

# Expanded Polypropylene

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## **1. UTILIZATION OF EXPANDED POLYPROPYLENE IN COMPONENT OR PRODUCT DESIGNS**

EPP has successfully been utilized in a variety of industries and applications where it is well suited to solve a number of common and difficult design, application and manufacturing problems due to its physical properties and free machining conditions.

## **2. SOME OF INDUSTRY EXAMPLE OF EXPANDED POLYPROPYLENE**

- Transportation (Automotive, etc.)
- Consumer Electronics
- Medical Devices
- Industrial Systems
- Household Appliances
- Returnable Systems
- Air Industry (Drones, etc.)
- Shock Absorber Systems

## **3. DIFFERENTIATED SOLUTION AREAS**

- Sound Absorption
- Sound Transmission Reduction
- Component Cooling Efficiency Improvements
- Thermal Insulation
- Vibration Dampening and Isolation
- Electrical Insulation
- Tuning of Sound and Vibration Dampening/Absorption Possible Within Design Parameters
- Product Weight Reduction
- Component Housing Part Reduction
- Fastening and Mounting Hardware Part Reduction
- Increased Product and Component Protection from Shock & Vibration
- Assembly Time Reduction
- Serviceability Time Improvement
- Reduction in Transport Packaging
- Anti-Static Properties
- Can Meet Many Flammability Requirements (UL, FMVSS, ASTM, etc.)
- 100% Recyclable
- Excellent Chemical Resistance
- RoHS Compliant
- No Phthalates
- Chlorofluorocarbon (CFC) Free

#### 4. MATERIAL PROPERTIES

Material properties of Expanded Polypropylene are changeable under different density values because of this reason tests apply the different density values of Expanded Polypropylene to find their material properties.

Thermal properties generally acceptable between -40 °C and 100 °C, but thermal properties can be change at different stress levels.

Physical Property	Test Method	Units	Test Results						
Density	ISO 845 : 2006	g/L	25	30	35	45	50	60	80
Compressive Strength	ISO 844 : 2014	kPa							
25% Strain			110	135	160	225	270	350	520
50% Strain			195	220	260	330	350	500	720
75% Strain			400	450	520	620	780	980	1620
Compression Set 25% Strain – 22 Hours – 23 °C	ISO 1856 : 2009 Method C	%	12	11,5	11,5	11	11	10,5	10,5
Tensile Strength	ISO 1798 : 2009	kPa	350	480	530	570	620	790	960
Tensile Elongation	ISO 1798 : 2009	%	20	20	19	18	18	16	16
Water Absorption	DIN 53428	%	~ 1 / ~ 3						
Flammability	ISO 3795 : 1989	mm/min	100	75	70	60	55	45	35
Chemal Resitance (Auto Fuels, Fluids, Solvents)		1 hr Exposure	Chemical resistance is good for specific chemicals						
Physical Property	Test Method	Units	Test Results						
Density	ISO 845 : 2006	g/L	90	100	120	140	160	180	200
Compressive Strength	ISO 844 : 2014	kPa							
25% Strain			650	720	930	1100	1300	1500	1800
50% Strain			800	980	1250	1500	1900	2500	2900
75% Strain			1800	2200	3300	4600	5500	7500	9500
Compression Set	ISO 1856 : 2009 Method C	%	10,5	10,5	10	10	10	10	10
Tensile Strength	ISO 1798 : 2009	kPa	1050	1135	1250	1450	1680	1850	1930
Tensile Elongation	ISO 1798 : 2009	%	15	12,5	12	11,5	10	8	7
Water Absorption	DIN 53428	%	~ 1 - ~ 3						
Flammability	ISO 3795 : 1989	<100 mm/min	30	25	20	16	14	12	12
Chemal Resitance (Auto Fuels, Fluids, Solvents)		1 hr Exposure	Chemical resistance is good for specific chemicals						

## **5. VIBRATION DAMPENING**

Good vibration dampening and even isolation can be readily achieved with EPP.

## **6. FLAME RETARDANT PROPERTIES**

EPP bead can meet:

- ISO 3795 : 1989
- UL-94 HBF

## **7. CHEMICAL RESISTANT PROPERTIES**

EPP has very good chemical resistance overall, with resiliency against acids and alkaline's, solvents, grease, oil, etc. A comprehensive guide to chemical resistance is published and available.

## **8. HUMIDITY AND WATER RESISTANCE**

EPP has very good resistance to humidity and water exposure. Typical water absorption is approximately 1% by volume after 24 hours submersion and approximately 3 % after 1 week.

Test method: DIN 53 248

## **9. DESIGN RULES**

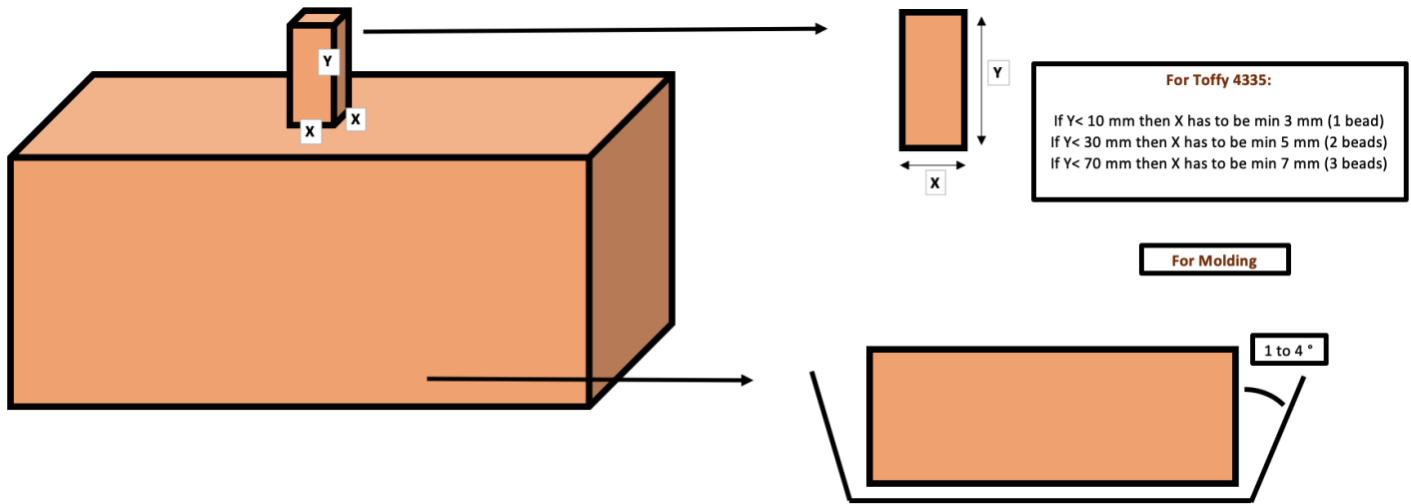
Exact design constraints are strongly dependent of local and overall part geometry, molded density, and molding technology (crack fill or pressure fill). The following indications are given as guidelines only.

- **Part dimensional limit**

Possible molded part dimensions depend on the exact size of the machine used. However as a general rule typical shapes with outer dimensions as large as 1800 x 1000 x 200 mm can be moulded in EPP Beads. Minimum thickness in the crack direction is approximately 5 mm.

- **Mold characteristics**

Aluminium, of 10 to 12 mm thickness, is usually used as raw material for the tool. Supporting elements shall be installed behind the cavity. The tool is equipped with uniformly dispersed core vents for the diffusion of steam, and with several fill guns placed in suitable locations for best filling of the part according to its geometry. For aesthetic reasons avoid putting fill guns on visible surfaces. The external diameter of the fill gun tips usually range from 18 to 24 mm. Part ejectors should also be positioned in proper locations.



**Negative Angles for 4335:**

Negative Angles are possible for Toffy EPP, but it has to be up to a certain depth, otherwise the part might break while leaving the mold. The negative angles depend on the density

- If  $B < 10$  mm then A has to be max 3 mm
- If  $B < 30$  mm then A has to be max 4 mm

## 9. DIMENSIONAL TOLERANCES.

Tolerances depend on the following parameters : type of moulding press, part geometry, design and layout of the tool, moulding parameters pre-treatment and post treatment.

Dimensions Linear/Thickness Foam Dimensions	Tolerance/Density			
	< 25g/l	25g/l to 50 g/l	51g/l to 80g/l	> 81 g/l
0 to 5 mm	±0.5 mm	±0.5 mm	±0.5 mm	±0.5 mm
6 to 15 mm	±1.0 mm	±1.0 mm	±1.0 mm	±1.0 mm
16 to 25 mm	±1.5 mm	±1.5 mm	±1.0 mm	±1.0 mm
26 to 50 mm	±2.0 mm	±2.0 mm	±1.5 mm	±1.5 mm
51 to 100 mm	±2.0 mm	±2.0 mm	±1.5 mm	±1.5 mm
101 to 250 mm	±2.5 mm	±2.5 mm	±2.0 mm	±2.0 mm
251 to 1000 mm	±3.5 mm	±3.0 mm	±3.0 mm	±2.5 mm
501 to 1000 mm	±5.0 mm	±4.5 mm	±4.0 mm	±3.5 mm
1000 mm to 1500 mm	±1.0 %	±1.0 %	±0.75 %	±0.5 %

### Disclaimer

*All data in this document are for general information purposes only. They are based upon tests performed to our best knowledge and experience, using typical EPP moulding equipment under CSP's standard conditions. As many properties will depend largely on part shape and size as well as on moulding parameters, these data can only be considered as indicative. Any data herein may change without prior notice. While we endeavour to keep the information up to date and correct according to the state of the art, we make no representations or warranties of any kind, express or implied, about the completeness, accuracy, reliability or suitability with respect to these data. Any reliance you place on this information is therefore strictly at your own risk. The user itself is responsible for testing the products in order to find out and to determine whether these are suitable for the application as well as to observe any industrial property rights and existing laws and regulations. In no event will we be liable for any loss or damage (including, without limitation, indirect or consequential loss or damage, or any loss or damage whatsoever arising from loss of profits) arising out of, or in connection with, the use of this information and/or the use, handling, processing or storage of this product*