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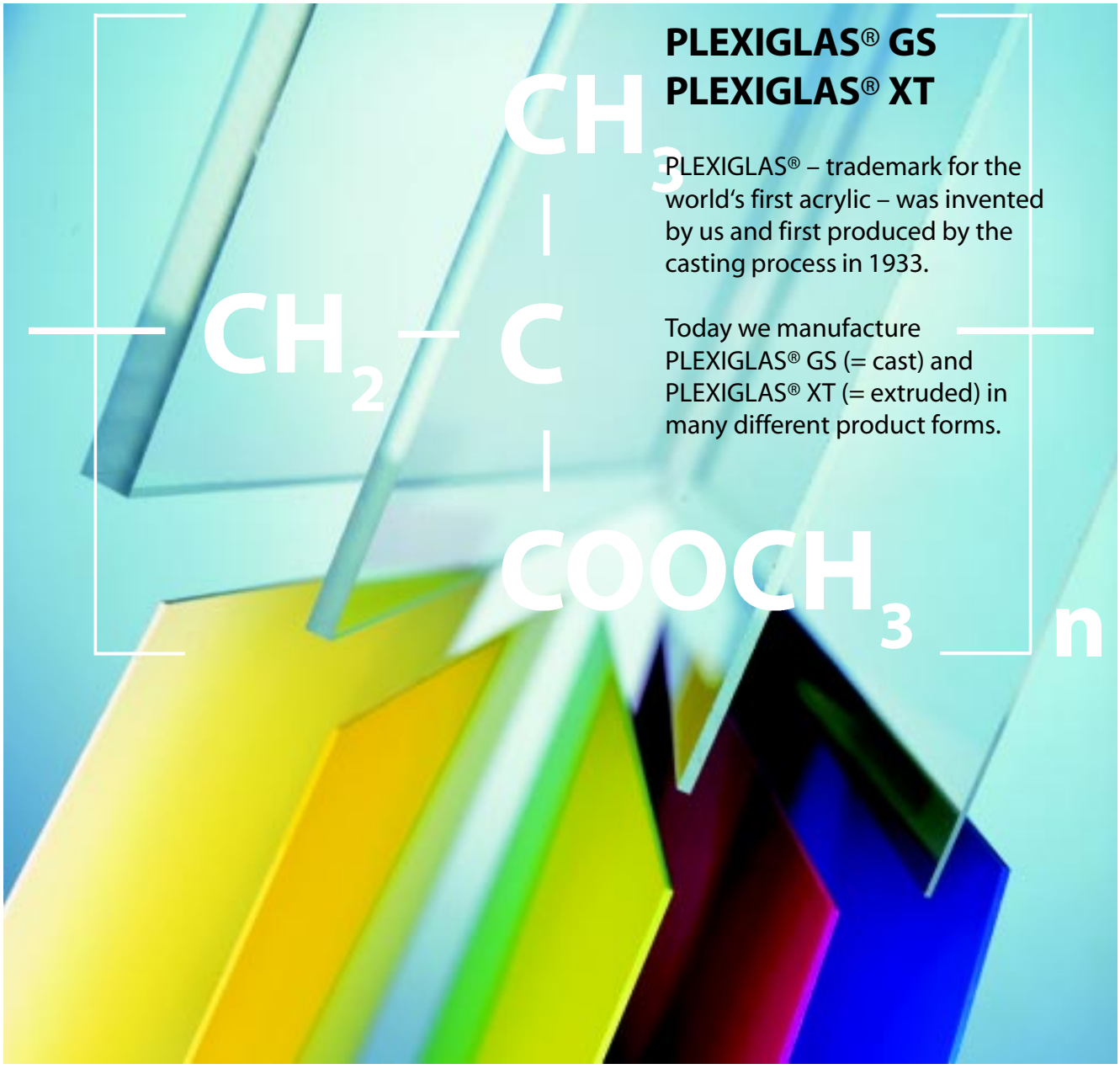
Röhm Plexiglas

Product Description



Ref. no. 211-1 January 2002

PLEXIGLAS® GS	PLEXIGLAS® XT
cast	**extruded**
absolutely colorless and clear	absolutely colorless and clear
break-resistant	break-resistant to impact-resistant (RESIST)
unequalled resistance to weathering and ageing	unequalled resistance to weathering and ageing
high-quality surface and planarity	very good surface
sheets, blocks, tubes, round and square rods	sheets, tubes, round rods, multi-skin sheets, corrugated sheets, mirror sheets
2 to 150 mm solid sheet / block thickness	1.5 to 25 mm solid sheet thickness, multi-skin sheets 16 mm and 32 mm thick
standard size up to 3050 x 2030 mm	standard size up to 4050 x 2050 mm (+ extra lengths)
more than 30 standard colors	more than 20 standard colors
good resistance to dilute acids	good resistance to dilute acids
limited resistance to organic solvents	limited resistance to organic solvents
good resistance to alkalis	good resistance to alkalis
very easy to work, similar to hardwood	easy to work, similar to hardwood
easy to thermoform over wide range of conditions	easy to thermoform under optimal constant conditions
easily and firmly bonded, e.g. with reaction adhesives (e.g. ACRIFIX® 190, 192)	easily bonded also with solvent adhesives (e.g. ACRIFIX® 116, 117)
burns more or less like hardwood; very little smoke generation	burns more or less like hardwood; very little smoke generation
max. service temperature approx. 80 °C	max. service temperature approx. 70 °C

Survey of the available grades of PLEXIGLAS® and their special properties

PLEXIGLAS® GS

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

PLEXIGLAS® GS 215 STRETCHED
UV-absorbing special grade, flame-retarded, B1 to DIN 4102, increased toughness (for cold-curved glazing in buildings).

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

PLEXIGLAS® GS 221
Standard grade for blocks over 90 mm thick, largely UV-absorbing.

PLEXIGLAS® GS 222
Standard grade for blocks 30 to 80 mm thick, largely UV-absorbing.

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

PLEXIGLAS® GS 232
Standard grade for tubes, UV-absorbing.

PLEXIGLAS® GS 233
Solid sheet standard grade from 2 to 25 mm thickness, largely UV-absorbing.

PLEXIGLAS® GS 235
Clear special grade with increased heat deflection temperature, yet easy to form (e.g. for sanitary ware).

PLEXIGLAS® GS 238
UV-transmitting, clear special grade for food contact applications; product composition complies with Recommendation XXII of the German Health Office and with FDA Regulation § 177.1010; for indoor use.

PLEXIGLAS® GS 245
Special grade of high optical quality; approved for aircraft glazing; UV-absorbing.

PLEXIGLAS® GS 249
Special grade of high quality; approved for aircraft glazing; increased heat deflection temperature; better solvent resistance; UV-absorbing.

PLEXIGLAS® GS 1001 [1)]
UV-transmitting, "forward-diffusing" special grade for edge-lit, energy-saving and ultra-slim signs.

PLEXIGLAS® GS 2458 [2)]
UV-transmitting and highly UV-resistant special grade for sunbeds etc.

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

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

PLEXIGLAS SOUNDSTOP® GS
Flame-retarded, UV-absorbing solid sheet special grade in accordance with ZTV-Lsw 88, EN 1793 and EN 1794 for noise control barriers.

PLEXIGLAS SOUNDSTOP® GS CC
UV-absorbing solid sheet special grade, flame-retarded with integrated PA threads, corresponds to ZTV-Lsw 88, EN 1793 and EN 1794 for noise control barriers.

PLEXIGLAS® GS SW and PLEXIGLAS FREE FLOW® GS SW
More and most (FREE FLOW) easily formable, clear and colored special grades with better chemical resistance and higher heat deflection temperature; for sanitary ware.

1) Europ. patent EP 656 548
2) Europ. patent EP 1 164 633

PLEXIGLAS® XT

PLEXIGLAS® XT 20070
Standard grade for solid sheets; largely UV-absorbing.

PLEXIGLAS® XT 20070 HQ
High-quality special grade, suitable for metallising, largely UV-absorbing.

PLEXIGLAS® XT 24370
UV-transmitting and highly UV-resistant special grade (for conservatories, patios, etc).

PLEXIGLAS® XT 24770
UV-transmitting and highly UV-resistant special grade for sunbed canopies, max. thickness 5 mm.

PLEXIGLAS® XT 29070 or 29080
Standard grades for multi-skin sheets PLEXIGLAS® S4P 32 and PLEXIGLAS ALLTOP® SDP 16, tubes and round rods, UV-transmitting.

PLEXIGLAS DAYLIGHT® XT
Special grades with integrated vents as daylight elements for light deviation and as sunshades in windows.

PLEXIGLAS® XT colors
transparent, translucent or opaque standard and special grades.

PLEXIGLAS HEATSTOP® XT / SP / WP [1)]
UV-absorbing standard grade for solid sheets, multi-skin sheets (The "Cool" Sheet) with a water-dispersing NO DROP 2) coating on one side and corrugated sheets (The "Cool" Sheet) which drastically reduces the incident thermal radiation; for domed and continuous rooflights.

PLEXIGLAS ALLTOP® SP [3)]
Standard grade for multi-skin sheets (The "Noble" Sheet) with a water-dispersing coating all around.

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

PLEXIGLAS RESIST® SP / WP [5)]
Impact modified standard and special grades for multi-skin sheets (The "Tough" Sheet) with a water-dispersing NO DROP 2) coating on one side and corrugated sheets (The "Tough" Sheet), UV-absorbing

PLEXIGLAS SATINICE® AR and DF
Clear and colored standard grades with one (AR) or two (DF) satin surfaces for picture glazing, furniture, displays, signs and light objects.

PLEXIGLAS SOUNDSTOP® XT [6)]
UV-absorbing solid sheet special grade without flame-retardant additives, corresponds to ZTV-Lsw 88, EN 1793 and EN 1794 for noise control barriers.

PLEXIGLAS® MIRROR XT
Various colored sheets of PLEXIGLAS® XT with one mirror surface and backpainted.

Typical property values

(at 23 °C and 50 % relative humidity)

Mechanical properties	PLEXIGLAS® GS 233; 222; 209	PLEXIGLAS® XT 20070; 29070	PLEXIGLAS RESIST® 45; 65; 75; 100	Unit	Test standard
Density ρ	1.19	1.19	1.9	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} (lzod)	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 a) –40 °C b) 23 °C c) 70 °C	 110 80 40	 100 72 35	 – 60; 50; 45; 40 –	MPa	ISO 527-2/1B/5
Elongationat 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 (5mm/min)
Compressive yield stress σ_{dF}	110	103	–	MPa	ISO 604
Max. safety stress $\sigma_{max.}$ (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	300 x thickness; 250 x thickness; 210 x thickness; 170 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 a) plastic / plastic b) plastic / steel c) steel / plastic	 0.8 0.5 0.45	 0.8 0.5 0.45	 – – –	–	–
Poisson's ratio μ_b (dilatation speed of 5 % per min; up to 2 % dilatation; at 23 °C)	0.37	0.37	–	–	ISO 527-1
Resistance to puck impact from thickness (Test Certificate No. from FMPA Stuttgart)	–	12 mm (46/900 550)	8 mm (46/900 550*) (* for RESIST "31" according to 65)	–	Similar to DIN 18032

Acoustical properties	**PLEXIGLAS® GS 233; 222; 209**	**PLEXIGLAS® XT 20070; 29070**	**PLEXIGLAS RESIST® 45; 65; 75; 100**	**Unit**	**Test standard**
Sound velocity (at room temperature)	2700…2800	2700…2800	–	m/s	–
Weight sounded reduction index R_w at thickness:					–
4 mm	26	26	–	dB	
6 mm	30	30	–		
10 mm	32	32	–		

Optical properties (of clear grades, at 3 mm thickness)	**PLEXIGLAS® GS 233; 222; 209**	**PLEXIGLAS® XT 20070; 29070**	**PLEXIGLAS RESIST® 45; 65; 75; 100**	**Unit**	**Test standard**
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; 4; 4; 4	%	–
Total energy transmittance g	85	85	85	%	DIN EN 410
Adsorption in the visible range	< 0.05	< 0.05	–	%	–
Refractive index n_D^{20}	1.491	1.491	–	–	ISO 489

Electrical properties	**PLEXIGLAS® GS 233; 222; 209**	**PLEXIGLAS® XT 20070; 29070**	**PLEXIGLAS RESIST® 45; 65; 75; 100**	**Unit**	**Test standard**
Volume resistivity ρ_D	$> 10^{15}$	$> 10^{15}$	$> 10^{14}$	ohm · cm	DIN VDE 0303, Part 3
Surface resistivity R_{OA}	$5 \cdot 10^{13}$	$5 \cdot 10^{13}$	$> 10^{14}$	ohm	
Dielectric strength E_d (1 mm specimen thickness)	~ 30	~ 30	–	kV/mm	DIN VDE 0303, Part 2
Dielectric constant ε at 50 Hz	3.6	3.7	–	–	DIN VDE 0303, Part 4
at 0.1 MHz	2.7	2.8	–	–	
Dissipation factor tan δ					
at 50 Hz	0.06	0.06	–	–	DIN VDE 0303, Part 4
at 0.1 MHz	0.02	0.03	–	–	
Tracking, CTI-Value	600	600	–	–	DIN VDE 0303, Part 1

Thermal properties	PLEXIGLAS® GS 233; 222; 209	PLEXIGLAS® XT 20070; 29070	PLEXIGLAS RESIST® 45; 65; 75; 100	Unit	Test standard
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: 1 mm 3 mm 5 mm 10 mm	 5.8 5.6 5.3 4.4	 5.8 5.6 5.3 4.4	 – – – –	 W/m²K	 DIN 4701
Specific heat c	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
Fire rating (material (thickness ≥ 2 mm)	B 2, normally flammable	B 2 normally flammable	B 2, normally flammable	–	DIN 4102
	Class 3	Class 3	–	–	BS 476, Part 7 + 6
	TP(b)	TP(b)	–	–	BS 2782, Method 508A
	M 4	M 4	–	–	NF P 92 501 + 92 505
Vicat softening temperature	115	102	101; 100; 100; 97	°C	ISO 306, Method B 50
Heat deflection temperature under load (HDT) a) deflection 1.8 MPa b) deflection 0.45 MPa	 105; 105; 107 113; 113; 115	 90 95	 – –	 °C	 ISO 75

Behavior towards water	PLEXIGLAS® GS 233; 222; 209	PLEXIGLAS® XT 20070; 29070	PLEXIGLAS RESIST® 45; 65; 75; 100	Unit	Test standard
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 water vapour N_2 O_2 CO_2 air	 $2.3 \cdot 10^{-10}$ $4.5 \cdot 10^{-15}$ $2.0 \cdot 10^{-14}$ $1.1 \cdot 10^{-13}$ $8.3 \cdot 10^{-15}$	 $2.3 \cdot 10^{-10}$ $4.5 \cdot 10^{-15}$ $2.0 \cdot 10^{-14}$ $1.1 \cdot 10^{-13}$ $8.3 \cdot 10^{-15}$	 – – – – –	$\frac{\text{g cm}}{\text{cm}^2\ \text{h Pa}}$	–

In addition to the mentioned products, we supply for various EUROPLEX® (films and sheets made of PMMA, PC, PSU, PPSU etc.) and ROHACELL® (PMI rigid foam).

***) Important notice**
This is an international English-language information prepared for several markets.
It is essential that the selection of particular materials and their methods of use conform with the requirements of national and local Building Regulations.
The availability of any particular product should be checked with your supplier.

Advice and delivery by:

röhm

Certified to DIN EN ISO 9001 (Quality) and DIN EN ISO 14001 (Environment)

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