



# Teflon™ PFA

## Fluoropolymer Film

## Properties Bulletin

### Description

Teflon™ PFA film is a transparent, thermoplastic film that can be heat sealed, thermoformed, vacuum formed, heat bonded, welded, metallized, laminated (combined with dozens of other materials), and used as an excellent hot-melt adhesive. This wide variety of fabrication possibilities combines with the following important properties to offer a unique balance of capabilities not available in any other plastic film.

### Chemical Compatibility

Teflon™ PFA film is chemically inert and solvent-resistant to virtually all chemicals, except molten alkali metals, gaseous fluorine, and certain complex halogenated compounds, such as chlorine trifluoride at elevated temperatures and pressures. It also has low permeability to liquids, gases, moisture, and organic vapors.

### Electrical Reliability

- Superior reliability and retention of properties over large areas of film
- High dielectric strength, over 260 kV/mm for 0.025-mm film (6500 V/mil for 1-mil film)
- No electric tracking, non-wettable, and non-charring
- Very low power factor and dielectric constant, only slight change over wide ranges of temperature and frequency

### Wide Thermal Range

- Continuous service temperature: -240 to 260 °C (-400 to 500 °F)
- Melting range: 300 to 310 °C (572 to 590 °F)
- Heat sealable

### Mechanical Toughness

- Superior anti-stick and low frictional properties
- High resistance to impact and tearing
- Useful physical properties at cryogenic temperatures

### Long Time Weatherability\*

- Inert to outdoor exposure
- High transmittance of ultraviolet and all, but far, infrared

### Reliability

- Teflon™ PFA film contains no plasticizers or other foreign materials.
- Conventional equipment and techniques can be used for processing; basic composition and properties will not be influenced.
- Rigid quality control by Chemours ensures uniform gauge, void-free film.

### Teflon™ PFA Film

The convenience of Teflon™ PFA fluoropolymer in easy-to-use film facilitates the design and fabrication of this low friction thermoplastic for all sorts of high performance jobs. It is transparent and can be heat sealed, thermoformed, welded, and heat bonded. Superior anti-stick properties make it an ideal release film for many applications. A cementable type with an invisible surface treatment is available for bonding to one or both sides with adhesives. This versatility is augmented by the superior properties of a true melt-processible fluoropolymer and the wide choice of product dimensions available from Chemours.

\*Type C film is not recommended for outdoor use.

**Table 1: Types and Gauges of Teflon™ PFA Fluoropolymer Film**

| Gauge                                    | 50   | 100 | 200 | 300 | 500 | 1000 | 2000 | 6000 | 9000 |
|--|------|-----|-----|-----|-----|------|------|------|------|
| Thickness, mil                           | 0.5  | 1   | 2   | 3   | 5   | 10   | 20   | 60   | 90   |
| Thickness, µm                            | 12.5 | 25  | 50  | 75  | 125 | 250  | 500  | 1500 | 2250 |
| Approx. area factor, ft <sup>2</sup> /lb | 180  | 90  | 45  | 30  | 18  | 9    | 4.5  | 1.5  | 1.0  |
| Approx. area factor, m <sup>2</sup> /kg  | 36   | 18  | 9   | 6.4 | 3.8 | 1.9  | 0.95 | 0.3  | 0.2  |
| <b>Availability</b>                      |      |     |     |     |     |      |      |      |      |
| Type LP—PFA, general-purpose             | X    | X   | X   | X   | X   | X    | X    | X    | X    |
| Type CLP—PFA, one side cementable        | X    | —   | X   | —   | —   | —    | —    | —    | —    |
| Type CLP-20—PFA, both sides cementable   | X    | X   | X   | X   | X   | —    | —    | —    | —    |

Note: Each roll of Teflon™ film is clearly identified as to resin type, film thickness, and film type.

PFA: Resin type      200: Film thickness, 200 gauge, 2 mil      CLP: Film type, cementable one side



**Table 2: Typical Properties of Teflon™ PFA Fluoropolymer Film**

| Property  | Test Method*                     | Typical Value**            |   |
|---|----------------------------------|----------------------------|---|
|   |                                  | SI Units                   | English Units                                   |
| <b>Mechanical</b>   |                                  |                            |   |
| Tensile Strength at Break   | D882                             | 21 MPa                     | 3000 psi  |
| Elongation at Break   | D882                             |                            | 300%  |
| Yield Point   | D882                             | 12 MPa                     | 1700 psi  |
| Elastic Modulus   | D882                             | 480 MPa                    | 70,000 psi                                      |
| Impact Resistance   | Chemours pneumatic impact tester | 6.2 x 10 <sup>4</sup> J/m  | 14 in·lb/mil                                    |
| Folding Endurance (MIT)   | D2176                            |                            | 100,000 cycles                                  |
| Tear Strength—Initial (Graves)  | D1004                            | 4.90 N                     | 500 g   |
| Tear Strength—Propagating (Elmendorf)   | D1922                            | 0.74 N                     | 75 g  |
| <b>Thermal</b>  |                                  |                            |   |
| Melt Point  | D3418                            | 302–310 °C                 | 575–590 °F                                      |
| Thermal Conductivity  | Cenco-Fitch                      | 0.195 W/(m·K)              | 1.35 Btu·in/(hr·ft <sup>2</sup> ·°F)            |
| Specific Heat   | —                                | 1172 J/(kg·K)              | 0.28 Btu/(lb·°F)                                |
| Dimensional Stability   | 30 min at 150 °C (302 °F)        |                            | MD = 1% shrinkage<br>TD = 1% shrinkage          |
| Oxygen Index  | D2863                            |                            | 95%   |
| <b>Electrical</b>   |                                  |                            |   |
| Dielectric Strength, short-time, in air at 23 °C (73 °F), 6.35 mm (1/4 in) diameter electrode, 0.79 mm (1/32 in) radius, 60 Hz, 500 V/s rate of rise: 0.025 mm (1 mil) film | D149 Method A                    | 260 kV/mm                  | 6500 V/mil                                      |
| Dielectric Constant, 25 °C (77 °F), 100 Hz to 1 MHz   | D150                             |                            | 2.0   |
| Dissipation Factor, 25 °C (77 °F), 100 Hz to 1 MHz  | D150                             |                            | 0.0002–0.0007                                   |
| Volume Resistivity, –40 to 240 °C (–40 to 464 °F)   | D257                             |                            | >1 x 10 <sup>17</sup> ohm·cm                    |
| <b>Chemical</b>   |                                  |                            |   |
| Moisture Absorption   | —                                |                            | <0.02%  |
| Permeability, Gas:  |                                  |                            | cm <sup>3</sup> /(m <sup>2</sup> ·24 hr·atm)*** |
| Carbon Dioxide  | D1434                            |                            | 14 x 10 <sup>3</sup>                            |
| Nitrogen  |                                  |                            | 2.0 x 10 <sup>3</sup>                           |
| Oxygen  |                                  |                            | 6.7 x 10 <sup>3</sup>                           |
| Permeability, Vapor:  |                                  |                            | g/(100 in <sup>2</sup> ·24 hr)                  |
| Water   | E96                              | g/(m <sup>2</sup> ·d)<br>2 | 0.13  |
| <b>General</b>  |                                  |                            |   |
| Density   | D1505                            | 2150 kg/m <sup>3</sup>     | 134 lb/ft <sup>3</sup>                          |
| Coefficient of Friction Kinetic (Film-to-Steel)   | D1894                            |                            | 0.1–0.3   |
| Refractive Index  | D542                             |                            | 1.350   |
| Solar Transmission  | E424                             |                            | 96%   |

\*ASTM method, unless otherwise specified

\*\*For 0.050-mm (2-mil) film at 25 °C (77 °F), unless otherwise specified

\*\*\*To convert to cm<sup>3</sup>/(100 in<sup>2</sup>·24 hr·atm), multiply by 0.0645**HOW TO USE THE TEFLON™ BRAND NAME WITH YOUR PRODUCT**

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