



Testing. Advising. Assuring.

# Test report no. 2014-1499

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**Date of order:** 26.04.2014  
**Date of sampling:** No official taking out of the samples from a representative of the Exova Warringtonfire, Frankfurt  
**Date of delivery:** 26.04.2014  
**Date of test:** 05.05.2014 and 12.05.2014

## Order

1. Testing the smoke density and toxicity of a material in the test chamber according to EN ISO 5659-2 (NBS-Box)
2. Testing the heat release-, smoke production- and mass loss rate of a material according to DIN ISO 5660 (Cone-Calorimeter).
3. Classification according to EN 45545-2 - 2013.

## Description / designation of the test object

Leather named as Elmotransport 3

## Description of the relevant test procedure

EN ISO 5659-2 - 2007

ISO 5660-1 - 2002

## 1. Description of the test material

### 1.1 Details of the customer:

Trade name:	Elmotransport 3
Material type:	Seating material, leather
Thickness:	1.2 – 1.4 mm
Fire protection agent:	Flacavon ARM (3 times retardent)
Intended end use of Product:	Seating material

### 1.2 By the specimen preparation by Exova Warringtonfire, Frankfurt determined values:

Leather

Colour:	black
thickness:	av. 1.4 mm
Square weight::	1.067 kg/m <sup>2</sup> (average)

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

2. Test results:

## Test results Cone-Calorimeter according to ISO 5660

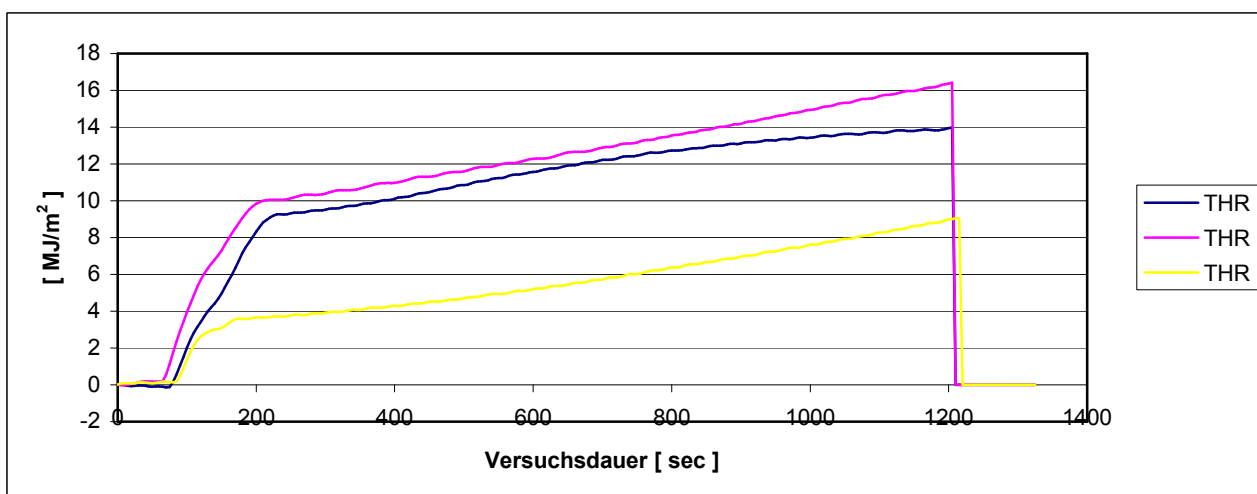
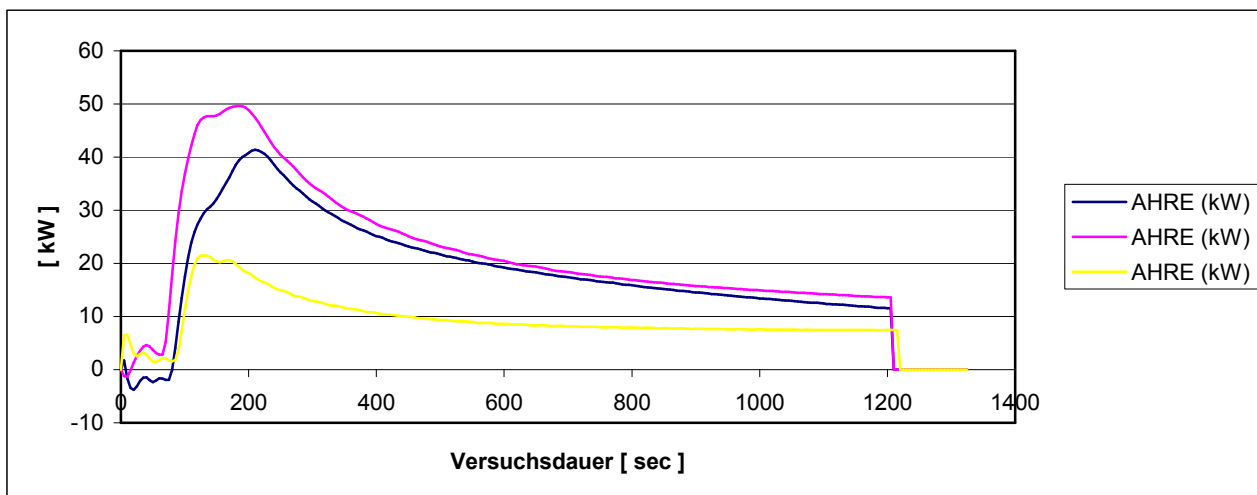
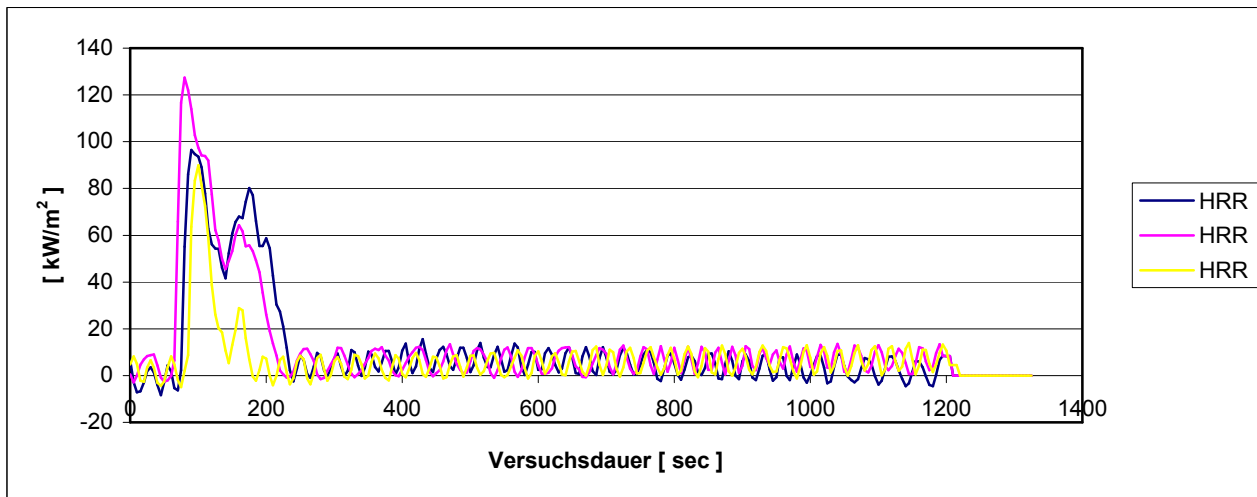
Clima storage (23°C/50%r.F.): >48h  
 Nominal heat flux [KW/m<sup>2</sup>]: 25  
 Heat flux calibration constant C: 0,04  
 Testroom temperature / -humidity: 21°C / 40% rel. LF

Single test results of 3 tests:

		Specimen 1	Specimen 2	Specimen 3	Average
Time to ignition	[s]	82	68	85	78,33
Mass of specimen	[g]	10,80	10,20	11	10,67
Mass loss rate	[g/m <sup>2</sup> s]	5,15	1,17	2,08	2,80
Mass loss	[g]	7,65	7,27	6,29	7,07
Marhe after start	[KW/m <sup>2</sup> ]	41,36	49,64	21,51	37,50
Heat release rate (180 s)	[KW/m <sup>2</sup> ]	52,59	54,94	20,39	42,64
Heat release rate (300 s)	[KW/m <sup>2</sup> ]	33,49	35,35	13,52	27,46
Heat release rate (top)	[KW/m <sup>2</sup> ]	96,45	127,45	89,89	104,60
Effective heat of combustion	[MJ/Kg]	16,09	19,66	12,47	16,07
Total heat release THR	THR	13,99	16,41	9,06	13,15
Specific extinction area	[m <sup>2</sup> /Kg]	505,03	766,64	1162,26	811,31
Carbon monoxid	[g/g]	0,04	0,03	-0,01	0,02
Carbon dioxid	[g/g]	1,13	1,33	0,51	0,99
Total smoke production	TSP	439,02	688,78	900,84	676,21
End of test	[s]	1325	1325	1335	1328,33

specimen extinguished after end of test

**2.2.2 Diagrams:**



### 2.3.1 Test results NBS-Box according to ISO 5659

Clima storage (23°C/50%r.F.): >48h  
 Testmodus: 25 KW/m<sup>2</sup>  
**Test duration:** 1200 s  
**Testroom temperature/humidity:** 21°C / 40% rel. LF

		<b>Specimen 1</b>	<b>Specimen 2</b>	<b>Specimen 3</b>	<b>Average</b>
<b>Initial mass</b>	<b>[g]</b>	4,7	5,6	5,3	<b>5,2</b>
<b>Final mass</b>	<b>[g]</b>	1,4	2,3	2	<b>1,9</b>
<b>Mass loss</b>	<b>[g]</b>	3,3	3,3	3,3	<b>3,3</b>
<b>Mass loss</b>	<b>[%]</b>	70,2	58,9	62,3	<b>63,8</b>
<b>Max. spec. opt. density up to 4 minutes</b>	<b>DS</b>	110,59	176,14	74,2	<b>120,31</b>
<b>Max. spec. opt. density</b>	<b>DS</b>	115,77	198,05	94,74	<b>136,19</b>
<b>Time to max. opt. density</b>	<b>[s]</b>	341	330	398	<b>356,33</b>
<b>Valeur obscurcissement fumée</b>	<b>VOF4 [min]</b>	155,84	193,88	101,49	<b>150,4</b>
<b>Conventional Index of Toxicity</b>	<b>(CIT) 4 min</b>	0,0482	0,0297	0,0372	<b>0,0384</b>
<b>Conventional Index of Toxicity</b>	<b>(CIT) 8 min</b>	0,2098	0,1922	0,2058	<b>0,2026</b>
<b>Time to ignition</b>	<b>[s]</b>	68	75	79	-
<b>Time to extinguishing</b>	<b>[s]</b>	270	268	305	-

Remarks: none.

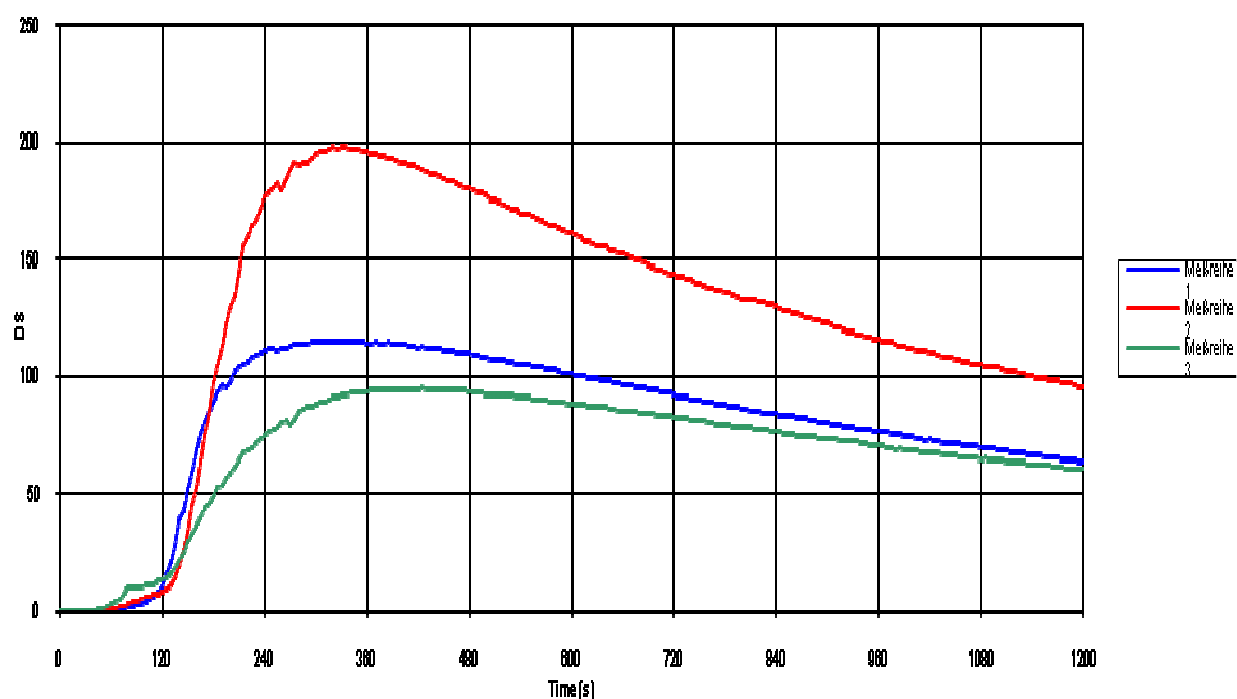
**2.3.2 Measurement of the smoke density:**

specimen	weight [ g ]	ignition [ s ]	extinguish [ s ]
1	4,7	68	270
2	5,6	75	268
3	5,3	79	305

minutes	DS specimen	DS specimen	DS specimen
	1	2	3
1	1	1	3
2	10	8	13
3	89	97	49
4	111	176	74
5	115	195	89
6	114	196	93
7	112	378	94
8	110	180	93
9	105	170	91
10	101	161	88
11	96	152	85
12	92	143	83
13	88	136	79
14	84	129	76
15	80	123	73
16	76	116	71
17	73	110	67
18	70	105	65
19	67	100	63
20	63	95	60
<b>DS max 4 minutes</b>	110,59	176,14	74,2
<b>VOF4</b>	155,84	193,88	101,49

**2.3.3 Smoke density diagram:**

**Specific Optical Density Graph 25 Kw fl**



**2.4.1 Measurement of the toxicity:**

<b>Analytic procedure:</b>	Measurement of the toxicity with FTIR at 25 kW/m <sup>2</sup>						
	Temperature sample extraction point: <40 °C						
<b>Clima (23°C/50%r.F.):</b>	>48	<b>h</b>	<b>Testroom temperature / humidity</b>	23	°C	50	%

<b>Specimen no.</b>	<b>gas</b>	<b>conc. after 4 min ppm</b>	<b>conc. after 8 min ppm</b>
Carbon Dioxid CO <sub>2</sub>	1	1325	5083
	2	1109	3978
	3	1237	4549
	<b>average</b>	<b>1224</b>	<b>4537</b>
Carbon Monoxide CO	1	11	70
	2	10	72
	3	10	49
	<b>average</b>	<b>10</b>	<b>64</b>
Hydrogen Fluoride HF	1	0	0
	2	0	0
	3	0	0
	<b>average</b>	<b>0</b>	<b>0</b>
Hydrogen Chloride HCl	1	0	0
	2	0	0
	3	0	0
	<b>average</b>	<b>0</b>	<b>0</b>
Hydrogen Cyanide HCN	1	1	17
	2	7	24
	3	0	14
	<b>average</b>	<b>3</b>	<b>18</b>
Nitrous Gases NO-NO <sub>2</sub>	1	10	41
	2	4	35
	3	7	39
	<b>average</b>	<b>7</b>	<b>38</b>
Sulfur Dioxide Hydrogen SO <sub>2</sub> -H <sub>2</sub> S	1	5	9
	2	0	5
	3	5	23
	<b>average</b>	<b>3</b>	<b>12</b>
Hydrogen Bromide HBR	1	0	0
	2	0	0
	3	1	0
	<b>average</b>	<b>0</b>	<b>0</b>



### 3. Assessment

The in chapter 1 described material fulfils after the tests the requirements of the class **HL 3** according to EN 45545-2\_2013 for **R21 - material**.

Table 5 – Set of material requirements, R21

Test method reference	Parameter Unit	Requirement Definition	HL 1	HL 2	HL 3	Result/Average
T03.02 ISO 5660-1: 25 kWm-2	MARHE kWm-2	Maximum	75	50	50	<b>37,50</b>
T10.03 EN ISO 5659-2: 25 kWm-2	Ds max. dimensionless	Maximum	300	300	200	<b>136,19</b>
T11.02 EN ISO 5659-2: 25 kWm-2	CITG dimensionless	Maximum	1,2	0,9	0,75	<b>0,0384</b> (4 min.)
						<b>0,2026</b> (8 min.)

n.e.: not executed

### 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 13.05.2014



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Tester in charge



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Laboratory Supervisor

The results of the tests relate only to the behaviour of the test specimen which is designated on the top.  
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This test report contains 9 pages.