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Daikin Neoflon® PFA

Product Information Guide

Daikin PFA is a copolymer of tetrafluoroethylene (TFE) and perfluoroalkyl vinyl ether. DAIKIN Neoflon® PFA melting points range from 295 to 310°C. Compared to FEP, the copolymerization composition ratio of the comonomer content is small, and PFA has a chemical structure that is close to PTFE. Therefore, PFA has a higher melting point and higher heat resistance than FEP. Daikin PFA has excellent mechanical strength at high temperatures, and has excellent moldability for easy processing using extrusion, compression, blow, transfer, and injection molding methods.

Pellets

Daikin PFA pellets have good melt flow characteristics and can be processed in the same manner as other thermoplastic resins. The semiconductor grades (SH Series) have reduced elusion ions, and are used for various components for semiconductor manufacture lines where high purity is essential.

Property	Test Method	AP-201	AP-202	AP-210	AP-230	AP-201SH	AP-211SH	AP-231SH
Bulk Density (g/l)		1200	1200	1200	1200	1200	1200	1200
Specific Gravity	ASTM D3307	2.14-2.15	2.14-2.15	2.14-2.15	2.14-2.15	2.14-2.15	2.14-2.15	2.14-2.15
Melt Flow Rate (g/10min)	ASTM D3307	20.0-30.0	63.0-81.0	10.0-17.0	1.5-2.5	20.0-30.0	10.0-17.0	1.5-2.5
Melting Point °C	ASTM D3307	300-310	300-310	300-310	300.310	300.310	300.310	300-310
Continuous Service Temperature (°C)		260	260	260	260	260	260	260
Mechanical								
Tensile Strength (MPa), min	ASTM D3307	20	20	25	30	20	25	30
Elongation (%), min	ASTM D3307	300	230	300	300	300	300	300
Compressive Strength (MPa)	ASTM D695 1% Deformation, 25°C	5-6	5-6	5-6	5-6	5-6	5-6	5-6
MIT Flex, cycles	ASTM D2176	11,000	5,300	20,000	600,000	11,000	120,000	2,700,000
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
Volume Resistivity (Ohm-cm)	ASTM D257	10^{18}	10^{18}	10^{18}	10^{18}	10^{18}	10^{18}	10^{18}
Dielectric Constant	ASTM D150							
	10^3	2.1	2.1	2.1	2.1	2.1	2.1	2.1
	10^6	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Dielectric Dissipation Factor	ASTM D150							
	10^3	$1x10^{-5}$	$1x10^{-5}$	$1x10^{-5}$	$1x10^{-5}$	$1x10^{-5}$	$1x10^{-5}$	$1x10^{-5}$
	10^6	$3x10^{-4}$	$3x10^{-4}$	$3x10^{-4}$	$3x10^{-4}$	$3x10^{-4}$	$3x10^{-4}$	$3x10^{-4}$
Combustibility(%)	ASTM D2863/ Oxygen Concentration Index	>95	>95	>95	>95	>95	>95	>95
Process Methods		Extrusion Injection	Extrusion	Extrusion Injection	Extrusion	Injection	Extrusion Injection	Extrusion Injection
Uses		Complicated injection molded parts requiring high melt flow to fill, thin wall wire insulations	Good insulation for micro wire applications	Injection molded parts, wire insulation	Linings, tubing	Good fluidity, suited to making moldings of complex shapes requiring high fluidity	Tubing & injection molded parts requiring high stress crack resistance, etc.	Linings, tubings

Polymer Processing of Daikin PFA Pellets

Molding

PFA can generate traces of highly corrosive gas when it decomposes at the molding temperature, requiring materials of construction with outstanding corrosion and heat resistance for extrusion and injection-molding equipment used for molding.

Extrusion Molding

In extrusion, covered electrical wire, pipe, tubing, monofilament, film, etc. can be formed by extrusion. Extruders with a cylinder diameter from 30 to 65 mm are most commonly used. A rapid compression type screw with an L/D ratio of 20 to 24 and compression ratio of 2.5 to 3.0 is also used.

Injection Molding

DAIKIN PFA has good injection moldability and can easily mold complicated profiles, such as semiconductor manufacturing jigs, electrical and electronic components. A screw-type molding machine is generally used, and the spool, runner, and gate must be made slightly thicker than normal, as short as possible, and have the cross section nearly circular to reduce molding strain. Hard chromium-plated dies are generally used.

Transfer Molding

Pipe, valves, joints, and other linings for the chemical industry, brewing industry, etc. can be formed by transfer molding PFA. Components subject to lining processing, such as pipes and valves, are used for the outer die or inner die, and are heated to temperatures that exceed the melting point. PFA resin that has been separately melted inside the cylinder is pressure-fed into the components and cooled while under pressure. Components can be molded at die temperatures of 350 to 370°C and resin temperatures of 350 to 390°C.

Dispersions

Neoflon PFA dispersions are water-based coatings with bases of co-polymers of tetrafluoroethylene and perfluoroalkylvinylether.

Product No.	Color	Viscosity (Cp)	pH	Solid Content (%)	Uses
AD-2CRER	White, milky	140-260	8-10	50	Dispersion makes pinhole free films with non-stick properties
AW-5000R	White, milky	15-65	7.5-11	47	Films with excellent abrasion resistance and non-stick properties. Used in printers and copy rolls

Coating Powders

Product No.	Color	Bulk Density	Description	Processing Methods
AC-5600	White	500	Up to a thickness of 100 µm per single coat	Electro-static spray coating Fluidized bed coating
AC-5539	Gray	500	Multiple coats, up to 1,000 µm	Roto molding, Roto lining
AC-5820	White	830	0.5-5.0mm thickness	Roto lining
AC-5830	Gray	850	0.5-5.0mm thickness	Roto lining
ACX-31	White	750	30-80 µm thickness	Electro-static spray coating
ACX-34	White	700	30-80 µm thickness	Electro-static spray coating

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Daikin Neoflon® PFA Properties

Thermal Properties:
Due to the high bonding strength of the carbon, fluorine, and oxygen atoms, PFA demonstrates nearly the same outstanding capabilities as PTFE in temperatures ranging from -200°C to 260°C. From 200°C to 260°C, PFA maintains its flexibility without a loss of toughness. The maximum continuous use temperature for PFA is 260°C (500°F). This is the highest temperature for continuous use of any fluoropolymer resin.

Chemical Properties:
Daikin PFA provides excellent chemical resistance.

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

Low Friction:
Daikin PFA is inherently non-cohesive and it is extremely repellent of water, oil and other substances. Furthermore, its surface is characteristically slippery.

Quality/Regulatory:
Daikin PFA pellets comply with the requirements set forth in FDA specification 21 CFR.l77.1550. Daikin America's manufacturing facility is registered to IS0-9001 (Quality System), IS0-1400 (Environmental System) and Responsible Care 14001 (Safety, Health, Environment and Security).

Safety:
When PFA resins are heated to temperatures above 300°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).

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.