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Tissue paper and tissue products —

Part 7:
Determination of optical properties — Measurement of brightness and colour

Papier tissue et produits tissues —

Partie 7: Détermination des propriétés optiques — Mesurage du degré de blancheur et de la couleur

[Revision of first edition (ISO 12625-7:2007)]

ICS 85.060

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the European Committee for Standardization (CEN), and processed under the **CEN-lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five-month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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ISO 12625-7 was prepared by the European Committee for Standardisation (CEN) Technical Committee CEN/TC 172, *Pulp, paper and board,* in collaboration with Technical Committee ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 2, *Test methods for quality specifications for paper and board,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 12625-7:2007) of which has been technically revised. The following changes have been made:

a) the measurement of optical properties, measured with D65/10° were added;

b) to measure brightness and colour of tissue paper and tissue products the illuminant conditions were specified;

c) measurements of whiteness and opacity were excluded;

d) editorial updating.

ISO 12625 consists of the following parts, under the general title *Tissue paper and tissue products*:

— *Part 1: General guidance on terms;*

— *Part 3: Determination of thickness, bulking thickness and apparent bulk density;*

— *Part 4: Determination of tensile strength, stretch at break and tensile energy absorption;*

— *Part 5: Determination of wet tensile strength;*

— *Part 6: Determination of grammage;*

— *Part 7: Determination of optical properties — Measurement of brightness and colour;*

— *Part 8: Water-absorption time and water-absorption capacity; basket-immersion test method;*

— *Part 9: Determination of ball burst strength;*

— Part 12: Determination of tensile strength of perforated lines — Calculation of perforation efficiency;

Introduction

Optical measurement are affected by the geometry of the instruments used and by the texture of the material. The design of the instrument to be used according to this part of ISO 12625, and the routine to be adopted for its calibration, are specified in ISO 2469.

The optical properties are related to the visual appearance of the material. Therefore, although optical properties are intrinsic properties of tissue paper, they are not functional properties.

Tissue paper and tissue products —

Part 7:
Determination of optical properties — Measurement of brightness and colour

1 Scope

This part of ISO 12625 specifies testing procedures for the instrumental determination of brightness and colour of tissue paper and tissue products. It also gives specific instructions for the preparation of test pieces (single-ply, multi-ply products) and for the optical measurements of products, where special precautions may be necessary.

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.

ISO 186, *Paper and board — Sampling to determine average quality*

ISO 187, *Paper, board and pulps; standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples*

ISO 2469:2007, *Paper, board and pulps — Measurement of diffuse radiance factor*

ISO 2470-2, *Paper, board and pulps — Measurement of diffuse blue reflectance factor — Part 2: Outdoor daylight conditions (D65 brightness)*

ISO 5631-2:2008, *Paper and board — Determination of colour by diffuse reflectance — Part 2: Outdoor daylight conditions /D65/10°)*

ISO 11475, *Paper and board — Determination of CIE whiteness, D65/10° (Outdoor daylight)*

3 Terms and definitions

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

3.1
reflectance factor
R
ration of the radiation reflected by a body to that reflected by the perfect diffuser under the same conditions of illumination and detection

NOTE 1 The reflectance factor is expressed as a percentage.

NOTE 2 The reflectance factor is influenced by the backing if the body is translucent.

3.2
diffuse reflectance factor
R
ratio of the reflection from a body to that from the perfect reflecting diffuser under the same conditions of diffuse illumination and normal detection

NOTE 1 The ratio is often expressed as a percentage.

NOTE 2 Adopted from ISO 2469:2007.

3.3
intrinsic reflectance factor
R_∞
diffuse reflectance factor of a layer or pad of material thick enough to be opaque, i.e. such that increasing the thickness of the pad by doubling the number of sheets results in no change in the measured reflectance factor

NOTE Adapted from ISO 2469:2007.

3.4
D65 brightness
Intrinsic reflectance factor measured with a reflectometer having the characteristics described in ISO 2469, equipped with a filter or corresponding function having an effective wavelength of 457 nm (and a half bandwidth of 44 nm, and adjusted so that the UV content of the irradiation incident upon the test piece corresponds to that of the CIE standard illuminant D65.

NOTE The filter function is described more fully by the weighing function factors given in ISO 2470-2.

3.5
tristimulus units
X_{10}, Y_{10}, Z_{10}
amounts of the three reference colour stimuli, in a given chromatic system, required to match the stimulus considered

NOTE 1 In ISO 5631-2 the CIE standard illuminant D65 and the CIE 1964 (10°) standard observer are used to define the trichromatic system.

NOTE 2 The subscript 10 is applied to conform to the CIE convention that tristimulus units have the subscript 10 when the CIE 1964 (10°) standard observer is used.

NOTE 3 Adapted from ISO 5631-2:2008.

3.6
colour (D65/10°)
*L**, *a** and *b** units of the sample according to the CIELAB 1976 system, corresponding to the CIE standard illuminant D65, described in TS ISO 10526 [2] and the CIE 1964 supplementary standard colorimetric observer, described in ISO 11664-1 [3], determined by measurement under the conditions specified in ISO 5631-2.

4 Apparatus

4.1 Reflectometer or spectrophotometer

having the geometric, spectral and photometric characteristics described in ISO 2469 and calibrated in accordance with the provisions of ISO 2469, and equipped for the measurement of blue reflectance factor

4.1.1 In the case of a filter reflectometer, the radiation falling upon the test piece shall have a UV content corresponding to that of the CIE standard illuminant D65, adjusted or verified by the help of the fluorescent reference standard (4.2.2).

4.1.2 In the case of an abridged spectrophotometer, the instrument shall have an adjustable filter with a cut-off wavelength of 420 nm or some other system for adjustment and control, and this filter shall be adjusted or the system shall be calibrated with the help of the fluorescence reference standard (4.2.2), so that the UV content of the illumination falling upon the sample corresponds to that of the CIE standard illuminant D65.

4.2 Reference standard for calibration of the instrument

to be used sufficiently frequently to ensure satisfactory calibration and UV adjustment.

4.2.1 Non-fluorescent reference standard for photometric calibration, issued by an ISO/TC 6 authorized laboratory in accordance with the provisions of ISO 2469.

4.2.2 Fluorescent reference standard for use in adjusting the UV content of the radiation incident upon the sample, having a CIE whiteness (D65/10°) unit assigned by an ISO/TC 6 authorized laboratory as prescribed in ISO 11475:2004, Annex B.

NOTE Greater precision in the D65 brightness measurement would be attained if a fluorescent reference standard having an assigned D65 brightness unit were used. It is, however, important for the industry to have only one UV-filter adjustment for all measurements under CIE illuminant D65 conditions. For this reason, a reference standard having an assigned CIE whiteness (D65/10°) units as prescribed in ISO 11475 is preferred.

4.3 Working standards

4.3.1 Two plates of flat opal glass, ceramic or other suitable non-fluorescent material, cleaned and calibrated as described in ISO 2469.

NOTE In some instruments, the function of the primary working standard may be taken over by a built–in internal standard.

4.3.2 Stable plastic or other tablet, incorporating a fluorescent whitening agent.

4.3.3 Black cavity, having a reflectance factor which does not differ from its nominal unit by more than 0,2 %, at all wavelengths. The black cavity should be stored upside down in a dust-free environment or with a protective cover.

NOTE The condition of the black cavity can be checked by reference to the instrument maker.

5 Calibration

5.1 Using the units assigned to the non-fluorescent reference standard (4.2.1), calibrate the instrument with the UV-cut-off filters removed from the radiation beams. The setting of the UV-adjustment filter is not important at this stage.

5.2 Using the appropriate measurement procedure, measure the radiance factors of the fluorescent reference standard (4.2.2); calculate the whiteness units and compare the unit obtained with the assigned to the fluorescent reference standard.

A measured whiteness unit higher than the assigned unit indicates that the relative UV-content is too high and vice versa.

5.3 Using the UV-adjustment filter or other adjustment device, adjust the UV-content of the illumination until measurement gives the correct whiteness unit.

5.4 Repeat the calibration as described in 5.1 using the non-fluorescent reference standard (4.2.1) with the UV-adjustment filter in the position which gave the correct whiteness unit. Repeat the measurement of the whiteness of the fluorescent reference standard (4.2.2) as described in 5.2. If the whiteness unit obtained does not agree with the assigned value, adjust the position of the UV-adjustment filter until measurement gives the correct whiteness unit as described in 5.3.

5.5 Repeat 5.4 until the correct value for the whiteness of the fluorescent reference standard is obtained with the instrument correctly calibrated to the non-fluorescent reference standard. The UV-content is now correctly adjusted with respect to whiteness to a relative UV-content equivalent to the D65 illuminant. Record the setting of the UV-adjustment.

NOTE 1 This setting is equivalent to the D65 illuminant and CIE 1964 (10°) observer with respect to whiteness. Variations in the green/red tint value may still arise and it cannot be assumed that the tristimulus values and other parameters will also be exactly those applicable to the D65 illuminant.

NOTE 2 In some instruments, the procedure indicated in subclauses 5.2 to 5.5 is performed automatically.

5.6 Calibrate the fluorescent tablet (4.3.2) as working standard.

This working standard may only be used in the specific instrument in which its value was assigned to and shall only be used to monitor changes in the lamps. A new value shall be assigned with a fluorescent reference standard of level 3 (4.2.2), if the lamps are changed or the used working standards show deviations of more than 1 whiteness unit.

5.7 Calibrate the opal glass or ceramic plates (4.3.1) as working standards as described in ISO 2469.

5.8 After adjustment of the UV-content as in 5.1 to 5.5, insert the UV-cut-off filter and calibrate the instrument in this position with the UV-adjustment unchanged.

6 Sampling

If the tests are being made to evaluate a lot, the sample shall be selected in accordance with ISO 186. If the tests are being made on another type of sample, make sure, the specimens taken are representative of the sample received. When sampling finished roll products, eliminate at least the first six layers and the last six layers because of the possible presence of adhesive or mechanical damage.

Mark the samples for identification, and make sure that the two sides of the paper or of the product can be distinguished.

7 Conditioning

Condition the samples according to ISO 187, unless otherwise agreed between the parties concerned and keep them in the standard atmosphere throughout the test.

8 Preparation of test pieces

Cut test pieces of at least 50 mm x 50 mm or 50 mm in diameter, which are free from dirt, perforation and any defect. Assemble sufficient test pieces in a pad with their top sides uppermost; the number of test pieces should be such that doubling the number does not alter the reflectance factor.

Protect the pad by placing a protecting sheet on both sides the top and bottom. Avoid contamination and unnecessary exposure to light or heat.

If the pads are very voluminous and bulky, steps shall be taken to expel the air. The pads should be carefully compressed between the protecting sheets.

Mark the pad in one corner to identify the sample and the marked side.

