Specification

Physical and chemical properties

PCP
D 0687

V 513

D 0687

Colour:	clear
Application:	Lower segment glass for photochromic ophthalmic crown glass

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.

Because this glass type is produced by another company we specified the original data sheet values of the manufacturer in *italic letters* and added another Barberini GmbH specific characteristic values.

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 (20 °C)

Pretreatment of samples
[ ] Condition as supplied
[x] annealed at 40 °C/h

n_g	1.6779
$n_{F'}$	1.6684
n_F	1.6673
n_e	1.6588 ± 0.001
n_d	1.6545
n_D	1.6543
$n_{C'}$	1.6500
n_C	1.6492

1.1.1 Abbe value

v_e	35.8 ± 0.6
v_d	36.0

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 = 2.0 mm (λ = 300 nm to 1500 nm): see annex

1.2.1.2 $\tau(\lambda)$ - individual values in % (d = 2.0 mm)

$\tau(\lambda)_{max}$ for the λ - range 280 nm to 315 nm	< 0.001
$\tau(\lambda)_{max}$ for the λ - range 315 nm to 350 nm	18
τ_{380}	79.5
$\tau(\lambda)_{min}$ for the λ - range 500 nm to 650 nm	◊

1.2.1.3 Edge wavelength (d = 2.0 mm)

Edge wavelength $\lambda_{c\ (\tau = 0.46)}$ in nm	359

1.2.2 Luminous transmittance τ_v

1.2.2.1 Luminous transmittance τ_{vD65} in % at nominal thickness

d = 2.0 mm *** nominal transmittance**: 88.4* ± 0.5

Luminous transmittance as a function of thickness

Thickness in mm	1.4	2.0	3.0	4.0	5.0	6.0
τ_{vD65} in %	88.4	88.4	88.4	88.4	88.4	88.4
τ_{vA} in %	88.5	88.5	88.5	88.5	88.5	88.5
τ_{vC} in %	88.4	88.4	88.4	88.4	88.4	88.4

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1.2.2.2	**Scale number / Filter category**		
	N for mean thickness *d* = mm (τ_{vD65} = %)		◊
	N for mean thickness *d* = mm (τ_{vD65} = %)		◊
	filter category for nominal transmittance τ_{vD65} = %		◊
1.2.3	**Special transmittance values in % (*d* = 2.0 mm)**		
1.2.3.1	**UV - transmittance**		
		τ_{UVA}	27.6
		τ_{SUV}	◊
		τ_{SUVA}	◊
		τ_{SUVB}	◊
1.2.3.2	**IR - transmittance**	τ_{SIR}	89
1.2.3.3	**Solar blue - light transmittance**	τ_{sb}	◊
1.3	**Colour**		
1.3.1	**Visual evaluation**		◊
1.3.2	**Colorimetry**		
	Chromaticity coordinates	x_{10} y_{10}	0.315 0.332
	Chromaticity coordinates (colour locus) are referred to the Standard Illuminant D_{65} according to CIE 10°-observer for nominal thickness (d = 2,0mm)		
1.3.3	**Signal light recognition**		
	Relative visual attenuation coefficient (quotient) *Q* for signal light recognition for nominal thickness (d = 2,0mm)	Q_{blue}	1.0
		Q_{green}	1.0
		Q_{yellow}	1.0
		Q_{red}	1.0
1.3.4	**Yellowness index (*d* = 10 mm)**		
		Y_i	2.2

Form 0050/1e

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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	469
Annealing point	13.0	493
Softening point	7.6	643
Forming temperature	6.0	728
Forming temperature	5.0	801
Forming temperature	4.0	900

2.2	**Transformation temperature *Tg* in °C**	497
2.3	**Coefficient of mean linear thermal expansion α(20 °C;300 °C) in 10^{-6} K^{-1}** (Static measurement)	6.2

2.4 Fuseability

Stress-free fusing with major blanks from Barberini GmbH, listed in the margin is possible with a maximum birefringence of 70 nm/cm, measured 0.5 mm from the fusing area in the major blank.	PHOTOSOLAR SUPERGREY PHOTOSOLAR SUPERBROWN PHOTOSOLAR SUPER

2.5	**Mean specific heat capacity c_p(20 °C to 100 °C) in J/(g · K)**	◊

3. Mechanical properties

3.1	**Density ρ in g/cm³**	3.80
3.2	**Stress optical coefficient *C* in 1.02 · 10^{-12} m²/N**	2.31
3.3	**Breaking strength**	◊
3.4	**Young's modulus *E* in kN/mm²**	◊
3.5	**Poisson's ratio μ**	◊
3.6	**Torsion modulus *G* in kN/mm²**	◊
3.7	**Knoop hardness *HK* 0.1/20**	460

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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	6

4.2 Acid resistance acc. to DIN 12 116

Acid class	S 4
Half surface weight loss after 6 hours in mg/dm²	> 250

4.3 Alkali resistance acc. to DIN ISO 695

Class	A 3
Surface weight loss after 3 hours in mg/dm²	654

4.4 Hazardous Substances

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

5. Electrical properties — disregarded

6. Other properties — disregarded

7. Annex (diagrams, curves)

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