SYCHTA LABORATORIUM Sp. J.
Laboratorium Badań Palności Materiałów
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72-010 Police

AB 1501

TEST REPORT

Order no: 3501748030 Signature: SL/Z-638/EN45545-R1/0680a/2023 Police, 16.08.2023

Test methods:

1. ISO 5658-2:2006. Reaction to fire tests – Spread of flame – Part 2: Lateral spread on building and transport products in vertical configuration.
2. EN-ISO 5659-2:2017. Plastic – Smoke generation – Part 2: Determination of optical density by a single – chamber test.
3. ISO 5660-1:2015. Reaction to fire tests – Heat release, smoke production and mass loss rate – Part 1: Heat release rate (cone calorimeter method).
4. EN 45545-2:2020. Railway applications – Fire protection on railway vehicles – Part 2: Requirements for fire behavior of materials and components.

Content of request: Tests according to EN 45545-2:2020 - requirement R1 (without T11.01 test).

Sponsor: 3M Poland Sp. z o.o.
Al. Katowicka 117, Kajetany
05-830 Nadarzyn, Poland
Poland

Material: 3M™ Double Coated Tape 99786 +

Composition: aluminium plate 1 mm thick + "3M™ Double Coated Tape 99786+" + aluminium plate 1 mm thick

Manufacturer/supplier: 3M Poland Sp. z o.o.
Al. Katowicka 117, Kajetany
05-830 Nadarzyn, Poland
Poland

Assessment: The tested product fulfils the requirement R1 according to EN 45545-2:2020 for hazard level HL1, HL2 and HL3 (preliminary classification only, without T11.01 test).

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Report applies only to the sample tested and is not necessarily indicative of the qualities of apparently identical or similar products.

Content of test report: five pages with signature and numbers.

1. Spread of flame according to ISO 5658-2

Substrate: 1 mm aluminium plate on both sides.
Tested side: 1mm aluminium plate

Table 1.1. Findings of critical heat flux at extinguishment CFE

Name of measured quantity	Unit	Specimen			Average	Standard deviation
		1	2	3		
Mass of the specimen	g	684,8	-	-	-	-
Specimen thickness	mm	2,2	-	-	-	-
Ignition time	s	-	-	-	-	-
Extinction time	s	-	-	-	-	-
Duration of the test	s	600	-	-	-	-
Flame-spread distance	mm	0	-	-	-	-
Critical heat flux at extinguishment CFE	$kW \cdot m^{-2}$	>50	-	-	-	-
Flaming particles or droplets	YES/NO	NO	-	-	-	-

Table 1.2. Time of the movement of the flame front

Distance from exposed of the specimen	Calibration flux levels at the specimen	Time of arrival of the flame front		
		Specimen		
		1	2	3
mm	$kW \cdot m^{-2}$	s		
50	50,5	-	-	-
100	48,5	-	-	-
150	46,4	-	-	-
200	41,4	-	-	-
250	36,4	-	-	-
300	30,2	-	-	-
350	23,9	-	-	-
400	18,2	-	-	-
450	12,5	-	-	-

Remarks: none.

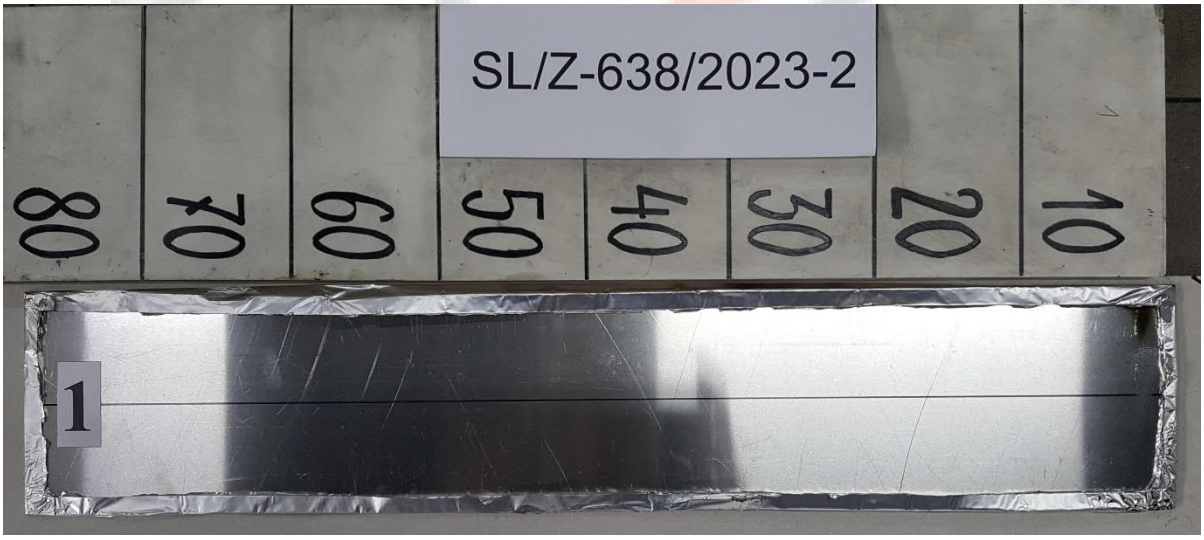


Figure 1. Appearance of the specimens after the test

2. Smoke generation according to EN-ISO 5659-2 + EN 45545-2

Test conditions - irradiance of 50 $kW \cdot m^{-2}$

Table 2. Final findings of smoke generation

Name of measured quantity	Unit	Specimen			Average	Standard deviation
		1	2	3		
Mass of specimen	g	30,8	-	-	-	-
Specimen thickness	mm	2,2	-	-	-	-
Ignition time - t_z	s	-	-	-	-	-
Extinction time	s	-	-	-	-	-
Duration of the test	s	600	-	-	-	-
Maximum of specific optical density - $D_s max$	-	3	-	-	-	-
Time of arrival of the maximum of $D_s max$	s	552	-	-	-	-
Specific optical density in the first 4 min of the test - Ds(4)	-	2	-	-	-	-
Cumulative specific optical densities in the first 4 min of the test - VOF_4	min	3	-	-	-	-

Remarks: none.

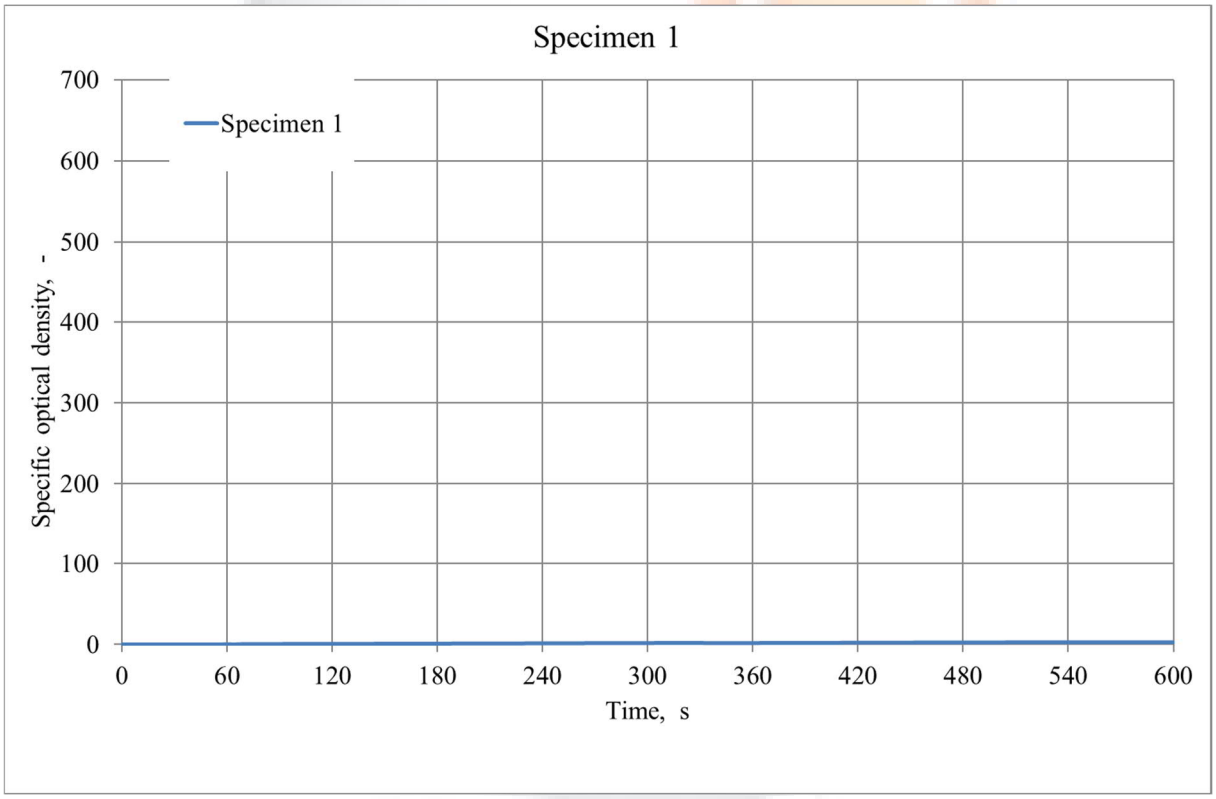


Figure 2. Specific optical density in the time

3. Heat release rate of specimen according to ISO 5660-1

Test conditions - irradiance of 50 kW·m^{-2}

Table 3. Heat release rate

Name of measured quantity	Unit	Specimen			Average	Standard deviation
		1	2	3		
Mass of the specimen	g	55,1	-	-	-	-
Specimen thickness	mm	2,2	-	-	-	-
Ignition time	s	-	-	-	-	-
Extinction time	s	-	-	-	-	-
Duration of the test	s	1200	-	-	-	-
Maximum heat release rate	kW·m^{-2}	2	-	-	-	-
Total heat release	MJ·m^{-2}	0,4	-	-	-	-
Maximum average rate of heat emission MARHE	kW·m^{-2}	0,5	-	-	-	-
Fire integrity acc. 5.2.2.2 EN 45545-2	YES/NO	YES	-	-	-	-

Remarks: none.

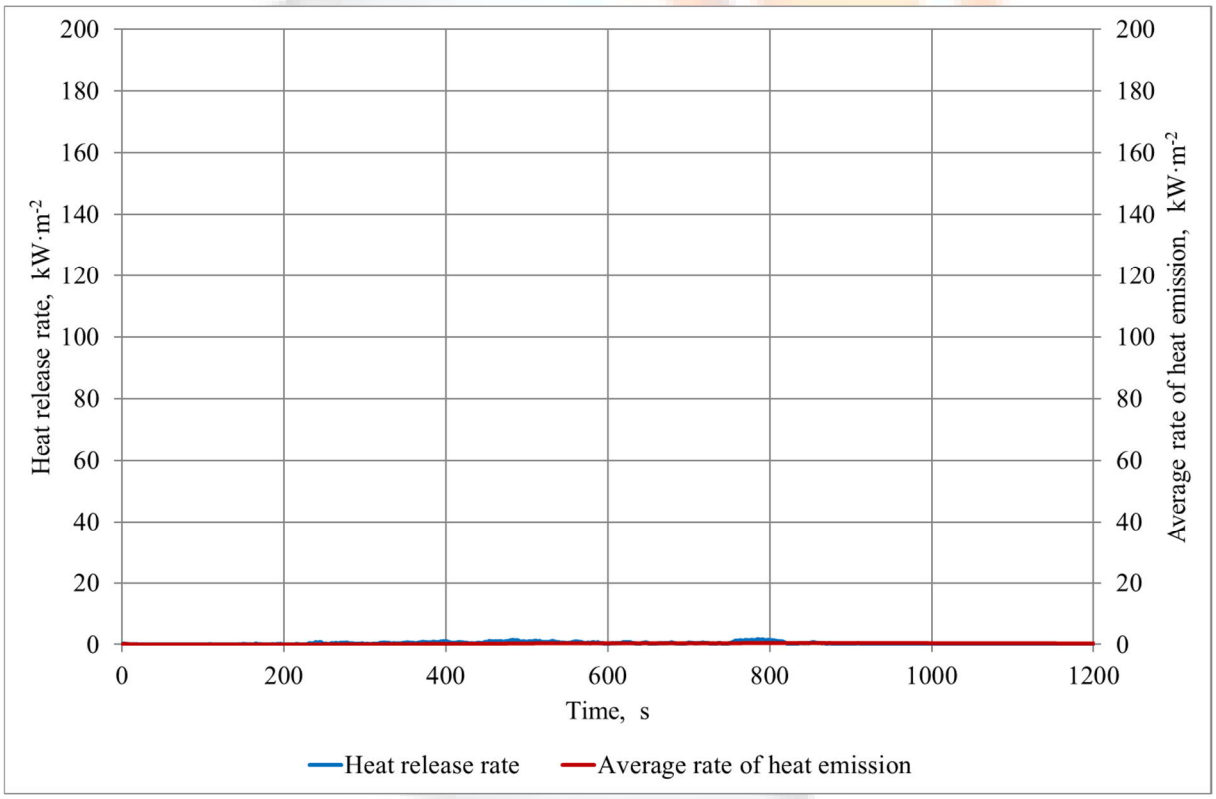


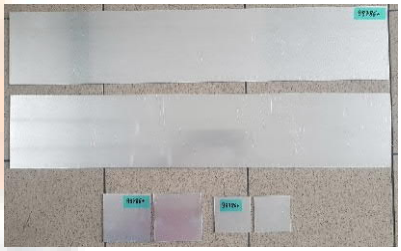
Figure 3.1. The relation of heat release rate and the time – specimen 1

4. Final findings

Requirement	Method/norm	Measured quantity	Unit	Measured value	Critical value			Crossing coefficient		
					HL1	HL2	HL3	HL1	HL2	HL3
R1	T02 ISO 5658-2	CFE	$kW \cdot m^{-2}$	>50	20	20	20	0,40	0,40	0,40
	T03.01 ISO 5660-1: 50 $kW \cdot m^{-2}$	MARHE	$kW \cdot m^{-2}$	0,5	-	90	60	-	0,01	0,01
	T10.01 EN ISO 5659-2: 50 $kW \cdot m^{-2}$	$D_s(4)$	-	2	600	300	150	0,00	0,01	0,01
	T10.02 EN ISO 5659-2: 50 $kW \cdot m^{-2}$	VOF_4	min	3	1200	600	300	0,00	0,01	0,01
	T11.01 EN 17084 Method 1 50 $kW \cdot m^{-2}$	CIT_G (4)	-	-	1,2	0,9	0,75	-	-	-
		CIT_G (8)	-	-	1,2	0,9	0,75	-	-	-

The tested product fulfils the requirement R1 according to EN 45545-2:2020 for hazard level HL1, HL2 and HL3 (preliminary classification only, without T11.01 test).

5. Remaining required information



Date of receipt of samples: 02.08.2023

Sampling: sponsor took and delivered samples.

Description of the test material: Multilayer system consisted of aluminium plate 1 mm thick + "3M™ Double Coated Tape 99786+" + aluminium plate 1 mm thick. Total thickness of 2,2 mm and weight per unit area approx. 5,5 kg/m^2 (with substrate). 2 samples dimensions of 800x155 mm, 2 samples dimensions of 100x100 mm and 2 samples dimensions of 75x75 mm were delivered by the sponsor.

Conditioning of specimens: constant mass at a temperature of 23±2°C, and relative humidity of 50±5 %.

Declarations:

1. The test results relate to the behaviour of the test specimens under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the products in use.
2. The information provided on the first page of the report concerning the scope of research and identification of the tested object/objects were provided by the Sponsor.

Operators:

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dr inż. Krzysztof Sychta

Date and place of test - 04.08 and 07.08.2023, Police