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Optics and optical instruments — Test methods for telescopic systems —

Part 5: Test methods for transmittance

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Optique et instruments d'optique — Méthodes d'essai pour systèmes télescopiques —

Partie 5: Méthodes d'essai du facteur de transmission

AMENDEMENT 1

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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The committee responsible for this document is ISO/TC 172, *Optics and photonics*, Subcommittee SC 4, *Telescopic systems*.

Optics and optical instruments — Test methods for telescopic systems —

Part 5:
Test methods for transmittance

AMENDMENT 1

Update references to ISO/CIE 10526 and ISO/CIE 10527. This applies to Clause 2, the Bibliography, and all instances ISO/CIE 10526 and ISO/CIE 10527 are referenced.

ISO/CIE 10526 has been cancelled and replaced by ISO 11664-2:

ISO 11664-2:2007, *Colorimetry — Part 2: CIE standard illuminants*

ISO/CIE 10527 has been cancelled and replaced by ISO 11664-1:

ISO 11664-1:2007, *Colorimetry — Part 1: CIE standard colorimetric observers*

In addition, add to the Bibliography:

ISO 11664-3:2012, *Colorimetry — Part 3: CIE tristimulus values*

ISO 11664-4:2008, *Colorimetry — Part 4: CIE 1976 L*a*b* Colour space*

ISO 11664-5:2009, *Colorimetry — Part 5: CIE 1976 L*u*v* Colour space and u', v' uniform chromaticity scale diagram*

Page 3, Subclause 5.5

Add the following paragraphs:

Generally, the smallest possible aperture stop should be used which is compatible with the signal-to-noise requirements of the detector.

Special care should be taken when measuring telescopic systems with variable magnification where at some magnification settings the entrance pupil can be considerably smaller than the free objective lens diameter. In this case, it is recommended to take the entrance pupil as the "maximum available aperture".

Page 3, Subclause 5.6

Add the following paragraph:

The test specimen should be oriented in a way such that no obstructions occur in the measurement beam (e.g. by reticle structures).

Page 11, Annex B

Add the following new Clause B.3: CIELAB values

B.3 CIELAB values

This clause is a description of an alternative method for the determination of a colour hue (tint) of the visible image.

To get a reasonable idea of the colour hue of the test specimen's image, it is also possible to use the CIELAB colour space to determine the values L^*, a^*, and b^*. The value L^* is not necessary for this method.

CIELAB is a colour space with perceptually uniformly spaced colour distribution.

The normalized standardized spectral values X_n, Y_n, and Z_n for the white point of D 65 and the 10° observer are taken from Table B.3.

Table B.3 — Normalized standardized spectral values $X_{10W} = X_n$; $Y_{10W} = Y_n$; $Z_{10W} = Z_n$

Standard illuminant	x_{10}	y_{10}	z_{10}	X_{10W}	Y_{10W}	Z_{10W}
D 65	0,313 8	0,331 0	0,355 2	94,81	100,00	107,34

From the spectral transmittance the values X, Y, and Z, according to ISO 11664-1, are calculated. With these and the standardized spectral values, the following values X^*, Y^*, and Z^* are calculated.

$$X^* = \sqrt[3]{X / X_n} \quad \text{for } X/X_n > (6/29)^3$$

$$X^* = (841/108)\left(X / X_n\right) + 4/29 \quad \text{for } X/X_n \le (6/29)^3$$

$$Y^* = \sqrt[3]{Y / Y_n} \quad \text{for } Y/Y_n > (6/29)^3$$

$$Y^* = (841/108)\left(Y / Y_n\right) + 4/29 \quad \text{for } Y/Y_n \le (6/29)^3$$

$$Z^* = \sqrt[3]{Z / Z_n} \quad \text{for } Z/Z_n > (6/29)^3$$

$$Z^* = (841/108)\left(Z / Z_n\right) + 4/29 \quad \text{for } Z/Z_n \le (6/29)^3$$

With X^*, Y^*, and Z^*, the following values a^* and b^* are calculated.

Coordinate a^*

$$a^* = 500\left(X^* - Y^*\right)$$

Coordinate b^*

$$b^* = 200\left(Y^* - Z^*\right)$$

Finally the chromaticity (tint value) C^*_{ab} is calculated according to the following equation: (distance from the white point)

$$C^*_{ab} = \sqrt{a^{*2} + b^{*2}}$$

To determine the tint the signs of a^*, b^*, and the amount $|b^*/a^*|$ are used. The names of the colours are taken from the Table B.4.

Table B.4 — Colour naming conventions – tint name

		a^*		
		–	+	$\|b^*/a^*\|$
b^*	+	yellow (Y)		>2,5
		yellow green (YG)	orange (O)	0,4 to 2,5
		green (G)	red (R)	<0,4
	–	green (G)	red (R)	<0,4
		blue green (BG)	purple (P)	0,4 to 2,5
		blue (B)		>2,5

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