

ULTEM® 1000

GE Plastics - Polyether Imide

Product Description

Unreinforced. 392F (200C) DTUL at 264 psi, UL94 V-0/5V rated. In 1000-1000 ONLY--USP Class VI, FDA food contact and tripartite (modified ISO 10993-1).

Product Characteristics

Material Status	Commercial: Active
Availability	North America
Test Standards Available	ASTM
Features	Food Contact Acceptable
Agency Ratings	<ul style="list-style-type: none">ISO 10993FDA Food Contact, Unspecified RatingUSP Class VI
Automotive Specifications	<ul style="list-style-type: none">GM GMP.PE1.001FORD WSK-M4D716-A
Forms	<ul style="list-style-type: none">Pellets
Processing Method	<ul style="list-style-type: none">Injection MoldingExtrusionExtrusion Blow Molding
Multi-Point Data	<ul style="list-style-type: none">Coefficient of Thermal Expansion vs. Temperature (ASTM E831)Compressive Stress vs. Strain (ASTM D695)Elastic Modulus vs Temperature (ASTM D4065)Flexural DMA (ASTM D4065)Instrumented Impact (Energy) (ASTM D3763)Instrumented Impact (Load) (ASTM D3763)Pressure-Volume-Temperature (PVT - Zoller Method)Shear DMA (ASTM D4065)Shear Modulus vs. Temperature (ISO 11403-2)Specific Heat vs. Temperature (ASTM D3417)Tensile Creep (ASTM D2990)Tensile FatigueTensile Stress vs. Strain (ASTM D638)Thermal Conductivity vs. Temperature (ASTM E1530)Viscosity vs. Shear Rate (ASTM D3835)Viscosity vs. Shear Rate (ISO 11403-2)

Properties ¹

Physical	Nominal Values	(English)	Test Method
Density -Specific Gravity	1.27	sp gr 23/23°C	ASTM D792
Melt Mass-Flow Rate (MFR) (337°C/6.6 kg)	9.00	g/10 min	ASTM D1238
Mold Shrink, Linear-Flow (0.125 in)	0.0050 to 0.0070	in/in	ASTM D955
Water Absorption @ Equil (73 °F)	1.3	%	ASTM D570
Water Absorption @ 24 hrs (73 °F)	0.25	%	ASTM D570

Mechanical	Nominal Values	(English)	Test Method
Tensile Modulus ²	520000	psi	ASTM D638
Tensile Strength @ Yield ³	16000	psi	ASTM D638
Tensile Elongation @ Yld ^{3a}	7.0	%	ASTM D638
Tensile Elongation @ Brk ^{3a}	60	%	ASTM D638
Flexural Modulus (4.00 in Span) ⁴	510000	psi	ASTM D790
Flexural Strength @ Yield (4.00 in Span) ⁴	24000	psi	ASTM D790
Taber Abrasion Resistance (CS-17 Wheel, 1000 gm, 1000 Cycles)	10.0	mg	ASTM D1044

Impact	Nominal Values	(English)	Test Method
Notched Izod Impact (73 °F)	1.00	ft-lb/in	ASTM D256
Unnotched Izod Impact (73 °F)	25.0	ft-lb/in	ASTM D256
Reverse Notch Izod Impact (73 °F)	25	ft-lb/in	ASTM D256
Gardner Impact (73 °F)	324	in-lb	ASTM D3029

Hardness	Nominal Values	(English)	Test Method
Rockwell Hardness (M-Scale)	109		ASTM D785

Thermal	Nominal Values (English)		Test Method
DTUL @264psi - Unannealed (0.250 in)	394	°F	ASTM D648
DTUL @66psi - Unannealed (0.250 in)	410	°F	ASTM D648
Vicat Softening Point (Rate B)	426	°F	ASTM D1525
CLTE, Flow (0 to 300°F (-18 to 149°C))	3.1E-005	in/in/°F	ASTM D696
CLTE, Transverse (0 to 300°F (-18 to 149°C))	3.0E-005	in/in/°F	ASTM D696
Thermal Conductivity	1.5	Btu-in/hr/ft ² /°F	ASTM C177

Electrical	Nominal Values (English)		Test Method
Volume Resistivity	1.0E+017	ohm-cm	ASTM D257
Dielectric Strength			ASTM D149
(In Oil, 0.125 in)	500	V/mil	
(In Oil, 0.0620 in)	710	V/mil	
(In Air, 0.0620 in)	831	V/mil	
Dielectric Constant			ASTM D150
(1000 Hz)	3.150		
(100 Hz)	3.150		
Dissipation Factor			ASTM D150
(2000000000 Hz)	0.0025		
(1000 Hz)	0.0012		
(100 Hz)	0.0015		
Arc Resistance (PLC) (Tungsten Electrode, 0.125 in)	PLC 5		ASTM D495

Ignition Characteristics	Nominal Values (English)		Test Method
UL File Number (USA)	E121562		
Flame Rating - UL			UL 94
(0.0750 in)	5VA		
(0.0160 in)	V-0		
Limiting Oxygen Index	47	%	ASTM D2863

UL 746	Nominal Values (English)		Test Method
Rel Temp Indx Mech w/olmp	338	°F	UL 746
Rel Temp Indx Mech w/lmp	338	°F	UL 746
Rel Temp Indx Elect	338	°F	UL 746
Comparative Tracking Index (CTI) (PLC) (0.125 in)	PLC 4		UL 746
High Voltage Arc Tracking Rate (HVTR) (PLC) (0.125 in)	PLC 2		UL 746
Hot-wire Ignition (HWI) (PLC) (0.125 in)	PLC 1		UL 746
High Amp Arc Ignition (HAI) (PLC) (0.125 in)	PLC 3		UL 746

Additional Properties

CSA (See File for complete listing), CSA LISTED: LS88480 File No.
NBS Smoke Density, flaming, Dmax 20 min, ASTM E 662: 30.0000
NBS Smoke Density, flaming, Ds 4 min, ASTM E 662: 0.7000
Poisson's Ratio, ASTM D 638: 0.3600

Processing Information

Injection Molding Parameters	Nominal Values (English)		Test Method
Drying Temperature	300	°F	
Drying Time	4.0 to 6.0	hr	
Drying Time, Maximum	24	hr	
Suggested Max Moisture	0.020	%	
Suggested Shot Size	40 to 60	%	
Rear Temperature	630 to 750	°F	
Middle Temperature	640 to 750	°F	
Front Temperature	650 to 750	°F	
Nozzle Temperature	650 to 750	°F	
Processing (Melt) Temp	660 to 750	°F	
Mold Temperature	275 to 325	°F	
Back Pressure	50.0 to 100	psi	
Screw Speed	40 to 70	rpm	
Clamp Tonnage	3.0 to 5.0	tons/in ²	
Vent Depth	0.0010 to 0.0030	in	

Extrusion Molding Parameters	Nominal Values (English)	Test Method
Drying Temperature	300 °F	
Drying Time	4.0 hr	
Cylinder Zone 1 Temp.	615 to 660 °F	
Cylinder Zone 2 Temp.	625 to 675 °F	
Cylinder Zone 3 Temp.	625 to 675 °F	
Melt Temperature	625 to 675 °F	
Back Pressure	1200 to 7000 psi	

Extrusion Notes

NOTE: Release grades (grade numbers ending in R), plate-out and/or die build-up may occur due to the internal release agent.

SCREW DESIGN: 1.8 to 2.8:1.0 Compression Ratio
16 to 24:1 L/D

SCREW SPEED: 10 to 70 rpm

PURGE: HDPE or undried polycarbonate.

Processing information below is for intermittent extrusion blow molding.

CAUTION: DO NOT purge with low melting styrene or acrylic resins.

Drying Temperature: 280-300°F

Drying Time (basic): 4-6 hr

Drying Time (maximum): 24 hr

Moisture Content, max: 0.01-0.02%

Melt Temperature (Parison): 610-675°F

Barrel - Zone 1: 615-660°F

Barrel - Zone 2: 625-675°F

Barrel - Zone 3: 625-675°F

Barrel - Zone 4: 625-675°F

Adapter - Zone 5: 625-675°F

Head - Zone 6 - Top: 625-675°F

Head - Zone 7 - Bottom: 625-675°F

Head - Zone 8 - Die: 620-675°F

Mold Temperature: 150-350°F

Screw Speed: 10-70 rpm

16 to 24/1 L/D with 1.8 to 2.5/1.0 compression ratio screw.

Up to 30% Regrind has been successfully reprocessed

Purge using 0.030-0.035 MFR HDPE or high viscosity polycarbonate.

Notes

¹ Typical properties; not to be construed as specifications.

² 0.2 in/min

³ Type I, 0.2 in/min

⁴ 0.1 in/min

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