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Photography — Archiving Systems — Vocabulary

Photographie — Systèmes d'archivage — Vocabulaire

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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.

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 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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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 42, *Photography*.

Introduction

This International Standard provides a vocabulary which standardizes the use and meaning of terms associated with archiving systems for photography. These terms are drawn from traditional photography, digital photography, image permanence and information technology.

This International Standard is organized alphabetically and follows natural (English) word order wherever possible. The source documents for many of the definitions are International Standards developed by ISO/TC 42. Where possible, users are advised to verify if a more recent edition of the source document has been published, which contains an updated version of the term and definition. Future revisions of this International Standard will include updated terms and definitions consistent with the source documents at the time the revision is prepared.

Photography — Archiving Systems — Vocabulary

1 Scope

This International Standard defines terms used in the area of imaging system capability qualification for archival recording and approval.

Only terms related to this area are included. These terms are relevant to the current tasks or are of general interest in imaging system capability qualification for archival recording and approval.

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.

There are no normative references cited in this document.

3 Terms and definitions

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

3.1
acutance
numerical value that correlates to some extent with subjective image sharpness

3.2
automatic document feeder
ADF
powered device to feed microforms, films or paper into a scanner for capture

[SOURCE: ISO 12651-1:2012, 4.10]

3.3
Adobe RGB 1998
three-component colour image encoding defined in Adobe RGB (1998) colour image encoding

[SOURCE: ISO 12640-4:2011, 3.1]

3.4
aliasing
output image artefacts that occur in a digital imaging system for input images having significant energy at frequencies higher than the Nyquist frequency of the system

Note 1 to entry: These artefacts usually manifest themselves as moiré patterns in repetitive image features or as jagged “stairstepping” at edge transitions.

[SOURCE: ISO 16067-1:2003, 3.2]

3.5
ambient light
illumination that remains present in an area when some indicated light source (such as a specialized light, projector, or self-luminous display) is turned off

Note 1 to entry: Ambient light can be natural or artificial light. Ambient light is generally uncontrolled and can be highly variable, posing a possible risk to image quality. The level of ambient light should be minimized in relation to the level of light produced by the imaging system.

[SOURCE: ISO 4246:1994, 15]

3.6
array (imaging)
orderly arrangement of individual sensor elements in image capture devices

Note 1 to entry: In digital imaging, there are primarily three array types: two dimensional or area arrays, one dimensional or linear arrays, and tri-linear arrays consisting of three consecutive linear arrays of red, green, and blue sensitive sensor elements.

3.7
artifact
general term to describe a broad range of undesirable flaws or distortions in digital reproductions produced during capture or data processing

Note 1 to entry: Some common forms of image artifacts include noise, chromatic aberration, blooming, interpolation, and imperfections created by compression, among others.

3.8
aspect ratio
ratio of length to width of an object

[SOURCE: ISO 13794:1999, 2.10]

3.8.1
image aspect ratio
ratio of the image width to the image height

[SOURCE: ISO 15740:2008, 3.16]

3.8.2
pixel aspect ratio
ratio of the distance between sampling points in the two orthogonal sampling directions

Note 1 to entry: If the distances are equal, the pixel aspect ratio equals 1:1, and is said to be “square”.

Note 2 to entry: See also image aspect ratio (3.8.1).

[SOURCE: ISO 12231:2005, 2.6.2]

3.8.3
sampling aspect ratio
ratio of the sample spacing in the two orthogonal sampling directions

[SOURCE: ISO 12231:2012, 3.155]

3.9
banding (imaging)
unwanted stripes or bands that occur in a digital image

Note 1 to entry: Bands are usually caused by fixed pattern noise of linear sensors in scanners or interference problems between electronic parts of a camera.

3.10
binary image
digitized image consisting of an array of pixels, each of which has a value of 0 or 1, whose values are normally represented by dark and bright regions on the display screen or by the use of two distinct colours

[SOURCE: ISO 13322-1:2004, 3.1.3]

3.11
bit depth
maximum number of discrete levels available for the digitized representation of the signal intensity, represented as a power of two

Note 1 to entry: The term can be confusing since it is sometimes used to represent bits per pixel and at other times, the total number of bits used multiplied by the number of total channels. For example, a typical colour image using 8 bits per channel is often referred to as a 24-bit colour image (8 bits × 3 channels). Colour scanners and digital cameras typically produce 24 bit (8 bits × 3 channels) or 36 bit (12 bits × 3 channels) images, and high-end devices can produce 48 bit (16 bit × 3 channels) images. A grayscale scanner would generally be 1 bit for monochrome or 8 bit for grayscale (producing 256 shades of gray). Bit depth is also referred to as colour depth.

[SOURCE: ISO 22493:2008, 5.2.2.2.1]

3.12
bit rate
number of bits transmitted per second

[SOURCE: ISO/IEC 18000-2:2009, 4.2]

3.13
bitonal (digital) image
see binary image

3.14
black point
neutral colour with the lowest luminance that can be produced by an imaging medium in normal use, measured using the specified measurement geometry

[SOURCE: ISO 12231:2012, 3.104]

3.15
blooming
phenomenon which occurs when a pixel of the solid-state imaging device is so illuminated that the number of generated electrons is greater than can be stored

Note 1 to entry: This excess of electrons can spread into neighbouring cells. As a result, the highlight areas of the scene appear increased in size on the television screen.

[SOURCE: IEC 808-04-03]

3.16
bits per pixel
see bit depth

3.17
brightness
attribute of a visual sensation according to which an area appears to emit more or less light

Note 1 to entry: Brightness is among the three attributes that specify colour. The other two attributes are hue and saturation.

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

3.18
checkerboard
regular squared dark and bright structure on a surface like the one used on a chess board

3.19
chroma
C*
chromatic
chromaticiness, colourfulness, of an area judged as a proportion of the brightness of a similarly illuminated area that appears white or hrightly transmitting

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

3.20
chromatic aberration
image defect caused when different wavelengths of light are focused at different distances from a lens (longitudinal chromatic aberration) or when the scale of the image at different wavelengths is different (lateral chromatic aberration)

Note 1 to entry: This results in varying degrees of sharp focus at the image sensor or shifted objects in an image depending on the colour or wavelength of light. Chromatic aberration is seen as "colour fringing," and is most noticeable in an image at edges with high contrast.

3.21
chromaticity
attribute of a colour stimulus defined by its trichromatic coordinates or by its dominant or complementary wavelength and purity characteristics taken together

[SOURCE: IEC 723-08-33]

3.22
chromaticity coodinates
ratios of each of the members of a set of CIE tristimulus values to their sum

[SOURCE: ISO 105-A08:2001, 2.4]

3.23
CIELAB colour space
three-dimensional, approximately uniform colour space, produced by plotting, in rectangular coordinates the component values are L*, a*, b*

[SOURCE: ISO 5631-1:2009, 3.5]

[SOURCE: CIELAB colour space is specified in CIE Publication 15]

3.24
clipping
abrupt truncation of a signal when the signal exceeds a system's ability to differentiate signal values above or below a particular level

Note 1 to entry: In the case of images, the result is that there is no differentiation of light tones when the clipping is at the high end of signal amplitude and no differentiation of dark tones when clipping occurs at the low end of signal amplitude. For digital audio, clipping occurs when the signal is restricted by the selected bit depth (which represents amplitude). In a system using 16-bit signed integers, 32 767 is the largest positive value that can be represented. If input levels are set so that excursions above that are permitted, then clipping will result and some information will be lost.

Note 2 to entry: If clipping occurs in only one or two channels of an RGB image, the hue will change instantly. For example, Caucasian skin tones can go reddish yellow when highlight clipping occurs in the red channel only.

3.24.1
clipping (black)
truncation of a signal when the signal represents a tone darker than the system's ability to differentiate

Note 1 to entry: Excessive black clipping tends to result in "blocked-up" or featureless shadows in an image.

3.24.2
clipping (highlights)
truncation of a signal when the signal represents a tone lighter than the system's ability to differentiate

Note 1 to entry: Excessive highlight clipping tends to result in "blown-out" or featureless highlights in an image.

3.25
codec
device or algorithm used to perform encoding/decoding and compression/decompression of the digital data

Note 1 to entry: This may be combined with converting analog signals into digital (and vice versa).

[SOURCE: ISO/TR 16056-1:2004, 3.16]

3.26
colorimeter
instrument for measuring colorimetric quantities, such as the tristimulus values of a colour stimulus

[SOURCE: IEC 845-05-18]

Note 1 to entry: Colorimeters are the primary device used to evaluate the colour qualities of display monitors. There are two basic types of colorimeters: tristimulus colorimeter and spectrocolorimeters.

3.27
colorimetry
measurement of colours based on a set of conventions

[SOURCE: IEC 845-05-10]

3.28
colour
sensation resulting from the visual perception of radiation of a given spectral composition

[SOURCE: ISO 4618:2006, 2.57]

3.29
colour accuracy
ability of an imaging system to reproduce the colours of some intended object, as specified using some colour difference metric

Note 1 to entry: The reference object against which the colour accuracy is measured can be, for example, an original scene, the colorimetry of an original scene chromatically adapted to some different adopted white, or an image file describing a reproduction on some reference medium.

3.30
colour cast
tint of a particular colour, usually unwanted, which affects the whole of a photographic image

3.31
colour channel
data channel that represents some specific aspect relating to colour in an image

Note 1 to entry: A colour channel stores the colour information for one colour component of a colour model. For example, the RGB colour model has three separate colour channels; one for red, one for green and one for blue.

3.32
colour constancy
high level of invariance of the visual system relative to changes in the spectral qualities of the illumination to the perception of reflective colours

3.33
colour depth
here usually being the bit depth per colour channel but sometimes also used for the sum of the bit depth's for all colour channels

Note 1 to entry: See bit depth.

3.34
colour difference metric
metric based on some specified mathematical difference between the points representing a test specimen and its reference in an appropriate colour space

3.35
colour distance
see colour difference

3.36
colour encoding
quantized digital encoding of a colour space, encompassing both colour space encodings and colour image encodings

[SOURCE: ISO/TS 22028-3:2006, 3.5]

3.37
colour filter array
mosaic or stripe layer of coloured transmissive filters fabricated on top of an imager in order to obtain a colour image from a single image sensor

[SOURCE: ISO 12231:2005, 2.8]

3.38
colour fringing
existence of coloured fringes in the area of high contrast structures in images

Note 1 to entry: One of the sources for these is lateral and longitudinal chromatic aberration.

3.39
colour gamut
solid in a colour space, consisting of all those colours that are either: present in a specific scene, artwork, photograph, photomechanical, or other reproduction; or capable of being created using a particular output device and/or medium.

Note 1 to entry: See also luminance ratio (3.155).

[SOURCE: ISO/TS 22028-3:2006, 3.6]

3.40
colour image encoding
digital encoding of the colour values for a digital image, including the specification of a colour space encoding, together with any information necessary to properly interpret the colour values, such as the image state, the intended image viewing environment and the reference medium

Note 1 to entry: In some cases, the intended image viewing environment will be explicitly defined for the colour image encoding. In other cases, the intended image viewing environment may be specified on an image-by-image basis using metadata associated with the digital image.

Note 2 to entry: Some colour image encodings will indicate particular reference medium characteristics, such as a reflection print with a specified density range. In other cases, the reference medium will not be applicable, such as with a scene-referred colour image encoding, or will be specified using image metadata.

Note 3 to entry: Colour image encodings are not limited to pictorial digital images that originate from an original scene, but are also applicable to digital images with content, such as text, line art, vector graphics and other forms of original artwork.

[SOURCE: ISO/TS 22028-3:2006, 3.7]

3.41
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]

3.42
colour misregistration
colour-to-colour spatial dislocation of otherwise spatially coincident colour features of an imaged object

3.43
colour model
way of specifying or describing a colour numerically

EXAMPLE In the 24-bit-deep RGB colour model, the intensity of each of the red, green and blue components of the model (8 bits for each channel) are represented on a scale from 0 to 255.

Note 1 to entry: Common examples include RGB, HSV and CMYK.

Note 2 to entry: The lowest intensity of any colour is represented by 0 and the highest intensity by 255.

Note 3 to entry: There are two main categories of colour models: additive and subtractive. Additive colour models (such as RGB) are based on transmitted light while subtractive colour models (such as CMYK) are based on reflected light.

3.44
colour rendering
mapping of image data representing the colour-space coordinates of the elements of a scene to output-referred image data representing the colour-space coordinates of the elements of a reproduction

Note 1 to entry: Colour rendering generally consists of one or more of the following: compensating for differences in the input and output viewing conditions, tone scale and gamut mapping to map the scene colours onto the dynamic range and colour gamut of the reproduction, and applying preference adjustments.

[SOURCE: ISO/TS 22028-3:2006, 3.8]

3.45
colour re-rendering
mapping of picture-referred image data appropriate for one specified real or virtual imaging medium and viewing conditions to picture-referred image data appropriate for a different real or virtual imaging medium and/or viewing conditions

Note 1 to entry: Colour re-rendering generally consists of one or more of the following: compensating for differences in the viewing conditions, compensating for differences in the dynamic range and/or colour gamut of the imaging media, and applying preference adjustments.

[SOURCE: ISO 22028-1:2004, 3.12]

3.46
colour space
geometric representation of colours in space, usually of three dimensions

[SOURCE: CIE Publication 17.4 (845-03-25) and ISO 22028-1]

3.47
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 can 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 RGB colour space.)

Note 2 to entry: This term is also defined in ISO 22028-1, ISO/TS 22028-2 and ISO/TS 22028-3.

3.48
colour space (colorimetric)
colour space having an exact and simple relationship to CIE colorimetric values

Note 1 to entry: Colorimetric colour spaces include those defined by CIE (e.g. CIE XYZ, CIELAB, CIELUV, etc.), as well as colour spaces that are simple transformations of those colour spaces (e.g. additive RGB colour spaces).

[SOURCE: ISO 22028-1]

3.49
colour space white point
colour stimulus to which colour space values are normalized

Note 1 to entry: It is not necessary that the colour space white point correspond to the assumed adapted white point and/or the reference medium white point for a colour image encoding.

[SOURCE: ISO 22028-1]

3.50
colour temperature
temperature of a Planckian radiator whose radiation has the same chromaticity as that of a given stimulus

[SOURCE: ISO 9241-302:2008, 3.2.13]

3.51
compression (lossless, visually lossless, lossy)

3.51.1
image compression
process that alters the way digital image data is encoded in order to reduce the size of an image file

[SOURCE: ISO 12233:2000, 3.11]

3.51.2
lossless compression
data file compression technique where the decompressed image is identical to the original uncompressed image

[SOURCE: ISO 12651:1999, 4.79]

3.51.3
lossy compression
data file compression technique where the decompressed image may not be identical to the original uncompressed image

[SOURCE: ISO 12651:1999, 4.80]

3.51.4
visually lossless compression
form or manner of lossy compression where the data that is lost after the file is compressed and decompressed is not detectable to the eye; the compressed data appearing identical to the uncompressed data

Note 1 to entry: Visually lossless compression according to this definition is independent of the viewing condition meaning that even at highest magnification levels the difference to uncompressed data is visually imperceptible.

3.52
compression ratio
relationship of the file size before compression to the file size after compression

[SOURCE: ISO 12651-1:2012, 4.32]

3.53
continuous tone (image)
image represented using a large enough number of potential tonal levels per pixel so that the differences between adjacent tonal levels are visually imperceptible in the intended use condition

Note 1 to entry: It is an image that has not undergone a graphic arts halftone screening process.

Note 2 to entry: Generally referring to pictorial images, where there is a non-broken range of tones from white to black that may have every shade of gray represented. There are theoretically an infinite number of tones. Traditional photography (photochemical photography) produces continuous tone images. When reformatting pictorial items, it is important to distinguish continuous tone originals from printed halftones, since these two classes are likely to require different strategies and methods for making the digital images.

3.54
contrast
difference between the grey levels of two specified parts of the image

[SOURCE: ISO 21227-1:2003, 3.5.4]

3.55
contrast sensitivity function
CSF
functional description of the human visual systems sensitivity to peak-to-peak luminance differences (i.e. contrast) of a range of sine wave spatial frequencies

Note 1 to entry: The CSF varies with colour and viewing conditions.

Note 2 to entry: While the CSF is dependent on the average luminance viewing conditions, a single one is usually adopted for typical conditions.

3.56
correlated colour temperature
temperature of the Planckian radiator whose perceived colour most closely resembles that of a given stimulus at the same brightness and under specified viewing conditions

[SOURCE: ISO 3664:2009, 3.3]

3.57
D50
D65
standard illuminants specified by CIE publication 15

EXAMPLE A, D50, D65, F series.

[SOURCE: ISO 3664]

3.58
data rate
number of bits that are conveyed or processed per unit of time, most often (but not exclusively) employed when discussing time-based media like sound or video

Note 1 to entry: The data rate is often expressed in units of kilobits per second (kbit/s or kbps, 10 to the third power), megabits per second (Mbit/s or Mbps, 10 to the sixth power), or gigabits per second (Gbit/s or Gbps, 10 to the ninth power).

3.59
decibel
dB
one-tenth of the bel

Note 1 to entry: The decibel is more often used than the bel as a unit of level.

Note 2 to entry: The decibel can be defined as a unit of level of a power-like quantity when the base of the logarithm is the tenth root of 10. Also, the decibel is the unit of level of a field quantity when the base of the logarithm is the 20th root of 10.

[SOURCE: IEC 801-22-03]

3.60
decoder
equipment, application, or algorithm for decoding signals, which may include decompression of data previously compressed by an encoder

Note 1 to entry: This definition is derived from the IEC 723-07-47 definition for broadcasting, sound and television and was altered to be applicable to imaging and archiving in general.

3.61
defect
event or shortcoming that does not conform to specification

Note 1 to entry: Defects are generally classed by severity, with class one being the highest severity.

3.62
defect pixel
pixel or subpixel that operates in a way other than the one in which it is driven

[SOURCE: ISO 9241-302:2008, 3.4.30]

3.63
delta E
see colour difference

3.64
de-mosaicing
calculation of missing colors at every position of an image generated by a sensor with a colour filter array

3.65
densitometer
instrument for measuring optical densities by transmission or by reflection under standardized geometrical and spectral conditions

[SOURCE: ISO 6196-6:1992, 06.06.03]

3.66
density
degree of light absorption, reflection, or scattering characteristics of a photographic image, expressed as the logarithm to the base 10 of the ratio of incident radiant flux to the transmitted, reflected, or scattered flux

[SOURCE: SOURCE; ISO 18913:2003, 3.26]

3.67
depth of field
axial depth of the space on both sides of the object plane within which the object can be moved without detectable loss of sharpness in the image, while the positions of the image plane and of the objective are maintained

[SOURCE: ISO 10934-1:2002, 2.36]

3.68
depth of focus
axial depth of the space on both sides of the image within which the image appears acceptably sharp, while the positions of the object plane and of the objective are maintained

[SOURCE: ISO 10934-1:2002, 2.37]

3.69
device level target
DLT
test chart designed and used to test the performance and characteristics of an imaging device or an imaging system

3.70
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 colorimetry can also be categorized as colorimetric colour spaces. For example, additive RGB colour spaces corresponding to real or idealized CRT displays can be treated as colorimetric colour spaces.

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

3.71
digital code value [digital output level]
numerical value assigned to a particular output level

[SOURCE: ISO 16067-1:2003, 3.3]

3.72
digital file
set of related digital records held in a tightly bound relationship within the business system and managed as a single object

Note 1 to entry: At a high level of abstraction, a digital or computer file is a stored segment or block of information that is available to a computer program. Files are so named because they are the counterparts of the paper documents traditionally kept in file folders, usually stored in a file cabinet. Computer operating systems consider files as a sequence of bytes, while application software interprets the binary data as, say, text characters, image pixels, or audio samples.

[SOURCE: ISO 16175-2:2011, 3.10]

3.73
digital image
digital file consisting of picture elements (pixels) with one or more digital code values per pixel that represent a colour or tonal value

Note 1 to entry: A digital image can represent a natural scene or any kind of object.

3.74
digital imaging
process of creating digital images

Note 1 to entry: The term may also be used more generally to include digital image processing.

3.75
digital imaging system
system that records and/or produces images using digital data

[SOURCE: ISO/TS 22028-3:2006, 3.13]

3.76
digital master
raw, partially processed, or fully processed digital reference image in mostly a scene referred state that may require additional processing for output and display

3.77
digital negative
DNG
digital image file format designed by Adobe Systems

Note 1 to entry: DNG is a file format that wraps camera sensor data ("camera RAW data") plus metadata to support image reconstruction, adjustment, and display based on the TIFF/EP (ISO 12234-2) International Standard.

3.78
digital output level
numerical value assigned to a particular output level

Note 1 to entry: This term is also defined in ISO 16067-2 and ISO 21550.

[SOURCE: ISO 14524:2009, 3.2]

3.79
digital still camera
DSC
device which incorporates an image sensor and produces a digital signal representing a still picture

Note 1 to entry: A digital still camera is typically a portable, hand-held device. The digital signal is usually recorded on a removable memory, such as a solid-state memory card or magnetic disk.

Note 2 to entry: This term is also defined in ISO 12232, ISO 15739 and ISO 17321-1.

3.80
digitization
act of generating a digital (quantized) representation of a continuous signal

[SOURCE: ISO 20998-1:2006, 2.7]

3.81
display white point
chromaticity of a computer display's nominal white value

[SOURCE: ISO/IEC 15948:2004, 3.1.52]

3.82
distortion (geometric distortion, TV distortion)
displacement from the ideal shape of a subject (lying on a plane parallel to the image plane) in the recorded image

Note 1 to entry: It basically derives from variation of lateral magnification in the image field of a camera lens and results in straight lines being rendered as curves. There are other factors to induce geometric distortion, for example, rotational asymmetricity of a camera lens or position shift processing in a camera imaging process.

[SOURCE: ISO 17850]

3.83
dither
intentionally applied noise that is intended to randomize quantization error

Note 1 to entry: This can have the effect of preventing visible or audible patterns in images and sounds, such as contouring that are more objectionable than random noise. Dither is routinely used in processing of both digital audio and digital images.

3.84
Dmax
Dmin
see maximum density, minimum density

Note 1 to entry: Dmax is an abbreviation for maximum density and Dmin for minimum density.

Note 2 to entry: The abbreviations are used both in describing the characteristics of an image or an imaging device such as a scanner.

3.85
dots per inch
DPI
unit for the number of spots that a scanner (printer) can divide an image into (scan, print) per inch both horizontally or vertically

Note 1 to entry: See sampling rate.

3.86
downsampling
reduction of samples in data where the sampling rate is reduced with reference to the original sampling rate

3.87
dynamic range
difference, over a given period of time, between maximum and minimum signal levels, expressed in decibels, contrast ratios or f-stops

Note 1 to entry: The minimum signal level must be greater than a specified usable signal level.

Note 2 to entry: This definition is derived from IEC 702-04-23, but was altered to match the imaging and archiving application.

3.87.1
ISO DSC dynamic range
ratio of the maximum exposure level that provides a pixel value below the highlight clipping value to the minimum exposure level that can be captured with an incremental signal-to-temporal-noise ratio of at least 1, as determined in accordance with ISO 15739

[SOURCE: ISO 12231:2012, 3.86]

3.87.2
ISO scanner dynamic range
difference of the maximum density where the incremental gain is higher than 0,5, as determined according to ISO 21550 to the minimum density that appears unclipped

[SOURCE: ISO 21550:2004, 3.13]

3.88
eciRGB v2
RGB colour encoding specified in ISO 22028-4

3.89
edge spread function
ESF
normalized spatial signal distribution in the linearized output of an imaging system resulting from imaging a theoretical infinitely sharp edge

Note 1 to entry: See also line spread function (3.150), point spread function (3.195).

[SOURCE: ISO 16067-2:2004, 3.4]

3.90
effectively spectrally neutral
having spectral characteristics which result in a specific imaging system producing the same output as for a spectrally neutral object

Note 1 to entry: See also spectrally neutral (3.241).

[SOURCE: ISO 16067-2:2004, 3.5]

3.91
electronic scanner for photographic films
scanner incorporating an image sensor that outputs a digital signal representing a still film image

[SOURCE: ISO 16067-2:2004, 3.6]

3.92
electronic scanner for photographic prints
scanner incorporating an image sensor that outputs a digital signal representing a still print image

[SOURCE: ISO 16067-1:2003, 3.6]

3.93
electronic still-picture camera
camera incorporating an image sensor that outputs an analogue or digital signal representing a still-picture, or records an analog or digital signal representing a still picture on a removable media, such as a memory card or magnetic disk

[SOURCE: ISO 12233:2000, 3.7]

3.94
encoder
device, application, or algorithm that encodes data, often used for data compression

Note 1 to entry: A decoder is used to play the data, which often entails decompression.

3.95
exchangeable image file format
EXIF
metadata set to accompany TIFF, JPEG, and RIFF WAV formatted image files

Note 1 to entry: Exif was prepared by the Technical Standardization Committee on AV & IT Storage Systems and Equipment and is Published by the Japan Electronics and Information Technology Industries Association (JEITA). The Exif 2.2 specification (JEITA CP-3451) is in nearly universal use by camera manufacturers. The Exif data structure is based on the TIFF tags and there is significant overlap between TIFF and Exif metadata. While, the Exif standard is almost exclusively focused on image data, it does stipulate a method of writing audio data in files. Also specified is the relational information indicating the relation between image files and audio files.

3.96
exposure (H) (photographic)
total quantity of light allowed to fall upon a photosensitive emulsion or an imaging sensor (measured in lux seconds)

[SOURCE: ISO 10934-1:2002, 2.50]

3.96.1
colour sequential exposure
acquisition of a picture by combining repeated exposures to capture different colour components

[SOURCE: ISO 12231:2012, 3.52.2]

3.97
exposure index
EI
numerical value that is inversely proportional to the exposure provided to an image sensor to obtain an image

Note 1 to entry: Images obtained from a DSC using a range of exposure index values will normally provide a range of image quality levels.

[SOURCE: ISO 12232:2006, 3.2]

3.98
exposure latitude
acceptable exposure variation without losing highlight or shadow detail

Note 1 to entry: The exposure latitude depends on the degree to which the dynamic range of the imaging system exceeds that of the scene or original to be digitized.

3.99
exposure process
various methods to capture images in the electronic still picture camera

[SOURCE: ISO 12231:2005, 2.38]

3.100
exposure series
series of images of the same subject taken using different exposure index values

[SOURCE: ISO 12232:2006, 3.3]

3.100.1
single exposure
acquisition of a picture by a single exposure, with one or more image sensors, that exposes all sensor pixels, all colours, and all image locations at the same time

[SOURCE: ISO 12231:2012, 3.52.1]

3.100.2
time sequential exposure
acquisition of a picture by combining repeated exposures to capture different spatial components

[SOURCE: ISO 12231:2012, 3.52.3]

Note 1 to entry: Time sequential exposure can be with a line array (line scanning) or an area array. With a line array, the picture is acquired by optical or physical sub-scanning with an image sensor in one dimension. With an area array, repeated exposures may integrate smaller pictures into a larger picture by means of image sensor shifting.

3.101
extended gamut
colour gamut extending outside that of the standard sRGB CRT display as defined by IEC 61966-2-1

[SOURCE: ISO/TS 22028-3:2006, 3.14]

3.102
fast scan direction
scan direction corresponding to the direction of the alignment of the addressable photoelements in a linear array image sensor.

[SOURCE: ISO 21550:2004, 3.7]

3.103
fiducial mark
index mark on a test system that allows automatic geometric identification and orientation detection of an object using imaging systems

3.104
file format (image)
processing method to encode the image information for storage in a computer file

Note 1 to entry: Typical file formats in archiving are Tiff, JPEG, JPEG 2000, and PNG.

Note 2 to entry: Set of structural conventions that define a wrapper, formatted data, and embedded metadata, and that can be followed to represent images, audiovisual waveforms, texts, etc., in a digital object. The wrapper component on its own is often colloquially called a *file format*. The formatted data may consist of one or more encoded binary bitstreams, for such entities as images or waveforms, and/or textually-encoded data, often marked up with XML or HTML, for texts. The embedded metadata may be skeletal or extensive.

[SOURCE: ISO 29301:2010, 3.15]

3.105
flare
light falling on an image, in an imaging system, which does not emanate from the subject point

Note 1 to entry: See also image flare, veiling flare, veiling glare.

Note 2 to entry: Flare is also sometimes referred to as veiling glare.

3.105.1
image flare
unwanted increase in signal resulting from light incident on an image sensor that does not emanate from the subject point

Note 1 to entry: While image flare can result from a variety of causes, the following four are common: internal multiple reflections between lens surfaces, light diffusion at lens barrel, body, or edge of lens, leaking of light, and the tails of the lens optical transfer function including spherical and comatic aberrations. Differentiation between these four may be difficult once an image is captured, but it is more appropriate to evaluate the last one with regard to the system resolution. Thus, care should be taken to minimize optical transfer function contribution in the measurement of image flare.

Note 2 to entry: "Image flare" was defined in ISO 3664:2000 in another context but it was deleted in ISO 3664:2009.

3.106
flat field
area of uniform spectral radiance as measured from a specified position

3.107
focus bracketing, focus series
see focus stacking

[SOURCE: ISO 10934-2:2007, 2.28.2]

3.108
focus stacking
image stack acquired at different focal positions

[SOURCE: ISO 10934-2:2007, 2.28.2]

Note 1 to entry: A digital imaging process that combines multiple images focused on different distances at parallel planes on a three-dimensional object to produce an image with a greater depth of field than could be achieved with a single image. The technique is most commonly used in macro photography and photo microscopy.

3.109
gain
quantitative expression of a power increase by the ratio of the values at two points of a power or of a quantity related to power in a well defined manner

Note 1 to entry: By extension, the word "gain" may represent the ratio of powers in a given situation and in a reference condition; for example, the "gain of an antenna".

Note 2 to entry: Gain is generally expressed in logarithmic units by a positive or negative value. When a gain has a negative value in logarithmic units, attenuation may be used instead of gain.

[SOURCE: IEC 702-02-11]

3.110
gain modulation
variation of the gain over the signal level.

Note 1 to entry: One example for a gain modulation is the application of a gamma to an image.

3.111
gamma
exponent that describes approximations to certain non-linear transfer functions encountered in image capture and reproduction

Note 1 to entry: Within this International Standard, gamma is the exponent in the transfer function from display_output to image_sample. Image_sample = display_output gamma where both display_output and image_sample are scaled to the range 0 to 1.

[SOURCE: ISO/IEC 15948:2004, 3.1.20]

3.112
gamma correction
process that alters the image data in order to modify the tone reproduction

Note 1 to entry: Gamma correction is performed in part to correct for the nonlinear light-output versus signal input characteristic of the display. The relationship between the light input level and the output signal level, called the OECF, provides the gamma correction curveshape for an image capture device.

Note 2 to entry: The gamma correction is usually an algorithm, lookup table, or circuit which operates separately on each colour component of an image.

Note 3 to entry: This term is also defined in ISO 12233, ISO 16067-1, ISO 16067-2 and ISO 21550.

3.113
gamut, colour
see colour gamut

3.114
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 colorimetry 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/TS 22028-2:2006, 3.14]

3.115
gray card
test chart consisting of a spectrally neutral or effectively spectrally neutral single test pattern at a defined reflectance or transmittance value in a prescribed spatial arrangement

3.116
gray scale (grey scale pattern)
test chart consisting of test pattern based on spectrally neutral or effectively spectrally neutral, and consists of a large number of different reflectance or transmittance values in a prescribed spatial arrangement

Note 1 to entry: Grey scale patterns are typically used to measure opto-electronic conversion functions.

Note 2 to entry: This term is also defined in ISO 16067-1, ISO 16067-2 and ISO 21550.

[SOURCE: ISO 12233:2000, 3.32.2]

3.117
hardcopy
representation of an image on a substrate which is self-sustaining and reasonably permanent

EXAMPLE Prints, transparencies.

Note 1 to entry: See also softcopy (3.238).

[SOURCE: ISO 3664:2009, 3.4]

3.118
horizontal resolution
resolution value measured in the longer image dimension, corresponding to the horizontal direction for a "landscape" image orientation, typically, using a vertically oriented test-chart feature

[SOURCE: ISO 12233:2000, 3.9]

3.119
high dynamic range imaging
HDR
set of techniques that allow a greater dynamic range of exposures or values (i.e. a wide range of values between light and dark areas) than normal digital imaging techniques

Note 1 to entry: The intention is to accurately represent the wide range of intensity levels found in such examples as exterior scenes that include light-colored items struck by direct sunlight and areas of deep shadow.

3.120
HSV
abbreviation for the hue, saturation and value colour model

[SOURCE: ISO/IEC 9592-1:1997, 3.138]

3.121
hue
attribute of a visual sensation by which the colour of a specimen is judged to be similar to one of the perceived colours, red, yellow, green or blue, or to a combination of two of them

[SOURCE: ISO 105-A08:2001, 2.15]

3.122
hyperbolic wedge
bar target resolution feature where spatial frequencies increase linearly (i.e. hyperbolic) with distance making a wedge or fluted appearance to the feature

Note 1 to entry: Its utility lies in the extended high frequency portions of the target.

3.123
International Colour Consortium
ICC
consortium established in 1993 to create, promote and encourage the standardization and evolution of an open, vendor-neutral, cross-platform colour management system architecture

Note 1 to entry: The resulting ICC specification (ISO 15076-1:2005) provides a cross-platform format to translate colour data between devices in order to ensure colour fidelity, and is specified in many International Standards.

3.124
ICC profile
International Colour Consortium's file format, used to store transforms from one colour encoding to another, e.g. from device colour coordinates to profile connection space, as part of a colour management system.

[SOURCE: ISO 22028-1:2004, 3.24]

3.125
illuminance
quotient of the luminous flux incident on an element of the surface containing the point by the area of that element

Note 1 to entry: CIE 17.4-1987, 845-01-38.

[SOURCE: ISO 3664:2009, 3.5]

3.126
illumination
application of visible radiation (light) to an object

Note 1 to entry: CIE-Publ. No. 17.

[SOURCE: ISO 11315-1:1997, 3.1]

3.127
image capture
see digital imaging

3.128
image capture device
device for converting a scene or a fixed image, such as a print, film, or transparency, to digital image data

[SOURCE: ISO 15740:2008, 3.17]

3.129
image compression
process that alters the way digital image data is encoded in order to reduce the size of an image file

[SOURCE: ISO 12233:2000, 3.11]

Note 1 to entry: See also compression.

3.130
image processing
use of a data processing system to create, scan, analyze, enhance, interpret, or display images

[SOURCE: ISO/IEC 2382-1:1993, 01.06.20]

Note 1 to entry: The manipulation of digitally encoded image data. Two of the most common categories of image processing include image data compression and image enhancement. Typical processes include resizing, cropping, sharpening, rotating, and adjusting colour or contrast.

3.131
image quality
impression of the overall merit or excellence of an image, as perceived by an observer neither associated with the act of photography, nor closely involved with the subject matter depicted

Note 1 to entry: The purpose of defining image quality in terms of third-party (uninvolved) observers is to eliminate sources of variability that arise from more idiosyncratic aspects of image perception and pertain to attributes outside the control of imaging system designers.

[SOURCE: ISO 20462-3:2005, 3.3]

3.132
image sensor
electronic device that converts an optical image into an electronic signal

Note 1 to entry: An example is a charge-coupled device (CCD) array.

[SOURCE: ISO 12233:2000, 3.12]

3.133
image state
attribute of a colour image encoding indicating the rendering state of the image data

Note 1 to entry: The primary image states defined in this document are the scene-referred image state, the original-referred image state and the output-referred image state.

[SOURCE: ISO/TS 22028-3:2006, 3.15]

Note 2 to entry: During the last few years, imaging specialists have refined the concept of image states and, in 2004, this concept was described and defined in ISO 22028-1. At the highest level, there are two states: *scene-referred*, which "represents estimates of the colour-space coordinates of the elements of a scene," and *picture-referred*, which "represents the colour-space coordinates of the elements of a hardcopy or softcopy image." The latter state has two subcategories: *original-referred*, which is "typically produced by scanning artwork," and *output-referred*, an image "that has undergone colour-rendering appropriate for a specified real or virtual output device and viewing conditions." In turn, output referred is further divided into *reference-output-referred* (related to ICC Profile Connection Space or PCS) and *actual-output-referred* (actual device constrained, e.g., CMYK colour space). There do not appear to be well-established metadata conventions for expressing these states, nor do there appear to be file headers (or other structures) in which to inscribe such data.

3.134
incremental gain function
change in the output level (digital code value) divided by the change in the input level (luminance or exposure) as a function of input level

Note 1 to entry: For the determination of incremental gain values, log input values are not used.

Note 2 to entry: If the input exposure points are very finely spaced and the output noise is small compared to the quantization interval, the incremental gain function may have a jagged shape. Such behaviour is an artefact of the quantization process and should be removed by using an appropriate smoothing algorithm, or by fitting a smooth curve to the data. In some cases, it may be desirable to fit a curve to the input-output data and then determine the incremental gain function by taking the first derivative of the function used for the curve fit.

Note 3 to entry: This term is also defined in ISO 15739 and ISO 21550.

[SOURCE: ISO 14524:2009, 3.7]

3.135
incremental output signal
input level (luminance or exposure, not logged) multiplied by the system incremental gain at that level

Note 1 to entry: See also incremental gain function (3.134).

[SOURCE: ISO 14524:2009, 3.8]

3.136
incremental signal to noise ratio
ratio of the incremental output signal to the root mean square (rms) noise level, at a particular signal level

Note 1 to entry: The incremental signal to noise ratio is typically expressed as a graph or table showing the rms noise level versus output signal level for the full range of output signal levels.

Note 2 to entry: This term is also defined in ISO 15739 and ISO 21550.

3.137
International Colour Consortium profile connection space
ICC PCS
standard colour image encoding defined by the International Colour Consortium providing a standard connection point for combining ICC profiles

Note 1 to entry: The ICC.1:2001 specification defines two variations of the PCS, an original-referred variation for colorimetric intent profiles, and a standard output-referred variation for perceptual intent profiles.

[SOURCE: ISO 22028-1:2004, 3.26]

3.138
irradiance
point on a surface, the radiant energy flux incident on an element of the surface, divided by the area of that element

Note 1 to entry: Irradiance is normally expressed in watts per square metre.

[SOURCE: ISO 9806-1:1994, 3.13]

3.139
ISO scanner dynamic range
difference of the maximum density where the incremental gain is higher than 0,5, as determined according to ISO 21550, and the minimum density that appears unclipped

[SOURCE: ISO 21550:2004, 3.13]

3.140
ISO speed
numerical value calculated from the exposure provided at the focal plane of a DSC to produce specified camera output signal characteristics using the methods described in ISO 12232

Note 1 to entry: The ISO speed is usually the highest exposure index value that still provides peak image quality for normal scenes. However, a DSC does not necessarily use the ISO speed value as the exposure index value when capturing images.

Note 2 to entry: This term is also defined in ISO 12232.

3.141
jaggies
visible "steps" of edges or lines around a pixel in a digital image, and is most notable in areas of high contrast

Note 1 to entry: Anti-aliasing can reduce the visibility of the jagged features.

3.142
joint photographic experts group
JPEG
specific image compression method defined in ISO/IEC 10918-1

[SOURCE: ISO 15740:2008, 3.23]

3.143
JPEG 2000
JP2
image coding format compliant to ISO/IEC 15444

[SOURCE: ISO/IEC 15444-1:2004, 3.57]

3.144
L*a*b*
see CIELAB colour space

3.145
light
electromagnetic radiation directly capable of causing a visual sensation

[SOURCE: ISO 10934-1:2002, 2.88]

Note 1 to entry: The band of electromagnetic radiation that human eyes can detect. This ranges from wavelengths of approximately 400 to approximately 700 nanometers (nm). Normal human vision responds slightly beyond this range to both shorter and longer wavelength radiation, but with very little sensitivity. Maximum sensitivity of the human vision in bright-light conditions is approximately 555 nm, corresponding to the perception of green. Visual sensitivity to wavelengths is dependent on luminance levels or levels of brightness, and is described as scotopic (dark-adapted) and photopic (light-adapted) sensitivities. A less common term is mesopic sensitivity, falling between dark and light-adapted sensitivity. The term "light" is equivalent in meaning to "visible spectrum." The section of the band of electromagnetic radiation with a wavelength shorter than that of visible light is termed ultraviolet and the section with wavelengths longer than that of visible light is termed infrared.

3.146
limiting resolution
value of that portion of a specified resolution test pattern, measured in line widths per picture height, which corresponds to an average modulation value equal to some specified percentage of the modulation value at a specified reference frequency

EXAMPLE The limiting resolution could be the test pattern value, in line widths per picture height (LW/PH), corresponding to a camera output modulation level of 10 % of the camera output modulation level at a reference frequency of 10 LW/PH.

Note 1 to entry: This term is also defined in ISO 12233.

3.147
linear Image
output data in a digital image with the resulting signal being approximately linearly proportional to the luminance

3.148
linearized
digital signal conversion performed to invert the camera opto-electronic conversion function (OECF) so that the resulting signal is approximately linearly proportional to the scene luminance

[SOURCE: ISO 12233:2000, 3.18]

3.149
line pairs per millimeter
lp/mm
metric for specifying resolution in terms of the number of equal width black and white line pairs per millimeter that can be resolved according to some criterion, such as visual resolution or limiting resolution

Note 1 to entry: Distance units other than millimetres can also be used.

Note 2 to entry: This term is also defined in ISO 12233.

3.150
line spread function
LSF
normalized spatial signal distribution in the linearized output of an imaging system resulting from imaging a theoretical infinitely thin line

Note 1 to entry: If the imaging system is operating in an isoplanatic region and in its linear range, the LSF is equal to the first derivative of the ESF.

[SOURCE: ISO 12233:2000, 3.16]

3.151
line width per picture height
LW/PH
metric for specifying the width of a feature on a test chart, relative to the height of the active area of the chart, which is equal to the height of the active area of the test chart divided by the width of a black line, that is equal to the total number of lines of the same width which can be placed edge to edge within the height of a test target, or within the vertical field of view of a camera

Note 1 to entry: If the height of the active area of the chart equals 20 cm, a black line of 1 000 LW/PH has a width equal to 20/1 000 cm.

[SOURCE: ISO 12233:2000, 3.17]

3.152
lines per millimeter
lines/mm
metric for specifying resolution in terms of the number of equal-width black and white lines per millimetre that can be resolved according to some criterion, such as visual resolution or limiting resolution

Note 1 to entry: Distance units other than millimetres can also be used.

Note 2 to entry: This term is also defined in ISO 12233.

3.153
luminance
quantity defined by the formula where d2ϕv is the luminous flux transmitted by an elementary beam passing through the given point and propagating in the solid angle dΩ containing the given direction; dA is the area of a section of that beam containing the given point; θ is the angle between the normal to that section and the direction of the beam

Note 1 to entry: CIE 17.4-1987, 845-01-35.

[SOURCE: ISO 3664:2009, 3.7]

3.154
luminance factor
ratio of the luminance of the surface element in the given direction to that of a perfect reflecting or transmitting diffuser identically illuminated

Note 1 to entry: See also luminance ratio (3.155).

[SOURCE: ISO/TS 22028-3:2006, 3.16]

3.155
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]

3.156
maximum density
density corresponding to the minimum transmittance or reflectance factor that a photographic product can achieve or a digital imaging device is able to reproduce

[SOURCE: ISO 12641:1997, 3.15]

3.157
maximum exposure limit
smallest exposure which produces the digital output level corresponding to the maximum detectable exposure

Note 1 to entry: The maximum detectable exposure is also known as the saturation or quantization ceiling.

Note 2 to entry: See also minimum exposure limit (3.162).

[SOURCE: ISO 14524:2009, 3.9]

3.158
megapixel
megapixel is one million pixels, and is commonly abbreviated “MP”

Note 1 to entry: The megapixel count of a camera sensor is one of the most common characteristics used in describing and comparing digital cameras.

3.159
metadata (administrative, descriptive, technical)
data associated with a digital image aside from the pixel values that comprise the digital image

Note 1 to entry: Metadata are typically stored as tags in the digital image file.

[SOURCE: ISO 22028-1:2004, 3.31]

3.159.1
administrative metadata
metadata used for the management of digital content, such as information about rights and permissions (see Metadata, rights), as well as other facts about a given digital object

3.159.2
descriptive metadata
metadata providing information about the intellectual or artistic content of an object and may also contain data describing the physical attributes of the object

Note 1 to entry: Descriptive metadata supports specific user tasks, such as discovery and identification of content. In libraries, this category is sometimes called *bibliographic metadata*.

3.159.3
preservative metadata
metadata associated with the Preservation Metadata for Digital Materials (PREMIS) working group

Note 1 to entry: The group defined a core preservation metadata set, supported by a data dictionary, and identified strategies for encoding, storing, and managing this metadata. Many data elements that are important for preservation are found in other categories, especially those classified as administrative.

3.159.4
technical metadata
metadata providing technical information about the digital files and multifile objects

Note 1 to entry: As further defined by three terms for important aspects of technical information: (1) file-characteristics metadata for technical information about the formatted digital file in hand; (2) source metadata for technical information about the source item, whether analog or digital; and (3) process metadata for information about the technical processes used to convert the source item into the digital file that is described in (1).

3.160
metamerism
phenomenon characterized by the difference in colour observed when two specimens visually matching under a given lightsource are viewed under another light source with different spectral characteristics

[SOURCE: ISO 4618:2006, 2.153]

3.161
minimum density
density corresponding to the maximum transmittance factor (film) or reflectance factor (paper) that a photographic product can achieve

[SOURCE: ISO 12641:1997, 3.13]

3.162
minimum exposure limit
largest exposure below saturation which produces an incremental output signal equal in magnitude to the output noise

Note 1 to entry: See also incremental output signal (3.135), maximum exposure limit (3.157), output noise.

[SOURCE: ISO 14524:2009, 3.10]

3.163
modulation
difference between the minimum and maximum signal levels divided by the sum of these levels

[SOURCE: ISO 12233:2000, 3.19]

3.164
modulation transfer function
MTF
modulus of the optical transfer function

Note 1 to entry: See also optical transfer function, spatial frequency response.

[SOURCE: ISO 12233:2000, 3.20]

3.165
moiré
spatial beat phenomenon generated by the modulation of numerous spatial frequencies

Note 1 to entry: The sampling of spatially continuous incident patterns by each pixel of an image pickup device causes aliasing distortion to appear in the video signal. With a video camera, the distortion in the luminance signal is called luminance moiré while that in the chrominance signals is called chrominance moiré.

[SOURCE: IEC 808-04-07]

3.166
monochromatic light
light characterized by having a single wavelength

3.167
mosaic image
image produced by combining numerous individual images into a single image

Note 1 to entry: A mosaic image is produced by images that have been combined or stitched together in rows and columns, creating a single image from a matrix of images as opposed to a stiched panorama image. Also referred to as a photo montage or a tiled image.

3.168
neutral colour
see spectrally neutral

3.169
newton rings
faint coloured rings or fringe patterns formed by the interference between a direct and a reflected beam of light generated by two transparent surfaces in close contact

[SOURCE: ISO 18913:2003, 3.74]

3.170
noise
unwanted variations in the response of an imaging system

[SOURCE: ISO 21550:2004, 3.14]

3.170.1
total noise
all the unwanted variations captured by a single exposure

[SOURCE: ISO 15739:2003, 3.10.1]

3.170.2
Fixed Pattern Noise
FPN
unwanted variations which are consistent for every exposure

Note 1 to entry: The sensor definition of FPN is spatial pixel variations which do not vary frame to frame given the same illumination, aperture value, integration time and ISO setting.

Note 2 to entry: That most FPN sources pattern noise vary in DNs with sensor gain/ISO speed and thus cannot be considered static versus exposure.

There are 3 classes of fixed pattern noise:

a) static with integration time e.g. pixel FPN, line FPN, row FPN;

b) vary with integration time like Dark current FPN but it is still static frame to frame;

c) signal dependent FPN like the PRNU but still static frame to frame.

Dark current FPN is also termed Dark Signal Non-Uniformity (DSNU).

[SOURCE: ISO 15739:2003, 3.10.2]

3.170.3
temporally varying noise
random noise due to sensor dark current shot noise, photon shot noise, analogue processing, and quantization, that varies from one image to the next

[SOURCE: ISO 15739:2003, 3.10.3]

3.170.4
photo-response non-uniformity
PRNU
pixel-to-pixel gain mismatch

Note 1 to entry: It is normally expressed as a percentage of signal as it is a gain error. It is static frame to frame and thus contributes to fixed pattern noise but its magnitude is a function of signal level. Thus, it is a signal-dependent FPN.

3.171
noise power spectrum
noise spectral power distribution
curve or equation that expresses the camera output noise as a function of two-dimensional image spatial frequencies

[SOURCE: ISO 15739:2003, 3.11]

3.172
normalized spatial frequency
unit used for expressing spatial frequency response, where the distance dimension has been removed by multiplying the spatial frequency in cycles per millimetre by the sampling period in millimetres

Note 1 to entry: Normalized spatial frequency is particularly appropriate for comparing the spatial frequency response of imaging systems where the rendering magnification is unknown, and the total number of samples is equal.

[SOURCE: ISO 12233:2000, 3.21]

3.173
Nyquist frequency
Nyquist limit
spatial frequency equal to 1/2 times the inverse of the sampling period

Note 1 to entry: Energy at an input spatial frequency above the Nyquist limit will alias to a spatial frequency below the Nyquist limit in the output image. The Nyquist limit may be different in the two orthogonal directions.

Note 2 to entry: The highest possible frequency that can be coded at a given sampling rate in order to be able to fully reconstruct the signal. Nyquist principle states that the sampling rate must be at least twice the maximum bandwidth of the analog signal in order to allow the signal to be completely represented.

[SOURCE: ISO 12233:2000, 3.22]

3.174
object level target
test chart designed to check the image quality taken of individual objects

Note 1 to entry: The chart is usually placed aside of the object and captured in the image.

3.175
opto-electronic conversion function
OECF
relationship between the log of the input levels and the corresponding digital output levels for an opto-electronic digital image capture system

Note 1 to entry: If the input log exposure points are very finely spaced and the output noise is small compared to the quantization interval, the OECF may have a step-like character. Such behaviour is an artefact of the quantization process and should be removed by using an appropriate smoothing algorithm or by fitting a smooth curve to the data.

[SOURCE: ISO 14524:2009, 3.11]

3.175.1
camera opto-electronic conversion function
camera OECF
relationship between the input scene log luminances and the digital output levels for an opto-electronic digital image capture system

Note 1 to entry: The units of measurement for this function are log10 candelas per square metre.

Note 2 to entry: This term is also defined in ISO 15739.

[SOURCE: ISO 14524:2009, 3.1]

3.175.2
focal plane camera opto-electronic conversion function
focal plane OECF
relationship between the input focal plane log exposures and the digital output levels for an opto-electronic digital image capture system

Note 1 to entry: The units of measurement for this function are log10 lux-seconds.

[SOURCE: ISO 14524:2009, 3.5]

3.176
optical character recognition
OCR
technique where characters are recognised and converted into binary code

Note 1 to entry: Optical Character Recognition (OCR) is a technology that allows dots or pixels representing machine generated characters in a raster image to be converted into digitally coded text. In addition to recognizing and coding text, OCR programs attempt to recognize and code the structural elements of a document page, such as columns and non-text graphical elements. Intelligent Character Recognition (ICR) is a related technology more efficient to recognize hand written characters.

[SOURCE: ISO 12651-1:2012, 4.100]

3.177
optical density
see density

3.178
optical mark recognition
OMR
technology for extracting data from marked fields, such as checkboxes on printed tests, surveys, or ballots

Note 1 to entry: Since OMR technology only recognizes the mark and not the context of a form, positional data where marks are expected to appear must be pre-established.

3.179
optical resolution
see resolution

3.180
optical transfer function
OTF
two-dimensional Fourier transform of the imaging system's point spread function

Note 1 to entry: For the OTF to have significance, it is necessary that the imaging system be operating in an isoplanatic region and in its linear range.

Note 2 to entry: The OTF is a complex function whose modulus has unity value at zero spatial frequency.

Note 3 to entry: See also modulation transfer function (3.164) and spatial frequency response (3.239).

[SOURCE: ISO 12233:2000, 3.23]

3.181
opto-electronic digital image capture system
system which converts either a light exposure at the focal plane, or a spatial arrangement of luminances (a scene) to digital information

[SOURCE: ISO 14524:2009, 3.12]

3.182
original-referred image state
image state associated with image data that represents the colour-space coordinates of the elements of a two dimensional hardcopy or softcopy image, typically produced by scanning artwork, photographic transparencies or prints, or photomechanical or other reproductions

Note 1 to entry: When the phrase "original-referred" is used as a qualifier to an object, it implies that the object is in an original referred image state. For example, original-referred image data are image data in an original-referred image state.

Note 2 to entry: Original-referred image data are related to the colour-space coordinates of the original, typically measured according to ISO 13655, and do not include any additional veiling glare or other flare.

Note 3 to entry: The characteristics of original-referred image data that most generally distinguish them from scene-referred image data are that they refer to a two-dimensional surface, and the illumination incident on the two-dimensional surface is assumed to be uniform (or the image data corrected for any non-uniformity in the illumination).

Note 4 to entry: There are classes of originals that produce original-referred image data with different characteristics. Examples include various types of artwork, photographic prints, photographic transparencies, emissive displays, etc. When selecting a colour re-rendering algorithm, it is usually necessary to know the class of the original in order to determine the appropriate colour re-rendering to be applied. For example, a colorimetric intent is generally applied to artwork, while different perceptual algorithms are applied to produce photographic prints from transparencies, or newsprint reproductions from photographic prints. In some cases, the assumed viewing conditions are also different between the original classes, such as between photographic prints and transparencies, and will usually be considered in well-designed systems.

Note 5 to entry: In a few cases, it may be desirable to introduce slight colorimetric errors in the production of original-referred image data, for example, to make the gamut of the original more closely fit the colour space, or because of the way the image data were captured (such as a Status A densitometry-based scanner).

[SOURCE: ISO 22028-1:2004, 3.32]

3.183
output referred image state
image state associated with image data that represents the colour-space coordinates of the elements of an image that has undergone colour-rendering appropriate for a specified real or virtual output device and viewing conditions

Note 1 to entry: When the phrase "output-referred" is used as a qualifier to an object, it implies that the object is in an outputreferred image state. For example, output-referred image data are image data in an output-referred image state.

Note 2 to entry: Output-referred image data are referred to the specified output device and viewing conditions. A single scene can be colour-rendered to a variety of output-referred representations depending on the anticipated output-viewing conditions, media limitations, and/or artistic intents.

Note 3 to entry: Output-referred image data can become the starting point for a subsequent reproduction process. For example, sRGB output-referred image data are frequently considered to be the starting point for the colour re-rendering performed by a printer designed to receive sRGB image data.

Note 4 to entry: This term is also defined in ISO 22028-1, ISO/TS 22028-2 and ISO/TS 22028-3.

3.184
PDF/A (ISO 19005-1)
file format defined in PDF Reference and its Errata

[SOURCE: ISO 15930-4]

Note 1 to entry: Adobe's Portable Document Format (PDF) is a document encoding system that maintains the original content, structure and appearance of a document across many computer platforms and communications networks. Adobe has created a near universal document format that is device and resolution independent. A free and widely available PDF viewer allows users to open, view, navigate, and usually print an electronic document. As of July 1, 2008, PDF has been recognized as ISO 32000-1:2008 and the ISO 15930 series.

[SOURCE: ISO 19005-1:2005, 3.14]

3.185
peak signal-to-noise ratio
ratio between the maximum power of a signal and the power of noise contained in the signal

Note 1 to entry: Often abbreviated as PSNR.

3.186
photography
acquisition, processing, or reproduction of optically formed images using chemical or electronic technologies

3.187
photometer
instrument for measuring photometric quantities

[SOURCE: IEC 845-05-15]

3.188
photosite integration time
total time period during which the photosites of an image sensor are able to integrate the light from the scene to form an image

[SOURCE: ISO 12232:2006, 3.7]

3.189
picture-referred image state
image state associated with image data that represents the colour-space coordinates of the elements of a hardcopy or softcopy image, encompassing both original-referred image data and output-referred image data

Note 1 to entry: When the phrase "picture-referred" is used as a qualifier to an object, it implies that the object is in a picturereferred image state. For example, picture-referred image data are image data in a picture-referred image state.

Note 2 to entry: Picture-referred image data will generally be colour-rendered for a specific real or virtual imaging medium and viewing condition.

Note 3 to entry: Picture-referred image data can include image data that do not originate from an original scene, such as text, line art, vector graphics and other forms of original artwork.

[SOURCE: ISO 22028-1:2004, 3.34]

3.190
pixel
smallest discrete picture element in a digital image file

[SOURCE: ISO 12640-4:2011, 3.5]

3.191
pixel count
total number of pixels per file, length, or area depending on the unit used

3.192
pixel interpolation
image processing operation that attempts to estimate interstitial pixel positions

3.193
pixel misregistration
colour-to-colour spatial dislocation of otherwise spatially coincident colour features of an imaged object

3.194
pixels per inch
PPI
sample rate of an imaging device such as a scanner or the sample rate of a digital image

3.195
point spread function
PSF
normalized spatial signal distribution in the linearized output of an imaging system resulting from imaging a theoretical infinitely small point source

[SOURCE: ISO 12233:2000, 3.24]

3.196
preservation master file
see archival master file

3.197
profiling
creation of (ICC) colour profiles for imaging devices in order to enhance the accuracy in colour reproduction

3.198
Pro photo RGB
colour Image encoding specified in ISO 22028-2 ROMM RGB

Note 1 to entry: ProPhoto RGB is a large gamut colour space developed by Kodak primarily for photographic applications. The space encompasses 90% of the CIE L*a*b* colour space - compared to Adobe RGB's coverage of about 50%. ProPhoto RGB is also known as ROMM RGB for Reference Output Medium Metric RGB.

3.199
quality assurance
planned and systematic activities necessary to provide confidence that a product satisfies given acceptance criteria

Note 1 to entry: Quality Assurance (QA) is often confused with Quality Control (QC), but where QC activities are concentrated on detecting defects, QA is proactive and concerned with preventing defects by ensuring that the required levels of quality are achieved for a product or service. A QA program is heavily dependent on data from QC data to search for patterns and trends. QA activities also include controlled experiments, design reviews, and system tests. QA programs can influence quality through creating Quality Assurance Plans, quality-related policies, or creating and conducting trainings.

[SOURCE: ISO 22716:2007, 2.27]

3.200
quality control
part of quality management (3.201) focused on fulfilling quality requirements

Note 1 to entry: Quality Control (QC) includes activities that examine products through observation or testing to determine if they meet their specifications. The purpose of this activity is to detect defects in products or processes where defects are defined as deviating from predetermined requirements.

[SOURCE: ISO 9000:2005, 3.2.10]

3.201
quality management
management system to direct and control an organization with regard to quality

[SOURCE: ISO 9000:2005, 3.2.3]

3.202
radiometry
metrology of radiation

[SOURCE: ISO 921:1997, 995]

3.203
raster data
set of digital picture elements arranged in a grid pattern

[SOURCE: ISO 12637-2:2008, 2.105]

3.204
raster image
image formed by a set of picture elements arranged in a grid pattern

[SOURCE: ISO 12651:1999, 4.07]

3.205
raw data
raw DSC image data
image data produced by, or internal to, a DSC that has not been processed, except for A/D conversion and the following optional steps: linearization, dark current/frame subtraction, shading and sensitivity (flat field) correction, flare removal, white balancing (e.g. so the adopted white produces equal RGB values or no chrominance), missing colour pixel reconstruction (without colour transformations)

[SOURCE: ISO 17321-1:2006, 3.4]

3.206
reference file (for image quality)
file containing reference information to verify at least one quality aspect of an image

3.207
reference target
arrangement of test patterns designed to test particular aspects of an imaging system

Note 1 to entry: Like the ones used in ISO 12233:2000, ISO 16067-1:2003, ISO 16067-2:2004.

3.208
reflection
process by which radiation is returned by a surface or a medium without a change in the frequency of its monochromatic components [IEC 50:1987(845)]

[SOURCE: ISO 9802:1996, 04.11]

3.208.1
diffuse reflection
diffusion by reflection in which, on the macroscopicscale, there is no regular reflection

[SOURCE: ISO 9241-302:2008, 3.3.26]

3.208.2
specular or regular reflection
reflection at the specular angle in accordance with the laws of geometrical optics, without diffusion

[SOURCE: ISO 8254-1:2009, 3.2]

Note 1 to entry: Specular reflection is the type of reflection observed when light is reflected off a shiny, glossy, or mirror-like surface, where light from a single incoming direction is reflected into a single outgoing direction. Stated in more standard terminology, the angle of incidence of the light ray is equal to the angle of reflection. Specular reflection may occur across the entire surface of an object or only a small portion of the surface. An example of the later is the use of gold gilding on medieval illuminations or the use of gold leaf for ornamental details on fine book bindings. The gold portions produce specular reflections while the other portions of the page or binding produce a diffuse reflection. Most natural objects exhibit a combination of specular and diffuse reflection.

3.209
reflective object
object that is intended to be, or is generally, viewed or used in a manner in which some or all of the of light that strikes its surface is reflected

Note 1 to entry: Most reflective objects are largely opaque, but may be translucent. For example, thin printed paper transmits a significant portion of the light striking it, but it is intended to be used in a reflective manner to properly read the text and interpret any graphics.

3.210
reflective scanning
digital imaging of an object where light is reflected from the object, generally a reflective object, such as a map or printed page of text

3.211
region of interest
ROI
area (inside defined boundaries) that the user wants to analyse

[SOURCE: ISO/IEC 13660:2001, 3.29]

3.212
rendered data
image data to which colour rendering has been applied

3.213
rendering
action of transforming the colour in an image from a scene description to a specific output description/device

3.214
rendering intent
style of mapping colour values from one image description to another

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

3.215
reproduction scale
ratio of the size of an object in a digital image and the size of the original object

3.216
reprographic illumination geometry
typical arrangement of the illumination in two dimensional reprographic photography where the lights are positioned on two sides of the original in a 45° angle to the plane of original and to the camera, which is positioned perpendicular to the plane of the original

3.217
resolution (theoretical resolution, limiting resolution)
measure of the ability of a camera system, or a component of a camera system, to depict picture detail

Note 1 to entry: Resolution measurement metrics include resolving power, limiting resolution, special frequency response (SFR), MTF and OTF.

Note 2 to entry: This term is also defined in ISO 16067-1, ISO 16067-2 and ISO 21550.

[SOURCE: ISO 12233:2000, 3.25]

3.218
RGB
additive process colour model where the channels are called red, green and blue

[SOURCE: ISO 12646:2008, 3.1.11]

3.219
sampled imaging system
imaging system or device which generates an image signal by sampling an image at an array of discrete points, or along a set of discrete lines, rather than a continuum of points

Note 1 to entry: The sampling at each point is done using a finite-size sampling aperture or area.

[SOURCE: ISO 21550:2004, 3.16]

3.220
sampling efficiency
ratio of the measured limiting resolution and the Nyquist frequency

Note 1 to entry: Both values need to have the same unit.

3.221
sampling frequency
reciprocal of the sample spacing

Note 1 to entry: Expressed in samples per unit distance (e.g. dots per inch).

Note 2 to entry: This term is also defined in ISO 16067-1, ISO 16067-2 and ISO 21550.

3.222
sampling rate (claimed sampling rate, obtained sampling rate)
number of samples per unit of time, angle, revolutions, or other mechanical, independent variable for uniformly sampled data

[SOURCE: ISO 18431-1:2005, 3.13]

3.222.1
claimed sampling rate
sampling rate stated in the meta data of the image or stated by the camera or software used to operate the imaging device

3.222.2
obtained sampling rate
sampling rate per unit of space determined from imaging a test chart with known geometric structures

3.223
saturation
dimension of colour that describes its purity.

[SOURCE: ISO 5492:2008, 3.34]

3.224
scanner
electronic device that converts a fixed image, such as a film or film transparency, into an electronic signal

[SOURCE: ISO 21550:2004, 3.19]

3.225
scanner opto-electronic conversion function
scanner OECF
relationship between the input density and the digital output levels for an opto-electronic digital image capture system

Note 1 to entry: This term is also defined in ISO 16067-1, ISO 16067-2 and ISO 21550.

3.226
scene luminance ratio
ratio of the highest (highlight) luminance value to the lowest (shadow) luminance value in a scene

Note 1 to entry: See also scene.

[SOURCE: ISO 14524:2009, 3.14]