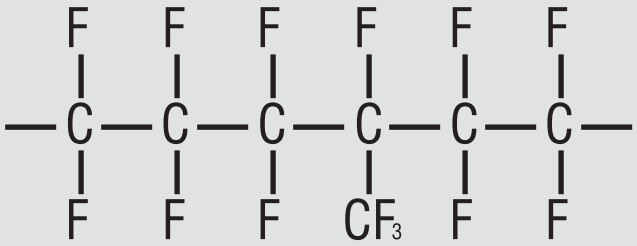
DAIKIN

# Product information

## DAIKIN-NEOFLON® FEP

**Daikin FEP is a copolymer of tetrafluoroethylene (TFE) and hexafluoropropylene (HFP). DAIKIN-Neoflon® FEP consists of carbon atoms and fluorine atoms, as does PTFE, and has the molecular structure shown below. Daikin FEP has a lower melt viscosity than PTFE and can be processed like other thermoplastic resins by the melt flow processes of extrusion, transfer, injection and compression molding. Because the bonding energy between its carbon and fluorine atoms is so high, and the molecule is completely filled with fluorine atoms, Daikin FEP fluorocarbon polymer has excellent thermal, electrical, and chemical stability.**




**Thermal Properties:** Daikin FEP offers superior reliability and retention of its properties in a wide thermal range from cryogenic to high temperature (-200°C to +200°C).

**Chemical Properties:** Daikin FEP maintains its physical properties in extreme environments. It provides excellent chemical and permeation resistance including exposure to weathering, light, and moisture.

**Electrical Properties:** A low dielectric constant and dissipation factor exist along with high dielectric strength over a wide range of frequencies and temperatures.

**Low Friction:** Daikin FEP offers the lowest critical surface energy of any plastic material in addition to excellent water and oil repellency for non-stick and mold release applications.

**High Transparency:** Products prepared from Daikin FEP are transparent with good transmittance of both ultraviolet and visible wavelengths; the lowest refractive index of any plastic and characterized by very low light reflection.

# DAIKIN-NEOFLON® FEP

## Pellets

Daikin FEP molding materials are available in multiple grades supplied as translucent white pellets for melt flow processes.

| Property | Test Method | NP-20 | NP-30 | NP-40 | NP-120 | NP-130 | NP-107 | NP-101 | NP-112 | NP-102 | NP-1105 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulk Density (g/l) | | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 |
| Specific Gravity | ASTM D2116 | 2.12-2.17 | 2.12-2.17 | 2.12-2.17 | 2.12-2.17 | 2.12-2.17 | 2.12-2.17 | 2.12-2.17 | 2.12-2.17 | 2.12-2.17 | 2.12-2.17 |
| Melt Flow Rate (g/10min) | ASTM D2116 | 4.5-8.5 | 2.0-3.5 | 0.75-1.8 | 4.0-8.0 | 2.0-3.6 | 15.6-20.0 | 21.0-27.0 | 9.0-14.0 | 23.0-30.0 | 19.0-26.0 |
| Melting Point °C | ASTM D2116 | 265-275 | 265-275 | 265-275 | 260-270 | 250-260 | 250-260 | 250-260 | 250-260 | 250-265 | 245-270 |
| Continuous Service Temperature (°C) | | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| **Mechanical** | | | | | | | | | | | |
| Tensile Strength (MPa) | ASTM D2116 | 19.6-34.3 | 19.6-34.3 | 19.6-34.3 | 19.6-34.3 | 19.6-34.3 | 19.6-34.3 | 19.6-34.3 | 19.6-34.3 | 19.6-34.3 | 19.6-34.3 |
| Elongation (%) | ASTM D2116 | 300-400 | 300-400 | 300-400 | 300-400 | 300-400 | 300-400 | 300-400 | 300-400 | 300-400 | 300-400 |
| Compressive Strength (MPa) | ASTM D695 1 % Deformation, 25°C | 5-6 | 5-6 | 5-6 | 5-6 | 5-6 | 5-6 | 5-6 | 5-6 | 5-6 | 5-6 |
| MIT Flex, cycles | ASTM D2176 | 5,000 | 30,000 | 250,000 | 30,000 | 200,000 | 8,000 | 5,000 | 12,000 | 5,000 | 5,000 |
| **Electrical** | | | | | | | | | | | |
| Dielectric Breakdown Strength (V/mil) | ASTM D149 Short time 1/8 in | 500-600 | 500-600 | 500-600 | 500-600 | 500-600 | 500-600 | 500-600 | 500-600 | 500-600 | 500-600 |
| Volume Resistivity (Ohm-cm) | ASTM D257 | $<10^{18}$ | $<10^{18}$ | $<10^{18}$ | $<10^{18}$ | $<10^{18}$ | $<10^{18}$ | $<10^{18}$ | $<10^{18}$ | $<10^{18}$ | $<10^{18}$ |
| Dielectric Constant | ASTM D150<br>$10^3$<br>$10^6$ | <br>2.1<br>2.1 | <br>2.1<br>2.1 | <br>2.1<br>2.1 | <br>2.1<br>2.1 | <br>2.1<br>2.1 | <br>2.1<br>2.1 | <br>2.1<br>2.1 | <br>2.1<br>2.1 | <br>2.1<br>2.1 | <br>2.1<br>2.1 |
| Dielectric Dissipation Factor | ASTM D150<br>$10^3$<br>$10^6$ | <br>$6x10^{-5}$<br>$5x10^{-4}$ | <br>$6x10^{-5}$<br>$5x10^{-4}$ | <br>$6x10^{-5}$<br>$5x10^{-4}$ | <br>$6x10^{-5}$<br>$5x10^{-4}$ | <br>$6x10^{-5}$<br>$5x10^{-4}$ | <br>$6x10^{-5}$<br>$5x10^{-4}$ | <br>$6x10^{-5}$<br>$5x10^{-4}$ | <br>$6x10^{-5}$<br>$5x10^{-4}$ | <br>$6x10^{-5}$<br>$5x10^{-4}$ | <br>$6x10^{-5}$<br>$5x10^{-4}$ |
| Combustibility (%) | ASTM D2863/ Oxygen Concentration Index | >95 | >95 | >95 | >95 | >95 | >95 | >95 | >95 | >95 | >95 |
| **Process Methods** | | Extrusion Injection | Extrusion | Extrusion Injection Compression | Extrusion | Extrusion | Extrusion Injection | Extrusion | Extrusion Injection | Extrusion Injection | Extrusion Injection |
| **Uses** | | Wire and cable coatings, film, tube, small parts | Heavy wall wire insulation, tubes, cable jacketing | Films and sheets, tubes, pipe & valve linings, sleeves | Heavy wall wire insulation, cable jacketing, tubes | Heavy wall wire insulation, cable jacketing, pipe, shrinkable tubes | Wire and cable coatings, tube, small parts | High speed wire and cable coatings | Wire and cable coating | Wire and cable coating, tube, small parts | Wire and cable coatings, tubes, small parts |

Daikin America, Inc. 20 Olympic Drive, Orangeburg, New York (845) 365-9500 (800) 365-9570 Fax: (845) 365-9515 Web: www.daikin-america.com

# DAIKIN-NEOFLON® FEP

## Polymer Processing of Daikin FEP Pellets

FEP can be molded by methods used by most thermoplastic resins, including extrusion, injection molding, blow molding, and compression molding

### Molding Temperature

The molding temperature varies depending upon the method, but FEP is usually molded within the range of 320 to 400°C.

### Molding Machines

Extrusion and injection molding machines with outstanding heat and corrosion resistance are required for molding FEP. For screws, breaker plates, dies, etc., high Ni-alloy, Hastelloy C (available from Mitsubishi Material), Duranikel or their equivalents are recommended. For the cylinder inner surfaces, X-alloy (available from the Japan Steel Works) and X-alloy (available from Hitachi Metals) or their equivalents are recommended.

### Colorant

Where moldings must be colored, colorants with heat stability above 400°C must be used. There are two methods for blending colorants: dry blend and master batch. In general, the master batch method disperses more easily. Master-batch pellets are available in 10 colors. Good colored moldings can be obtained by adding Daikin FEP NP-20 in quantities of 5 to 10 times the colorant and molding by extrusion.

## Dispersions

Daikin FEP dispersions are fine-powder suspensions. Since FEP has good flowability when melted, a continuous, pinhole-free film can be obtained.

| Product No. | Color | Specific Gravity (25°C) | Solid Content (mass %) | Viscosity (mPa·s at 25 °C) | pH | Major Uses |
|---|---|---|---|---|---|---|
| ND-110 | Translucent, white liquid | 1.40-1.43 | 52.5-54.5 | 10-30 | 8-9 | Glass fabric and glass mat coating, film casting, spray coating, and release coating formulations |

# DAIKIN-NEOFLON® FEP

## Coating Powders

Daikin FEP coating powders are designed for high build coatings having excellent resistance to chemical and corrosive environments.

| Product No. | Color | Bulk Density | Description | Processing Methods |
|---|---|---|---|---|
| NC-1500 | White | 530 | Up to a thickness of 100 µm per single coat | Electro-static spray coating<br>Fluidized bed coating |
| NC-1539 | Gray | 530 | Multiple coats, up to 2,000 µm | Electro-static spray coating<br>Fluidized bed coating |
| NC-1810 | White | 750 | 0.5-5.0mm thickness | Roto lining |
| NC-1830 | Gray | 750 | 0.5-5.0mm thickness | Roto lining |

## Quality/Regulatory:

Daikin FEP pellets comply with the requirements set forth in FDA specification 21 CFR.177.1550 Daikin America's manufacturing facility is registered to ISO-9001 (Quality System), ISO-14001 (Environmental System) and Responsible Care 14001 (Safety, Health, Environment and Security).

## Safety:

When FEP resins are heated to temperatures above 260°C, some decomposition products may be given off. These decomposition products may be harmful, and inhalation of these fumes must be avoided. Ovens, process equipment and working area must be adequately ventilated. For further information, please refer to the material safety data sheet for these products and the *Guide to the Safe Handling of Fluoropolymer Resins* published by SPI Inc., The Society of Plastics Industry, Inc., 1801 K Street, NW, Suite 600K, Washington, DC, 20006-1301 (202-972-5200).

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## Medical Use:

These products are not specifically designed or manufactured for use in implantable medical and/or dental devices. They have not been tested for such applications and will only be sold for such use pursuant to contract containing specific terms and conditions required by us.



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Daikin America, Inc.
20 Olympic Drive
Orangeburg, NY 10962
(845) 365-9500
(800) 365-9570
Fax: (845) 365-9515
www.daikin-america.com

Daikin Chemical Europe GmbH
Immermannstr, 65d
40210 Dusseldorf,
Germany
49-211-1640834
Fax: 49-211-1640734
www.daikinchem.de

Daikin Industries, Ltd.
Umeda Center Bldg.
2-4-12, Nakazaki-Nishi, Kita-ku,
Osaka 530-8323, Japan
81-6-6373-4349
Fax: 81-6-6373-4390
www.daikin.com/chm