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Analytical colorimetry —

Part 2: Saunderson correction, solutions of the Kubelka-Munk equation, tinting strength, depth of shade and hiding power

Analyse colorimétrique —

Partie 2: Correction de Saunderson, solutions de l'équation de Kubelka-Munk, pouvoir colorant, profondeur de teinte et pouvoir masquant

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 256, *Pigments, dyestuffs and extenders,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 298, *Pigments and extenders,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 18314-2:2015), which has been technically revised.

The main changes are as follows:

— the title has been amended by “depth of shade”;

— the terms and definitions in Clause 3 have been aligned with ISO 18451-1;

— the document has been editorially revised and the bibliography has been updated.

A list of all parts in the ISO 18314 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Analytical colorimetry —

Part 2:
Saunderson correction, solutions of the Kubelka-Munk equation, tinting strength, depth of shade and hiding power

1 Scope

This document specifies the Saunderson correction for different measurement geometries and the solutions of the Kubelka-Munk equation for hiding and transparent layers. It also specifies methods for the calculations of the tinting strength including the residual colour difference based on different criteria such as the depth of shade. Finally, methods for determining the hiding power are provided.

The procedures for preparing the samples for these measurements are not part of this document. They are agreed between the contracting parties or are described in other national or international standards.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

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

3.1
tinting strength
colour strength
measure of the ability of a colourant to colour other materials because of its absorptive power

[SOURCE: ISO 18451-1:2019, 3.122]

3.2
relative tinting strength
relative colour strength
percentage ratio of the *tinting strength* (3.1) of the colourant under test related to the tinting strength of a reference colourant

[SOURCE: ISO 18451-1:2019, 3.105]

3.3
tinting strength criterion
parameter that describes the colouring effect of a colourant, based on its absorption

Note 1 to entry: The tinting strength criteria used in this document are the following:

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— value of the Kubelka-Munk function at the absorption maximum;

— weighted sum of the Kubelka-Munk function values;

— tristimulus value Y;

— the smallest of the tristimulus values X, Y, Z;

— shade depth parameter B.

Note 2 to entry: Examples of other tinting strength parameters not used in this document are the following:

— unweighted sum of the Kubelka-Munk function values;

— chromaticity given by the three colour coordinates (L^*, a^*, b^*);

— reflectance factor at the absorption maximum.

3.4
residual colour difference
colour difference that remains between the white reductions of the reference and test samples when the *tinting strength criterion* (3.3) values are the same or have been equalized

EXAMPLE Residual colour difference is given by ΔE^*.

3.5
depth of shade
shade depth
colour depth
measure for the intensity of a colour perception that increases with increasing chroma and decreases with increasing lightness

Note 1 to entry: Colourations having the same depth of shade appear to be prepared using the same concentrations of colourants having the same *tinting strength* (3.1).

[SOURCE: ISO 18451-1:2019, 3.26, modified — admitted terms “shade depth” and “colour depth” have been added.]

3.6
standard depth of shade
standard shade depth
standard colour depth
SD
depth of shade (3.5) level laid down by convention

[SOURCE: ISO 18451-1:2019, 3.113, modified — admitted terms “standard shade depth” and “standard colour depth” have been added.]

3.7
hiding power
ability of coating to obliterate the colour or colour differences of the substrate

Note 1 to entry: The use of the German expressions “Deckkraft” und “Deckfähigkeit” should be avoided.

Note 2 to entry: The term “coverage” is ambiguous because it is used in some instances to refer to hiding power and in others to mean spreading rate. The more precise terms hiding power and spreading rate should always be used.

[SOURCE: ISO 18451-1:2019, 3.47]

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