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Optics and photonics — Optical coatings —

Part 5: Minimum requirements for antireflecting coatings

Optique et photonique — Traitements optiques —

Partie 5: Exigences minimales pour revêtements anti-réfléchissants

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 3, *Optical materials and components*.

A list of all parts in the ISO 9211 series can be found on the ISO website.

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Optics and photonics — Optical coatings —

Part 5:
Minimum requirements for antireflecting coatings

1 Scope

This document specifies minimum requirements for the optical effects and the mechanical, chemical and environmental properties of antireflecting coatings. This document applies to antireflecting coatings for optical applications. Thereby the user is able to rely on defined numerical data while the manufacturer of thin films has the choice for the materials and production method.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9211-1, *Optics and photonics — Optical coatings — Part 1: Vocabulary*

ISO 9211-2, *Optics and photonics — Optical coatings — Part 2: Optical properties*

ISO 9211-3, *Optics and photonics — Optical coatings — Part 3: Environmental durability*

ISO 9211-4, *Optics and photonics — Optical coatings — Part 4: Specific test methods*

ISO 9022-2, *Optics and photonics — Environmental test methods — Part 2: Cold, heat and humidity*

ISO 10110-7, *Optics and photonics — Preparation of drawings for optical elements and systems — Part 7: Surface imperfections*

ISO 10110-8, *Optics and photonics — Preparation of drawings for optical elements and systems — Part 8: Surface texture; roughness and waviness*

ISO 10110-9, *Optics and photonics — Preparation of drawings for optical elements and systems — Part 9: Surface treatment and coating*

ISO 13696, *Optics and optical instruments — Test methods for radiation scattered by optical components*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9211-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

NOTE The antireflecting coatings are named type U, V and W in accordance with the form of their characteristic reflection curves. Additionally, type X can be applied, the optical properties of which are agreed to be in accordance with ISO 9211-2.

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3.1
antireflecting coating type U
single layer coating which is characterized by a single reflection minimum at a wavelength λ_1

Note 1 to entry: The spectral position and the value of the reflection minimum result from the layer thickness and the refractive indices of the layer material and the substrate (see Figure 1).

3.2
antireflecting coating type V
double layer coating which is characterized by a single reflection minimum at a wavelength λ_1

Note 1 to entry: Compared to type U the slopes are steeper. The value of the reflection minimum is lower and is to a large extent independent of the refractive index of the substrate (see Figure 2).

3.3
antireflecting coating type W
multilayer coating with a reflection reduction that is largely independent of the refractive index of the substrate and covers a larger spectral range within the boundary values λ_1 and λ_2, where $\frac{\lambda_2}{\lambda_1} \geq 1{,}57$

Note 1 to entry: See Figure 3.

3.4
antireflecting coating type X
multilayer coating, the reflection reducing properties of which are described in ISO 9211-2 and which does not match types U, V or W

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4 Designation

Designation of a reflection reducing coating of type W with the boundary values $\lambda_1 = 420\,\text{nm}$ and $\lambda_2 = 660\,\text{nm}$:

AR coating ISO 9211–5 – W – 420 – 660

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5 Indication in drawings

When applying this document, Ⓛ (the symbol for optical coating in accordance with ISO 10110-9) shall be indicated in the drawing in conjunction with the designation in accordance with Clause 4.

6 Minimum requirements

The minimum requirements shall apply to unstressed antireflecting coatings as specified in Table 1. The spectral reflectance for the coating types U, V, W and X is given in Table 2.

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