



BPC300 Photochromic Spectrometer

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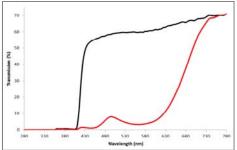
The Bentham BPC300 is a turn-key solution for the characterisation of photochromic lens transmission in accordance with international standards¹ and a key tool in the development of photochromic formulations.

In the BPC300, a conditioned photochromic sample is immersed in a temperature-controlled water bath prior to launching a pre-defined series of transmission measurements, corrected to transmission in air where desired.

In consideration of standards, the spectral transmission of the lens (280-780nm) is measured at 23°C in the faded state prior to exposure to an air mass 2 (AM2) conditioning beam at 50klx for a period of 15 minutes. The process is completed by the re-evaluation of transmission, now in the darkened state and the generation of a report.

Where specific claims are made with respect to performance at varying temperature, or for use in night driving, different measurement conditions apply.

The high degree of configurational flexibility of the BPC300 permits darkening and fading-back kinetic studies, whilst the modification of sample temperature, conditioning beam illuminance and spectrum allows accounting for a wide range of lens exposure conditions.





Reported Parameters			
τ_{V0}	Luminous transmittance in the faded state at (23± 2)°C		
τ_{V1}	Luminous transmittance in the darkened state at (23± 2)°C		
τ_{V0} / τ_{V1}	Photochromic response		
τ_{VW}	Luminous transmittance at (5± 2)°C		
$ au_{VS}$	Luminous transmittance at high temperature (35± 2)°C		
τ_{VA}	Luminous transmittance at reduced solar simulator level and (23±2)°C		
τ_{SUVA}	Mean UVA spectral transmittance weighted by AM2		
τ_{SUVB}	Mean UVB spectral transmittance weighted by AM2		
Q _{sign}	Visual attenuation coefficient for red, green, blue and yellow incandescent and LED traffic signals		
$ au_{sb}$	Solar blue light transmittance		
	Lens category in faded and darkened states		
	Colourimetric parameters in CIE 1931 & CIELab colour spaces		

¹ ISO/ EN 8980-3:2013: "Ophthalmic optics. Uncut finished spectacle lenses. Transmittance specifications and test methods."

ISO/ EN 12312-1:2013: "Eye and face protection. Sunglasses and related eyewear. Sunglasses for general use"

System Overview Spectrometer

Lens transmission is measured by illuminating the sample with an optically chopped, monochromatic probe output from a TMc300 single monochromator. Light transmitted by the sample is measured by a dual detector station coupled to a fully automated DSP lock-in amplifier.

Optical chopping is important to allow measurement during sample activation by the AM2 conditioning beam.

AM2 Conditioning Beam

Photochromic activation is achieved, in conformance with standards, by using a close AM2 spectral match conditioning beam producing an illuminance of 50± 5 klx at the sample plane. Uniformity of illumination is ensured by the use of a bifurcated fibre. An automated shutter ensures correct timing of sample exposure.

The illuminance at the sample plane may be varied and the source filtered where required.

Water Bath

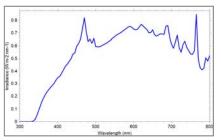
The mounted sample is immersed in a temperaturecontrolled water bath for the purposes of maintaining temperature during conditioning and to allow evaluating the photochromic response at different temperatures.

A dual optical path system is implemented to obviate the need for user intervention when measuring the reference level.

Software Control

All measurements with this system are driven from the BPC300 utility in our proprietary Windows software, BenWin+. Full control of measurement conditions is permitted, allowing the definition of measurement procedure which, once in place, can be simply run to perform routine measurements. A PDF measurement report may be generated at the end of the automated procedure.











Specification

Spectral range of operation 280-780nm Spectral data interval 5nm Spectral bandwidth (FWHM) 5nm Minimum measured transmittance <0.25% Uncertainty spectral transmittance <2% (k=2) at all wavelengths Uncertainty luminous transmittance <1% (k=2) Wavelength accuracy <320nm, ± 0.1nm; >320nm, ± 0.2nm Beam diameter at sample plane 4mm diameter Maximum sample dlameter 75mm Conditioning beam spectral match Irradiance (W.m²) Iso 8980-3:2013 BPC300 (Typical) Iso 8980-3:2013 BPC300 (Typical) BPC300 (Typical) Iso 8980-3:2013 B	Specification				
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340-380nm 380-420nm 12± 3.0 13.8 420-460nm 20± 3.0 26± 2.6 27.2 Conditioning beam illuminance Conditioning beam attenuation Conditioning beam filter wheel Eight positions for 25mm diameter filters Water bath temperature range Temperature accuracy Bench space required Computer requirements Services requirements 5.6± 1.5 6.3 2.8 380-420nm 12± 3.0 21.3 26± 2.6 27.2 0-50klx at sample plane Four positions fitted with iris diaphragms Eight positions for 25mm diameter filters Vater bath temperature range 5-50°C Temperature accuracy ± 0.2°C Bench space required OS: Windows 7 or newer (32-/64-bit) Minimum hard disk space: approx. 100MB Minimum RAM: 2 GB 4 x USB 2.0 ports 6 x 110/220V AC mains sockets, 1200VA total Nitrogen gas supply (where measurements below		ISO 8980-3:2013	BPC300 (Typical)		
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