Plastic Material Property Data

	PROPERTY	UNITS	TEST	PEEK UNFILLED	ULTEM® 1000	TORLON® 4203	TORLON® 4301	VESPEL® SP-1	TEFLON® PTFE (UNFILLED)	DELRIN® AF PTFE-FILLED	NYLON UNFILLED	POLY-CARBONATE	G10
PHYSICAL	DENSITY	lb./in.^{3} g/cm^3	D792	0.047 1.31	0.046 1.28	0.051 1.41	0.052 1.45	0.051 1.43	0.078 2.16	0.054 1.50	0.042 1.15	0.043 1.2	0.065 1.80
	WATER ABSORPTION, 24 HRS	%	D570	0.10	0.25	0.4	0.4	at 73°F 0.24 48 hrs at 122°F 0.72	<0.01	0.2	0.3	0.12	0.10
MECHANICAL	TENSILE STRENGTH	psi	D638	16,000	16,500	18,000	12,000	at 73°F 12,500 at 500°F 6,000	3,900	8,000	11,500	9,500	lengthwise - 45,000 crosswise - 38,000
	TENSILE MODULUS	psi	D638	500,000	475,000	600,000	800,000	—	80,000	435,000	425,000	320,000	—
	TENSILE ELONGATION AT BREAK	%	D638	20	80	10	3	at 73°F 7.5 at 500°F 6.0	300	15	50	60	—
	FLEXURAL STRENGTH	psi	D790	25,000	20,000	24,000	23,000	at 73°F 16,000 at 500°F 9,000	No Break	12,000	15,000	15,000	lengthwise - 75,000 crosswise - 65,000
	FLEXURAL MODULUS	psi (Kpsi)	D790	600,000	500,000	600,000	800,000	at 73°F 450,000 at 500°F 250,000	72,000	435,000	450,000	375,000	lengthwise - 2,700 crosswise - 2,400
	COMPRESSIVE STRENGTH	psi	D695	20,000	22,000	24,000	22,000	10% strain at 73°F 19,300	3,500	16,000	12,500	12,000	65,000
	COMPRESSIVE MODULUS	psi	D695	500,000	480,000	700,000	950,000	350,000	70,000	350,000	420,000	240,000	
	HARDNESS, ROCKWELL (SHORE D)	—	D785	M100	M112 / R125	M120	M106	E45-60	(D50)	M85 / R115	M85 / R115	M70 / R118	M110
	IZOD IMPACT NOTCHED	ft.-lb./in.	D256	1.0	0.5	2.0	0.8	0.8	3.5	0.7	0.6	13	lengthwise - 14.0 crosswise - 12.0
THERMAL	COEFFICIENT OF LINEAR THERMAL EXPANSION	x10^{-6} in./in./°F	D696	2.6	3.1	1.7	1.4	3.0	7.5	5.00	5.5	3.9	lengthwise - 0.55 crosswise - 0.66
	HEAT DEFLECTION TEMP	at 264 psi F° / °C	D648	320 / 160	392 / 200	532 / 278	534 / 279	680 / 360	132 / 55	244 / 118	200 / 93	270 / 132	—
	MELTING TEMPERATURE	°F / °C	D3418	644 / 340	419 / 215	—	—	—	635 / 335	347 / 175	500 / 260	293 / 145	—
	MAXIMUM OPERATING TEMP	°F / °C	—	480 / 249	340 / 171	500 / 260	500 / 260	500 / 260	500 / 260	180 / 82	210 / 99	250 / 121	284 / 140
	THERMAL CONDUCTIVITY	BTU-in./ft.^{2}-hr.-°F x10^{-4}cal/cm-sec-°C	C177	1.75 6.03	0.90 3.10	1.80 6.20	3.70 12.8	2.0 6.9	1.70 5.86	n/a n/a	1.7 5.9	1.3 6.9	2.0 7.0
	FLAMMABILITY RATING	—	UL94	V-0	V-0	V-0	V-0	V-0	V-0	HB	V-2	H-B / V-0	H-B
ELECTRICAL	DIELECTRIC STRENGTH	(V/mil) short time, 1/8" thick	D149	480	830	580	—	560	285	400	400	390	800
	DIELECTRIC CONSTANT	at 1 MHz (60 Hz)	D150	3.30	3.15	4.2	6.0	3.55	2.1	3.1	3.6	3.17	5.0
	DISSIPATION FACTOR	at 1 MHz (60 Hz)	D150	0.003	0.0013	0.026	0.037	0.0034	<0.0002	0.010	0.02	0.0009	0.019
	VOLUME RESISTIVITY	(ohm-cm) at 50% RH	D257	4.9 x 10^{16}	6.7 x 10^{17}	>10^{16}	>10^{13}	10^{14} - 10^{15}	>10^{18}	3.0 x 10^{16}	>10^{13}	10^{16}	—
	ARC RESISTANCE	(sec)	D495	—	—	—	—		—	—	—	—	100

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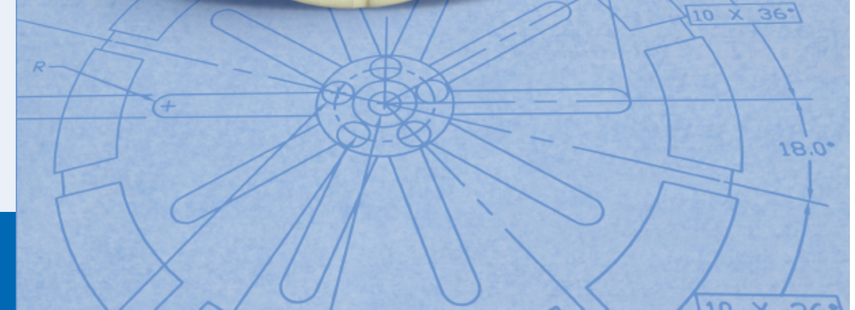

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CERAMIC ■ PLASTIC MATERIAL DATA

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Ceramic Material Property Data

				ALUMINA			ZIRCONIA TOUGHENED ALUMINA	ZIRCONIA	MULLITE	STEATITE	BORON NITRIDE				MACOR®
	FORMULATION			AL96	AL995	AL998	ZTA	Y-TZP	MULLITE	STEATITE	HBN	HBR	HBC	HBT	GLASS CERAMIC
	PROPERTY	ASTM Method	units												
PHYSICAL	COLOR	—	–	WHITE	CREAM	CREAM	CREAM/WHITE	CREAM/WHITE	GRAY/TAN	OFF-WHITE	WHITE	WHITE	WHITE	WHITE	WHITE
PHYSICAL	GAS/LIQUID PERMEABILITY	F134B	atm-cc/sec	NONE	NONE	NONE	NONE	NONE	NONE	<1	—	—	—	—	NONE
PHYSICAL	DENSITY	C 20-97	g/cc	3.69	3.90	3.90	4.30	6.00	2.97	2.61-2.7	2.1	2.0	2.0	1.8	2.52
MECHANICAL	HARDNESS	—	MOH'S SCALE	9.0	9.0	9.0	9.0	8.0	NA	7.5	2	2	2	1	—
MECHANICAL	WATER ABSORPTION	C 20-97	%	0	0	0	0	0	0	0	—	—	—	—	0
MECHANICAL	FLEXURAL STRENGTH	F 417-87	psi	50,000	55,000	50,000	66,000	130,000	17,000	17,000	11,000	6,000	2,500	2,500	13,600
MECHANICAL	TENSILE STRENGTH	—	psi	19,000	25,000	25,000	—	—	15,000	10,000	—	—	—	—	50,000
MECHANICAL	COMPRESSIVE STRENGTH	—	psi	300,000	375,000	375,000	—	—	150,000	80,000	16,000	9,000	6,000	4,800	9.7
MECHANICAL	ELASTIC MODULUS	C848	psi x 10^6	45	54	54	—	—	25	14-15	11.30	9	7	6	3.7
MECHANICAL	SHEAR MODULUS	C848	psi x 10^6	18	21	21	—	—	10	6	—	—	—	—	—
THERMAL	C.T.E., 25-100°, 25-600°C	C372-96	x10 $^{-6}$/C	7.8, 7.8	7.3, 7.7	6.6, 7.6	—	—	4.7, 5.2	7.6, 7.5	2.5, 2.5	2.5, 2.5	0, 0.5	0, 0.2	9.3, 11.4
THERMAL	THERMAL CONDUCTIVITY, 25°C	C 408	W/m-K	23	31	30	—	—	5	2	33	33	23	19	1.46
THERMAL	MAX USE TEMP (Non-loading)	—	°F/C	3100/1700	3050/1675	3050/1675	1832/1000	2700/1480	3100/1700	2350/1300	1022F / 550C AIR 1022F / 550C VACCUUM	1562F / 850C AIR 2102F / 1150C VACCUUM	1562F / 850C AIR 3632F / 2000C VACCUUM	1562F / 850C AIR 3632F / 2000C VACCUUM	1832/1000
ELECTRICAL	DIELECTRIC STRENGTH (.125 in thick)	D 149-97A	V/mil	260	270	245	—	—	260	270	1,346	1,346	1,372	864	785
ELECTRICAL	DIELECTRIC CONSTANT, 1 MHz	D 150-98	—	9.0	9.8	10.1	—	—	6.7	5.6	4.2	4.1	4.1	3.8	—
ELECTRICAL	DIELECTRIC CONSTANT *(@GHz)*	D 2520-95	—	9.1 *(@10.6)*	9.7 *(@7.0)*	10.0 *(@7.3)*	—	—	6.9 *(@8.9)*	5.6 *(@9.2)*	4.3	4.2	4.1	3.9	5.67 *(@8.5)*
ELECTRICAL	DISSIPATION FACTOR, 1 MHz	D 150-98	—	0.0005	0.0001	0.023	—	—	0.002	0.003	<0.0002	<0.0002	<0.0002	<0.0002	—
ELECTRICAL	LOSS INDEX, 1 MHz, 25°C	D 150-98	—	0.005	0.001	0.230	—	—	0.010	0.015	0.00084	0.00082	0.00082	0.00076	—
ELECTRICAL	DIELECTRIC LOSS *(@GHz)*	D 2520-95	—	0.0009 *(@10.6)*	0.0001 *(@7.0)*	0.003 *(@7.3)*	—	—	0.003 *(@8.9)*	0.005 *(@9.2)*	—	—	—	—	0.0071 *(@8.5)*
ELECTRICAL	VOLUME RESISTIVITY, 25°C	D 257	ohms-cm	>1.0E+15	>1.0E+15	>1.0E+15	—	—	>1.0E+15	>1.0E+15	10^{15}	10^{15}	10^{15}	10^{15}	>1.0E+15
ELECTRICAL	VOLUME RESISTIVITY, 300°C	—	—	2.3E+14	4.0E+13	7.9E+12	—	—	4.8E+13	1.5E+13	—	—	—	—	—
ELECTRICAL	VOLUME RESISTIVITY, 700°C	—	—	7.1E+09	5.1E+09	7.7E+09	—	—	4.1E+09	1.7E+09	10^9	10^9	10^{10}	10^{10}	—

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