

Specification

Physical and chemical properties

PCP

D 263 M

D 263 M - Cover Glass

D 0089 .

D 263 M (cover glass) is a clear borosilicate glass of high chemical resistance. In medical and biological research it is used as microscopic cover glass for preparations.

The subsequent properties are based primarily upon the measuring results of the very latest standards and measuring methods, which are defined in corresponding "Measuring and Test Procedures". We retain the right to change the data in keeping with the latest technical standards. Non-toleranced numerical values are reference values of an average production quality.

Values marked with $\diamond$ do not apply to the type of glass or no values are available.

Requirements deviating from these specifications must be defined in writing in a **customer agreement**.

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1. Optical properties

1.1 Refractive indices (Condition as supplied)

n_e	1.5255 ± 0.0015
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n_D	1.5230
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1.1.1 Abbe value

v_e	55
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1.2 Transmittance data

1.2.1 Spectral transmittance $\tau(\lambda)$

1.2.1.1 $\tau(\lambda)$ - curve

Plot of spectral transmittance $\tau(\lambda)$ for
 $d = 0.15$ mm ($\lambda = 280$ nm to 800 nm)

see annex

1.2.1.2 $\tau(\lambda)$ - individual values ($d = 0.15$ mm)

λ in nm	$\tau(\lambda)$ in %
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380	90.4
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632.8	91.8
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1064	92.0
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1.2.1.3 Edge wavelength ($d = 0.15$ mm)

Edge wavelength

λ_c ($\tau = 0.46$) in nm

312

1.2.2 Luminous transmittance τ_{VD65} in % ($d = 0.15$ mm)

91.7 ± 0.3

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2. Thermal properties

2.1 Viscosities and corresponding temperatures

Designation	Viscosity $\lg \eta$ in dPas	Temperature ϑ in °C
Strain point	14.5	529
Annealing point	13.0	557
Softening point	7.6	736
Forming temperature	6.0	839
Forming temperature	5.0	929
Forming temperature	4.0	1051

2.2 Transformation temperature T_g in °C

557

2.3 Coefficient of thermal expansion α

2.3.1 Coefficient of mean linear thermal expansion $\alpha(20\text{ °C}; 300\text{ °C})$ in 10^{-6} K^{-1} (Static measurement)

7.2

2.4 Fuseability

◇

2.5 Mean specific heat capacity $c_p(20\text{ °C to } 100\text{ °C})$ in J/(g · K)

0.82

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3. Mechanical properties

3.1	Density ρ in g/cm ³ (annealed at 40 °C/h)	2.51
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3.2	Stress optical coefficient C in $1.02 \cdot 10^{-12}$ m ² /N	3.4
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3.3 Breaking strength

A higher mechanical strength can be realized by chemical toughening according to the ion exchange procedure (refer to annex 3.3.1).

3.3.1 Chemical toughening ($d = 0.15$ mm)

Processing temperature ϑ in °C	410
Processing time t in h	4
Compressive stress D_s as birefringence in nm/cm	6800
Penetration depth N_z up to neutral zone in μ m	36
Further information	see annex

3.4	Young's modulus E in kN/mm ²	72.9
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3.5	Poisson's ratio μ	0.208
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3.6	Torsion modulus G in kN/mm ²	30.1
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3.7	Knoop hardness HK 0.1/20	590
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4. Chemical properties

4.1 Hydrolytic resistance acc. to DIN ISO 719

Hydrolytic class	HGB 1
Equivalent of alkali (Na_2O) per gram of glass grains in $\mu\text{g/g}$	20

4.2 Acid resistance acc. to DIN 12116

Acid class	S 2
Half surface weight loss after 6 hours in mg/dm^2	1.4

4.3 Alkali resistance acc. to DIN ISO 695

Class	A 2
Surface weight loss after 3 hours in mg/dm^2	88

4.4 Hazardous Substances

EC-directive 2002/95/EC (RoHS-directive)

Test Items	RoHS Limit in mg/kg	Value* in mg/kg
Cadmium (Cd)	100	< Limit
Lead (Pb)	1000	< Limit
Mercury (Hg)	1000	< Limit
Hexavalent chromium (Cr(VI))	1000	< Limit
Polybrominated biphenyls (Sum of PBBs)	1000	< Limit
Polybrominated diphenyl ethers (Sum of PBDEs)	1000	< Limit

* Test Report SGS INSTITUTE

5. Electrical properties

5.1	Dielectric constant (Permittivity) ϵ_r at 1 MHz	6.7
5.2	Dissipation factor $\tan \delta$ at 1 MHz	$61 \cdot 10^{-4}$
5.3	Electric volume resistivity ρ_D in $\Omega \cdot \text{cm}$ at the specified temperatures	
5.3.1	ρ_D for alternating current 50 Hz	
	$\vartheta = 250^\circ\text{C}$	$1.6 \cdot 10^8$
	$\vartheta = 350^\circ\text{C}$	$3.5 \cdot 10^6$

6. Other properties

disregard

7. Annex (diagrams, curves)

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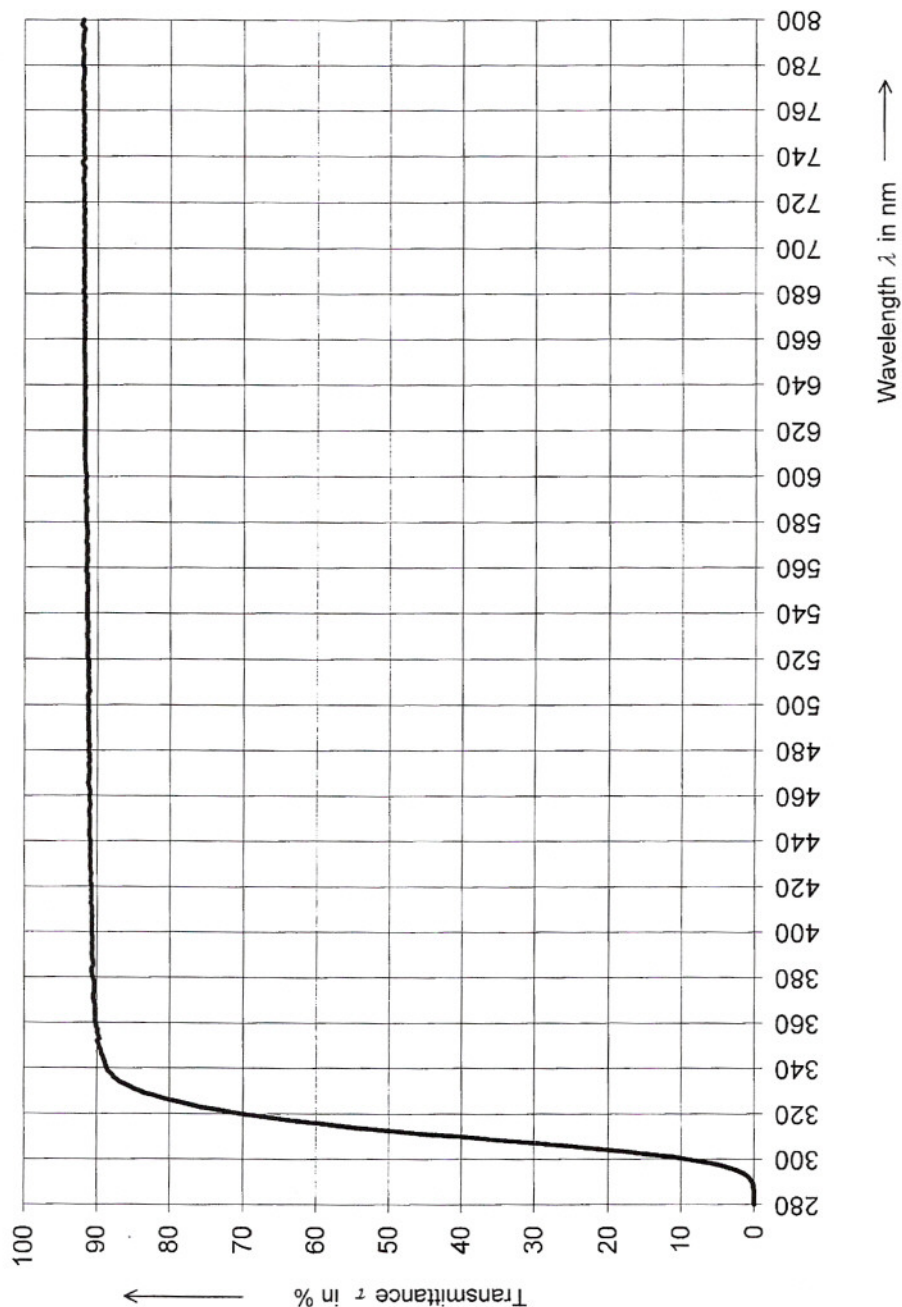
PCP

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Spectral Transmittance

Type of Glass: D 263 M

Thickness: 0.15 mm



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Chemical toughening parameter

Glass and chemical toughening parameters

Transformation temperature	°C	557
Glass thickness	mm	0.15
Processing time	h	4
Processing temperature	°C	410
Salt bath (* weight percentages)	KNO ₃ in % *	99.5
	SiO ₂ x H ₂ O in % *	0.5

Chemical toughening results *

Penetration depth	µm	36
Birefringence	nm/cm	6800

* measured across at a sample piece ground down to 0.3 mm ± 0.05 mm

Ball drop test acc. FDA	% failed	not carried out
Ball drop test acc. DIN	% failed	not carried out

