SYCHTA LABORATORIUM Sp. J.
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AB 1501

TEST REPORT

Order no: 81A26213 Signature: SL/Z-184/EN45545-R1/0127a/2024 Police, 06.03.2024

Test methods:

1. ISO 5658-2:2006/Amd.1:2011. 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/Amd.1:2019. Reaction to fire tests – Heat release, smoke production and mass loss rate – Part 1: Heat release rate (cone calorimeter method).
4. EN 17084:2018. Railway applications – Fire protection of railway vehicles – Toxicity test of materials and components.
5. EN 45545-2:2020+A1:2023. 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+A1:2023 - requirement R1/HL2.

Sponsor: Camira Transport Fabrics Ltd
Hopton Mils
Mirfield HD9 4 AY
United Kingdom

Material: Lucia CS

Composition: Composition details: 100% Trevira CS Flame Retardant Polyester, Batch Number: 514525, Fabric Type: Upholstery Fabric

Manufacturer/supplier: Camira Transport Fabrics Ltd
Hopton Mils
Mirfield HD9 4 AY
United Kingdom

Assessment: The tested product fulfils the requirement R1 according to EN 45545-2:2020+A1:2023 for hazard level HL1 and HL2.

The reprint and the copying: only with the agreement of Camira Transport Fabrics Ltd

Without the written consent of the Sychta Laboratory the report can be copied only in one piece.

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: seven pages with signature and numbers.

1. Spread of flame according to ISO 5658-2

Substrate: without additional substrate.
Tested side: both sides identical.

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	41,8	42,2	39,6	41,2	1,4
Specimen thickness	mm	0,7	0,7	0,7	0,7	0,0
Ignition time	s	18	18	8	15	6
Extinction time	s	42	42	41	42	1
Duration of the test	s	645	645	645	645	0
Flame-spread distance	mm	0	0	0	0	0
Critical heat flux at extinguishment CFE	$kW \cdot m^{-2}$	>50	>50	>50	>50	-
Flaming particles or droplets	YES/NO	NIE	NIE	NIE	NIE	

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	1,6	1,6	1,6	1,6	0,0
Specimen thickness	mm	0,7	0,7	0,7	0,7	0,0
Ignition time - t_z	s	99	61	79	80	19
Extinction time	s	176	101	-	-	-
Duration of the test	s	600	600	600	600	0
Maximum of specific optical density - $D_s max$	-	130	142	121	131	11
Time of arrival of the maximum of $D_s max$	s	568	84	208	287	251
Specific optical density in the first 4 min of the test - Ds(4)	-	128	122	120	123	4
Cumulative specific optical densities in the first 4 min of the test - VOF_4	min	291	351	301	314	32

Remarks: none.

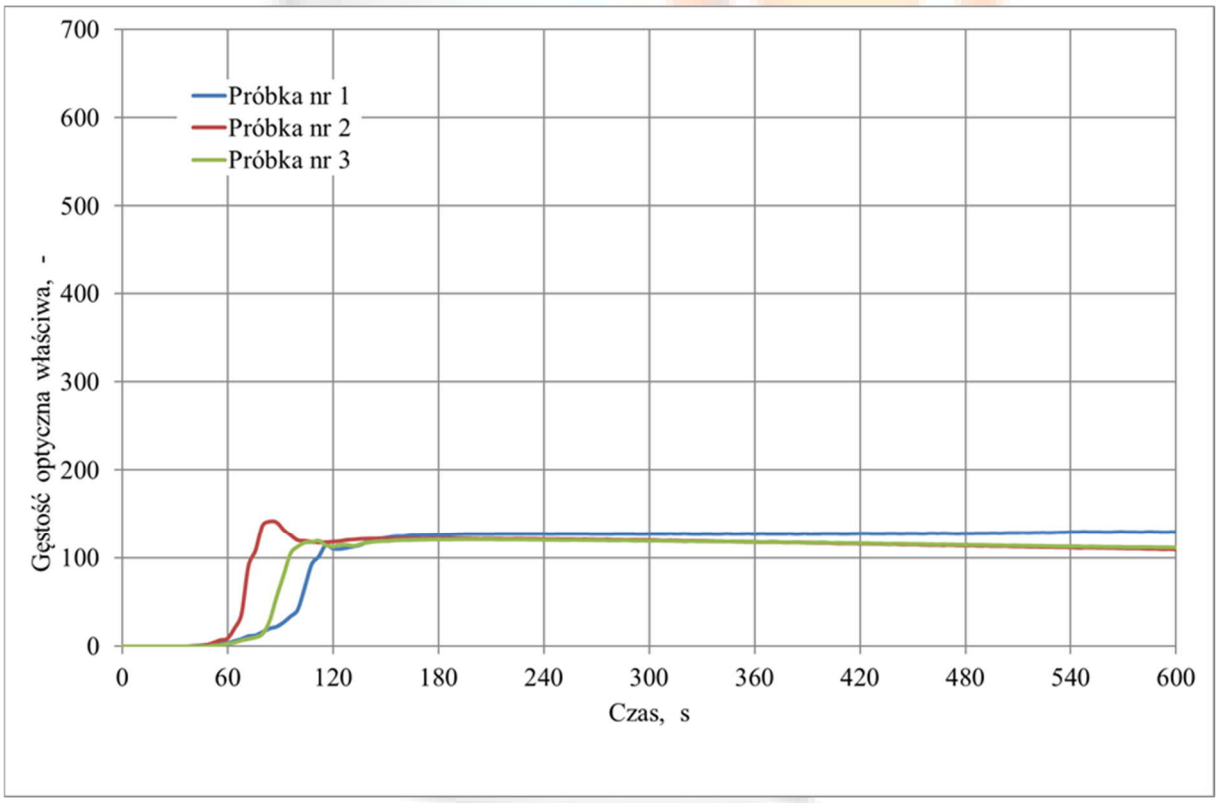

Figure 2. Specific optical density in the time

3. Results of toxic products emission of material decomposition and burning according to EN 17084, Method 1

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

Table 3.1. Concentration of toxic products of material decomposition and burning after 4 min

Toxic component of burning products	Concentration of toxic products after 4 min				
	Specimen no.			Average	Standard deviation
	1	2	3		
	$mg \cdot m^{-3}$				
CO_2	2458	2504	2760	2574	163
CO	133	160	166	153	18
HCN	0	0	0	0	0
NO_2	0	0	0	0	0
NO	0	0	0	0	0
HCL	0	0	0	0	0
SO_2	0	0	0	0	0
HF	0	0	0	0	0
HBr	0	0	0	0	0

Table 3.2. Concentration of toxic products of material decomposition and burning after 8 min

Toxic component of burning products	Concentration of toxic products after 8 min				
	Specimen no.			Average	Standard deviation
	1	2	3		
	$mg \cdot m^{-3}$				
CO_2	2754	2897	3286	2979	275
CO	205	203	256	222	30
HCN	0	0	0	0	0
NO_2	0	0	0	0	0
NO	0	0	0	0	0
HCL	0	0	0	0	0
SO_2	0	0	0	0	0
HF	0	0	0	0	0
HBr	0	0	0	0	0

Table 3.3. Conventional index of toxicity

Name of measured quantity	Unit	Specimen			Average	Standard deviation
		1	2	3		
Conventional index of toxicity CIT_G at 4 min	-	0,01	0,01	0,01	0,01	0,00
Conventional index of toxicity CIT_G at 8 min	-	0,02	0,02	0,02	0,02	0,00

Remarks: none.

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

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

Table 4. Heat release rate

Name of measured quantity	Unit	Specimen			Average	Standard deviation
		1	2	3		
Mass of the specimen	g	2,9	3,0	2,9	2,9	0,1
Specimen thickness	mm	0,7	0,7	0,7	0,7	0,0
Ignition time	s	18	18	18	18	0
Extinction time	s	48	50	76	58	16
Duration of the test	s	1200	1200	1200	1200	0
Maximum heat release rate	kW·m^{-2}	216	212	231	220	10
Total heat release	MJ·m^{-2}	4,3	4,7	4,6	4,5	0,2
Maximum average rate of heat emission MARHE	kW·m^{-2}	78,0	77,9	77,9	77,9	0,1
Fire integrity acc. 5.2.2.2 EN 45545-2	YES/NO	NIE	NIE	NIE	NIE	-

Remarks: none.

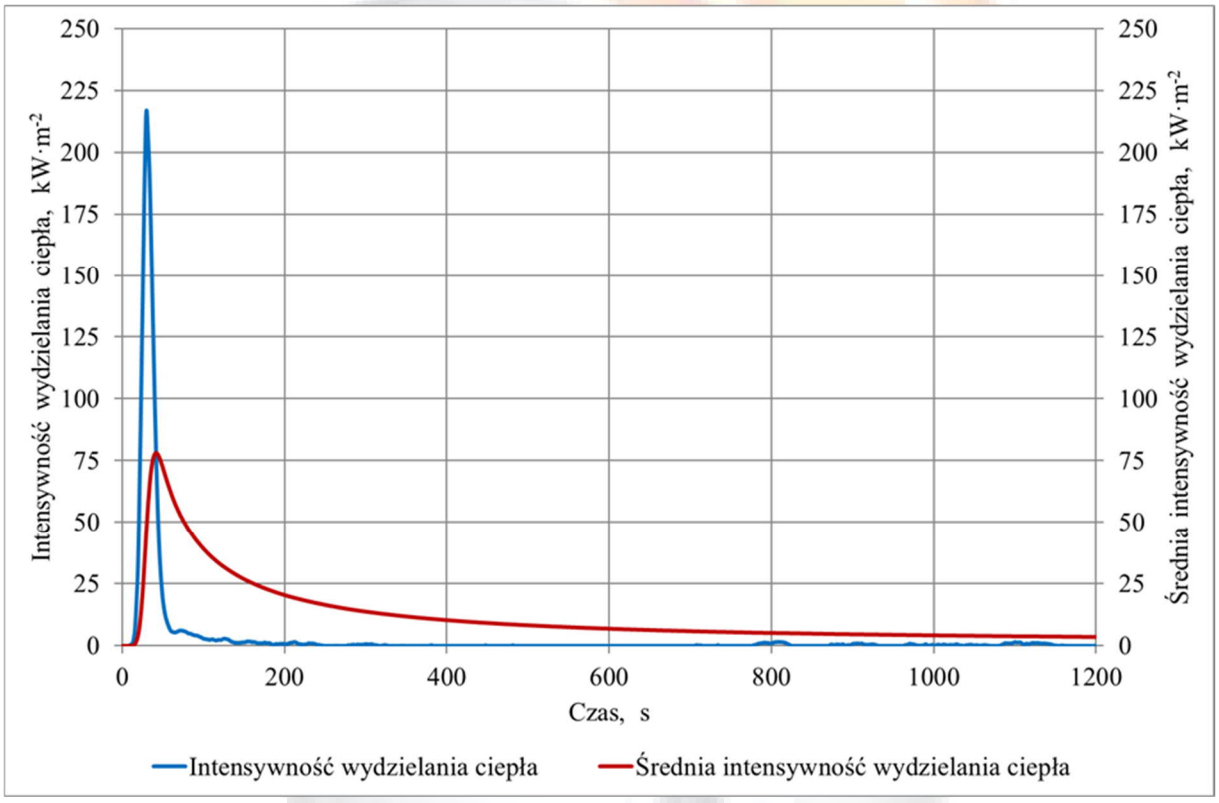

Figure 4.1. The relation of heat release rate and the time – specimen 1

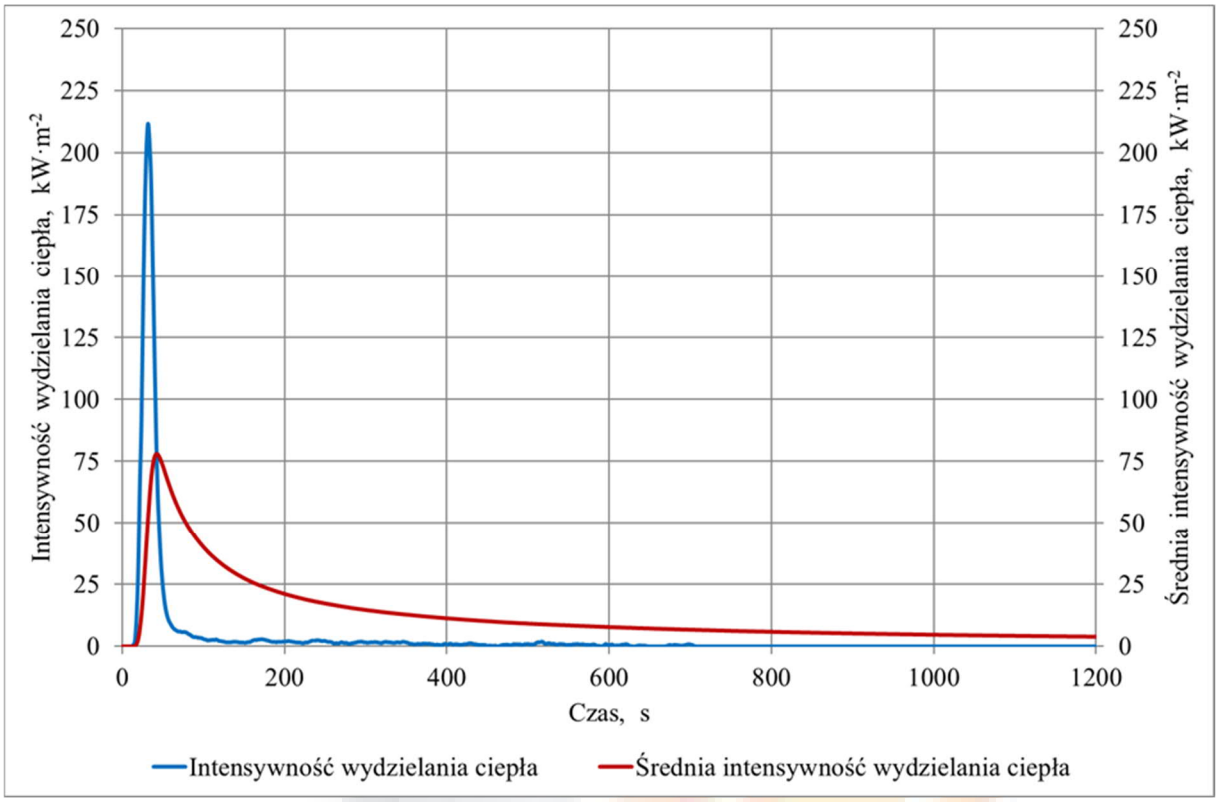

Figure 4.2. The relation of heat release rate and the time – specimen 2

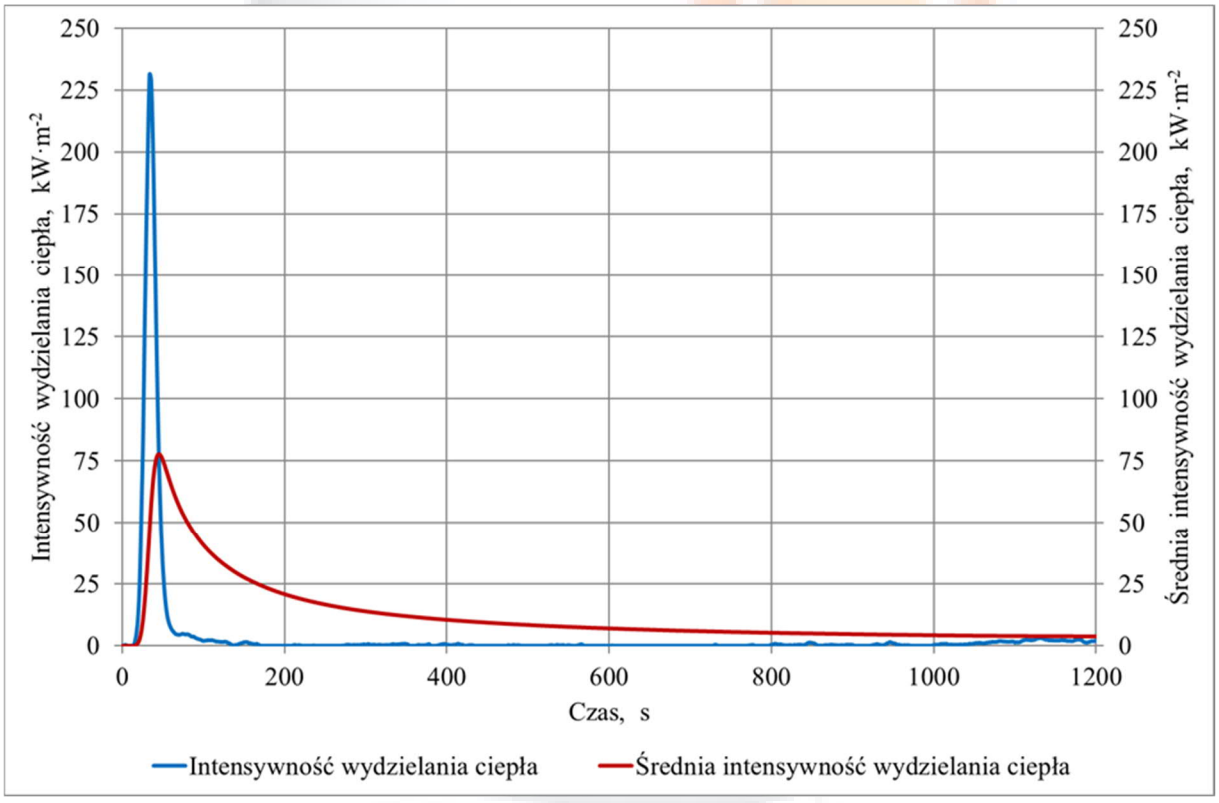

Figure 4.3. The relation of heat release rate and the time – specimen 3

5. 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	$kW \cdot m^{-2}$	77,9	-	90	60	-	0,87	1,30
	T10.01 EN ISO 5659-2: 50 $kW \cdot m^{-2}$	$D_s(4)$	-	123	600	300	150	0,20	0,41	0,82
	T10.02 EN ISO 5659-2: 50 $kW \cdot m^{-2}$	VOF_4	min	314	1200	600	300	0,26	0,52	1,05
	T11.01 EN 17084 Method 1 50 $kW \cdot m^{-2}$	CIT_G (4)	-	0,01	1,2	0,9	0,75	0,01	0,01	0,02
		CIT_G (8)	-	0,02	1,2	0,9	0,75	0,01	0,02	0,02

The tested product fulfils the requirement R1 according to EN 45545-2:2020+A1:2023 for hazard level HL1, HL2.

6. Remaining required information

Date of receipt of samples: 29.02.2024.

Sampling: sponsor took and delivered samples.

Description of the test material: light blue fabric, described as "Lucia CS" with thickness of 0,7 mm, weight per unit area 280-330 g/m^2. Sponsor delivered one sample with dimensions of 3360x1720 mm. Laboratory prepared samples for the test.

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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Date and place of test: 06.03.2024, Police