DuPont™ Teflon® PFA 440HPB

Molding and Extrusion Resin

Product Information

For inventory control purposes product name may be followed by an X.

Products labeled PFA 440HPB and PFA 440HPB X are equivalent and all information in this document is applicable to both.

Typical Application

Applications for DuPont™ Teflon® PFA 440HPB include fluid handling components for critical, high-purity processes like semiconductor, pharmaceutical, and biotechnology, as well as applications where purity in the parts-per-billion range is needed. Teflon® PFA 440HPB offers a slightly lower melt flow rate than Teflon® PFA 440HPA, ultimately providing a higher degree of stress-crack resistance.

Description

DuPont™ Teflon® PFA 440HPB is a special purpose fluoroplastic resin available in pellet form. This resin is a chemically modified form of Teflon® PFA 340 that combines many of the benefits of the parent resin (a relatively high typical melt flow rate of 14) with several additional benefits including enhanced purity, improved thermal stability while processing, and chemical inertness; for example, to ozonated fluids. Table 1 shows the typical property data for Teflon® PFA 440HPB.

Teflon® PFA 440HPB is a premium resin with the lowest level of extractables designed to meet ultra-high purity requirements. Teflon® PFA 440HPB has a relatively high melt flow rate for injection molding and extrusion processes, and the highest level of inertness due to stable end group polymer structure. The enhanced purity of Teflon® PFA 440HPB makes it suitable for applications that require improved color, lower extractable fluorides, and freedom from other foreign materials. This product contains no additives and is designed for hostile chemical environments where purity in the parts-per-billion range is needed. Examples are in semiconductor manufacture, fluid handling systems for industry or life sciences, and instrumentation for precise measurements of fluid systems. Compared to other thermoplastics, the high melt strength and thermal stability of Teflon® PFA 440HPB can be used to improve processing rates, combining the processing ease of conventional thermoplastics with many properties similar to those of polytetrafluoroethylene.

Properly processed products made from neat Teflon® PFA 440HPB resin provide the superior properties characteristic of fluoroplastic resins: chemical inertness, exceptional dielectric properties, heat resistance, toughness and flexibility, low coefficient of friction, non-stick characteristics, negligible moisture absorption, low flammability, performance at temperature extremes, and excellent weather resistance.

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In a flame situation, products of Teflon® PFA 440HPB resist ignition and do not promote flame spread. When ignited by flame from other sources, their contribution of heat is very small and added at a slow rate with very little smoke.

Processing

Teflon® PFA 440HPB can be processed by conventional melt extrusion and by injection, compression, and transfer molding processes. High melt strength and heat stability permit the use of relatively large die openings and high temperature draw-down techniques that increase production rates. Reciprocating screw injection molding machines are preferred. Corrosion-resistant metals should be used in contact with molten fluoroplastic resin. Extruder barrel should be long, relative to diameter, to provide residence time for heating the resin to approximately 390°C (730°F). For more detailed processing information, including recommended draw-down ratios, consult your DuPont representative.

Safety Precautions

WARNING! VAPORS CAN BE LIBERATED THAT MAY BE HAZARDOUS IF INHALED.
Before using DuPont™ Teflon® PFA 440HPB resin, refer to the Safety Data Sheet and the latest edition of "The Guide to the Safe Handling of Fluoropolymer Resins," published by The Society of the Plastics Industry, Inc. (www.fluoropolymers.org) or by PlasticsEurope (www.plasticseurope.org). Open and use containers only in well-ventilated areas using local exhaust ventilation (LEV). Vapors and fumes liberated during hot processing of PFA Teflon® 440HPB should be exhausted completely from the work area. Contamination of tobacco with these polymers must be avoided. Vapors and fumes liberated during hot processing and which are not properly exhausted, or from smoking tobacco or cigarettes contaminated with Teflon® PFA 440HPB may cause flu-like symptoms such as chills, fever and sore throat. This may not occur until several hours after exposure and will typically pass within about 24 hours. Mixtures with some finely divided metals, such as magnesium or aluminum, can be flammable or explosive under some conditions.

Food Contact Compliance

Properly processed products made from Teflon® PFA 440HPB resin can qualify for use in contact with food in compliance with FDA 21 CFR 177.1550 and European Regulation (EU) No 10/2011. For details and information, please contact your DuPont representative.

Storage and Handling

Special product isolation and packaging procedures are used by DuPont to eliminate external contamination of Teflon® PFA 440HPB resin. Processors also must avoid contamination for successful production of high purity products. The properties of Teflon® PFA 440HPB resin are not affected by storage time. Ambient storage conditions should be designed to avoid airborne contamination and water condensation on the resin when it is removed from containers.

Table 1: Typical Property Data for Teflon® PFA 440HPB

PROPERTY	TEST METHOD		UNIT	TYPICAL VALUE
GENERAL				
Melt Flow Rate	ISO 12086	ASTM D3307	g/10min	14
Melting Point	-	ASTM D4591	˚C (˚F)	305 (581)
Specific gravity	-	ASTM D792	-	2.15
Critical Shear Rate, 372˚C (702˚F)	-	-	1/s	50
MECHANICAL				
Tensile Strength	ISO 12086	ASTM D3307	MPa (psi)	
23˚C (73˚F)				25 (3,600)
250˚C (482˚F)				14 (1,800)
Ultimate Elongation	ISO 12086	ASTM D3307	%	
23˚C (73˚F)				300
250˚C (482˚F)				480
Flexural Modulus	ISO 178	ASTM D790	MPa (psi)	
23˚C (73˚F)				590 (85,000)
250˚C (482˚F)				55 (8,000)
MIT Folding Endurance (0.20mm, 8mils film)	-	ASTM D2176‡	Cycles	15,000*
Hardness Durometer	ISO 868	ASTM D2240	-	D55
ELECTRICAL				
Dielectric Strength, Short Time, 0.25mm (0.010 in)	IEC 243	ASTM D149	kV/mm (V/mil)	80 (2,000)
Dielectric Constant, 1 MHz (106 Hz)	IEC 250	ASTM D150	-	2.03
Dissipation Factor, 1 MHz (106 Hz)	IEC 250	ASTM D150	-	<0.0002
Volume Resistivity	ISO 1325	ASTM D257	ohm•cm	10^{18}
OTHER				
Water Absorption, 24h	-	ASTM D570	%	<0.03
Weather and Chemical Resistance	-	-	-	Outstanding
Limiting Oxygen Index	ISO 4589	ASTM D2863	%	>95
Flammability Classification†	-	UL 94	-	V-0

* Depending on fabrication conditions
‡ Historical standard
† These results are based on laboratory tests under controlled conditions and do not reflect performance under actual fire conditions, current rating is a typical theoretical value.

Note: Teflon® PFA 440HPB meets the requirements of ASTM D3307, Type I
Nominal properties are not suitable for specification purposes.
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.

This product is manufactured with technology that meets the goals of the U.S. Environmental Protection Agency (EPA) 2010/15 PFOA stewardship program. See www.fluoropolymers.dupont.com for more details.

Freight Classifications

DuPont™ Teflon® PFA 440HPB resin is classified as "Plastics, Materials, Pellets."

Packaging

Teflon® PFA 440HPB is supplied as pellets and is available in 25-kg multilayer bags with an integral polyethylene liner.

HOW TO USE THE DUPONT™ TEFLON® BRAND NAME WITH YOUR PRODUCT

Teflon® is a registered trademark of DuPont for our brand of fluoroplastic resins. Customer use of the Teflon® brand name must be licensed by DuPont in association with approved applications. Without a license, customers may not identify their product with the DuPont™ Teflon® brand name.

Unlicensed customers may refer to the DuPont product offering when used as an ingredient in their products by the DuPont product code number and generic descriptor. In this instance, when the product offering is to be sold and used without a license, the customer may refer to the ingredient as **DUPONT™ PFA 440HPB** fluoropolymer resin.

If you are interested in applying for a trademark licensing agreement for the DuPont™ Teflon® brand, please contact us at (800) 207-0756 in the US or (302) 996-7906 (outside of the US).

For more information, visit www.teflon.com/industrial

For sales and technical support contacts, visit www.teflon.com/industrialglobalsupport

CAUTION: Do not use DuPont materials in medical applications involving permanent implantation in the human body or contact with bodily fluids or tissues unless the material has been provided from DuPont under a written contract that is consistent with DuPont policy regarding medical applications and expressly acknowledges the contemplated use. For further information, please contact your DuPont representative. You may also visit www.teflon.com/industrial to download a copy of the "DuPont POLICY Regarding Medical Applications" H-50103 and "DuPont CAUTION Regarding Medical Applications" H-50102.

For medical emergencies, spills, or other critical situations, call (800) 441-7515 within the United States. For those outside of the United States, call (302) 774-1000.

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