

# Principal Features of MELDIN® 7000

## Geometric Stability at High Temperature

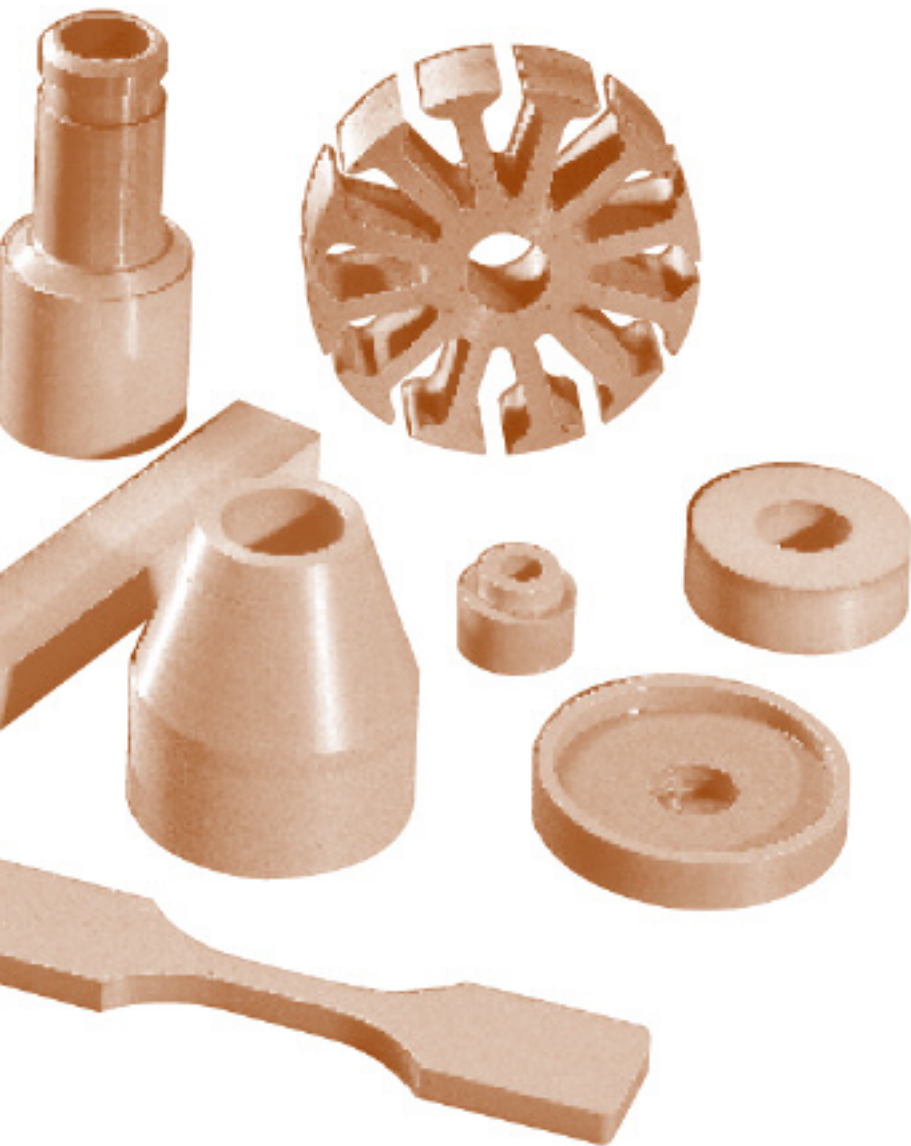
MELDIN® 7000 series materials exhibit extremely high geometric stability at elevated temperatures. Testing has shown MELDIN® 7000 to have less than 0.04% variation from its original dimensions after cycling from 73°F (22.77°C) to 500°F (260°C) over a 2-day period.

## Total Process Control... Powder-to-Parts

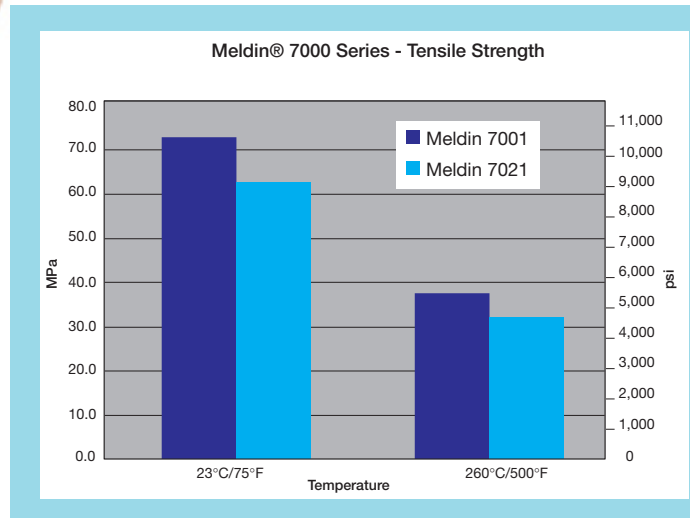
Our expanding resin production facility and our R&D testing labs allow Saint-Gobain Performance Plastics to maintain control of the quality and source of the base polyimide resin. Our "Powder-to-Parts" capability means total process control of resin production, stock shape manufacturing, direct forming, and critical dimensional machining of your finished parts.

## Longer Life at Higher Loads and Speeds

The self-lubricating grades of MELDIN® 7000 do not melt when exposed to high load (P), or high speed (V) applications, as compared to more traditional PTFE or thermoplastic polymers. P x V limits for MELDIN® 7000 self-lubricating grades exceed 300,000 in dry environments and past 1,000,000 in liquid or grease lubricated environments.



## Technical Graphs



# MELDIN® 7000 Compounds



## MELDIN® 7001, Unfilled Grade

A thermosetting polyimide, MELDIN® 7001 is our unfilled base resin. This grade offers the maximum mechanical properties and high chemical resistance. The MELDIN® 7001 grade is ideal for electrical and thermal insulating applications. More ductile than ceramics, and lighter weight than metals, MELDIN® 7001 is a popular choice for structural parts in aerospace and other applications where metal replacement is desirable.

## MELDIN® 7211, Lowest Friction Grade

MELDIN® 7211 has 10% PTFE and 15% graphite filler, which provides our lowest coefficient of friction grade.

## MELDIN® 7003

MELDIN® 7003 includes 15% molybdenum disulfide lubricating filler for wear applications that operate in a vacuum or in very dry conditions.

## MELDIN® 7021, Self-Lubricating Grade

Our self-lubricating grade, MELDIN® 7021, has 15% by weight graphite fillers, encapsulated by the base polyimide resin. With its low coefficient of friction and high heat resistance (up to 900°F [482°C]), MELDIN® 7021 provides our customers the best all-around choice for high temperature bearings, seals, and other low-wear applications.

## MELDIN® 7022

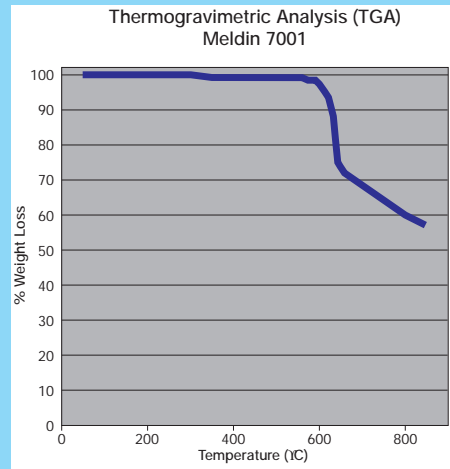
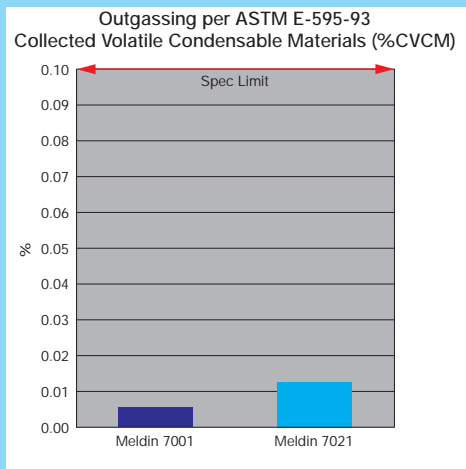
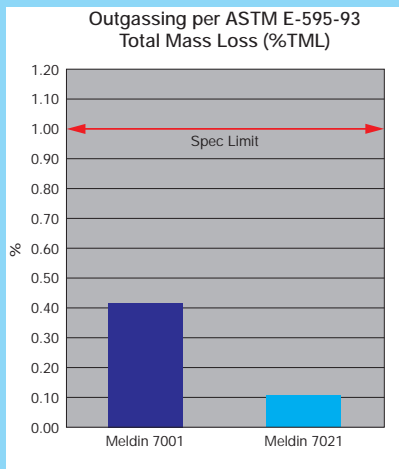
With 40% graphite filler, the MELDIN® 7022 grade offers additional dimensional stability and the lowest coefficient of thermal expansion of any MELDIN grade.

### Product availability:

- Basic shapes
- Finished parts

### Manufacturing processes:

- Compression Molding
- Injection Molding
- Direct forming
- Machined parts



# Typical Properties of MELDIN® 7000

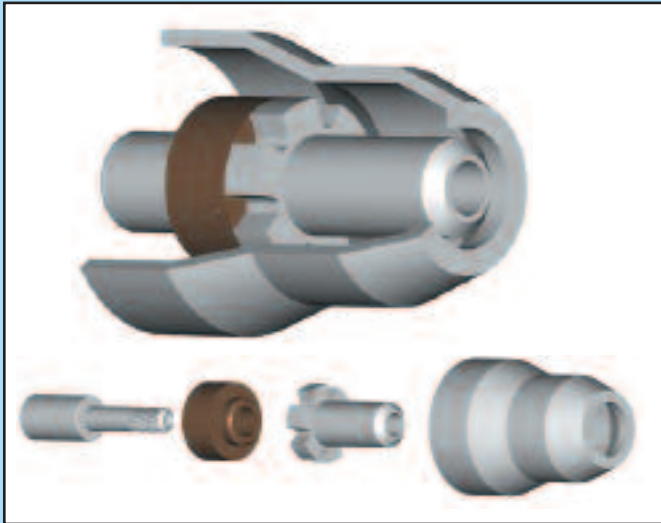
## MELDIN® 7001

		Molding Method Code →	DF	CM
		Molding Method Description →	Direct Formed	Compression Molded
PROPERTY at @ 73°F (23°C)	TEST METHOD	ENGLISH (METRIC)		
<b>MECHANICAL</b>				
Tensile Strength	ASTM D638	psi (MPa)	10500 (72.4)	12500 (86.2)
Elongation	ASTM D638	%	8.0	8.0
Flexural Strength	ASTM D790	psi (MPa)	12800 (88)	15800 (109)
Flexural Modulus	ASTM D790	psi x 10 <sup>5</sup> (GPa)	3.7 (2.5)	4.6 (3.1)
Compressive Stress @ 1% Strain	ASTM D695	psi (MPa)	3000 (21)	3800 (26.2)
Compressive Stress @ 10% Strain	ASTM D695	psi (MPa)	14000 (96.5)	18500 (127.5)
Compressive Modulus	ASTM D695	psi x 10 <sup>5</sup> (GPa)	2.9 (2.0)	3.8 (2.6)
<b>COEFFICIENT OF THERMAL EXPANSION</b>				
73 to 500°F (23 to 260°C)	ASTM E831	in/in/°F (m/m/°C) x 10 <sup>5</sup>	2.7 (4.9)	2.7 (4.9)
-80 to 73°F (-62 to 23°C)	ASTM E831	in/in/°F (m/m/°C) x 10 <sup>6</sup>	—	—
Thermal Conductivity	ASTM F433	BTU in/hr ft <sup>2</sup> °F (W/m°C)	2.2 (0.31)	2.4 (0.34)
<b>ELECTRICAL</b>				
Dielectric Strength, Short time 2mm (.08") thick	ASTM D149	V/mil (MV/m)	—	580 (22.9)
Dielectric Constant 100 Hz	ASTM D150	—	—	3.18
Dielectric Constant 10 KHz	ASTM D150	—	—	3.16
Dielectric Constant 1 MHz	ASTM D150	—	—	3.14
Surface Resistivity	ASTM D257	Ohm-Sq	—	10 <sup>15</sup> - 10 <sup>16</sup>
<b>OTHER</b>				
Specific Gravity	ASTM D792	—	1.34	1.43
Hardness Rockwell E	ASTM D785	—	—	40 - 55
Water Absorption, 24 hours	ASTM D570	%	—	0.23
Water Absorption, 48 hours	ASTM D570	%	—	0.64
Deformation under Load @ 2000 psi	ASTM D-621	%	0.1	0.1
Limiting Oxygen Index	ASTM D2863	—	—	100
High Temperature Dimensional Stability @ 500°F	INTERNAL	% Change	0.00% Max	—
<b>MECHANICAL PROPERTIES @ 500°F (260°C)</b>				
Tensile Strength	ASTM D638	psi (MPa)	5500 (38)	6250 (43)
Elongation	ASTM D638	%	7.5	5.0
Flexural Strength	ASTM D790	psi (MPa)	7000 (48)	9100 (62.7)
Flexural Modulus	ASTM D790	psi x 10 <sup>5</sup> (GPa)	2 (1.3)	2.5 (1.7)
<b>SPECIFICATION QUALIFICATION</b>				
ASTM D 6456 - 99 Standard Specification for Finished Parts Made from Polyimide Resin		Satisfies →	Type I D	Type I P
SAE AMS 3644E Polyimide, Molded Rod, Bar and Tube, Plaque, and Formed Parts		Satisfies →	Class 1 Form D	Class 1 Form P
MIL-R-46198 Resin, Polyimide, Hot Pressed or Pressed and Sintered		Satisfies →	Type I D	Type I P

NOTE: For Type 1M, Form M, or Classes 1M, 2M, or 3M: Contact Saint-Gobain @ 401-253-2000

MELDIN® 7021		MELDIN® 7022		MELDIN® 7211		MELDIN® 7003
DF	CM	DF	CM	DF	CM	CM
Direct Formed	Compression Molded	Direct Formed	Compression Molded	Direct Formed	Compression Molded	Compression Molded
9100 (62.7)	9500 (65.5)	7200 (49.6)	8000 (55)	8000 (55)	7500 (51.7)	9200 (63.4)
5.5	4.7	3.0	3.0	5.4	4.0	5.5
13000 (89.5)	15800 (109)	10500 (72.4)	13000 (89.6)	11000 (75.8)	11800 (81.4)	13000 (89.6)
4.5 (3.0)	5.3 (3.6)	6.7 (4.5)	7.7 (5.2)	4.0 (2.7)	5.0 (3.4)	4.6 (3.1)
3400 (23)	4300 (29.7)	3300 (22.8)	4700 (32.4)	2300 (15.9)	3500 (24)	3700 (25.5)
15300 (106)	18000 (124)	14000 (96.5)	15500 (107)	11200 (77.2)	14950 (103)	17000 (117)
3.0 (2.1)	4.5 (3.1)	2.9 (2.0)	4.8 (3.3)	2.5 (1.7)	3.5 (2.4)	3.6 (2.5)
2.0 (3.6)	2.2 (4.0)	1.1 (2.0)	1.4 (2.5)	2.4 (4.3)	2.4 (4.3)	—
—	—	—	—	—	—	—
3.0 (0.43)	5 (0.71)	—	—	—	5.2 (0.74)	—
—	280 (11)	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	10^8 - 10^9	—	—	—	—	—
1.42	1.51	1.56	1.65	1.45	1.53	1.61
—	25-40	—	5-20	—	1 - 15	—
—	0.19	—	0.25	—	0.23	—
—	0.50	—	0.48	—	0.46	—
0.14	0.1	0.15	—	0.2	—	—
—	100	—	—	—	—	—
0.04% Max	—	0.002% Max	—	0.002% Max	—	—
4700 (32.4)	5700 (39.3)	4000 (27.6)	4500 (31)	4300 (29.7)	4300 (29.7)	—
5.2	3.2	3.0	2.4	5.1	2.8	—
7500 (51.7)	8600 (59.3)	6000 (41.4)	7000 (48.3)	6000 (41.4)	6000 (41.4)	—
2.6 (1.8)	3.5 (2.4)	3.8 (2.6)	5.2 (3.6)	2.7 (1.9)	3.0 (2.1)	—
Type II Class 1D	Type II Class 1P	Type II Class 2D	Type II Class 2P	Type II Class 3D	Type II Class 3P	Type III
Class 2 Form D	Class 2 Form P	Class 3 Form D	Class 3 Form P	Class 4 Form D	Class 4 Form P	Class 5 Form P
Type II Class 1D	Type II Class 1P	Type II Class 2D	Type II Class 2P	Type II Class 3D	Type II Class 3P	Type III

# Applications of MELDIN® 7000



MELDIN® 7001 materials are direct formed and machined for use in critical plasma cutting torches in the torch handle. These torches create high energy vortex gas streams, and MELDIN® 7000 parts distribute these gases precisely due to their inherent dimensional stability and machinability. Also, other parts in the torch handle insulate high electrical energy from the user, ensuring safe operation. High impact resistance increases the useful life of this equipment as compared to ceramic alternatives.

Our MELDIN® 7021 self-lubricating polyimide materials meet or exceed the most stringent requirements for aerospace applications. Backed up by third-party independent testing, the MELDIN® 7021 material grade provides our customers with consistent mechanical and performance properties for aircraft airframe systems such as landing gear and fuselage components, as well as jet engine parts such as pads, bumpers, washers, seals, and bearings.



Semi-conductor manufacturing customers require process equipment whose materials have high purity, high resistance to solvents, oils, and other process chemicals, and high electrical insulative properties — all combined with the ability to hold dimensional features over a wide temperature range. The MELDIN® 7001 unfilled resin grade fulfills all these requirements. Available as finished or in basic shapes (ask about our 12" x 12" plates), MELDIN® 7001 will add value to your production.