
Colour terminology for office colour equipment

Terminologie couleur pour équipement couleur de bureau

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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.

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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

$\log_{10} (1/R)$, 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	monochrome printer	solid colour
composite black	named colour	subtractive primaries
composite grey	pure black	vividness
full colour	pure grey	
highlight colour	rich black	

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

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

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

Market segment Device	Primary colours ^a	Typical device input			
		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®, Illustrator® and Acrobat® 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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