+: measured on dry test specimens

++: measured on test specimens in equilibrium with the standard atmosphere 23°C/50% RH (mostly derived from literature)

(1) According to method 1 of ISO 62 and done on discs ø 50 x 3mm.

(2) The figures given for these properties are for the most part derived from raw material supplier data and other literature.

(3) Values for this property are only mentioned for amorphous materials and not for semi-crystalline ones.

(4) Only for short time exposure (a few hours) in applications where no or only a very low load is applied to the material.

(5) Temperature resistance over a period of 5,000/20,000 hours. After these periods of time, there is a decrease in tensile strength of about 50% as compared with the original value. The temperature values given here are thus based on the thermal-oxidative degradation which takes place and causes a reduction in properties.

Note, however, that, as for all thermoplastics, the maximum allowable service temperature depends in many cases essentially on the duration and the magnitude of the mechanical stresses to which the material is subjected.

(6) Impact strength decreasing with decreasing temperature, the minimum allowable service temperature is practically mainly determined by the extent to which the material is subjected to impact. The values given here are based on unfavourable impact conditions and may consequently not be considered as being the absolute practical limits.

(7) These estimated ratings, derived from raw material supplier data, are not intended to reflect hazards presented by the materials under actual fire conditions. There are no UL-yellow cards available for these stock shapes.

(8) The figures given for the properties of dry material (+) are for the most part average values of tests run on test specimens machined out of rods ø 40 - 60 mm. Considering the very low water absorption of ERTACETAL, ERTALYTE and PC 1000, the values for the mechanical and electrical properties of these materials can be considered as being practically the same for dry (+) and moisture conditioned (++) test specimens.

(9) Test speed: Type 1 B

(10) Test speed: 20mm/min (5 mm/min for ERTALON 66-GF30, ERTACETAL H-TF and ERTALYTE TX).

(11) Test speed: 1mm/min.

(12) Test specimens: cylinders (ø 12 x 30 mm)

(13) Pendulum used: 15 J.

(14) 10 mm thick test specimens.

(15) Electrode configuration: 25/75mm coaxial cylinders; in transformer oil according to IEC 296; 1 mm thick natural coloured test specimens. It is important to know that the electric strength of black extruded material (ERTALON 6 SA, ERTALON 66 SA, ERTACETAL and ERTALYTE) can be as low as 50% of the value for natural material. Possible microporosity in the centre of polyacetal stock shapes also significantly reduces the electric strength.

(16) The property-values given below do not apply to the ERTALYTE sheets.

° This table is a valuable help in the choice of a material. The data listed here fall within the normal range of product properties, but they **should not be used to establish material specification limits** nor used alone as the basis of design.

It has to be noted that ERTALON 66-GF30 is a fibre reinforced, and consequently anisotropic material (properties differ when measured parallel and perpendicular to the extrusion direction).

PROPERTIES		TEST METHODS ISO/(IEC)	UNITS	ERTALON 6SA	ERTALON 66SA	ERTALON 66SA-C	ERTALON 4.6	ERTALON 66-GF30	ERTALON 6 PLA	ERTALON 6 XAU+	ERTALON LFX	NYLATRON MC 901	NYLATRON GSM	NYLATRON GS	ERTACETAL C	ERTACETAL H	ERTACETAL H-TF	ERTALYTE (16)	ERTALYTE TX	QUADRANT PC 1000
Colour		-	-	natural (white)/black	natural (white)/black	natural (white)	reddish brown	black	natural (ivory)/black	black	green	blue	grey-black	grey-black	natural (white)/black	natural (white)/black	deep brown	natural (white)/black	pale grey	natural (clear, translucent)
Density			1183	1.14	1.14	1.14	1.18	1.29	1.15	1.15	1.135	1.15	1.16	1.15	1.41	1.43	1.50	1.39	1.44	1.20
Water absorption:																				
• after 24/96 h immersion in water of 23°C (1)		62	mg	86/168	40/72	65/120	90/180	30/56	44/83	47/89	44/83	49/93	52/98	46/85	20/37	18/36	16/32	6/13	5/11	13/23
		62	%	1.28/2.50	0.60/1.07	0.97/1.79	1.30/2.60	0.39/0.74	0.65/1.22	0.69/1.31	0.66/1.24	0.72/1.37	0.76/1.43	0.68/1.25	0.24/0.45	0.21/0.43	0.18/0.36	0.07/0.16	0.06/0.13	0.18/0.33
• at saturation in air of 23°C / 50% RH		-	%	2.6	2.4	2.5	2.8	1.7	2.2	2.2	2	2.3	2.4	2.3	0.20	0.20	0.17	0.25	0.23	0.15
• at saturation in water of 23°C		-	%	9	8	8.5	9.5	5.5	6.5	6.5	6.3	6.6	6.7	7.8	0.85	0.85	0.72	0.50	1.47	0.35
THERMAL PROPERTIES (2)																				
Melting temperature		-	°C	220	255	240	295	255	220	220	220	220	220	255	165	175	175	255	255	-
Glass transition temperature (3)		-	°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	150
Thermal conductivity at 23°C		-	W/(K.m)	0.28	0.28	0.28	0.30	0.30	0.29	0.29	0.28	0.29	0.30	0.29	0.31	0.31	0.31	0.29	.029	0.21
Coefficient of linear thermal expansion:																				
• average value between 23 and 60°C		-	m/(m.K)	90×10^{-6}	80×10^{-6}	85×10^{-6}	80×10^{-6}	50×10^{-6}	80×10^{-6}	80×10^{-6}	80×10^{-6}	80×10^{-6}	80×10^{-6}	80×10^{-6}	110×10^{-6}	95×10^{-6}	105×10^{-6}	60×10^{-6}	65×10^{-6}	65×10^{-6}
• average value between 23 and 100°C		-	m/(m.K)	105×10^{-6}	95×10^{-6}	100×10^{-6}	90×10^{-6}	60×10^{-6}	90×10^{-6}	90×10^{-6}	90×10^{-6}	90×10^{-6}	90×10^{-6}	90×10^{-6}	125×10^{-6}	110×10^{-6}	120×10^{-6}	80×10^{-6}	85×10^{-6}	65×10^{-6}
Temperature of deflection under load:																				
• method A: 1.8 MPa	+	75	°C	70	85	75	160	150	80	80	75	80	80	85	105	115	105	75	75	130
Max. allowable service temperature in air:																				
• for short periods (4)		-	°C	160	180	170	200	240	170	180	165	170	170	180	140	150	150	160	160	135
• continuously: for 5000/20000 h (5)		-	°C	85/70	95/80	90/75	155/135	120/110	105/90	120/105	105/90	105/90	105/90	95/80	115/100	105/90	105/90	115/100	115/100	125/115
Min. service temperature (6)				-40	-30	-30	-40	-20	-30	-30	-20	-30	-30	-20	-50	-50	-20	-20	-20	-60
Flammability (7):																				
• "Oxygen Index"		4589	%	25	26	24	24	-	25	25	-	25	25	26	15	15	-	25	25	25
• according to UL 94 (3/6mm thickness)		-	-	HB / HB	HB / V-2	HB / HB	HB / HB	HB / HB	HB / HB	HB / HB	HB / HB	HB / HB	HB / HB	HB / HB	HB / HB	HB / HB	HB / HB	HB / HB	HB / HB	HB / HB
MECHANICAL PROPERTIES at 23°C (8)																				
Tension test (9):																				
• tensile stress at yield / tensile strength at break (10)	+	527	MPa	76 / -	90 / -	86 / -	100 / -	- / 100	85 / -	83 / -	70 / -	81 / -	78 / -	92 / -	68 / -	78 / -	- / 55	90 / -	- / 76	70 / -
	++	527	MPa	45 / -	55 / -	50 / -	55 / -	- / 75	55 / -	55 / -	45 /	50 / -	50 / -	55 / -	68 / -	78 / -	- / 55	90 / -	- / 76	70 / -
• tensile strain at break (10)	+	527	%	> 50	> 40	> 50	25	5	25	25	25	35	25	20	35	35	10	15	7	> 50
	++	527	%	> 100	> 100	> 100	> 100	12	> 50	> 50	> 50	> 50	> 50	> 50	35	35	10	15	7	> 50
• tensile modulus of elasticity (11)	+	527	MPa	3250	3450	3300	3300	5900	3500	3400	3000	3200	3300	3500	3100	3600	3200	3700	3450	2400
	++	527	MPa	1400	1650	1450	1300	3200	1700	1650	1450	1550	1600	1675	3100	3600	3200	3700	3450	2400
Compression test (12):																				
• compressive stress at 1 / 2 / 5 % nominal strain (11)	+	604	MPa	24/46/80	25/49/92	24/47/88	23/45/94	28/55/90	26/51/92	26/51/92	22/43/79	24/47/86	25/49/88	25/49/92	19/35/67	22/40/75	20/37/69	26/51/103	24/47/95	18/35/72
Creep test in tension (9):																				
• stress to produce 1% strain in 1000 h ($\sigma_{1/1000}$)	+	899	MPa	18	20	19	22	26	22	22	18	21	21	21	13	15	13	26	23	17
	++	899	MPa	7	8	7.5	7..5	18	10	10	8	9	9	9	13	15	13	26	23	17
Charpy impact strength - Unnotched (13)	+	179/1eU	kJ/m²	no break	no break	no break	no break	≥50	no break	no break	≥50	no break	no break	no break	≥150	≥200	≥30	≥50	≥30	no break
Charpy impact strength - Notched	+	179/1eU	kJ/m²	5.5	4.5	5	8	6	3.5	3.5	4	3.5	3.5	4	7	10	3	2	2.5	9
Izod impact strength - Notched	+	180/2A	kJ/m²	5.5	4.5	5	8	6	3.5	3.5	4	3.5	3.5	4	7	10	3	2	2.5	9
	++	180/2A	kJ/m²	15	11	13	25	11	7	7	7	7	7	9	7	10	3	2	2.5	9
Ball indentation hardness (14)	+	2039-1	N/mm²	150	160	155	165	165	165	1 65	145	160	160	165	140	160	140	170	160	120
Rockwell hardness (14)	+	2039-2	-	M 85	M 88	M 87	M 92	M 76	M 88	M 87	M 82	M 85	M 84	M 88	M 84	M 88	M 84	M 96	M 94	M 75
ELECTRICAL PROPERTIES at 23°C																				
Electric strength (15)	+	(243)	kV/mm	25	27	26	25	30	25	29	22	25	24	26	20	20	20	22	21	28
	++	(243)	kV/mm	16	18	17	15	20	17	19	14	17	16	17	20	20	20	22	21	28
Volume resistivity	+	(93)	Ohm.cm	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{15}$	$>10^{15}$	$>10^{15}$
	++	(93)	Ohm.cm	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{13}$	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{15}$	$>10^{15}$	$>10^{15}$
Surface resistivity	+	(93)	Ohm	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{14}$	$>10^{14}$	$>10^{15}$
	++	(93)	Ohm	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{14}$	$>10^{14}$	$>10^{15}$
Relative permittivity: • at 100 Hz	+	(250)	-	3.9	3.8	3.8	3.8	3.9	3.6	3.6	3.5	3.6	3.6	3.8	3.8	3.8	3.6	3.4	3.4	3
	++	(250)	-	7.4	7.4	7.4	7.4	6.9	6.6	6.6	6.5	6.6	6.6	7.4	3.8	3.8	3.6	3.4	3.4	3
• at 1 MHz	+	(250)	-	3.3	3.3	3.3	3.4	3.6	3.2	3.2	3.1	3.2	3.2	3.3	3.8	3.8	3.6	3.2	3.2	3
	++	(250)	-	3.8	3.8	3.8	3.8	3.9	3.7	3.7	3.6	3.7	3.7	3.8	3.8	3.8	3.6	3.2	3.2	3
Dielectric dissipation factor tanδ: • at 100 Hz	+	(250)	-	0.019	0.013	0.013	0.009	0.012	0.012	0.015	0.015	0.012	0.012	0.013	0.003	0.003	0.003	0.001	0.001	0.001
	++	(250)	-	0.13	0.13	0.13	0.13	0.19	0.14	0.15	0.15	0.14	0.14	0.13	0.003	0.003	0.003	0.001	0.001	0.001
• at 1 MHz	+	(250)	-	0.021	0.020	0.020	0.019	0.014	0.016	0.017	0.016	0.016	0.016	0.020	0.008	0.008	0.008	0.014	0.014	0.008
	++	(250)	-	0.06	0.06	0.06	0.06	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.008	0.008	0.008	0.014	0.014	0.008
Comparative tracking index (CTI)	+	(112)	-	600	600	600	400	475	600	600	600	600	600	600	600	600	600	600	600	350 (225)
	++	(112)	-	600	600	600	400	475	600	600	600	600	600	600	600	600	600	600	600	350 (225)

Note: 1 g/cm³ = 1000 kg/m³ ; 1 N/mm² = 1 MPa; 1 kV/mm = 1 MV/m.