

## FluoroGrip® – F Optically Clear (HD-FEP) Teflon®

### Industrial Uses

#### Type

FluoroGrip® Optically Clear, fluoropolymer film protects windows, machine guards and equipment from harsh manufacturing environments. FluoroGrip® optically clear film is manufactured from high molecular weight fluorinated ethylene propylene (HD-FEP) resin by Integument Technologies

FluoroGrip materials are manufactured utilizing a patented plasma surface modification science. The process creates a chemical covalent bond between the fluoropolymer film material and the optically clear, pressure sensitive adhesive. The bond is non-visible and permanent enabling it to be used in surface protection applications where no conventional adhesive-backed film product can be used (i.e. machinery equipment glass).

#### Uses

FluoroGrip® – F Optically Clear Film is made from high molecular weight resin for applications where chemical resistance, high flex life and stress-crack-resistant performance are required. The films offer an excellent, cost-effective alternative to thicker sheets currently used to protect standard polycarbonate glass used on equipment such as critical clean and etch, post-ash clean/photoresist strip, and other systems.

FluoroGrip® films provide superior resistance to a wide range of aggressive chemicals and withstand the high temperatures found in harsh semiconductor processing environments while remaining optically clear. Films are available in a variety of thicknesses (3-30 mils), widths and lengths. Fabricated shapes and contours can be produced via heat sealing and thermoforming. The outstanding weatherability and optical properties of FluoroGrip F film provides excellent performance in outdoor atmospheric environments. The film remains permanently UV stable and is easy to clean.

The optically clear adhesive delivers a low haze, high clarity bond and is cleanroom suitable. It offers virtually defect-free bonding, long-term durability and excellent temperature resistance.

### Technical Data

#### Physical Properties

##### General

|                           | ASTM Method | Metric Value | Metric Units       | English Value | English Units       |
|---------------------------|-------------|--------------|--------------------|---------------|---------------------|
| Specific Gravity          | D-792       | 2.12-2.17    |                    | 2.12-2.17     |                     |
| Yield (1 mil film)        |             | 18           | m <sup>2</sup> /kg | 90            | ft <sup>2</sup> /lb |
| Flammability              | UL-94       | V-0          |                    | V-0           |                     |
| Water Absorption (24 hrs) |             | <0.01        | %                  | <0.01         | %                   |

Available Thicknesses  
(Film Only; Not Including Adhesive)

2 mil, 5 mil, 10 mil,  
20 mil, 30 mil

##### Mechanical

|                                  | ASTM Method | Metric Value | Metric Units | English Value | English Units   |
|----------------------------------|-------------|--------------|--------------|---------------|-----------------|
| Tensile Strength @ Break         | D-882       | 24           | MPa          | 3500          | Psi             |
| Elongation @ Break               | D-882       | 300          | %            | 300           | %               |
| Tensile Modulus                  | D-882       | 480          | MPa          | 70000         | Psi             |
| Initial Tear Strength, 1 mil     | D-1004      | 2.2-2.7      | N            | 0.5-0.6       | lb <sub>f</sub> |
| Initial Tear Strength, 2 mil     | D-1004      | 4.9-5.3      | N            | 1.1-1.2       | lb <sub>f</sub> |
| Propagating Tear Strength, 1 mil | D-1922      | 1.4-1.5      | N            | 0.32-0.33     | lb <sub>f</sub> |
| Propagating Tear Strength, 2 mil | D-1922      | 2.4-2.7      | N            | 0.55-0.60     | lb <sub>f</sub> |
| Fold Endurance (M.I.T.)          | D-2176      | 10000        | cycles       | 10000         | cycles          |

##### Electrical

|                            | ASTM Method | Metric Value | Metric Units | English Value | English Units |
|----------------------------|-------------|--------------|--------------|---------------|---------------|
| Dielectric Strength, 1 mil | D-149       | 240          | kV/mm        | 6000          | V/mil         |
| Dielectric Constant, 1kHz  | D-150       | 2.1          | 2.1          |               |               |
| Dissipation Factor, 1kHz   | D-150       | 0            | <0.0003      |               |               |

## FluoroGrip® – F Optically Clear (HD-FEP) Teflon®

### Industrial Uses

#### Uses (cont.)

FluoroGrip® optically clear films offer peel and stick installation and can be easily applied over polycarbonate glass and other surfaces. The films are easily cut to match the size and shape of the desired surface area, do not require primers or hazardous solvents, and the solid sheet design assures consistent coverage, even on edges, angles and corners. Installation is simple enough for untrained personnel to apply and its fluoropolymer composition makes cleaning fast and easy. The film systems are engineered for easy maintenance, inspection and repair. They can be furnished pre-applied to polycarbonate sheets or in ready to apply rolls.

#### Note

Refer to FluoroGrip installation manual and instruction guide for the use and installation of FluoroGrip film systems.

#### Certifications

FluoroGrip – F is designed to meet the requirements to comply with the FDA's Register of Food Additive Regulations.

### Technical Data

#### Physical Properties

##### Thermal

|   | ASTM Method | Metric Value           | Metric Units | English Value          | English Units      |
|---|-------------|------------------------|--------------|------------------------|--------------------|
| Melt Point                              | D-3418      | 252-282                | °C           | 485-540                | °F                 |
| Continuous Service Temp.                |             | 163                    | °C           | 325                    | °F                 |
| Specific Heat                           |             | 1172                   | J/(k·°K)     | 0.28                   | Btu/(lb·°F)        |
| Coefficient of Thermal Conductivity     |             | 0.2                    | w/(m·°K)     | 1.35                   | Btu in/(hr·ft²·°F) |
| Coefficient of Linear Thermal Expansion | D-696       | 9.9 x 10 <sup>-5</sup> | mm/(mm·°C)   | 5.5 x 10 <sup>-5</sup> | in/(in·°F)         |
| Limiting Oxygen Index                   | D-2863      | 95                     | %            | 95                     | %                  |

##### Optical Film

|                    | ASTM Method | Metric Value | Metric Units | English Value | English Units |
|--------------------|-------------|--------------|--------------|---------------|---------------|
| Refractive Index   | D-542       | 1.341-1.347  |              | 1.341-1.347   |               |
| Solar Transmission | E-424       | 96           | %            | 96            | %             |

##### Adhesive

|                            | ASTM Method                    | Metric Value | Metric Units | English Value | English Units |
|----------------------------|--------------------------------|--------------|--------------|---------------|---------------|
| Refractive Index           | D-542                          | 1.47         | 1.341-1.347  |               |               |
| Visible Light Transmission | ART #4064 (Gardner Haze Meter) | >98          | %            | >98           | %             |

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