



Comparison of Physical Properties of MAPAL 1.8 mm thick Foam PP and 2 mm thick Foam PVC

MAPAL submitted samples of 1.8 mm thick foam PP and 2 mm thick foam PVC to three Israeli laboratories: **Israel Plastics & Rubber Center (IPRC) lab, Plastics App. lab and Carmel Olephins lab** in order to test the mechanical properties of both types of sheets.

The results of the tests performed are presented in the attached document.

Upon studying the report, the superior mechanical properties of foam PP become quite obvious.

The main advantages of foam PP are: higher hardness & scratch resistance values, higher impact resistance values and improved flexural properties.

These three main parameters show the enhanced performance characteristics of foam PP compared to foam PVC. The study demonstrates the advantages of foam PP for almost every application.



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1. Mechanical Properties

Test			Foam PP 1.8 mm thick	Foam PVC 2 mm thick
	Test Method	Units	Value	Value
Specific Gravity	ASTM D 792	g/cm ³	0.55-0.62	0.55-0.62
Scratch Resistance	Hardness	N	10	5
	Test Rod			
Hardness Shore D	ISO 7619		>60	40
Tensile Modulus MD/TD	ISO 527	MPa	323/356	116/654
Tensile Strength MD/TD	ISO 527	MPa	12/14	6/15
Flexural Modulus MD/TD	ISO 178	MPa	957/1005	352/1203
Flexural Strength MD/TD	ISO 178	MPa	27.4/29.5	8.1/22.2
Max Strain MD/TD	ISO 527	%	75/>100	27/26
Charpy Impact Strength	ISO 179	kJ/m ²	3.6	2.6

Conclusions & Remarks

1. PP Scratch Resistance property value is twice that of PVC. PP hardness Shore D is at least 50% higher than PVC. These two properties cancel the need for PE protection on the sheet and increase the number of times the sheet can be used.
2. PP tensile and flexural properties on MD and TD are balanced. PVC sheets are about 3 times weaker than PP due to the lower Tensile values and Flexural Modulus values on MD.
6. Maximum strain of PP is much higher than PVC .
7. The Charpy Impact is 40% higher than PVC.



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2. Other Properties

Test			Foam PP 1.8 mm thick	Foam PVC 2 mm thick
	Test Method	Units	Value	Value
Service temperature Range		°C	-15/85	-10/55
Water Absorption	ASTM D-570	%	0.2	1.8
Heat Distortion Temp.	ASTM D-648	°C	80-85	58-61
Coef. of Linear Thermal Expansion	By means of DMA	mm/(m°C)	0.158	0.063
(40-60°C) Surface Resistance	ASTM D-257	Ohm	1.e ¹⁶	1.e ¹⁶
Volume Resistance	ASTM D-267	Ohm.cm	1.e ¹⁶	1.e ¹⁶

Conclusion &Remarks

1. Service temperature range is much wider for PP, heat distortion and linear thermal expansion values are higher for PP than PVC. When bending the PP sheets it is necessary to use a temperature higher than 85 °C.
2. Surface and Volume resistance electric properties are similar.