# DuPont™ Tefzel® 750

## fluoropolymer resin

### Description

DuPont™ *Tefzel*® fluoropolymer 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*® 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*® 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*® 750 are compared to *Tefzel*® 200 in **Table 1**.

**Table 1**
**Typical Mechanical Properties for DuPont™ *Tefzel*® 750 and DuPont™ *Tefzel*® 200***

| Property | *Tefzel*® 750 | *Tefzel*® 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 End Products

*Tefzel*® 750 fluoropolymer resin is expected to find wide use for wire service at up to 200°C (392°F).

*Tefzel*® 750 is also expected to find use 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*® 750 resin has a higher use temperature rating than *Tefzel*® 200 and 280, but its melting point is about 20°C (36°F) lower. Therefore, the extrusion temperature profile should be lower for *Tefzel*® 750. It has been recently observed that several wire manufacturers are using the temperature profiles generally employed with *Tefzel*® 200 and 280 resins to obtain high extrusion rates with *Tefzel*® 750. Additionally, because *Tefzel*® 750 has a higher usage temperature rating (200°C [392°F]) than *Tefzel*® 200 or 280 (150°C [302°F]), some wire manufacturers tend to raise the processing temperature for *Tefzel*® 750 even higher than that employed for processing *Tefzel*® 200 and 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*® 750. Note, however, that in many cases, inadvertent combination of fine mesh screens and a higher processing temperature profile than necessary to process *Tefzel*® 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*® 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*® 750. For pigmentation, finely screened color concentrates made with *Tefzel*® 750 base resin are recommended.

The following is a suggested starting-point setup for extrusion-process wire insulated with *Tefzel*® 750.

### *Color Concentrate*

Finely screened color concentrate with *Tefzel*® 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

**WARNING!**

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

Before using *Tefzel*® 750, 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*® 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.

## Packaging

*Tefzel*® 750 is available in 2.5 mm (0.1-in.) pellets. It is packaged in a 20.4-kg (45-lb) multilayer kraft bag with an integral polyethylene liner and in a 150-kg (330-lb) drum with a polyethylene liner.

## Freight Classification

*Tefzel*® fluoropolymer resin is classified as "Plastics, Synthetic, OTL, NOIBN" for rail shipments; "Plastic Materials, Granules" for truck shipments; and "Plastics, Synthetic" for express shipments.

## 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.

Measurements of the melt flow number for *Tefzel*® and *Teflon*® are detailed in a DuPont Technical Information Bulletin.

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