Technical Information

PLEXIGLAS® GS/XT

Product Description

Application Characteristics of PLEXIGLAS®

PLEXIGLAS® GS	PLEXIGLAS® XT
cast	extruded
absolutely colorless and clear	absolutely colorless and clear
break-resistant to impact-resistant (PLEXIGLAS® Resist)	break-resistant to impact-resistant (PLEXIGLAS® Resist 45–100)
unequalled resistance to weathering and aging	unequalled resistance to weathering and aging
high-quality surface and planarity; high-gloss, textured or satin (PLEXIGLAS® Satinice)	very good surface; high-gloss, textured or satin (PLEXIGLAS® Satinice)
solid sheets, blocks, tubes, round and square rods	solid sheets, tubes, round rods, multi-skin sheets, corrugated sheets, mirror sheets
2 mm to 160 mm solid sheet/block thickness	1.5 to 25 mm solid sheet thickness, multi-skin sheets 8, 16 and 32 mm thick
standard sizes up to 3050 x 2030 mm	standard size 3050 x 2050 mm, extra lengths and special sizes on request
over 40 standard color	over 20 standard colors
good resistance to dilute acids and to alkalis limited resistance to organic solvents	good resistance to dilute acids and to alkalis limited resistance to organic solvents
very easy to work, similar to hardwood	very easy to work, similar to hardwood
easy to thermoform over a wide range of conditions	very easy to thermoform under optimal, constant conditions
easily and firmly bonded, e.g. with reaction adhesives (e.g. ACRIFIX® 2R 0190, 1R 0192)	very easily bonded, also with solvent adhesives (e.g. ACRIFIX® 1S 0116, 1S 0117)
burns more or less like hardwood; very little smoke generation; combustion gases are non-toxic and non-corrosive	burns more or less like hardwood; very little smoke generation; combustion gases are non-toxic and non-corrosive
max. service temperature approx. 80 °C	max. service temperature approx. 70 °C

Survey of PLEXIGLAS® Grades and Relevant Product Groups

PLEXIGLAS® GS

PLEXIGLAS® GS 0F00 (233)
Standard solid sheet grade from 2 to 25 mm thickness, largely UV-absorbing

PLEXIGLAS® GS 0F00 (221, 222)
Standard grade for blocks from 30 mm thickness, UV-absorbing

PLEXIGLAS® GS 0Z09 (209)
UV-absorbing special grade with increased heat deflection temperature and better chemical resistance.

PLEXIGLAS® GS 0Z18 (218)
UV-transmitting special grade for exacting demands (e. g. for optical waveguides).

PLEXIGLAS® GS 0A31 (231)
UV-absorbing special grade for applications requiring high UV protection, as well as for areas with strong sunlight.

PLEXIGLAS® GS 0F32 (232)
Standard grade for tubes, UV-absorbing

PLEXIGLAS® GS 241, 245, 249
Special grades approved for aircraft glazing, UV-absorbing, of high optical quality.

PLEXIGLAS® GS[1)] (SUNACTIVE)
UV-transmitting, highly UV-resistant clear and transparent-colored special grades for tanning beds.

PLEXIGLAS® GS Colors
Transparent, translucent, opaque, fluorescent or multicolored standard and special grades.

PLEXIGLAS® Hi-Gloss (MULTICOLOR)
Special solid sheet grades from 9 mm thickness, consisting of two or three transparent, translucent, opaque or fluorescent colored layers, with high-gloss, satin or textured surfaces; for applications with cutouts or decorative edge effects.

PLEXIGLAS® LED (truLED)
UV-absorbing grades in specific colors offers ideal properties especially for backlighting with LEDs, such as maximum transmission and optimum light diffusion.

PLEXIGLAS® LED (EndLighten T)
Transparent, UV-absorbing, „forward-diffusing" speciality for edge-lit, energy-saving and ultraslim illuminated signs and light objects.

PLEXIGLAS® Resist
Special solid sheet grade with greater impact strength and lower rigidity, with high-gloss or satin surfaces, UV-absorbing, for windshields on two-wheeled vehicles, tradeshow booth construction and store fixtures, protective glazing etc.

PLEXIGLAS® Satinice
Clear and colored standard grades with one (SC) and two (DC) satin surfaces for furniture, displays, illuminated signs and light objects.

PLEXIGLAS® Soundstop GS
UV-absorbing special solid sheet grade, complies with ZTV-Lsw 06, EN 1793 and EN 1794 for noise barriers.

PLEXIGLAS® Soundstop GS CC
UV-absorbing special solid sheet grade with integrated PA threads, complies with ZTV-Lsw 06, EN 1793 and EN 1794 for noise barriers.

PLEXIGLAS® Textures (Struktur)
Standard grades of clear and transparent-colored solid sheets with a textured surface for balcony parapets, decorative glazing and promotional items.

Our group of cast acrylic products furthermore comprises:

PLEXIGLAS® Mineral (PLEXICOR)
Special grades of solid sheets and formed products made from mineral-filled, opaquely colored acrylic material with surface décors; for countertops and items of furniture, tradeshow booths and store fixtures.

PARAPAN®
High-gloss solid acrylic sheets in 18 mm main thickness with special opaque standard and special colors for furniture fronts.

[1)] Europ. Patent EP 1 164 633

PLEXIGLAS® XT

PLEXIGLAS® XT 0A000 (20070)
Standard solid sheet grade; largely UV-absorbing

PLEXIGLAS® XT 0A000 (20070 HQ)
High-quality special grade of solid sheets, suitable for mirror coating, largely UV-absorbing.

PLEXIGLAS® UV 100 (Gallery)
Family of UV-absorbing and UV-protecting standard grades for glazing of pictures and exhibits.

PLEXIGLAS® XT 0A370 (24370)
UV-transmitting and highly UV-resistant clear special grade of solid sheet (for conservatories, patios, etc).

PLEXIGLAS® XT 0A770 (24770) (SUNACTIVE)
UV-transmitting, highly UV-resistant clear special grade for tanning bed canopies; thickness max. 3 mm

PLEXIGLAS® XT 0A070 (29070 bzw. 29080)
Standard grades of PLEXIGLAS ALLTOP® SDP 16 double-skin sheets, and of tubes and round rods; UV-transmitting

PLEXIGLAS® XT Colors
Transparent, translucent, opaque, multicoloured or metallic standard and special grades.

PLEXIGLAS® Alltop SP[3)]
Group of multi-skin sheets with a waterdispersing coating on both surfaces and inside the cavities.

PLEXIGLAS® Heatstop XT / SP / WP[1)]
IR-reflecting standard grades that greatly reduce incident solar radiation of solid sheets, multi-skin sheets with a water-dispersing NO DROP[2)] coating on one side, and corrugated sheets; for domed and continuous rooflights, patio and conservatory roofs etc.; UV-absorbing

PLEXIGLAS® Hi-Gloss
A noble appearance and special deep-view effect are the characteristics of these high-gloss solid sheets, which are available in various colors and with up-to-the-minute décors.

PLEXIGLAS® LED (EndLighten)
UV-absorbing, „forward-diffusing" special grade for edge-lit, energy-saving and ultraslim illuminated signs.

PLEXIGLAS® Optical (RP)
Satin, grey-transparent colored special grade made of special molding compound, with specific lighting-engineering performance for rear projection (RP).

PLEXIGLAS® Reflections (MIRROR, RADIANT)
Attractively mirror-coated and reflective solid sheets with a metallic, glossy, matte or rainbow-colored surface.

PLEXIGLAS® Resist[4)] 45, -65, -75, -100
Standard grades of solid sheets with higher, graded impact strength and reduced rigidity, UV-absorbing.

PLEXIGLAS® Resist SP / WP[5)]
Groups of multi-skin sheets with higher impact strength, with a water-dispersing NO DROP[2)] coating on one side, and corrugated sheets; UV-absorbing.

PLEXIGLAS® Satinice
0D010 DF: Sheets, rods and tubes uniformely matte through and through, for light objects and illuminated signs. SC, DC: Clear and colored, coextruded standard grades with one (SC) and two (DC) satin surfaces for picture glazing, furniture, displays, illuminated signs and light objects.

PLEXIGLAS® Soundstop XT[6)]
UV-absorbing special grades of solid sheet, in accordance with ZTV-Lsw 06, EN 1793 and EN 1794 for noise barriers

PLEXIGLAS® Textures (Textured)
Solid sheets with a variety of classical surface textures, combined with trendy colors or a rainbow effect.

[1)] Europ. Patent EP 548 822
[2)] Europ. Patent EP 149 182
[3)] Europ. Patent EP 530 617
[4)] Europ. Patent EP 776 931
[5)] Europ. Patent EP 733 754
[6)] Europ. Patent EP 600 332

Typical Property Values (at 23 °C and 50 % relative humidity)

Mechanical properties

	PLEXIGLAS® GS 0F00; 0F00; 0Z09 (233; 222; 209)	PLEXIGLAS® XT 0A000; 0A070 (20070; 29070)	PLEXIGLAS® Resist 45; 65; 75; 100	Unit	Teststandard
Density ρ	1.19	1.19	1.19	g/cm³	ISO 1183
Impact strength a_{cU} (Charpy)	15	15	45; 65; 75; no break	kJ/m²	ISO 179/1fu
Notched impact strengh a_{iN} (Izod)	1.6	1.6	2.5; 4.5; 6.0; 6.5	kJ/m²	ISO 180/1 A
Notched impact strength a_{cN} (Charpy)	–	–	3.5; 6.5; 7.5; 8.0	kJ/m²	ISO 179/1eA
Tensile strength σ_M				MPa	ISO 527-2/1B/5
−40 °C	110	100	–		
23 °C	80	72	60; 50; 45; 40		
70 °C	40	35	–		
Elongation at break ε_B	5.5	4.5	–	%	ISO 527-2/1B/5
Nominal elongation at break ε_{tB}	–	–	10; 15; 20; 25	%	ISO 527-2/1B/50
Flexural strength σ_{bB} Standard test specimen (80 x 10 x 4 mm³)	115	105	95; 85; 77; 69	MPa	ISO 178
Compressive yield stress σ_{dF}	110	103	–	MPa	ISO 604
Max. safety stress $\sigma_{zul.}$ (up to 40 °C)	5–10	5–10	5–10	MPa	–
Modulus of elasticity E_t (short-term value)	3300	3300	2700; 2200; 2000; 1800	MPa	ISO 527-2/1B/1
Min. cold bending radius	330 x thickness	330 x thickness	270 x thickness; 210 x thickness; 180 x thickness; 150 x thickness	–	–
Dynamic shear modulus G at approx. 10 Hz	1700	1700	–	MPa	ISO 537
Indentation hardness $H_{961/30}$	175	175	145; 130; 120; 100	MPa	ISO 2039-1
Abrasion resistance in Taber abrader test (100 rev.; 5,4 N; CS-10F)	20–30	20–30	20–30; 30–40; 30–40; 30–40;	% Haze	ISO 9352
Coefficient of friction μ				–	–
plastic / plastic	0.8	0.8	–		
plastic / steel	0.5	0.5	–		
steel / plastic	0.45	0.45	–		
Poisson's ratio μ_b (dilatation speed of 5 % per min; up to 2 % dilatation; at 23 °C)	0.37	0.37	0.41; 0.42, 0.41; 0.43	–	ISO 527-1
Resistance to puck impact from thickness (Test Certificate No. from FMPA Stuttgart)	–	12 mm (46/900 549)	-; 6[1]; (6); 6[2] mm ([1]46/901 869/ Sm/C; [2]46/901 870/Sm/C)	–	similar to DIN 18 032, Part 3

Thermal properties

	PLEXIGLAS® GS 0F00; 0F00; 0Z09 (233; 222; 209)	PLEXIGLAS® XT 0A000; 0A070 (20070; 29070)	PLEXIGLAS® Resist 45; 65; 75; 100	Unit	Teststandard
Coefficient of linear thermal expansion α for 0–50 °C	$7 \cdot 10^{-5}$ (=0.07)	$7 \cdot 10^{-5}$ (=0.07)	$7 \cdot 10^{-5}$; $8 \cdot 10^{-5}$; $9 \cdot 10^{-5}$; $11 \cdot 10^{-5}$ (0,07; 0,08; 0,09; 0,11)	1/K (mm/m °C)	DIN 53752-A
Possible expansion due to heat and moisture	5	5	5; 6; 6; 8	mm/m	–
Thermal conductivity λ	0.19	0.19	–	W/mK	DIN 52612
U-value, for thickness				W/m^2K	DIN 4701
1 mm	5.8	5.8	5.8	MPa	ISO 527-2/1B/5
3 mm	5.6	5.6	5.6		
5 mm	5.3	5.3	5.3		
10 mm	4.4	4.4	4.4		
Specific heat c	1.47	1.47	1.47	J/gK	–
Forming temperature	160–175	150–160	150–160; 140–150; 140–150; 140–150	°C	–
Max. surface temperature (IR radiator)	200	180	–	°C	–
Max. permanent service temperature	80	70	70; 70; 70; 65	°C	–
Reverse forming temperature	> 80; > 80; > 90	> 80; > 80	> 80; > 80; > 75; > 70	°C	–
Ignition temperature	425	430	–	°C	DIN 51794
Smoke gas volume	very little	very little	very little	–	DIN 4102
Smoke gas toxicity	none	none	none	–	DIN 53436
Smoke gas corrosiveness	none	none	none	–	–
Class					DIN 4102
	B2	B2	B2	–	BS 476, Part 7 + 6
	Class 3	Class 3	–	–	BS 2782
	TP (b)	TP (b)	–	–	Method 508 A
	E	E	E	–	DIN EN 13501
German building inspectorate test report	P-K017 / 11.06	P-K018 / 02.07	P-K019 / 05.07	–	–
Vicat softening temperature	115	103	102; 100; 100; 97	°C	ISO 306, Method B 50
Heat deflection temperature under load (HDT)				°C	ISO 75
deflection 1.8 MPa	105; 105; 107	95	94; 93; 92; 90		
deflection 0.45 MPa	113; 113; 115	100	99; 98; 96; 93		

Acoustical properties

	PLEXIGLAS® GS 0F00; 0F00; 0Z09 (233; 222; 209)	PLEXIGLAS® XT 0A000; 0A070 (20070; 29070)	PLEXIGLAS® Resist 45; 65; 75; 100	Unit	Teststandard
Sound velocity (at room temperature)	2700–2800	2700–2800	–	m/s	–
Weight sounded reduction index R_w at thickness				dB	–
4 mm	26	26	–		
6 mm	30	30	–		
10 mm	32	32	–		

Optical properties (of clear grades, at 3 mm thickness)

	PLEXIGLAS® GS 0F00; 0F00; 0Z09 (233; 222; 209)	PLEXIGLAS® XT 0A000; 0A070 (20070; 29070)	PLEXIGLAS® Resist 45; 65; 75; 100	Unit	Teststandard
Transmittance τ_{D65}	~ 92	~ 92	~ 91	%	DIN 5036, Part 3
UV transmission	no; no; no	no; yes	no; no; no; no	–	–
Reflecion loss the visible range (for each surface)	4	4	4	%	–
Total energy transmittance g	85	85	85	%	DIN EN 410
Adsorption in the visible range	< 0.05	< 0.05	< 0.05	%	–
Refractive index n_D^{20}	1.491	1.491	1.491	–	ISO 489

Electrical properties

	PLEXIGLAS® GS 0F00; 0F00; 0Z09 (233; 222; 209)	PLEXIGLAS® XT 0A000; 0A070 (20070; 29070)	PLEXIGLAS® Resist 45; 65; 75; 100	Unit	Teststandard
Volume resistivity ρ_D	$> 10^{15}$	$> 10^{15}$	$> 10^{14}$	Ohm · cm	DIN VDE 0303, Part 3
Surface resistivity σ R_{OA}	$5 \cdot 10^{13}$	$5 \cdot 10^{13}$	$> 10^{14}$	Ohm	DIN VDE 0303, Part 3
Dielectric strength E_d (1 mm thickness)	~ 30	~ 30	–	kV/mm	DIN VDE 0303, Part 2
Dielectric constant ε					DIN VDE 0303, Part 4
at 50 Hz	3.6	3.7	–	–	
at 0.1 MHz	2.7	2.8	–	–	
Dissipation factor tan tan δ					DIN VDE 0303, Part 4
at 50 H	0.06	0.06	–	–	
at 0.1 MHz	0.02	0.02	–	–	
Tracking, CTI-Value	600	600	–	–	DIN VDE 0303, Part 1

Behavior towards water

	PLEXIGLAS® GS 0F00; 0F00; 0Z09 (233; 222; 209)	PLEXIGLAS® XT 0A000; 0A070 (20070; 29070)	PLEXIGLAS® Resist 45; 65; 75; 100	Unit	Teststandard
Water absorption (24 hrs, 23 °C) from dry state; specimen 60 x 60 x 2 mm³	41	38	41; 45; 46; 49	mg	ISO 62, Method 1
Max. weight gain during immersion	2,1	2,1	2,1	%	ISO 62, Method 1
Permeability to				$\frac{g\ cm}{cm^2\ h\ Pa}$	–
water vapour	$2.3 \cdot 10^{-10}$		–		
N_2	$4.5 \cdot 10^{-15}$	3.7	–	–	
O_2	$2.0 \cdot 10^{-14}$	2.8	–	–	
CO_2	$1.1 \cdot 10^{-13}$		–		
air	$8.3 \cdot 10^{-15}$	0.06	–	–	

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