Analytical colorimetry

Part 4: Metamerism index for pairs of samples for change of illuminant
National foreword

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The UK participation in its preparation was entrusted to Technical Committee STI/1, Pigments.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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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.
Introduction

For the phenomenon of metamerism of pairs of samples, three different kinds are distinguished:

a) Illuminant metamerism occurs if both of the object colours of a pair of samples are perceived as being the same only under a specific illuminant (e.g. under illuminant D65), while they differ under a different illuminant (e.g. illuminant A).

b) Observer metamerism occurs if the object colours of a pair of samples are perceived as being the same by one observer, while a different observer perceives a colour difference under the same illuminant and the same reference conditions.

   NOTE 1 The observer metamerism is caused by differences between the distributions of spectral colour matching functions of different observers.

c) Field-size metamerism occurs if both of the object colours of a pair of samples are perceived as being the same on the retina for a size of an observation field (e.g. defined by the 2° standard observer), while they differ for a different observation field on the retina (e.g. 10°).

   NOTE 2 The reason for field-size metamerism is based on the existent colour matching functions of an observer during an observation situation. The colour matching functions change with the size of the observation field on the retina. Such change of the observation field can also occur if, for example, the pair of samples is examined from different distances.
Analytical colorimetry —

Part 4: Metamerism index for pairs of samples for change of illuminant

1 Scope

This document specifies a formalism for the calculation of the illuminant metamerism of solid surface colours. It cannot be applied to colours of effect coatings without metrical adaptation.

This document only covers the phenomenon of metamerism for change of illuminant, which has the greatest meaning in practical application. In the case of chromaticity coordinates of a pair of samples under reference conditions that do not exactly match, recommendations are given on which correction measures are to be taken. Regarding the reproduction of colours, the metamerism index is used as a measure of quality in order to specify tolerances for colour differences between a colour sample and a colour match under different illumination conditions.

The quantification of the illuminant metamerism of pairs of samples is formally performed by a colour difference assessment, for which tolerances that are common for the evaluation of residual colour differences can be used.

NOTE In the colorimetric literature and textbooks, the term geometric metamerism is sometimes used for the case that two colours appear to be the same under a specific geometry for visual assessment and selected standard observer and standard illuminant pair, but is perceived as two different colours at changed observation geometry. The term geometric metamerism is different to metamerism described in this document.

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/CIE 11664-1, Colorimetry — Part 1: CIE standard colorimetric observers
ISO/CIE 11664-2-1, Colorimetry — Part 2: CIE standard illuminants
ISO/CIE 11664-4, Colorimetry — Part 4: CIE 1976 L*a*b* colour space
CIE 015, Colorimetry
CIE S 017, International Lighting Vocabulary

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CIE S 017 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