

# Tefzel™ ETFE 750

## Fluoroplastic Resin

### Product Information

#### Description

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

Tefzel™ ETFE 750 retains the traditional characteristics of Tefzel™ resins while providing some new property advantages, including increased flexibility and improved retention of properties after aging at elevated temperatures, higher limiting oxygen index, and long-term service life at higher temperatures than other Tefzel™ resins.

Underwriters Laboratories, Inc. (UL) has rated wire insulated with Tefzel™ ETFE 750 (10 mil for 600V, 6 mil for 300V) for service in appliances at a maximum continuous operating temperature of 200 °C (392 °F). This rating was determined under the guidelines of UL Subject 758 for appliance wiring material. Upper service temperatures for other applications should be determined under the guidelines for those applications. Temperature ratings may not be the same as the rating for appliance wire, because the test procedures are different.

Typical properties for Tefzel™ ETFE 750 are compared to Tefzel™ ETFE 200 in Table 1.

#### Typical End Products

Tefzel™ ETFE 750 fluoroplastic resin can be used for wire service at up to 200 °C (392 °F).

Tefzel™ ETFE 750 can also be used as insulation for applications where customers need the basic benefits of Tefzel™ together with increased flexibility and improved retention of properties after aging at elevated temperatures. Flexibility is desirable for ease of handling during maintenance and repair procedures.

#### Processing

Tefzel™ ETFE 750 resin has a higher use temperature rating than Tefzel™ ETFE 200 and Tefzel™ ETFE 280, but its melting point is about 20 °C (36 °F) lower. Therefore, the extrusion temperature profile should be lower for Tefzel™ ETFE 750.

It has been recently observed that several wire manufacturers are using the temperature profiles generally employed with Tefzel™ ETFE 200 and Tefzel™ ETFE 280 resins to obtain high extrusion rates with Tefzel™ ETFE 750. Additionally, because Tefzel™ ETFE 750 has a higher usage temperature rating (200 °C [392 °F]) than Tefzel™ ETFE 200 or Tefzel™ ETFE 280 (150 °C [302 °F]), some wire manufacturers tend to raise the processing temperature for Tefzel™ ETFE 750 even higher than that employed for processing Tefzel™ ETFE 200 and Tefzel™ ETFE 280 to obtain higher production rates.

Wire manufacturers also practice the use of fine mesh screens for improved color concentrate dispersion during extrusion processing. With the availability of finely

screened color concentrates, it is not necessary to use fine mesh screens during extrusion processing of Tefzel™ ETFE 750. Note, however, that in many cases, inadvertent combination of fine mesh screens and a higher processing temperature profile than necessary to process Tefzel™ ETFE 750 can lead to significant change of melt flow number (or molecular weight) of the cable insulation or jacket. In turn, a higher than normal change (i.e., greater than 40% increase) in melt flow number could reduce the stress crack resistance of the insulated or jacketed cable.

It is recommended that for extrusion processing of Tefzel™ ETFE 750, a melt temperature of 332 °C (630 °F) be maintained and, in any case, should not exceed 335 °C (635 °F). No breaker plate or screens are required to process Tefzel™ ETFE 750. For pigmentation, finely screened color concentrates made with Tefzel™ ETFE 750 base resin are recommended.

The following is a suggested starting point setup for extrusion process wire insulated with Tefzel™ ETFE 750.

Color Concentrate	Finely screened color concentrate with Tefzel™ ETFE 750 as base resin.
Breaker Plate, Screens	Not necessary
Draw Down 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)
Adapter	321 °C (610 °F)
Crosshead	327 °C (620 °F)
Die	332 °C (630 °F)
Melt	332-335 °C (630-635 °F)

### Safety Precautions

Before using Tefzel™ ETFE 750, refer to the Safety Data Sheet and the latest edition of "The Guide to the Safe Handling of Fluoropolymer Resins," published by The Society of the Plastics Industry, Inc. ([www.fluoropolymers.org](http://www.fluoropolymers.org)) or by PlasticsEurope ([www.plasticseurope.org](http://www.plasticseurope.org)).

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™ ETFE 750, 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.

### Storage and Handling

The properties of Tefzel™ ETFE 750 resins are not affected by storage time. Ambient storage conditions should be designed to avoid airborne contamination and the formation of water condensation on the resin when it is removed from containers.

### Packaging

Tefzel™ ETFE 750 is available in 2.5-mm (0.1-in) pellets. Tefzel™ fluoroplastic resins are packaged in 20.3-kg (45-lb) plastic bags.

### Quality Assurance

Tefzel™ resins, including Tefzel™ 750, retain their tensile strength and elongation properties exceptionally well and should not be used as the only means of determining if the resin was properly processed. Careful measurements of the melt flow number after processing provides a good check of fabricated wire. This information can be used to initiate processing changes to maintain quality production. The melt flow number should not increase more than 40% for all Tefzel™ resins during processing.

**Table 1. Typical Mechanical Properties for Tefzel™ ETFE 750 and Tefzel™ ETFE 200\***

Property	Tefzel™ ETFE 750	Tefzel™ ETFE 200
Flexural Modulus, psi (ASTM D790)	93,500	150,000
Tensile Strength, psi (ASTM D1708)		
at 23 °C (73 °F)	5,500	6,500
at 140 °C (284 °F)	1,650	1,650
at 160 °C (320 °F)	1,250	1,000
at 180 °C (356 °F)	900	700
at 200 °C (392 °F)	500	500
Elongation, % (ASTM D1708)		
at 23 °C (73 °F)	300	300
at 140 °C (284 °F)	600	550
at 160 °C (320 °F)	650	450
at 180 °C (356 °F)	600	400
at 200 °C (392 °F)	600	300
Specific Gravity (ASTM D792)	1.75-1.79	1.71
Melt Flow Rate, dg/min (ASTM D3159)	7	7
Melt Point, °C (°F) (ASTM D3159)	220-255 (427-490)	255-280 (491-536)
LOI (ASTM D2863)	34	31
MIT Flex Life	120,000	33,000

\*Measured on compression-molded specimens

Typical properties are not suitable for specification purposes.

Tefzel™ ETFE 750 meets the requirements of ASTM D3159, Type II, Grade 1

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