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Colour terminology for office colour equipment

Terminologie couleur pour équipement couleur de bureau

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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 document should be noted. This document 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/IEC JTC 1, *Information technology*, Subcommittee SC 28, *Office equipment*.

Introduction

Technical colour terms have been published in various fields of standards such as colour photography, graphic technology printing and computer graphics. However, no standard colour terms have been published for office equipment.

As a result, misunderstandings between users and colour office equipment providers can occur when terms are interpreted differently.

The purpose of this International Standard is to provide terminology for use by office equipment providers to help customers use their colour equipment effectively.

Colour terminology for office colour equipment

1 Scope

This International Standard provides definitions for colour terms used with office equipment, in particular for use with colour scanning and printing devices that have digital imaging capabilities, including multi-function devices.

This International Standard is not intended to replace terms and definitions published in documents or user interfaces issued or created by manufacturers.

2 Terms and definitions

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

2.1
colour balance
adjustment of colour channel gains or processing

2.1.1
grey balance
set of tone values for cyan, magenta and yellow that are expected to appear as an achromatic grey under specified viewing conditions when printed using the specified printing conditions

Note 1 to entry: The user can choose between the following two practical definitions and one theoretical definition of grey, depending upon the particular context.

a) practical definitions:

   1) a colour having the same CIELAB a* and b* values as the print substrate;

   2) a colour that has the same CIELAB a* and b* values as a half-tone tint of similar L* value printed with black ink;

b) theoretical definition:

   1) the colourimetric definition of grey is when the CIELAB a* and b* values are both equal to 0.

[SOURCE: ISO/TS 10128:2009, 3.3, modified]

2.2 black

2.2.1
composite black
printing black with multiple colourants

2.2.2
pure black
black generated only in black colourant in a printing device

2.2.3
rich black
black generated by a mixture of black colourant and other colourants in a printing device

2.3
calibration
set of operations that establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding values realized by standards

[SOURCE: ISO 14807:2001, 3.11]

2.4
colour appearance
aspect of visual perception by which things are recognized by their colour

[SOURCE: CIE S17/E:2011 ILV, 17-199, modified — "2." part has been removed.]

2.4.1
brightness
attribute of a visual perception according to which an area appears to emit, or reflect, more or less light

[SOURCE: CIE S17/E:2011 ILV, 17-111]

2.4.2
colourfulness
attribute of a visual sensation according to which the perceived colour of an area appears to be more or less chromatic

[SOURCE: ISO/IEC 8613-2:1995]

2.4.3
highlight colour
especially light and low chroma colour

2.4.4
metamerism
phenomenon characterized by the difference in colour observed when two specimens visually matching under a given light source are viewed under another light source with different spectral characteristics

[SOURCE: ISO 4618:2014, 2.157]

2.4.5
vividness
attribute of colour used to indicate the degree of departure of the colour from a neutral black colour

2.5
colour difference
perceived dissimilarity between two colour elements

[SOURCE: CIE S17/E:2011 ILV, 17-206]

2.6 colour encoding

2.6.1
colour palette
fixed set or range of available colours that can be selected

[SOURCE: ISO/TS 16071:2003, 3.8]

2.6.2
full colour
method of representing colours with 3-channel or more, and each channel has 8-bit or more information

Note 1 to entry: Each channel may have 12,16-bit. In "Commercial printing", there are multi-channel colour reproduction such as "CMYKOG".

2.6.3
indexed colour
palette colour
colour selection scheme in which the colour index is used to retrieve colour values from a colour table

[SOURCE: ISO/IEC 8632-1:1999, 4.1.62]

2.6.4
named colour
colour with associated colour expression specification

2.6.5
spot colour
single colourant, identified by name, whose printing tone-values are specified independently from the colour values specified in a colour coordinate system

[SOURCE: ISO 12639:2004, 4.1.10]

2.7
colour management
communication of the associated data required for unambiguous interpretation of colour content data, and application of colour data conversions, as required, to produce the intended reproductions

[SOURCE: ISO 15076-1:2010, 3.1.11]

2.7.1
characterization
process of relating device-dependent colour values to device-independent colour values

[SOURCE: ISO 12637-2:2008, 2.7]

2.7.2
colour gamut
volume, area, or solid in a colour space, consisting of all those colours that are either

a) present in a specific scene, artwork, photograph, photomechanical, or other reproduction, or

b) capable of being created using a particular output device and/or medium

Note 1 to entry: In reproduction and media applications, only the volume or solid in colour space is regarded as colour gamut. In applications such as signal lighting, the colour gamut is an area.

[SOURCE: CIE S17/E:2011 ILV, 17-211]

2.7.3
gamut mapping
mapping of the colour space coordinates of the elements of a source image to colour space coordinates of the elements of a reproduction to compensate for differences in the source and output medium colour gamut capability

Note 1 to entry: The term “gamut mapping” is somewhat more restrictive than the term “colour rendering” because gamut mapping is performed on colourimetry that has already been adjusted to compensate for viewing condition differences and viewer preferences, although these processing operations are frequently combined in reproduction and preferred reproduction models.

[SOURCE: ISO 22028-1:2004, 3.22]

2.7.4
International Color Consortium
ICC
industry association formed to develop standardized mechanisms for colour management

[SOURCE: ISO 15930-3:2002, 3.9]

2.7.5
ICC profile
International Color Consortium's file format, used to store transforms from one colour encoding to another

[SOURCE: ISO 22028-1:2004, 3.24, modified — e.g. part has been removed.]

2.7.6
rendering intent
style of mapping colour values from one image description to another

[SOURCE: ISO 15076-1:2010, 3.1.27]

2.8
colour space
geometric representation of colours in space, usually of three dimensions

[SOURCE: ISO 22028-1:2004, 3.13]

2.8.1
colour space encoding
digital encoding of a colour space, including the specification of a digital encoding method, and a colour space value range

Note 1 to entry: Multiple colour space encodings may be defined based on a single colour space where the different colour space encodings have different digital encoding methods and/or colour space value ranges. (For example, 8-bit sRGB and 10-bit e-sRGB are different colour space encodings based on a particular additive RGB colour space.)

[SOURCE: ISO 22028-1:2004, 3.14]

2.8.2
device-dependent colour space
colour space defined by the characteristics of a real or idealized imaging device

Note 1 to entry: Device-dependent colour spaces having a simple functional relationship to CIE colourimetry can also be categorized as colourimetric colour spaces. For example, additive RGB colour spaces corresponding to real or idealized CRT displays can be treated as colourimetric colour spaces.

[SOURCE: ISO 22028-1:2004, 3.17]

2.8.3
device-independent colour space
colour coordinate system defined in terms of the amounts of visual stimuli colour capabilities independent of the specific device characteristics

[SOURCE: ISO 12637-2:2008, 2.47]

2.9
daylight illuminant
illuminant having the same or nearly the same relative spectral power distribution as a phase of daylight

[SOURCE: IEC 60050, 845-03-11]

2.10
dynamic range
difference between peak white and the black level

[SOURCE: ISO 22493:2014, 4.7.2]

2.11 environment

2.11.1
adapted white
colour stimulus that an observer who is adapted to the viewing environment would judge to be perfectly achromatic and to have a luminance factor of unity; i.e. absolute colorimetric coordinates that an observer would consider to be a perfect white diffuser

Note 1 to entry: The adapted white may vary within a scene.

[SOURCE: ISO 22028-1:2004, 3.2]

2.11.2
glare
discomfort or impairment of vision experienced when parts of the visual field are excessively bright in relation to the brightness of the general surroundings to which the eyes are adapted

[SOURCE: ISO 11064-6:2005, 3.7]

2.11.3
surface colour
colour perceived as belonging to a surface from which the light appears to be diffusely reflected or radiated

[SOURCE: IEC 60050, 845-02-20]

2.11.4
surround
area adjacent to the border of an image, which, upon viewing the image, may affect the local state of adaptation of the eye

[SOURCE: ISO 12646:2008, 3.1.15]

2.11.5
viewing conditions
description of the surrounding environmental conditions during the process of viewing

[SOURCE: ISO/TS 18173:2005, 2.28]

2.12 grey

2.12.1
composite grey
printing grey with multiple colourants

2.12.2
greyscale
image representation in which each pixel is defined by a single sample of colour information, representing overall luminance (on a scale from black to white), and optionally an alpha sample (in which case it is called greyscale with alpha)

[SOURCE: ISO/IEC 15948:2004, 3.1.21]

2.12.3
pure grey
grey generated only in black colourant in a printing device

2.13
luminance ratio
ratio of the maximum luminance to the minimum luminance that is either: present in a specific scene, artwork, photograph, photomechanical, or other reproduction; or is capable of being created using a particular output device and medium

[SOURCE: ISO 22028-1:2004, 3.28]

2.14 measuring instrument

2.14.1
spectrophotometer
optical instrument that measures spectral transmittance or reflectance

[SOURCE: ISO 17861:2014, 3.5, modified — Note 1 has been removed.]

2.14.2
spectroradiometer
instrument for measuring radiometric quantities in narrow wavelength intervals over a given spectral region

[SOURCE: ISO 13655:2009, 3.11]

2.15 mixture of colour

2.15.1
shade
colour made by mixing a black dye or pigment with colourants

2.15.2
tint
colour made by varying the amount of a single colourant

2.15.3
tone
degree of lightness or darkness in any given area of an image

[SOURCE: ISO 12637-2:2008, 2.132]

2.16 monochrome

2.16.1
monochrome printer
printer that is only capable of printing with only one colourant that is black

2.16.2
monochrome image
image in one colour or shades of one hue

[SOURCE: ISO/IEC 13660:2001, 3.16]

2.17 output form of image

2.17.1
hardcopy
representation of an image on a substrate which is self-sustaining and reasonably permanent

[SOURCE: ISO 22028-1:2004, 3.23]

2.17.2
softcopy
representation of an image produced using a device capable of directly representing different digital images in succession and in a non-permanent form

Note 1 to entry: The most common example is a monitor.

[SOURCE: ISO 3664:2009, 3.14]

2.18 optical phenomena

2.18.1
flare
light falling on an image, in an imaging system, which does not emanate from the subject point

Note 1 to entry: Veiling glare is also sometimes referred to as flare.

[SOURCE: ISO 12231:2012, 3.59]

2.18.2
fluorescent
lamp that provides UV-A irradiation within a wavelength range of 300 nm to 400 nm

Note 1 to entry: A suitable lamp is the so-called black light blue (BLB) fluorescent lamp, with a maximum wavelength of 351 nm, as described in ISO 4892-3.

[SOURCE: ISO 27447:2009, 3.10]

2.18.3
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]

2.18.4
transparency
physical property of allowing the transmission of light through a material

Note 1 to entry: A material with high transparency is one with low opacity.

Note 2 to entry: Transparency is the extreme value of high translucency.

Note 3 to entry: A transparent material allows light to pass through undiminished, while a negligible portion of the transmitted light is scattered.

[SOURCE: ISO/TR 28642:2011, 3.9]

2.18.5
transparent colour
attribute that signifies that the underlying image (if any) shows through

[SOURCE: ISO 12639:2004, 4.1.14, modified — Note 1 has been removed.]

2.19
solid colour
colour printed in an area with a maximum coverage of a colourant

2.19.1
additive primaries
components used for adding light in colour mixtures, generally red, green and blue

2.19.2
primary colour
unitary colours from which all other colours are created (in additive and subtractive colour theory)

Note 1 to entry: See Annex B for detail explanation to “primary colours”.

[SOURCE: ISO 12637-2:2008, 2.99, modified — Note 1 to entry has been added.]

2.19.3
secondary colour
colours to be defined by a mixture of two primary colours except black

Note 1 to entry: See Annex B for detail explanation to "primary colours" and "secondary colours".

[SOURCE: IEC 61966-7-1:2006, 3.11, modified — Note 1 to entry has been modified.]

2.19.4
subtractive primaries
components used for removing light in colour mixtures, generally cyan, magenta and yellow

2.20
test pattern
specified arrangement of spectral reflectance or transmittance characteristics used in measuring an image quality attribute

[SOURCE: ISO 16067-1:2003, 3.20]

2.21
tone reproduction
relationship between data in the colour digital image file which are intended to reproduce the images of primary, secondary and achromatic colours and the CIE 1976 lightness values of reflective prints actually reproduced

[SOURCE: IEC 61966-7-1:2006, 3.14]

2.21.1
gamma correction
process that alters the image data in order to modify the tone reproduction

[SOURCE: ISO 12233:2014, 3.7]

2.21.2
optical density
log10 (1/R), where R is the reflectance factor, measured according with 0/45-degree geometry, Illuminant A, and ISO visual density calibration

[SOURCE: ISO/IEC 13660:2001, 3.6]

Annex A
(informative)

Classification of terms according to definitions in previously published International Standards

A.1 General

In this International Standard, previously published International Standards are referenced as much as possible in establishing the definition of each term. However, as previously published International Standards have different scopes for each, some of the terms have different definitions or definitions that are not suitable for office equipment. This Annex is intended to clarify the relevance to previously published International Standards. All the terms defined in this International Standard are classified into four categories as follows:

a) terms that are not defined in previously published International Standards;

b) terms that have conflicting definitions in previously published International Standards;

c) terms that have adapted definitions for office equipment;

d) terms that have definitions in previously published International Standards that are appropriate for office equipment.

Existing standardized definitions were identified using databases such as: ISO Online Browsing System (https://www.iso.org/obp/ui/) and Electropedia (http://www.electropedia.org). The following classifications are made based on the information available as of December 31, 2012.

A.2 Colour terms list for office colour equipment

A.2.1 Terms that are not defined in previously published International Standards

Terms listed below are not defined in previously published International Standards.

additive primaries
composite black
composite grey
full colour
highlight colour
monochrome printer
named colour
pure black
pure grey
rich black
solid colour
subtractive primaries
vividness

A.2.2 Terms that have conflicting definitions in previously published International Standards

As terms listed below have several definitions in previously published International Standards, the most suitable definition for office equipment users is selected.

brightness
calibration
colour difference
colour gamut
dynamic range
flare
gamma correction
glare
gloss
luminance ratio
optical density
tone
transparency

A.2.3 Terms that have adapted definitions for office equipment

The definitions of terms listed below are modified from those of previously published International Standards, as they are not appropriate for office equipment.

NOTE The terms that have source references included with their definitions in the body of the International Standard have definitions that were not significantly modified from the previously published International Standard. The terms that do not have source references listed in the body of the standard have definitions in previously published International Standards that are not appropriate for office equipment and were, therefore, treated as different terms.

colour balance
colour appearance
grey balance
ICC profile
primary colour
secondary colour
shade
spectrophotometer
tint
transparent colour

A.2.4 Terms that have definitions in previously published International Standards that are appropriate for office equipment

Terms listed below have definitions that are not changed from previously published International Standards, as they are suitable for office equipment.

adapted white
characterization
colour management
colour palette
colour space
colour space encoding
colourfulness
daylight illuminant
device-dependent colour space
device-independent colour space
fluorescent
gamut mapping
greyscale
hardcopy
indexed colour
International Colour Consortium
metamerism
monochrome image
rendering intent
softcopy
spectroradiometer
spot colour
surface colour
surround
test pattern
tone reproduction
viewing conditions

Annex B
(informative)

Primary colours and typical input in various devices vs market segments

Table B.1 — Primary colours and typical input in various devices vs. market segments

		Typical device input			
Market segment / Device	**Primary colours**[a]	**Consumer**	**Office**	**Professional printing (Graphic technology)**	**Photography**
Corresponding organization		IEC/TC 100	JTC 1/SC 28	ISO/TC 130	ISO/TC 42
Digital camera	**RGB**	**Natural scene**	**—**	**—**	**Natural scene**
Monitor	**RGB**	**RGB**	**—**	**RGB**	**RGB**
Scanner	**RGB**	**2D Media**	**2D Media**	**2D Media**	**2D Media**
Printer	**CMYK**	**RGB**	**RGB**[b]	**CMYK**	**—**
Projector	**RGB**	**RGB**	**RGB**	**—**	**—**

NOTE "—" indicates that the device is not relevant for the corresponding organization.

[a] Primary colours of digital cameras, monitors, scanners and projectors are generally RGB, while primary colours of printers are generally CMYK.

[b] Most office printers only accept RGB values as input signals, while printer primary colours are generally CMYK. The RGB input signals are converted to CMYK values by gamut-mapping algorithms provided by the office printer manufacturer and then printed onto output media.

For many office document applications, users specify colour using RGB values, while for a few applications such as Photoshop®,[c] Illustrator®,[c] and Acrobat®,[c] users can specify colour with either RGB or CMYK values.

When colours are specified by CMYK values in an application's user interface, they are first converted to RGB by the gamut-mapping algorithm incorporated in the application, rather than by an algorithm supplied by the printer manufacturer. These values are then converted from application RGB values to printer CMYK values by the gamut-mapping algorithm provided by the office printer manufacturer (postscript printers are an exception to this workflow).

In this workflow, unless the preference settings of the applications are set appropriately, the CMYK values resulting on the output media are typically not what the user intended.

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