



# Teflon™ PFA 416HP

## Molding and Extrusion Resin

## Product Information

For inventory control purposes, product name may be followed by an X. Products labeled PFA 416 HP and PFA 416 HP X are equivalent, and all information in this document is applicable to both.

### Typical Applications

Applications for Teflon™ PFA 416HP include high performance thin-wall wire coatings; intricate injection molded parts for production of chemicals where purity in the parts-per-billion range is needed; semiconductor components and electronic parts; and fluid handling systems for high performance chemical filters. With a typical melt flow rate (MFR) of 42, Teflon™ PFA 416HP resin is ideally suited for applications requiring a high processing speed and very low viscosity.

### Description

Teflon™ PFA 416HP is a special purpose fluoroplastic resin available in pellet form. This resin has a higher melt flow rate (typical MFR of 42) than most other PFA fluoroplastic resins, which permits higher extrusion speed and easier processing, making Teflon™ PFA 416HP a cost-effective alternative for producing thin-wall and complicated articles.

Unlike other high melt flow rate polymers, Teflon™ PFA 416HP is specially formulated to provide a high melt flow rate for processing ease, while still providing good flexural properties and stress-crack resistance. These unique properties, coupled with the resin's high thermal stability, enable thin coatings of ultra-fine wires and injection molding of complex parts. Table 1 shows the typical property data for Teflon™ PFA 416HP.

The enhanced purity of Teflon™ PFA 416HP makes it suitable for applications that require improved color, lower extractable fluorides, and freedom from other foreign materials. Teflon™ PFA 416HP contains no additives and is designed for hostile chemical environments where purity in the parts-per-billion range is needed. Teflon™ PFA 416HP combines the processing ease of conventional thermoplastics with many properties similar to those of polytetrafluoroethylene. Compared to other thermoplastics, the high melt strength and thermal stability of Teflon™ PFA 416HP can be used to improve processing rates, and allows intricate electronics to be insulated with an extremely thin coating and still withstand soldering.

Properly processed products made from neat Teflon™ PFA 416HP resin provide the superior properties typical of the 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.

In a flame situation, products of Teflon™ PFA 416HP 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 416HP 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 Chemours sales representative.

### Safety Precautions

WARNING! VAPORS CAN BE LIBERATED THAT MAY BE HAZARDOUS IF INHALED.

Before using Teflon™ PFA 416HP 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](http://www.fluoropolymers.org)) or by PlasticsEurope ([www.plasticseurope.org](http://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 Teflon™ PFA 416HP should be exhausted completely from the work area. Contamination of tobacco with these polymers must be avoided. Vapors and fumes liberated during hot processing that are not properly exhausted, or from smoking tobacco or cigarettes contaminated with Teflon™ PFA 416HP, 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 416HP 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 Chemours sales representative.

### Storage and Handling

Special product isolation and packaging procedures are used by Chemours to eliminate external contamination of Teflon™ PFA 416HP resin. Processors also must avoid contamination for successful production of high purity products. The properties of Teflon™ PFA 416HP 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.

### Freight Classifications

Teflon™ PFA 416HP resin is classified as "Plastics, Materials, Pellets."

### Packaging

Teflon™ PFA 416HP is supplied as pellets and available in 25-kg multilayer bags with an integral polyethylene liner.

**Table 1: Typical Property Data for Teflon™ PFA 416HP Molding and Extrusion Resin**

Property	Test Method		Unit	Typical Value
<b>GENERAL</b>				
Melt Flow Rate	ISO 12086	ASTM D3307	g/10 min	42
Melting Point	—	ASTM D4591	°C (°F)	305 (581)
Specific Gravity	—	ASTM D792	—	2.15
Critical Shear Rate, 372 °C (702 °F)	—	—	1/s	250
<b>MECHANICAL</b>				
Tensile Strength	ISO 12086	ASTM D3307	MPa (psi)	
23 °C (73 °F)				25 (3,600)
Ultimate Elongation	ISO 12086	ASTM D3307	%	
23 °C (73 °F)				350
Flexural Modulus	ISO 178	ASTM D790	MPa (psi)	
23 °C (73 °F)				690 (100,000)
MIT Folding Endurance (0.20 mm, 8 mil film)	—	ASTM D2176 <sup>†</sup>	Cycles	4,000*
Hardness Durometer	ISO 868	ASTM D2240	—	D55
<b>ELECTRICAL</b>				
Dielectric Strength, Short Time, 0.25 mm (0.010 in)	IEC 243	ASTM D149	kV/mm (V/mil)	80 (2,000)
Dielectric Constant, 1 MHz (10 <sup>6</sup> Hz)	IEC 250	ASTM D150	—	2.03
Dissipation Factor, 1 MHz (10 <sup>6</sup> Hz)	IEC 250	ASTM D150	—	<0.0002
Volume Resistivity	ISO 1325	ASTM D257	ohm-cm	10 <sup>18</sup>
<b>OTHER</b>				
Water Absorption, 24 hr	—	ASTM D570	%	<0.03
Weather and Chemical Resistance	—	—	—	Outstanding
Limiting Oxygen Index	ISO 4589	ASTM D2863	%	>95
Continuous Service Temperature <sup>‡</sup>	—	—	°C (°F)	260 (500)
Flammability Classification <sup>†</sup>	—	UL 94	—	V-0

\* Depending on fabrication conditions

† Historical standard

‡ Definition of continuous service temperature: The continuous service temperature is based on accelerated heat-aging tests, and represents the temperature at which tensile strength and ultimate elongation retain 50% of the original values after 20,000 hr thermal aging. Continuous service temperature above 260 °C (500 °F) may be feasible, depending on such factors as chemical exposure, support from the substrate, etc. When considering uses of Teflon™ PFA 416HP above 260 °C (500 °F), preliminary testing should be done to verify suitability.

\* 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 416HP meets the requirements of ASTM D3307, Type IX

Typical 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.

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