



Product Information

DAIKIN-POLYFLON™ PTFE

Molding Powders

DAIKIN-POLYFLON PTFE (polytetrafluoroethylene) molding powders are excellent, fine cut resins, well suited for a variety of demanding chemical, mechanical, electrical and non-stick surface applications. These PTFE resins are fully fluorinated and have the best thermal, electrical, and chemical properties of all fluoropolymers with a continuous service rating of 500°F (260°C). DAIKIN-POLYFLON PTFE molding powders are available in homopolymer and modified fine cut grades.

Thermal Properties:

Daikin PTFE molding powders can be used continuously at temperatures up to 260°C (500°F) and for short periods of time at higher temperatures. They also possess excellent low temperature strength.

Chemical Properties:

Daikin PTFE molding powders are completely inert to attack by all chemicals except high-temperature, high-pressure elemental fluorine gas, molten alkaline metals and chlorine trifluoride.

Electrical Properties:

The non-polar molecular structure makes Daikin PTFE molding powders ideal for use as high-frequency insulating material. The dielectric constant and dissipation factor are uniformly low over a wide frequency range.

Low Friction:

Under ordinary conditions of use, Daikin PTFE molding powders possess the lowest coefficient of friction of any solid material. Also, the non-stick properties of these products prevent most materials from adhering to them.

Typical Applications:

Chemical/Mechanical—Packings, gaskets, diaphragms, bellows, corrosion-resistant linings, piping components, pump parts, O-rings, V-rings, bushings, slide bearings, etc.

Electrical/Other—Insulating skived tape, insulating sleeves, terminals, connectors, sockets, spacers, electronic parts, laboratory equipment, etc.

Typical Properties

PTFE

Modified PTFE

Property	Unit	Test Method	M-12	M-15	M-15X	M-18	M-111	M-112
Bulk Density	g/l	ASTM D 4894	350	465	455	480	360	360
Std. Specific Gravity	—	ASTM D 4894	2.16	2.16	2.16	2.16	2.17	2.15
Shrinkage	%	ASTM D 4894	3.1	4.1	4.4	3.2	4.4	4.6
ASTM Type/Grade		ASTM D 4894	II	II	II	II	III/1	III/1
Type of Polymer			Homopolymer	Homopolymer	Homopolymer	Homopolymer	Modified	Modified
Selection Guide:			Superior Mechanical & Electrical Properties Thin Film Skiving	General Purpose	Filled Compounds	General Purpose Filled Compounds	Excellent Creep Resistance and Weldability, for Sheet Linings, Gaskets, and Compressive Applications	Excellent Flexibility and Weldability for Bellows and Diaphragms

	Test Method/Condition	M-12	M15	M-15X	M-18	M-111	M-112
THERMAL							
Melt Point, °C	DSC 2 nd melt	327	327	327	327	324	323
Continuous Service		500°F (260°C)	500°F (260°C)	500°F (260°C)	500°F (260°C)	500°F (260°C)	500°F (260°C)
MECHANICAL							
Tensile Strength ¹ , MPa (psi)	ASTM D 4894	43(6,237)	43(6,237)	43(6,237)	43(6,237)	40(5,802)	40(5,802)
Elongation ¹ , %	ASTM D 4894	400	400	400	400	500	425
Compressive Strength ²	ASTM D 695						
0.2% off set, MPa (psi)		7.6(1,102)	7.8(1,131)	7.8(1,131)	7.8(1,131)	8.7(1,262)	7.7(1,117)
1% strain		5.0(725)	5.0(725)	5.0(725)	5.0(725)	5.9(855)	4.7(682)
25% strain		28.2(4,089)	28.1(4,075)	28.1(4,075)	28.1(4,075)	28.6(4,147)	28.3(4,103)
Compression Creep Characteristics	ASTM D 621						
...Total Deformation, %	25°C-13.7 MPa	18.7	17.2	17.2	17.2	10.6	12.9
Compression Set, %		8.8	8.6	8.6	8.6	3.0	4.8
...Total Deformation, %	100°C-13.7 MPa	31.4	33.3	33.3	33.3	21.7	24.9
Compression Set, %		18.5	20.1	20.1	20.1	7.4	8.7
...Total Deformation, %	200°C-6.9 MPa	26.7	27.0	27.0	27.0	14.9	17.7
Compression Set, %		15.3	16.0	16.0	16.0	4.1	5.0
MIT Flexural Life	ASTM D 2178	7 x 10 ⁶	5 x 10 ⁶	5 x 10 ⁶	5 x 10 ⁶	3 x 10 ⁶	27 x 10 ⁶
SVI (Stretching Void Index)	ASTM D 4895	270	300	300	300	62	40
ELECTRICAL							
Dielectric Breakdown Voltage, kV/0.1mm		12.5	10.0	10.0	10.0	13.5	13.0
Volume Resistivity, Ω cm	ASTM D 257	> 10 ¹⁸	> 10 ¹⁸	> 10 ¹⁸	> 10 ¹⁸	> 10 ¹⁸	> 10 ¹⁸
Surface Resistivity, Ω	ASTM D 257	> 10 ¹⁵	> 10 ¹⁵	> 10 ¹⁵	> 10 ¹⁵	> 10 ¹⁵	> 10 ¹⁵
Dielectric Constant, 10 ³ Hz	ASTM D 150	< 2.1	< 2.1	< 2.1	< 2.1	< 2.1	< 2.1
Dielectric Loss, 10 ³ Hz	ASTM D 150	< 1 x 10 ⁻⁴	< 1 x 10 ⁻⁴	< 1 x 10 ⁻⁴	< 1 x 10 ⁻⁴	< 1 x 10 ⁻⁴	< 1 x 10 ⁻⁴

¹1.5mm thick sheet ²10 x 20mm sample

Processing:

The melt viscosity of PTFE is extremely high in comparison with other thermoplastics, due to its high molecular weight. Therefore, special-processing techniques are required to mold it. The basic molding method is to preform the powder, sinter it, and cool it. Physical and electrical properties of the molded product depend upon the preform pressure, sintering temperature, sintering time, and cooling rate. The recommended processing conditions for DAIKIN-POLYFLON PTFE are shown in the following tables:

Typical Molding Pressures

Product	Small Parts (Less than 100 mm dia.)	Large Parts (Greater than 100 mm dia.)
M-12, M-15, M-15X, M-18	15–25 MPa (2,176-3,626 psi)	12–17 MPa (1,740-2,465 psi)
M-111	20–40 MPa (2,901-5,802 psi)	20–30 MPa (2,901-4,351 psi)
M-112	20–70 MPa (2,901-10,153 psi)	20–30 MPa (2,901-4,351 psi)

Typical Sintering Conditions

Preform Size		Sintering Cycle		
Part Size (mm) (O.D./I.D.)xL	Weight kg	Heating Rate °C/hour	Sintering ¹ hours	Cooling Rate °C/hour
50 x 50	0.2	50	5 at 370°C	50
100 x 100	1.7	30	10 at 370°C	30
174/52 x 130	6.0	30	12 at 370°C	30
420/150 x 600	150	50°C/hour 25° →150°C	20 at 365°C	10°C/hour 365° →315°C
		3 hours at 150°C		10 hours at 315°C
		25°C/hour 150° →250°C		10°C/hour 315°C →250°C
		3 hours at 250°C		25°C/hour 250° →100°C
		15°C/hour 250° →315°C		
420/150 x 1200	300	50°C/hour 25° →150°C	30 at 365°C	10°C/hour 365° →315°C
		5 hours at 150°C		13 hours at 315°C
		25°C/hour 150° →250°C		10°C/hour 315°C →250°C
		5 hours at 250°C		25°C/hour 250° →100°C
		15°C/hour 250° →315°C		
		5 hours at 315°C		
		10°C/hour 315°C →365°C		

¹ For modified PTFE (M-111 and M-112), the sintering hold temperature is 5-10°C lower.

- For sintering, set the article vertically on a stand provided with a ventilation opening in the center, so that air is allowed to pass through the center of the article, to assist in the interior heating rate of the article.
- Preforming pressure: 15 MPa (2175 psi), double ended pressing, Ram speed: 40 to 60 mm/min. (pressure applied in 4 or 5 stages), Dwell time: 45 min. or more.

Packaging:

Daikin M-18 and M-15X PTFE molding powders are packaged in 100 lb. fiber drum containers with poly liners. M-12, M-15, M-111 and M-112 are packaged in 110 lb. fiber drum containers with poly liners.

Quality/ Regulatory:

Daikin PTFE molding powders 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).

Storage & Handling:

Molding powders tend to form agglomerates easily; therefore, do not store large quantities of powder in deep containers, and avoid strong vibrations and shock. Storage at temperatures above 19°C tends to promote agglomerate formation. Should agglomerates form, keep the powder at less than 19°C (ideally 15°C or below) for two days then sift through a coarse screen and allow to come to room temperature before molding.

Safety:

When PTFE 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 (202-974-5200)

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.

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