

## MATERIAL DATASHEET

### TOTAL Polystyrene 1441

Easy Flow Polystyrene

Polystyrene Crystal 1441 is an easy flow Polystyrene for injection molding application.  
It offers low viscosity at high shear rate, that allows an easy injectability, and a high softening point.

**Applications:**

- Cutlery
- Household
- Toy

Properties	Test Method		S.I.		Metric		English	
	ISO	ASTM	Value	Units	Value	Units	Value	Units
<b>RHEOLOGICAL</b>								
Melt Flow Index (200 °C - 5 kg)	1133	D-1238	0.008	kg/ 10 min	8.00	g/ 10 min	1.76E-02	lb/ 10 min
Spiral Flow (220 °C)	-	D-3123	0.55	m	55	cm	21.65	in
<b>THERMAL</b>								
Vicat Softening Point 10N (T increase = 50 °C/h)	306	D-1525	370	K	97	°C	207	°F
Heat Distortion Temperature	75	D-648	353	K	80	°C	176	°F
Coefficient of Linear Thermal Expansion (10 <sup>-5</sup> )	-	D-696	8.90E-03	m/K	8.90	mm/°C	1.95E-01	in/°F
<b>MECHANICAL</b>								
Unnotched Izod Impact Strength	180	D-256	7.00	kJ/m <sup>2</sup>	6.50	kg-cm/cm	1.19	ft-lb/in
Tensile Strength at Yield	527	D-638	45	MPa	450	kg/cm <sup>2</sup>	6528	psi
Elongation at Break	527	D-638	2	%	2	%	2	%
Flexural Modulus	178	D-790	3050	MPa	30500	kg/cm <sup>2</sup>	442487	psi
Rockwell Hardness	2039	D-785	L-70	-	L-70	-	L-70	-
<b>ELECTRICAL</b>								
Dielectric Strength	-	D-149	152000	kV/m	152	kV/mm	3861	kV/in
Surface resistivity	IEC 93	-	>10e+13	Ohms <sup>-1</sup>	>10e+13	Ohms <sup>-1</sup>	>10e+13	Ohms <sup>-1</sup>
<b>MISCELLANEOUS</b>								
Density	-	D-792	1040	kg/m <sup>3</sup>	1.04	g/cm <sup>3</sup>	64.91	lb/ft <sup>3</sup>
Mold Shrinkage	-	D-955	0.4 - 0.7	%	0.4 - 0.7	%	0.4 - 0.7	%
Water absorption	62	D-570	0.04	%	0.04	%	0.04	%



#### RECOMMENDED INJECTION MOLDING PARAMETERS

Barrel Temperature	Value	Units
Zone 1	150 - 180	°C
Zone 2	180 - 210	°C
Zone 3	210 - 230	°C
Zone 4	210 - 250	°C
Nozzle	210 - 250	°C

#### General Information :

Standard Properties: All tests are carried out at 23 °C unless otherwise stated. Mechanical properties are measured on injection moulded test specimens.

Bulk Density: Bulk Density of all Natural grades is approximately 0.6 g/cm<sup>3</sup>.

TOTAL Polystyrene 1441 should be kept in a cool and dry place. Avoid direct exposure to sunlight.

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## Safety and Material Handling

TOTAL REFINING & CHEMICALS offers a comprehensive range of TOTAL POLYSTYRENE (PS) specially formulated to suit different needs.

This extensive line includes impact polymers, either natural or with additives, with equally wide-ranging properties to fulfill all customer expectations in terms of fire resistance, appearance, cost and processing. Its tremendous ease of processing and its low cost make it one of the most commonly used polymers in the food packaging, audio/video, household appliances and construction industries.

TOTAL REFINING & CHEMICALS is committed to providing information to assist our customers in reducing the risks of handling and using our products. This bulletin sheet is intended to be a quick reference guide for TOTAL REFINING & CHEMICALS customers to store, handle and use our products safely and in an environmentally sound manner. We aim to minimize the impact on mankind and the environment during production, storage, transportation, sale, use and disposal of our products.

Safety Data Sheets are updated regularly, to reflect changes and updates on information in an SDS. Before handling or using any product, please request and assess the most current Safety Data Sheets. The information provided below is appropriate only to TOTAL REFINING & CHEMICALS' s products as delivered. In the course of fabrication, many additives and ingredients may be added before the finished product. These must be explored *thoroughly for their* respectively health and safety considerations.

### Product Stewardship Program

The aim of the product stewardship code of the responsible care initiative, which makes health, safety and environmental protection an integral part of designing, manufacturing, marketing, distributing, using, recycling and disposing our products. Successful implementation of these initiatives is a shared responsibility that includes all who come into contact with a product. TOTAL REFINING & CHEMICALS will work with customers to help ensure that all who use and handle our products follow safe and environmentally sound practices.

### General Safe Handling Information

TOTAL POLYSTYRENE are relatively inert and have a very low degree of toxicity under normal conditions of use. TOTAL REFINING & CHEMICALS should be kept in cool and dry place. Avoid direct exposure to sunlight. Keep at room temperature. Nevertheless, safety and health

precautions should be observed in the handling and fabrication of plastic materials.

*Noise* is a common problem in the molding and compounding process. If possible, no worker should be exposed to excessive noise (Leq8hours 85dBA). Proper hearing protectors should be provided for workers, coupled with regular audiometric examinations.

*Air borne dusts* often result from sawing, filing, and sanding of plastic parts in post-moulding operations. These may cause irritation to eyes and the upper respiratory tract. Processing may also release fumes, which may contain irritating decomposition products. Adequate exhaust ventilation is recommended. Good housekeeping and controlling of dusts are necessary for safe handling of product. Workers should use approved respirators. If vapours cause irritation to eyes, a full-face respirator is recommended. Avoid accumulation of static charges during transfers in metallic systems.

Workers should be protected from the possibility of contact with *molten PS* during fabrication. Molten material may cause burns. Wash affected areas abundantly and thoroughly with water. In case of adhesion, do not try to remove product. Treat the affected areas as burns.

*Proper manual handling practices* should be observed in the lifting and transportation of PS packages. Occurrences in back and arm injuries are common in erroneous lifting techniques.

### Flammability and Combustibility

Thermal decomposition at 200 °C gives off flammable and harmful products such as styrene, ketones, toluenes and alcohol. There would be formation of toxic products, such as carbon oxides through combustion.

In fighting fire, wear a self-contained breathing apparatus and protective suit. Water or water fog are the preferred extinguishing media. Foam, alcohol resistant foam, carbon dioxide, or dry chemicals may also be used.

### Safe Disposal

Disposal methods must be in compliance with international, national and local laws and regulations. Destroy the product by incineration at an approved waste disposal site.

However, Polystyrene offers many possibilities for post consumer recycling such as: (1) Energy recycling using heat recovery systems for urban and industrial heating systems, (2) Material recycling. Polystyrene should be recycled whenever possible. Because of their high energy content, plastics can help the entire waste mix burn hotter and more completely in a waste-to-energy incinerator.

### Care for the Environment

PS must not be discarded indiscriminately into the waterways nor land.

Heavy metals are not used in the manufacture of TOTAL POLYSTYRENE. As such, disposal of HIPS via convention methods would be safe for the environment. Incineration of HIPS would not emit heavy metals or deleterious dioxins into the environment. There would be no leaching of heavy metals into the earth when the incineration ash is land filled.

### Customer Notice

TOTAL REFINING & CHEMICALS stresses the importance of health and environmental protection during the entire lifetime of all TOTAL REFINING & CHEMICALS' s products, and calls for TOTAL REFINING & CHEMICALS to cooperate closely with its customers and partners. To help ensure that TOTAL REFINING & CHEMICALS' s products are not used improperly, TOTAL REFINING & CHEMICALS's personnel will assist customers in dealing with product safety, health and environmental considerations.

This information is provided for GENERAL INFORMATION ONLY. TOTAL REFINING & CHEMICALS and its affiliates provide a Safety Data Sheet (SDS) for this product, in the appropriate language, according to applicable laws and regulations.

Anyone using this product should carefully review the SDS, as well as any other applicable precautions and instructions for use. No liability whatsoever can be accepted by TOTAL REFINING & CHEMICALS and its affiliates with regard to the handling, processing or use of the product or products concerned which must in all cases be used in accordance with all applicable laws and regulations.

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