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REPORT

Reaction to fire testing of Avery Dennison® 5600 LD Translucent Film
Single Burning Item test according to EN 13823:2014

Report no.	2016-Efectis-R000626
Sponsor	Avery Dennison Willem Einthovenstraat 11 2342 BH OEGSTGEEST THE NETHERLANDS
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1. PRODUCT IDENTIFICATION

Avery Dennison® 5600 LD Translucent Film, further referred to as 'the product'.

2. ABSTRACT

Determination of the reaction to fire properties of the product, when exposed to the thermal attack by a **Single Burning Item** according to EN 13823:2010+A1:2014, with the objective to obtain the reaction to fire classification according to EN 13501-1:2007+A1:2009.

3. DETAILS OF THE PRODUCT TESTED

3.1 INTENDED APPLICATION

The product will be used as a wall covering.

3.2 MANUFACTURER/IMPORTER

Avery Dennison
Graphics & Reflective Solutions
P.O. Box 28
2300 AA LEIDEN
THE NETHERLANDS

3.3 PRODUCT DESCRIPTION

According to the sponsor the product is from inside out composed of:
Face film: 70 µm, translucent cast vinyl film
Various colours
Adhesive: 30 µm, permanent, transparent acrylic based
Backing paper: 75 µm, PET liner
See appendix 'Product data sheet' for more detailed information.

The product has a total thickness of 100 µm and a mass per unit area of approx. 125 kg/m^2 (measured on the product).

4. DETAILS OF THE EXAMINATION

4.1 SAMPLES

Sampling procedure	The samples were submitted by the sponsor.
Age	At the time of receipt: no information received.
Date of receipt	April 29, 2016

4.2 SPECIMENS

Substrate used	Steel sheet, thickness approx. 1.2 mm (class A1/A2 according to EN 13238:2010)
Specimen preparation	The long specimen wing was provided with a vertical joint at a distance of 200 mm from the inner corner. See photographs of the SBI test at the end of the report The specimens were prepared by Efectis.
Method of fixing	Using the adhesive of the product

4.3 CONDITIONING

Prior to the examinations, the specimens were conditioned over a period of 2 weeks minimum at a temperature of (23 ± 2) ºC and a relative humidity of (50 ± 5) % according to § 4.1 of EN 13238.

4.4 EXAMINATION

Method of mounting and fixing	The panels were positioned with an air gap of 40 mm to the backing board
Deviations from the test method	None
Harmonised Product Standard	At the time of examination of the product, the sponsor was not aware of a related existing Harmonised Product Standard
Assessment	The film colours used in the tests are red, blue and green. The results of the tests performed are representative for all colours
Assessment	One SBI test was performed with each colour as mentioned above, before it was decided to perform the full examination with the red coloured specimens.
Number of tests	A total of three Single Burning Item tests were carried out, all in accordance with EN 13823
Date of examination:	May 10 and 25, 2016

The results are given in Table 1.

Table 1: Single Burning Item classification parameter results

Test parameter \ Test number		1	2	3	**Classification parameter**	4	5
Sample colour		Red				Blue	Green
$FIGRA_{0.2\ MJ}$	[W/s]	56	65	76	**66**	42	48
$FIGRA_{0.4\ MJ}$	[W/s]	0	0	0	**0**	0	21
THR_{600s}	[MJ]	0.7	0.7	0.7	**0.7**	0.6	0.8
LFS	{Yes, No}	No	No	No	**No**	No	No
SMOGRA	$[m^2/s^2]$	16.1	14.6	13.0	**14.6**	15.8	12.4
TSP_{600s}	$[m^2]$	59	42	37	**46**	45	51
Flaming droplets/particles							
Flaming ≤ 10 s	{Yes, No}	No	No	No	**No**	No	No
Flaming > 10 s	{Yes, No}	No	No	No	**No**	No	No

FIGRA Fire growth rate: The maximum of the quotient of heat release rate from the burning specimen and the time of its occurrence, determined during the full test period, using a THR-threshold of 0.2 MJ or 0.4 MJ and a HRR-threshold of 3 kW.

THR_{600s} Total heat release from the burning specimen during the first 600s of exposure to the main burner flames.

LFS Lateral flame spread over the long specimen wing.

SMOGRA Smoke growth rate: The maximum of the quotient of smoke production rate from the burning specimen and the time of its occurrence (multiplied by 10.000), determined during the full test period, using the TSP-threshold of 6 m^2 and the SPR-threshold of 0.1 m^2/s.

TSP_{600s} Total smoke production from the burning specimen during the first 600s of exposure to the main burner flames.

Observations of physical behaviour of the test specimen: None

5. CONCLUSIONS

A formal classification is to be assessed in accordance with EN 13501-1, "Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests".

Graphs of Rate of Heat Release ($HRR_{av}(t)$), Rate of Smoke Production ($SPR_{av}(t)$), Total Heat release (THR(t)), Total Smoke Production (TSP(t)), $FIGRA_{0.2\ MJ}$, $FIGRA_{0.4\ MJ}$ and SMOGRA, are presented hereafter followed by some photographs of the test setup and test results.

Remarks:
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.

Regarding the estimated precision of the test method, the following information is given in Annex B of EN 13823.

Table B.2 — Average relative standard deviations

	$FIGRA_{0.2\ MJ}$	$FIGRA_{0.4\ MJ}$	$THR_{600\ s}$	SMOGRA	$TSP_{600\ s}$
Average (s_r /m)	14 %	15 %	11 %	15 %	18 %
Average (s_R /m)	23 %	25 %	21 %	40 %	44 %

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APPENDIX: CHARTS

Chart 1 Rate of Heat Release ($HRR_{av}(t)$) [kW]

Chart 2 Rate of Smoke Production ($SPR_{av}(t)$) [m^2/s]

Chart 3 Total Heat release (THR(t)) [MJ]

Chart 4 Total Smoke Production (TSP(t)) [m^2]

Chart 5 $FIGRA_{0.2\ MJ}$ [W/s]

Chart 6 $FIGRA_{0.4\ MJ}$ [W/s]

Chart 7 SMOGRA [m^2/s^2]

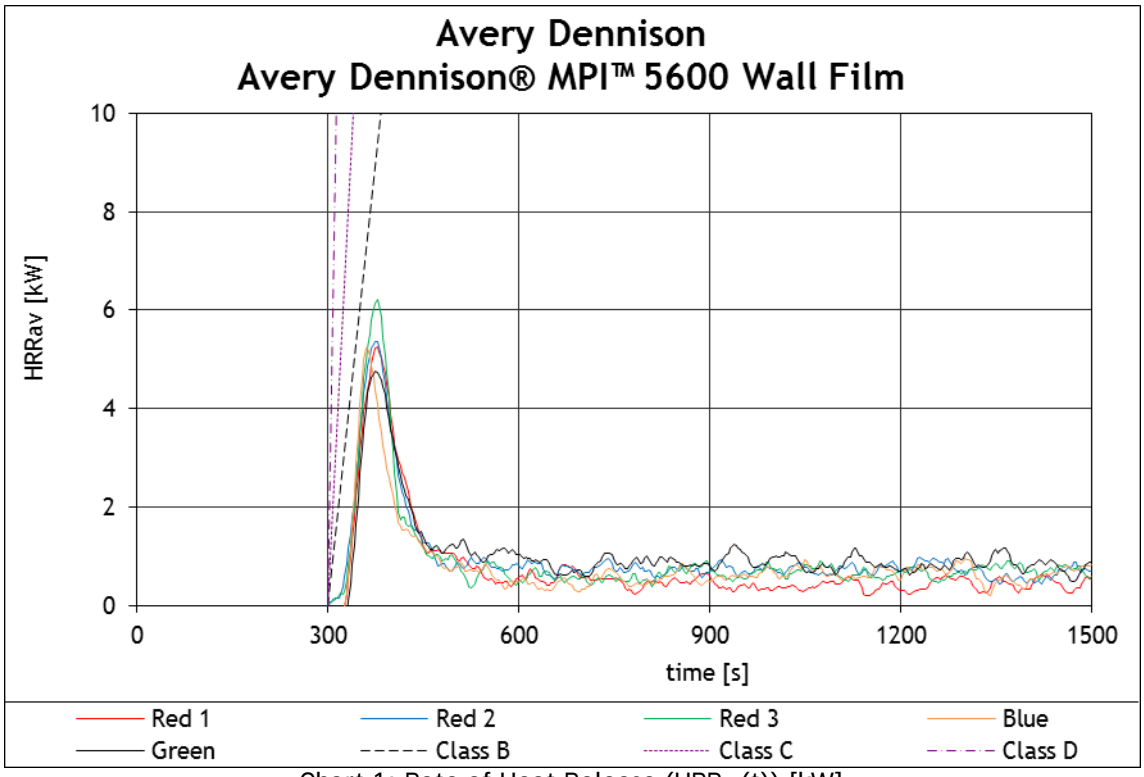

Chart 1: Rate of Heat Release ($HRR_{av}(t)$) [kW]

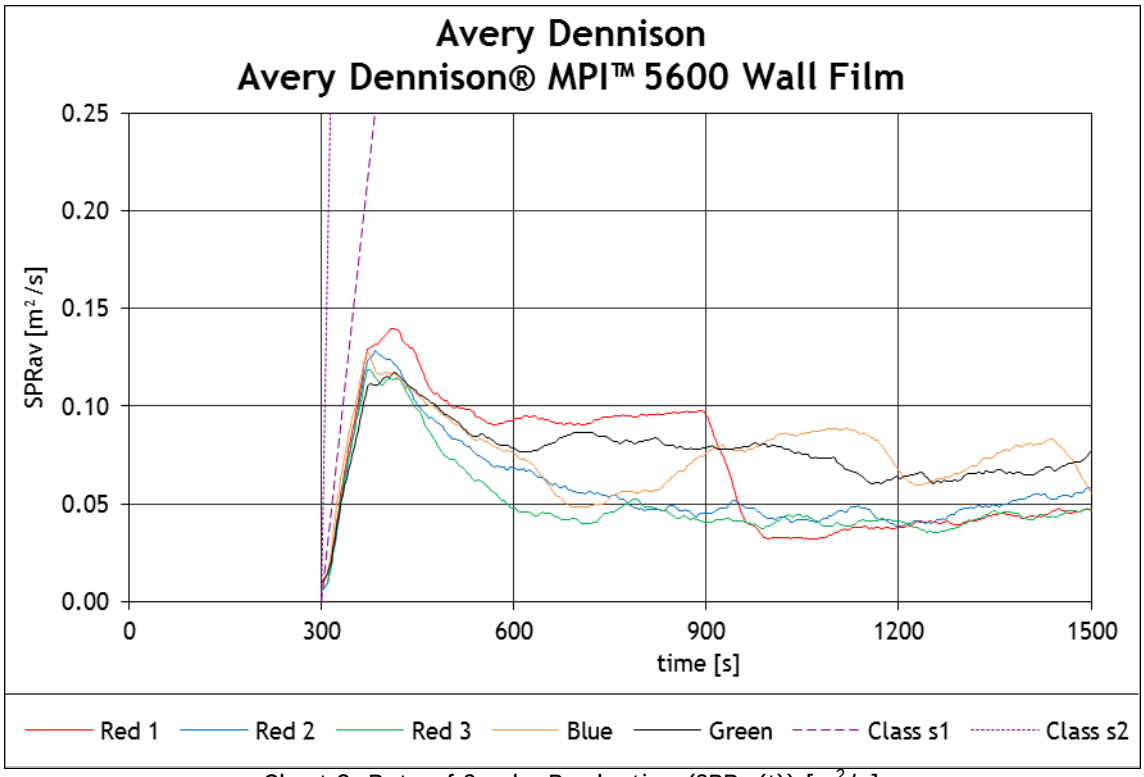

Chart 2: Rate of Smoke Production ($SPR_{av}(t)$) [m^2/s]

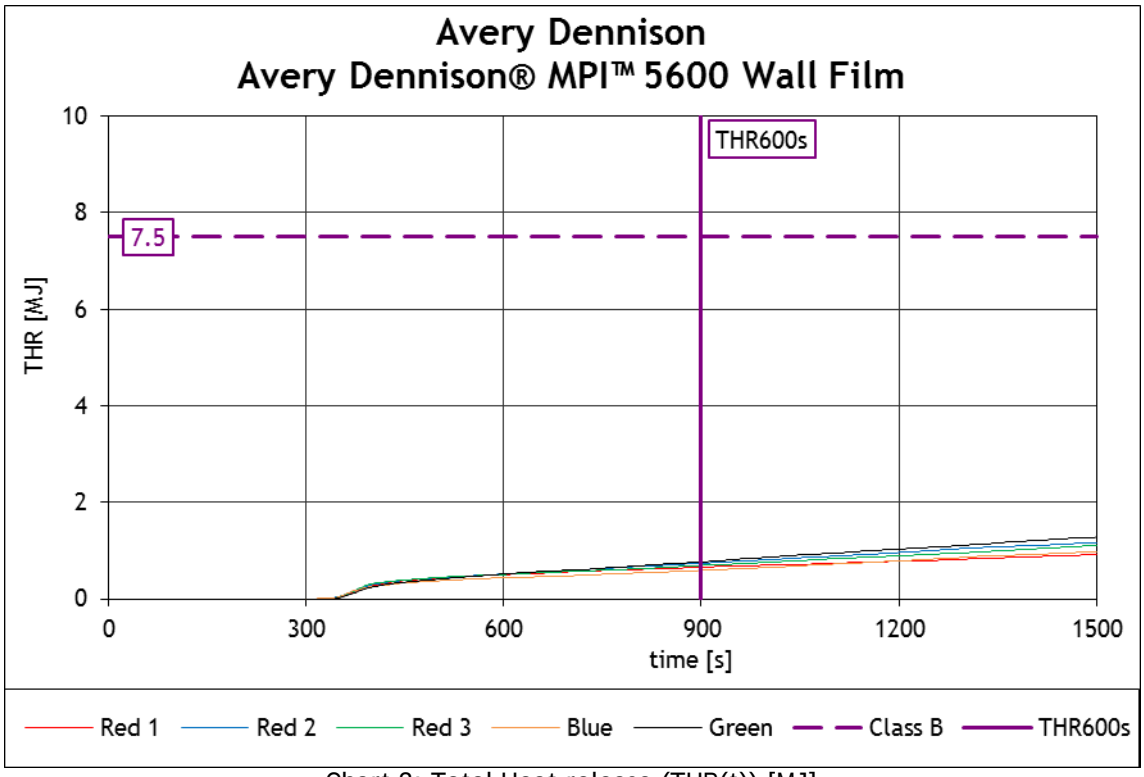

Chart 3: Total Heat release (THR(t)) [MJ]

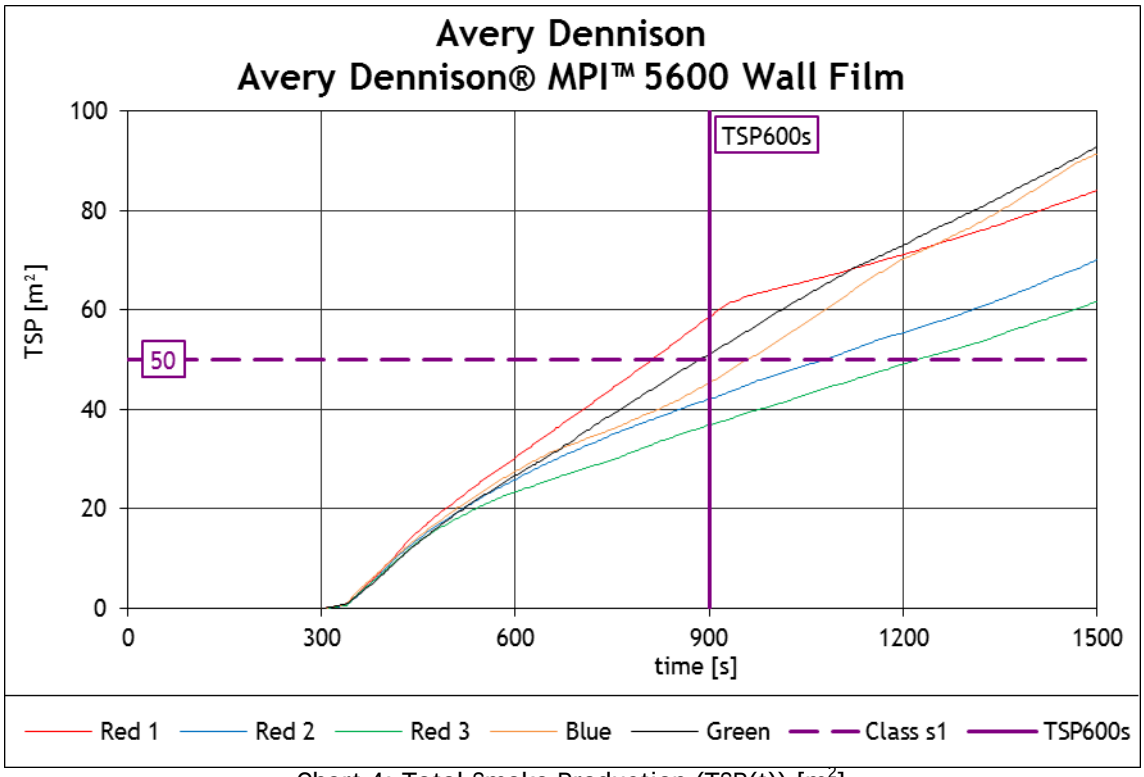

Chart 4: Total Smoke Production (TSP(t)) [m^2]

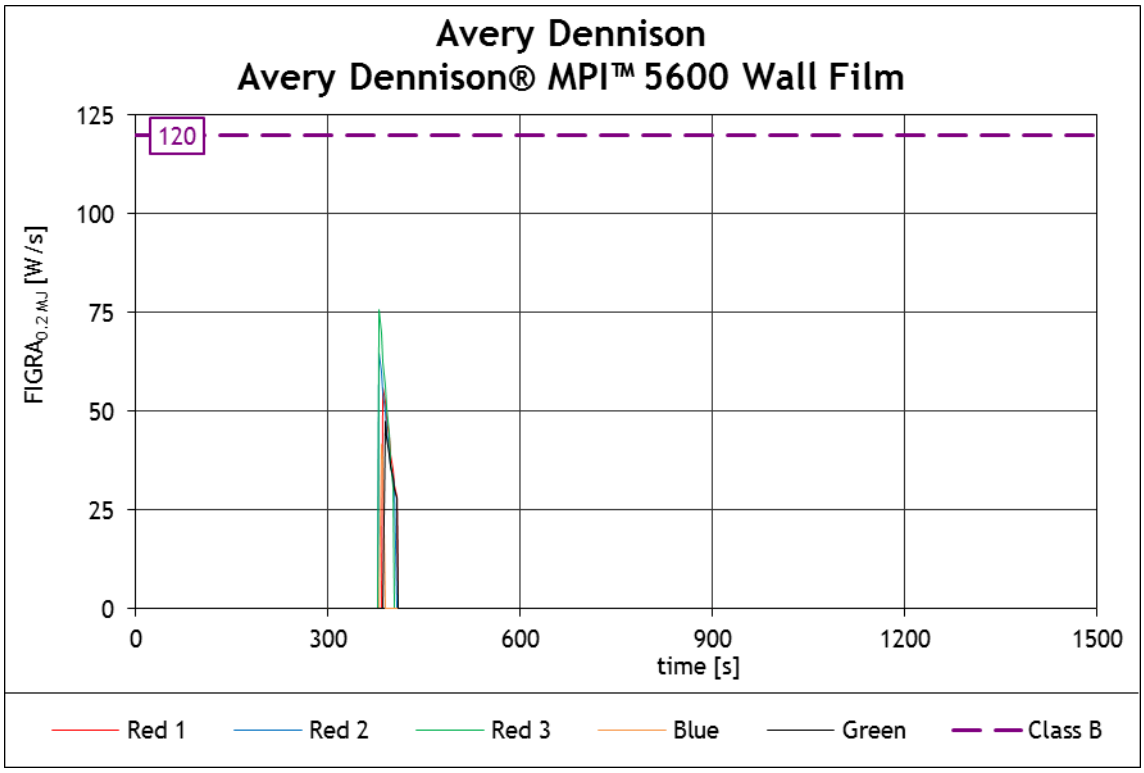

Chart 5: $FIGRA_{0.2\ MJ}$ [W/s]

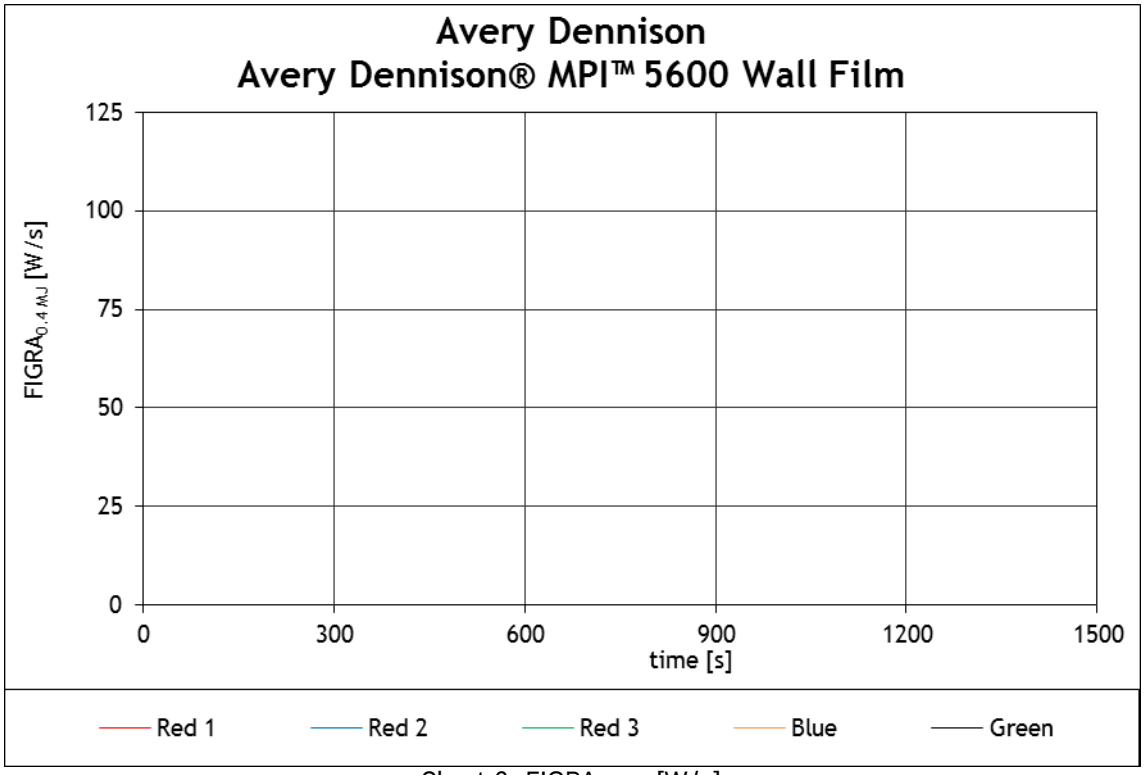

Chart 6: $FIGRA_{0.4\ MJ}$ [W/s]

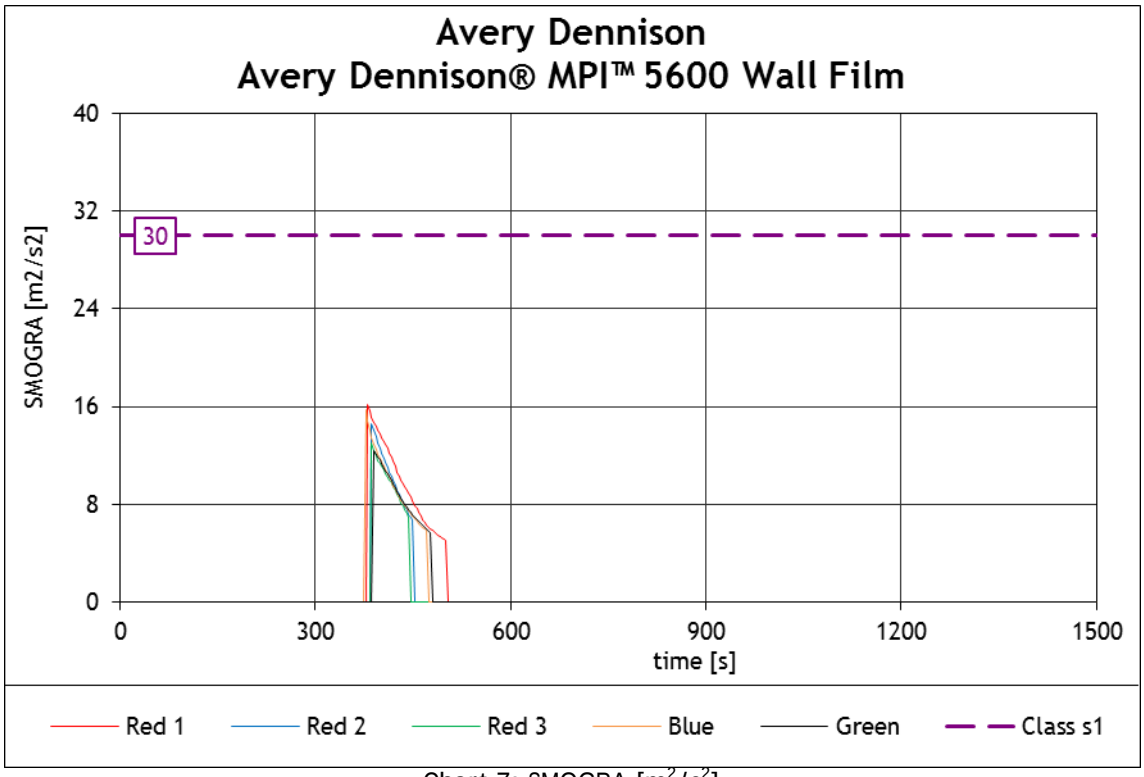

Chart 7: SMOGRA [m^2/s^2]

APPENDIX: PHOTOGRAPHS

Avery Dennison® MPI™ 5600
Photographs 1 – 4: Colour: red
Photographs 5 – 8: Colour: blue
Photographs 9 – 12: Colour: green

Photographs 1 and 2: Specimen 1 prior to testing

Photographs 3 and 4: Specimen 1 after testing

Photographs 5 and 6: Specimen prior to testing

Photographs 7 and 8: Specimen after testing

Photographs 9 and 10: Specimen prior to testing

Photographs 11 and 12: Specimen after testing

APPENDIX: PRODUCT DATA SHEET

PRODUCT DATA SHEET

Avery Dennison® 5600 LD Translucent Film

issued: **05/2016**
Rev: 0

Introduction

Avery Dennison® 5600 LD Translucent Film series have been especially designed to meet the challenges of LED illuminated signage. The range provides a simple single film solution - eliminating LED "hot spots" without the cost and complexity of additional diffuser film or pigmented acrylic sheet.
Avery Dennison 5600 LD Translucent Film series offer excellent conversion using computerised sign cutting on flatbed plotters and friction controlled plotters. In its design, the properties for excellent performance in thermoforming processes are built-in.

Description

Facefilm:	70 micron, translucent cast vinyl film
Adhesive:	Permanent, transparent acrylic based
Backing paper:	75 micron PET liner

Features

- Excellent colour fastness and durability up to 10 years
- Single layer concept with high light transmission.
- Excellent colour uniformity in reflected and transmitted light
- Excellent adhesion to a wide variety of substrates
- Superior dimensional stability
- Suitable for thermoforming
- Color matching, minimum order of one roll

Recommendations for use

- Graphics for LED internally illuminated signs and canopies
- Applications on both rigid and flexible substrates
- Window graphics and retail signage using LED lighting technology

Avery Dennison® Colour Matching

A fast colour matching service is offered for projects where specific colour needs cannot be matched from the standard colour range. The minimum order quantity for this service is one roll.

PANTONE® Cross-references

A range of Pantone-approved colours is offered for faster colour choices and for the ease of use to the designers and signmakers. A separate list with Pantone-approved cross-references shows the approved colours and the link to the standard Avery Dennison name and code.
PANTONE® is the property of Pantone, Inc.

AVERY DENNISON Inspired Brands. Intelligent World.™ graphics.averydennison.eu

PRODUCT CHARACTERISTICS — Avery Dennison® 5600 LD Translucent Film

Physical properties

Features	Test method[1]	Results
Caliper, facefilm colours	ISO 534	70 micron
Caliper, facefilm black & white	ISO 534	50 micron
Caliper, facefilm + adhesive	ISO 534	100 micron (B&W 80 micron)
Tensile strength	ISO 2813, 20º	1.0 kN/m
Elongation	DIN 53455	75%
Gloss	ISO 2813, 20°	25 GU
Dimensional stability	FINAT FTM 14	0.2 mm. max
Adhesion, initial	FINAT FTM-1, stainless steel	540 N/m
Adhesion, ultimate	FINAT FTM-1:	
	PMMA	650 N/m
	Glass	600 N/m
	Stainless steel	650 N/m
Shelf life	Stored at 22° C/50-55 % RH	2 years
Durability[2]	Vertical exposure only	
Black & white	ISO 4892-2	10 years
Colours		8 years

Temperature range

Features		Results
Application temperature Minimum		Minimum: +10°C
Service temperature		-50° to +110° C
Heat resistance	3 weeks exposure at 80º C	No significant colour change

Important
Information on physical and chemical characteristics is based upon tests we believe to be reliable. The values listed herein are typical values and are not for use in specifications. They are intended only as a source of information and are given without guarantee and do not constitute a warranty. Purchasers should independently determine, prior to use, the suitability of this material to their specific use.
All technical data are subject to change. In case of any ambiguities or differences between the English and foreign versions of these Conditions, the English version shall be controlling.

Warranty
Avery Dennison® branded materials are manufactured under careful quality control and are warranted to be free from defect in material and workmanship. Any material shown to our satisfaction to be defective at the time of sale will be replaced without charge. Our aggregate liability to the purchaser shall in no circumstances exceed the cost of the defective materials supplied. No salesman, representative or agent is authorised to give any guarantee, warranty, or make any representation contrary to the foregoing.
All Avery Dennison® branded materials are sold subject to the above conditions, being part of our standard conditions of sale, a copy of which is available on request.

1) Test methods
More information about our test methods can be found on our website: www.graphics.averydennison.eu

2) Durability
The durability is based on middle European exposure conditions. Actual performance life will depend on substrate preparation, exposure conditions and maintenance of the marking. For instance, in the case of signs facing south; in areas of long high temperature exposure such as southern European countries; in industrially polluted areas or high altitudes, exterior performance will be decreased.