DuPont™ Teflon® PTFE TE3908

AQUEOUS FLUOROPOLYMER RESIN
MADE WITH ECHELON™ TECHNOLOGY

Product Information

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 products under license from DuPont should either contact (800) 441-7515 in the US or the regional sales office listed at the back of this brochure. Without a license, customers may not identify their product as containing Teflon®, but may refer to the resin as PTFE fluoropolymer dispersion TE3908.

Description

Teflon® PTFE TE3908 fluoropolymer resin is a negatively charged, hydrophobic colloid, containing approximately 61% (by total weight) of 0.05 to 0.5 µm PTFE (polytetrafluoroethylene) resin particles suspended in water. Seen as a milky white liquid, it also contains approximately 6% (by weight of PTFE) of a nonionic wetting agent and stabilizer. Viscosity at room temperature is approximately 30 cP. Nominal pH is 10.5.

Compared with other grades of PTFE dispersions, Teflon® PTFE TE3908 is especially formulated to provide void-free coatings with enhanced surface smoothness and gloss. It imparts many of the unique properties of PTFE resin to porous structures.

Teflon® PTFE TE3908 is similar to Teflon® PTFE TE3893. Both are typically used to coat woven glass cloth. Teflon® PTFE TE3908 offers better gloss, weldability and better wetting than Teflon® PTFE TE3893.

When properly processed, the PTFE resin in Teflon® PTFE TE3908 exhibits the superior properties typical of the fluoro polymer 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. Refer to **Table 1** for typical property data.

Typical End Products

Teflon® PTFE TE3908 is used for coated glass fabric for high-performance industrial or food conveyor belting and nonadhesive separator sheets for laminating or press blankets requiring high-quality surface finish; electrical insulation for wire, printed circuit boards, and rotating equipment; cast film for capacitors or chemical barriers; and surface coatings for other substrates.

FDA Compliance

Properly processed products (sintered at high temperatures common to the industry) made from DuPont™ Teflon® PTFE TE3908 resin can qualify for use in contact with food in compliance with FDA Regulation 21 CFR 177.1550 and the German BGA. Products made from unsintered dispersion do not comply.

Processing

PTFE resin does not respond to solvent or melt processes. A dispersion of PTFE particles provides an alternate method for making coated or impregnated products.

Conventional dip or flow techniques can be used for coating or impregnating other products with Teflon® PTFE TE3908.

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The resin particles can be consolidated by heat into a coherent matrix or coating or left as particles to influence the properties of a finished product.

A continuous PTFE resin coating on woven fabrics can be made by dip coating. Successive passes must be used to build up thickness slowly and without cracks. Teflon® PTFE TE3908 fluoropolymer provides good rewetting on each pass and void-free buildup suitable for more demanding electrical and chemical service applications. Each coating layer is usually dried to remove water (typically at 120°C [250°F]), baked to remove the wetting agent (typically at 290°C [554°F]), sometimes calendered, and finally heated above the crystalline melting point of the resin particles (approximately 337°C [639°F]). Glass, PTFE, Nomex® aramid fiber, Kevlar® aramid fiber, or other high-temperature resistant fibers must be used.

Products utilizing entrained PTFE resin particles only for their lubricating or hydrophobic properties are dried and baked, but not heated above the crystalline melting point of the particles. For example, rope-like products, such as shaft packings, can be made from braided fabrics in a variety of cross sections. The dispersion wets internal surfaces and promotes penetration of the extremely small particles. The unmelted particles are sheared and retained as an impregnant, even when compressed in service and exposed to steam or chemicals. Unmelted particles also can improve flexibility and flex life. High-temperature resistant fibers are not necessarily required in these applications.

Other solid or liquid ingredients can be added to Teflon® PTFE TE3908 to provide specific processing or finished product behavior.

Safety Precautions

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

Before using DuPont™ Teflon® PTFE TE-3908, read the Material Safety Data Sheet and the detailed information in the "Safe handling of Fluoropolymer dispersions" published by the APME or the "Guide to the Safe Handling of Fluoropolymer Resins," latest edition, published by the Fluoropolymers Division of The Society of the Plastics Industry. These documents are available from DuPont.

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 TE3908, may cause flu-like symptoms (chills, fever, sore throat) that may not occur until several hours after exposure and 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.

Teflon® PTFE TE3908 contains additives in the aqueous phase that are irritants. In case of skin contact, flush with water immediately. In case of eye contact, flush with water immediately and get medical help.

Storage and Handling

The dispersion particles in Teflon® PTFE TE3908 will settle on prolonged standing or on heating above 66°C (150°F). They usually can be redispersed by mild agitation. Drums may be rolled or the product stirred gently just prior to use. The dispersion must be protected from freezing, which will cause irreversible settling.

Ammonium hydroxide is used by DuPont to set pH to 10.5 at the time of shipment. High ambient temperatures can deplete the ammonia level and reduce the pH. Declining pH eventually favors bacterial growth, which causes odor and scum. The pH should be measured and maintained between 9.5 and 10.

Both very high and very low temperatures may be detrimental. Dispersions must not be allowed to freeze. The optimum storage temperature range is 7–24°C (45–75°F), with temperatures low in the range preferred. Storage at 7–32°C (45–90°F) is acceptable within nominal shelf life for standard dispersions. If dispersions are to be stored for extended periods beyond their nominal shelf life, low-temperature storage is especially desirable because the particles are harder at lower temperatures and, therefore, are less likely to stick together as they settle.

High-speed stirring, pumping, or any other violent agitation must be avoided to minimize sheared particles or coagulation. Ideally, the dispersion should be conveyed by gravity from storage to processing stations.

Storage and handling areas should be clean. Keep dispersion drums closed and clean to avoid both contamination and coagulation by drying at the liquid surface. High processing temperatures will cause even very small foreign particles to become visible or to make defects in finished products. Good housekeeping and careful handling are essential.

Packaging

Teflon® PTFE TE3908 is packaged in 30-litre non-returnable drums and 1000-litre recyclable containers

Freight Classification

Teflon® PTFE TE3908, when shipped by rail or express, is classified "Plastics, Synthetic, Liquid, NOIBN." Resin shipped by truck is classified "Plastics, Materials, Liquid, NOI."

TABLE 1: Typical Property Data for DuPont™ Teflon® TE3908

Property	Test method[1]		Unit	Typical value
General				
Solids content (% PTFE by weight)	ISO 12086	D4441	%	61
Density of dispersion (at 61% solids)	ISO 8962	D4441	g/cm^3	1.52
Resin dry weight (at 61% solids)		DuPont	g/l (lbs/gal)	927 (7.7)
Color				White
Dispersion particle size, average diameter	ISO 13321	DuPont	µm	0.220
pH of dispersion	ISO 976	E70		10.5
Brookfield viscosity (at 25°C)	ISO 2555	D2196	mPa·s (cP)	30 (30)
Standard specific gravity of sintered resin	ISO 12086	D4894-D4895		2.225
Thermal[2]				
Initial melt, peak temperature		D4895	°C	337
Second melt, peak temperature		D4895	°C	327
Brittleness temperature		D746	°C	< –75
Continuous service temperature (max)			°C	260
Other[2]				
Water absorption		D570	%	< 0.01
Weather and chemical resistance				Excellent

Note: Teflon® TE3908 meets the requirements of ASTM D4441-04, type II, grade 6, class B. Typical properties are not suitable for specification purposes. Decimals are indicated by a period (.) [1] ASTM unless otherwise specified. [2] These results are based on tests made on thin cast films.

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