

DuPont™ Tefzel® HT-2129

fluoropolymer resin

Description

Because they offer mechanical strength and toughness together with resistance to heat and chemicals, DuPont™ Tefzel® fluoropolymer resins are widely used to make compact wire and cable constructions that provide long, reliable service in demanding environments. In addition, Tefzel® resins offer easy processing, high specific dielectric strength, and a low coefficient of friction.

Tefzel® HT-2129 retains these traditional characteristics of Tefzel® resins while providing some new property advantages. The advantages offered by Tefzel® HT-2129 include greater flexibility, improved retention of tensile properties at elevated temperatures, reduced flammability, and long-term service life at potentially higher temperatures compared to other Tefzel® resins.

Tefzel® HT-2129 has a temperature rating of 150°C (302°F).

Typical properties for Tefzel® HT-2129 are listed in **Table 1** together with the same properties for Tefzel® HT-2127 and Tefzel® 200 for comparison.

Typical End Products

The relatively low flexural modulus of Tefzel® HT-2129 means that compared with Tefzel® HT-2127 and Tefzel® 200, it can be used as a thicker wall insulation on a given conductor for greater durability while retaining the same degree of flexibility. It can also be used in large diameter constructions to reduce stiffness.

Wire insulated with Tefzel® HT-2129 could find use in industries where its special performance attributes are needed. In electronic control assemblies, for example, increased flexibility may be an asset during manufacturing.

Table 1
Typical Mechanical Properties for DuPont™ Tefzel® HT-2129,
DuPont™ Tefzel® HT-2127 and DuPont™ Tefzel® 200*

Property	Tefzel® HT-2129	Tefzel® HT-2127	Tefzel® 200
Flexural Modulus, MPa (kpsi) (ASTM D790)	517 (75)	645 (93.5)	1,200 (170)
Tensile Strength, MPa (kpsi) (ASTM D1708)			
at 23°C (73°F)	34 (5.0)	38 (5.5)	45 (6.5)
at 140°C (284°F)	7 (1.0)	11 (1.7)	11 (1.7)
at 160°C (320°F)	6 (0.8)	9 (1.2)	7 (1.0)
at 180°C (356°F)	5 (0.7)	6 (0.9)	5 (0.7)
at 200°C (392°F)	3 (0.5)	4 (0.5)	4 (0.5)
Elongation, % (ASTM D1708)			
at 23°C (73°F)	300	300	300
at 140°C (284°F)	450	600	550
at 160°C (320°F)	450	650	450
at 180°C (356°F)	550	600	400
at 200°C (392°F)	600	600	300
Specific Gravity (ASTM D792)	1.80–1.85	1.75–1.79	1.71
Melt Flow Rate, g/10 min (ASTM D3159)	9	7	7
Melt Point, °C (°F) (ASTM D3159)	230–245 (446–473)	245–250 (473–482)	255–280 (491–536)
Limiting Oxygen Index, % (ASTM D2863)	40	34	31
MIT Flex Life, Cycles	180,000	120,000	33,000

* Measured on compression-molded specimens



Processing

Tefzel[®] HT-2129 resin has a melting point lower than *Tefzel*[®] 200 or 280 and, therefore, it should be processed at a temperature profile up to 40°C (72°F) lower than that for *Tefzel*[®] 200 or 280 resin. Inadvertent combination of higher processing temperature profile than necessary and shear stress could lead to a significant change for melt flow rate (molecular weight) of the fabricated part. A higher than normal change of melt flow rate could reduce stress crack resistance of the finished component made from *Tefzel*[®] HT-2129 fluoropolymer resin.

Following are suggested starting point set-up conditions for a wire extrusion using *Tefzel*[®] HT-2129 resin:

Breaker Plate, Screens: Not necessary

Drawdown Ratio: 5–30

Draw Ratio Balance: 1.05–1.10

Temperature Profile:

Barrel:

Rear 288°C (550°F)

Center 316°C (600°F)

Front 321°C (610°F)

Adaptor: 321°C (610°F)

Crosshead: 327°C (620°F)

Die: 332°C (630°F)

Melt: 332 to 335°C (630 to 635°F)

Safety Precautions

WARNING! Vapors can be liberated which may be hazardous if inhaled.

Before using *Tefzel*[®] HT-2129, read the Material Safety Data Sheet and the detailed information in the “Guide to the Safe Handling of Fluoropolymer Resins,” latest edition, published by the Fluoropolymers Division of The Society of the Plastics Industry—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 *Tefzel*[®] HT-2129, may cause flu-like symptoms (chills, fever, sore throat) that may not occur until several hours after exposure and typically 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.

Packaging

Tefzel[®] HT-2129 resin is available in 2.5 mm (0.1-in.) pellets. It is packaged in a 45-lb (20.3-kg) multilayer kraft bag with an integral polyethylene liner and in a 330-lb (149-kg) drum with a polyethylene liner.

U.S. Freight Classification

For rail shipments, *Tefzel*[®] is classified as “Plastics, Synthetic, OTL, NOIBN”; for truck shipments as “Plastic Materials, Granules”; and for express shipments as “Plastics, Synthetic.”

Table 2
DuPont™ *Tefzel*[®] HT-2129

Shear Rate	Shear Stress (275°C)	Viscosity (275°C)	Quality	Shear Stress (300°C)	Viscosity (300°C)	Quality
Sec-l	Pascals	Pascal-Sec		Pascals	Pascal-Sec	
10.4	4.88E+04	4.69E+03	Smooth	3.85E+04	3.70E+03	Smooth
34.7	1.13E+05	3.24E+03	Smooth	7.13E+04	2.05E+03	Smooth
104	1.97E+05	1.89E+03	Smooth	1.06E+05	1.01E+03	Smooth
347	2.34E+05	6.76E+02	Smooth	1.76E+05	5.07E+02	Smooth
1040	3.38E+05	3.25E+02	Rough	2.72E+05	2.62E+02	Rough
3470	4.46E+05	1.28E+02	Rough	4.22E+05	1.22E+02	Rough

Figure 1.

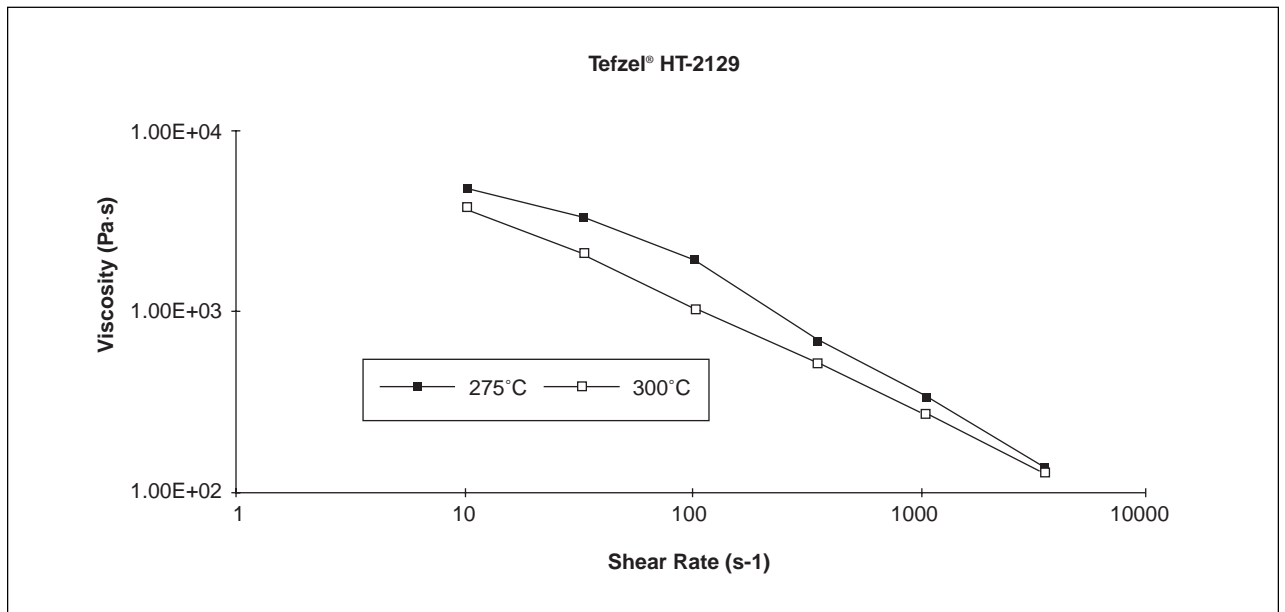
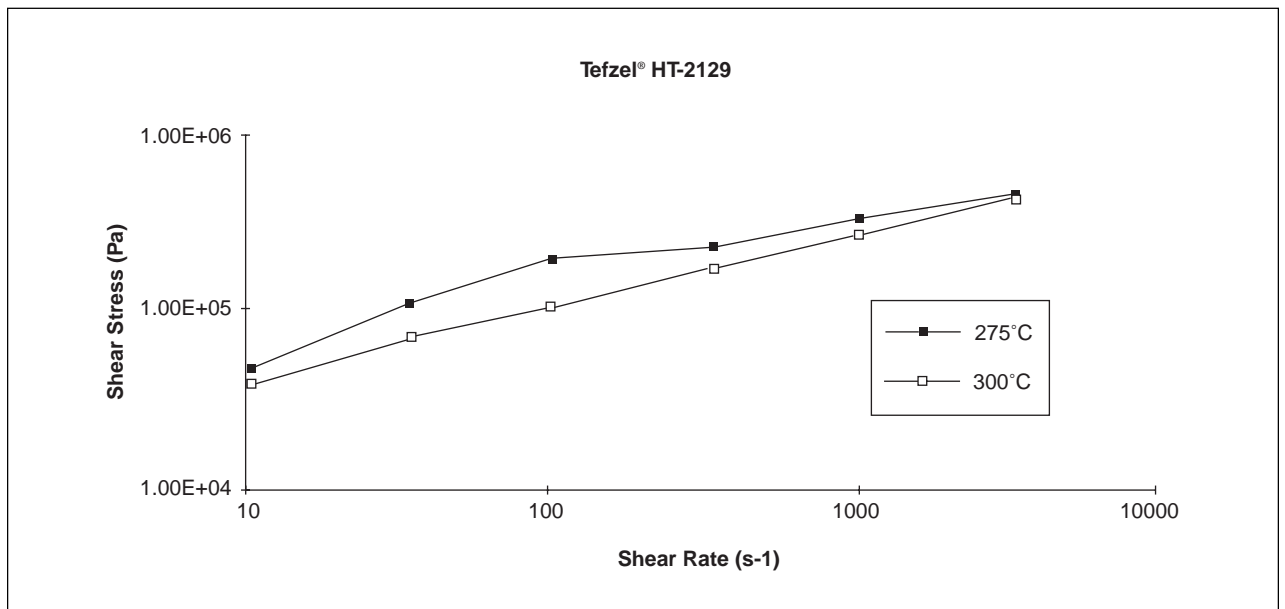


Figure 2.



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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-50102.

