

# TOTAL PETROCHEMICALS

## MATERIAL DATASHEET

### Total Petrochemicals Polystyrene 4440

High Flow High Impact Polystyrene

Total Petrochemicals Polystyrene 4440 is a high impact polystyrene for injection molding of parts demanding good dimensional stability, particularly front and back covers for television sets. In addition, the flow properties of this grade make it particularly suitable for the molding of large parts and for use with new techniques such as gas injection.

#### Applications:

- Television front and back covers
- Office Equipments

| Properties                                                  | Test Method | S.I.      |                    | Metric    |                    | English   |                    |
|-------------------------------------------------------------|-------------|-----------|--------------------|-----------|--------------------|-----------|--------------------|
|                                                             |             | Value     | Units              | Value     | Units              | Value     | Units              |
| RHEOLOGICAL                                                 |             |           |                    |           |                    |           |                    |
| Melt Flow Index (200 °C - 5 kg)                             | ASTM D-1238 | 0.01      | kg/ 10 min         | 10.00     | g/ 10 min          | 2.20E-02  | lb/ 10 min         |
| Spiral Flow ( 220 °C)                                       | ASTM D-3123 | 0.53      | m                  | 53        | cm                 | 20.87     | in                 |
| THERMAL                                                     |             |           |                    |           |                    |           |                    |
| Vicat Softening Point 10N (T increase = 50 °C/h)            | ASTM D-1525 | 369       | K                  | 96        | °C                 | 205       | °F                 |
| Heat Distortion Temperature                                 | ASTM D-648  | 352       | K                  | 79        | °C                 | 174       | °F                 |
| Coefficient of Linear Thermal Expansion (10 <sup>-5</sup> ) | ASTM D-696  | 3.34E-05  | m/K                | 9.15      | mm/°C              | 1.07E-02  | in/°C              |
| Ball Pressure Test (2.00 mm)                                | JET         | 358.15    | K                  | 85.00     | °C                 | 185.00    | °F                 |
| MECHANICAL                                                  |             |           |                    |           |                    |           |                    |
| Notched Izod Impact Strength                                | ASTM D-256  | 11.00     | kJ/m <sup>2</sup>  | 10.10     | kg-cm/cm           | 1.86      | ft-lb/in           |
| Tensile Strength at Yield                                   | ASTM D-638  | 30        | MPa                | 300       | kg/cm <sup>2</sup> | 4352      | psi                |
| Tensile Strength at Break                                   | ASTM D-638  | 25        | MPa                | 255       | kg/cm <sup>2</sup> | 3627      | psi                |
| Elongation at Break                                         | ASTM D-638  | 50        | %                  | 50        | %                  | 50        | %                  |
| Tensile Modulus                                             | ASTM D-638  | 2100      | MPa                | 21000     | kg/cm <sup>2</sup> | 304663    | psi                |
| Flexural Modulus                                            | ASTM D-790  | 2090      | MPa                | 20900     | kg/cm <sup>2</sup> | 303212    | psi                |
| Rockwell Hardness                                           | ASTM D-785  | R95       | -                  | R95       | -                  | R95       | -                  |
| ELECTRICAL                                                  |             |           |                    |           |                    |           |                    |
| Dielectric Strength                                         | ASTM D-149  | 150000    | kV/m               | 150       | kV/mm              | 3810      | kV/in              |
| Surface resistivity                                         | ISO IEC 93  | >10e+13   | Ohms <sup>-1</sup> | >10e+13   | Ohms <sup>-1</sup> | >10e+13   | Ohms <sup>-1</sup> |
| MISCELLANEOUS                                               |             |           |                    |           |                    |           |                    |
| Density                                                     | ASTM D-792  | 1040      | kg/m <sup>3</sup>  | 1.04      | g/cm <sup>3</sup>  | 64.91     | lb/ft <sup>3</sup> |
| Mold Shrinkage                                              | ASTM D-955  | 0.4 - 0.7 | %                  | 0.4 - 0.7 | %                  | 0.4 - 0.7 | %                  |
| Water absorption                                            | ASTM D-570  | 0.07      | %                  | 0.07      | %                  | 0.07      | %                  |



**RECOMMENDED INJECTION MOLDING PARAMETERS**

| Barrel Temperature | Value     | Units | Mold Temperature                   | Value     | Units |
|--------------------|-----------|-------|------------------------------------|-----------|-------|
| Zone 1             | 150 - 180 | °C    | Fixed Half                         | 30 - 40   | °C    |
| Zone 2             | 160 - 200 | °C    | Moving Half                        | 10 - 30   | °C    |
| Zone 3             | 180 - 220 | °C    | Injection Pressure                 | 200 - 400 | Bars  |
| Zone 4             | 200 - 230 | °C    | Hold on Pressure                   | NIL       | Bars  |
| Nozzle             | 200 - 240 | °C    | Screw Back Pressure                | 10 - 45   | Bars  |
|                    |           |       | Screw Speed                        | 50 - 200  | RPM   |
|                    |           |       | Pre Drying Temperature for 2 hours | 70        | °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 Petrochemicals Polystyrene 4440 should be kept in a cool and dry place. Avoid direct exposure to sunlight.

**Total Petrochemicals**

Total Petrochemicals SEA Pte Ltd

53 Tuas Crescent,

Singapore (638732)

Tel: +65 686 21 228

Fax: +65 686 90 345

Information contained in this publication is true and accurate at the time of publication and to the best of our knowledge. The nominal values stated herein are obtained using laboratory test specimens. Before using one of the products mentioned herein, customers and other users should take all care in determining the suitability of such product for the intended use. Unless specifically indicated, the products mentioned herein are not suitable for applications in the pharmaceutical or medical sector. The companies within TOTAL PETROCHEMICALS do not accept any liability whatsoever arising from the use of this information or the use, application or processing of any product described herein. No information contained in this publication can be considered as a suggestion to infringe patents. The companies disclaim any liability that may be claimed for infringement or alleged infringement of patents.



**TOTAL**

datasheet - Total Petrochemicals 4440  
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# TOTAL PETROCHEMICALS

## Safety and Material Handling

TOTAL PETROCHEMICALS offers a comprehensive range of TOTAL PETROCHEMICALS 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 PETROCHEMICALS 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 PETROCHEMICALS 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 PETROCHEMICALS' 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 PETROCHEMICALS 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 PETROCHEMICALS POLYSTYRENE are relatively inert and have a very low degree of toxicity under normal conditions of use. TOTAL PETROCHEMICALS POLYSTYRENE should be kept in cool and dry place. Avoid direct exposure to sunlight. Keep at temperatures below 70C. 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 200oC 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 is not used in the manufacture of TOTAL PETROCHEMICALS 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 PETROCHEMICALS stresses the importance of health and environmental protection during the entire lifetime of all TOTAL PETROCHEMICALS products, and calls for TOTAL PETROCHEMICALS to cooperate closely with its customers and partners. To help ensure that TOTAL PETROCHEMICALS' s products are not used improperly, TOTAL PETROCHEMICALS' s personnel will assist customers in dealing with product safety, health and environmental considerations.

This information is provided for GENERAL INFORMATION ONLY. TOTAL PETROCHEMICALS and its affiliates provide a Safety Data Sheet (SDS) for this product, in the appropriate language, according to applicable laws and regulations. Copies in your language can be obtained free of charge from your TOTAL PETROCHEMICALS representative.

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 PETROCHEMICALS 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.

The information contained in this document is based on trials carried out by our Research Centers and data selected from the literature. To the best of our knowledge and at the time of publication, this information is true and accurate. It shall, however, in no event be held to constitute or imply any warranty, undertaking express or implied commitment from our part. TOTAL PETROCHEMICALS and its affiliates disclaim any liability that may be claimed for infringement or alleged infringement of patents."

