



Teflon®

Fluoropolymer

Teflon® 30-N PTFE aqueous dispersion

Typical applications

Teflon® 30-N is used to impregnate packings made from braided fibers for severe chemical and thermal service; to coat glass fabric for industrial conveyor belting, non-adhesive separator sheets for laminating and press blankets, and gaskets; surface coatings for other substrates and as an additive in thermoplastics, lubricants or coatings.

Description

Teflon® 30-N PTFE aqueous dispersion is a negatively charged hydrophobic colloid containing approximately 60% (by total weight) of 0,05 to 0,5 µm polytetrafluoroethylene (PTFE) resin particles suspended in water. A milky white liquid, 30-N also contains approximately 6% (by weight of PTFE) of a non-ionic wetting agent and stabilizer. Viscosity at room temperature is approximately 15 mPa·s. Nominal pH is 10.

Compared to other grades of PTFE dispersions Teflon® 30-N is a general-purpose product, often preferred for impregnating woven goods and for some coating processes. It imparts various of the unique properties of PTFE resin to porous structures, as well as to a base material when used as an additive.

When properly processed, the PTFE resin in Teflon® 30-N exhibits the superior properties typical of the fluoropolymer resins: retention of properties after service at 260°C, useful properties at -240°C, chemical inertness to nearly all industrial chemicals and solvents, low friction and non-stick surface. Dielectric properties are outstanding and stable over a wide frequency and temperature range.

FDA compliance

Properly processed products (sintered at high temperature common to the industry) made from Teflon® 30-N resin can qualify for use in contact with food in compliance with FDA regulation 21 CFR 177.1550 and the German BGA. Articles made from unsintered dispersions do not comply.

Processing

PTFE resins can not be processed by solvent or melt techniques. A dispersion of PTFE particles provides an alternate method for coating or impregnating various products.

Conventional dip or flow techniques can be used for coating or impregnating various products with Teflon® 30-N. The resin particles can be consolidated by heat into a coherent matrix such as a coating or left as particles to influence the properties of 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. Each coating layer is usually dried to remove water (typically at 120°C), baked to remove the wetting agent (typically at 290°C), sometimes calendered, and finally heated above the crystalline melting point of the resin particles (approximately 337°C). Glass, PTFE, Nomex® aramid fiber, Kevlar® aramid fiber, or other high-temperature resistant fibers must be used.

Products using 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 yarn 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® 30-N fluoropolymer to provide specific processing or finished product behaviour.

Safety precautions

Industrial experience has proven that adequate ventilation, in properly maintained processing and handling areas, will eliminate known hazards to personnel. Resin containers should be opened and used in well-ventilated areas.

Equipment used to process at melt temperatures should be provided with local exhaust ventilation to completely remove all fumes and vapours from the processing area. In addition, care should be exercised to avoid the contamination of cigarettes and other forms of smoking tobacco when using fluoropolymer resins.

Dispersion may irritate skin and eyes. Avoid prolonged or repeated contact with skin and eyes. Vapours liberated during processing at elevated temperatures may be harmful.

Wash hands before eating or smoking. In case of contact, flush with water: for eyes, get medical attention.

Before using fluoropolymer resins, read the Material Safety Data Sheet (MSDS) and the detailed information in "Guide for the safe handling of Fluoropolymer Resins" published by APME. Copies can be obtained through your local DuPont representative.

Storage and handling

The dispersion particles in Teflon® 30-N dispersion will settle on prolonged standing or upon heating above 65°C to form a gelatinous layer on the container bottom. This layer can usually be redispersed by mild agitation. Drums may be rolled or the product stirred gently just prior to use. Freezing will cause irreversible settling, therefore the product must be protected against freezing.

Ammonium hydroxide is used by DuPont to set the pH to 10 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 with ammonia between 9,5 to 10.

Both very high and very low temperatures may be detrimental. Dispersions must not be allowed to freeze. The optimum storage temperature range is 7-25°C, with temperatures low in the range preferred. Storage at 7-32°C is acceptable within nominal shelf life for standard dispersions. If dispersions are to be stored for extended periods beyond their nominal shelf life, lower temperature storage is especially desirable because the particles are harder at lower temperatures and are, therefore, 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 and to minimize foaming. Ideally, the dispersion should be conveyed by gravity from storage to processing stations.

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

Packaging

Teflon® 30-N PTFE aqueous dispersion is packaged in 30 litre drums and 1000 litre containers.

Typical Property Data for Teflon® 30-N

Property	Test method ¹⁾		Unit	Typical value
General				
Solids content (% PTFE by weight)	ISO 12086	D 4441	%	60
Density of dispersion (at 60% solids)	ISO 8962	D 4441	g/cm ³	1,50
Resin dry weight (at 60% solids)/liter dispersion		DuPont	g	900
Colour				White
Dispersion particle size, average diameter		DuPont	µm	0,210
pH of dispersion	ISO 1148	E 70		10,0
Brookfield viscosity (at 25°C)	ISO 2555	D 2196	mPa·s	15
Standard specific gravity of sintered resin	ISO 12086			2,220
Mechanical²⁾				
Tensile strength	ISO 12086	D 882	MPa	24
Ultimate elongation	ISO 12086	D 882	%	400
Electrical²⁾				
Relative permittivity (100 Hz to 60 MHz)	IEC 250	D 150		2,1
Dissipation factor, tg δ (1 KHz)	IEC 250	D 150		<0,0003
Dielectric strength (film thickness 0,05 mm)	IEC 243	D 149	kV/mm	>120
Volume resistivity	IEC 93	D 257	Ω·m	10 ¹³
Thermal²⁾				
Brittleness temperature		D 746	°C	< -75
Continuous service temperature (max)			°C	260
Other²⁾				
Water absorption		D 570	%	< 0,01
Weather and chemical resistance				Excellent

Note: Teflon® 30-N meets the requirements of ASTM D 4441-98, type II, grade 6, class A.
Typical properties are not suitable for specification purposes.

¹⁾ ASTM unless otherwise specified.

²⁾ These results are based on tests made on thin cast films.

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