



Teflon®

Fluoropolymer

Teflon® FEP TE 9302-N Moulding and extrusion resin

Typical applications

Tubes, piping, linings, bellows, valves and other components for the chemical industry. Jackets for Wire and Cable applications demanding a high degree of stress crack resistance.

Description

Teflon® TE 9302-N is one of DuPont's melt processable copolymers of tetrafluoroethylene and hexafluoropropylene.

It offers the excellent combination of properties characteristic of Teflon® fluoropolymer resins: non-ageing characteristics, chemical inertness, exceptional dielectric properties, heat resistance, toughness and flexibility, low coefficient of friction, non-stick characteristics, negligible moisture absorption and excellent weather resistance.

Teflon® TE 9302-N has one of the highest molecular weight of the Teflon® FEP grades, and possesses a very high degree of stress crack resistance. It is used in the chemical industry for applications such as chemical linings, bellows, valve components, pipes and tubings. It can be processed by conventional thermoplastic techniques, melt extrusion and transfer moulding. In special demanding Wire and Cable applications, requiring a very high degree of stress crack resistance, it could be used as a material for jacketing.

Teflon® TE 9302-N is a "high productivity" type of Teflon® FEP. At processing temperatures it shows, compared to Teflon® 160-N, a lower viscosity and a higher critical shear rate. In similar constructions, it can be processed at much faster rates and higher extrusion line speeds, and the final product will show comparable physical properties.

Stress crack resistance is an important element in establishing end-use performance. Extensive testing of wire and cable constructions is required for definitive performance evaluation. However, experience shows that the MIT folding endurance or flex life test, performed on a thin film of resin, has established a good correlation with extensive cable testing. The higher the MIT flex life, the higher the stress-crack resistance of the resin.

The folding endurance of the high productivity grade Teflon® TE 9302-N, is marginally inferior to the one of the general purpose grade Teflon® 160-N. DuPont does however always recommend, in particular for applica-

tions involving repeated thermal and flex cycling, to undertake more extensive and more specific tests on the final cable itself. The MIT test results should be viewed as a guide to comparative performance of the various grades of resin. See also DuPont's bulletin "Grade selector for Wire and Cable applications."

Teflon® TE 9302-N will, according to material specification ASTM D 2116, fall into the category type IV.

Processing

Teflon® TE 9302-N fluoropolymer resin may be converted by conventional melt processing techniques, typical of those used for other thermoplastic resins.

The extruders and moulding machines used for Teflon® TE 9302-N should be constructed of corrosion-resistant materials and be capable of operating at temperatures of 310-400°C.

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. 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 properties of Teflon® TE 9302-N resins are not affected by storage time. Ambient storage conditions should be designed to avoid airborne contamination and water condensation of the resin when it is removed from containers.

Packaging

Teflon® TE 9302-N is packaged in 25 kg, single layer, plastic bags. For convenient shipment, orders of 500 kg pallets are recommended.

Typical Property Data for Teflon® FEP TE 9302-N

Property	Test method ¹⁾		Unit	Typical value
General				
Melt flow rate (MFR 372/5,0)	ISO 12086	D 2116	g/10 min	3
Specific gravity	ISO 1183	D 792	–	2,12-2,17
Bulk density		DuPont	g/l	1300
Mechanical				
Tensile strength, 23 °C	ISO 12086	D 638	MPa	30
Ultimate elongation, 23 °C	ISO 12086	D 638	%	300
Flexural modulus, 23 °C	ISO 178	D 790	MPa	655
Hardness, Shore durometer	ISO 868	D 2240	–	D55
MIT folding endurance (0,18-0,20 mm film)		D 2176	cycles	80000
Electrical				
Relative permittivity (60 Hz to 1 GHz)	IEC 250	D 150	–	2,1
Dissipation factor, tg δ (60 Hz to 1 GHz)	IEC 250	D 150	–	0,0002-0,001
Dielectric strength, short time	IEC 243	D 149		
0,25 mm film			kV/mm	>80
3,2 mm sheet			kV/mm	20
Volume resistivity	IEC 93	D 257	Ω · m	>10 ¹⁶
Thermal				
Melting point		D 4591/D 3418	°C	255
Continuous service temperature ²⁾		–	°C	205
Rate of burning ³⁾		D 635	s	<5
			mm	5
Limiting Oxygen Index	ISO 4589	D 2863	%	>95
Specific heat capacity (20 °C)		C 177	J/(kg · K)	1090
Thermal conductivity (λ)		C 177	W/(m · K)	0,24
Other				
Chemical resistance		D 543		Excellent
Water absorption, 24 h		D 570	%	<0,01
Weathering resistance				Excellent

Note: Teflon® TE 9302-N will, according to the material specifications ASTM D 2116, fall into the category Type IV.
Typical properties are not suitable for specification purposes.

1) ASTM unless otherwise specified.

2) Definition of continuous service temperature:

The continuous service temperature is based on accelerated heat-ageing tests, and represents the temperature at which tensile strength and ultimate elongation retain 50% of the original values, after 20000 h thermal ageing. Continuous service temperature above 205°C, may be feasible, depending on such factors as chemical exposure, support from the substrate, etc. Particularly when considering uses of Teflon® FEP TE 9302-N above 205°C, preliminary testing should be done to verify suitability.

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

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Caution: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement", H-51459.



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