Specification

Physical and chemical properties

PCP
D 0082

- p r o v i s i o n a l -

LaSF 1.9/30 D 0082

Colour:	clear
Application:	High index light weight glass for corrective lenses with very high power

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
[x] Condition as supplied (blanks)
[x] annealed at 40°C/h (strips)

n_g	*1.9238*
$n_{F'}$	*1.9083*
n_F	*1.9066*
n_e	*1.8929 ± 0.0015*
n_d	*1.8860*
n_D	*1.8858*
$n_{C'}$	*1.8789*
n_C	*1.8776*

1.1.1 Abbe value

ν_e	*30.4 ± 0.6*
ν_d	*30.6*

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 - 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 - 315 nm	< 0.001
$\tau(\lambda)_{max}$ for the λ - range 315 - 350 nm	11.5
τ_{380}	*69*
$\tau(\lambda)_{min}$ for the λ - range 450 - 650 nm	◊
$\tau(\lambda)_{min}$ for the λ - range 500 - 650 nm	◊

1.2.1.3 Edge wavelength (d = 2.0 mm)

Edge wavelength $\lambda_{C\ (\tau = 0.46)}$ in nm: *363*

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**: *82.2* ± 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 %	◊	*82.2*	◊	◊	◊	◊
τ_{vA} in %	◊	*82.3*	◊	◊	◊	◊
τ_{vC} in %	◊	*82.2*	◊	◊	◊	◊

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1.2.2.2	**Shade *N* / 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}	23.9
		τ_{SUV}	◊
		τ_{SUVA}	◊
		τ_{SUVB}	◊
1.2.3.2	**IR - transmittance**	τ_{SIR}	84.5
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}	*0.316* *0.334*
	Chromaticity coordinates (colour locus) are referred to the Standard Illuminant D_{65} according to CIE 10°-observer for the nominal transmittance τ_{vD65} = *82.2* % (refer to 1.2.2.1)		
1.3.3	**Signal recognition**		
	Relative visual attenuation coefficient *Q* for signal lights referred to the nominal transmittance τ_{vD65} = *82.2* % (refer to 1.2.2.1)	Q_{blue}	*1.00*
		Q_{green}	*1.00*
		Q_{yellow}	*1.00*
		Q_{red}	*1.00*
1.3.4	**Yellowness index (*d* = 10 mm)**		
		Y_i	*3 ± 1*

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2. Thermal properties

2.1 Viscosities and corresponding temperatures

Designation	Viscosity log η in dPas	Temperature ϑ in °C
Strain point	14.5	◊
Annealing point	13.0	*639*
Softening point	7.6	737
Forming temperature	6.0	◊
Forming temperature	5.0	◊
Forming temperature	4.0	*958*

2.2	**Transformation temperature *Tg* in °C**	*649*
2.3	**Coefficient of mean linear thermal expansion $\alpha_{(20°C-300°C)}$ in 10^{-6} K^{-1}** (Static measurement)	*8.3*
2.4	**Fuseability**	◊
2.5	**Mean specific heat capacity $c_{p\,(20°C-100°C)}$ in J/(g · K)**	◊

3. Mechanical properties

3.1	**Density ρ in g/cm³**	*4.02*
3.2	**Stress optical coefficient *C* in 1.02 · 10^{-12} m²/N**	*1.86*
3.3	**Breaking strength**	
	A higher mechanical strength can be realized **only** by thermal toughening.	
3.3.1	**Chemical toughening**	not possible
3.3.2	**Thermal toughening**	
	Recommended minimum thickness *d* in mm for toughened safety glass lenses without corrective effect as per ball drop test (DIN EN 168)	2.5
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_{100}**	633

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4.	**Chemical properties**		
4.1	**Hydrolytic resistance acc. to DIN ISO 719**		
		Hydrolytic class	*HGB 2*
		Equivalent of alkali (Na_2O) per gram of glass grains in µg/g	*< 40*
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 1
		Surface weight loss after 3 hours in mg/dm²	3.4
4.4	**Hazardous Substances**		
	EC-directive 2002/95/EC (RoHS-directive)		on request
5.	**Electrical properties**		disregard
6.	**Other properties**		disregard
7.	**Annex** (diagrams, curves)		

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Spectral Transmittance

Type of Glass: LaSF 1.9/30
Thickness: 2.00 mm