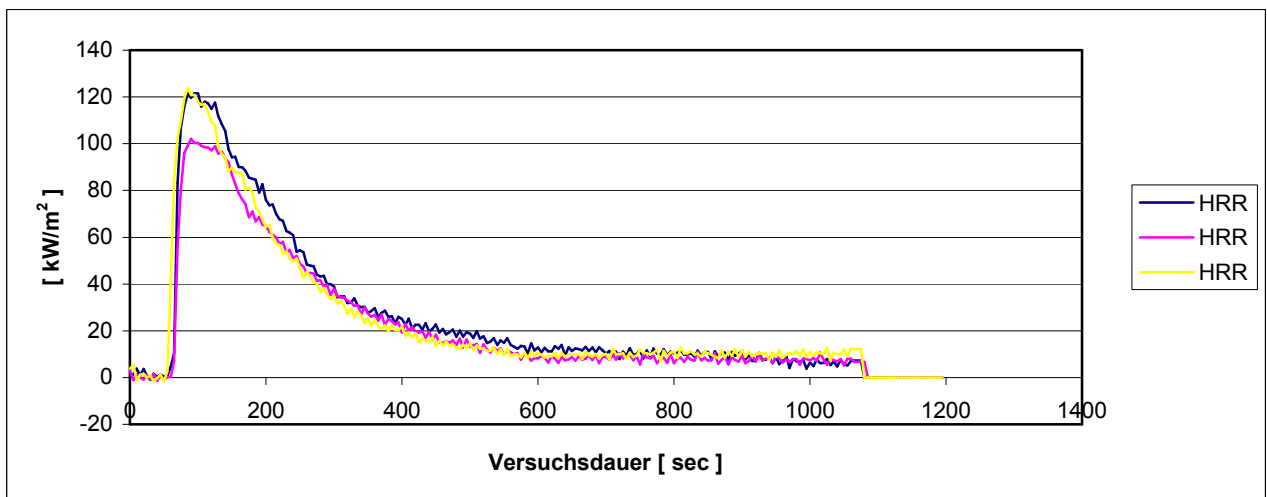
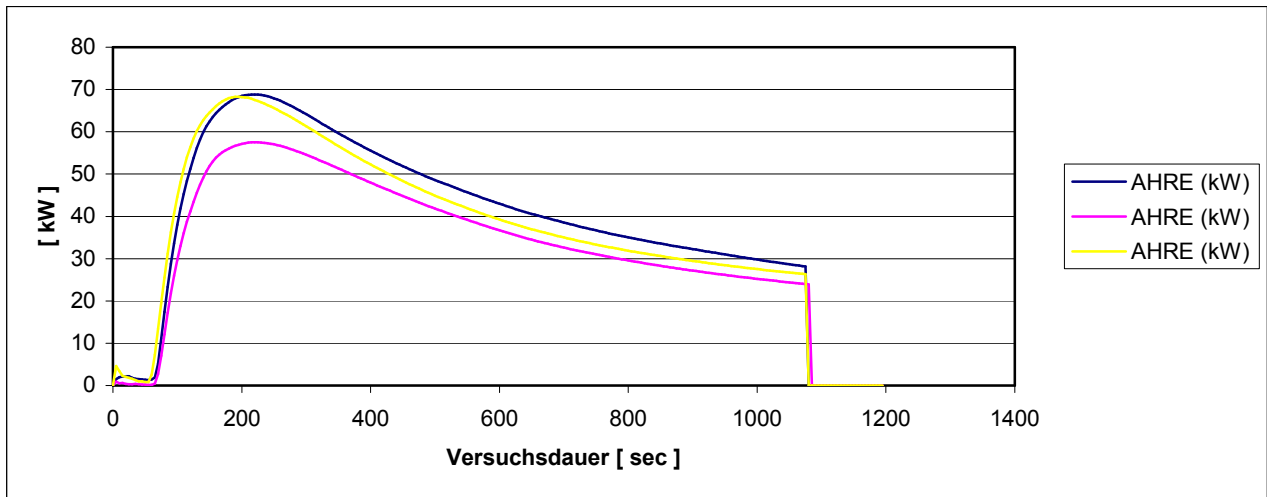
Test results Cone-Calorimeter according to ISO 5660

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]	66	63	63	64
Mass of specimen	[g]	29,10	27,50	27,10	27,90
Mass loss rate	[g/m ² s]	1,02	1,31	1,78	1,37
Mass loss	[g]	4,99	5,48	4,61	5,03
Marhe after start	[KW/m ²]	68,83	57,51	68,28	64,87
Heat release rate (180 s)	[KW/m ²]	81,91	74,87	86,77	81,18
Heat release rate (300 s)	[KW/m ²]	67,93	60,30	66,32	64,85
Heat release rate (top)	[KW/m ²]	121,69	102,15	123,90	115,92
Effective heat of combustion	[MJ/Kg]	53,22	41,46	54,02	49,57
Total heat release THR	THR	30,29	25,83	28,37	28,16
Specific extinction area	[m ² /Kg]	687,28	524,98	656,96	623,07
Carbon monoxid	[g/g]	0,01	0,02	0,13	0,05
Carbon dioxid	[g/g]	2,83	2,39	2,98	2,73
Total smoke production	TSP	412,59	344,02	363,44	373,35
End of test	[s]	1195	1200	1195	1196,67

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:

		Probe 1	Probe 2	Probe 3	Mittelwert
Probengewicht vor Versuch	[g]	16,4	16,3	15,7	16,13
Probengewicht nach	[g]	14,1	14,4	13,3	13,93
Gewichtsverlust	[g]	2,3	1,9	2,4	2,2
Gewichtsverlust	[%]	14,0	11,7	15,3	13,67
Max. spez. Opt. Dichte bis 4 Minuten	DS	80,01	75,11	73,04	76,05
Max. spez. Opt. Dichte	DS	146,17	118,57	96,41	120,38
Zeit zur max. opt. Dichte	[s]	854	765	520	713
Valeur obscurcissement fumée	VOF4 [min]	129,35	135,41	131,05	131,94
Conventional Index of Toxicity	(CIT) 4 min	0,0440	0,0669	0,0447	0,0519
Conventional Index of Toxicity	(CIT) 8 min	0,1471	0,1580	0,0873	0,1308
Zeit zur Entzündung	[s]	620	380	270	423,33
Zeit zum Verlöschen	[s]	900	730	660	763,33

Remarks: none.

2.3.2 Measurement of the smoke density:

specimen	weight [g]	ignition [s]	extinguish [s]
1	16,4	620	900
2	16,3	380	730
3	15,7	270	660

minutes	DS specimen	DS specimen	DS specimen
	1	2	3
1	3	3	3
2	28	35	33
3	59	60	59
4	80	75	73
5	93	86	82
6	103	94	89
7	112	101	94
8	119	108	96
9	125	113	96
10	131	116	96
11	140	117	96
12	144	118	95
13	146	118	95
14	146	117	95
15	145	117	95
16	145	116	95
17	144	115	94
18	144	113	94
19	143	112	93
20	142	110	92
DS max 4 minutes	80	75	73
VOF4	130	136	132

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	981	1792
2	Dioxid	1046	4503
3	CO ₂	1063	5567
	average	1030	3954
1	Carbon	278	1676
2	Monoxide	575	1699
3	CO	370	834
	average	408	1403
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	1	3
2	Cyanide	4	7
3	HCN	3	7
	average	3	6
1	Nitrous Gases	0	0
2	NO-NO ₂	0	0
3		0	0
	average	0	0
1	Suflor Dioxide	28	36
2	Hydrogen Sulfide	26	33
3	SO ₂ -H ₂ S	17	13
	average	24	27
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 2 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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The results of the tests relate only to the behaviour of the test specimen which is designated on the top.

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