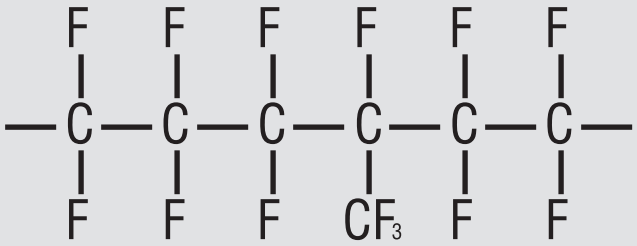
DAIKIN

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.

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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 10^3 10^6	 2.1 2.1	 2.1 2.1	 2.1 2.1	 2.1 2.1	 2.1 2.1	 2.1 2.1	 2.1 2.1	 2.1 2.1	 2.1 2.1	 2.1 2.1
Dielectric Dissipation Factor	ASTM D150 10^3 10^6	 $6x10^{-5}$ $5x10^{-4}$	 $6x10^{-5}$ $5x10^{-4}$	 $6x10^{-5}$ $5x10^{-4}$	 $6x10^{-5}$ $5x10^{-4}$	 $6x10^{-5}$ $5x10^{-4}$	 $6x10^{-5}$ $5x10^{-4}$	 $6x10^{-5}$ $5x10^{-4}$	 $6x10^{-5}$ $5x10^{-4}$	 $6x10^{-5}$ $5x10^{-4}$	 $6x10^{-5}$ $5x10^{-4}$
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

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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

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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 Fluidized bed coating
NC-1539	Gray	530	Multiple coats, up to 2,000 µm	Electro-static spray coating 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.