

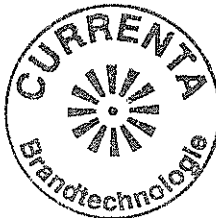
12. February 2010

Test report	10/0228e
Test standard	NF P 92-501 : 1985 Reaction to fire tests - Radiation test used for rigid materials, or for materials on rigid substrates (flooring and finishes) of all thicknesses, and for flexible materials thicker than 5 mm NF P 52-505 : 1985 Safety against fire. Building materials. Reaction to fire tests. Test used for thermal melting materials. Dripping test.
Classification standard	NF P 92-507 : 2004 Fire safety - Building - Interior fitting materials - Classification according to their reaction to fire. NF F 16-101 : 1988 Railway rolling stock – Fire behaviour – Choice of materials
Client	Bayer Sheet Europe NV Mr. Bral Wakkensesteenweg 47 B-8700 Tielt
Material	Makrolon GP white 130
Nominal thickness	2 mm

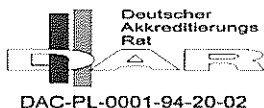
Test result

During the tests on 23 December 2009 & 18 January 2010 the requirements of class M2 were fulfilled.


Michael Halfmann
(Head of Fire Testing)




Frank Volkenborn
(Customer Support Fire Testing)



The Fire Technology laboratory of Currenta is accredited according to EN ISO/IEC 17025 generally for fire testing. The Fire Technology is notified by Federal Railway Authorities "Eisenbahnbundesamt (EBA)", "Eisenbahn-Cert (EBC) for European Railway Systems and for French Railway systems from L'agence de certification ferroviaire (CERTIFER).

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.

When evidence shall be provided for materials, the test reports may be not older than 3 years.

This test report may not be reproduced except in full, without our written approval.



Client's material description¹:

Trade name	Makrolon GP white 130
Product description	Makrolon opal white
Manufacturer	Bayer Sheet Europe NV
Data sheet no.	Remark 1
Safety data sheet no.	Remark 1
Thickness [mm]	2
Area related mass [kg/m ²]	2,4
Density [kg/m ³]	1200
Composition [%]	Makrolon + pigment
Colour	Opal white
Appearance	Remark 1
Flame-retardant treatment	No
Homogenous product	yes
Field of application, maybe withdrawing	Remark 1
Standard handling	Remark 1
Standard backing	Remark 1
Surface to be tested?	Remark 1

Measurements:

File-No.	L91386A
Delivery date	2009-12-16
Date of test	2009-12-23
Conditioning	> 48 h / 23 °C / 50 % r. h.
Dimensions [mm]	400 x 300
Thickness [mm]	2
Area related mass [kg/m ²]	2,58
Colour	Opal white
Appearance of surface	Flat
Tested surface	The specimens are symmetric
Operator	Thomas Wolff
Test equipment no.	L-B411-P0007

¹ Remark 1: The customer hasn't provide this information

Remark 2: The customer is unable to provide this information

Test results NF P 92-501:

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
♦	/	25	25	6	3	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
/	/	30	15	3	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	♦
Burning time				Front side									Back side							
Ignition	t_i	[s]	108								109									
Extinguish	e	[s]	287								287									
Criteria for classification 1. Result				$\Sigma h = 107$ cm			$t_i = 108$ s			$\Delta t = 160$ s			$\Delta t_{ges} = 179$ s			$q = 7.83$				

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
♦	/	30	20	6	3	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
/	/	30	9	3	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	♦
Burning time				Front side									Back side							
Ignition	t_i	[s]	93								95									
Extinguish	e	[s]	288								288									
Criteria for classification 2. Result				$\Sigma h = 101$ cm			$t_i = 93$ s			$\Delta t = 176$ s			$\Delta t_{ges} = 195$ s			$q = 8.19$				

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
♦	/	3	30	12	3	∅	/	/	/	/	/	/	/	/	/	/	/	/	/	/
/	/	3	18	9	∅	∅	/	/	/	/	/	/	/	/	/	/	/	/	/	♦
Burning time				Front side									Back side							
Ignition	t_i	[s]	119								124									
Extinguish	e	[s]	363								351									
Criteria for classification 3. Result				$\Sigma h = 78$ cm			$t_i = 119$ s			$\Delta t = 181$ s			$\Delta t_{ges} = 244$ s			$q = 4.87$				

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
♦	/	25	25	12	3	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
/	/	30	15	6	∅	/	/	/	/	/	/	/	/	/	/	/	/	/	/	♦
Burning time				Front side									Back side							
Ignition	t_i	[s]	99								104									
Extinguish	e	[s]	314								306									
Criteria for classification 4. Result				$\Sigma h = 116$ cm			$t_i = 99$ s			$\Delta t = 178$ s			$\Delta t_{ges} = 215$ s			$q = 8.78$				

Legend: "∅"- The flames were not bigger than the diameter of the emitter.; "x"- jittering flames; "/"- no burning

Observations: Burning debris

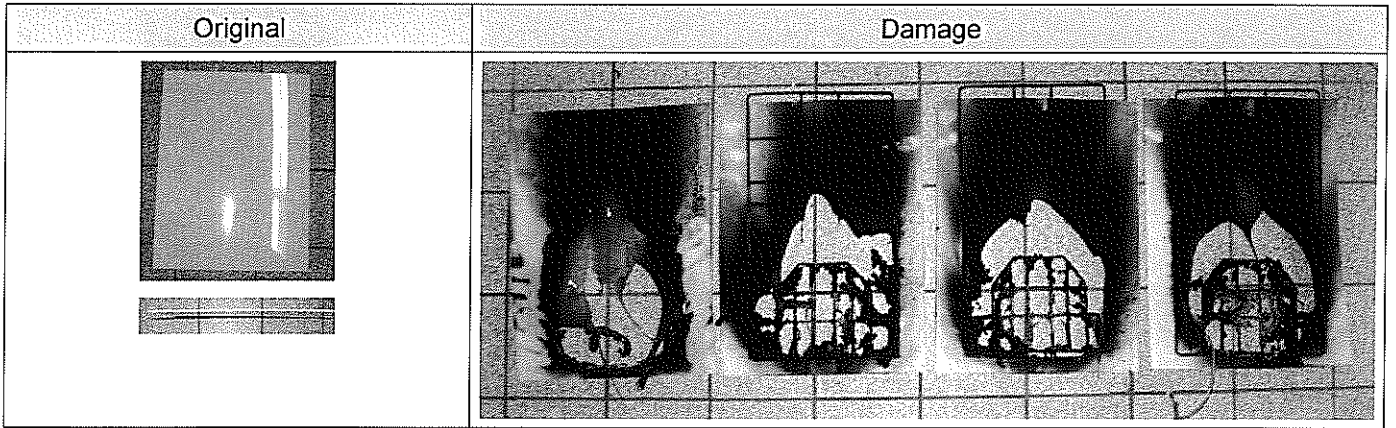
$$q = \frac{100 * \Sigma h}{t_i * \sqrt{\Delta t}} \quad \bar{q} = \frac{\Sigma q}{n} \quad \bar{q} = 7,42 \quad \text{Class} \quad \text{M 2}$$

For final classification additional tests according NF P 92-505 - dripping test - are required!

Criteria for classification:

M1	M2	M3	M4
$\bar{q} = 2,5$	$\bar{q} = 15$	$\bar{q} = 50$	additional test required

Pictures of the test samples:



Additional test according NF P 95-505:

File-No.	L91386B	
Delivery date	2009-12-16	
Date of test	2010-01-18	
Conditioning	> 48 h / 23 °C / 50 % r. h.	
Dimensions	[mm]	70 x70
Thickness	[mm]	2
Area related mass	[kg/m ²]	2,37
Colour	Opal white	
Appearance of surface	Flat	
Tested surface	The specimens are symmetric	
Operator	Jörg Swienty	
Test equipment no.	L-B411-P0006	
All the test specimens were consumed	Yes	

Test results:

Measurements		Test 1	Test 2	Test 3	Test 4
1. Ignite - from / to	[min:s]	-	-	-	-
2. Ignite - from / to	[min:s]				
3. Ignite - from / to	[min:s]				
4. Ignite - from / to	[min:s]				
5. Ignite - from / to	[min:s]				
6. Ignite - from / to	[min:s]				
Flame height	[mm]	-	-	-	-
Dripping after	[min:s]	7:32	7:21	7:12	7:03
Burning droplets (cotton burns) after	[min:s]				
Observations	Charing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	swelling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	ripping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	shrinking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	unrolling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	glowing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

During the tests on 18 January 2010 according NF P 92-505 the tested Material has fulfilled the requirements.

The material will be classified according to the results of the main test.

Pictures of the test samples:

