

## Reaction to fire testing of Avery Dennison® 777 Cast Film Single Burning Item test according to EN 13823:2010

Report no.	2013-Efectis-R0367b
Sponsor	Avery Dennison Graphics & Reflective Solutions P.O. Box 118 2394 ZG HAZERSWOUDE THE NETHERLANDS
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## 1. PRODUCT IDENTIFICATION

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Avery Dennison® 777 Cast Film, further referred to as 'the product'.

## 2. ABSTRACT

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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, with the objective to obtain the reaction to fire classification according to EN 13501-1:2007+A1:2009.

## 3. DETAILS OF THE PRODUCT TESTED

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### 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 118  
2394 ZG HAZERSWOUDE  
THE NETHERLANDS

### 3.3. PRODUCT DESCRIPTION

According to the sponsor the product is composed of:

- Face film: 60 micron cast vinyl
- Adhesive: permanent, acrylic based, 25 µm
- Backing paper: one side coated white craft paper, 137 g/m<sup>2</sup>

The product, excluding backing paper, has a total thickness of 85 µm.

See Product Data Sheets on the pages 13 and 14.

#### 4. DETAILS OF THE EXAMINATION

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##### 4.1. SAMPLES

Sampling procedure	The samples were submitted by the sponsor.
Age	At the time of receipt: no information received.
Date of receipt	June 26, 2013

##### 4.2. SPECIMENS

Substrate used	Steel sheet, thickness approx. 1.2 mm (class A1/A2 according to EN 13238:2010)
Method of fixing	The product was glued to the substrate using the permanent adhesive of the product.
Specimen preparation	The long specimen wing was not 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.
Date of preparation	September 23 and October 3, 2103

##### 4.3. CONDITIONING

Prior to the examinations, the specimens were conditioned over a period of 2 weeks at a temperature of  $(23 \pm 2)$  °C and a relative humidity of  $(50 \pm 5)$  % 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	One SBI test was performed with a white, red and black specimen, before it was decided to perform the full examination with the black specimens.
Assessment	A smoke correction of the measured Total Smoke Production (TSP) of the product is conducted as described in the Note in §A.6.1.2 of EN 13823. Contrary to the description in the Note no additional SBI test is performed to determine the TSP of the system itself. Standardly the SBI system produces a TSP larger than 20 m <sup>2</sup> . This minimum value for the TSP is used to correct the average TSP of the SBI tests

performed on the product. The corrected value will be used as the classification parameter for the TSP.

Number of tests

A total of four Single Burning Item tests were carried out, all in accordance with EN 13823.

Date of examination

October 3 and 24, 2013

The results are given in Table 1.

Table 1: Single Burning Item classification parameter results

Test number	1	2	3	Classification parameter	4	5
Test parameter						
Sample variant	black				white	red
FIGRA <sub>0.2 MJ</sub> [W/s]	0.0	0.0	0.0	0.0	0.0	0.0
FIGRA <sub>0.4 MJ</sub> [W/s]	0.0	0.0	0.0	0.0	0.0	0.0
THR <sub>600s</sub> [MJ]	0.6	0.6	0.6	0.6	0.4	0.5
LFS {Yes, No}	No	No	No	No	No	No
SMOGRA [m <sup>2</sup> /s <sup>2</sup> ]	15.0	19.3	14.1	16.1	0.0	0.0
TSP <sub>600s</sub> [m <sup>2</sup> ]	49	66	61	59 - 20 = 39	41	43
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: Maximum of the quotient of heat release rate from the specimen and the time of its occurrence using a THR-threshold of 0.2 MJ or 0.4 MJ.

THR<sub>600s</sub> Total heat release from the 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: Maximum of the quotient of smoke production rate from the specimen and the time of its occurrence.

TSP<sub>600s</sub> Total smoke production from the 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 %



C.C.M. Steinhage B.Sc.  
Project leader reaction to fire

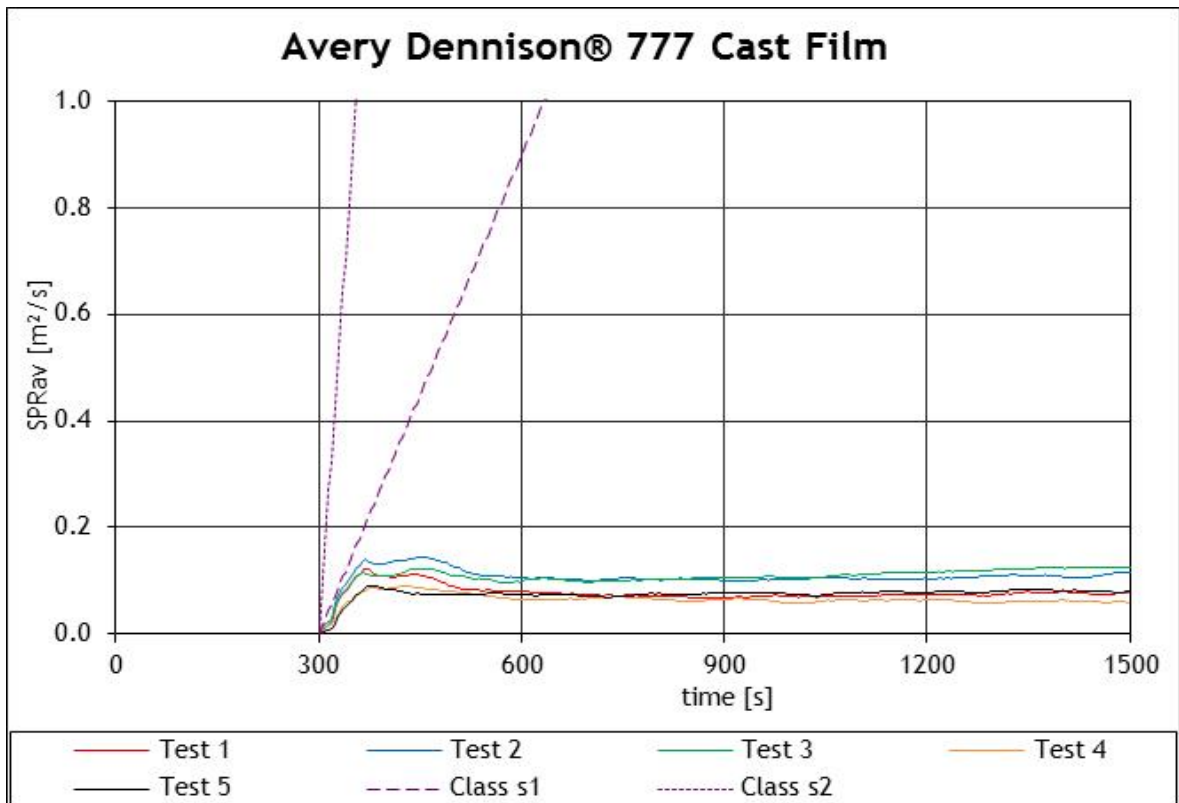
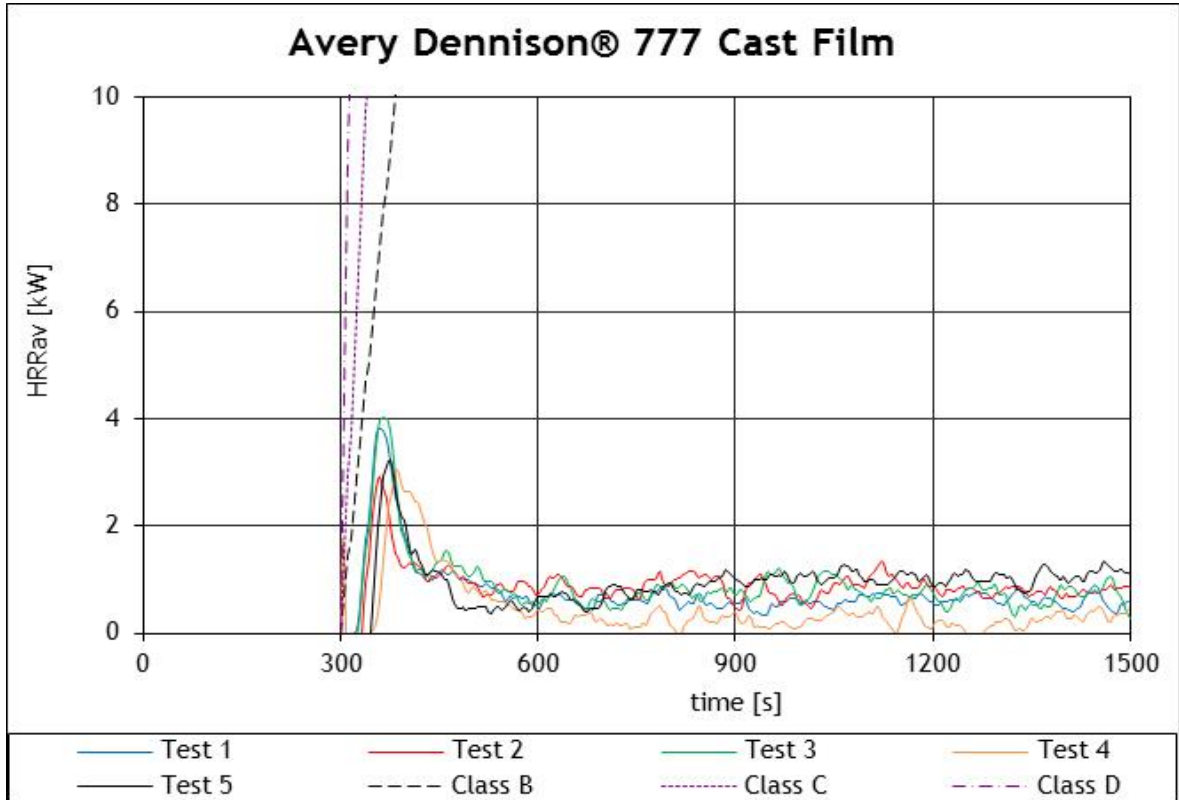


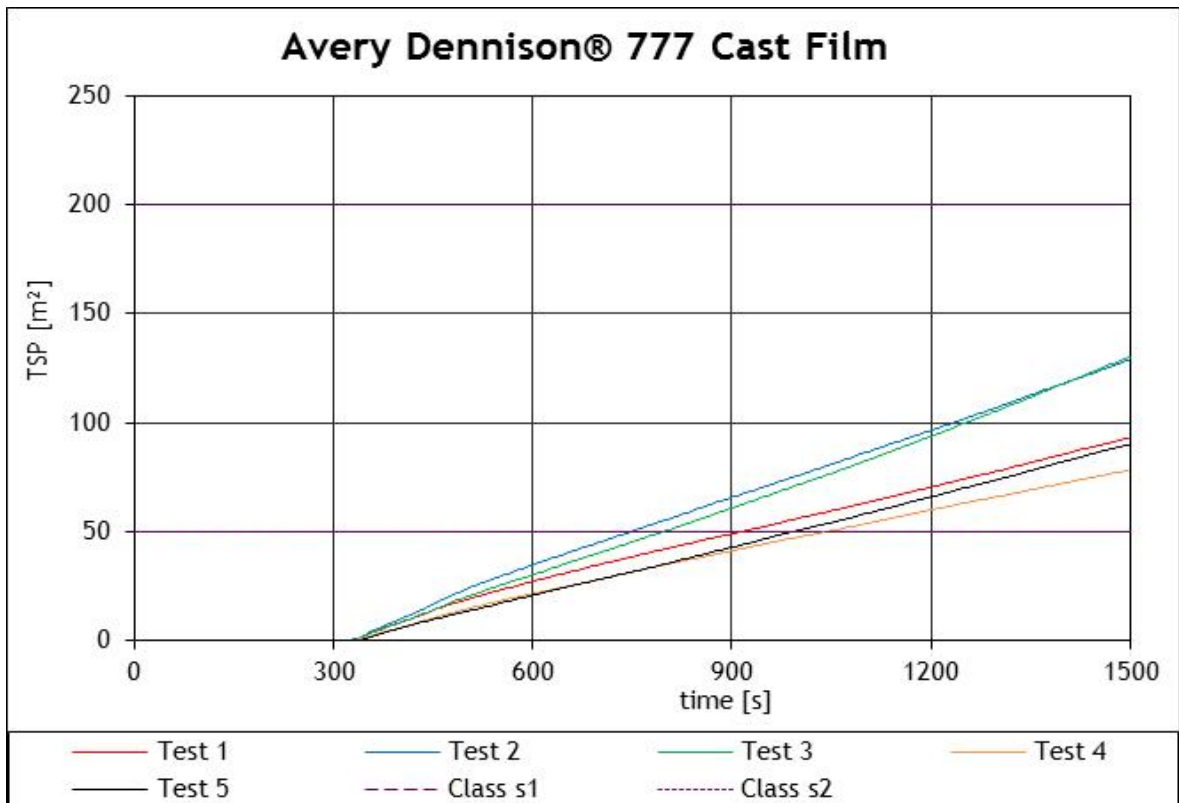
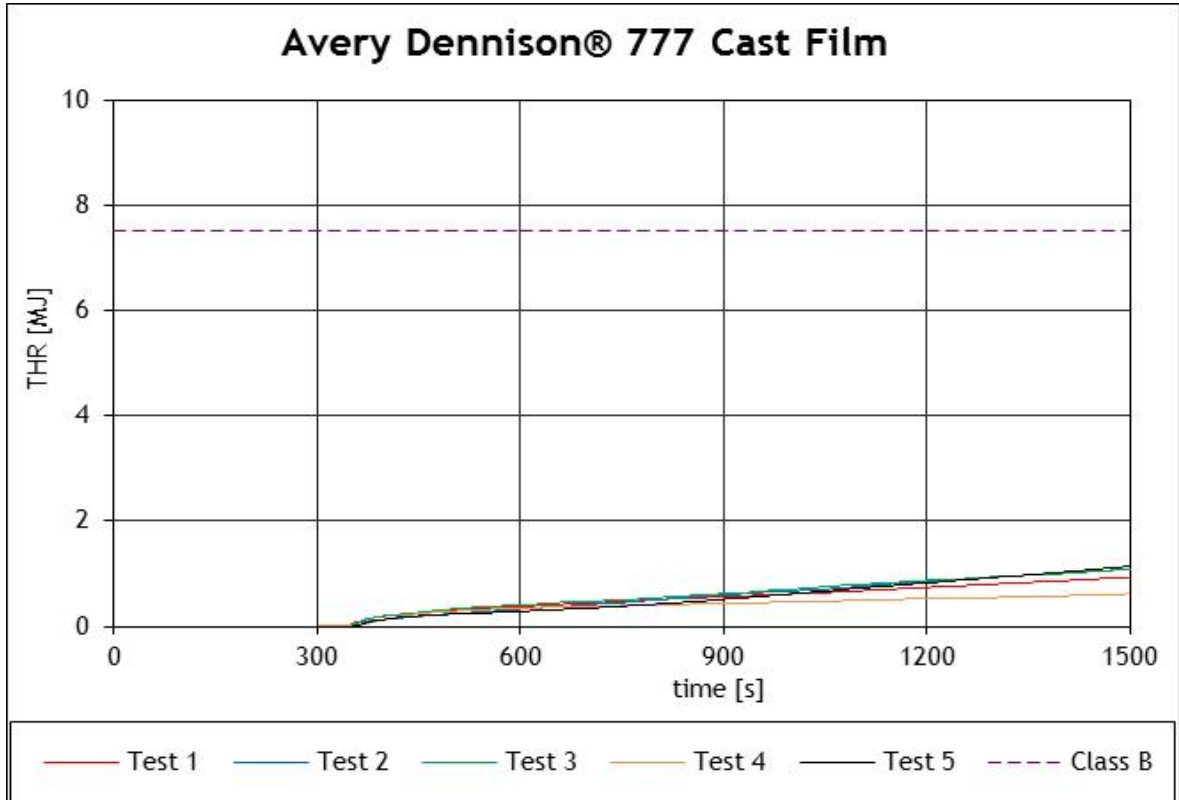
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Project leader reaction to fire

## APPENDIX: CHARTS

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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 [ $m^2/s^2$ ]







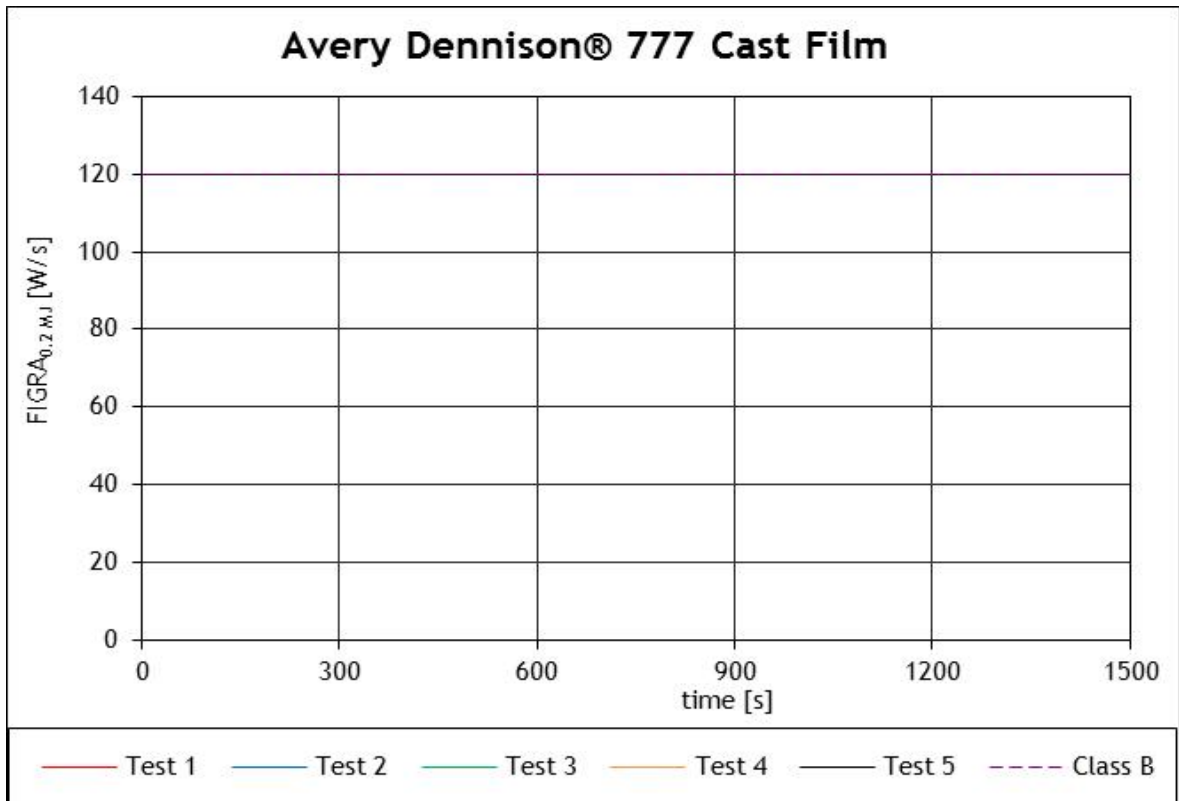


Chart 5: FIGRA<sub>0.2 MJ</sub> [W/s]

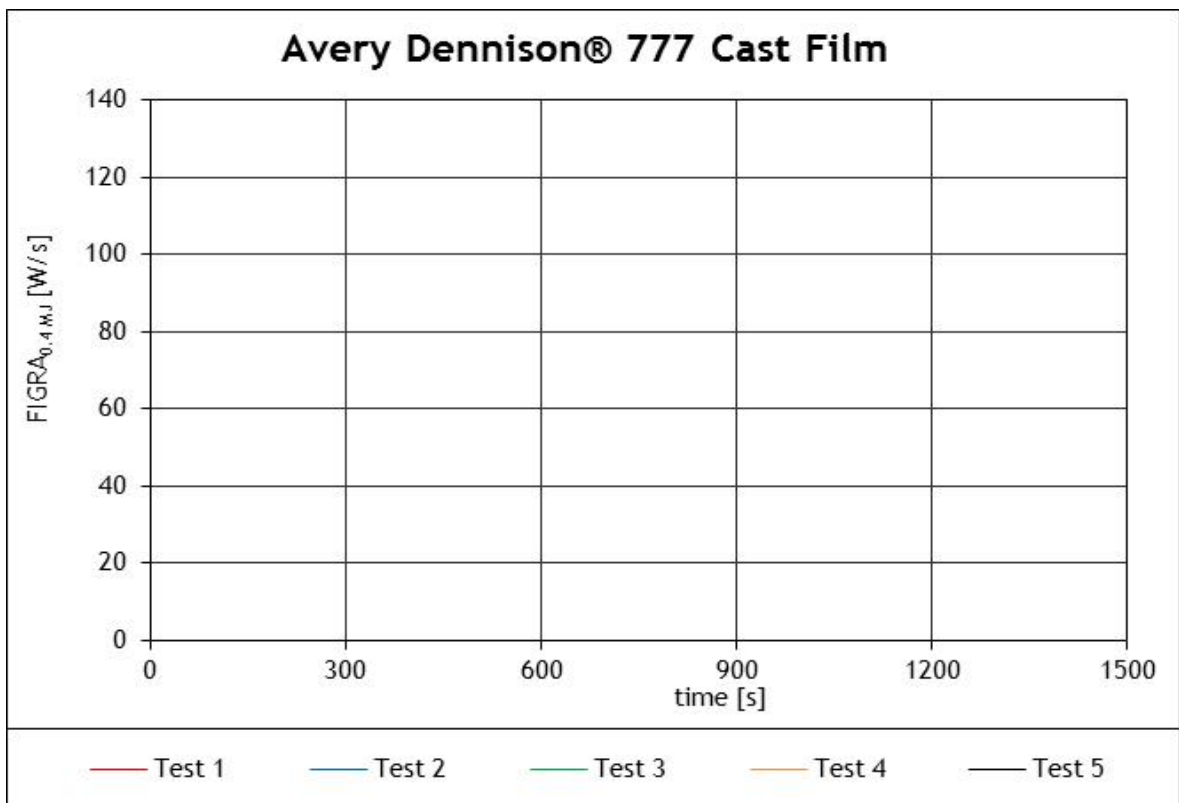
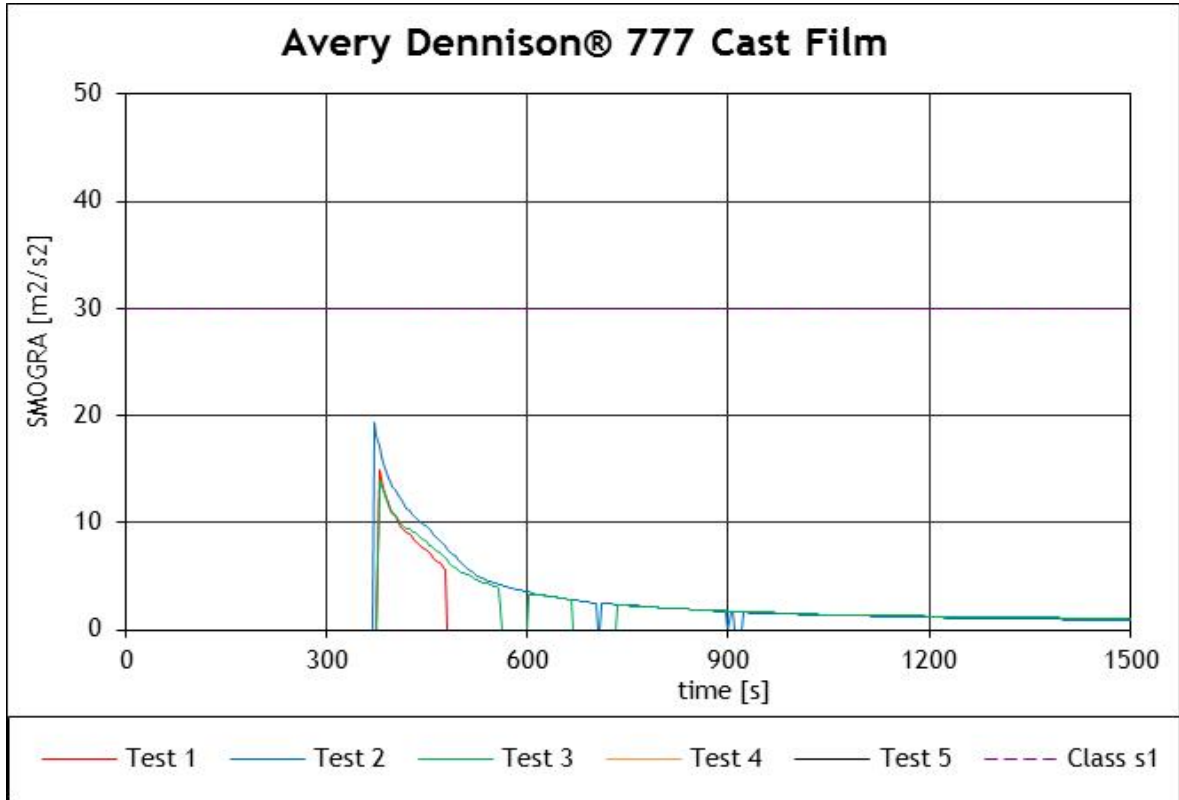


Chart 6: FIGRA<sub>0.4 MJ</sub> [W/s]



**APPENDIX: PHOTOGRAPHS**



Photographs 1 and 2: Red specimen prior to and after testing



Photographs 3 and 4: White specimen prior to and after testing



Photographs 5 and 6: Black specimen prior to testing



Photographs 7 and 8: Black specimen after testing

## APPENDIX: PRODUCT DATA SHEET

### PRODUCT DATA SHEET



### Avery Dennison® 777 Cast Film

issued: 03-07-2013

#### Introduction

Avery Dennison 777 Cast Films are a signmaker's everyday answer for all kinds of quality signage, indoors and outdoors – including applications over rivets and corrugations, and jobs requiring applied durability of up to 8 years\*.

Avery Dennison 777 Cast Films are available in a very extensive range of standard colors, including gloss, matt and metallic. All the colors are based on organic pigments, REACH compliant.

#### Description

Facefilm: 60 micron cast vinyl  
Adhesive: permanent, acrylic based  
Backing paper: one side coated white kraft paper, 137 g/m<sup>2</sup>

#### Conversion

Avery Dennison 777 Cast Film offers good weeding and cutting performance on a wide range of computer signmaking equipment. Avery Dennison 777 Cast Film can be thermal transfer printed.

#### Features

- Very good conformability to rivets and corrugations.
- Very good layflatness and stability during cutting and weeding.
- Very good durability and outdoor performance\*\*.
- High gloss appearance.
- Outstanding choice of colours and finishes.
- Excellent dimensional stability during use and application.

Avery Dennison 777 Cast Film White and White Matt are manufactured on a blue contrast backing paper for ease of conversion.

#### Recommendations for use

Avery Dennison 777 Cast Films offer a wide range of colours for:

- Graphics on rigid-sided vehicles.
- Graphics on boats and sport vehicles.
- Directional signage.
- Window graphics.
- Retail signage.
- Outdoor advertising.
- Point-of-sale and promotional uses.

\*Depending on the color, application and exposure conditions as further described in this Product data Sheet. Not applicable for horizontal use.

\*\*Under recommended use and exposure conditions. Not for horizontal use.

**PRODUCT CHARACTERISTICS**

Avery® 777 Cast Film

**Physical properties**

Features	Test method <sup>1</sup>	Results
Caliper, facefilm	ISO 534	60 micron
Caliper, facefilm + adhesive	ISO 534	85 micron
Gloss (except for matt)	ISO 2813, 20°	50%
Dimensional stability	DIN 30646	0.20 mm. max
Elongation at break	DIN 53445	120%
Adhesion, initial	FINAT FTM-1, stainless steel	400 N/m
Adhesion, ultimate	FINAT FTM-1, stainless steel	600 N/m
Flammability		self-extinguishing
Accelerated ageing	SAE J 2527, 2000hr	No negative impact on film performance
Shelf life	Stored at 22° C/50-55 % RH	2 years
Durability <sup>2</sup>	Vertical exposure only, not for horizontal use	
Black & White		up to 8 years
All Colors & Transparent		up to 7 years
Metallic		up to 5 years

**Temperature range**

Features	Results
Application temperature	Minimum: +10° C
Temperature range	-40° to + 110° C

**Chemical resistance**

Features	Test method <sup>1</sup>	Results
Humidity resistance	200 hours exposure	No effect
Saltspray resistance	120 hours exposure	No effect
Water resistance	48 hours immersion	No effect

**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.

**Warranty**

Avery® 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 or the price of the material will be refunded, at our option. Our aggregate liability to the purchaser shall in no circumstances exceed the purchase price of the materials shown to be defective. No salesman, representative or agent is authorised to give any guarantee, warranty, or make any representation contrary to the foregoing. All Avery® 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.

**2) Durability**

The durability is based on middle European exposure conditions and on vertical use only. 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.