Teflon® PTFE 8
fluoropolymer resin

Granular Compression Molding Resin

Brand
Teflon® is a registered trademark of DuPont for its brand of fluoropolymer resins, which can only be licensed by DuPont for use in approved applications. Customers who wish to use the Teflon® trademark in connection with DuPont PTFE products under license from DuPont should contact (800) 262-2745. Without a license, customers may not identify their product as containing Teflon®, but may refer to the resin as PTFE 8.

Description
Teflon® PTFE 8 is a free-flowing white powder composed of relatively large particles. Its most unique features are high bulk density and excellent powder flow.

The high bulk density and low compression ratio of Teflon® PTFE 8 permit the use of shallow molds for small parts and complex shapes. Good powder flow is necessary for use in equipment that feeds resin automatically.

Teflon® PTFE 8 is used for general-purpose, high-speed automatic preforming of small parts and ram extrusion of large diameter rod and tubing.

Properly processed products made from neat Teflon® PTFE 8 provide the superior properties typical of the fluoropolymer resins: retention of properties after service at 260°C (500°F), useful properties at –240°C (~400°F), chemical inertness to nearly all industrial chemicals and solvents, and low friction and antistick surfaces. Dielectric properties are outstanding and stable with frequency and temperature. Molded products have moderate stiffness and high ultimate elongation.

In a flame situation, products of Teflon® PTFE 8 resist ignition and do not themselves promote flame spread. When ignited by flame from other sources, their contribution of heat is small and with very little smoke.

Statements, or data, regarding behavior in a flame situation are not intended to reflect hazards presented by this or any other material when under actual fire conditions.

Typical End Products
Many end products are molded or fabricated from moldings of Teflon® PTFE 8, including small parts such as ball valve seats, seals, discs, and lab ware. Large-diameter rods and tubing made from Teflon® PTFE 8 are stock shapes that are machined into parts such as electrical insulators, mechanical bushings, and seal rings.

FDA Compliance
Properly processed products (sintered at high temperatures common to the industry) made from Teflon® PTFE 8 resin can qualify for use in contact with food in compliance with FDA Regulation 21 CFR 177.1550.

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Processing

Teflon® PTFE 8 is usually processed in two steps: preforming and sintering.

The powder is first compacted into a preformed shape approximating that of the desired molding.

Teflon® PTFE 8 can be preformed by machines that automatically fill-and-press small shapes. Automatic preforming requires resins that flow well, have high bulk density, and have particles that break up readily under pressure to provide void-free moldings.

The preformed shapes are usually sintered in batches using a precise heating and cooling cycle, which consolidates them at temperatures above the crystalline melting point of the neat powder.

The properties of a finished molding are dependent on preform pressure, sintering time and temperature, and cooling rate.

Teflon® PTFE 8 is also used for ram extrusion, a process that combines preforming and sintering in one continuous operation. Large-diameter rods and tubing are made by forcing successive charges of powder down a cylinder heated to a specified temperature profile. Refer to the typical property data in Table 1.

Safety Precautions

WARNING!

VAPORS CAN BE LIBERATED THAT MAY BE HAZARDOUS IF INHALED.


Open and use containers only in well-ventilated areas using local exhaust ventilation (LEV). Vapors and fumes liberated during hot processing, or from smoking tobacco or cigarettes contaminated with Teflon® PTFE 8, may cause flu-like symptoms (chills, fever, sore throat) that may not occur until several hours after exposure and that typically pass within about 24 hours. Vapors and fumes liberated during hot processing should be exhausted completely from the work area; contamination of tobacco with polymers should be avoided.

Mixtures with some finely divided metals, such as magnesium or aluminum, can be flammable or explosive under some conditions.
Storage and Handling

Preforming is easiest when the resin is uniformly between 21–27°C (70–80°F). As temperature declines below this range, the resin will be increasingly difficult to mold without cracks and problems with condensed moisture. Higher temperatures inhibit flow and promote lumping. Storage conditions should be set accordingly.

Cleanliness is a critical requirement for successful use of Teflon® PTFE 8. The white resin and high sintering temperatures cause even very small foreign particles to become visible in finished moldings. Keep resin drums closed and clean. Good housekeeping and careful handling are essential.

Freight Classification

Teflon® PTFE 8, when shipped by rail or express, is classified “Plastics, Synthetic, O.T.L., NOIBN.” Resin shipped by truck is classified “Plastics, Materials Granules.”

Packaging

Teflon® PTFE 8 is packaged in 100-lb (45-kg) drums. Each drum has a bag liner made of polyethylene resin.

Table 1
Typical Property Data for Teflon® PTFE Fluoropolymer Resin Grade 8*

<table>
<thead>
<tr>
<th>Property</th>
<th>ASTM Test Method</th>
<th>Unit</th>
<th>Nominal Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Bulk Density</td>
<td>D4894</td>
<td>g/L</td>
<td>725</td>
</tr>
<tr>
<td>Average Mold Shrinkage (at preform pressure of 35 MPa [5,000 psi])</td>
<td>D4894</td>
<td>%</td>
<td>2.8</td>
</tr>
<tr>
<td>Powder Flow</td>
<td>Modified D1855</td>
<td>g/min</td>
<td>300</td>
</tr>
<tr>
<td>Average Particle Size</td>
<td>D4894</td>
<td>µm</td>
<td>600</td>
</tr>
<tr>
<td>Standard Specific Gravity</td>
<td>D4894</td>
<td>—</td>
<td>2.16</td>
</tr>
<tr>
<td>Melting, Peak Temperature</td>
<td></td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>D4894</td>
<td></td>
<td>342 ± 10</td>
</tr>
<tr>
<td>Second</td>
<td>D4894</td>
<td>°C</td>
<td>327 ± 10</td>
</tr>
<tr>
<td>Mechanical</td>
<td></td>
<td>°F</td>
<td>(648 ± 18)</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>D4894</td>
<td>MPa (psi)</td>
<td>27.6 (4,000)</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>D4894</td>
<td>%</td>
<td>300</td>
</tr>
</tbody>
</table>

*Teflon® PTFE 8 is ASTM D4894, Type IV, Grade 1.

Note: Typical properties are not suitable for specification purposes.
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CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see “DuPont Medical Caution Statement,” H-50102.