

Specification

Physical and chemical properties

PCP

D 1230

Neophan Gold 1230

D 1230

Colour: grey

Application: medium tinted sunglare filter with
contrast intensification and UV - absorption
filter category 2 acc. to DIN EN 1836

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 \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 1230					
Physical and chemical properties							
1.	Optical properties						
1.1	Refractive indices (20 °C)						
	Pretreatment of samples	n_g	1.5504				
	[x] Condition as supplied	n_F'	1.5381				
	[] annealed at 40 °C/h	n_F	1.5376				
		n_e	1.5331				
		n_d	1.5307				
		n_D	1.5306				
		n_C'	1.5282				
		n_C	1.5278				
1.1.1	Abbe value	v_e	53.8				
		v_d	53.9				
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 ($\lambda = 300$ 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	< 0.1					
	$\tau(\lambda)_{\max}$ for the λ - range 315 nm to 350 nm	< 0.1					
	τ_{380}	< 1.0					
	τ_{400}	< 10					
	$\tau(\lambda)_{\min}$ for the λ - range 500 nm to 650 nm	7.5					
1.2.1.3	Edge wavelength ($d = 2.0$ mm)						
	Edge wavelength λ_c ($\tau = 0.46$) in nm	◇					
1.2.2	Luminous transmittance τ_v						
1.2.2.1	Luminous transmittance τ_{vD65} in % at nominal thickness	30.0* ± 2.5					
	$d = 2.0$ mm	* nominal transmittance					
	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 %	41.4	30.0	18.8	◇	◇	◇
	τ_{vA} in %	42.0	30.8	18.0	◇	◇	◇
	τ_{vC} in %	41.4	30.1	18.8	◇	◇	◇

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1.2.2.2	Scale number / Filter category		
	<i>N</i> for mean thickness $d = 1.6$ mm ($\tau_{vD65} = 37.3$ %)		5 - 2
	<i>N</i> for mean thickness $d = 2.5$ mm ($\tau_{vD65} = 22.8$ %)		5 - 2.5
	filter category for nominal transmittance $\tau_{vD65} = 30.0$ %		2
1.2.3	Special transmittance values in % ($d = 2.0$ mm)		
1.2.3.1	UV - transmittance		
		τ_{UVA}	< 0.1
		τ_{SUV}	< 0.1
		τ_{SUVA}	< 0.1
		τ_{SUVB}	< 0.1
1.2.3.2	IR - transmittance	τ_{SIR}	80
1.2.3.3	Solar blue - light transmittance	τ_{sb}	20.5
1.3	Colour		
1.3.1	Visual evaluation		◇
1.3.2	Colorimetry		
	Chromaticity coordinates	A x_{10} y_{10}	0.346 ₇ 0.362 ₇
	Chromaticity coordinates (colour locus) are referred to the Standard Illuminant D_{65} according CIE 10°-observer for the nominal transmittance $\tau_{vD65} = 30.0$ % (refer to 1.2.2.1)	B x_{10} y_{10}	0.342 ₈ 0.366 ₄
	In case of verification, the measured values may additionally deviate by the measuring uncertainty of the used measuring devices.	C x_{10} y_{10}	0.349 ₁ 0.372 ₆
	part of chromaticity coordinates	D x_{10} y_{10}	0.353 ₀ 0.368 ₉
			see annex
1.3.3	Signal light recognition		
	Relative visual attenuation coefficient (quotient) Q for signal light recognition referred to the nominal transmittance $\tau_{vD65} = 30.0$ % (refer to 1.2.2.1)	Q_{blue} Q_{green} Q_{yellow} Q_{red}	1.01 1.00 1.04 1.29
1.3.4	Yellowness index ($d = 10$ mm)		
		Y_i	◇

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Physical and chemical properties			
2. Thermal properties			
2.1 Viscosities and corresponding temperatures			
Designation	Viscosity lg η in dPas	Temperature ϑ in °C	
Strain point	14.5	502	
Annealing point	13.0	535	
Softening point	7.6	739	
Forming temperature	6.0	850	
Forming temperature	5.0	943	
Forming temperature	4.0	1065	
2.2 Transformation temperature T_g in °C		533	
2.3 Coefficient of mean linear thermal expansion $\alpha(20\text{ °C};300\text{ °C})$ in 10^{-6} K^{-1} (Static measurement)		8.8	
2.4 Fuseability		◇	
2.5 Mean specific heat capacity $c_p(20\text{ °C to }100\text{ °C})$ in $\text{J}/(\text{g} \cdot \text{K})$		◇	

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3.	Mechanical properties	
3.1	Density ρ in g/cm ³ (annealed at 40 °C/h)	2.65
3.2	Stress optical coefficient C in $1.02 \cdot 10^{-12}$ m ² /N	◇
3.3	Breaking strength	
	<p>A higher mechanical strength can be realized by chemical toughening according to the ion exchange procedure (refer to annex 3.3.1) or by thermal toughening. Both toughening methods may cause in slightly transmittance - and colourchange.</p>	
3.3.1	Chemical toughening	
	Processing temperature ϑ in °C	420
	Processing time t in h	16
	Compressive stress D_s as birefringence in nm/cm	7600
	Penetration depth N_z up to neutral zone in μ m	57
	Further information	see annex
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/mm ²	◇
3.5	Poisson´s ratio μ	◇
3.6	Torsion modulus G in kN/mm ²	◇
3.7	Knoop hardness HK 0.1/20	◇

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4.	Chemical properties	
4.1	Hydrolytic resistance acc. to DIN ISO 719	
	Hydrolytic class	HGB 3
	Equivalent of alkali (Na ₂ O) per gram of glass grains in µg/g	119
4.2	Acid resistance acc. to DIN 12 116	
	Acid class	S 1
	Half surface weight loss after 6 hours in mg/dm ²	0.13
4.3	Alkali resistance acc. to DIN ISO 695	
	Class	A 2
	Surface weight loss after 3 hours in mg/dm ²	78
4.4	Hazardous Substances	
	EC-directive 2002/95/EC (RoHS-directive)	on request
5.	Electrical properties	disregarded
6.	Other properties	
6.1	Dichroism	
	Owing to the selective absorption band (570 nm to 600 nm), the colour sensitivity can be influenced by a dichroic effect with increasing glass thickness and as a function of the light conditions.	
7.	Annex (diagrams, curves)	

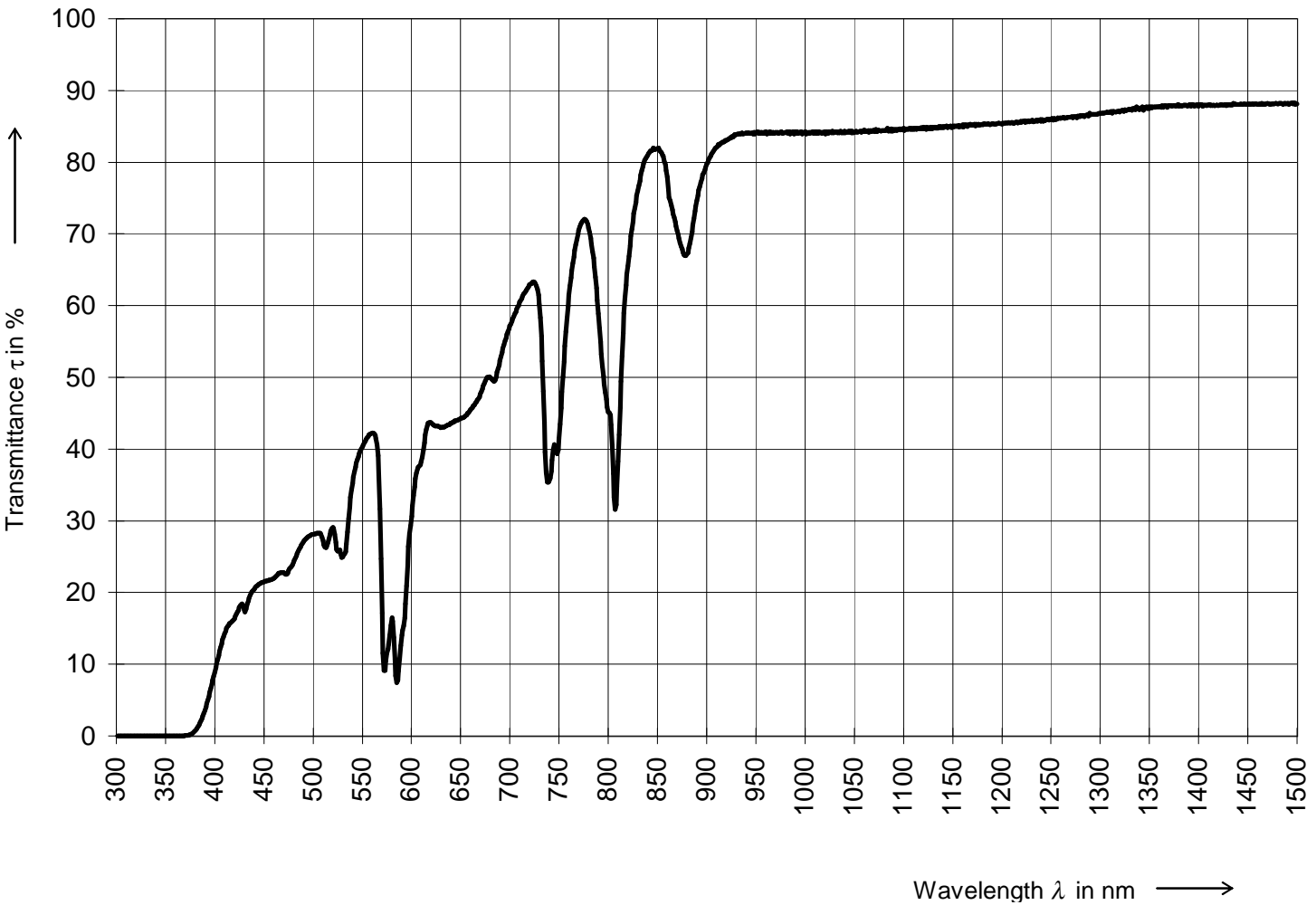
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Spectral Transmittance

Type of Glass: Neophan Gold 1230
Thickness: 2.00 mm

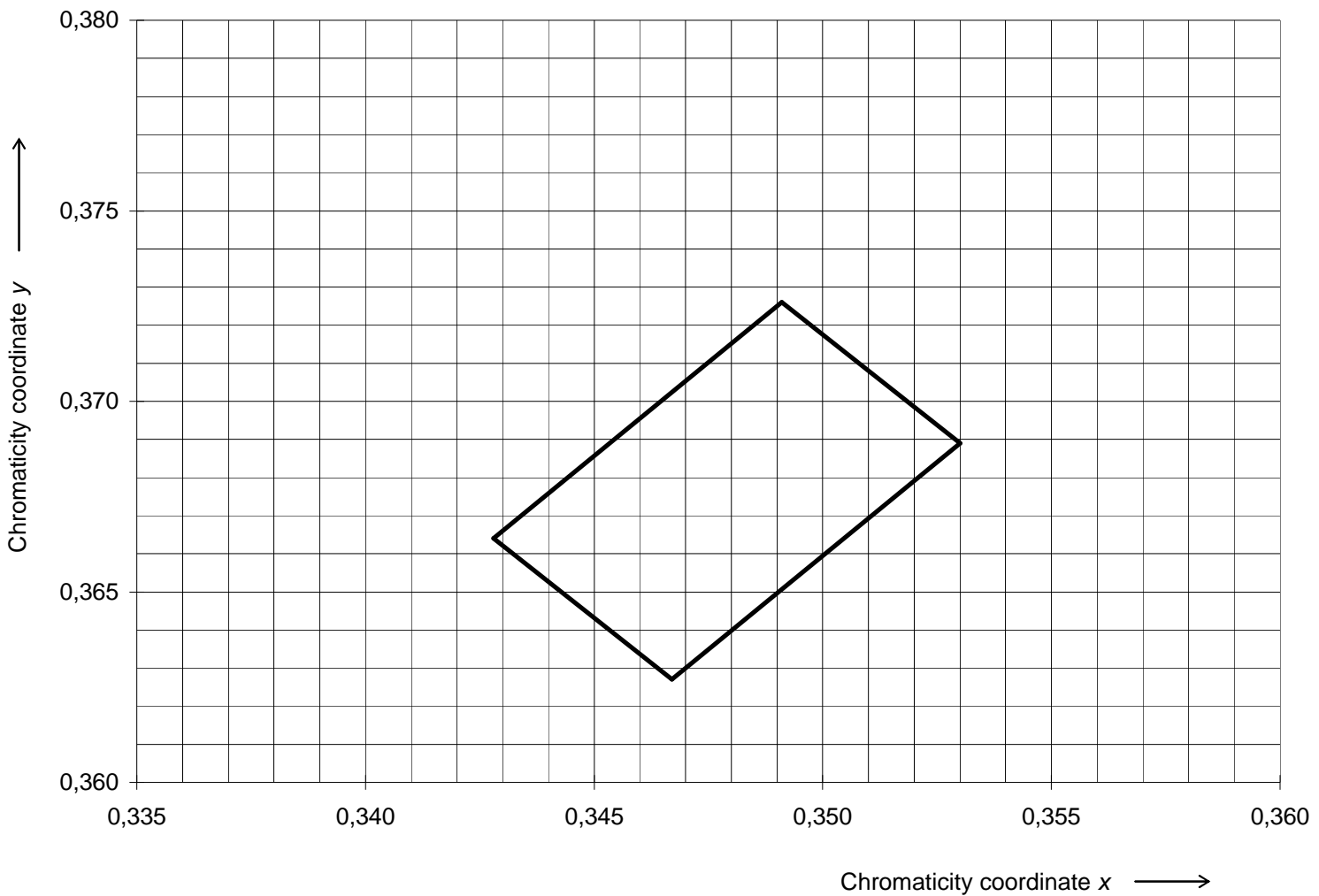


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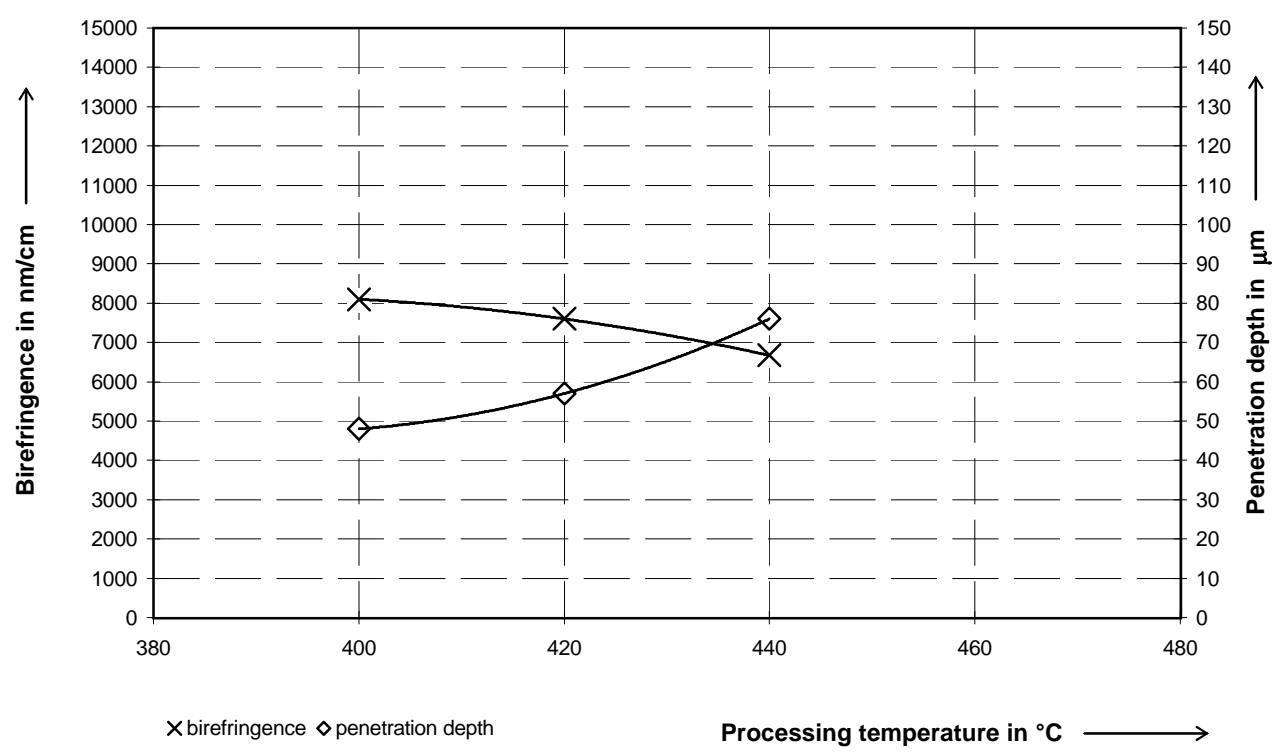
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Chromaticity Coordinates

Type of Glass: Neophan Gold 1230
Thickness: 2.00 mm



Annex 3.3.1

Specification		PCP D 1230													
Physical and chemical properties															
Chemical toughening parameter															
Glass and chemical toughening parameters															
Transformation temperature	°C	533													
Glass thickness	mm	2													
Processing time	h	16													
Processing temperature	°C	420													
Salt bath (* weight percentages)	KNO ₃ in % *	99.5													
	SiO ₂ x H ₂ O in % *	0.5													
Chemical toughening results *															
Penetration depth	µm	57													
Birefringence	nm/cm	7600													
* 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													
 <table border="1"> <caption>Data points from the graph</caption> <thead> <tr> <th>Processing temperature (°C)</th> <th>Birefringence (nm/cm)</th> <th>Penetration depth (µm)</th> </tr> </thead> <tbody> <tr> <td>400</td> <td>8000</td> <td>4800</td> </tr> <tr> <td>420</td> <td>7500</td> <td>5800</td> </tr> <tr> <td>440</td> <td>6500</td> <td>7500</td> </tr> </tbody> </table>				Processing temperature (°C)	Birefringence (nm/cm)	Penetration depth (µm)	400	8000	4800	420	7500	5800	440	6500	7500
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