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 ◊ 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
		n_D	1.5230
1.1.1	**Abbe value**	ν_e	55
1.2	**Transmittance data**		
1.2.1	**Spectral transmittance τ (λ)**		
1.2.1.1	**τ (λ) - curve**		
	Plot of spectral transmittance $\tau(\lambda)$ for d = 0.15 mm (λ = 280 nm to 800 nm)		see annex
1.2.1.2	**τ (λ) - individual values (d = 0.15 mm)**		
		λ in nm	τ (λ) in %
		380	90.4
		632.8	91.8
		1064	92.0
1.2.1.3	**Edge wavelength (d = 0.15 mm)**		
	Edge wavelength	$\lambda_{c\ (\tau = 0.46)}$ 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 η 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 *Tg* in °C**	557
2.3	**Coefficient of thermal expansion α**	
2.3.1	**Coefficient of mean linear thermal expansion α(20 °C;300 °C) in 10^{-6} K^{-1} (Static measurement)**	7.2
2.4	**Fuseability**	◊
2.5	**Mean specific heat capacity c_p(20 °C to 100 °C) in J/(g · K)**	0.82

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3.	**Mechanical properties**	
3.1	**Density ρ in g/cm³** (annealed at 40 °C/h)	2.51
3.2	**Stress optical coefficient *C* in 1.02 · 10^{-12} m²/N**	3.4
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 *Ds* as birefringence in nm/cm	6800
	Penetration depth *Nz* up to neutral zone in µm	36
	Further information	see annex
3.4	**Young's modulus *E* in kN/mm²**	72.9
3.5	**Poisson's ratio μ**	0.208
3.6	**Torsion modulus *G* in kN/mm²**	30.1
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 µg/g	20

4.2 Acid resistance acc. to DIN 12116

Acid class	S 2
Half surface weight loss after 6 hours in mg/dm²	1.4

4.3 Alkali resistance acc. to DIN ISO 695

Class	A 2
Surface weight loss after 3 hours in mg/dm²	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 δ at 1 MHz

$61 \cdot 10^{-4}$

5.3 Electric volume resistivity ρ_D in $\Omega \cdot$ cm at the specified temperatures

5.3.1 ρ_D for alternating current 50 Hz

ϑ = 250 °C	$1.6 \cdot 10^8$
ϑ = 350 °C	$3.5 \cdot 10^6$

6. Other properties

disregard

7. Annex (diagrams, curves)

Specification

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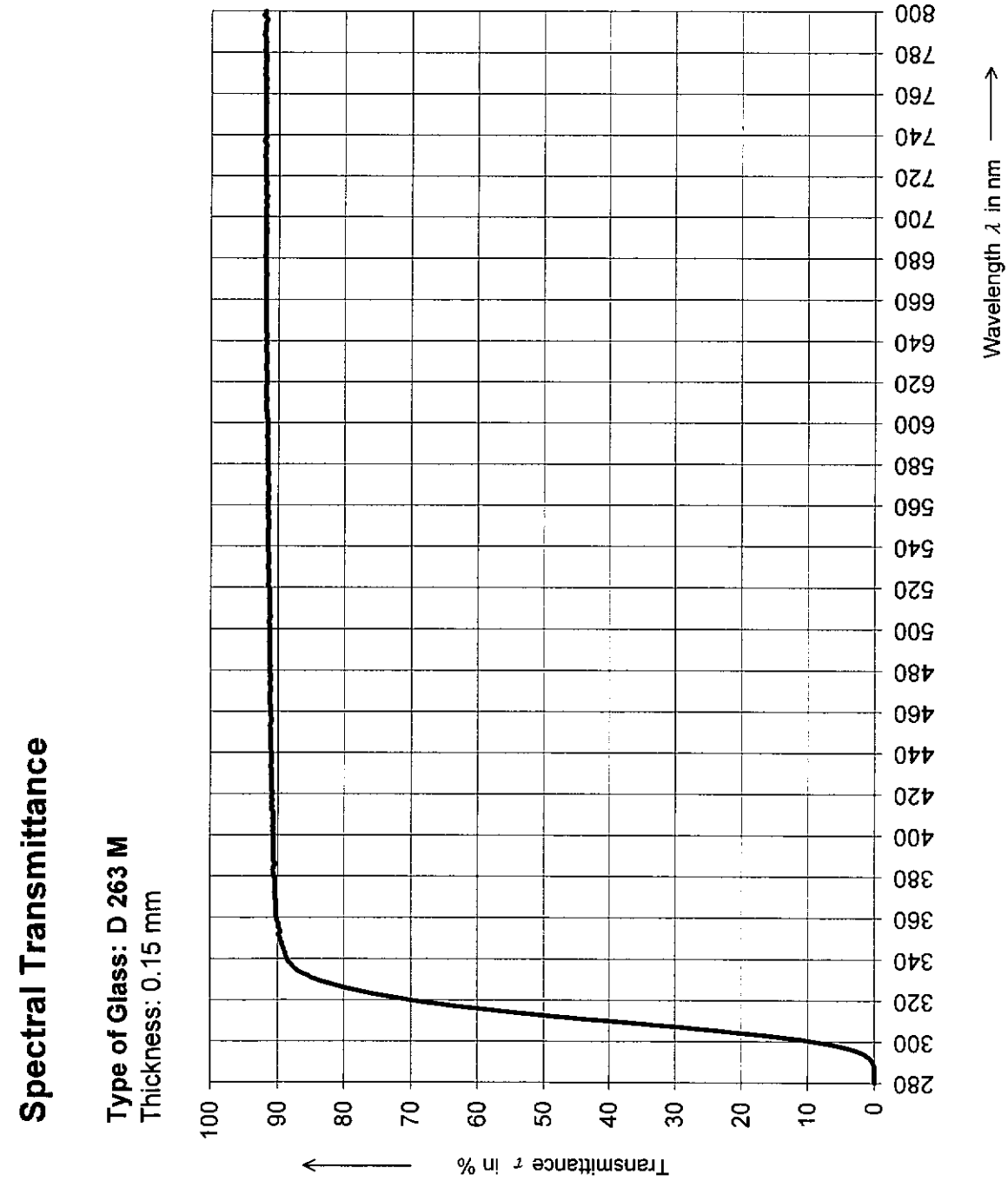

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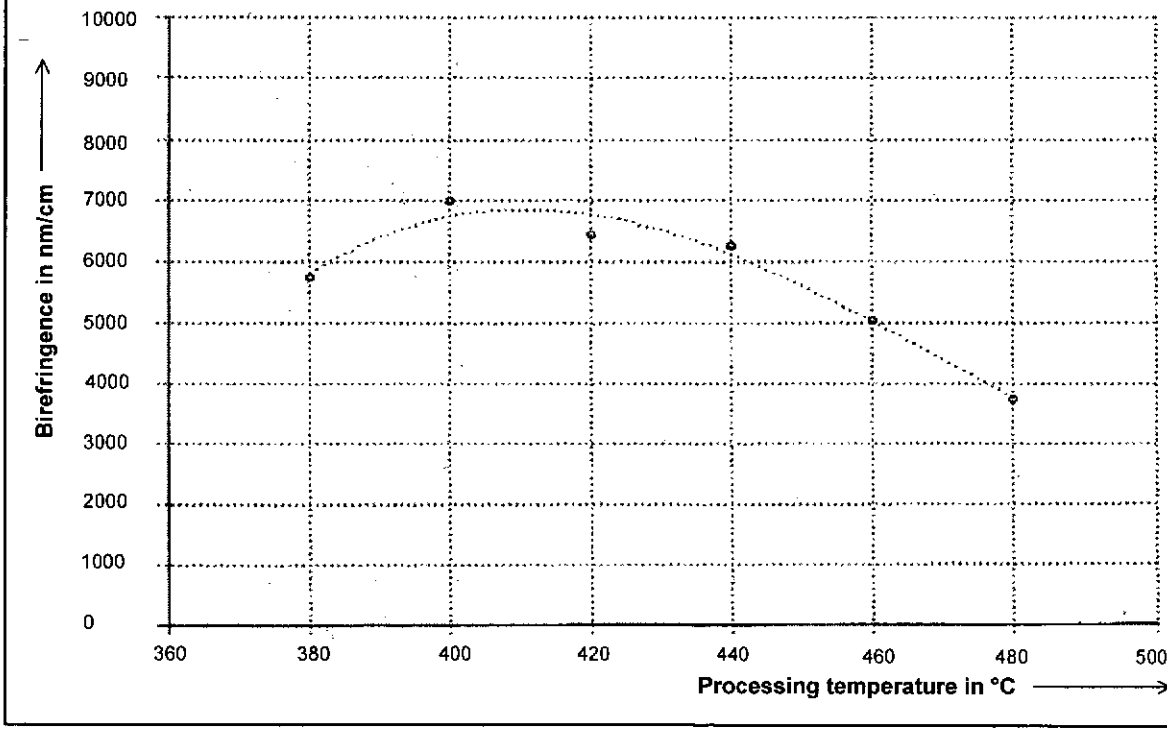
Annex 3.3.1

Specification Physical and chemical properties		**PCP** **D 263 M**
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_2O 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



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