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Textiles - Tests for colour fastness - Method for the instrumental assessment of the colour inconstancy of a specimen with change in illuminant (CMCCON02)

纺织品 色牢度试验 试样颜色随照明体变化的仪器评定方法

(CMCCON02)

(ISO 105-J05:2007, MOD)

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Table of Contents

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1 Scope

This Standard specifies a colorimetric method to calculate the assessment value of the extent (and direction) of change in colour of the test specimen when the chromaticity of the illuminant changes, that is, to assess the color inconstancy of the specimen.

Note 1: Color inconstancy and metamerism are related but distinct. It is related to changes in the illuminant,

a) Color inconstancy is the extent of change in the colour appearance of a single specimen.

b) Metamerism is the extent of change in the color difference between two specimens.

This Standard provides a method for assessing a) but not b).

Note 2: The results of this method and the results of the visual assessments are comparable only if the visual assessment is carried out under the following conditions:

a) Illumination with the same spectral power distribution as the colorimeter is used;

b) The illuminance of the illuminator irradiating the specimen is 1 000 lx ~ 4 000 lx;

c) It is evaluated by persons who fully meet the relevant observation conditions.

This Standard applies to textile fabrics.

2 Normative references

The following referenced documents are indispensable for the application 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.

GB/T 8424.1, Textiles - Tests for colour fastness - General principles for measurement of surface colour (GB/T 8424.1-2001, eqv ISO 105-J01:1997)

GB/T 8424.3, Textiles - Tests for colour fastness-Calculation of colour differences (GB/T 8424.3-2001, eqv ISO 105-J03:1995)

3 Principle

Under the CIE standard D65 reference illuminant and the agreed test illuminator, respectively measure or calculate the tristimulus values (X_r, Y_r, Z_r and X, Y, Z) of the specimen. All calculations are based on CIE 1964 Standard Colorimetric Observer. Transform the tristimulus values (X, Y, Z) of the specimen in the test illuminant into the tristimulus values (X_c, Y_c, Z_c) of the corresponding colors in illuminant D65 by a chromatic adaptation transform (CAT02). Finally, according to the color-difference formula that is specified in GB/T 8424.3, calculate the colour difference between the tristimulus values (X_c, Y_c, Z_c) of the corresponding color of the specimen in illuminator D65 and the tristimulus values (X_r, Y_r, Z_r) measured or calculated in illuminator D65. The colour difference is the required Colour-Inconstancy Index, CMCCON02.

Note 1: For further information on CMCCON02 and CAT02, see Reference [2].

Note 2: The corresponding color is the color that would have the same appearance in illuminator D65 as it has in the test illuminator.

4 Procedure

All tristimulus values in this Standard shall be obtained based on the CIE 1964 Standard Colorimetric Observer (10°).

4.1 Select appropriate instruments and software to respectively measure or calculate the tristimulus values (X_r, Y_r, Z_r) and (X, Y, Z) of the specimen in illuminator D65 and in the agreed test illuminator according to GB/T8424.1.

4.2 Calculate the (R, G, B) values of the specimen and the (R_w, G_w, B_w) values of the perfect reflecting diffuser, each under the test illuminator, as well as the (R_{wr}, G_{wr}, B_{wr}) values of the perfect reflecting diffuser in illuminant D65.

During the calculation, keep six decimal places, as shown in the reverse matrix M^{-1}_{CA1T02}. When necessary, double-precision arithmetic shall be used.

4.5 Use the tristimulus values (X_c, Y_c, Z_c) of the corresponding colour in illuminator D65 as batch, and the tristimulus values (X_r, Y_r, Z_r) measured or calculated in illuminator D65 as standard, to calculate the color difference between the colors they represent according to GB/T 8424.3.

5 Interpretation of results

5.1 The color difference calculated according to 4.5 is the required Colour-Inconstancy Index, CMCCON02, which is used to measure the extent of color change of the specimen in the test illuminator and illuminator D65. If CMCCON02 is zero, it means that the color of the specimen has not changed under these two illuminants (this does not mean that under the other pair of illuminants, the color of the specimen will not change). The larger the value of CMCCON02, the greater the color inconstancy of the specimen under these two illuminants.

5.2 If necessary, report differences in lightness, chroma and hue (ΔL*, ΔC* and ΔH*) to better understand the nature and direction of the CMCCON02.

Note: See Appendix A for test data and examples.

6 Test report

The test report shall include the following contents:

a) number of this Standard;

b) a detailed description of the test specimen;

c) a description of the colorimeter or spectrophotometer used for the test, including the CIE geometry type for which the input data is obtained, the equipment model, etc.;

d) test date;

e) identification of the test illuminant, such as illuminant A;

f) the origin of the weighting function of the illuminant D65 and the test illuminator, e.g., ASTM E308-01[4];

g) the color-difference formula used to calculate the value of CMCCON02, e.g., CMC (1:1);

h) the value of Colour-Inconstancy Index, CMCCON02, e.g., CMCCON02 = 3.1;

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