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ULTEM™ RESIN 3310TD

DESCRIPTION

ULTEM 3310TD resin is an amorphous, filled, near infra-red transparent polyetherimide (PEI) thermoplastic, offering a material with an unique combination of low CTE and high near infra-red transparency.

GENERAL INFORMATION	
Features	Chemical Resistance, High Flow, Low Warpage, Thin Wall, Dielectrics, Amorphous, IR Transparent, Transparent/Transluscent, Creep resistant, Dimensional stability, High stiffness/Strength, High temperature resistance
Fillers	Mineral
Polymer Types	Polyetherimide (PEI)
Processing Techniques	Injection Molding
INDUSTRY	SUB INDUSTRY
Industrial	Electrical

TYPICAL PROPERTY VALUES

Revision 20220720

PROPERTIES	TYPICAL VALUES	UNITS	TEST METHODS
MECHANICAL (1)			
Tensile Stress, brk, Type I, 5 mm/min	62	MPa	ASTM D638
Tensile Strain, brk, Type I, 5 mm/min	1.5	%	ASTM D638
Tensile Modulus, 5 mm/min	5000	MPa	ASTM D638
Flexural Stress, brk, 1.3 mm/min, 50 mm span	106	MPa	ASTM D790
Flexural Strength, 1.3 mm/min, 50 mm span	109	MPa	ASTM D790
Flexural Modulus, 1.3 mm/min, 50 mm span	5000	MPa	ASTM D790
Tensile Stress, break, 5 mm/min	67	MPa	ISO 527
Tensile Strain, break, 5 mm/min	1.6	%	ISO 527
Tensile Modulus, 1 mm/min	4900	MPa	ISO 527
Flexural Stress, break, 2 mm/min	124	MPa	ISO 178
Flexural Modulus, 2 mm/min	4900	MPa	ISO 178
IMPACT (1)			
Izod Impact, notched, 23°C	47	J/m	ASTM D256
Izod Impact, unnotched, 23°C	580	J/m	ASTM D4812
Izod Impact, notched 80*10*4 +23°C	4.7	kJ/m²	ISO 180/1A
Izod Impact, unnotched 80*10*4 +23°C	36.5	kJ/m²	ISO 180/1U
Charpy 23°C, V-notch Edgew 80*10*4 sp=62mm	4.1	kJ/m²	ISO 179/1eA
Charpy 23°C, Unnotch Edgew 80*10*4 sp=62mm	21.1	kJ/m²	ISO 179/1eU
THERMAL (1)			
HDT, 0.45 MPa, 3.2 mm, unannealed	206	°C	ASTM D648
HDT, 1.82 MPa, 3.2mm, unannealed	196	°C	ASTM D648
Vicat Softening Temp, Rate B/50	211	°C	ASTM D1525
Vicat Softening Temp, Rate B/120	211	°C	ASTM D1525

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ROPERTIES TYPICAL VALUES UNITS TEST METHODS CTE. 40°Ct o 150°C, flow 3.96.05 1/°C ASTM E831 CTE. 40°Ct o 150°C, flow 4.06.05 1/°C ASTM E831 DTD [78, 0.45 MPs Flatw 80°10°4 sp=64mm 208 °C 150.75 /4 HDT [78, 0.45 MPs Flatw 80°10°4 sp=64mm 197 °C 150.75 /4 Vicas Softening Temp, Rate 8/50 21 °C 150.36 Vicas Softening Temp, Rate 8/120 21 °C 80.36 PHYSICAL*** "STM D792 ************************************				
CTE, 40°C to 150°C, xflow 4.0605 1/°C ASTM E831 HDT/BI, 0.45 MPa Flatwa 80°10°4 spe-64mm 208 °C 150 75/BC LDT/AI, 3. MPa Flatwa 80°10°4 spe-64mm 197 °C 150 75/BC Vicas Softening Temp. Rate 8/150 211 °C 150 306 Vicas Softening Temp. Rate 8/120 212 °C 150 306 PHYSICAL ⁽¹⁾ ************************************	PROPERTIES	TYPICAL VALUES	UNITS	TEST METHODS
HDT/Bf. 0.45 MPa Flatus 80¹10²4 sp=64mm 208 °C ISO 75/Bf HDT/Af. 1.8 MPa Flatus 80¹10²4 sp=64mm 197 °C 150 75/Bf Vicat Softening Temp, Rate B/S0 212 °C 150 306 PHYSICAL.** "C 150 306 PHYSICAL.** "C 150 306 PHYSICAL.** "C 150 306 Mel Flow Rate, 387°C/6.7 kgf 15.46 3 10 mg /10 mg ASTM D722 Mel Flow Rate, 337°C/6.7 kgf 15.45 3 g/m³ 150 1183 Moisture Absorption, (23°C/50x 8H/24hrs) 0.077 % 150 62-4 Water Absorption, (23°C/24hrs) 0.58 % 586 (method Mold Shrinkage, flow (²¹) 0.58 % 586 (method Mold Shrinkage, flow (²¹) 0.58 % 581 (method Mold Shrinkage, flow (²¹) 5 % 581 (method 1-0 mm and 1550 mm 8 3 581 (method at 1.0 mm and 1550 mm 16.24 5 50 489 Abbe number 16.26 10 50 489 50 489	CTE, -40°C to 150°C, flow	3.9E-05	1/°C	ASTM E831
HDT/Af, 1.8 MPa Flatw 80¹0²4.sp=64mm 197 °C ISO 306 Vicat Softening Temp, Rate 8/50 211 °C 150 306 Vicat Softening Temp, Rate 8/120 212 °C 150 306 PHYSICAL*** "C 150 306 PHYSICAL*** "C ASTM D792 Bed Flow Rate, 337°C/6.7 kgf 1.546 . ASTM D792 Melt Flow Rate, 337°C/6.7 kgf 1.545 . (m²) 10 min ASTM D1238 Melt Volume Rate, MVR at 337°C/6.7 kg 1.545 . (m²) 10 min . STM D1238 Melt Volume Rate, MVR at 337°C/6.7 kg 0.077 % 150 624 . Wide Absorption, (23°C/24hrs) 0.12 % . . 62 4 Mold Shrinkage, flow (a) 0.58 % .	CTE, -40°C to 150°C, xflow	4.0E-05	1/°C	ASTM E831
Vicat Softening Temp, Rate B/50 211 °C ISO 306 Vicat Softening Temp, Rate B/120 212 °C 1SO 306 BHYSICAL ¹⁰ Specific Gravity 1.546 - ASTM D1238 Melk Flow Rate, 337°C/6.7 kgf 10.3 g/cm³ KSD 1183 Melk Volume Rate, MVR at 337°C/6.7 kg 6.84 cm²/10 min ISO 133 Melt Volume Rate, MVR at 337°C/6.7 kg 6.84 cm²/10 min ISO 133 Molst Lydra Absorption, (23°C/25% RH/24hrs) 0.77 % ISO 62-1 Water Absorption, (23°C/25% RH/24hrs) 0.12 % ISO 62-1 Water Absorption, (23°C/25% RH/24hrs) 0.52 % ASI (certain) Water Absorption, (23°C/25% RH/24hrs) 0.58 % ASI (certain) Water Absorption, (23°C/24hrs) 0.58 % ASI (certain) Water Absorption, (23°C/24hrs) 8 % ASI (certain) Water Absorption, (23°C/24hrs) 8 8 ASI (certain) Water Absorption, (23°C/24hrs) 8 8 ASI (certain) ASI (certain)	HDT/Bf, 0.45 MPa Flatw 80*10*4 sp=64mm	208	°C	ISO 75/Bf
Vicat Softening Temp, Rate B 120 °C ISO 306 PHYSICAL *** PHYSICAL *** Specific Gravity 1.546 < ASTM D792	HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm	197	°C	ISO 75/Af
Physical. (**) Specific Gravity 1.546 . ASTM D792 Melt Flow Rate, 337°C/6.7 kgf 10.3 g/10 min ASTM D1238 Density 1.545 g/m² ISO 1183 Melt Volume Rate, MWR at 337°C/6.7 kg 6.84 cm²/10 min ISO 1133 Moisture Absorption, (23°C/50% RH/24hrs) 0.077 % ISO 62-4 Water Absorption, (23°C/24hrs) 0.12 % SABIC method Mold Shrinkage, flow ⁽²⁾ 0.55 % SABIC method Mold Shrinkage, flow ⁽²⁾ 0.55 % ASTM D1003 Mold Shrinkage, flow ⁽²⁾ 5.5 % ASTM D1003 Mold Shrinkage, flow ⁽²⁾ 5.0 ASTM D1003 Mold G1003 Mold Shrinkage, flow ⁽²⁾ 8 ASTM D1003 Mold G1003 Mold G1003 Mold G1003 Mold G1003 Mold G1003 Mold G1003	Vicat Softening Temp, Rate B/50	211	°C	ISO 306
Specific Gravity 1.546 • O ASTM D792 Melt Flow Rate, 337°C/6.7 kgf 10.3 g/10 min ASTM D1238 Density 1.545 g/cm² 150 1183 Melt Volume Rate, MVR at 337°C/6.7 kg 6.84 cm²/10 min 150 1133 Moisture Absorption, (23°C/50% RH/24hrs) 0.077 \$ 150 62.4 Water Absorption, (23°C/24hrs) 0.12 \$ 506 62.4 Mold Shrinkage, flow ⁽²⁾ 0.55 \$ \$ ASIBC method Mold Shrinkage, stlow ⁽²⁾ 0.55 \$ \$ ASIM D103 B 1 5 \$ \$ ASIM D103 B 2 1.0 mm and 850 mm 81 \$ ASTM D103 B 1.0 mm and 1350 nm 1.637 \$ XSIM D103 B 2 1.50 nm 1.626 \$ \$ ASTM D103 B 2 1.50 nm 1.626 \$ \$ \$ \$ B 2 1.50 nm \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	Vicat Softening Temp, Rate B/120	212	°C	ISO 306
Melt Flow Rate, 337°C/6.7 kg/f 10.3 g/cm³ ASTM D1238 Density 1.545 g/cm³ ISO 1183 Melt Volume Rate, MVR at 337°C/6.7 kg 6.84 cm³/10 min ISO 62-4 Moisture Absorption, (23°C/50x RH/24hrs) 0.077 % ISO 62-4 Water Absorption, (23°C/24hrs) 0.12 % SABIC method Mold Shrinkage, flow (2) 0.55 % SABIC method Mold Shrinkage, xflow (2) 0.55 % SABIC method OPTICAL Light Transmission % ASTM D1003 ASTM D1003 at 1.0 mm and 1350 nm 85 % ASTM D1003 ASTM D1003 Refractive Index 1 6 ASTM D1003 ASTM D1003 Melt Septimental ASTM D1003 Melt Septimental ASTM D1003 Melt Septimental Melt Septimental ASTM D1003 Melt Septimental ASTM D1003 Melt Septimental ASTM D1003 Melt Septimental Melt Septimental <th>PHYSICAL (1)</th> <th></th> <th></th> <th></th>	PHYSICAL (1)			
Density 1.545 g/cm³ ISO 1183 Melt Volume Rate, MVR at 337°C/6.7 kg 6.84 cm³/10 min ISO 6133 Moisture Absorption, (23°C/50% RH/24hrs) 0.077 % ISO 624 Water Absorption, (23°C/24hrs) 0.12 % SABIC method Mold Shrinkage, flow ⁽²⁾ 0.58 % SABIC method Mold Shrinkage, xllow ⁽²⁾ 0.55 % SABIC method OPTICAL ⁽¹⁾ ** ** SABIC method Will Transmission ** ASTM D1003 ** at 1.0 mm and 850 nm 8 \$ ASTM D1003 ** Refractive Index ** \$ ASTM D1003 ** at 850 nm 1.637 * \$ 8 4 8 4 8 4 8 4 8 4 8 4 8 8 4 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 </th <th>Specific Gravity</th> <th>1.546</th> <th>-</th> <th>ASTM D792</th>	Specific Gravity	1.546	-	ASTM D792
Melt Volume Rate, MVR at 337°C/6.7 kg 6.84 cm³/10 min ISO 1133 Moisture Absorption, (23°C/264rs) 0.077 % ISO 62-4 Water Absorption, (23°C/24hrs) 0.12 % SD6 2-1 Mold Shrinkage, fflow (²) 0.58 % SABIC method Mold Shrinkage, xflow (²) 0.55 % SABIC method OPTICAL (¹) Light Transmission ** ASTM D1003 at 1.0 mm and 850 nm 81 % ASTM D1003 Refractive Index ** ** ** ** at 850 nm 1.637 - \$ 4.9 ** Abbe number 1.626 - . \$ 4.9 ** NIECTION MOLDING (³) **	Melt Flow Rate, 337°C/6.7 kgf	10.3	g/10 min	ASTM D1238
Moisture Absorption, (23°C/50% RH/24hrs) 0.077 % ISO 62-4 Water Absorption, (23°C/24hrs) 0.12 % ISO 62-1 Mold Shrinkage, flow (2) 0.58 % SABIC method Mold Shrinkage, xflow (2) 0.55 % SABIC method OPTICAL (1) Light Transmission at 1.0 mm and 850 nm 81 % ASTM D1003 Refractive Index at 1350 nm 1.637 - ISO 489 Abbe number 1.626 - ISO 489 Abbe number 35 − 150 ° C Drying Temperature 4 − 6 Hrs Drying Time 4 − 6 Hrs Maximum Moisture Content 30 − 390 ° C Nozzle Temperature 350 − 380 °C C Nozzle Temperature 350 − 380 °C C Reference 2 Temperature 350 − 370 °C C	Density	1.545	g/cm³	ISO 1183
Water Absorption, (23°C/24hrs) 0.12 % ISO 62-1 Mold Shrinkage, flow (2) 0.58 % SABIC method Mold Shrinkage, xflow (2) 0.55 % SABIC method OPTICAL (1) Light Transmission at 1.0 mm and 850 nm 81 % ASTM D1003 at 1.0 mm and 1350 nm 85 % ASTM D1003 Refractive Index . ISO 489 at 1350 nm 1.626 . ISO 489 Abbe number 19 . ISO 489 INJECTION MOLDING (3) Time Time 4 - 6 Hrs L Maximum Moisture Content . C L Maximum Moisture Content 350 - 390 °C L Nozzle Temperature 350 - 380 °C L Front - Zone 3 Temperature 350 - 370 °C L Middle - Zone 2 Temperature 350 - 370 °C L	Melt Volume Rate, MVR at 337°C/6.7 kg	6.84	cm³/10 min	ISO 1133
Moid Shrinkage, flow (2) 0.58 % SABIC method Moid Shrinkage, xflow (2) 0.55 % SABIC method OPTICAL (1) Light Transmission at 1.0 mm and 850 nm 81 % ASTM D1003 at 1.0 mm and 1350 nm 85 % ASTM D1003 Refractive Index . SO 489 at 1350 nm 1.626 . ISO 489 Abbe number 19 . ISO 489 INJECTION MOLDING (3) . ISO 489 Drying Temperature 135 - 150 °C . Drying Time 4 - 6 Hrs . Melt Temperature 360 - 390 °C . Nozzle Temperature 350 - 380 °C . Front - Zone 3 Temperature 350 - 370 °C . Middle - Zone 2 Temperature 350 - 370 °C .	Moisture Absorption, (23°C/50% RH/24hrs)	0.077	%	ISO 62-4
Mold Shrinkage, xflow (²) 5.55 % ASIC method DOTICAL (¹) Light Transnission at 1.0 mm and 850 nm 81 % ASTM D1003 at 1.0 mm and 1350 nm 85 % ASTM D1003 Refractive Index at 850 nm 1.637 ° ISO 489 at 1350 nm 1.626 ° ISO 489 Abbe number 19 ° ISO 489 INJECTION MOLDING (³) Cying Time 4-6 Hrs Maximum Moisture Content 9.02 % Melt Temperature 360-390 °C Nozzle Temperature 350-380 °C Front - Zone 3 Temperature 350-370 °C Middle - Zone 2 Temperature 350-370 °C Regretature 350-370 °C	Water Absorption, (23°C/24hrs)	0.12	%	ISO 62-1
OPTICAL ⁽¹⁾ Light Transmission 8 ASTM D1003 at 1.0 mm and 850 nm 85 x ASTM D1003 Refractive Index T SO 489 at 850 nm 1.637 SO 489 Abbe number 1.626 SO 489 INJECTION MOLDING ⁽³⁾ SO 489 Drying Temperature 135 − 150 °C Drying Time 4 − 6 Hrs Maximum Moisture Content 0.02 % Melt Temperature 360 − 390 °C Nozzle Temperature 350 − 380 °C Front - Zone 3 Temperature 350 − 370 °C Middle - Zone 2 Temperature 350 − 370 °C	Mold Shrinkage, flow ⁽²⁾	0.58	%	SABIC method
Light Transmission at 1.0 mm and 850 nm 81 % ASTM D1003 at 1.0 mm and 1350 nm 85 % ASTM D1003 Refractive Index Transmission B 50 nm 1.637 ° \$0.489 at 1350 nm 1.626 1.50 489 \$0.489 INJECTION MOLDING ⁽³⁾ Transmission ° ° * Drying Temperature 135 - 150 ° ° * Drying Time 4 - 6 Hrs *	Mold Shrinkage, xflow ⁽²⁾	0.55	%	SABIC method
at 1.0 mm and 850 nm 81 % ASTM D1003 at 1.0 mm and 1350 nm 85 % ASTM D1003 Refractive Index *** ASTM D1003 at 850 nm 1.637 - ISO 489 Abbe number 19 - ISO 489 INJECTION MOLDING (3) *** *** *** Drying Temperature 135 – 150 *** *** *** *** Maximum Moisture Content 4 – 6 Hrs ***	OPTICAL (1)			
at 1.0 mm and 1350 nm 85 % ASTM D1003 Refractive Index	Light Transmission			
Refractive Index at 850 nm 1.637 - ISO 489 at 1350 nm 1.626 - ISO 489 NDECTION MOLDING (3) Drying Temperature Drying Time 4 - 6 Hrs Maximum Moisture Content 0.02 % Melt Temperature 360 - 390 °C Nozzle Temperature 350 - 380 °C Front - Zone 3 Temperature 350 - 370 °C Rear - Zone 1 Temperature 350 - 370 °C	at 1.0 mm and 850 nm	81	%	ASTM D1003
at 850 nm 1.637 - ISO 489 at 1350 nm 1.626 - ISO 489 INJECTION MOLDING (3) Drying Temperature 135 – 150 °C Drying Time 4 – 6 Hrs Maximum Moisture Content 0.02 % Melt Temperature 360 – 390 °C Nozzle Temperature 350 – 380 °C Front - Zone 3 Temperature 350 – 370 °C Middle - Zone 2 Temperature 350 – 370 °C Rear - Zone 1 Temperature 350 – 370 °C	at 1.0 mm and 1350 nm	85	%	ASTM D1003
at 1350 nm 1.626 - ISO 489 Abbe number 19 - 150 489 INJECTION MOLDING (3) Drying Temperature 135 – 150 °C Drying Time 4 – 6 Hrs Maximum Moisture Content 0.02 % Melt Temperature 360 – 390 °C Nozzle Temperature 350 – 380 °C Front - Zone 3 Temperature 350 – 370 °C Middle - Zone 2 Temperature 350 – 370 °C Rear - Zone 1 Temperature 350 – 370 °C	Refractive Index			
Abbe number 19 - ISO 489 INJECTION MOLDING (3) Drying Temperature 135 – 150 °C Drying Time 4 – 6 Hrs Maximum Moisture Content 0.02 % Melt Temperature 360 – 390 °C Nozzle Temperature 350 – 380 °C Front - Zone 3 Temperature 350 – 370 °C Middle - Zone 2 Temperature 350 – 370 °C Rear - Zone 1 Temperature 350 – 370 °C	at 850 nm	1.637	-	ISO 489
INJECTION MOLDING ⁽³⁾ Drying Temperature 135 − 150 °C Drying Time 4 − 6 Hrs Maximum Moisture Content 0.02 % Melt Temperature 360 − 390 °C Nozzle Temperature 350 − 380 °C Front - Zone 3 Temperature 350 − 380 °C Middle - Zone 2 Temperature 350 − 370 °C Rear - Zone 1 Temperature 350 − 370 °C	at 1350 nm	1.626	-	ISO 489
Drying Temperature 135 – 150 °C Drying Time 4 – 6 Hrs Maximum Moisture Content 0.02 % Melt Temperature 360 – 390 °C Nozzle Temperature 350 – 380 °C Front - Zone 3 Temperature 350 – 380 °C Middle - Zone 2 Temperature 350 – 370 °C Rear - Zone 1 Temperature 350 – 370 °C	Abbe number	19	-	ISO 489
Drying Time 4−6 Hrs Maximum Moisture Content 0.02 % Melt Temperature 360−390 °C Nozzle Temperature 350−380 °C Front - Zone 3 Temperature 350−380 °C Middle - Zone 2 Temperature 350−370 °C Rear - Zone 1 Temperature 350−370 °C	INJECTION MOLDING (3)			
Maximum Moisture Content 0.02 % Melt Temperature 360 – 390 °C Nozzle Temperature 350 – 380 °C Front - Zone 3 Temperature 350 – 380 °C Middle - Zone 2 Temperature 350 – 370 °C Rear - Zone 1 Temperature 350 – 370 °C	Drying Temperature	135 – 150	°C	
Melt Temperature 360 – 390 °C Nozzle Temperature 350 – 380 °C Front - Zone 3 Temperature 350 – 380 °C Middle - Zone 2 Temperature 350 – 370 °C Rear - Zone 1 Temperature 350 – 370 °C	Drying Time	4 – 6	Hrs	
Nozzle Temperature 350 – 380 °C Front - Zone 3 Temperature 350 – 380 °C Middle - Zone 2 Temperature 350 – 370 °C Rear - Zone 1 Temperature 350 – 370 °C	Maximum Moisture Content	0.02	%	
Front - Zone 3 Temperature 350 – 380 °C Middle - Zone 2 Temperature 350 – 370 °C Rear - Zone 1 Temperature 350 – 370 °C	Melt Temperature	360 – 390	°C	
Middle - Zone 2 Temperature 350 – 370 °C Rear - Zone 1 Temperature 350 – 370 °C	Nozzle Temperature	350 – 380	°C	
Rear - Zone 1 Temperature 350 – 370 °C	Front - Zone 3 Temperature	350 – 380	°C	
	Middle - Zone 2 Temperature	350 – 370	°C	
Mold Temperature 150 – 190 °C	Rear - Zone 1 Temperature	350 – 370	°C	
	Mold Temperature	150 – 190	°C	

⁽¹⁾ The information stated on Technical Datasheets should be used as indicative only for material selection purposes and not be utilized as specification or used for part or tool design.

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⁽²⁾ Measurements made from laboratory test coupon. Actual shrinkage may vary outside of range due to differences in processing conditions, equipment, part geometry and tool design. It is recommended that mold shrinkage studies be performed with surrogate or legacy tooling prior to cutting tools for new molded article.

⁽³⁾ Injection Molding parameters are only mentioned as general guidelines. These may not apply or may need adjustment in specific situations such as low shot sizes, large part molding, thin wall molding and gas-assist molding.