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Graphic technology — Communication of graphic paper properties

Technologie graphique — Communication des propriétés des papiers graphiques

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This International Standard was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 130, *Graphic technology*.

Introduction

This International Standard 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 International Standard describes data to be provided for reliable printing. A substrate description can be assessed to be in conformance with this International 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 paper mills. It is advisable 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 ISO/TC 6 whenever possible.

The evaluation of colour of the unprinted paper is critical to define prepress white point settings. This measurement can be performed with either diffuse:0° integrating sphere instruments (papermakers' equipment) or 45°:0° instruments (printers' equipment). Results are often close if the UV calibration is performed correctly. This International Standard specifies 45°:0° instruments (printers' equipment) to perform this evaluation as per ISO 13655, because of their wide availability at printers' facilities.

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

Properties linked to the printing process (e.g. dimensions, blistering and picking resistance in offset, missing dots in gravure) are not described in this International Standard, since they are implicitly needed when purchasing the paper meant for this printing process.

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

The bibliography lists basic references in graphic technology standards,[1][2] Paper and board standards,[3] previously published references,[4] commercial classifications,[5] conditions of sale,[6] and reference lists of printing characterization data publicly available.[8]

Graphic technology — Communication of graphic paper properties

1 Scope

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

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

Where multiple methods exist, the preferred procedure and its International Standard are specified.

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

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 534, *Paper and board — Determination of thickness, density and specific volume*

ISO 536, *Paper and board — Determination of grammage*

ISO 2470-1, *Paper, board and pulps — Measurement of diffuse blue reflectance factor — Part 1: Indoor daylight conditions (ISO brightness)*

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

ISO 2471, *Paper and board — Determination of opacity (paper backing) — Diffuse reflectance method*

ISO 2493-1, *Paper and board — Determination of bending resistance — Part 1: Constant rate of deflection*

ISO 2813, *Paints and varnishes — Determination of specular gloss of non-metallic paint films at 20 degrees, 60 degrees and 85 degrees*

ISO 5627, *Paper and board — Determination of smoothness (Bekk method)*

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

ISO 8254-1, *Paper and board — Measurement of specular gloss — Part 1: 75 degree gloss with a converging beam, TAPPI method*

ISO 8254-2, *Paper and board — Measurement of specular gloss — Part 2: 75 degree gloss with a parallel beam, DIN method*

ISO 8254-3, *Paper and board — Measurement of specular gloss — Part 3: 20 degree gloss with a converging beam, TAPPI method*

ISO 8791-2, *Paper and board — Determination of roughness/smoothness (air leak methods) — Part 2: Bendtsen method*

ISO 8791-4, *Paper and board — Determination of roughness/smoothness (air leak methods) — Part 4: Print-surf method*

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

ISO 11476, *Paper and board — Determination of CIE whiteness, C/2 degrees (indoor illumination conditions)*

ISO 12647-7, *Graphic technology — Process control for the production of half-tone colour separations, proof and production prints — Part 7: Proofing processes working directly from digital data*

ISO 13655, *Graphic technology — Spectral measurement and colorimetric computation for graphic arts images*

3 Terms and definitions

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

3.1
grammage
basis weight
mass of a unit paper area, expressed in grams per square metre

[SOURCE: ISO 536:2012, 3.1, modified]

3.2
single sheet thickness
distance between one surface of a paper and the other, measured under an applied static load

Note 1 to entry: This term is most commonly used for paper thickness.

[SOURCE: ISO 534:2011, 3.1, modified]

3.3
bulking thickness
thickness of a single sheet of paper, calculated from the thickness of several superimposed sheets in a pack, and measured under an applied static load

[SOURCE: ISO 534:2011, 3.2, modified]

3.4
apparent sheet density
mass per unit volume, expressed in grams per cubic centimetre, and calculated from the single sheet thickness

[SOURCE: ISO 534:2011, 3.3]

3.5
apparent bulk density
mass per unit volume, expressed in grams per cubic centimetre, and calculated from the bulking thickness

[SOURCE: ISO 534:2011, 3.4]

3.6
apparent specific sheet volume
volume per unit mass, expressed in cubic centimetres per gram, and calculated from the single sheet thickness

Note 1 to entry: This term is normally applicable to paper and most commonly calculated for paper bulk.

[SOURCE: ISO 534:2011, 3.5]

3.7
apparent specific bulk volume
volume per unit mass, expressed in cubic centimetres per gram, and calculated from the bulking thickness

[SOURCE: ISO 534:2011, 3.6]

3.8
Parker Print-Surf roughness
PPS
mean gap between a sheet of paper or board and a flat circular land pressed against it under specified conditions

Note 1 to entry: It is expressed in micrometres and calculated based on the airflow between the measuring land and the test piece.

[SOURCE: ISO 8791-4:2007, 3.1, modified]

3.9.1
Bendtsen roughness
measure of the rate at which air will pass between a flat circular land and a sheet of paper, when tested under specified conditions and at operating pressure

Note 1 to entry: It is expressed in millilitres per minute.

[SOURCE: ISO 8791-2:2013, 3.1, modified]

3.9.2
Bekk smoothness
time in seconds which, under a defined pressure differential, is required to draw a definite quantity of air at atmospheric pressure between the surface of the test piece and a ring-shaped plane surface, under specified conditions of contact

[SOURCE: ISO 5627:1995, 3.1]

3.10
gloss
mode of appearance by which reflected highlights of objects are perceived as superimposed on the surface due to the directionally selective properties of that surface

[SOURCE: ISO 8254-1:2009, 3.1]

3.11
opacity (paper backing)
ratio of the single-sheet luminance factor (C), R_0, to the intrinsic luminance factor (C), R_∞, of the same sample

Note 1 to entry: Opacity is expressed as a percentage.

Note 2 to entry: Luminance factor (C): (luminous reflectance factor or Y(C/2°)-value or R_y) is reflectance factor or radiance factor defined with reference to the CIE illuminant C.

Note 3 to entry: Single-sheet luminance factor (C) R0, is luminance factor (C) of a single sheet of paper with a black cavity as backing. Intrinsic luminance factor (C) R∞, is luminance factor (C) 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.

[SOURCE: ISO 2471:2008, 3.5, modified]

3.12
ISO brightness
R_{457}
intrinsic radiance (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 illuminant C

Note 1 to entry: Brightness measures the paper's ability to reflect light within a specific wavelength of blue, ignoring shade.

[SOURCE: ISO 2470-1:2009, 3.4]

3.13
D65 brightness
$R_{457,\,D65}$
intrinsic radiance (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-peak 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 1 to entry: Brightness measures the paper's ability to reflect light within a specific wavelength of blue, ignoring shade.

[SOURCE: ISO 2470-2:2008, 3.4]

3.14
CIE whiteness, C/2° indoor illumination conditions
$W_{C/2}$
measure of whiteness derived from the CIE tristimulus values under standard illuminant C, expressed as whiteness units

[SOURCE: ISO 11476:2010, 3.5, modified]

3.15
CIE whiteness, D65/10° outdoor daylight
$W_{D65/10}$
measure of whiteness derived from the CIE tristimulus values under standard illuminant D65, expressed as whiteness units

Note 1 to entry: Whiteness measures the paper's ability to reflect light across wavelengths comprising the full visible spectrum. It gives single figure information, including both luminance and shade and is therefore increasingly replacing brightness as first criterion of quality.

Note 2 to entry: The CIE whiteness equation defines a line along the dominant wavelength 425 nm in the CIE chromaticity diagram along which the whiteness increases the most. This equation has thus a preference towards red. It is important to note that the equation is only valid within a relative narrow interval of the colour space.

[SOURCE: ISO 11475:2004, 3.4, modified]

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, 3.7, modified]

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 in the UV excitation band.

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

3.17
CIELAB colour space and CIELAB values
three-dimensional, approximately uniform colour space, produced by plotting, in rectangular coordinates L*, a*, b*

Note 1 to entry: The quantity L* is a measure of the lightness, where L* = 0 corresponds to black and L* = 100 corresponds to the perfect reflecting diffuser. Visually, the quantities a* and b* represent respectively the red-green and yellow-blue axes in colour space, such that:

— +a* is a measure of the degree of redness;

— −a* is a measure of the degree of greenness;

— +b* is a measure of the degree of yellowness;

— −b* is a measure of the degree of blueness.

If both a* and b* are equal to zero, the test piece is grey.

[SOURCE: ISO 5631-2:2008, 3.6, modified]

3.18
bending resistance
force required to bend a rectangular test piece clamped at one end through a given angle

[SOURCE: ISO 2493-1:2010, 3.1 and 3.2, modified]

Note 1 to entry: Bending stiffness is the resistance that a test piece offers to bend, in the region of elastic deformation, as described in ISO 5628:2012, 3.1.

4 List of required criteria for communication of paper properties

When communicating the characteristics of printing papers, the intended use or printing process shall be identified and the following data with target values shall be used.

a) Brand name and optionally paper mill (as per 5.2).

b) Grammage (as per 5.3).

c) Bulk and/or thickness (as per 5.4).

d) Roughness PPS (Parker-Print Surf) or roughness Bendtsen or smoothness Bekk (as per 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 5.6).

The gloss level and the equipment used will determine the standard to be used. That 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 5.7).

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

Whiteness is recommended, but brightness will provide useful information. This choice, and the choice of the illuminant, will determine the standard to be used. The 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 on the end-user viewing conditions.

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

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

j) Supported colour gamut in the context of prepress design (as per 5.11).

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

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

l) Storage conditions (as per 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 5.14).

5 ISO standards related to required criteria

5.1 Sampling and general information useful for technical communication

When communicating the properties specified in Clause 4, the related standard specified below in Clause 5 to determine the property shall be used and the name of the standard cited.

When sampling is required, the procedure defined in ISO 186 should be used.

5.2 Brand name and paper mill

5.2.1 Brand name

This relates to Clause 4, list item a).

The paper manufacturer or paper vendor brand name shall be communicated.

5.2.2 Paper mill

This relates to Clause 4, list item a).

The name/location of the paper mill should be stated.

NOTE Paper is produced in mills mainly from natural raw materials or components. Paper mills even from the same supplier use different equipment and raw materials, depending on their geographical location.

5.3 Grammage

This relates to Clause 4, list item b).

Grammage (basis weight) shall be communicated on the basis of measurements made in accordance with ISO 536.

5.4 Bulk and/or thickness

This relates to Clause 4, list item c).

Bulk and/or thickness shall be communicated on the basis of measurements made in accordance with ISO 534.

ISO 534 specifies two methods for measuring the thickness of paper and board:

— the measurement of a single sheet of paper or board as a single sheet thickness;

— the measurement of a pack of sheets of paper as a bulking thickness.

The two methods generally lead to different results, therefore the selected measurement method in accordance with ISO 534 shall be communicated.

Single sheet thickness should be used to define thickness.

Bulk (apparent specific sheet volume) is the inverse of density (apparent sheet density).

5.5 Roughness for evaluation of surface properties

5.5.1 General

This relates to Clause 4, list item d).

5.5.2 Roughness ("PPS")

Roughness ("PPS") shall be communicated on the basis of measurements made in accordance with ISO 8791-4.

NOTE This is a roughness evaluation. The higher the value the rougher the paper is. Roughness PPS is mostly used for smooth papers, Rotogravure papers being a typical example.

5.5.3 Roughness ("Bendtsen")

Roughness ("Bendtsen") shall be communicated on the basis of measurements made in accordance with ISO 8791-2.

NOTE This is a roughness evaluation. The higher the value the rougher the paper is. Roughness Bendtsen is mostly used for rougher papers, matte offset papers being a typical example.

5.5.4 Smoothness ("Bekk")

Smoothness ("Bekk") shall be communicated on the basis of measurements made in accordance with ISO 5627.

NOTE This is a smoothness evaluation. The higher the value the smoother the paper is. Smoothness Bekk is mostly used for papers with intermediate surface properties, when roughness PPS is not suitable.

5.6 Gloss

This relates to Clause 4, list item e).

Depending on the gloss level of the substrate, gloss shall be communicated on the basis of measurements made in accordance with one of the standards below.

ISO 8254-1, *Paper and board — Measurement of specular gloss — Part 1: 75° gloss with a converging beam, TAPPI method.*

NOTE 1 The main application of this standard is coated papers. It is also used for glossy uncoated papers such as supercalandered papers.

ISO 8254-2, *Paper and board — Measurement of specular gloss — Part 2: 75° gloss with a parallel beam, DIN method.*

NOTE 2 This standard is applicable to gloss levels below 65 and is the preferred standard for surfaces of gloss levels below 20.

ISO 8254-3, *Paper and board — Measurement of specular gloss — Part 3: 20° gloss with a converging beam, TAPPI method.*

NOTE 3 The main application of this standard is to highly glossy surfaces.

ISO 2813, *Paints and varnishes — Determination of specular gloss of non-metallic paint films at 20°, 60°, 85°.*

5.7 Opacity

This relates to Clause 4, list item f).

Opacity shall be communicated on the basis of measurements made in accordance with ISO 2471.

The opacity value depends on the principle used for its evaluation. The method described in ISO 2471, used by the paper manufacturing industry, is applicable when it is desired to measure that property of a paper which governs the extent to which one sheet visually obscures printed matter on underlying sheets of similar paper. It is not to be confused with methods based on the reduction in a standard contrast by interposition of the paper, opacity (white backing), formerly known as contrast ratio, nor with the assessment of the amount and condition of light penetrating a sheet (transparency or translucency).

ISO 13655 defines the opacity of a substrate. It is equivalent to contrast ratio. This numerical value of opacity is defined as 100 times the ratio of the luminous reflectance factor of the substrate over a black backing to the luminous reflectance factor over a white backing. This value may be used for comparison purposes only.

5.8 Brightness and whiteness of unprinted paper

5.8.1 General

This relates to Clause 4, list item g).

There are several alternatives depending on the end use: ISO Brightness and D65 Brightness for commercial paper definition, CIE Whiteness C/2° for indoor visual appearance and CIE Whiteness D65/10° for outdoor visual appearance.

NOTE All testing procedures include a UV calibration.

In the case of a filter reflectometer, the radiation falling upon the test piece shall have a UV content corresponding to that of the appropriate CIE illuminant, adjusted or verified with the help of a fluorescent reference standard. In the case of an abridged spectrophotometer, the instrument shall have a UV-adjustable filter with a cut-off wavelength of 395 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 a fluorescence reference standard, so that the UV content of the illumination falling upon the sample corresponds to that of the appropriate CIE illuminant.

5.8.2 ISO Brightness and D65 Brightness

ISO Brightness and D65 Brightness allow reporting of appearance in commercial paper definitions.

ISO Brightness shall be communicated on the basis of measurements made in accordance with ISO 2470-1.

D65 Brightness shall be communicated on the basis of measurements made in accordance with ISO 2470-2.

D65 Brightness is recommended for medium to high brightness products.

NOTE ISO Brightness is typically used for newsprint and medium brightness grades. D65 Brightness is typically used in all grades in European markets except standard newsprint.

5.8.3 Whiteness C/2°

CIE Whiteness measured using CIE Illuminant C and the CIE 1931 Standard Colourimetric Observer (C/2°) permits evaluation of whiteness in indoor conditions.

CIE Whiteness C/2° (indoor illumination conditions) shall be communicated on the basis of measurements made in accordance with ISO 11476.

NOTE CIE Whiteness C/2° is typically used for Improved Newsprint, SuperCalendered (SC), Light Weight Coated (LWC), Medium Weight Coated (MWC), and Wood-Free Coated (WFC) grades.

5.8.4 Whiteness D65/10°

CIE Whiteness measured using CIE Illuminant D65 and the CIE 1964 Standard Colourimetric Observer (D65/10°) permits evaluation of whiteness in outdoor conditions.

CIE Whiteness D65/10° (outdoor illumination conditions) shall be communicated on the basis of measurements made in accordance with ISO 11475.

NOTE CIE Whiteness D65/10° is typically used for Medium Weight Coated (MWC), Wood-Free Coated (WFC), Uncoated Wood Free (UWF) grades, often in European markets.

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

This relates to Clause 4, list item 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.

NOTE 1 According to ISO 13655, 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 400 nm (often referred to as “UVCut”).

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

NOTE 2 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 3 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 4 ISO 13655 (for measurement) and ISO 3664 (for viewing) provide precise recommendations for the spectral power and UV content of illumination to be used in the printing chain to ensure consistent and predictable values.

5.10 Colour measurement of unprinted paper in outdoor conditions (D65/10°)

This relates to Clause 4, list item i).

Paper colour shall be communicated on the basis of measurements made in accordance with ISO 5631-2.

ISO 5631-2 shall be used as a basis for paper colour specifications.

NOTE Colour measures obtained according to ISO 5631-2 are independent of the instruments used, within the reproducibility of the method, provided such instruments are calibrated with ISO IR3 standards (fluorescent and non-fluorescent), according to ISO 2469.

5.11 Supported colour gamut in the context of prepress design

This relates to Clause 4, list item j).

Printing characterization data recommendations, based on publicly available alternatives shall be communicated. A list of publicly available alternatives is given in.[8]

Where substrate characteristics are included with the characterization data, they should be presented in the terms specified in this International Standard.

If no “well recognised” characterization data are available or have not yet been developed, this shall be stated and information should be provided.

5.12 Fluorescence in the context of prepress

This relates to Clause 4, list item 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 to as the difference UV-UVX), according to ISO 2470-2, 8.4. This International 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 four levels: faint, low, moderate, high, is a relevant estimate of fluorescence components. Usual limits for fluorescence : faint (>0), low (>4), moderate (>8), high (>14).

