INTERNATIONAL STANDARD

ISO 105-J02

Second edition
1997-12-15

Textiles — Tests for colour fastness —

Part J02:
Instrumental assessment of relative whiteness

Textiles — Essais de solidité des teintures —

Partie J02: Évaluation instrumentale de la blancheur relative

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Reference number
ISO 105-J02:1997(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 105-J02 was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 1, *Tests for coloured textiles and colorants.*

This second edition cancels and replaces the first edition (ISO 105-J02:1987), which has been technically revised.

ISO 105 was previously published in thirteen “parts”, each designated by a letter (e.g. “Part A”), with publication dates between 1978 and 1985. Each part contained a series of “sections”, each designated by the respective part letter and by a two-digit serial number (e.g. “Section A01”). These sections are now being republished as separate documents, themselves designated “parts” but retaining their earlier alphanumeric designations. A complete list of these parts is given in ISO 105-A01.

Annex A forms an integral part of this part of ISO 105.

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Printed in Switzerland

Textiles — Tests for colour fastness —

Part J02:
Instrumental assessment of relative whiteness

1 Scope

1.1 This part of ISO 105 specifies a method intended for quantifying the whiteness and tint of textiles, including fluorescent materials.

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1.2 Whiteness as measured by this test method is an indication of how white the textile appears to an average viewer. Tint, if other than zero, is an indication of a reddish or greenish hue having shifted away from a bluish (neutral) hue with a dominant wavelength of 466 nm. The formulae for calculation of whiteness and tint are those recommended by the CIE[1)].

1.3 Because reflectance is affected by the nature of the surface of the textile, comparisons can be made only between specimens of the same type of textile.

1.4 The application of the formulae is restricted to specimens that are called "white" commercially, that do not differ much in colour and fluorescence and that are measured on the same instrument at nearly the same time. Within these restrictions, the formulae provide relative, but not absolute, evaluations of whiteness that are adequate for commercial use when employing measuring instruments having suitable modern and commercially available capabilities.

1) International Commission on Illumination, Vienna.

1.5 Many impurities in textiles absorb short wavelength light, resulting in a yellowish appearance to observers. Therefore, a measurement of whiteness may be an indication of the degree to which a textile is free from impurities.

1.6 The effect of blueing components or fluorescent whitening agents (FWAs) on the whiteness of textiles may also be determined using the whiteness measurement.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 105. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreement based on this part of ISO 105 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of the IEC and ISO maintain registers of currently valid International Standards.

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ISO 105-J01:—[2], *Textiles — Test for colour fastness — Part J01: General principles for measurement of surface colour.*

CIE Publication No. 15.2: 1986[3], *Colorimetry* (second edition).

CIE Publication No. 17.4:1987[3], *International Lighting Vocabulary.*

ASTM E 284-96b:1996[4], *ASTM Terminology of Appearance (Revised).*

ASTM E 308-96:1996[4], *Practice for computing the colors of objects by using the CIE system.*

2) To be published.

3) Available from CIE Central Bureau, Kegelgasse 27, A-1030 Vienna, Austria.

4) Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 USA.

3 Definitions

For the purposes of this part of ISO 105, the following definitions apply:

3.1 CIE chromaticity coordinates. The ratio of each of the tristimulus values of a psychophysical colour to the sum of the tristimulus values.

3.2 CIE tristimulus values. The amounts of three non-real reference colour stimuli required to give a colour match with the colour stimulus considered, and defined by the CIE for the CIE 1931 colorimetric observer (2° standard observer) and the CIE 1964 supplementary colorimetric observer (10° standard observer).

3.3 fluorescent whitening agent (FWA). Colorant that absorbs near ultraviolet (UV) radiation and re-emits visible (violet-blue) radiation causing a yellowish material to which it has been applied to appear whiter.

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3.4 perfect reflecting diffuser. Ideal isotropic diffuser with reflectance of unity.

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NOTES

1 An isotropic diffuser is one in which the spatial distribution of reflected radiation is such that the radiance or luminance is the same in all directions in the hemisphere into which the radiation is reflected.

2 The perfect reflecting diffuser is the basis of calibration of reflectance measuring instruments. The equations for whiteness and tint are formulated so that the CIE concept of the perfect reflecting diffuser has a whiteness index of 100,0 and a tint value of 0,0.

3.5 whiteness. The attribute by which an object colour is judged to approach a preferred white.

3.6 tint. The hue of a white material as influenced by the wavelength of peak emission or reflectance.

NOTE — These definitions are based on CIE publication 15.2, CIE publication 17.4 or ASTM E 284-96b.

4 Principle

The CIE tristimulus values are measured using a reflectance spectrophotometer or colorimeter, and the whiteness and tint calculated from formulae based on the CIE chromaticity coordinates.

5 Apparatus and materials

5.1 Colour-measuring instrument, a reflectance spectrophotometer or colorimeter capable of measuring or calculating CIE tristimulus values with at least one of the CIE specified geometries (45/0, 0/45) as defined in ISO 105-J01 (*d*/0, 0/*d*). When integrating spheres are used for measuring fluorescent specimens, the spectral power distribution of the illuminating system is altered by the reflected and emitted power from the specimen. The use of the 45/0 or 0/45 condition is therefore preferable. If an integrating sphere instrument is to be used, measurements should, if possible, be made with the specular component of reflectance excluded.

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5.2 Reference standard, the primary standard is the perfect reflecting diffuser (see 3.4). Secondary reference standards are standards that are calibrated in terms of the perfect reflecting diffuser and are used in the standardization of the instrument.

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5.3 UV Lamp, used for visual determination of presence of FWA on textile specimens.

CAUTION: Protect the eyes from UV light. The safety recommendations provided by the UV light manufacturer should be followed.

6 Test specimen

Condition each specimen as described in annex A.2 of ISO 105-J01:1997. Keep the specimens free of dirt and stains. The exact size necessary will depend on the aperture of the reflectance-measuring instrument used and on the translucency of the textile material.