



Teflon™ FEP 9494

Fluoroplastic Resin

Product Information

For inventory control purposes, product name may be followed by an X. Products labeled FEP 9494 and FEP 9494 X are equivalent, and all information in this document is applicable to both.

Typical Applications

Applications for Teflon™ FEP 9494 include small diameter, thin wall wire and cable insulation; industrial film; and intricate or thin wall parts made by injection molding.

Description

Teflon™ FEP 9494 is a melt-processible fluoroplastic resin available in pellet form. It is a copolymer of tetrafluoroethylene and hexafluoropropylene, without additives, that meets the requirements of ASTM D 2116 Type II. With a relatively high melt flow rate and excellent electrical properties, Teflon™ FEP 9494 has been specifically designed for high-speed extrusion of thin coatings on small-gauge wires for twisted-pair constructions. Table 1 shows the typical property data for Teflon™ FEP 9494.

As shown in Table 1, this resin provides the electrical and mechanical properties needed for low voltage applications. In addition, Teflon™ FEP 9494 has a higher melt flow rate than most other fluoroplastic resins. This permits higher extrusion speeds and easier processing, making Teflon™ FEP 9494 a cost-effective alternative for producing thin-wall extrusions.

Teflon™ FEP 9494 is designed and made to have improved dissipation factor at high frequencies, and to have significant plate-out resistance in melt extrusion. It is suitable as a solid insulator and as a foamed insulator, when used with an appropriate nucleant in a nitrogen gas injection process.

Teflon™ FEP 9494 is used when traditional extrusion and molding processes are required for producing products with the superior properties of a fluoroplastic resin. Compared to other thermoplastics, the high melt strength and thermal stability of Teflon™ FEP 9494 can be used to improve processing rates. Compared with other fluoroplastics, creep resistance at high service temperatures provides a superior balance and level of end-use properties. Teflon™ FEP 9494 combines the processing ease of conventional thermoplastics with many properties similar to those of polytetrafluoroethylene.

Properly processed products made from neat Teflon™ FEP 9494 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.

In a flame situation, products of Teflon™ FEP 9494 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™ FEP 9494 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 400 °C (750 °F). For more detailed processing information, including recommended draw-down ratios, consult your Chemours sales representative.

Safety Precautions

Before using Teflon™ FEP 9494 resin, refer to the Material 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 Teflon™ FEP 9494 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™ FEP 9494, 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™ FEP 9494 resin can qualify for use in contact with food in compliance with FDA Inventory of Effective Food Contact Substance (FCS) Notification #947. For details and information, please contact your Chemours sales representative.

Storage and Handling

The properties of Teflon™ FEP 9494 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.

Packaging

Teflon™ FEP 9494 is supplied as pellets, and is available in 25-kg single layer plastic bags and 1,000-kg bulk containers.

Table 1: Typical Property Data for Teflon™ FEP 9494 Fluoroplastic Resin

Property	Test Method ¹		Unit	Typical Value
PROCESSING				
Melt Flow Rate (MFR at 372 °C [702 °F]/5.0 kg)	ISO 12086	D 2116	g/10 min	30
Specific Gravity	ISO 1183	D 792	—	2.15
Critical Shear Rate (372 °C/702 °F)	—	Chemours	1/s	200
MECHANICAL				
Tensile Strength, 23 °C (73 °F)	ISO 12086	D 638	MPa (psi)	20 (3,000)
Ultimate Elongation, 23 °C (73 °F)	ISO 12086	D 638	%	300
Flexural Modulus, 23 °C (73 °F)	ISO 178	D 790	MPa (psi)	520 (75,500)
MIT Folding Endurance (0.20 mm, 8 mil film)	—	D 2176 ²	Cycles	7,000
Hardness, Shore Durometer	ISO 868	D 2240	—	D 55
ELECTRICAL				
Dielectric Constant, 1 MHz	IEC 250	D 150	—	2.03
Dielectric Constant, 1 GHz	IEC 250	D 2520	—	2.03
Dissipation Factor, 1 MHz	IEC 250	D 150	—	0.0006
Dissipation Factor, 1 GHz	IEC 250	D 2520	—	0.0004
Dielectric Strength, Short Time, 0.25 mm (0.010 in) Film	IEC 243	D 149	kV/mm (V/mil)	80 (2,000)
THERMAL				
Melting Point	—	D 4591	°C (°F)	255 (491)
Limiting Oxygen Index	ISO 4589	D 2863	%	> 95
Flammability Classification ^{3, 4}	—	UL 94	—	V-0
OTHER				
Water Absorption, 24 hr	—	D 570	%	<0.01
Weather and Chemical Resistance	—	—	—	Excellent

Note: Teflon™ FEP 9494 meets the requirements of ASTM D 2116, Type II.

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.

¹ASTM method unless otherwise specified.

²Historical standard.

³These results are based on laboratory tests, under controlled conditions, and do not reflect performance under actual fire conditions.

⁴Current rating is a typical theoretical value.

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Replaces: K-26521

C-10091 (3/20)



Teflon™ FEP 9898

Fluoroplastic Resin

Product Information

Typical Applications

Applications for Teflon™ FEP 9898 include small diameter, thin wall wire and cable insulation; industrial film; and intricate or thin wall parts made by injection molding.

Description

Teflon™ FEP 9898 is a melt-processible fluoroplastic resin available in pellet form. It is a copolymer of tetrafluoroethylene and hexafluoropropylene, without additives, that meets the requirements of ASTM D 2116 Type II. With a relatively high melt flow rate and improved high frequency electrical properties, Teflon™ FEP 9898 has been designed for high-speed extrusion of thin coatings on small-gauge wires. Table 1 shows the typical property data for Teflon™ FEP 9898.

As shown in Table 1, this resin provides the electrical and mechanical properties needed for low voltage applications. In addition, Teflon™ FEP 9898 has a higher melt flow rate than most other fluoroplastic resins. This permits higher extrusion speeds and easier processing, making Teflon™ FEP 9898 a cost-effective alternative for producing thin-wall extrusions.

Teflon™ FEP 9898 is designed and made to have improved dissipation factor at high frequencies, and to have significant plate-out resistance in melt extrusion. It is suitable as a solid insulator and as a foamed insulator when used with an appropriate nucleant in a nitrogen gas injection process.

Teflon™ FEP 9898 is used when traditional extrusion and molding processes are required for producing products with the superior properties of a fluoroplastic resin. Compared to other thermoplastics, the high melt strength and thermal stability of Teflon™ FEP 9898 can be used to improve processing rates. Compared with other fluoroplastics, creep resistance at high service temperatures provides a superior balance and level of end-use properties. Teflon™ FEP 9898 combines the processing ease of conventional thermoplastics with many properties similar to those of polytetrafluoroethylene.

Properly processed products made from neat Teflon™ FEP 9898 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.

In a flame situation, products of Teflon™ FEP 9898 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™ FEP 9898 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 400 °C (750 °F). For more detailed processing information, including recommended draw-down ratios, consult your Chemours representative.

Safety Precautions

Before using Teflon™ FEP 9898 resin, refer to the Material 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 Teflon™ FEP 9898 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™ FEP 9898, 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™ FEP 9898 resin can qualify for use in contact with food in compliance with FDA Inventory of Effective Food Contact Substance (FCS) Notification #947. For details and information, please contact your Chemours representative.

Storage and Handling

The properties of Teflon™ FEP 9898 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.

Packaging

Teflon™ FEP 9898 is supplied as pellets and is available in 25-kg single layer plastic bags and in 1000 kg bulk containers.

Table 1: Typical Property Data for Teflon™ FEP 9898 Fluoroplastic Resin

Property	Test Method ¹		Unit	Typical Value
PROCESSING				
Melt Flow Rate (MFR at 372 °C [702 °F]/5.0 kg)	ISO 12086	D 2116	g/10 min	30
Specific Gravity	ISO 1183	D 792	—	2.15
Critical Shear Rate (372 °C [702 °F])	—	Chemours	1/s	200
MECHANICAL				
Tensile Strength, 23 °C (73 °F)	ISO 12086	D 638	MPa (psi)	20 (3,000)
Ultimate Elongation, 23 °C (73 °F)	ISO 12086	D 638	%	300
Flexural Modulus, 23 °C (73 °F)	ISO 178	D 790	MPa (psi)	520 (75,500)
MIT Folding Endurance (0.20 mm, 8 mil film)	—	D 2176 ²	Cycles	7,000
Hardness, Shore Durometer	ISO 868	D 2240	—	D 55
ELECTRICAL				
Dielectric Constant, 1 MHz	IEC 250	D 150	—	2.03
Dielectric Constant, 1 GHz	IEC 250	D 2520	—	2.03
Dissipation Factor, 1 MHz	IEC 250	D 150	—	0.0006
Dissipation Factor, 1 GHz	IEC 250	D 2520	—	0.0004
Dissipation Factor, 10 GHz	IEC 250	D 2520	—	< 0.0004
Dielectric Strength, short time, 0.25 mm (0.010 in) film	IEC 243	D 149	kV/mm (V/mil)	80 (2,000)
THERMAL				
Melting Point	—	D 4591	°C (°F)	255 (491)
Limiting Oxygen Index	ISO 4589	D 2863	%	> 95
Flammability Classification ^{3,4}	—	UL 94	—	V-0
OTHER				
Water Absorption, 24 hr	—	D 570	%	<0.01
Weather and Chemical Resistance	—	—	—	Excellent

Note: Teflon™ FEP 9898 meets the requirements of ASTM D 2116, Type II.

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.

¹ASTM method unless otherwise specified.

²Historical standard.

³These results are based on laboratory tests, under controlled conditions, and do not reflect performance under actual fire conditions.

⁴Current rating is a typical theoretical value.

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C-10057 (3/20)



Teflon™ PFA 440HPA

Molding and Extrusion Resin

Product Information

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

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

Typical Applications

Applications for Teflon™ PFA 440HPA 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 440HPA offers a slightly higher melt flow rate than Teflon™ PFA 440HPB, providing greater processing ease.

Description

Teflon™ PFA 440HPA is a special purpose fluoropolymer 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 16) 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 440HPA.

Teflon™ PFA 440HPA is a premium resin with the lowest level of extractables designed to meet ultra-high purity requirements. Teflon™ PFA 440HPA has a relatively high melt flow rate (typical MFR of 16) 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 440HPA 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 fluoropolymers, the high melt strength and thermal stability of Teflon™ PFA 440HPA can be used to improve processing rates, combining the processing ease of conventional fluoropolymers with many properties similar to those of polytetrafluoroethylene.

Properly processed products made from neat Teflon™ PFA 440HPA resin provide the superior properties characteristic of fluoropolymer 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 440HPA 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 440HPA 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 fluoropolymer 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 representative.

Safety Precautions

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

Before using Teflon™ PFA 440HPA resin, refer to the Safety Data Sheet and the latest edition of "The Guide to the Safe Handling of Fluoropolymer Resins," published by the Plastics Industry Association (www.plasticsindustry.org) or 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 Teflon™ PFA 440HPA 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 440HPA, 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 440HPA 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 representative.

Storage and Handling

Special product isolation and packaging procedures are used by Chemours to eliminate external contamination of Teflon™ PFA 440HPA resin. Processors also must avoid contamination for successful production of high purity products. The properties of Teflon™ PFA 440HPA 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 440HPA resin is classified as "Plastics, Materials, Pellets"

Packaging

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

Table 1: Typical Property Data for Teflon™ PFA 440HPA

Property	Test Method		Unit	Typical Value
GENERAL				
Melt Flow Rate	ISO 20568	ASTM D3307	g/10 min	16
Melting Point	—	ASTM D4591	°C (°F)	305 (581)
Specific Gravity	—	ASTM D792	—	2.15
Critical Shear Rate, 372 °C (702 °F)	—	—	1/sec	56
MECHANICAL				
Tensile Strength	ISO 12086 ^a	ASTM D3307	MPa (psi)	
23 °C (73 °F)				25 (3,600)
250 °C (482 °F)				14 (1,800)
Ultimate Elongation	ISO 12086 ^a	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 (0.20 mm, 8 mil film)	—	ASTM D2176 ^b	Cycles	20,000 ^c
Hardness Durometer	ISO 868	ASTM D2240	—	D55
ELECTRICAL				
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 ⁶ Hz)	IEC 250	ASTM D150	—	2.03
Dissipation Factor, 1 MHz (10 ⁶ Hz)	IEC 250	ASTM D150	—	<0.0002
Volume Resistivity	ISO 1325	ASTM D257	ohm-cm	10 ¹⁸
OTHER				
Water Absorption, 24 hr	—	ASTM D570	%	<0.03
Weather and Chemical Resistance	—	—	—	Outstanding
Limiting Oxygen Index	ISO 4589	ASTM D2863	%	>95
Continuous Service Temperature ^d	—	—	°C (°F)	260 (500)
Flammability Classification ^e	—	UL 94	—	V-0

^a ISO 12086 is a retired standard.^b Depending on fabrication conditions.^c Historical standard^d 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 440HPA above 260 °C (500 °F), preliminary testing should be done to verify suitability.^e 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 440HPA meets the requirements of ASTM D3307, Type I

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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Teflon™ PFA 450HP

Molding and Extrusion Resin

Product Information

For inventory control purposes, product name may be followed by an X. Products labeled PFA 450HP and PFA 450HP X are equivalent, and all information in this document is applicable to both.

Typical Applications

Applications for Teflon™ PFA 450HP include tubing, chemical linings for pipes, valves, and fittings used in the chemical processing industries, unsupported pipe linings for the production of ultra-pure chemicals, semiconductor components, and fluid handling components for high-performance chemical delivery systems where purity in the parts-per-billion range is needed. Teflon™ PFA 450HP is preferred in applications where extended service is required in hostile environments involving chemical, thermal, and mechanical stress.

Description

Teflon™ PFA 450HP is a special purpose fluoroplastic resin available in pellet form. This resin is a chemically modified form of Teflon™ PFA 350 that combines many of the benefits of the parent resin (highest resistance to environmental stress-cracking with a typical MIT folding endurance of 500,000*) 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 450HP.

Teflon™ PFA 450HP is a relatively low melt flow rate (typical MFR of 2), premium resin with the lowest level of extractables designed to meet ultra-high purity requirements. An enhanced resistance to environmental stress-cracking makes Teflon™ PFA 450HP a preferred resin when extended service is required in hostile environments involving chemical, thermal, and mechanical stress. Additionally, the enhanced purity of Teflon™ PFA 450 HP 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 450HP 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 450HP 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.

In a flame situation, products of Teflon™ PFA 450HP 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 450HP can be processed by conventional melt extrusion, and by injection, compression, transfer, and blow-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 representative.

Safety Precautions

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

Before using Teflon™ PFA 450HP 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 Teflon™ PFA 450HP 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 450HP, 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 450HP 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 representative.

Storage and Handling

Special product isolation and packaging procedures are used by Chemours to eliminate external contamination of Teflon™ PFA 450HP resin. Processors also must avoid contamination for successful production of high purity products. The properties of Teflon™ PFA 450HP 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 450HP resin is classified as "Plastics, Materials, Pellets."

Packaging

Teflon™ PFA 450HP is supplied as pellets and is available in 25-kg multilayer bags with an integral polyethylene liner.

Table 1: Typical Property Data for Teflon™ PFA 450HP

Property	Test Method		Unit	Typical Value
GENERAL				
Melt Flow Rate	ISO 12086	ASTM D3307	g/10 min	2
Melting Point	—	ASTM D4591	°C (°F)	305 (581)
Specific Gravity	—	ASTM D792	—	2.15
Critical Shear Rate, 372 °C (702 °F)	—	—	1/s	12
MECHANICAL				
Tensile Strength	ISO 12086	ASTM D3307	MPa (psi)	
23 °C (73 °F)				28 (4,000)
250 °C (482 °F)				14 (2,000)
Ultimate Elongation	ISO 12086	ASTM D3307	%	
23 °C (73 °F)				300
250 °C (482 °F)				500
Flexural Modulus	ISO 178	ASTM D790	MPa (psi)	
23 °C (73 °F)				625 (90,000)
250 °C (482 °F)				69 (10,000)
MIT Folding Endurance (0.20 mm, 8 mil film)	—	ASTM D2176 [†]	Cycles	500,000*
Hardness Durometer	ISO 868	ASTM D2240	—	D55
ELECTRICAL				
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 ⁶ Hz)	IEC 250	ASTM D150	—	2.03
Dissipation Factor, 1 MHz (10 ⁶ Hz)	IEC 250	ASTM D150	—	<0.0002
Volume Resistivity	ISO 1325	ASTM D257	ohm-cm	10 ¹⁸
OTHER				
Water Absorption, 24 hr	—	ASTM D570	%	<0.03
Weather and Chemical Resistance	—	—	—	Outstanding
Limiting Oxygen Index	ISO 4589	ASTM D2863	%	>95
Continuous Service Temperature [‡]	—	—	°C (°F)	260 (500)
Flammability Classification [†]	—	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 450HP 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 450HP meets the requirements of ASTM D3307, Type II

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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Teflon™ PFA 451HP

Molding and Extrusion Resin

Product Information

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

Products labeled PFA 451HP and PFA 451HP X are equivalent, and all information in this document is applicable to both.

Typical Applications

Applications for Teflon™ PFA 451HP include tubing, unsupported pipe linings for the production of ultra-pure chemicals, semiconductor fluid handling components, and high-performance chemical delivery systems where purity in the parts-per-billion range is needed. Teflon™ PFA 451HP is preferred in applications where surface smoothness and the highest levels of chemical permeation resistance are required.

Description

Teflon™ PFA 451HP is a special purpose fluoroplastic resin available in pellet form. This resin is a chemically modified form of Teflon™ PFA 350 that combines many of the advantages of the parent resin with several additional benefits. Teflon™ PFA 451HP exhibits improved surface smoothness achieved through minimization of spherulite size, enhanced chemical permeation resistance achieved by increasing its crystallinity from Teflon™ PFA 450HP, enhanced purity, and improved thermal stability while processing.

Teflon™ PFA 451HP is a relatively low melt flow rate (typical MFR of 2), premium resin with the lowest level of extractables designed to meet ultra-high purity requirements. An enhanced resistance to environmental stress-cracking and chemical permeation make Teflon™ PFA 451HP a preferred resin when extended service is required in hostile environments involving chemical, thermal, and mechanical stress. Additionally, the enhanced purity of Teflon™ PFA 451HP 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 451HP 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 451HP 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.

In a flame situation, products of Teflon™ PFA 451HP 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 451HP can be processed by conventional melt extrusion, and by injection, compression, transfer, and blow-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 representative.

Safety Precautions

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

Before using Teflon™ PFA 451HP 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 Teflon™ PFA 451HP 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 451HP, 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 451HP 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 representative.

Storage and Handling

Special product isolation and packaging procedures are used by Chemours to eliminate external contamination of Teflon™ PFA 451HP resin. Processors also must avoid contamination for successful production of high purity products. The properties of Teflon™ PFA 451HP 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 451HP resin is classified as "Plastics, Materials, Pellets"

Packaging

Teflon™ PFA 451HP is supplied as pellets and is available in 25-kg multilayer bags with an integral polyethylene liner.

Table 1: Typical Property Data for Teflon™ PFA 451HP

Property	Test Method		Unit	Typical Value
GENERAL				
Melt Flow Rate	ISO 12086	ASTM D3307	g/10 min	2
Melting Point	—	ASTM D4591	°C (°F)	305 (581)
Specific Gravity	—	ASTM D792	—	2.15
Critical Shear Rate, 372 °C (702 °F)	—	—	1/s	12
MECHANICAL				
Tensile Strength	ISO 12086	ASTM D3307	MPa (psi)	
23 °C (73 °F)				33 (4,800)
200 °C (392 °F)				18 (2,600)
Ultimate Elongation	ISO 12086	ASTM D3307	%	
23 °C (73 °F)				360
200 °C (392 °F)				500
Flexural Modulus	ISO 178	ASTM D790	MPa (psi)	
23 °C (73 °F)				410 (60,000)
200 °C (392 °F)				54 (7,800)
MIT Folding Endurance (0.20 mm, 8 mil film)	—	ASTM D2176 [†]	Cycles	300,000*
Hardness Durometer	ISO 868	ASTM D2240	—	D55
ELECTRICAL				
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 ⁶ Hz)	IEC 250	ASTM D150	—	2.03
Dissipation Factor, 1 MHz (10 ⁶ Hz)	IEC 250	ASTM D150	—	<0.0002
Volume Resistivity	ISO 1325	ASTM D257	ohm-cm	10 ¹⁸
OTHER				
Water Absorption, 24 hr	—	ASTM D570	%	<0.03
Weather and Chemical Resistance	—	—	—	Outstanding
Limiting Oxygen Index	ISO 4589	ASTM D2863	%	>95
Continuous Service Temperature [‡]	—	—	°C (°F)	260 (500)
Flammability Classification [†]	—	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 451HP 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 451HP meets the requirements of ASTM D3307, Type II

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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Teflon™ PTFE 62 X

Fine Powder Fluoroplastic Resin

Product Information

Description

Teflon™ PTFE 62 X is a polytetrafluoroethylene fine powder resin used primarily for paste extrusion. Teflon™ PTFE 62 X offers the excellent combination of properties typical of Teflon™ fluoroplastic resins:

- Non-aging characteristics
- Chemical inertness to nearly all industrial chemicals and solvents
- Exceptional dielectric properties, stable with frequency and temperature
- Toughness and flexibility
- Low coefficient of friction
- Non-stick characteristics
- Negligible moisture absorption
- Excellent weather resistance
- Service temperature up to 260 °C (500 °F)
- Useful properties at -240 °C (-400 °F)
- Moderate stiffness and high ultimate elongation

Compared with other grades of PTFE fine powder, Teflon™ PTFE 62 X is a premium resin that has increased thermal stability, superior flex life, superior stress crack resistance, low permeability, and high clarity.

Teflon™ PTFE 62 X is designed for processing at medium to high reduction ratios of 100:1 to 600:1. It is particularly suitable for production of high quality tubing, spaghetti tubing, and wire coating. This grade is also highly suitable for after-processing technologies, such as flanging, welding, blow molding, and convoluting.

Teflon™ PTFE 62 X meets the requirements of ASTM D4895, Type 1, Grade 4, Class B.

Typical Applications

Teflon™ PTFE 62 X is mainly used for tubing installed in demanding applications. It includes high performance

articles, such as reinforced hose requiring the ultimate in reliability and performance in chemical, pharmaceutical, and automotive industry in use with hydraulic fluid, hydrocarbon fuel, or reactive gas. Such applications are, for example, overbraided hoses for fuel assemblies and brake systems.

Processing

Teflon™ PTFE 62 X is extruded using a liquid processing aid, such as naphtha. In the paste extrusion process, the powder is mixed with a lubricant aid and then compressed into a cylindrical preform slug under light pressure (1.5–2.0 MPa [220–290 psi]). The preform slug is placed in the cylinder of a paste extruder, where the composition is forced under high pressure through a finishing die to produce beading, tubing, or wire coatings.

After extrusion, the product is a low-density, but coherent, fibrous structure. Teflon™ PTFE 62 X is usually processed further, with heat, into a solid resin product, such as tubing. Heat is applied in two steps, which may be taken in-line with extrusion or separately. The lubricant must be removed first, usually by heating within the range of 100–300 °C (212–572 °F). A sintering step follows to melt the resin above its melting point of approximately 342 °C (648 °F) and produce the void-free, solid PTFE resin.

Food Contact Compliance

Properly processed products (sintered at high temperatures common to the industry) made from Teflon™ PTFE 62 X 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.

Safety Precautions

Before processing any fluoroplastics, read the Safety Data Sheet, available upon request from our Customer Service Group at (844) 773-CHEM/2436 in the U.S. or [REDACTED] outside of the U.S. Also read the detailed information in the latest edition of the "Guide to the Safe Handling of Fluoropolymer Resins," published by the Fluoropolymers Division of The Society of the Plastics Industry (www.fluoropolymers.org) or by PlasticsEurope (www.plasticseurope.org).

Storage and Handling

Teflon™ PTFE fine powder resins must be handled carefully to avoid shearing the powder prior to extrusion. Fibrillation by shearing is not reversible, and damaged particles can appear as defects in the finished product. As temperature is reduced below the transition point of 19 °C (66 °F), the powder becomes progressively less sensitive to mechanical damage or compaction in its containers.

Chemours recommends that powder compacted during shipping and storage be restored to its optimum condition by cooling it for one or two days below 19 °C (66 °F), followed by screening through a 2 to 4.76 mm opening sieve (4 to 10 mesh). Lumps that are retained on the sieve that can be broken up by shaking at temperatures below 19 °C (66 °F) may be used; however, harder lumps that can not be broken up should be discarded.

All processing steps prior to preforming should be done at reduced temperature, but ambient dew point must be controlled to prevent condensation on the resin. Storage and handling facilities should be clean to avoid any cross-contamination. The high sintering temperature causes even very small foreign particles to become visible or to cause defects in finished products. Keep resin drums closed and clean.

Packaging

Teflon™ PTFE 62 X resin is packaged in 25-kg (55.1-lb) plastic containers. For convenient shipment, orders of 300-kg (661.4-lb) pallets (12 drums) are recommended.

Typical Property Data for Teflon™ PTFE 62 X Fine Powder Fluoroplastic Resin

Property Test	Test Method		Unit	Typical Value
Average Particle Size	ASTM D4895	ISO 12086	µm	480
Bulk Density	ASTM D4895	ISO 12086	g/L	495
Standard Specific Gravity	ASTM D4895	ISO 12086		2.152
Thermal Instability Index	ASTM D4895	ISO 12086		<7
Stretch Void Index	ASTM D4895	ISO 12086		<50
Extrusion Pressure at RR = 400:1	ASTM D4895	ISO 12086	MPa (psi)	23 (3,335)
Melt Peak Temperature				
Initial	ASTM D4895	ISO 12086	°C (°F)	341 (646)
Second	ASTM D4895	ISO 12086	°C (°F)	322 (612)

Note: Teflon™ PTFE 62 X meets the requirements of ASTM D4895-15, Type I, Grade 4, Class B.
Typical properties are not suitable for specification purposes.

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Replaces: K-24271

C-10127 (2/16)



Teflon™ PTFE 62N X

Fine Powder Fluoroplastic Resin

Product Information

Description

Teflon™ PTFE 62N X is a polytetrafluoroethylene fine powder resin used primarily for paste extrusion. Teflon™ PTFE 62N X offers the excellent combination of properties typical of Teflon™ fluoroplastic resins:

- Non-aging characteristics
- Chemical inertness to nearly all industrial chemicals and solvents
- Exceptional dielectric properties, stable with frequency and temperature
- Toughness and flexibility
- Low coefficient of friction
- Non-stick characteristics
- Negligible moisture absorption
- Excellent weather resistance
- Service temperature up to 260 °C (500 °F)
- Useful properties at -240 °C (-400 °F)
- Moderate stiffness and high ultimate elongation

Compared with other grades of PTFE fine powder, Teflon™ PTFE 62N X is a premium resin that has increased thermal stability, superior flex life, superior stress crack resistance, low permeability, and high clarity.

Teflon™ PTFE 62N X is designed for processing at low to medium reduction ratios of 100:1 to 600:1. It is particularly suitable for production of high quality tubing, spaghetti tubing, wire coating, and extruded shapes. This grade is also highly suitable for after processing technologies, such as flanging, welding, blow molding, and convoluting.

Teflon™ PTFE 62N X meets the requirements of ASTM D4895, Type I, Grade 4, Class B.

Typical Applications

Teflon™ PTFE 62N X is mainly used for tubing installed in demanding applications. It includes high performance

articles, such as reinforced hose requiring the ultimate in reliability and performance in chemical, pharmaceutical, and automotive industry in use with hydraulic fluid, hydrocarbon fuel, or reactive gas. Such applications are, for example, overbraided hoses for fuel assemblies and brake systems.

Processing

Teflon™ PTFE 62N X is extruded using a liquid processing aid, such as naphtha. In the paste extrusion process, the powder is mixed with a lubricant aid and then compressed into a cylindrical preform slug under light pressure (1.5–2.0 MPa [220–290 psi]). The preform slug is placed in the cylinder of a paste extruder, where the composition is forced under high pressure through a finishing die to produce beading, tubing, or wire coatings.

After extrusion, the product is a low-density, but coherent, fibrous structure. Teflon™ PTFE 62N X is usually processed further, with heat, into a solid resin product, such as tubing. Heat is applied in two steps, which may be taken in-line with extrusion or separately. The lubricant must be removed first, usually by heating within the range of 100–300 °C (212–572 °F). A sintering step follows to melt the resin above its melting point of approximately 342 °C (648 °F) and produce the void-free, solid PTFE resin.

Food Contact Compliance

Properly processed products (sintered at high temperatures common to the industry) made from Teflon™ PTFE 62N X 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.

Safety Precautions

Before processing any fluoroplastics, read the Safety Data Sheet, available upon request from our Customer Service Group at (844) 773-CHEM/2436 in the U.S. or [REDACTED] outside of the U.S. Also read the detailed information in the latest edition of the "Guide to the Safe Handling of Fluoropolymer Resins," published by the Fluoropolymers Division of The Society of the Plastics Industry (www.fluoropolymers.org) or by PlasticsEurope (www.plasticseurope.org).

Storage and Handling

Teflon™ PTFE fine powder resins must be handled carefully to avoid shearing the powder prior to extrusion. Fibrillation by shearing is not reversible, and damaged particles can appear as defects in the finished product. As temperature is reduced below the transition point of 19 °C (66 °F), the powder becomes progressively less sensitive to mechanical damage or compaction in its containers.

Chemours recommends that powder compacted during shipping and storage be restored to its optimum condition by cooling it for one or two days below 19 °C (66 °F), followed by screening through a 2 to 4.76 mm opening sieve (4 to 10 mesh). Lumps that are retained on the sieve that can be broken up by shaking at temperatures below 19 °C (66 °F) may be used; however, harder lumps that can not be broken up should be discarded.

All processing steps prior to preforming should be done at reduced temperature, but ambient dew point must be controlled to prevent condensation on the resin. Storage and handling facilities should be clean to avoid any cross-contamination. The high sintering temperature causes even very small foreign particles to become visible or to cause defects in finished products. Keep resin drums closed and clean.

Packaging

Teflon™ PTFE 62N X resin is packaged in 25-kg (55.1-lb) plastic containers. For convenient shipment, orders of 300-kg (661.4-lb) pallets (12 drums) are recommended.

Typical Property Data for Teflon™ PTFE 62N X Fine Powder Fluoroplastic Resin

Property Test	Test Method		Unit	Typical Value
Average Particle Size, d50	ASTM D4895	ISO 12086	µm	480
Bulk Density	ASTM D4895	ISO 12086	g/L	495
Standard Specific Gravity	ASTM D4895	ISO 12086		2.148
Thermal Instability Index	ASTM D4895	ISO 12086		<7
Stretch Void Index	ASTM D4895	ISO 12086		<50
Extrusion Pressure at RR = 400:1	ASTM D4895	ISO 12086	MPa (psi)	24 (3,500)
Melt Peak Temperature				
Initial	ASTM D4895	ISO 12086	°C (°F)	341 (646)
Second	ASTM D4895	ISO 12086	°C (°F)	322 (612)

Note: Teflon™ PTFE 62N X meets the requirements of ASTM D4895-15, Type I, Grade 4, Class B.
Typical properties are not suitable for specification purposes.

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Replaces: K-24269

C-10121 (2/16)



Teflon™ PTFE 601 X

Fine Powder Fluoroplastic Resin

Product Information

Description

Teflon™ PTFE 601 X is a polytetrafluoroethylene fine powder resin used primarily for paste extrusion. Teflon™ PTFE 601 X offers the excellent combination of properties typical of Teflon™ fluoroplastic resins:

- Chemical inertness to nearly all industrial chemicals and solvents
- Superior in-use thermal stability (low thermal instability index)
- Exceptional dielectric properties, stable with frequency and temperature
- Toughness and flexibility
- Low coefficient of friction
- Non-stick characteristics
- Negligible moisture absorption
- Excellent weather resistance
- Service temperature up to 260 °C (500 °F)
- Useful properties at -240 °C (-400 °F)
- Moderate stiffness and high ultimate elongation

Teflon™ PTFE 601 X is designed for processing at low to medium reduction ratios of 10:1 to 300:1. It is particularly suitable for unsintered stretched products and for sintered products with high mechanical properties.

Teflon™ PTFE 601 X meets the requirements of ASTM D4895, Type I, Grade 1, Class A.

Typical Applications

Teflon™ PTFE 601 X is mainly used for unsintered articles, including filter membranes and gaskets.

Processing

Teflon™ PTFE 601 X is extruded using a liquid processing aid, such as naphtha. In the paste extrusion process, the powder is mixed with a lubricant aid and then compressed into a cylindrical preform slug under light pressure (1.5–2.0 MPa [220–290 psi]). The preform slug is placed in the cylinder of a paste extruder, where the composition is forced under high pressure through a finishing die to produce beading, tubing, or wire coatings.

After extrusion, the product is a low-density, but coherent, fibrous structure. After removal of the lubricant by heating within the range of 100–300 °C (212–572 °F), the extrudate can be either sintered above its melting point of around 345 °C (653 °F) to produce a void-free PTFE article or calendered and stretched to produce unsintered or semi-sintered articles.

Food Contact Compliance

Properly processed products (sintered at high temperatures common to the industry) made from Teflon™ PTFE 601 X 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.

Safety Precautions

Before processing any fluoroplastics, read the Safety Data Sheet, available upon request from our Customer Service Group at (844) 773-CHEM/2436 in the U.S. or [REDACTED] outside of the U.S. Also read the detailed information in the latest edition of the "Guide to the Safe Handling of Fluoropolymer Resins," published by the Fluoropolymers Division of The Society of the Plastics Industry (www.fluoropolymers.org) or by PlasticsEurope (www.plasticseurope.org).

Storage and Handling

Teflon™ PTFE fine powder resins must be handled carefully to avoid shearing the powder prior to extrusion. Fibrillation by shearing is not reversible, and damaged particles can appear as defects in the finished product. As temperature is reduced below the transition point of 19 °C (66 °F), the powder becomes progressively less sensitive to mechanical damage or compaction in its containers.

Chemours recommends that powder compacted during shipping and storage be restored to its optimum condition by cooling it for one or two days below 19 °C (66 °F), followed by screening through a 2 to 4.76 mm opening sieve (4 to 10 mesh). Lumps that are retained on the sieve that can be broken up by shaking at temperatures below 19 °C (66 °F) may be used; however, harder lumps that cannot be broken up should be discarded.

All processing steps prior to preforming should be done at reduced temperature, but ambient dew point must be controlled to prevent condensation on the resin. Storage and handling facilities should be clean to avoid any cross-contamination. The high sintering temperature causes even very small foreign particles to become visible or to cause defects in finished products. Keep resin drums closed and clean.

Packaging

Teflon™ PTFE 601 X resin is packaged in 27.2-kg (60-lb) plastic containers. For convenient shipment, orders in multiples of 326.4-kg (720-lb) pallets (12 drums) are recommended.

Typical Property Data for Teflon™ PTFE 601 X Fine Powder Fluoroplastic Resin

Property Test	Test Method		Unit	Typical Value
Average Particle Size	ASTM D4895	ISO 12086	µm	500
Bulk Density	ASTM D4895	ISO 12086	g/L	550
Standard Specific Gravity	ASTM D4895	ISO 12086		2.160
Thermal Instability Index	ASTM D4895	ISO 12086		<50
Extrusion Pressure at RR = 100:1	ASTM D4895	ISO 12086	MPa (psi)	9.0 (1,300)
Melt Peak Temperature				
Initial	ASTM D4895	ISO 12086	°C (°F)	342 (648)
Second	ASTM D4895	ISO 12086	°C (°F)	327 (621)

Note: Teflon™ PTFE 601 X meets the requirements of ASTM D4895-15, Type I, Grade 1, Class A.
Typical properties are not suitable for specification purposes.

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Replaces: K-26440

C-10125 (2/16)



Teflon™ PTFE 605XT X

Fine Powder Fluoroplastic Resin

Product Information

Description

Teflon™ PTFE 605XT X is a polytetrafluoroethylene fine powder resin used primarily for paste extrusion. Teflon™ PTFE 605XT X offers the excellent combination of properties typical of Teflon™ fluoroplastic resins:

- Non-aging characteristics
- Chemical inertness to nearly all industrial chemicals and solvents
- Exceptional dielectric properties, stable with frequency and temperature
- Toughness and flexibility
- Low coefficient of friction
- Non-stick characteristics
- Negligible moisture absorption
- Excellent weather resistance
- Service temperature up to 260 °C (500 °F)
- Useful properties at -240 °C (-400 °F)
- Moderate stiffness and high ultimate elongation

Teflon™ PTFE 605XT X is designed for processing at low to medium reduction ratios of 10:1 to 300:1. It is particularly suitable for unsintered stretched products and sintered products with high mechanical properties.

Teflon™ PTFE 605XT X meets the requirements of ASTM D4895, Type I, Grade 1, Class A, except Average Particle Size.

Typical Applications

Teflon™ PTFE 605XT X is mainly used for unsintered articles, including filter membranes and gaskets. It is also used for making sintered products, such pipe liners and tubes.

Processing

Teflon™ PTFE 605XT X is extruded using a liquid processing aid such as naphtha. In the paste extrusion process, the powder is mixed with a lubricant aid and then compressed into a cylindrical preform slug under light pressure (1.5–2.0 MPa [220–290 psi]). The preform slug is placed in the cylinder of a paste extruder, where the composition is forced under high pressure through a finishing die to produce beading, tubing, or wire coatings.

After extrusion, the product is a low-density, but coherent, fibrous structure. After removal of the lubricant by heating within the range of 100–300 °C (212–572 °F), the extrudate can be either sintered above its melting point of around 345 °C (653 °F) to produce a void-free PTFE article, or calendered and stretched to produce unsintered or semi-sintered articles.

Food Contact Compliance

Properly processed products (sintered at high temperatures common to the industry) made from Teflon™ PTFE 605XT X 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 representative.

Safety Precautions

Before processing any fluoroplastics, read the Safety Data Sheet, available upon request from our Customer Service Group at (844) 773-CHEM/2436 in the U.S. or [REDACTED] outside of the U.S. Also read the detailed information in the latest edition of the "Guide to the Safe Handling of Fluoropolymer Resins," published by the Fluoropolymers Division of The Society of the Plastics Industry (www.fluoropolymers.org) or by PlasticsEurope (www.plasticseurope.org).

Storage and Handling

Teflon™ PTFE fine powder resins must be handled carefully to avoid shearing the powder prior to extrusion. Fibrillation by shearing is not reversible, and damaged particles can appear as defects in the finished product. As temperature is reduced below the transition point of 19 °C (66 °F), the powder becomes progressively less sensitive to mechanical damage or compaction in its containers.

Chemours recommends that powder compacted during shipping and storage be restored to its optimum condition by cooling it for one or two days below 19 °C (66 °F), followed by screening through a 2–4.76 mm opening sieve (4–10 mesh). Lumps that are retained on the sieve that can be broken up by shaking at temperatures below 19 °C (66 °F) may be used; however, harder lumps that can not be broken up should be discarded.

All processing steps prior to preforming should be done at reduced temperature, but ambient dew point must be controlled to prevent condensation on the resin. Storage and handling facilities should be clean to avoid any cross-contamination. The high sintering temperature causes even very small foreign particles to become visible or to cause defects in finished products. Keep resin drums closed and clean.

Packaging

Teflon™ PTFE 605XT X resin is packaged in 25-kg (55.1-lb) plastic containers. For convenient shipment, orders of 300-kg (661.4-lb) pallets (12 drums) are recommended.

Typical Property Data for Teflon™ PTFE 605XT X Fine Powder Fluoroplastic Resin*

Property Test	Test Method		Unit	Typical Value
Average Particle Size	ASTM D4895	ISO 12086	µm	675
Bulk Density	ASTM D4895	ISO 12086	g/L	555
Standard Specific Gravity	ASTM D4895	ISO 12086		2.163
Extrusion Pressure at RR = 100:1	ASTM D4895	ISO 12086	MPa (psi)	7.0 (1,015)
Melt Peak Temperature				
Initial	ASTM D4895	ISO 12086	°C (°F)	344 (651)
Second	ASTM D4895	ISO 12086	°C (°F)	326 (620)

Teflon™ PTFE 605XT X meets the requirements of ASTM D4895-15, Type I, Grade 1, Class A, except Average Particle Size.

*Typical properties are not suitable for specification purposes.

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Replaces: K-24254

C-10136 (2/16)