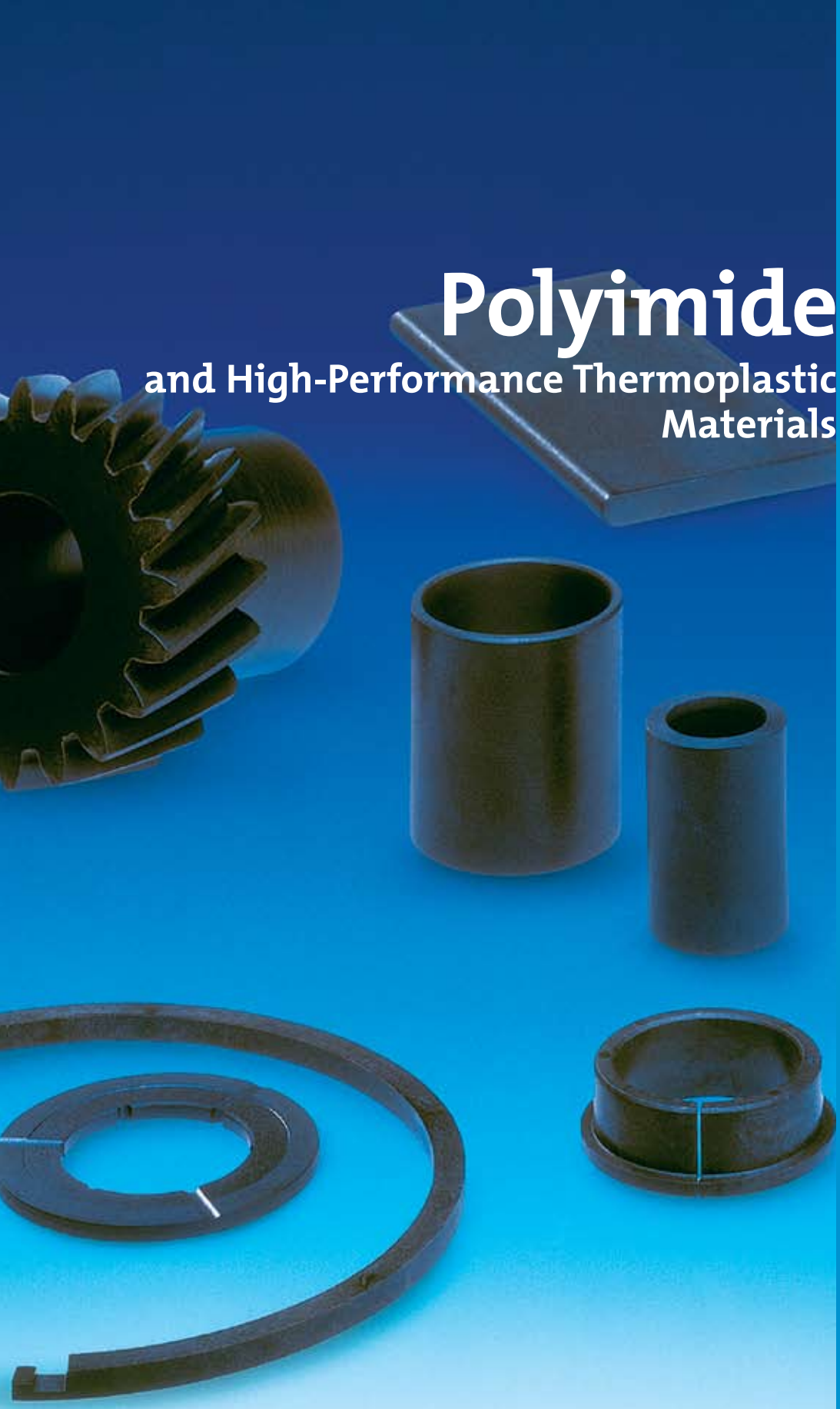


Polyimide and High-Performance Thermoplastic Materials

MELDIN®

- Temperature from Cryogenic to 600°F (315°C)
- Intermittently up to 900°F (482°C)
- Self-lubricating properties

Available as:

- Machined part
- Stock shape
- Custom molded

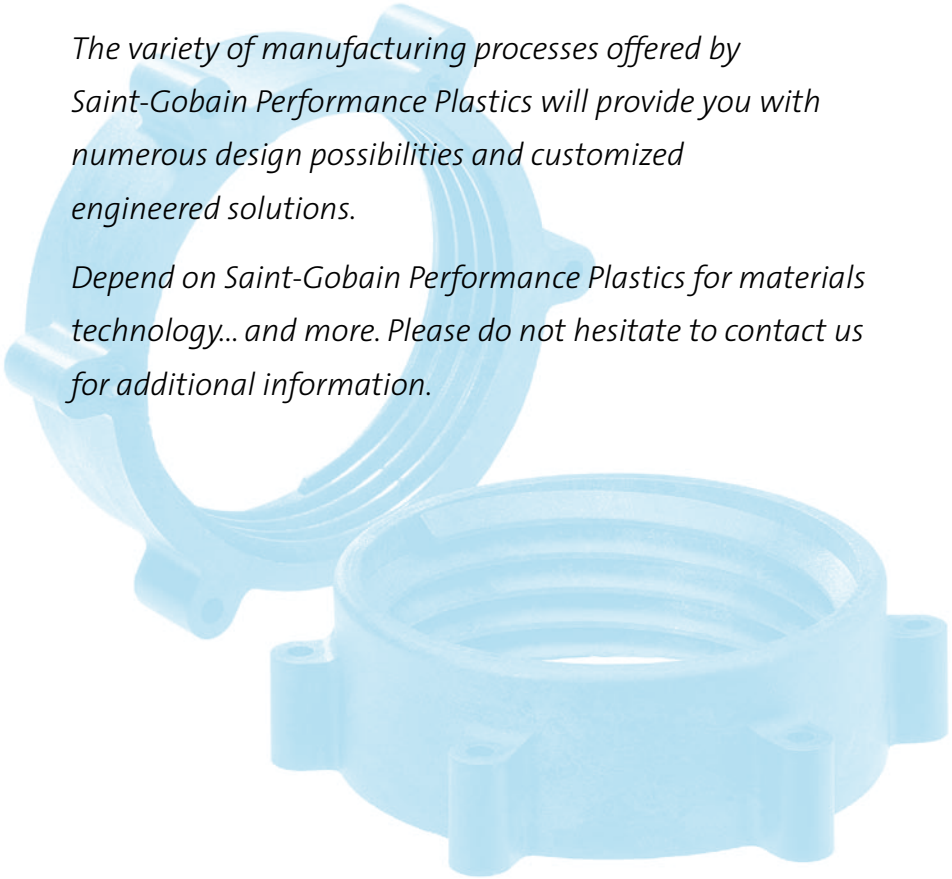
SAINT-GOBAIN
PERFORMANCE PLASTICS

Table of Contents

Saint-Gobain Performance Plastics Corporation has built a reputation for innovation through the development of high-performance polymer components, solving the most demanding design problems. Many products are in use today only because our parts have out-performed and replaced metals, ceramics, and inferior plastics in critical applications.

The variety of manufacturing processes offered by Saint-Gobain Performance Plastics will provide you with numerous design possibilities and customized engineered solutions.

Depend on Saint-Gobain Performance Plastics for materials technology... and more. Please do not hesitate to contact us for additional information.

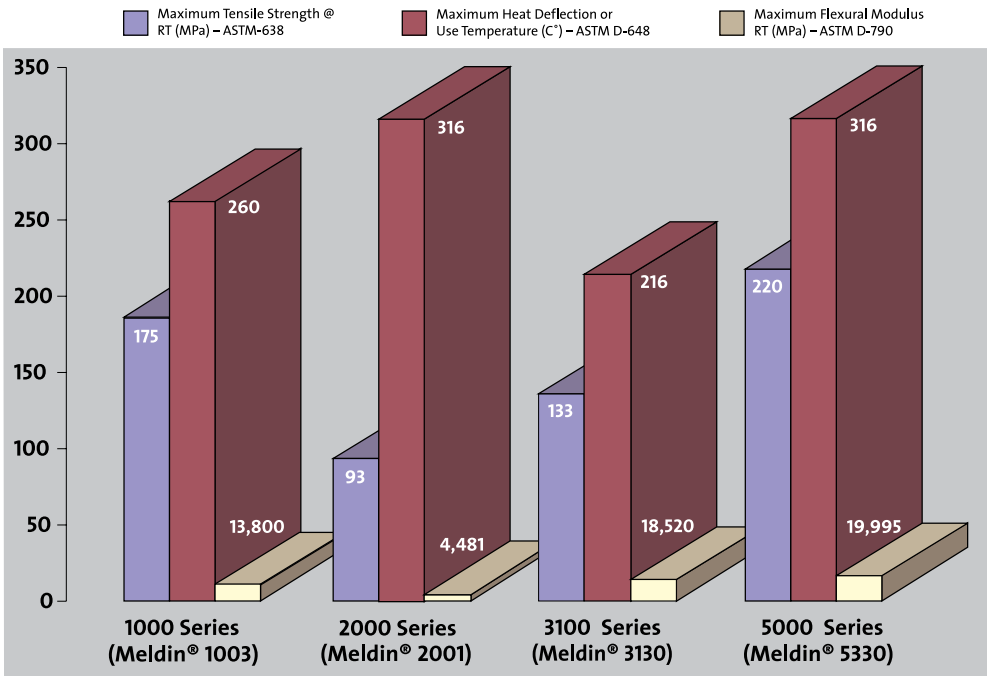


MELDIN®

Saint-Gobain Performance Plastics is your most dependable source for high-performance polymer components, and the technology with which to use them effectively.

The MELDIN® series sets the standard of excellence for problem-solving materials. Our engineers have designed these products for highly demanding applications in which metals and other materials will not perform adequately.

Each specially compounded product in the MELDIN® series has unique characteristics suitable for your specific applications. The MELDIN® product line is the most complete range of polyimide and engineered thermoplastic materials available today.



Typical Properties		1000 Series (1003)	2000 Series (2001)	3100 Series (3130)	5000 Series (5330)
Max. Tensile Strength @RT	MPa (psi)	175 (25,500)	93 (13,500)	133 (19,376)	220 (32,000)
Max. Flexural Strength @RT	MPa (psi)	193 (28,000)	144 (21,000)	222 (32,226)	354 (51,300)
Max. Flexural Modulus @RT	MPa (psi)	13,600 (2,000,000)	4,481 (650,000)	18,520 (2,683,000)	19,995 (2,900,000)
Max. Compressive Strength @RT	MPa (psi)	155 (22,500)	275.8 (40,000)	175 (25,440)	237.8 (34,500)
Max. Heat Deflection or Use Temp.	˚C (˚F)	260 (500)	316 (600)*	216 (421)	316 (600)
Environment					
High Temperature		X	X	X	X
Corrosive		X	X	X	X
Water		X		X	X
Steam		X			X
Manufacturing Process					
Compression Molding			X		
Injection Molding		X		X	X
Available Shapes					
Rods			X		
Sheets			X		
Finished Parts or Near Net Shape		X		X	X
Machined Parts		X	X	X	X

*MELDIN® 2000 series has no heat deflection temperature. It is used at 316°C with excursions to 482°C. (Note: The purpose of this table is to provide a brief overview of any key attributes or properties that can be used to differentiate the four MELDIN® grades listed.)

Design Performance With MELDIN® Materials

These materials, available in custom molded and machined components and stock shapes for machining, retain their critical properties over a temperature range from cryogenic through +600°F (315°C) for continuous operation, and may be used intermittently up to +900°F (482°C).

Superior strength and rigidity, combined with self-lubricating properties, provide long maintenance-free service for the most demanding bearing and structural applications. These include parts for engines, medical devices, aircraft and aerospace power and systems, electronics, and industrial equipment.

MELDIN® 2000 is processed by a compression molding technique similar to powdered metal technology. It can also be finish machined from basic shapes to close tolerance parts.

MELDIN® 1000, MELDIN® 3100 and MELDIN® 5000 are custom injection molded into any finished part configuration, regardless of its intricacy.

From one-off prototypes through multi-million piece production runs, the MELDIN® series provides the material of choice for all severe service applications where design challenges include temperature extremes, high loads and speeds, wear, and chemicals. These include bearings, thrust washers, vanes, wear rings, piston rings, and structural components.

Principal Features of MELDIN® 1000

Excellent Chemical Resistance

Even at elevated temperatures, most MELDIN® 1000 grades have superior resistance to chemicals ranging from acids to oils and solvents to fuels, and even to high temperature steam. Plus the MELDIN® 1380 grade works well in applications that have food contact.

Good Dimensional Stability

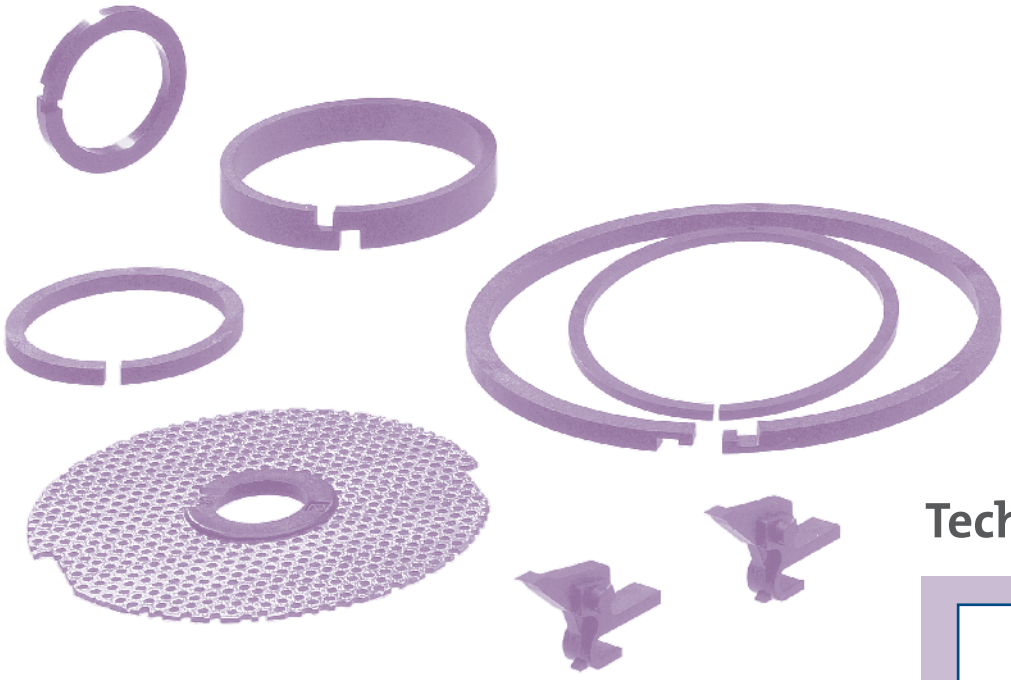
MELDIN® 1000 materials exhibit low coefficients of thermal expansion, which aid these components when functioning in close-clearance applications. In addition, these materials have low creep and low water absorption, which also allows designers to specify close clearances in moving mating components.

Structural Integrity

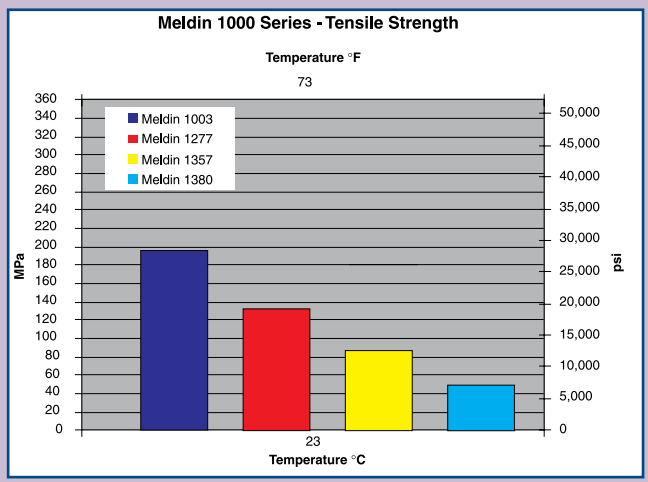
Components such as piston rings or seals made with MELDIN® 1000 materials offer excellent self-energizing qualities due the materials' high strength and good rigidity. With a high strength-to-weight ratio, these products exhibit good durability and wear resistance.

Design Versatility

MELDIN® 1000 materials have properties that allow them to be designed into components ranging from structural components to dynamic bearing and sealing components. Their excellent physical, chemical, and thermal properties allow the MELDIN® 1000 grades to be the first material of choice for piston rings, thrust washers, and bushings.



Technical Graphs



MELDIN® 1000 Compounds

MELDIN® 1003

MELDIN® 1003 components offer the highest level of strength and rigidity for this product family. They maintain high chemical, tensile, and flexural properties even at elevated temperatures.

MELDIN® 1277

Specify MELDIN® 1277 when the product requirements call for structural integrity and low deformation. This material also exhibits good electrical insulative properties and dimensional stability.

MELDIN® 1357

MELDIN® 1357 offers the lowest wear rate and coefficient of friction, which makes it the best candidate for tribological applications. In addition, its self-lubricating properties allow it to operate quietly in dry operating environments.

MELDIN® 1380

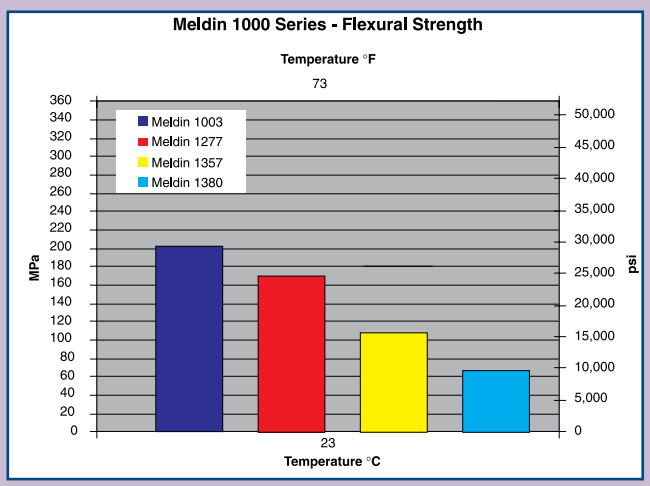
Specify MELDIN® 1380 for use with soft mating surfaces that gall easily, such as stainless steel or aluminum. MELDIN® 1380 also complies with the FDA Title 21 CFR regulations for contact with articles intended for repeated use in contact with food.

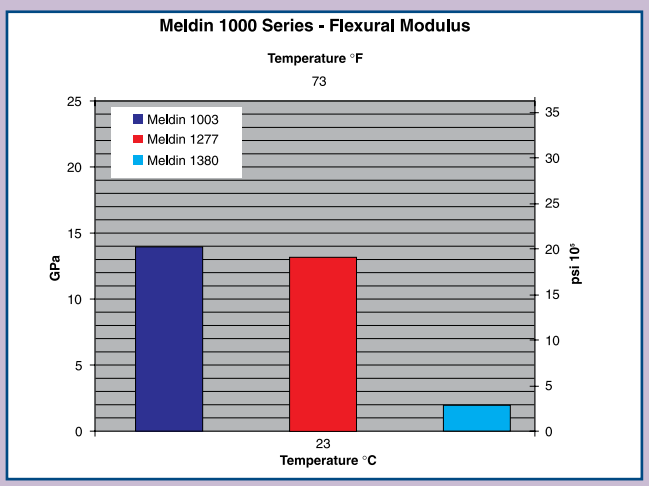
Product availability:

Basic shapes	☐
Finished parts	☑

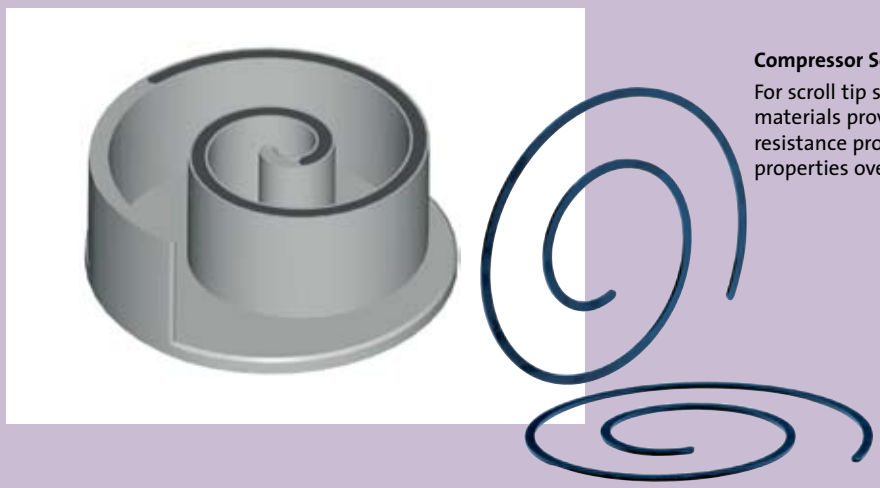
Manufacturing processes:

Compression molding	☐
Injection molding	☑
Direct forming	☐
Machined parts	☑





Applications of MELDIN® 1000



Compressor Scroll Tip Seals

For scroll tip seal applications, MELDIN® 1000 series materials provide some parts with superior wear resistance properties, and superior deformation properties over those of standard PTFE scroll tip seals.

Appliance Applications

MELDIN® 1000 series components are used in appliance applications due to their superior wear life and ability to operate without the need for any oils or lubricants. In addition, the MELDIN® 1380 grade complies with the FDA Title 21 CFR regulations for contact with articles intended for repeated use in contact with food.

Vehicle Components

In vehicle systems such as transmission bearings or thrust washers, as well as fuel pump bearings, MELDIN® 1000 series materials provide performance superior to metallic components. The MELDIN® 1000 series materials' wear resistance, coupled with their excellent chemical resistance, make them ideal materials for vehicle system components.

Typical Properties of MELDIN® 1000

PROPERTY	TEST METHOD	ENGLISH (METRIC)	MELDIN® 1003	MELDIN® 1277	MELDIN® 1357	MELDIN® 1380
MECHANICAL @ RT						
Tensile Strength	ASTM D638	psi (MPa)	25,500 (175)	18,850 (130)	12,500 (86)	6,800 (46.8)
Tensile Modulus	ASTM D638	psi x 10^5 (GPa)			4.5 (3.1)	2.7 (1.8)
Elongation	ASTM D638	%	2.0	0.5	4.5	6.5
Flexural Strength	ASTM D790	psi (MPa)	28,000 (193)	24,650 (170)	16,200 (112)	9,500 (65.5)
Flexural Modulus	ASTM D790	psi x 10^5 (GPa)	20.0 (13.8)			2.6 (1.7)
Compressive Strength	ASTM D695	psi (MPa)	22,500 (155)		13,500 (93)	
Izod Impact Strength (notched)	ASTM D256	Ft-lb/in (J/m)	0.8 (43)	1.59 (85)		0.8 (42.7)
THERMAL						
Coefficient of Thermal Expansion	ASTM E831-93	in/in/°F (m/m/°C) x 10^{-5}	0.80 (1.4)	1.39 (2.5)	1.9 (3.4)	
Heat Deflection Temperature @ 264 psi (1.8 MPa)	ASTM D648	°F (°C)	500 (260)	450 (232)	450 (232)	183 (84)
Thermal Conductivity	ASTM F433	BTU in/hr ft^2 °F (W/m°C)	5.4 (0.75)			
ELECTRICAL						
Surface Resistivity	ASTM D257	Ohm	150			
GENERAL						
Specific Gravity	ASTM D792	—	1.57	1.65	1.44	1.47
Water Absorption	ASTM D570	%	0.03	0.01		0.2
300°F (149°C)						
Tensile Strength	ASTM D638	psi (MPa)	10,000 (69)		5,600 (38)	
Elongation	ASTM D638	%	2.5			
Compressive Strength	ASTM D695	psi (MPa)	5,500 (38)		4,500 (31)	
400°F (204°C)						
Tensile Strength	ASTM D638	psi (MPa)	6,750 (46)		3,400 (23)	
Elongation	ASTM D638	%	2.8			
Compressive Strength	ASTM D695	psi (MPa)	3,400 (172.3)		3,300 (23)	

Principal Features of MELDIN® 2000

Excellent Tensile Strength and Elongation

MELDIN® 2000 materials exhibit superior tensile strength and elongation properties, even at elevated temperatures, providing the mechanical integrity necessary for the most demanding applications.

High Compressive Strength

With an ultimate compressive strength of over 40,000 psi and a usable limit of 34,000 psi at 10% strain, MELDIN® 2001 provides the highest resistance to compressive failure of any of the MELDIN® 2000 compositions. The additional formulations, however, also offer excellent compressive properties.

High Modulus

MELDIN® 2000 materials have inherently high moduli and yield points in tension, compression, and flex. These combined features provide non-brittle materials for use in applications where extreme rigidity is essential.

Superior Creep Resistance

These materials all display minimal deformation under load. MELDIN® 2030 provides additional ductility and conformability without sacrificing load carrying capacity when a sealing surface is required. These characteristics allow for dry-running bearing operation at high PVs and high-static loading without concern for deflection.

Superb Dimensional Stability

MELDIN® 2000 products have no observable melting point. This feature, combined with an extremely low thermal expansion, high resistance to deformation under load, and low hysteresis, provides excellent dimensional stability. Even under the most severe conditions of harsh chemicals and temperature extremes, MELDIN® 2000 retains its dimensional quality and functionality.

Balanced Electrical Properties

Both MELDIN® 2001 and MELDIN® 2030 have high dielectric strength, a stable dielectric constant, and very high volume and surface resistivity. MELDIN® 2001, with its balance of physical and electrical properties, is ideal for stationary electrical insulating applications. Bearings made of MELDIN® 2030 provide dry self-lubrication in addition to electrical insulation.

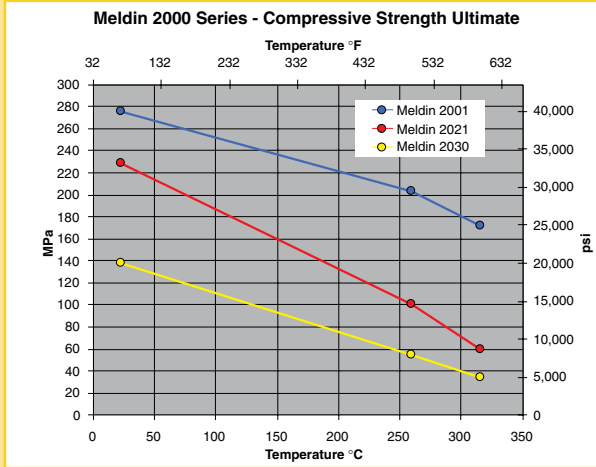
Low Outgassing

In independent testing to ASTM R595, MELDIN® 2000 exhibited remarkably low outgassing. Other than absorbed water, MELDIN® 2000 materials showed negligible mass loss and collectible condensables. This feature allows for trouble-free, clean operation in ultra-high vacuum environments.

Low Friction, High Resistance to Wear

MELDIN® 2021, MELDIN® 2211, and MELDIN® 2030 bearing grades are all capable of carrying high loads at temperature extremes. Specially designed for optimum friction and wear properties, these MELDIN® products provide smooth interaction and zero abrasion when operating against both ferrous and non-ferrous mating surfaces.

Technical Graphs



MELDIN® 2000 Compounds

MELDIN® 2001

This material is best suited for thermal and electrical insulation and radiation resistance. MELDIN® 2001 has the highest compressive properties of any material in the series.

MELDIN® 2030

The MELDIN® 2030 bearing compound operates with extremely low friction in both dynamic and static applications, and provides thermal and electrical insulation.

MELDIN® 2211

MELDIN® 2211 offers the balanced properties of low friction, high strength and resistance to compressive creep.

MELDIN® 2021

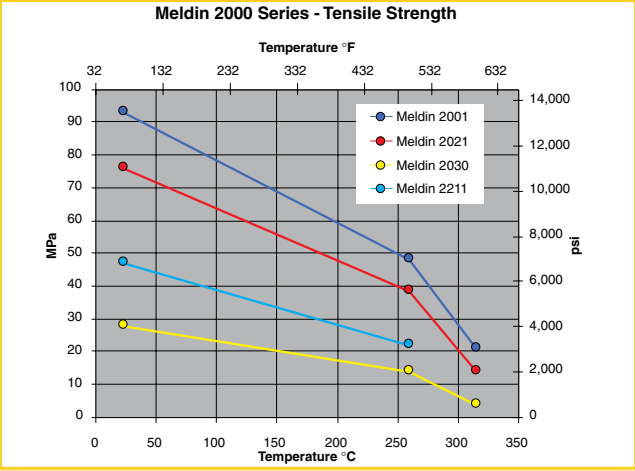
A multi-purpose bearing grade for high temperature and high load applications, MELDIN® 2021 maintains its strength and rigidity at elevated temperatures.

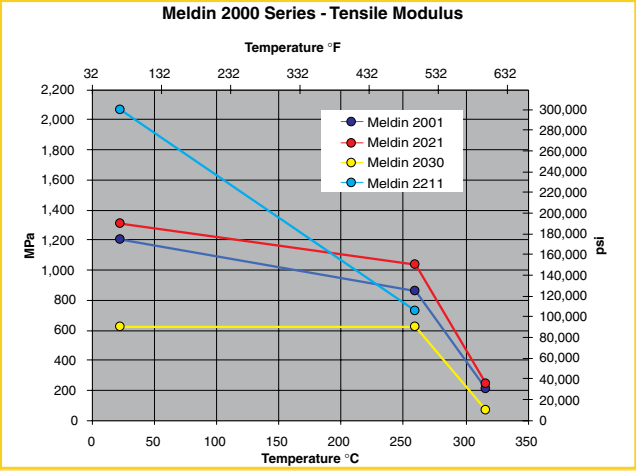
Product availability:

Basic shapes	☐
Finished parts	☑

Manufacturing processes:

Compression molding	☑
Injection molding	☐
Direct forming	☐
Machined parts	☑

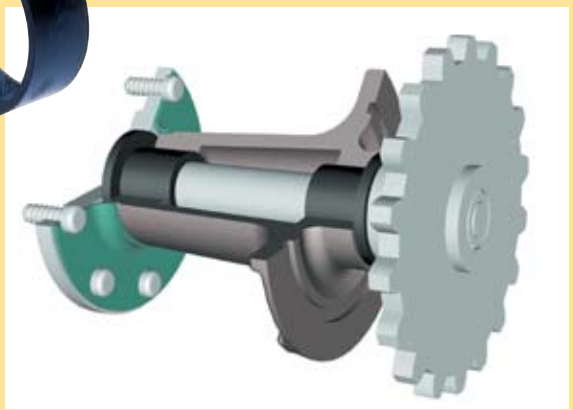




Applications of MELDIN® 2000

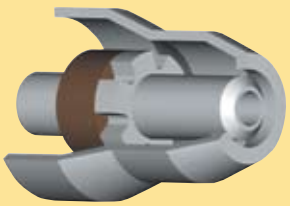
Glass Handling Equipment

In glass bottle production, MELDIN® take-out inserts and grippers are used for mold removal and transfer of red-hot bottles. MELDIN® components improve bottle quality and production yield. Due to their low thermal conductivity, they reduce microcracking caused by rapid, non-uniform cooling.



Bearing Applications

MELDIN® materials can be used for very demanding bearing applications in motors, general industrial equipment and machinery, and business machines.



Welding or Plasma Cutting Equipment

Because of their high temperature capabilities, MELDIN® materials improve wear life of welding and plasma cutting equipment.

Typical Properties of MELDIN® 2000

PROPERTY	TEST METHOD	ENGLISH (METRIC)	MELDIN® 2001	MELDIN® 2021	MELDIN® 2030	MELDIN® 2211
MECHANICAL @ RT						
Tensile Strength Ultimate	ASTM D638	psi (MPa)	13,500 (93)	11,000 (75.8)	4,000 (27.5)	6,800 (46.8)
Tensile Modulus	ASTM D638	psi x 10^5 (GPa)	1.75 (1.2)	1.90 (1.3)	.90 (0.6)	3.00 (2.0)
Elongation Ultimate	ASTM D638	%	8.0	5.0	4.0	4.0
Flexural Strength Ultimate	ASTM D790	psi (MPa)	21,000 (144.7)	12,500 (86.1)	7,000 (48.2)	11,500 (79.2)
Flexural Modulus	ASTM D790	psi x 10^5 (GPa)	6.50 (4.4)	5.75 (3.9)	3.90 (2.6)	5.50 (3.8)
Compressive Strength Ultimate	ASTM D695 modified	psi (MPa)	40,000 (275.7)	33,000 (227.5)	20,000 (137.8)	
Compressive Strength @ 10% Strain	ASTM D695 modified	psi (MPa)	34,000 (234.4)	30,000 (206.8)	17,000 (117.2)	
Compressive Modulus	ASTM D695 modified	psi x 10^5 (GPa)	4.00 (2.7)	4.00 (2.7)	2.00 (1.3)	
Deformation @ 2000 psi, 24 hrs mold direction	ASTM D621	%	0.10	0.09	0.35	0.10
Izod Impact Strength (notched)	ASTM D256	Ft-lb/in (J/m)	0.53 (28.3)	0.38 (20.3)	0.34 (18.2)	0.37 (19.8)
THERMAL						
Coefficient of Thermal Expansion	ASTM E831-93	in/in/°F (m/m/°C) x 10^{-5}	2.95 (5.3)	2.7 (4.9)	3.3 (5.9)	3.2 (5.8)
Thermal Conductivity	C518/C177	BTU in/hr ft^2 °F (W/m°C)	3.0 (0.43)	4.3 (0.62)	2.4 (0.35)	2.8 (0.40)
ELECTRICAL						
Volume Resistivity	ASTM D257	Ohm/cm	10^{15}	10^{15}	10^{15}	10^{15}
Surface Resistivity	ASTM D257	Ohm	10^{16}	10^{15}	10^{15}	10^{15}
Dielectric Constant 10^2 Hz	ASTM D150	—	3.40	12.65	3.03	5.56
Dielectric Constant 10^4 Hz	ASTM D150	—	3.39	12.41	3.02	5.53
Dielectric Constant 10^6 Hz	ASTM D150	—	3.35	11.92	2.98	5.47
Dielectric Strength	ASTM D149	V/mil (MV/m)	400 (15.8)	200 (7.9)	500 (19.7)	
Dissipation Factor 10^2 Hz	ASTM D150	—	.0016	.0067	.0012	.0019
Dissipation Factor 10^4 Hz	ASTM D150	—	.0030	.0096	.0031	.0028
Dissipation Factor 10^6 Hz	ASTM D150	—	.0039	.0190	.0049	.0035
GENERAL						
Specific Gravity	ASTM D792	—	1.39	1.48	1.57	1.53
Hardness Shore D	ASTM D2240	—	92	90	80	85
Water Absorption	ASTM D570	%	0.13	0.13	0.62	0.18
OTHER						
Outgassing	ASTM E5955	% TML	1.63	1.38	1.25	1.19
Outgassing	ASTM E55955	%CVCM	.01	.00	.00	.02
Outgassing	ASTM E595	%WVR	1.04	.69	1.15	.5
500°F (260°C)						
Tensile Strength Ultimate	ASTM D638	psi (MPa)	7,000 (48.2)	5,600 (38.6)	2,000 (13.7)	3,200 (22)
Tensile Modulus	ASTM D638	psi x 10^5 (GPa)	1.25 (0.8)	1.50 (1.0)	.90 (0.6)	1.05 (0.7)
Elongation Ultimate	ASTM D638	%	7.0	3.5	2.8	3.0
Compressive Strength Ultimate	ASTM D695 modified	psi (MPa)	29,500 (203.3)	14,500 (100)	8,000 (55.1)	
Compressive Strength Yield	ASTM D695 modified	psi (MPa)	11,000 (75.8)	9,000 (62)	5,500 (38)	
Compressive Strain Yield	ASTM D695 modified	%	7.0	7.0	7.0	
Compressive Modulus	ASTM D695 modified	psi x 10^5 (GPa)	1.75 (1.2)	1.90 (1.3)	0.80 (0.5)	
600°F (316°C)						
Tensile Strength Ultimate	ASTM D638	psi (MPa)	3,000 (20.6)	2,000 (13.7)	500 (3.4)	
Tensile Modulus	ASTM D638	psi x 10^5 (GPa)	0.30 (0.2)	0.35 (0.2)	0.10 (0.06)	
Elongation Ultimate	ASTM D638	%	25	12	4.0	
Compressive Strength Ultimate	ASTM D695 modified	psi (MPa)	25,000 (172.3)	8,500 (58.6)	5,000 (34.4)	
Compressive Strength Yield	ASTM D695 modified	psi (MPa)	7,000 (48.2)	5,000 (34.4)	3,200 (22)	
Compressive Strain Yield	ASTM D695 modified	%	7.0	7.0	6.0	
Compressive Modulus	ASTM D695 modified	psi x 10^5 (GPa)	1.00 (0.6)	0.75 (0.5)	0.55 (0.3)	

Principal Features of MELDIN® 3100

Excellent Mechanical Properties

MELDIN® 3100 materials have excellent mechanical properties, in tension and compression, and maintain an impressive level of these attributes as operating temperatures increase. These properties add extreme strength and rigidity to component parts, even in narrow cross-section.

Broad Design Flexibility

Since MELDIN® 3100 components are manufactured by an injection molding process, extremely intricate as-molded part designs are available. Injection molding allows for close tolerances, without the complication and cost of secondary machining.

No Post Cure

Typically, MELDIN® 3100 molded components require no post cure. Product deliveries are enhanced through reduced lead times and brief manufacturing cycles.

Good Chemical Resistance

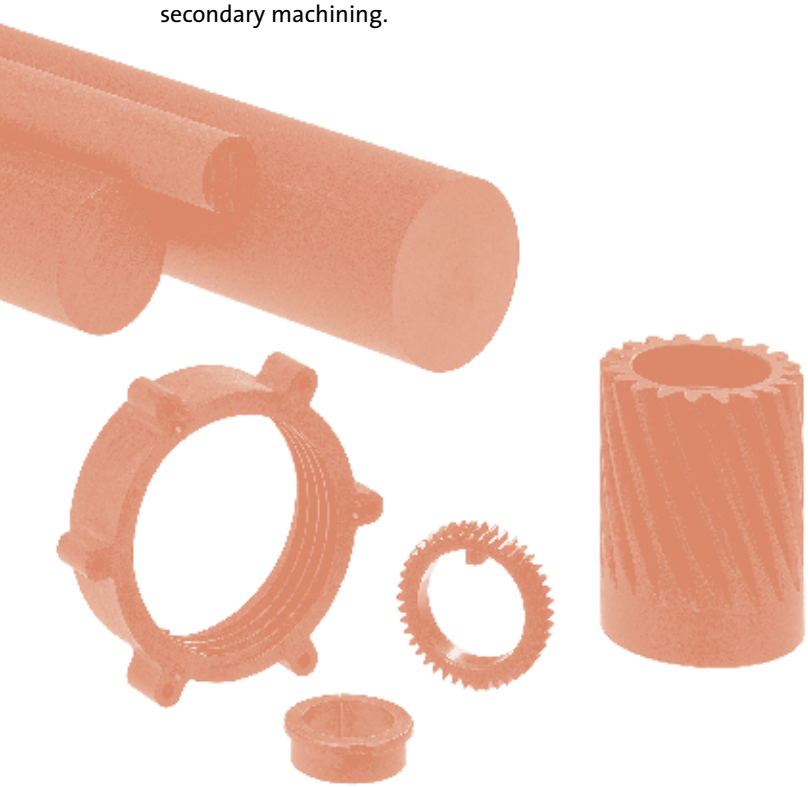
MELDIN® 3100 is resistant to a great many chemicals, fuels, and lubricating fluids. This outstanding chemical resistance provides superior performance in a variety of aggressive environments.

Superior Weld Line Strength

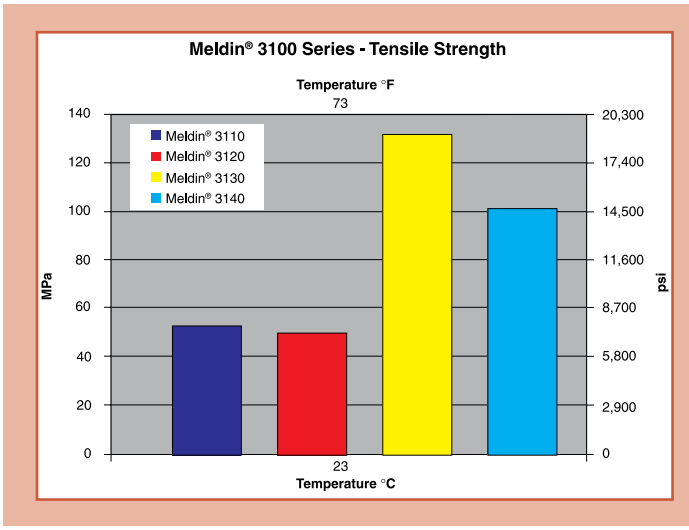
Unlike other high performance materials, MELDIN® 3100 exhibits extremely strong weld lines. With MELDIN® 3100 components, you don't have to be concerned about molded part integrity.

Complete Mating Surface Compatibility

There are MELDIN® 3100 bearing grades available for all mating surfaces with hardnesses of Rockwell B25 and higher.



Technical Graphs



MELDIN® 3100 Compounds

MELDIN® 3110

This bearing formulation has a very low coefficient of friction and is particularly well suited for use with soft mating surface materials such as aluminum and soft stainless steel.

MELDIN® 3120

This excellent multi-purpose, wear-resistant material that is suitable for bearing, thrust washer, and piston ring applications. It also has a low coefficient of thermal expansion.

MELDIN® 3130

MELDIN® 3130 components provide good strength and stiffness in addition to excellent high velocity performance. This formulation can be used with both hard or soft mating surfaces.

MELDIN® 3140

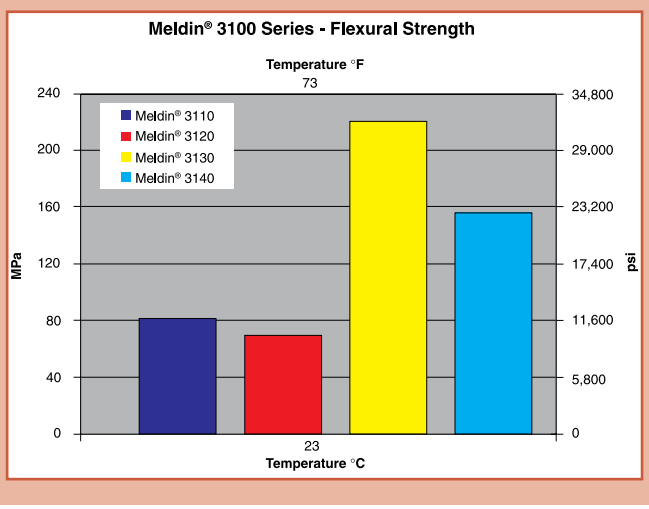
MELDIN® 3140 is an ideal thrust washer material and is well suited for thrust washer applications. Its high strength and stiffness, combined with its excellent heat dissipation properties, make it an excellent choice for high pressure loading applications.

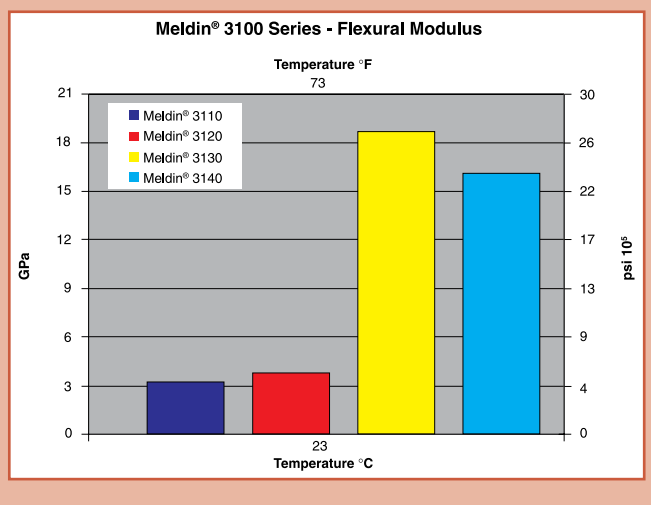
Product availability:

Basic shapes	☐
Finished parts	☑

Manufacturing processes:

Compression molding	☐
Injection molding	☑
Direct forming	☐
Machined parts	☑

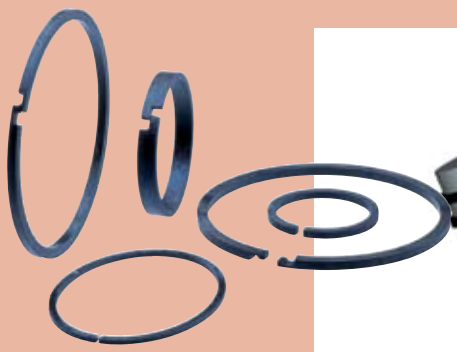




Applications of MELDIN® 3100

Heavy Equipment Applications

MELDIN® 3100 series mechanical components are used on heavy duty industrial rotating equipment. Their exceptional wear resistance and load bearing properties make these materials the best choice for applications requiring heat dissipation and dry-running characteristics.



Compressor Piston Rings

MELDIN® 3100 series materials offer a very wide chemical compatibility and excellent wear life versus classical cast iron solutions.

Automotive Interiors

In automotive interior applications such as power seats, MELDIN® 3100 components are used in areas where there is high pressure loading in a small amount of space. Their ability to operate without lubrication allows for quiet operation of electric motors, and use of small motor sizes.

Typical Properties of MELDIN® 3100

PROPERTY	TEST METHOD	ENGLISH (METRIC)	MELDIN® 3110	MELDIN® 3120	MELDIN® 3130	MELDIN® 3140
MECHANICAL @ RT						
Tensile Strength	ASTM D638	psi (MPa)	7,880 (54.3)	7,353 (50.7)	19,376 (133.59)	14,946 (103.05)
Tensile Modulus	ASTM D638	psi x 10^5 (GPa)	1.71 (1.18)	1.84 (1.27)	5.55 (3.83)	5.66 (3.91)
Elongation	ASTM D638	%	7.5	6.3	5.4	6.6
Flexural Strength	ASTM D790	psi (MPa)	11,950 (82.4)	10,098 (69.62)	32,266 (222.47)	22,746 (156.83)
Flexural Modulus	ASTM D790	psi x 10^5 (GPa)	4.61 (3.18)	5.41 (3.74)	26.83 (18.52)	23.06 (15.91)
Compressive Strength	ASTM D695	psi (MPa)	14,516 (100.08)			
Compressive Modulus	ASTM D695	psi x 10^5 (GPa)	2.58 (1.78)			
Izod Impact Strength (notched)	ASTM D256	Ft-lb/in (J/m)	0.38 (20.28)			
THERMAL						
Coefficient of Thermal Expansion	ASTM D696	in/in/°F (m/m/°C) x 10^{-5}	2.2 (3.9)			
Heat Deflection Temperature @ 264 psi (1.8 MPa)	ASTM D648	°F (°C)	418 (214)	422 (217)	421 (216)	430 (221)
Tg		°F (°C)	451 (233)	451 (233)	451 (233)	451 (233)
GENERAL						
Specific Gravity	ASTM D792	—	1.4	1.4	1.44	1.65
Hardness Shore D	ASTM D2240	—	80			
Hardness Rockwell M	ASTM D785	—	85			
TRIBOLOGICAL						
Coeffiecient of Friction	Saint-Gobain	—	0.20			
Wear Factor K	ASTM D3702	[(in^3min/(ft.lb.hr)] E^{-10} [mm^3/Nm]E^{-8}	5.93 (11.95)			

Principal Features of MELDIN® 5000

Toughness and Durability

MELDIN® 5000 components supply many other advantages over metals, machined ceramics, and other costly machined materials with the ease and convenience of thermoplastics. With their high tensile, compressive, and flexural strength, these products replace conventional materials with added advantages, including impact resistance and electrical insulation.

Tight-tolerance Molding

Since MELDIN® 5000 materials are injection molded into tight-tolerance finished component shapes, metal-like finishes are available without expensive machining. In addition, complex designs are attainable without costly secondary operations.

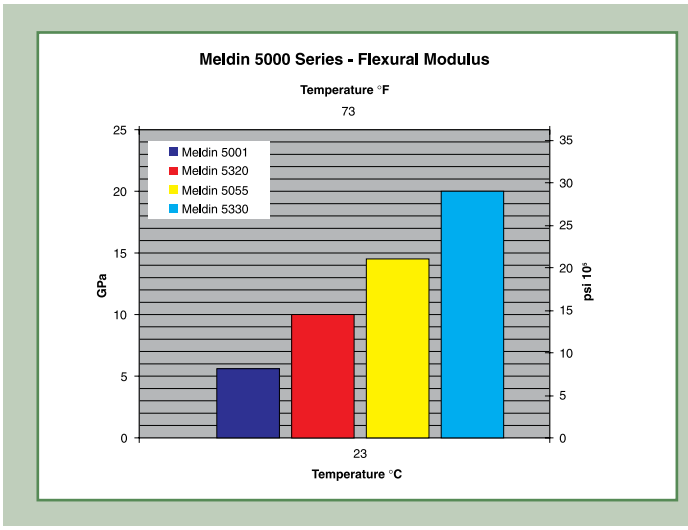
Complete Product Offering

Three structural grades provide a full complement of choices, matching component base material to end use application. MELDIN® 5001, MELDIN® 5015, and MELDIN® 5025 provide excellent chemical resistance and thermomechanical properties in addition to superior dimensional stability and physical strength. MELDIN® 5055 combines these excellent properties with inherent lubricity for bearing applications.

Diverse Applications

MELDIN® 5000 products provide invaluable service in an extensive range of applications. Virtually every industry can benefit by adding high performance and high quality MELDIN® 5000 bearings, bushings, insulators, piston rings, connectors, valve seats, and other component shapes and configurations, into their designs.

Technical Graphs



MELDIN® 5000 Compounds

MELDIN® 5001

MELDIN® 5001 components offer superior strength in structural applications when electrical insulation combined with intricate part design is required. The melt characteristics of MELDIN® 5001 material allow for fine detail, regardless of part complexity.

MELDIN® 5320

Meldin® 5320 components supply substantial strength and rigidity. They maintain high tensile, flexural, and compressive properties, even at elevated temperatures.

MELDIN® 5055

Low-friction, wear-resistant bearings custom molded from MELDIN® 5055 compound perform at high loads and high temperatures with minimal deformation. MELDIN® 5055 is self-lubricating, operates quietly, and is resistant to most chemicals and fluids.

MELDIN® 5330

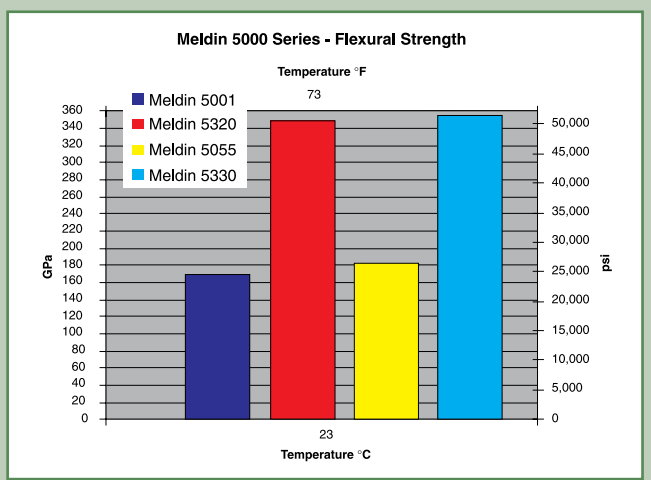
Specify MELDIN® 5330 when part requirements include structural integrity and high resistance to thermal expansion. This material exhibits good wear properties and dimensional stability, making it an excellent candidate for bearing applications.

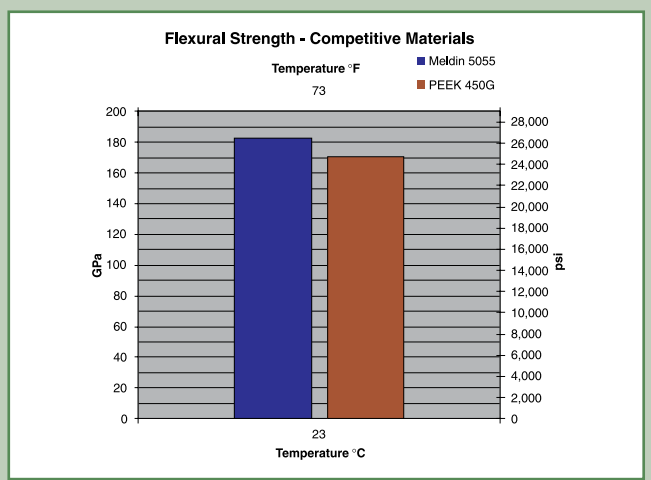
Product availability:

Basic shapes	☐
Finished parts	☑

Manufacturing processes:

Compression molding	☑
Injection molding	☐
Direct forming	☐
Machined parts	☑





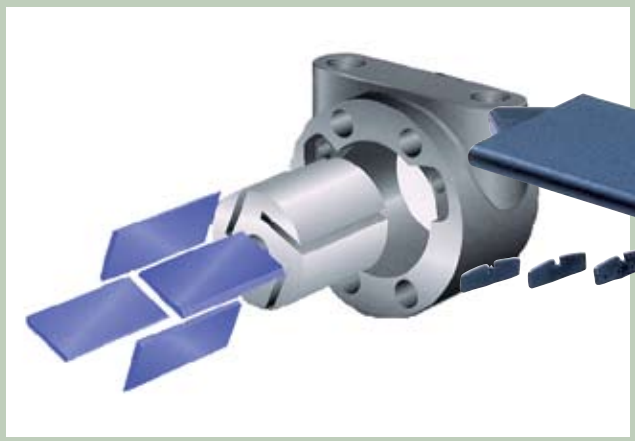
Applications of MELDIN® 5000

Transmission Thrust Washers and Rings

Potential applications for MELDIN® 5000 series materials are numerous in the transmissions of heavy and light vehicles. Mainly used as thrust washers or piston rings, the MELDIN® 5000 series offers high wear resistance and excellent self-lubrication characteristics for dry-running applications.

Compressor Valve Plates and Valve Rings

For compressor valve component applications, Meldin® 5000 series materials provide some parts with superior chemical compatibility, excellent deformation under load properties, superior wear resistance over those of other thermoplastic parts, and superior chemical resistance over those of some metallic parts.



Vanes for Air Motors and Pumps

Different MELDIN® grades are available depending on the temperatures, speeds, and housing materials of various applications. The MELDIN® vane out-performs carbon or phenolic vanes in terms of wear resistance and does not require any external lubricants.

Typical Properties of MELDIN® 5000

PROPERTY	TEST METHOD	ENGLISH (METRIC)	MELDIN® 5001	MELDIN® 5055	MELDIN® 5320	MELDIN® 5330
MECHANICAL @ RT						
Tensile Strength	ASTM D638	psi (MPa)	16,000 (110)	16.300	22,600 (156)	32.000 (220,5)
Tensile Modulus	ASTM D638	psi x 10^5 (GPa)	7.0 (4.8)	23.0 (15.9)		
Elongation	ASTM D638	%	2.8	1.2	2.7	1.5
Flexural Strength	ASTM D790	psi (MPa)	24,500 (169)	26,400 (182)	36,200 (250)	51,300 (354)
Flexural Modulus	ASTM D790	psi x 10^5 (GPa)	8.15 (5.6)	21.2 (14.5)	14.0 (9.6)	29 (20)
Compressive Strength	ASTM D695	psi (MPa)	30,000 (206.8)	18,000 (124)	31,000 (214)	34,500 (238)
Compressive Modulus	ASTM D695	psi x 10^5 (GPa)	4.3 (2.9)	4.55 (3.1)		
THERMAL						
Coefficient of Thermal Expansion						
75°F to 300°F (24°C to 149°C)	ASTM E831-93	in/in/°F (m/m/°C) x 10^{-5}	1.91 (3.4)	1.47 (2.6)	1.2 (2.15)	0.8 (1,44)
390°F to 570°F (199°C to 2999°C)	ASTM E831-93	in/in/°F (m/m/°C) x 10^{-5}	3.94 (7.1)	5.12 (9.2)		
Heat Deflection Temperature @ 264 psi (1.8 MPa)	ASTM D648	°F (°C)	491 (255)	600 (316)	600 (316)	600 (316)
Thermal Conductivity	ASTM F433	BTU in/hr ft^2 °F (W/m°C)		5.3 (.76)	2.95 (.42)	6.35 (.91)
ELECTRICAL						
Volume Resistivity	ASTM D257	Ohm-cm	2			
Dielectric Constant at 1 kHz	ASTM D150	—	3.4			
Dielectric Constant at 10 kHz	ASTM D150	—	3.4			
Dielectric Strength	ASTM D149	V/mil (MV/m)	433 (17)			
Dissipation Factor at 1 kHz	ASTM D150	—	0			
Dissipation Factor at 10 kHz	ASTM D150	—	.001			
Arc Resistance	ASTM D495	Seconds	135			
GENERAL						
Specific Gravity	ASTM D792	—	1.30	1.40	1.51	1.41
Hardness Rockwell A	ASTM D785	—				
Hardness Rockwell K	ASTM D785	—	50	24,9		
Hardness Rockwell M	ASTM D785	—			103	107
Water Absorption	ASTM D570	%	0.23	0.20	.11	0.6
Poisson's Ratio	—	—	0.36	0.42		
550°F (288°C)						
Flexural Strength	ASTM D790	psi (MPa)		2,100 (14.5)		
Flexural Modulus	ASTM D790	psi x10w^5 (GPa)		125,000 (.86)		

MELDIN® 8000 & 9000 Series

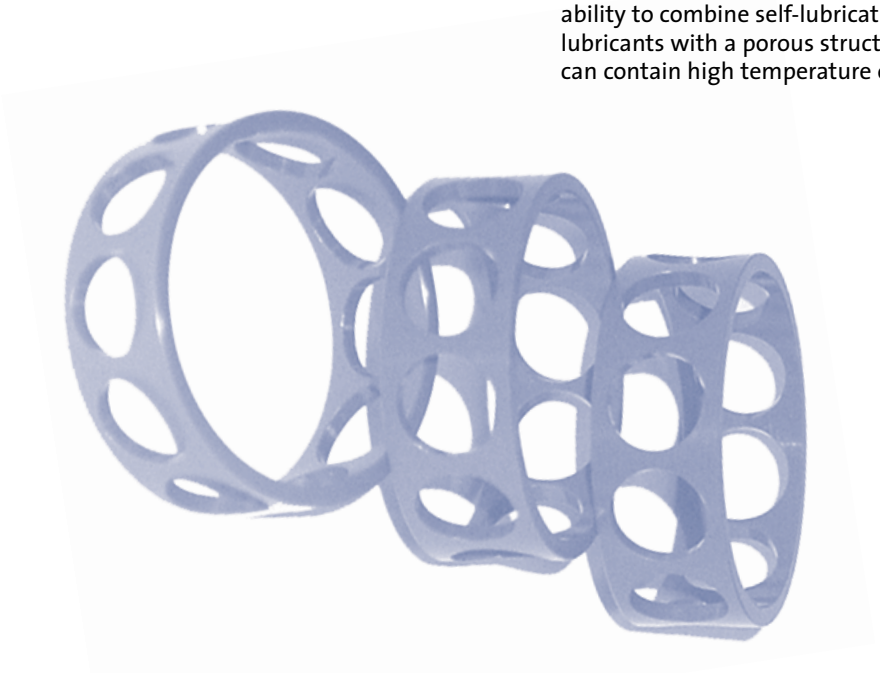
Combines Self-lubricating Dry Lubricants with a Porous Structure

Other grades available are the MELDIN® 8000 and 9000 series. These two series were originally developed for the aerospace industry.

Ideal for Use in Gyroscopes

One major application is high temperature ball bearing cages in Gyroscopes. Gyroscopes must operate with very low friction ball bearings. MELDIN® 8000 and 9000 ball bearing cages are used because of their unique ability to combine self-lubricating dry lubricants with a porous structure that can contain high temperature oils.

These oils are vacuum impregnated into the material. These two important features ensure that these life critical applications will have a lengthy storage period (since typical external lubricants will dry out over time) and operate over a wide range of operating temperatures.



Ball Bearing Cage

Typical Properties of MELDIN® 8100 & 9000

PROPERTY	TEST METHOD	ENGLISH (METRIC)	MELDIN® 8100	MELDIN® 9000
MECHANICAL @ RT				
Ring Tensile Strength	—	psi (MPa)	1,000 (6.89)	2,000 (13.78)
THERMAL				
Coefficient of Thermal Expansion	—	in/in/°F (m/m/°C) x 10^{-5}	1.5 (2.7)	1.5 (2.7)
Operating Temperature Range	—	°F (°C)	-400 to +600 (-240 to +315)	-400 to +600 (-240 to +315)
OUTGASSING				
Total Mass Loss	—	%	1.39	—
Collected Volatile Condensable Materials	—	%	0.01	—
GENERAL				
Minimum Hardness	ASTM D2240	Shore D	84	84
Pore Size	ASTM D2873	microns	0.7 to 1.25	—
Pore Volume (cumulative intrusion)	ASTM D2873	cubic cm per gram	—	0.12 to 0.22

Customized Engineering Support and Solutions

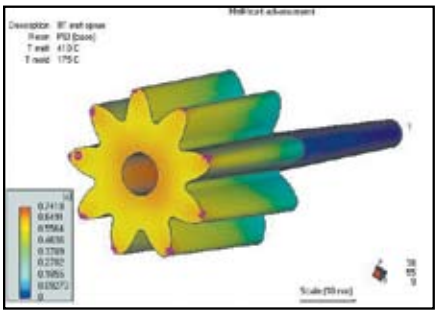
Saint-Gobain Performance Plastics uses its state-of-the-art testing and engineering equipment to support you in your most challenging applications.

Tribology Test Rigs

Tribology test rigs continuously measure material wear, coefficient of friction, and mating surface temperature over time. A wide range of mating surface materials, surface finishes, and surface hardnesses are available for testing. Test rig options include submerged (wet) testing, as well as externally heated mating surfaces to simulate hot environments.

Tribological Test Room

Tribology test room can operate 24 hours a day with continuous computer data acquisition.



Mold flow analysis is used for both engineering and process studies.

Saint-Gobain Performance Plastics Plants for MELDIN® Products

Bristol/USA

Kontich/Belgium

Logroño/Spain

Chemical Resistance of MELDIN®

	MELDIN® 2001	MELDIN® 2021	MELDIN® 2030	MELDIN® 2211	MELDIN® 3110	MELDIN® 3120
2-Butanene	●	●	●	●	●	●
Acetic Acid	●	●	●	●	●	●
Acetylene	●	●	●	●	●	●
Alkalines						
Ammonia						
Amyl Chloride	●	●	●	●	●	●
Analine	●	●	●	●	●	●
Aqua Regia	●	●	●	●	●	●
Benzaldehyde	●	●	●	●	●	●
Benzonitrile	●	●	●	●	●	●
Benzenesulfonic Acid	●	●	●	●	●	●
Bromine	●	●	●	●	●	●
Calcium Hypochlorite	●	●	●	●	●	●
Camphor Oil	●	●	●	●	●	●
Carbon Sulfide	●	●	●	●	●	●
Carbon Tetrachloride	●	●	●	●	●	●
Chloral Hydrate	●	●	●	●	●	●
Chloroacetic Acid	●	●	●	●	●	●
Chlorine or Bleaching Agents						
Chloroform	●	●	●	●		
Chlorosulfonic Acid	●	●	●	●		
Chromic Acid	●	●	●	●	●	●
Concentrated Oxidizing Acids	●	●	●	●	●	●
Creosote	●	●	●	●	●	●
Cresol	●	●	●	●	●	●
Decalin	●	●	●	●	●	●
Dichlorobenzene	●	●	●	●	●	●
Diethyl Ether	●	●	●	●	●	●
Dimethylamine	●	●	●	●	●	●
Dimethyl Sulfoxide	●	●	●	●	●	●
Ethyl Acetate	●	●	●	●	●	●
Ethylene & Propylene Dichloride	●	●	●	●	●	●
Ferric Chloride	●	●	●	●	●	●
Ferric Nitrate	●	●	●	●	●	●
Ferric Sulfate	●	●	●	●	●	●
Ferrous Sulfate	●	●	●	●	●	●
Fluoboric Acid	●	●	●	●	●	●
Flourinating Agents, strong	●	●				
Flourine >140˚F & Dry Gas >250˚F	●	●				
Fluosilicic Acid	●	●	●	●		
Hydrobromic Acid	●	●	●	●	●	●
Hydrochloric Acid					●	●
Hydrocyanic Acid	●	●	●	●	●	●
Hydrofluoric Acid					●	●
Hydrofluosilicic Acid	●	●	●	●	●	●
Hydrogen Fluoride, Dry >250˚F	●	●	●	●	●	●
Hydrogen Peroxide	●	●	●	●	●	●
Hydroxides						
Mercury of Silver salts	●	●	●	●	●	●
Methylene Chloride	●	●	●	●	●	●
MEK	●	●	●	●	●	●
Molten Alkali metals	●	●			●	●
Molten Anhydrous bases						
Nitric Acid (30%)					●	●
Nitrobenzene	●	●	●	●	●	●
Oleum	●	●	●	●	●	●
P-Dioxane	●	●	●	●	●	●
Partly Halogenated Hydrocarbons	●	●	●	●	●	●
Phenol (Diluted)	●	●	●	●	●	●
Phosphoric Acid	●		●	●	●	●
Potassium Chlorate	●	●	●	●	●	●
Potassium Cyanide	●	●	●	●	●	●
Potassium Dichromate	●	●	●	●	●	●
Potassium Hydroxide					●	●
Potassium Nitrate	●	●	●	●	●	●
Sodium Chlorate	●	●	●	●	●	●
Sodium Cyanide	●	●	●	●	●	●
Sodium Hydroxide					●	●
Sodium Nitrate	●	●	●	●	●	●
Stannous Chloride	●	●	●	●	●	●
Steam						
Sulfur Dioxide 5% + H2O	●	●	●	●	●	●
Sulfur, Molten	●	●	●	●	●	●
Sulfuric Acid (40%)	●	●	●	●	●	●
Tetralin	●	●	●	●		
Trichloroethylene	●	●	●	●		
Toluene	●	●	●	●	●	●
Trifluoroacetic Acid	●	●	●	●	●	●
Xylene	●	●	●	●	●	●
Zinc Chloride	●	●	●	●	●	●

MELDIN® 3130	MELDIN® 3140	MELDIN® 5001	MELDIN® 5320	MELDIN® 5055	MELDIN® 5330
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SAINT-GOBAIN
PERFORMANCE PLASTICS

Saint-Gobain Performance Plastics
386 Metacom Avenue
Bristol, RI 02809
Tel: 401-253-2000
Toll Free: 800-223-4966
Fax: 401-253-8211
www.plastics.saint-gobain.com

MELDIN® APPLICATION INQUIRY FORM

NOTE: Please attach any helpful comments/sketches

CUSTOMER INFORMATION

COMPANY:

STREET:

CITY, STATE. ZIP:

ENGINEERING CONTACT

TELEPHONE No. FAX No.

PURCHASING CONTACT:

TELEPHONE No. FAX No.

ACTION REQUIRED	DATE NEEDED	QUOTATION GENERALITIES
MATERIAL RECOMMENDATION ❑		QUOTE PRODUCTION QUANTITIES OF:
PROVIDE TECH DATA ON MATERIAL ❑		
PART DESIGN RECOMMENDATION ❑		SEND QUOTE TO:
PRODUCE PROTOTYPES ❑		QUOTE DUE DATE:

PRODUCT INFORMATION (ATTACH DRAWING OR SKETCH IF AVAILABLE)

DESIGN: NEW ❑ EXISTING ❑ **BEARING* SIZE:** UNITS: IN ❑ MM ❑
*For non-bearing application, attach drawing

IF EXISTING:

TYPE/BRAND: ID: OD:

MATERIAL: LENGTH: FLANGE OD:

PART/DRAWING No: FLANGE THICKNESS:

DESCRIBE END USES: OTHER DIMENSIONS:

DESIRED CHARACTERISTICS:

OTHER COMMENTS:

MELDIN® APPLICATION INQUIRY FORM

APPLICATION PARAMETERS

PART INSTALLATION

PRESS FIT ON OD:

SHRINK FIT ON ID:

MECHANICAL MEANS:

SLIP FIT:

BONDING:

OTHER (LIST):

SHAFT SPECIFICATIONS

DIAMETER (& TOLERANCE):

MATERIAL TYPE:

SURFACE FINISH:

HARDNESS:

HOUSING SPECIFICATIONS

DIAMETER (& TOLERANCE):

MATERIAL TYPE:

LENGTH (& TOLERANCE):

TEMPERATURE

TYPICAL: °F ❑ °C ❑

MAXIMUM: °F ❑ °C ❑

DURATION: Min. ❑ Hrs. ❑

MINIMUM: °F ❑ °C ❑

DURATION: Min. ❑ Hrs. ❑

MAXIMUM:

LOAD

RADIAL ❑ THRUST ❑

UNITS: LB ❑ PSI ❑ N/MM² ❑ OTHER:

CANTILEVERED ❑ IMPACT ❑

CONSTANT ❑ MISALIGNMENT ❑

TYPICAL:

MAXIMUM:

Duration:

MINIMUM:

Duration:

VELOCITY

UNITS: RPM ❑ FT/MIN ❑ M/SEC ❑

LINEAR/STROKE LENGTH:

NUMBER OF STROKES/MIN:

ROTARY:

DEGREE OF OSCILLATION:

NUMBER OF CYCLES/MIN:

OTHER:

RUNNING SURFACE: ID ❑ OD ❑ FACE ❑

ENVIRONMENT

DRY ❑ WATER ❑ LUBRICATED ❑

CLEAN ❑ DIRT ❑ VACUUM ❑

CHEMICALS (SPECIFY):

GASES (SPECIFY):

OIL (TYPE):

SERVICE LIFE

CURRENT:

DESIRED:

PRODUCT VALIDATION

BENCH: ❑

FIELD: ❑

BOTH: ❑

PRODUCT TESTING

TEST START DATE:

TEST DURATION:

		INJECTION MOLDING	NORGLIDE® BEARINGS	NORSLIDE®	OMNILIP™	OMNISEAL®	MELDIN®	RULON®	RAM EXTRUSION	HIGH PURITY PRODUCTS	MACHINED & MOLDED COMPONENTS
NORTH AMERICA											
*Saint-Gobain Performance Plastics Corporation Wayne, New Jersey • USA	Phone: (1) 973-696-4700 Fax: (1) 973-696-4056		•	•							
*Saint-Gobain Performance Plastics Corporation Bristol, Rhode Island • USA	Phone: (1) 401-253-2000 Fax: (1) 401-253-1755	•					•	•	•		•
*Saint-Gobain Performance Plastics Corporation Garden Grove, California • USA	Phone: (1) 714-630-5818 Fax: (1) 714-688-2614				•	•				•	•
EUROPE											
* Saint-Gobain Performance Plastics Pampus GmbH Willich • Germany	Phone: (49) 2154 600 Fax: (49) 2154 60310		•	•				•			•
*Saint-Gobain Performance Plastics N.V. Kontich • Belgium	Phone: (32) 34 58 28 28 Fax: (32) 34 58 26 69				•	•	•	•			•
*Saint-Gobain Performance Plastics Asti Charnay-les-Macon • France	Phone: (33) 3 85 20 27 00 Fax: (33) 3 85 29 18 48									•	
*Saint-Gobain Performance Plastics Asti Nanterre • France	Phone: (33) 1 55 68 59 59 Fax: (33) 1 55 68 59 68		•	•						•	
Saint-Gobain Performance Plastics Agrate Brianza (Mi) • Italy	Phone: (39) 03 96 50 070 Fax: (39) 03 96 52 736		•	•	•	•	•	•		•	
Saint-Gobain Performance Plastics Espana, S.A. Barcelona • Spain	Phone: (34) 93 682 8138 Fax: (34) 93 682 8143		•	•							
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