

# Product Comparison

## Technical Data

### Product Description

	A fluoro-resin suitable for compound with additives such as carbon.
POLYFLON™ PTFE M-18F	<p>Introduction</p> <ul style="list-style-type: none"> <li>• POLYFLON M-18F is a polytetrafluoroethylene virgin granular fine cut resin.</li> <li>• Compressing the powder and sintering are a general method for use due to its high melt viscosity.</li> <li>• Suitable for compound material with additives such as carbon.</li> </ul>
Ultrason® P 3010	Ultrason P 3010 is an unreinforced, flame retardant, higher viscosity injection molding PPSU grade, with improved chemical resistance.
VICTREX™ PEEK POLYMER 450G™	<p>High performance thermoplastic material, unreinforced PolyEtherEtherKetone (PEEK), semi crystalline, granules for injection moulding and extrusion, standard flow, colour natural/beige.</p> <p>Applications for higher strength and stiffness as well as high ductility. Chemically resistant to aggressive environments. Suitable for steam sterilisation. Further information is available on request.</p>
Solef® 6008	Solef® 6008 PVDF homopolymer is a low-viscosity PVDF resin and is typically processed by injection molding.
Kynar® 720	<p>Kynar® resins are fluorinated thermoplastic homopolymers.</p> <p>Outstanding characteristics: chemical resistance, imperviousness to UV, high barrier properties, high purity, good mechanical and thermo-mechanical properties.</p> <p>Kynar® 720 resin is a standard grade of granules for injection molding. This product is NSF/ANSI/CAN 61 certified.</p> <p>A powder form is available as Kynar® 721 resin.</p>

General	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720
Manufacturer / Supplier	• DAIKIN INDUSTRIES, Ltd.	• BASF Corporation	• Victrex plc	• Syensqo	• Arkema High Performance Polymers
Generic Symbol	• PTFE	• PPSU	• PEEK	• PVDF	• PVDF

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Additive	--	--	--	--	<ul style="list-style-type: none"> <li>• Heat Stabilizer</li> <li>• UV Stabilizer</li> </ul>
Features	<ul style="list-style-type: none"> <li>• High Viscosity</li> </ul>	<ul style="list-style-type: none"> <li>• Chemical Resistant</li> <li>• Flame Retardant</li> <li>• High Viscosity</li> </ul>	--	<ul style="list-style-type: none"> <li>• Homopolymer</li> <li>• Low Viscosity</li> </ul>	<ul style="list-style-type: none"> <li>• Barrier Resin</li> <li>• Chemical Resistant</li> <li>• Corrosion Resistant</li> <li>• Heat Stabilized</li> <li>• High Purity</li> <li>• Homopolymer</li> <li>• Light Stabilized</li> <li>• UV Resistant</li> </ul>
Uses	--	--	--	--	<ul style="list-style-type: none"> <li>• Coating Applications</li> <li>• Film</li> <li>• Sheet</li> <li>• Wire &amp; Cable Applications</li> </ul>
Agency Ratings	--	<ul style="list-style-type: none"> <li>• EC 1907/2006 (REACH) --</li> </ul>	--	--	<ul style="list-style-type: none"> <li>• ANSI</li> <li>• NSF STD-61</li> </ul>
RoHS Compliance	--	<ul style="list-style-type: none"> <li>• RoHS Compliant</li> </ul>	--	--	--

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Appearance	--	--	<ul style="list-style-type: none"> <li>• Beige</li> <li>• Natural Color</li> </ul>	--	--		
Forms	<ul style="list-style-type: none"> <li>• Granules</li> </ul>	<ul style="list-style-type: none"> <li>• Pellets</li> </ul>	<ul style="list-style-type: none"> <li>• Granules</li> </ul>	--	<ul style="list-style-type: none"> <li>• Granules</li> <li>• Pellets</li> </ul>		
Processing Method	<ul style="list-style-type: none"> <li>• Compression Molding</li> <li>• Sintering</li> </ul>	<ul style="list-style-type: none"> <li>• Injection Molding</li> </ul>	<ul style="list-style-type: none"> <li>• Extrusion</li> <li>• Injection Molding</li> </ul>	<ul style="list-style-type: none"> <li>• Injection Molding</li> </ul>	<ul style="list-style-type: none"> <li>• Casting</li> <li>• Coating</li> <li>• Coextrusion</li> <li>• Extrusion</li> <li>• Film Extrusion</li> <li>• Injection Molding</li> <li>• Sheet Extrusion</li> <li>• Thermoforming</li> </ul>		
Multi-Point Data	--	--	--	--	<ul style="list-style-type: none"> <li>• Isothermal Stress vs. Strain (ISO 11403)</li> <li>• Secant Modulus vs. Strain (ISO 11403)</li> <li>• Specific Volume vs Temperature (ISO 11403)</li> <li>• Viscosity vs. Shear Rate (ISO 11403)</li> </ul>		
Physical	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
Density / Specific Gravity							
--	2.15	--	--	--	--	g/cm³	ASTM D4894
--	--	--	--	1.75 to 1.80	--	g/cm³	ASTM D792
-- <sup>4</sup>	--	--	--	--	1.77 to 1.79	g/cm³	ASTM D792
--	--	1.29	--	--	1.78	g/cm³	ISO 1183
Crystalline	--	--	1.30	--	--	g/cm³	ISO 1183
Apparent (Bulk) Density	0.33	--	--	--	--	g/cm³	ASTM D4894
Melt Mass-Flow Rate (MFR)							ASTM D1238
230°C/2.16 kg	--	--	--	5.5 to 11	--	g/10 min	
230°C/3.8 kg	--	--	--	--	5.0 to 27	g/10 min	
230°C/5.0 kg	--	--	--	16 to 30	--	g/10 min	

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Melt Volume-Flow Rate (MVR)							ISO 1133
230°C/5.0 kg	--	--	--	--	18	cm³/10min	
360°C/10.0 kg	--	35	--	--	--	cm³/10min	
Spiral Flow <sup>5</sup>	--	--	11.0	--	--	cm	Internal Method
Molding Shrinkage							
Flow	3.7	--	--	--	--	%	Internal Method
Flow	--	--	--	2.0 to 3.0	--	%	
Across Flow	--	1.0	--	--	2.0	%	ISO 294-4
Across Flow <sup>6</sup>	--	--	1.3	--	--	%	ISO 294-4
Flow	--	0.90	--	--	2.0	%	ISO 294-4
Flow <sup>6</sup>	--	--	0.90	--	--	%	ISO 294-4
Water Absorption							
24 hr, 23°C	--	--	--	< 0.040	--	%	ASTM D570
Saturation	--	--	--	--	0.010 to 0.030	%	ASTM D570
Saturation, 23°C	--	1.2	0.45	--	0.020	%	ISO 62
Equilibrium, 23°C, 50% RH	--	0.60	--	--	0.015	%	ISO 62
Water Absorption - Saturation (100°C)	--	--	0.55	--	--	%	ISO 62
Average Particle Size	25	--	--	--	--	µm	ASTM D4894
Mechanical	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
Tensile Modulus							
23°C	--	--	--	--	1380 to 2310	MPa	ASTM D638
23°C, 2.00 mm <sup>7</sup>	--	--	--	1800 to 2500	--	MPa	ASTM D638
--	--	--	--	--	2200	MPa	ISO 527-1
23°C	--	2270	4000	--	--	MPa	ISO 527-1

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Tensile Strength							
Yield, 23°C	--	--	--	--	44.8 to 55.2	MPa	ASTM D638
Yield, 23°C, 2.00 mm <sup>8</sup>	--	--	--	50.0 to 60.0	--	MPa	ASTM D638
Yield	--	--	--	--	54.0	MPa	ISO 527-2
Yield, 23°C	--	74.0	98.0	--	--	MPa	ISO 527-2
Break, 23°C	--	--	--	--	34.5 to 55.2	MPa	ASTM D638
Break, 23°C, 2.00 mm <sup>8</sup>	--	--	--	30.0 to 50.0	--	MPa	ASTM D638
--	58.0	--	--	--	--	MPa	ASTM D4894
Tensile Elongation							
Yield, 23°C	--	--	--	--	5.0 to 10	%	ASTM D638
Yield, 23°C, 2.00 mm <sup>8</sup>	--	--	--	5.0 to 10	--	%	ASTM D638
Yield	--	--	--	--	8.0	%	ISO 527-2
Yield, 23°C	--	7.8	--	--	--	%	ISO 527-2
Break	440	--	--	--	--	%	ASTM D4894
Break, 23°C	--	--	--	--	20 to 100	%	ASTM D638
Break, 23°C, 2.00 mm <sup>8</sup>	--	--	--	20 to 300	--	%	ASTM D638
Break, 23°C	--	--	45	--	--	%	ISO 527-2
Nominal Tensile Strain at Break	--	--	--	--	> 50	%	ISO 527-2
Flexural Modulus							
23°C	--	--	--	--	1380 to 2310	MPa	ASTM D790
23°C	--	--	3800	--	--	MPa	ISO 178
Flexural Strength							
5.0% Strain, 23°C	--	--	--	--	58.6 to 75.8	MPa	ASTM D790
23°C <sup>9</sup>	--	--	165	--	--	MPa	ISO 178
3.5% Strain, 23°C	--	--	125	--	--	MPa	ISO 178
125°C	--	--	85.0	--	--	MPa	ISO 178
175°C	--	--	19.0	--	--	MPa	ISO 178
275°C	--	--	12.5	--	--	MPa	ISO 178

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Mechanical	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
Compressive Strength							
23°C	--	--	--	--	68.9 to 103	MPa	ASTM D695
23°C	--	--	125	--	--	MPa	ISO 604
120°C	--	--	70.0	--	--	MPa	ISO 604
Coefficient of Friction							ASTM D1894
vs. Itself - Dynamic	--	--	--	0.15 to 0.35	--		
vs. Itself - Static	--	--	--	0.20 to 0.40	--		
vs. Steel - Dynamic <sup>4</sup>	--	--	--	--	0.14		
vs. Steel - Static <sup>4</sup>	--	--	--	--	0.20		
Taber Abrasion Resistance							
1000 Cycles, 1000 g, CS-10 Wheel	--	--	--	5.00 to 10.0	--	mg	ASTM D4060
1000 Cycles, 1000 g, CS-17 Wheel	--	--	--	--	5.00 to 9.00	mg	Internal Method
Impact	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
Charpy Notched Impact Strength							
23°C, 4.00 mm <sup>10</sup>	--	--	--	40.0 to 120	--	J/m	ASTM D6110
-30°C	--	25	--	--	--	kJ/m <sup>2</sup>	ISO 179
-30°C	--	--	--	--	5.0	kJ/m <sup>2</sup>	ISO 179/1eA
23°C	--	75	--	--	--	kJ/m <sup>2</sup>	ISO 179
23°C	--	--	7.0	--	8.0	kJ/m <sup>2</sup>	ISO 179/1eA
Charpy Unnotched Impact Strength							
-30°C	--	No Break	--	--	--		ISO 179
-30°C	--	--	--	--	190	kJ/m <sup>2</sup>	ISO 179/1eU
23°C	--	No Break	--	--	--		ISO 179
23°C	--	--	No Break	--	--		ISO 179/1U
23°C	--	--	--	--	210	kJ/m <sup>2</sup>	ISO 179/1eU

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Impact	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
Notched Izod Impact							
23°C	--	--	--	--	80 to 210	J/m	ASTM D256
-30°C	--	25	--	--	--	kJ/m²	ISO 180
23°C	--	55	--	--	--	kJ/m²	ISO 180
23°C	--	--	8.0	--	--	kJ/m²	ISO 180/A
Unnotched Izod Impact							
23°C	--	--	--	--	1100 to 4300	J/m	ASTM D256
23°C	--	--	No Break	--	--		ISO 180/1U
Hardness	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
Durometer Hardness							
Shore D, 23°C	--	--	--	--	76 to 80		ASTM D2240
Shore D, 1 sec, 2.00 mm	--	--	--	73 to 80	--		ASTM D2240
Shore D, 23°C	--	--	85	--	--		ISO 868
Ball Indentation Hardness	--	124	--	--	--	MPa	ISO 2039-1
Thermal	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
Deflection Temperature Under Load							
0.45 MPa, Unannealed <sup>11</sup>	--	--	--	--	125 to 140	°C	ASTM D648
0.45 MPa, Unannealed	--	--	--	--	132	°C	ISO 75-2/B
1.8 MPa, Unannealed <sup>11</sup>	--	--	--	--	105 to 115	°C	ASTM D648
1.8 MPa, Unannealed	--	198	--	--	110	°C	ISO 75-2/A
1.8 MPa, Unannealed	--	--	152	--	--	°C	ISO 75-2/Af

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Thermal	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
Glass Transition Temperature							
--	--	--	--	-40.0	--	°C	ASTM D4065
--	--	--	--	--	-40.6 to -38.3	°C	ASTM D7028
-- <sup>12</sup>	--	--	--	--	-40.0	°C	ISO 11357-2
Onset	--	--	143	--	--	°C	ISO 11357-2
Midpoint	--	--	150	--	--	°C	ISO 11357-2
Vicat Softening Temperature							
--	--	--	--	135 to 145	--	°C	ASTM D1525 <sup>13</sup>
--	--	--	--	--	139	°C	ISO 306/B50
Melting Temperature							
--	--	--	--	170 to 175	--	°C	ASTM D3418
-- <sup>12</sup>	--	--	--	--	169	°C	ISO 11357-3
--	--	--	343	--	--	°C	ISO 11357-3
--	--	--	--	--	165 to 172	°C	ASTM D3418
-- <sup>14</sup>	327	--	--	--	--	°C	ASTM D4894
-- <sup>15</sup>	345	--	--	--	--	°C	ASTM D4894
Peak Crystallization Temperature (DSC)							
--	--	--	--	134 to 144	--	°C	ASTM D3418
CLTE - Flow							
0 to 40°C	--	--	--	1.4E-4	--	cm/cm/°C	ASTM D696
23°C	--	--	--	--	1.2E-4 to 1.4E-4	cm/cm/°C	ASTM D696
--	--	5.5E-5	--	--	--	cm/cm/°C	
--	--	--	--	--	1.4E-4	cm/cm/°C	ISO 11359-2
< 143°C	--	--	4.5E-5	--	--	cm/cm/°C	ISO 11359-2
> 143°C	--	--	1.2E-4	--	--	cm/cm/°C	ISO 11359-2
CLTE - Average							
< 143°C	--	--	55	--	--	ppm/K	
> 143°C	--	--	140	--	--	ppm/K	

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Thermal	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
Specific Heat							
--	--	--	--	--	745 to 958	J/kg/°C	DSC
23°C	--	--	--	1200	--	J/kg/°C	ASTM E968
100°C	--	--	--	1600	--	J/kg/°C	ASTM E968
Thermal Conductivity							
--	--	--	--	--	0.17 to 0.19	W/m/K	ASTM D433
23°C	--	--	--	0.20	--	W/m/K	ASTM C177
23°C <sup>16</sup>	--	--	0.29	--	--	W/m/K	ISO 22007-4
23°C <sup>17</sup>	--	--	0.32	--	--	W/m/K	ISO 22007-4
RTI Elec	--	--	260	--	150	°C	UL 746B
RTI Imp	--	--	180	--	150	°C	UL 746B
RTI Str	--	--	240	--	150	°C	UL 746B
Crystallization Heat	--	--	--	54.0 to 60.0	--	J/g	ASTM D3417
Heat of Fusion	--	--	--	58.0 to 67.0	--	J/g	ASTM D3417
Electrical	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
Surface Resistivity							
--	--	--	--	> 1.0E+14	--	ohms	ASTM D257
--	--	> 1.0E+15	--	--	--	ohms	IEC 60093
--	--	--	--	--	> 1.0E+15	ohms	IEC 62631-3-2
Volume Resistivity							
--	--	--	--	> 1.0E+14	--	ohms·cm	ASTM D257
20°C <sup>18</sup>	--	--	--	--	2.0E+14	ohms·cm	ASTM D257
--	--	> 1.0E+15	--	--	--	ohms·cm	IEC 60093
23°C	--	--	1.0E+16	--	--	ohms·cm	IEC 60093
125°C	--	--	1.0E+15	--	--	ohms·cm	IEC 60093
275°C	--	--	1.0E+9	--	--	ohms·cm	IEC 60093
--	--	--	--	--	2.0E+12	ohms·m	IEC 62631-3-1

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Electrical	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
<b>Dielectric Strength</b>							
23°C	--	--	--	--	> 67	kV/mm	ASTM D149
23°C, 1.00 mm	--	--	--	20 to 25	--	kV/mm	ASTM D149
--	--	44	--	--	21	kV/mm	IEC 60243-1
0.0500 mm	--	--	200	--	--	kV/mm	IEC 60243-1
2.00 mm	--	--	23	--	--	kV/mm	IEC 60243-1
<b>Dielectric Constant</b>							
1 kHz	--	--	--	--	4.50 to 9.50		ASTM D150
23°C, 1 kHz	--	--	--	7.00 to 10.0	--		ASTM D150
100 Hz	--	3.80	--	--	--		IEC 60250
1 MHz	--	3.70	--	--	--		IEC 60250
23°C, 50 Hz	--	--	3.00	--	--		IEC 60250
23°C, 1 kHz	--	--	3.10	--	--		IEC 60250
200°C, 50 Hz	--	--	4.50	--	--		IEC 60250
100 Hz	--	--	--	--	9.00		IEC 60250
1 MHz	--	--	--	--	7.00		IEC 60250
<b>Dissipation Factor</b>							
100 kHz	--	--	--	--	0.010 to 0.21		ASTM D150
100 Hz	--	1.7E-3	--	--	0.032		IEC 60250
1 MHz	--	8.9E-3	--	--	0.21		IEC 60250
23°C, 1 MHz	--	--	4.0E-3	--	--		IEC 60250
Comparative Tracking Index	--	150	150	--	600	V	IEC 60112

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Flammability	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
Flame Rating							
0.200 mm	--	--	--	V-0	--		UL 94
1.6 mm	--	V-0	--	--	--		UL 94
3.0 mm	--	V-0	--	--	--		UL 94
0.8 mm	--	--	--	--	V-0		IEC 60695-11-10, -20
1.6 mm	--	--	--	--	V-0		IEC 60695-11-10, -20
Glow Wire Flammability Index (2.0 mm)	--	--	960	--	--	°C	IEC 60695-2-12
Oxygen Index							
-- <sup>4</sup>	--	--	--	--	44	%	ASTM D2863
3.00 mm	--	--	--	44	--	%	ASTM D2863
--	--	--	--	--	66	%	ISO 4589-2
Optical	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
Refractive Index <sup>19</sup>	--	--	--	--	1.420		ASTM D542
Fill Analysis	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
Melt Viscosity							
230°C, 100 sec <sup>-1</sup>	--	--	--	--	600 to 1200	Pa·s	ASTM D3835
400°C	--	--	350	--	--	Pa·s	ISO 11443
Additional Information	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit	Test Method
Thermal Decomposition Temperature							TGA
in air, 1% wt. loss	--	--	--	--	375	°C	
in nitrogen, 1% wt. loss	--	--	--	--	410	°C	

## Product Comparison

Injection	POLYFLON™ PTFE M-18F	Ultrason® P 3010	VICTREX™ PEEK POLYMER 450G™	Solef® 6008	Kynar® 720	Unit
Drying Temperature	--	--	120 to 150	--	--	°C
Drying Time	--	--	3.0 to 5.0	--	--	hr
Hopper Temperature	--	--	< 100	--	--	°C
Rear Temperature	--	--	355	--	--	°C
Middle Temperature	--	--	360 to 365	--	--	°C
Front Temperature	--	--	370	--	--	°C
Nozzle Temperature	--	--	375	--	--	°C
Mold Temperature	--	--	170 to 200	--	--	°C