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Expertise in Paper Performance

ISO FDIS 15397 Communication of Graphic Paper Properties and Optics

Messages in 1 slide

- Close to be published ISO 15397 Communication of graphic paper properties adresses optic properties and requires:
  - To use paper equipement and metrics (D 65, d/0° spherical), for white paper color and visual perception evaluation.
  - To use printers equipment and metrics (D 50, 45°/0°) for printed paper color evaluation.
- In market industrial paper no value L* above 96. CIELAB max values (ISO 5631-2 D65/10°) are:
  - WF wood-free coated L* 95, b* -10.
  - UWF uncoated wood-free (copy paper) L* 94, b*-20.
- Issues with ISO 13655 conforming equipment.
  - L* reproducible, but a* and b* critical.
  - Fluorescence evaluation must be improved thru calibration routines.

Supporting slides

TC 130/WG4 N762

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Graphic Technology — Communication of graphic paper properties

Technologie graphique — Communication des propriétés des papiers graphiques

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Introduction

This document is intended to improve communication between the graphic papermaking industry and the printing industry based on their need to be able to produce quality printing. Paper properties and their measurement are presented and their use in the printing context is described.

This standard describes data to be provided for reliable printing. One may assess a substrate description to be in conformance with this standard, not a substrate itself.

Printing press settings depend on paper grade, and several paper properties are required in order to define a grade.

Paper measurement standards developed within ISO TC 6 are referenced in this International Standard. They were mainly used to develop paper industry test methods and allow the papermaking processes to be reproducible and reliable within the paper mills. It is recommended that paper purchasing specifications be based on paper industry standards. This recommendation also applies to paper proofing substrates. Special requirements for paper substrates for the reliable production of printed products need to be communicated on the basis of standards developed by TC 6 whenever possible.

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92 The evaluation of colour of the unprinted paper is critical to define prepress white point settings This
93 measurement can be performed with either diffuse:0° integrating sphere instruments (papermaker´s
94 equipment) or 45°:0° instruments (printers equipment). Results are often close if the UV calibration is
95 performed correctly. This International Standard specifies 45°:0° instruments (printers equipment) to perform
96 this evaluation as per ISO 13655, because obviously widely available at printers facilities.

97 For the evaluation of printed colours, measurement devices are developed according to ISO 13655 which
98 differ from the colour measurement devices in conformance to ISO 2469 and ISO 5631 1-2-3. The latter type
99 of instruments is used within paper mills for quality evaluation during paper manufacturing and unprinted
100 paper colour evaluation.

101 Properties linked to the printing process (examples: dimensions, blistering and picking resistance in offset,
102 missing dots in gravure) are not described in this standard, since they are implicitly needed when purchasing
103 the paper meant for this printing process.

104 Properties that are not based on ISO standards are not described here.

105 The bibliography lists basic references in Graphic technology standards [1] [2], Paper and board standards [3],
106 previously published references [4], commercial classifications [5], conditions of Sale [6], and reference lists of
107 printing characterisation data publicly available [8].

ISO FDIS 15397 Scope

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110 **1 Scope**

111 This International Standard specifies the list of paper substrate relevant properties to be communicated
112 between the paper and the printing industries.

113 This International Standard is applicable to papers intended to be printed in rotogravure, cold-set web offset,
114 heat-set web offset, sheet-fed offset, and flexographic printing processes and to proofing substrates.

115 Where multiple measures exist the preferred procedure and its International Standard is defined.

116 All measuring methods of properties specified in this International Standard are described in ISO Standards.

4 List of required criteria for communication of paper properties

For rotogravure, cold-set offset, heat-set web offset, sheet-fed offset, flexographic and proofing printing substrates, the intended use or printing process shall be identified and the following data shall be communicated by the paper manufacturer, with target values.

a) brand name and optionally paper mill (as per Clause 5.2)

b) grammage (as per Clause 5.3)

c) bulk and/or thickness (as per Clause 5.4)

d) roughness PPS (Parker-Print Surf) or roughness Bendtsen or smoothness Bekk (as per Clause 5.5)

For Rotogravure substrates, only roughness PPS is meaningful, values being usually below 3. When roughness PPS values are above 3, the use of roughness Bendtsen is recommended. When roughness Bendtsen is below 100, smoothness Bekk may be used, in particular in smooth writing papers.

e) gloss value and for proofing substrates characterization according to ISO 12647-7 (“glossy”, “semi-matte” or “matte”) (as per Clause 5.6)

The gloss level and the equipment used will determine the International Standard to be used. The International Standard shall therefore be cited when communicating gloss values.

NOTE 1 ISO 12647-7 characterizes proofing substrates measured according to ISO 8254-1 as “glossy” for values larger or equal to 60, as “matte” for values smaller or equal to 20 and “semi matte” in between.

f) opacity (as per Clause 5.7)

g) brightness and/or whiteness for visual appearance evaluation of unprinted paper (as per Clause 5.8)

Whiteness is recommended, but Brightness will bring useful information. This choice will determine the International Standard to be used. The International Standard used shall therefore be cited when communicating Whiteness and Brightness values.

NOTE 2 Brightness and Whiteness standards are available either for C illuminant or D65 illuminant. The choice of the illuminant depends of the end-user viewing conditions.

h) colour coordinates L*, a*, b* with D50 illuminant and CIE 1931 Standard Colorimetric Observer [9] for paper white point in printing conditions (as per Clause 5.9)

i) colour coordinates L*, a*, b* with D65 illuminant and CIE 1964 Standard Colorimetric Observer for unprinted paper in outdoor conditions (as per Clause 5.10)

j) supported colour gamut in the context of prepress design (as per Clause 5.11)

k) fluorescence or fluorescence estimate in the context of prepress. (as per Clause 5.12)

NOTE 3 To avoid distortions due to Fluorescence and for the purpose of proof to print match, proofing substrates and production papers need to be visually evaluated and measured each with the same amount of UV-content of the D50 simulator according to both ISO 13655 and ISO 3664.

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For proofing substrates, the following additional properties shall be communicated.

l) storage conditions (as per Clause 5.13)

Recommended storage conditions shall be specified due to the importance of proofing substrates to colour management.

For sheet-fed offset printing substrates, the following additional properties should be communicated.

m) bending resistance (bending stiffness) (as per Clause 5.14)

5.9 Colour measurement of paper white point in printing conditions (D50/2°)

Refers to Clause 4 h)

CIELAB values of paper shall be communicated in accordance with specific measurement conditions of ISO 13655. ISO 13655 recommends that all measurements should be made with M1 measuring conditions. These data depend also on the measurement device used. The measurement condition, the backing, the type and the manufacturer of the device, shall be communicated together with the CIELAB data, as required by ISO 13655.

When M1 condition of ISO 13655 is not available, the M0 condition may be used for communication and relative evaluation.

NOTE 1 CIELAB values for colour measurement of paper white point in printing conditions (D50/2°) are needed for graphic art prepress and colour management applications.

NOTE 2 Measurements of papers containing fluorescent additives, such as OBA, using instruments with M0 or M2 source conditions will not result in readings that are consistent with those obtained using M1 source conditions.

NOTE 3 ISO 13655 (for measurement) and ISO 3664 (for viewing) provide precise recommendations of the spectral power and UV content of illumination to be used in the printing chain to ensure consistent and predictable values.

3.16
fluorescence component
measure of the extent to which the whiteness of the material is affected by excitation of the added fluorescent whitening agent (FWA) or optical brightening agent (OBA)

[SOURCE: ISO 11476:2010, Clause 3.7]

NOTE 1 to entry: Fluorescent whitening agents (FWA) are also called optical brightening agents (OBA)

NOTE 2 to entry: Fluorescence component is calculated as the difference between the whiteness/brightness measured with a source of light having a UV-content corresponding to the chosen illuminant and the whiteness/brightness measured with a source without radiation of the excitation band.

NOTE 3 to entry: Fluorescence component measured with Brightness and D65 illuminant is most widely used with notation $F_{B, D65}$

[SOURCE: ISO TR 10688 Clause 4.10]

3.18
M0, M1, M2 measurement conditions
Measurement condition M0 requires the source illumination to closely match that of illuminant A; this provides consistency with existing instrumentation and ISO 5-3. Measurement condition M1 requires the colorimetry of the specimen illumination to closely match CIE illuminant D50. Measurement condition M2 only requires that the spectral power distribution of the specimen illumination be provided in the wavelength range from 420 nm to at least 700 nm and have no substantial radiation power in the wavelength range below 400nm (often referred to as “UVCut”)

[SOURCE: ISO 13655-2009 Introduction]

5.12 Fluorescence in the context of prepress

Refers to Clause 4 k)

To improve the visual perceived brightness/whiteness of substrates optical brighteners (OBA) (also called fluorescent whitening agents (FWA)) are commonly used. These substances absorb ultraviolet light and emit blue light. For unprinted substrates therefore the "reflection" within the blue region often exceeds 100 %. It shall be recognized that a single measurement condition does not characterize this situation sufficiently. The lack of a more comprehensive model nonetheless forces the users to apply the CIELAB model also for fluorescent samples. Fluorescence results in a significant decrease of the b*-coordinate of the CIELAB

measurement data if UV light is present, compared to measurements made in its absence. Brightness and Whiteness show significantly larger values with increased excitation of the OBA.

Fluorescence is communicated in the context of Colour Management adjustments.

The following method shall be used to measure Fluorescence: calculate the difference of D65 Brightness measurement performed with UV and with a UV-cut-off filter (often referred as the difference UV-UVX), according to clause 8.4 of ISO 2470-2 Paper, board and pulps — Measurement of diffuse blue reflectance factor — Part 2: Outdoor daylight conditions (D65 brightness). This standard refers to illuminant D65/10° conditions and diffuse:0° equipment.

NOTE 1 Other, non-preferred alternatives and working routines are used within paper mills to evaluate Fluorescence

Alternatively, a classification in 4 levels: faint, low, moderate, high, is a relevant estimate of fluorescence components. Usual limits for Fluorescence : faint (>0), low (>4), moderate (>8), high (>14).

Reflectance evaluated as per ISO 13655 M1 and M2 measuring conditions and in particular the difference of the CIE-b*-values indicates the degree of fluorescence that can be expected in graphic arts viewing and measurements.

NOTE 2 Optical Brightening Agents (OBA) are used in papermaking to achieve a high visual brightness or whiteness. The use of OBA influences paper colour properties under UV light and UV-containing illumination such as daylight simulating illumination sources. This excited emission influences the properties of white paper.

NOTE 3 Fluorescent radiance depends not only on the UV content of the light, but also on the measurement equipment used. UV calibration and the colour rendering quality of light sources to simulate the reference illuminant are critical issues. Geometry (diffuse:0°, 45°:0°, 0°:45°) is less critical in this respect, see recent studies [7] and the fact that luminescence is a totally Lambertian emission and hence will be nearly independent of the influx and efflux geometry.

NOTE 4 Deviations occur where fluorescence is present and when the UV content of measurement and viewing light source are different. ISO 3664 describes standardized conditions for the viewing of proofs and prints.

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Paperdam Scope

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- The objects of the foundation "Paperdam" are to contribute to the role of paper as a product within international standardisation in the graphic technology.

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