

<b>Specification</b> Physical and chemical properties	<b>PCP</b> <b>D 0587</b>
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**V 512**

**D 0587**

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  $\diamond$  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**.

Specification		PCP D 0587	
Physical and chemical properties			
<b>1.</b>	<b>Optical properties</b>		
<b>1.1</b>	<b>Refractive indices (20 °C)</b>		
	Pretreatment of samples	$n_g$	1.6031
	[ ] Condition as supplied	$n_{F'}$	1.5965
	[ x ] annealed at 40 °C/h	$n_F$	1.5958
		$n_e$	1.5898 ± 0.001
		$n_d$	1.5867
		$n_D$	1.5866
		$n_{C'}$	1.5835
		$n_C$	1.5829
<b>1.1.1</b>	<b>Abbe value</b>	$v_e$	45.2 ± 0.6
		$v_d$	45.4
<b>1.2</b>	<b>Transmittance data</b>		
<b>1.2.1</b>	<b>Spectral transmittance <math>\tau(\lambda)</math></b>		
<b>1.2.1.1</b>	<b><math>\tau(\lambda)</math> - curve</b>		
	Plot of spectral transmittance $\tau(\lambda)$ for $d = 2.0$ mm ( $\lambda = 300$ nm to 1500 nm)	see annex	
<b>1.2.1.2</b>	<b><math>\tau(\lambda)</math> - individual values in % (<math>d = 2.0</math> mm)</b>		
	$\tau(\lambda)_{\max}$ for the $\lambda$ - range 280 nm to 315 nm	< 0.1	
	$\tau(\lambda)_{\max}$ for the $\lambda$ - range 315 nm to 350 nm	73.5	
	$\tau_{380}$	87.5	
	$\tau(\lambda)_{\min}$ for the $\lambda$ - range 500 nm to 650 nm	◇	
<b>1.2.1.3</b>	<b>Edge wavelength (<math>d = 2.0</math> mm)</b>		
	Edge wavelength $\lambda_c$ ( $\tau = 0.46$ ) in nm	337	
<b>1.2.2</b>	<b>Luminous transmittance <math>\tau_v</math></b>		
<b>1.2.2.1</b>	<b>Luminous transmittance <math>\tau_{vD65}</math> in % at nominal thickness</b>	<b>90.1* ± 0.5</b>	
	<b><math>d = 2.0</math> mm</b>	<b>* nominal transmittance</b>	
	Luminous transmittance as a function of thickness		
	Thickness in mm	1.4	2.0
		3.0	4.0
		5.0	6.0
	$\tau_{vD65}$ in %	90.1	90.1
		90.1	90.0
	$\tau_{vA}$ in %	90.1	90.1
		90.1	90.0
	$\tau_{vC}$ in %	90.1	90.1
		90.1	90.0
		89.9	89.8

<b>Specification</b>		<b>PCP D 0587</b>	
Physical and chemical properties			
<b>1.2.2.2</b>	<b>Scale number / Filter category</b>		
	$N$ for mean thickness $d =$ mm ( $\tau_{vD65} =$ %)		◇
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	filter category for nominal transmittance $\tau_{vD65} =$ %		◇
<b>1.2.3</b>	<b>Special transmittance values in % (<math>d = 2.0</math> mm)</b>		
<b>1.2.3.1</b>	<b>UV - transmittance</b>		
		$\tau_{UVA}$	55.7
		$\tau_{SUV}$	◇
		$\tau_{SUVA}$	◇
		$\tau_{SUVB}$	◇
<b>1.2.3.2</b>	<b>IR - transmittance</b>	$\tau_{SIR}$	92
<b>1.2.3.3</b>	<b>Solar blue - light transmittance</b>	$\tau_{sb}$	◇
<b>1.3</b>	<b>Colour</b>		
<b>1.3.1</b>	<b>Visual evaluation</b>		◇
<b>1.3.2</b>	<b>Colorimetry</b>		
	Chromaticity coordinates	$x_{10}$	0.315
		$y_{10}$	0.332
	Chromaticity coordinates (colour locus) are referred to the Standard Illuminant $D_{65}$ according to CIE 10°-observer for nominal thickness ( $d = 2,0$ mm)		
<b>1.3.3</b>	<b>Signal light recognition</b>		
	Relative visual attenuation coefficient (quotient) $Q$	$Q_{blue}$	1.0
	for signal light recognition for nominal thickness ( $d = 2,0$ mm)	$Q_{green}$	1.0
		$Q_{yellow}$	1.0
		$Q_{red}$	1.0
<b>1.3.4</b>	<b>Yellowness index (<math>d = 10</math> mm)</b>		
		$Y_i$	1.2

<b>Specification</b>		<b>PCP D 0587</b>																					
Physical and chemical properties																							
<b>2.</b>	<b>Thermal properties</b>																						
<b>2.1</b>	<b>Viscosities and corresponding temperatures</b>																						
	<table border="1"> <thead> <tr> <th>Designation</th> <th>Viscosity lg <math>\eta</math> in dPas</th> <th>Temperature <math>\vartheta</math> in °C</th> </tr> </thead> <tbody> <tr> <td>Strain point</td> <td>14.5</td> <td>472</td> </tr> <tr> <td>Annealing point</td> <td>13.0</td> <td>497</td> </tr> <tr> <td>Softening point</td> <td>7.6</td> <td>654</td> </tr> <tr> <td>Forming temperature</td> <td>6.0</td> <td>745</td> </tr> <tr> <td>Forming temperature</td> <td>5.0</td> <td>826</td> </tr> <tr> <td>Forming temperature</td> <td>4.0</td> <td>938</td> </tr> </tbody> </table>	Designation	Viscosity lg $\eta$ in dPas	Temperature $\vartheta$ in °C	Strain point	14.5	472	Annealing point	13.0	497	Softening point	7.6	654	Forming temperature	6.0	745	Forming temperature	5.0	826	Forming temperature	4.0	938	
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<b>2.2</b>	<b>Transformation temperature <math>T_g</math> in °C</b>	498																					
<b>2.3</b>	<b>Coefficient of mean linear thermal expansion <math>\alpha(20\text{ °C};300\text{ °C})</math> in <math>10^{-6}\text{ K}^{-1}</math> (Static measurement)</b>	6.3																					
<b>2.4</b>	<b>Fuseability</b>																						
	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																					
<b>2.5</b>	<b>Mean specific heat capacity <math>c_p(20\text{ °C to }100\text{ °C})</math> in J/(g · K)</b>	◇																					
<b>3.</b>	<b>Mechanical properties</b>																						
<b>3.1</b>	<b>Density <math>\rho</math> in g/cm<sup>3</sup></b>	3.20																					
<b>3.2</b>	<b>Stress optical coefficient <math>C</math> in <math>1.02 \cdot 10^{-12}\text{ m}^2/\text{N}</math></b>	2.67																					
<b>3.3</b>	<b>Breaking strength</b>	◇																					
<b>3.4</b>	<b>Young's modulus <math>E</math> in kN/mm<sup>2</sup></b>	◇																					
<b>3.5</b>	<b>Poisson's ratio <math>\mu</math></b>	◇																					
<b>3.6</b>	<b>Torsion modulus <math>G</math> in kN/mm<sup>2</sup></b>	◇																					
<b>3.7</b>	<b>Knoop hardness <math>HK\ 0.1/20</math></b>	460																					

Form 0050/1e

<b>Specification</b>		<b>PCP</b>
Physical and chemical properties		<b>D 0587</b>
<b>4.</b>	<b>Chemical properties</b>	
<b>4.1</b>	<b>Hydrolytic resistance acc. to DIN ISO 719</b>	
	Hydrolytic class	HGB 1
	Equivalent of alkali (Na <sub>2</sub> O) per gram of glass grains in µg/g	14
<b>4.2</b>	<b>Acid resistance acc. to DIN 12 116</b>	
	Acid class	S 4
	Half surface weight loss after 6 hours in mg/dm <sup>2</sup>	68
<b>4.3</b>	<b>Alkali resistance acc. to DIN ISO 695</b>	
	Class	A 3
	Surface weight loss after 3 hours in mg/dm <sup>2</sup>	330
<b>4.4</b>	<b>Hazardous Substances</b>	
	EC-directive 2002/95/EC (RoHS-directive)	on request
<b>5.</b>	<b>Electrical properties</b>	disregarded
<b>6.</b>	<b>Other properties</b>	disregarded
<b>7.</b>	<b>Annex (diagrams, curves)</b>	

Form 0050/1e

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## Spectral Transmittance

Type of Glass: V 512  
Thickness: 2.00 mm

