



Chemical and physical properties

Microscope cover glasses **No. 1.5H** made of borosilicate glass D 263® M

Chemical composition (approximative)								
SiO ₂	B ₂ O ₃	Al ₂ O ₃	Na ₂ O	K ₂ O	ZnO	TiO ₂	Sb ₂ O ₃	Cl
64.0 %	8.5 %	4.0 %	6.5 %	7.0 %	5.5 %	4.0 %	< 0.5 %	< 0.1 %

Geometrical properties			
Thickness:	Nominal thickness in mm	Tolerance thickness in mm	Flatness in mm acc. to SEMI M1 GBINFER
Nr. 1.5H	0.170	± 0.005	0.5

Quality properties	
Roughness (Ra)	≤ 1 nm

Optical properties		
Refractive indices	n_g	1.5354
	$n_{F'}$	1.5305
	n_F	1.5300
	n_e	1.5255 ± 0.0015
	n_d	1.5231
	n_D	1.5230
	$n_{C'}$	1.5209
	n_C	1.5204
Abbe value v_e		55
Photoelastic constant in (nm/cm)MPa		34.7

Thermal properties		
CTE (Coefficient of thermal expansion) α	in 10 ⁻⁶ K ⁻¹ (20-300 °C)	7.2
Mean specific heat capacity c_p	in J/(gK) (20-100 °C)	0.8
Transformation temperature T_g	in °C	557
<u>Viscosities</u>	Viscosity lg η in dPas	Temperature in °C
Strain point	14.5	529
Annealing point	13.0	557
Softening point	7.6	736



Mechanical properties		
Density ρ (annealed at 40 °C/h)	in g/cm ³	2.51
Young's modulus E	in kN/mm ²	72.9
Poisson's ratio μ		0.21
Torsion modulus G	in kN/mm ²	30
Knoop hardness	HK 0.1/20	470
Vickers hardness	HV 0.2/25	510

Chemical properties		
Hydrolytic resistance (acc. to DIN ISO 719)	Hydrolytic class Equivalent of alkali per gram glass grains in $\mu\text{g/g}$	HGB 1 20
Acid resistance (acc. to DIN 12115)	Class Half surface weight loss after 6 hours in mg/dm ²	S3 2.1
Alkali resistance (acc. to DIN ISO 695)	Class Surface weight loss after 3 hours in mg/dm ²	A 2 88

Elektrical properties		
Dielectric constant ϵ_r (at $\vartheta = 25\text{ °C}$)	at 1 MHz	6.7
	at 1 GHz	6.4
	at 5 GHz	6.3
Dissipation factor $\tan \delta$ (at $\vartheta = 25\text{ °C}$)	at 1 MHz	$61 \cdot 10^{-4}$
	at 1 GHz	$74 \cdot 10^{-4}$
	at 5 GHz	$101 \cdot 10^{-4}$
Electric volume resistivity ρ_D (for alternate current 50 Hz)	in $\Omega \cdot \text{cm}$	$1.6 \cdot 10^8$ ($\vartheta = 250\text{ °C}$)
	in $\Omega \cdot \text{cm}$	$3.5 \cdot 10^6$ ($\vartheta = 350\text{ °C}$)



Transmittance values		
Thickness 0.170 mm	Wavelength at 254 nm at 380 nm at 632.8 nm at 1064 nm	$\tau(\lambda)$ in % < 0.1 91.4 92.0 92.1
Edge wavelength λ_c ($\tau = 0.46$)	Thickness in mm 0.170	Wavelength in nm 313
Luminous transmittance	Thickness in mm 0.170	T_{VD65} in % 91.9 ± 0.3