

# DuPont™ Tefzel® HT-2004

fluoropolymer resin

## HT-2004—25% Glass-Reinforced Tefzel®

### Comparison with Other High-Performance Plastics

DuPont™ Tefzel® ETFE fluoropolymer is a high-temperature thermoplastic that features unusual ruggedness, outstanding chemical resistance, and excellent dielectric properties (see Table 1).

The development of technology by DuPont for reinforcing Tefzel® ETFE fluoropolymer with glass fibers brings to the plastics industry a new opportunity for design. This product, designated Tefzel® HT-2004, combines the superior mechanical properties resulting from glass-reinforcement with the impressive thermal, chemical, and electrical properties of Tefzel®.

**Table 1**  
**Property Comparison of DuPont™ Tefzel® HT-2004 Versus Other High Performance Plastics**

	25% GR Tefzel® HT-2004	33% GR Nylon	20% GR Polysulfone	Polyaryl- sulfone
<b>Physical Property</b>				
Specific Gravity	1.86	1.38	1.38	1.36
Tensile Strength, MPa (psi)	83 (12,000)	124 (18,000)	90 (13,000)	90 (13,000)
Elongation, %	9	4*	2	13
Flex Modulus, MPa (psi)	6,550 (950,000)	6,205 (900,000)*	5,171 (750,000)	2,758 (400,000)
Impact Strength, (Notched Izod) ft-lb/in @ 23°C (73°F) @ -40°C (-40°F)	7.0 >2.5	2.1 1.9	1.0 1.0	3.0 —
<b>Thermal Property</b>				
Distortion Temp @ 264 psi, °C (°F)	210 (410)	249 (480)	177 (350)	274 (525)
Coefficient of Linear Thermal Expansion, in/in/°F	0.4 x 10 <sup>-5</sup>	1.3 x 10 <sup>-5</sup>	1.7 x 10 <sup>-5</sup>	2.6 x 10 <sup>-5</sup>
<b>Electrical, Chemical, Wear and Friction Property</b>				
<i>Chemical Resistance to:</i>				
Solvents	Excellent	Excellent	Poor	Good
Acids	Excellent	Fair	Very Good	Excellent
Bases	Excellent	Good	Very Good	Excellent
Wear Factor (in <sup>3</sup> min/ft-lb-hr)	16 x 10 <sup>-10</sup>	200 x 10 <sup>-10</sup>	—	—
Coefficient of Friction 10 fpm, 100 psi	0.31	0.48	—	—
Dielectric Strength @ 125 mil v/mil	410	400	425	350

\*Conditioned to 50% RH



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## DuPont™ *Tefzel*® HT-2004 versus Glass-Filled *Teflon*® PTFE

There is a big difference between the normal mechanical properties of 25% glass-reinforced *Tefzel*® HT-2004 and *Teflon*® PTFE filled with 25% glass. The former is truly reinforced while the other is filled. However, the wear properties of the two are very similar. At low velocities, the dynamic coefficient of friction of glass-filled *Teflon*® PTFE is superior to glass-reinforced *Tefzel*® but at high velocities and pressures (PV = 17,500) there is very little difference (see **Table 2**).

## Injection Molding

The processing techniques and conditions suggested for injection molding unreinforced *Tefzel*® are also generally suitable for glass-reinforced *Tefzel*®, with the exception of injection rate and mold temperatures—which should be higher—and materials of construction—which should be similar to those used for other glass-reinforced plastics. Refer to the Injection Molding Guide for DuPont Fluoropolymers.

## Safety Precautions

### WARNING!

### VAPORS CAN BE LIBERATED THAT MAY BE HAZARDOUS IF INHALED.

Before using *Tefzel*® HT-2004, 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-2004, may cause flu-like symptoms (chills, fever, sore throat) that may not occur until several hours after exposure and typically pass within 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.

**Table 2**  
**Property Comparison of HT-2004 Versus Unfilled DuPont™ Tefzel® and Glass-Filled PTFE Resins**

	<b>Tefzel® 200</b>	<b>Tefzel® HT-2004</b>	<b>PTFE + 25% Glass</b>
Tensile Strength, MPa (psi)	45 (6,500)	83 (12,000)	19 (2,700)
Elongation, %	150	9	250
Flex Modulus, MPa (psi)	1,379 (200,000)	6,550 (950,000)	1,655 (240,000)
Impact Strength (Notched Izod) ft-lb/in	No Break	7.0	2.2
Upper Service Temperature,* °C (°F)	150 (302)	125 (257)	260 (500)
Wear Factor, in <sup>3</sup> min/ft-lb hr	6,000 x 10 <sup>-10</sup>	16 x 10 <sup>-10</sup>	15 x 10 <sup>-10</sup>
Coefficient of Friction, 10 fpm 100 psi	0.40	0.31	0.14

\* "Thermal Index" per UL-746B (50% retention of elongation at 20,000 hrs).

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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.

