

Bellaterra: September 17th, 2018

File number: **18/17720-1672**

Petitioner: **3M ESPAÑA, S.L.**
Calle Juan Ignacio Luca de Tena, 19 -25
28027 MADRID
(Spain)

SIMPLIFIED SUMMARY REPORT

TEST REQUESTED

Compliance with the railway standard EN 45545-2:2013+A1:2015 performing the following test standards on a paint product:

- ISO 5658-2:2006 and ISO 5658-2Amd1:2011: "Reaction to fire tests -- Spread of flame -- Part 2: Lateral spread on building and transport products in vertical configuration."

- ISO 5660-1:2015: "Reaction to fire tests -- Heat release, smoke production and mass loss rate -- Part 1: Heat release rate (cone calorimeter method)"

- ISO 5659-2:2017: "Plastics -- Smoke generation -- Part 2: Determination of optical density by a single-chamber test" + EN 45545-2:2013+A1:2015 Annex C (Normative). Testing Methods for determination of toxic gases from railway products.

TESTED MATERIAL

Some panels were received with the following indications according to technical specifications provided by the petitioner:

Product trade name: **3M INDUSTRIAL PROTECTIVE FILM 7070UV**

3M INDUSTRIAL PROTECTIVE FILM 7070UV is an abrasion resistant, pressure sensitive adhesive film designed to protect surfaces from damage caused by abrasion, scratching, erosion, UV and minor impacts of 0.200 mm thickness, 1155 kg/m³ of density, transparent, dimensions 800mm x 155mm, 100mm x 100mm, 75mm x 75mm and smooth appearance.

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Fixing specifications: Substrate: Aluminium 5005 in the rough. Adhesive type: Acrylic 3M. Amount of adhesive: Thickness 0.038 mm incorporated in the sheet (total thickness 0.200 mm with adhesive included). Exposed surface: Polyurethane sheet support, bonded to the raw aluminium with 3M acrylic adhesive incorporated.

Final use condition: Coating of vertical and horizontal aluminium elements inside the train.
Maintenance conditions in their final use condition: Conventional cleaning with water and soap or mix of 50% isopropyl alcohol / 50% water.

TESTED MATERIAL

The tests are performed by a partner accredited laboratory; the complete tests and classification reports are attached in this test report in Annexes, with file numbers:

P-18-20445/1/I Test report

P-18-20445/2/I Classification report

TEST RESULTS

REQUIREMENT 1

Test method	Parameter	Number of tests	Continuous parameter mean	Compliance parameter R1-HL1	Compliance parameter R1-HL2	Compliance parameter R1-HL3
T02 ISO 5658-2	CFE (kW/m ²)	3	24.2 kW/m²	≥ 20 kW/m ²	≥ 20 kW/m ²	≥ 20 kW/m ²
T03.01 ISO 5660-1: 50 kW/m ²	MARHE (kW/m ²)	3	88.0 kW/m²	--	≤ 90 kW/m ²	≤ 60 kW/m ²
T10.01 ISO 5659-2: 50 kW/m ²	Ds (4 minutes) (dimensionless)	3	33.6	≤ 600	≤ 300	≤ 150
T10.02 ISO 5659-2: 50 kW/m ²	VOF4 (min)	3	82.0 min	≤ 1200 min	≤ 600 min	≤ 300 min
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2 Annex C. Method 1	CIT _G (4 minutes) (dimensionless)	3	0.020	≤ 1,2	≤ 0,9	≤ 0,75
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2 Annex C. Method 1	CIT _G (8 minutes) (dimensionless)	3	0.014	≤ 1,2	≤ 0,9	≤ 0,75

REQUIREMENT 2

Test method	Parameter	Number of tests	Continuous parameter mean	Compliance parameter R2-HL1	Compliance parameter R2-HL2	Compliance parameter R2-HL3
T02 ISO 5658-2	CFE (kW/m ²)	3	24.2 kW/m²	≥ 13 kW/m ²	≥ 13 kW/m ²	≥ 13 kW/m ²
T03.01 ISO 5660-1: 50 kW/m ²	MARHE (kW/m ²)	3	88.0 kW/m²	--	--	≤ 90 kW/m ²
T10.01 ISO 5659-2: 50 kW/m ²	Ds (4 minutes) (dimensionless)	3	33.6	≤ 600	≤ 300	≤ 150
T10.02 ISO 5659-2: 50 kW/m ²	VOF4 (min)	3	82.0 min	≤ 1200 min	≤ 600 min	≤ 300 min
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2 Annex C. Method 1	CIT _G (4 minutes) (dimensionless)	3	0.020	≤ 1,2	≤ 0,9	≤ 0,75
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2 Annex C. Method 1	CIT _G (8 minutes) (dimensionless)	3	0.014	≤ 1,2	≤ 0,9	≤ 0,75

REQUIREMENT 3

Test method	Parameter	Number of tests	Continuous parameter mean	Compliance parameter R3-HL1	Compliance parameter R3-HL2	Compliance parameter R3-HL3
T02 ISO 5658-2	CFE (kW/m ²)	3	24.2 kW/m²	≥ 13 kW/m ²	≥ 13 kW/m ²	≥ 13 kW/m ²
T03.01 ISO 5660-1: 50 kW/m ²	MARHE (kW/m ²)	3	88.0 kW/m²	--	--	--
T10.01 ISO 5659-2: 50 kW/m ²	Ds (4 minutes) (dimensionless)	3	33.6	--	≤ 480	≤ 240
T10.02 ISO 5659-2: 50 kW/m ²	VOF4 (min)	3	82.0 min	--	≤ 960 min	≤ 480 min
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2 Annex C. Method 1	CIT _G (4 minutes) (dimensionless)	3	0.020	≤ 1,2	≤ 0,9	≤ 0,75
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2 Annex C. Method 1	CIT _G (8 minutes) (dimensionless)	3	0.014	≤ 1,2	≤ 0,9	≤ 0,75

REQUIREMENT 7

Test method	Parameter	Number of tests	Continuous parameter mean	Compliance parameter R7-HL1	Compliance parameter R7-HL2	Compliance parameter R7-HL3
T02 ISO 5658-2	CFE (kW/m ²)	3	24.2 kW/m²	≥ 20 kW/m ²	≥ 20 kW/m ²	≥ 20 kW/m ²
T03.01 ISO 5660-1: 50 kW/m ²	MARHE (kW/m ²)	3	88.0 kW/m²	--	≤ 90 kW/m ²	≤ 60 kW/m ²
T10.04 ISO 5659-2: 50 kW/m ²	Ds max (dimensionless)	3	35.0	--	≤ 600	≤ 300
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2 Annex C. Method 1	CIT _G (4 minutes) (dimensionless)	3	0.020	--	≤ 1,8	≤ 1,5
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2 Annex C. Method 1	CIT _G (8 minutes) (dimensionless)	3	0.014	--	≤ 1,8	≤ 1,5

REQUIREMENT 17

Test method	Parameter	Number of tests	Continuous parameter mean	Compliance parameter R17-HL1	Compliance parameter R17-HL2	Compliance parameter R17-HL3
T02 ISO 5658-2	CFE (kW/m ²)	3	24.2 kW/m²	≥ 13 kW/m ²	≥ 13 kW/m ²	≥ 13 kW/m ²
T03.01 ISO 5660-1: 50 kW/m ²	MARHE (kW/m ²)	3	88.0 kW/m²	--	≤ 90 kW/m ²	≤ 60 kW/m ²
T10.04 ISO 5659-2: 50 kW/m ²	Ds max (dimensionless)	3	35.0	--	≤ 600	≤ 300
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2 Annex C. Method 1	CIT _G (4 minutes) (dimensionless)	3	0.020	--	≤ 1,8	≤ 1,5
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2 Annex C. Method 1	CIT _G (8 minutes) (dimensionless)	3	0.014	--	≤ 1,8	≤ 1,5

CLASIFICATION

This classification has been carried out according to European standard EN 45545-2:2013 +A1:2015. Railway applications – Fire protection on railway vehicles – Part 2: Requirements for fire behaviour of materials and component

The classifications obtained are the following ones:

Product reference: 3M INDUSTRIAL PROTECTIVE FILM 7070UV	Classification according to EN 45545-2:2013+A1:2015 (1), (2) and (3)
---	--

REQUIREMENT	HAZARD LEVEL
R1	HL1 and HL2
R2	HL1, HL2 and HL3
R3	HL1, HL2 and HL3
R7	HL1 and HL2
R17	HL1 and HL2

FIELD OF APPLICATION

(1) Classifications valid for the product, detailed as in the description of the classified product section and tested on the exposed face. The 0.2 mm protective film has been adhered on one of the faces of the aluminium standard substrate by the test applicant.

(2) Classifications valid for any superficial color and/or pattern of the product, as it is detailed in EN 45545-2:2012+A1:2015 standard, chapter 4.2.f.

(3) This document does not represent type approval or certification of the product.

Responsible of Fire Laboratory
LGAI Technological Center S.A. (APPLUS)

Responsible of Reaction to fire
LGAI Technological Center S.A. (APPLUS)

The results refer exclusively to the samples tested at the time and under the conditions indicated.

Applus+ guarantees that this task has been carried out in compliance with the requirements of our Quality and Sustainability System, and furthermore, that the contractual terms and legal regulations have been complied with.

In the framework of our improvement programme, we would appreciate any comments you may deem appropriate. These should be addressed to the manager who signs this document, or to the Quality Director of Applus+, at the following address: satisfaccion.cliente@applus.com

ANNEX



TEST REPORT

SUBJECT Nº/REPORT: P-18-20445/1/I
 COMPANY: **3M ESPAÑA, S.L.**
 ADDRESS: C/Juan Ignacio Luca de Tena, 19-25
 28027 MADRID

TESTED MATERIAL: **3M INDUSTRIAL PROTECTIVE FILM 7070UV**

DATE OF RECEPTION: 20th.07.18
 DATE OF ANALYSIS: 23rd.07.18 to 30th.08.18

Nº OF PAGES
 14
 (INCLUDING THIS COVER SHEET)

The results of the analysis only refer to the tested material.
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 José Luis Gómez
 Plastics & Composites Area Management
 Zamudio, 13th September 2018



MATERIAL

It has been received from **3M ESPAÑA, S.L.**, specimens of an industrial protective adhesive film adhered on one of the faces of the aluminium substrate.

The principal characteristics are the following ones according to the information supplied by the test applicant:

Manufacturer: **3M ESPAÑA, S.L.**
(Name and address) C/Juan Ignacio Luca de Tena,19-25
28027 MADRID

Product trade name: **3M INDUSTRIAL PROTECTIVE FILM 7070UV**

General Characteristics: Support of polyurethane sheet, joined to the aluminium substrate by means of an incorporated 3M acrylic adhesive

External layer characteristics (exposed face):

Type: Adhesive film designed to protect surfaces from damage caused by abrasion, scratching, erosion, UV and minor impacts.
Thickness: 0.2 mm
Density: 1155 kg/m³.
Color tested: Transparent
Aspect tested: Smooth
Orientability: Isotropic material on surface

Standard substrate a/t EN 45545-2:2013 + A1:2015:

Nature: Aluminium 5005 sheet
Thickness (mm): 1.0 ± 0.2
Density (kg/m³): 2700 ± 50

Fixing specifications:

Fixing method: Adhered by means of a pressure sensitive adhesive
Adhesive trade name: Acrylic 3M
Quantity applied: Thickness 0.038 mm incorporated in the sheet (total thickness 0.2 mm adhesive include)
End use condition: Vertical and horizontal Aluminium elements covering in train interiors



Maintenance conditions:

Conventional cleaning with water and soap or a mixture of 50% isopropyl alcohol and 50% water.

The material has been referred by the applicant and coded internally as:

Your Reference

3M INDUSTRIAL PROTECTIVE FILM 7070UV

Our Reference

P-18-20445-A-1

TESTS AND EQUIPMENT

It has been applied the following reaction to fire tests:

- Reaction to fire tests- Spread of flame- Part 2: Lateral spread on building and transport products in vertical configuration according to ISO 5658-2: 2006 + Amd.1:2011. Test carried out on the exposed face and the pilot flame used is a mixture of propane and air.
- Reaction to fire test - Heat release, smoke production and mass loss rate. Part 1: Heat release rate (cone calorimeter method) according to ISO 5660-1:2015.

Test conditions:

- a) Applying a radiation of 50 kW/m² on the exposed face.
- b) Distance of 25 mm between the surface of the specimen and the lowest edge of the radiator.
- c) The product is tested with the retainer frame (surface tested: 0,00884 m²) and placed, after wrapped in a layer of aluminium foil, directly above refractory fibre blanket according to paragraph 8.1.7.
- Plastics. Smoke generation. Part 2: Determination of optical density by a single-chamber test according to ISO 5659-2: 2017.
- Railway applications- Fire protection on railway vehicles- Part 2: Requirements for fire behaviour of materials and components. Annex C: Testing methods for determination of toxic gases from railway products. Smoke chamber method according to EN 45545-2:2013 + A1:2015. Annex C. Method 1.



These last two tests are carried out simultaneously and under these conditions:

- Applying a radiation of 50 kW/m^2 on the painted face.
- The distance between the surface of the specimen and the lowest edge of the radiator is 25 mm and pilot flame is not applied.
- The product is tested, after wrapped in aluminium foil, backed on a sheet of non-combustible insulating board (12,5 mm thick and density of $850 \pm 100 \text{ Kg/m}^3$) and a layer of low density refractory blanket layer under the non-combustible board.
- The test lasts 1200 s (according to C.8.2. Annex C of EN 45545-2:2013 + A1:2015 standard)

The principal equipment used to carry out the tests has been the following one:

- Cone calorimeter (MT FU 0053), heat flux meter associated (MT FU 0062) and its accessories.
- Vertical radiant panel (MT FU 0052) and optical pyrometer (MT FU 0056)
- Smoke chamber (MT FU 0054), heat flux meter associated (MT FU 0063) and its accessories.
- FTIR, model Gasmet CX-400, which operates with the analysis software Calcmeter STD&PRO. Version 11.11 and its accessories (MT FU 0059); with the capacity to operate with the smoke chamber simultaneously (MT FU 0054).
- Weighing machine (MT LB 0224), time device (MT FU 0029) and caliber (MT FU 0037)

NOTE:

Before the tests, the specimens were conditioned at $23 \pm 2 \text{ }^\circ\text{C}$ and $50 \pm 5\%$ of humidity until obtaining constant weight according to the mentioned standards.

The specimens were prepared following the test standards guidelines.

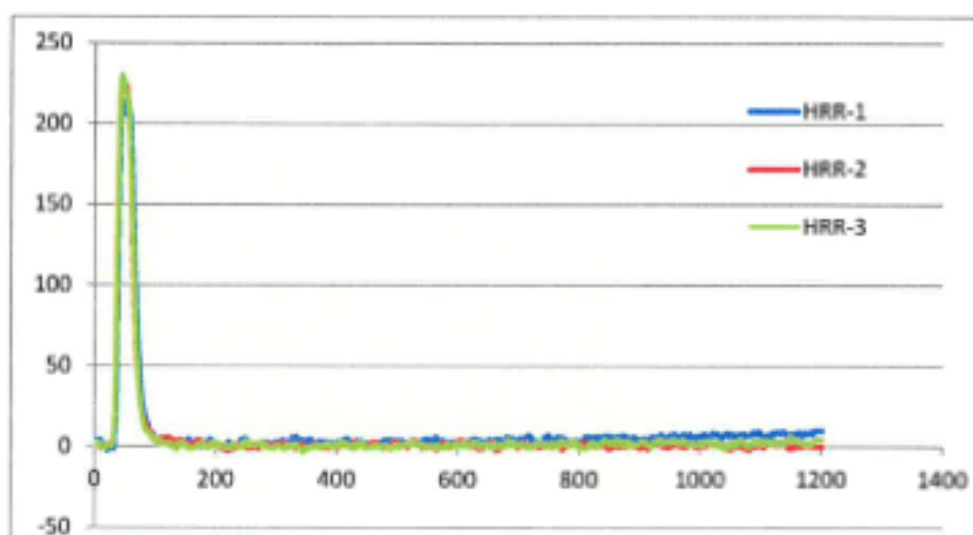
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Heat release rate determination a/t ISO 5660-1:2015⁽¹⁾

PARAMETER	Specimen 1	Specimen 2	Specimen 3	AVERAGE
MARHE(kW/m ²)	85.2	89.5	89.3	88.0

The following figure shows the rate of heat release evolution during the 20 minutes test (HRR vs t(s)):

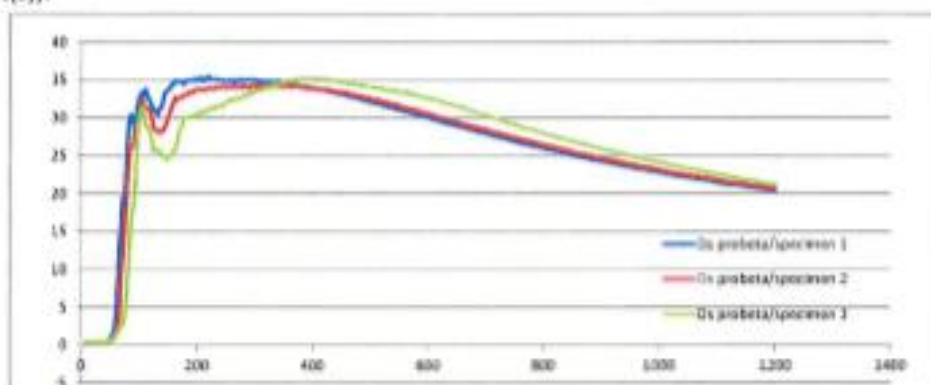




Optical smoke density determination a/t ISO 5659-2:2017 ^(*)

PARAMETER	Specimen 1	Specimen 2	Specimen 3	AVERAGE
Ds(4): Density at the 4 th minute	35.0	34.0	31.7	33.6
VOF4 (min)	88.7	82.2	75.0	82.0
Dm: Maximum density	35.4	34.5	35.2	35.0

The following figure shows the smoke density evolution during the 20 minutes test (Ds vs t(s)):



Gas toxicity determination test a/t EN 45545-2:2013 + A1:2015. Annex C. Method 1^(*)

PARAMETER	Specimen 1	Specimen 2	Specimen 3	AVERAGE
CIT ₀ 4 minutes	0.009	0.017	0.033	0.020
CIT ₀ 8 minutes	0.011	0.018	0.014	0.014

(*) All tests carried out on the exposed face.

NOTES:

- (1) "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".
- (2) "This document does not represent type approval or certification of the product".
- (3) "Uncertainty is available for the test applicant"


 IIA 45 notificación
 Jesus Ballester Maestu
 Maximum responsible for the test
 Zamudio, 13th September 2018



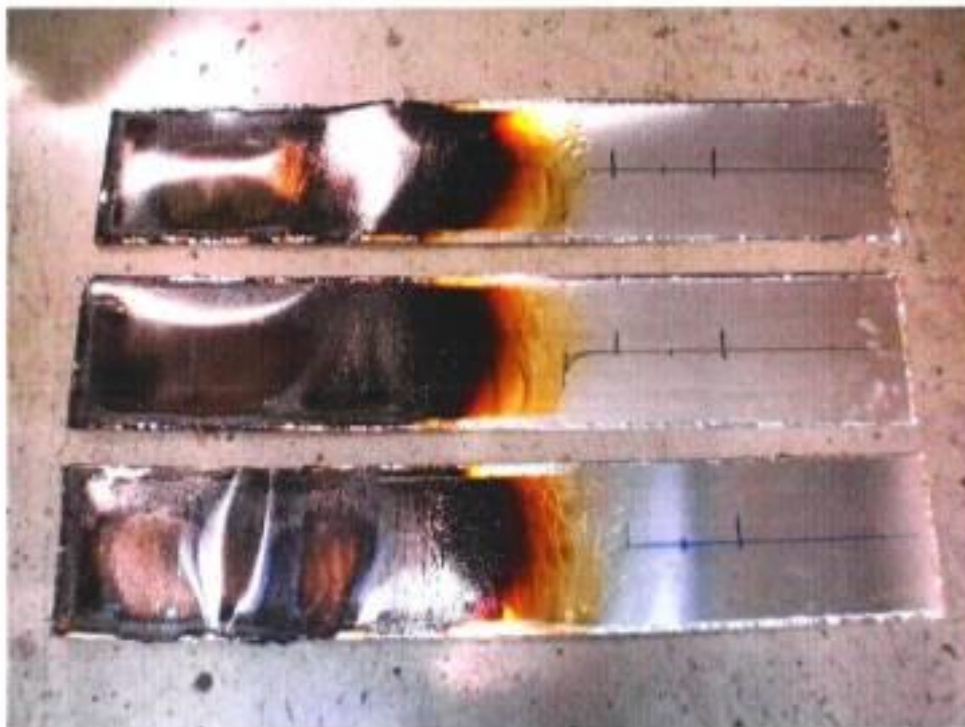
ANNEX

ASPECT SHOWN BY THE MATERIAL REFERRED AS:
3M INDUSTRIAL PROTECTIVE FILM 7070UV
AFTER THE CONE CALORIMETER TEST A/T ISO 5660-1:2015
(EXPOSED FACE TESTED)





ASPECT SHOWN BY THE MATERIAL REFERRED AS:
3M INDUSTRIAL PROTECTIVE FILM 7070UV
AFTER THE VERTICAL RADIANT PANEL TEST A/T ISO 5658-2:2006 + AMD 2011
(EXPOSED FACE TESTED)





ENSAJO DE CONO CALORIMÉTRICO
CONE CALORIMETRIC TEST

REFUGIO / DIRECTOR: P-18-20445
MATERIA / MATERIAL: P-18-20445-A-1
REVISOR / REVISOR: 0015003-1
ANALISTA / ANALYST: A. Gómez

INICIO DE ENSAYO / BEGINNING OF TEST: 20/03/2019
FIN DE ENSAYO / END OF TEST: 20/03/2019
TEMPERATURA / TEMPERATURE (°C): 25
HUMEDAD / HUMIDITY (%): 58

TIPO DE MATERIA:	Fibra de vidrio
TIPO DE MATERIAL:	Químico / Fibra
TIPO DE SUBSTRATO:	Aluminio
TIPO DE SUSTRATO:	Aluminio
TIPO DE LÍNEA:	-
TIPO DE JUNT:	-
Método de ensayo: ensayo de cono calorimétrico (EN 13773-1)	
Método de ensayo: ensayo de cono calorimétrico (EN 13773-1)	

RESULTADOS / RESULTS				
PROBETA / SPECIMEN	1	2	3	MEDIA AVERAGE
Espesor (Thickness) (mm)	1,23	1,23	1,23	---
Massa (Mass) (g)	29,32	29,31	29,54	---
Flujo de calor a 600s / Heat flux (W/m²)	0,0778	0,0745	0,0745	---
C. Constante de flujo / Flux constant	0,04008	0,04002	0,04002	---
Tiempo de flujo a 600s / Time to constant fluxing (s)	40	40	40	---
MAF60 (W/m²)	30,15	30,5	30,15	30,27
q600 (W/m²)	30,25	30,55	30,27	30,36
q600 (W/m²)	30,51	31,30	31,31	31,37
q600 max (W/m²)	31,374	32,538	32,538	32,537
q600 max (W/m²)	31,374	32,538	32,538	32,537
THR (J/m²)	11,1	1,3	2,5	5,71
Resistencia al grado de flujo a 600s (g)	29,01	29,42	29,45	29,29
Resistencia al grado de flujo a 600s (g)	29,06	29,42	29,42	29,29
Velocidad media de pérdida de masa (g/m²)	0,064	0,044	0,142	0,08
Velocidad media de pérdida de masa (g/m²)	0,064	0,044	0,142	0,08
MAF60: Pérdida de masa / masa (g/m²)	40,35	31,35	30,57	30,40
MAF60: 10% - 50% (g/m²)	---	---	---	---
Duración del ensayo / Test duration (s)	1200	1200	1200	---

Valor Medio del MAF60 / AVERAGE value (W/m²) = 30,27

COMENTARIOS / COMMENTS:

Se realizaron ensayos de acuerdo a la metodología del ensayo.

Difficulties during the test:

Difficult observations:

Difficult observations:

NOTA: Los resultados del ensayo corresponden al comportamiento de los especímenes de un producto, bajo las condiciones particulares de ensayo. No representan cantidad de datos o datos de valores de los especímenes de producto que pueden diferir de uno del producto.

NOTE: These test results relate only to the behavior of the product under the particular conditions of this test and they are not intended to be taken as values representing the potential behavior of the product in use.

REFUGIO / DIRECTOR: P-18-20445

Verificación del Informe / File verification: 26.06.2019



ENSAYO DE PAVEL RADIANTE VERTICAL
VERTICAL RADIANT PANEL

SPACUNTO/SUBJECT Nº: P-18-20445
MATERIAL/MATERIAL: P-18-20445-01
NORMA/PROCEDURE: ISO 1508
ANEXO/A/ANNEX: 1. Grupos

INICIO DE ENDESEMPEÑO/OF TEST: 24/03/2018
FIN DE ENDESEMPEÑO/OF TEST: 26/03/2018
TEMPERATURA/TEMPERATURE (°C): 24
HUMEDAD/HUMIDITY (%): 54

TIPO DE MATERIAL: Film adhesivo
TIPO DE MATERIAL: Adhesive film
TIPO DE SUBSTRATO: Acero
TIPO DE ELASTICIDAD: No elástico
TIPO DE UNIÓN: Adhesivo
TIPO DE JUNTAS: Adhesivo
TIPO DE JUNTAS: Adhesivo

RESULTADOS / RESULTS				
PRUEBA / SPECIMEN	1	2	3	MEDIA / AVERAGE
Inicio / Inicio (s)	1.34	1.35	1.15	---
Temperatura máxima de la muestra (s)	43	39	42	---
Temperatura máxima de la muestra (s)	---	---	---	---
Temperatura máxima de la muestra (s)	131	143	131	---
Temperatura máxima de la muestra (s)	---	---	---	---
Temperatura máxima de la muestra (s)	303	303	303	---
Temperatura máxima de la muestra (s)	---	---	---	---
Temperatura máxima de la muestra (s)	97	124	194	---
CR (J/m²)	24.313	24.221	24.227	24.25
GR (W/m²)	2.4544	2.385	2.4517	2.38
IR (W/m²)	0.1002	0.0804	0.1143	0.11
IR (W/m²)	1.0357	0.9303	0.8306	0.94
Duración del ensayo / Duration of the test (s)	755	734	753	---

Valor Medio de CR / CR average value (J/m²) = 24.25

Valor Medio de GR / GR average value (W/m²) = 2.38

Valor Medio de IR / IR average value (W/m²) = 0.11

Valor Medio de IR / IR average value (W/m²) = 0.94

OBSERVACIONES/OBSERVATIONS:

¿Desprendimiento de material observado? (DAMP): No

¿Ocas flamm during test? (DAMP): No

¿Se produjo algún tipo de daño durante el ensayo? (DAMP): No

¿Se produjo algún tipo de daño durante el ensayo? (DAMP): No

¿Se produjo algún tipo de daño durante el ensayo? (DAMP): No

¿Se produjo algún tipo de daño durante el ensayo? (DAMP): No

¿Se produjo algún tipo de daño durante el ensayo? (DAMP): No

¿Se produjo algún tipo de daño durante el ensayo? (DAMP): No

¿Se produjo algún tipo de daño durante el ensayo? (DAMP): No

NOTA: Los resultados del ensayo corresponden al comportamiento de las muestras de un producto, bajo las condiciones particulares de ensayo. No pretenden constituir el único criterio de valoración del riesgo potencial de incendio que puede existir en el uso del producto.

NOTE: These test results relate only to the behaviour of the product under the particular conditions of the test and they are not intended to be sole criterion for assessing the potential fire hazard of the product in use.



ENSAYO DE DENSIDAD DE HUMOS
SMOKE DENSITY TEST

MP ASUNTO / SUBJECTIVE: P-18-20445 INDEXO DE ENSAYO / RETURNING OF TEST: 26/06/2018
MATERIAL / MATERIAL: P-18-20445-A1 FIN DE ENSAYO / END OF TEST: 26/06/2018
NORMA / PROCEDURE: ISO 5659-2 TEMPERATURA / TEMPERATURE (°C): 25
ANALISTA / ANALYST: Edgar A HUMEDAD / HUMIDITY (%): 57

TPO DE MATERIAL: Film adhesivo
TYPE OF MATERIAL: Adhesive film
TPO DE SUBSTRATO: Aluminio
TYPE OF SUBSTRATE: Aluminium
CARA ENSAYADA: Cara vista
FACE TESTED: Exposed face
Nivel de radiación / Radiation level (kR/h ²): 80
Uso de placa (S / No) / Use of plate (Yes / No): No / No

RESULTADOS / RESULTS				
PROBETA / SPECIMEN	1	2	3	valor promedio
Espesor / Thickness (mm)	1,17	1,17	1,17	1,17
Masa inicial / Initial Mass (g)	16,38	16,66	16,12	16,40
Masa final / Final Mass (g)	15,26	15,27	15,27	15,25
Pérdida de masa / Mass loss (g)	1,12	1,39	1,25	1,27
Tiempo de ignición / Ignition Time (s)	60,00	70,00	70,00	70,00
Tiempo de extinción / Extinction Time (s)	150,00	130,00	150,00	140,00
D(4) Densidad a 4 minutos / Density at 4th minute	33,01	33,06	33,73	33,94
VO(4) (vol)	88,70	89,17	74,94	86,94
Dens. Densidad máxima / Maximum density	25,43	36,88	35,33	35,94
Dens. Densidad máxima corregida / Maximum corrected density	29,20	28,25	25,48	28,94
Duración del ensayo / Duration of the test (s)	1200,00	1200,00	1200,00	—

Valor medio de D(4) / D(4) average value = 33,94
Valor Medio de VO(4) / VO(4) average value (vol) = 86,94
Valor medio de Dens / Dens average value = 35,94

OBSERVACIONES / OBSERVATIONS:

Otras observaciones: No
Other observations: No

NOTA: Los resultados del ensayo corresponden al comportamiento de las muestras de un producto, bajo las condiciones particulares de ensayo, los resultados constituyen el único criterio de calificación del riesgo potencial de incendio que puede tener el uso del producto.

NOTE: These test results relate only to the behaviour of the product under the particular conditions of this test and they are not intended to be sole criterion for assessing the potential fire hazard of the product in use.



CLASSIFICATION REPORT

SUBJECT Nº/REPORT: P-18-20445/2/1
 COMPANY: 3M ESPAÑA, S.L.
 ADDRESS: C/Juan Ignacio Luca de Tena, 19-25
 28027 MADRID

PRODUCT NAME: 3M INDUSTRIAL PROTECTIVE FILM 7070UV

Nº OF PAGES
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 (INCLUDING THIS COVER SHEET)

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ENAC es firmante del Acuerdo Multilateral (MLA), (Acuerdo de Reconocimiento Mutuo MRA) de la European Cooperation for Accreditation (EA) y de la International Laboratory Accreditation Cooperation (ILAC), en materia de ensayos. (ENAC is a signatory to the Multilateral Agreement (MLA), MRA Mutual Recognition Agreement) of the European Cooperation for Accreditation (EA) and the International Laboratory Accreditation Cooperation (ILAC), in testing.


 José Luis Gómez
 Plastics & Composites Area Management
 Zamudio, 13th September 2018



DESCRIPTION OF THE CLASSIFIED PRODUCT

It has been received from **3M ESPAÑA, S.L.**, specimens of an industrial protective adhesive film adhered on one of the faces of the aluminium substrate.

The principal characteristics are the following ones according to the information supplied by the test applicant:

Manufacturer: **3M ESPAÑA, S.L.**
(Name and address) C/Juan Ignacio Luca de Tena,19-25
28027 MADRID

Product trade name: **3M INDUSTRIAL PROTECTIVE FILM 7070UV**

General Characteristics: Support of polyurethane sheet, joined to the aluminium substrate by means of an incorporated 3M acrylic adhesive

External layer characteristics (exposed face):

Type: Adhesive film designed to protect surfaces from damage caused by abrasion, scratching, erosion, UV and minor impacts.

Thickness: 0.2 mm

Density: 1155 kg/m³.

Color tested: Transparent

Aspect tested: Smooth

Orientability: Isotropic material on surface

Standard substrate a/t EN 45545-2:2013 + A1:2015:

Nature: Aluminium 5005 sheet

Thickness (mm): 1.0 ± 0.2

Density (kg/m³): 2700 ± 50

Fixing specifications:

Fixing method: Adhered by means of a pressure sensitive adhesive

Adhesive trade name: Acrylic 3M

Quantity applied: Thickness 0.038 mm incorporated in the sheet (total thickness 0.2 mm adhesive include)

End use condition: Vertical and horizontal Aluminium elements covering in train interiors

Maintenance conditions: Conventional cleaning with water and soap or a mixture of 50% isopropyl alcohol and 50% water.



TEST REPORTS AND RESULTS

Test reports

Name of the laboratory	Name of the sponsor	Test report reference number	Test method
GAIKER	3M ESPAÑA, S.L.	P-18-20445/1/I Test date: 23 rd .07.18 to 30 th .08.18	ISO 5658-2:2006 + Amd 1: 2011 ISO 5660-1:2015 ISO 5659-2:2017 EN 45545-2: 2013+A1:2015, Annex C, Method 1

Test results

REQUIREMENT 1

Test method	Parameter	Number of tests	Continuous parameter mean	Compliance parameters R1-HL1	Compliance parameters R1-HL2	Compliance parameters R1-HL3
T02 ISO 5658-2	CFE (kW/m ²)	3	24.2	≥ 20 kW/m ²	≥ 20 kW/m ²	≥ 20 kW/m ²
T03.01 ISO 5660-1: 50 kW/m ²	MARHE (kW/m ²)	3	88.0	-	≤ 90 kW/m ²	≤ 60 kW/m ²
T10.01 ISO 5659-2: 50 kW/m ²	D ₅ (4 minutes) (dimensionless)	3	33.6	≤ 600	≤ 300	≤ 150
T10.02 ISO 5659-2: 50 kW/m ²	VDF4 (min)	3	82.0	≤ 1200 min	≤ 600 min	≤ 300 min
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2, Annex C, Method 1	DT ₅ (4 minutes) (dimensionless)	3	0.020	≤ 1,2	≤ 0,9	≤ 0,75
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2, Annex C, Method 1	DT ₃ (8 minutes) (dimensionless)	3	0.014	≤ 1,2	≤ 0,9	≤ 0,75



REQUIREMENT 2

Test method	Parameter	Number of tests	Continuous parameter mean	Compliance parameters R2-HL1	Compliance parameters R2-HL2	Compliance parameters R2-HL3
T02 ISO 5658-2	CPE (kW/m ²)	3	24.2	≥ 13 kW/m ²	≥ 13kW/m ²	≥ 13 kW/m ²
T03.01 ISO 5660-1: 50 kW/m ²	MARHE (kW/m ²)	3	88.0	-	-	≤ 90 kW/m ²
T10.01 ISO 5659-2: 50 kW/m ²	D ₀ [4 minutes] (dimensionless)	3	33.6	≤ 600	≤ 300	≤ 150
T10.02 ISO 5659-2: 50 kW/m ²	VDF4 (min)	3	82.0	≤ 1200 min	≤ 600 min	≤ 300 min
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2, Annex C, Method 1	CT _A [4 minutes] (dimensionless)	3	0.020	≤ 1,2	≤ 0,9	≤ 0,75
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2, Annex C, Method 1	CT _A [8 minutes] (dimensionless)	3	0.014	≤ 1,2	≤ 0,9	≤ 0,75



REQUIREMENT 3

Test method	Parameter	Number of tests	Continuous parameter mean	Compliance parameters R3-HL1	Compliance parameters R3-HL2	Compliance parameters R3-HL3
T02 ISO 5658-2	CPE (kW/m2)	3	24.2	≥ 13 kW/m2	≥ 13kW/m2	≥ 13 kW/m2
T03.01 ISO 5660-1: 50 kW/m2	MARHE (kW/m2)	3	88.0	-	-	-
T10.01 ISO 5659-2: 50 kW/m2	Os (4 minutes) (dimensionless)	3	33.6	-	≤ 480	≤ 240
T10.02 ISO 5659-2: 50 kW/m2	VOF4 (min)	3	82.0	-	≤ 960min	≤ 480 min
T11.01 ISO 5659-2: 50 kW/m2 + EN 45545-2, Annex C. Method 1	CT ₄ (4 minutes) (dimensionless)	3	0.020	≤ 1,2	≤ 0,9	≤ 0,75
T11.01 ISO 5659-2: 50 kW/m2 + EN 45545-2, Annex C. Method 1	CT ₈ (8 minutes) (dimensionless)	3	0.014	≤ 1,2	≤ 0,9	≤ 0,75

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REQUIREMENT 17

Test method	Parameter	Number of tests	Continuous parameter mean	Compliance parameters R17-HL1	Compliance parameters R17-HL2	Compliance parameters R17-HL3
T02 ISO 5658-2	CPE (kW/m ²)	3	24.2	≥ 13 kW/m ²	≥ 13 kW/m ²	≥ 13 kW/m ²
T03.01 ISO 5659-1: 50 kW/m ²	MARHE (kW/m ²)	3	88.0	-	≤ 90 kW/m ²	≤ 60 kW/m ²
T10.04 ISO 5659-2: 50 kW/m ²	D _s max (dimensionless)	3	35.0	-	≤ 600	≤ 300
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2, Annex C, Method 1	CT ₅ (4 minutes) (dimensionless)	3	0.020	-	≤ 1,8	≤ 1,5
T11.01 ISO 5659-2: 50 kW/m ² + EN 45545-2, Annex C, Method 1	CT ₈ (8 minutes) (dimensionless)	3	0.014	-	≤ 1,8	≤ 1,5



CLASSIFICATION AND FIELD OF APPLICATION

This classification has been carried out according to European standard EN 45545-2: 2013 + A1:2015. Railway applications- Fire protection on railway vehicles- Part 2: Requirements for fire behaviour of materials and components.

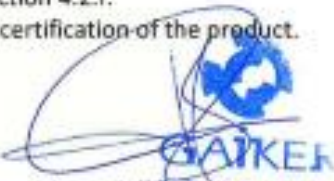
The classifications obtained are the following ones:

PRODUCT REFERENCE	CLASSIFICATION a/t EN 45545-2:2013 + A1:2015
3M INDUSTRIAL PROTECTIVE FILM 7070UV	(1), (2) and (3)

REQUIREMENT	HAZARD LEVEL
R1	HL1 and HL2
R2	HL1, HL2 and HL3
R3	HL1, HL2 and HL3
R7	HL1 and HL2
R17	HL1 and HL2

Field of application

- (1) Classifications valid for the product, detailed as in the description of the classified product section and tested on the exposed face. The 0.2 mm protective film has been adhered on one of the faces of the aluminium standard substrate by the test applicant.
- (2) Classifications valid for any superficial color and/or pattern of the product, as it is detailed in EN 45545-2:2013 + A1:2015 standard, section 4.2.f.
- (3) This document does not represent type approval or certification of the product.


Jesus Bailestero Maestru
Maximum Responsible for the test
Zamudio, 13th September 2018