BS EN IEC 62676-5:2018

BSI Standards Publication

Video surveillance systems for use in security applications

Part 5: Data specifications and image quality performance for camera devices

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Full document details: BS EN IEC 62676-5:2018

National foreword

This British Standard is the UK implementation of EN IEC 62676-5:2018. It is identical to IEC 62676-5:2018.

The UK participation in its preparation was entrusted to Technical Committee GW/1/10, Video Surveillance Systems (VSS), commonly known as CCTV.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Amendments/corrigenda issued since publication

Date	Text affected

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62676-5

August 2018

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English Version

Video surveillance systems for use in security applications - Part 5: Data specifications and image quality performance for camera devices (IEC 62676-5:2018)

Systèmes de vidéosurveillance destinés à être utilisés dans les applications de sécurité - Partie 5: Spécifications des données et performances de la qualité d'image pour les dispositifs de caméra (IEC 62676-5:2018)

Videoüberwachungsanlagen für Sicherungsanwendungen - Teil 5: Leistungsbeschreibung und Bildqualitätseigenschaften für Kameras (IEC 62676-5:2018)

This European Standard was approved by CENELEC on 2018-07-10. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Europäisches Komitee für Elektrotechnische Normung

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European foreword

The text of document 79/607/FDIS, future edition 1 of IEC 62676-5, prepared by IEC/TC 79 "Alarm and electronic security systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62676-5:2018.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2019-04-10
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-07-10

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 62676-2-1 NOTE Harmonized as EN 62676-2-1
IEC 62676-2-2 NOTE Harmonized as EN 62676-2-2
IEC 62676-2-3 NOTE Harmonized as EN 62676-2-3
IEC 62676-4 NOTE Harmonized as EN 62676-4

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60825-1	-	Safety of laser products -- Part 1: Equipment classification and requirements	EN 60825-1	-
IEC 61146-1	-	Video cameras (PAL/SECAM/NTSC) Methods of measurement -- Part 1: Non-broadcast single-sensor cameras	EN 61146-1	-
IEC 62471	-	Photobiological safety of lamps and lamp systems	EN 62471	-
IEC 62676-1-2	2013	Video surveillance systems for use in security applications -- Part 1-2: Video transmission ¿ General video transmission - requirements	EN 62676-1-2	2014
-	-		+ AC	2015
IEC 62676-3	-	Video surveillance systems for use in security applications - Part 3: Analog and digital video interfaces	EN 62676-3	-
ISO 14524	-	Photography – Electronic still picture-cameras – Methods for measuring optoelectronic conversion functions (OECFs)		-
ITU-R Recommendation BT.601-5	-	Encoding parameters of digital television-for studios		-
ITU-R Recommendation BT.709	-	Parameter values for the HDTV* standard-for production and international program exchange		-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

VIDEO SURVEILLANCE SYSTEMS FOR USE IN SECURITY APPLICATIONS –

Part 5: Data specifications and image quality performance for camera devices

FOREWORD

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International Standard IEC 62676-5 has been prepared by IEC technical committee 79: Alarm and electronic security systems.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
79/607/FDIS	79/609/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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A list of all parts in the IEC 62676 series, published under the general title *Video surveillance systems for use in security applications*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

IEC Technical Committee 79 in charge of alarm and electronic security systems together with many governmental organizations, test houses and equipment manufacturers has defined a common framework for video surveillance transmission in order to achieve interoperability between products.

The IEC 62676 series of standards on video surveillance systems is divided into five independent parts:

Part 1: System requirements

Part 2: Video transmission protocols

Part 3: Analog and digital video interfaces

Part 4: Application guidelines

Part 5: Data specifications and image quality performance for camera devices

Each part offers its own clauses for the scope, normative references, definitions and requirements.

The purpose of this part of IEC 62676 is to specify representation and measuring methods of performance values to be described in materials such as instruction manuals, brochures and specifications of video surveillance camera equipment, and provide convenience for users, installers, integrators and maintenance companies, etc.

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VIDEO SURVEILLANCE SYSTEMS FOR USE IN SECURITY APPLICATIONS –

Part 5: Data specifications and image quality performance for camera devices

1 Scope

This part of IEC 62676 defines recommendations and requirements for representation and measuring methods of performance values to be described in materials such as instruction manuals, brochures and specifications of video surveillance camera equipment.

This document consists of two parts. The first part is requirements for description of video surveillance camera specification items. The second part is requirements for measurement methods of video surveillance camera specification items.

A video surveillance camera's output can be analogue (e.g. composite video such as NTSC or PAL) or digital (e.g. compressed network output, uncompressed SDI (serial digital output), etc.).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification and requirements*

IEC 61146-1, *Video cameras (PAL/SECAM/NTSC) – Methods of measurement – Part 1: Non-broadcast single-sensor cameras*

IEC 62471, *Photobiological safety of lamps and lamp systems*

IEC 62676-1-2:2013, *Video surveillance systems for use in security applications – Part 1-2: System requirements – Performance requirements for video transmission*

IEC 62676-3, *Video surveillance systems for use in security applications – Part 3: Analog and digital video interfaces*

ISO 14524, *Photography – Electronic still picture cameras – Methods for measuring opto-electronic conversion functions (OECFs)*

ITU-R Recommendation BT.601, *Studio encoding parameters of digital television for standard 4:3 and wide-screen 16:9 aspect ratios*

ITU-R Recommendation BT.709, *Parameter values for the HDTV standards for production and international programme exchange*

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3 Terms, definitions and abbreviations

3.1 Terms and definitions

3.1.1
4k
image size format with approximately 4 000 horizontal pixels defined as SMPTE 2036 (3 840 × 2 160 UHDTV)

3.1.2
aperture
opening of lens diaphragm through which light passes

3.1.3
bit rate
amount of digital signal in a second

3.1.4
C/CS mount
lens physical mounting standards (C mount and CS mount) typically used for video surveillance cameras

Note 1 to entry: C mount is an older standard defined as one inch (25,4 mm) in diameter with 32 threads per inch and the flange back distance where an image is projected on a sensor is 17,526 mm.

Note 2 to entry: CS mount is a newer standard which uses the same diameter and thread of C mount, but the flange back distance is 12,5 mm.

3.1.5
colour temperature
measure of temperature of a heated surface which generates a radiant energy having the same spectral distribution generated from a blackbody of the same temperature

Note 1 to entry: Colour temperature is expressed in kelvins (K).

[SOURCE: IEC 60194:2015, 24.1355]

3.1.6
compression
process of reducing the size of data (image or video)

[SOURCE: IEC 62676-1-1:2013, 3.1.27, modified – In the definition, "data (image or video)" has replaced "a data (image) file".]

3.1.7
compression ratio
ratio of the uncompressed size of files, images or videos to the compressed size

Note 1 to entry: A high compression ratio means smaller image files and lower image quality and vice versa.

[SOURCE: IEC 62676-1-1:2013, 3.1.28, modified – In the definition, "files, images or videos" has replaced "files or images".]

3.1.8
contrast
<related to image> difference in visual luminance properties that makes an object (or its representation in an image) distinguishable from other objects and the background

Note 1 to entry: In visual perception of the real world, contrast is determined by the difference in the colour and brightness of the object and other objects within the same field of view.

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[SOURCE: IEC 62676-1-1:2013, 3.1.33]

3.1.9
dome camera
camera mounted inside a dome, usually protecting it from outside influences

3.1.10
dynamic range
quotient of the signal from the maximum measurable indication of a quantity by the signal from the minimum measurable value of that quantity

[SOURCE: IEC 62232:2011, 3.15]

3.1.11
electronic shutter
arrangement in the camera changing its sensitivity by electronically controlling the exposure time of the image sensor

[SOURCE: IEC 62676-4:2014, 3.1.14]

3.1.12
encoding streams
series of consecutive encoded images or video from the same image source which are transmitted from one system component to another

[SOURCE: IEC 62676-1-1:2013, 3.1.77, modified – In the definition, "encoding streams" has replaced "image streams", "encoded images or video" has replaced "images".]

3.1.13
exposure control
electronic control of the time needed to expose image sensor pixels to light

Note 1 to entry: For "live" video stream the default exposure is typically 1/25 s or 1/30 s.

3.1.14
exposure time
length of time for which image sensor pixels are exposed to light

3.1.15
flare
light falling on an image, in an imaging system, which does not emanate from the subject point

Note 1 to entry: Flare is also sometimes referred to as veiling glare.

Note 2 to entry: See also image flare (3.1.30).

3.1.16
frame
<related to image format> full frame of video as acquired in progressive mode or as combination of two interlaced fields together

[SOURCE: IEC 62676-2-1:2013, 3.1.20, modified – The specific context "<related to image format>" is added.]

3.1.17
frame rate
number of frames per second

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3.1.18
F-number
iris opening of a lens defined as a ratio between the focal length of the lens and its iris opening

Note 1 to entry: It is typically a number larger then 1 (e.g. F1.4, F2, F2.8) and indicates the amount of light coming through the lens where a lens with lower F-number transmits more light than a lens with higher numbers.

3.1.19
gain
camera function to amplify the electronic signal

3.1.20
gamma correction
correction of the linear response of a camera to compensate for the monitor screen non-linear response

Note 1 to entry: It is measured with the exponential value of the curve describing the non-linearity. A typical monochrome monitor's gamma is 2,2, and a camera needs to be set to the inverse value of 2,2 (which is 0,45) for the overall system to respond linearly (i.e. unity).

3.1.21
global shutter
image read-out method of the image sensor where the exposure timing of all visible lines is the same

Note 1 to entry: Global shutter is a term associated with the CMOS image sensors where the image read-out is usually sequential, i.e. line by line, which produces the so-called "rolling shutter" effect. If the read-out is non-sequential, i.e. all visible lines are read out at the same time, it is called "global shutter".

3.1.22
group of pictures
GOP
set of video images in an encoded video stream consisting of reference images (I-frames), predicted images (P-frames) and bi-directional images (B-frames)

3.1.23
H.264
ISO/IEC 14496-10, MPEG-4 Part 10 standard, also named Advanced Video Coding (AVC), supporting video compression (coding) from low bit-rate network streaming applications to HD video applications with near-lossless coding for network-friendly video representation

[SOURCE: IEC 62676-1-2:2013, 3.1.33, modified – In the definition, "ISO/IEC 14496-10, " is added.]

3.1.24
H.265
ISO/IEC 23008-2, MPEG-H Part 2 standard, also named High Efficiency Video Coding (HEVC), that provides about double the data compression ratio of H.264 at the same image quality

3.1.25
high definition
HD
image size format expressing sizes higher than standard definition (SD) television with aspect ratio of 16:9 defined as SMPTE ST 296 (1 280 × 720) and SMPTE ST 274 (1 920 × 1 080)

Note 1 to entry: Number of pixels in the image above HD, such as 4k, is defined in SMPTE ST 2036-1.

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3.1.26
illumination
<related to image sensor> level of illumination (illuminance) at the image sensor

[SOURCE: IEC 62676-1-1:2013, 3.1.66, modified – In the definition, "sensor" has replaced "device".]

3.1.27
illumination
<related to scene> level of illumination (illuminance) on the area to be kept under surveillance

[SOURCE: IEC 62676-1-1:2013, 3.1.66]

3.1.28
image
visual representation of a scene viewed by a camera

Note 1 to entry: In this document the term image includes multiple images in an image stream.

[SOURCE: IEC 62676-1-1:2013, 3.1.67]

3.1.29
image distortion
distortion of a scene projected on a sensor which deviates from the appearance of the same image as seen by a human eye

3.1.30
image flare
unwanted increase in signal of an output processed image or video resulting from light detected by an image sensor that does not emanate from a corresponding subject point

Note 1 to entry: This includes light from inside and outside the field of view.

3.1.31
image processing
method to change or analyse (digital) images with algorithms or (software) procedures

EXAMPLE Compression and encryption of images, methods for image content analysis.

[SOURCE: IEC 62676-1-1:2013, 3.1.73]

3.1.32
image quality
measurement of how accurately an observed image represents a real object as a collection of sharpness, brightness, colour reproduction, visual resolution, evenness of illumination, contrast, geometry, etc.

[SOURCE: IEC 62676-1-1:2013, 3.1.78]

3.1.33
interlaced scanning
scanning system for video whereby the even lines of a picture are scanned first and transmitted as field 1 and then the odd lines are scanned and transmitted as field 2

Note 1 to entry: The two fields make up a frame and the field and scanning rate are therefore twice the frame rate.

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3.1.34
IR cut-filter
optical device placed in front of an image sensor of a camera which cuts out the invisible infra-red wavelengths of a projected image which is required for colour cameras in order to reproduce natural colours as the human eye sees

3.1.35
IR spectrum
spectrum of frequencies (wavelengths) which are beyond the visible red wavelength (around 700 nm) which is typically invisible to human eyes

3.1.36
iris
variable aperture mechanism which regulates the amount of light passing through the lens onto the image sensor of the VSS camera

[SOURCE: IEC 62676-4:2014, 3.1.23]

3.1.37
JPEG
common standard for image compression, defined by the Joint Photographic Experts Group based on Discrete Cosine Transformation

Note 1 to entry: The JPEG file format is defined by the ISO/IEC 10918 series.

[SOURCE: IEC 62676-1-1:2013, 3.1.83, modified – In the definition, "based on Discrete Cosine Transformation" is added.]

3.1.38
JPEG-2000
common standard for image compression, more recent than JPEG (3.1.37), defined by the Joint Photographic Experts Group, based on wavelet compression

3.1.39
latency
<related to network delay> time that elapses between the initiation of a network request for data and the start of the actual data transfer

[SOURCE: IEC 62676-1-2:2013, 3.1.52, modified – The specific context "<related to network delay>" is added.]

3.1.40
latency
<related to system delay> measure of the time delay between the live action in front of the camera and the view on the monitors

Note 1 to entry: Latency (related to system delay mostly originated from video encoding and decoding) is a cumulative effect of network latency and encoding/decoding video compressed stream, of which the latter is usually more significant. An example of a measuring method is described in Annex E.

3.1.41
local tone mapping
image processing technique to map luminance signal level according to the histogram which expands the apparent visual contrast of the image

Note 1 to entry: Local tone mapping does not expand the actual dynamic range but improves the visibility by adjusting local contrast. Wide dynamic range (3.1.94) is a camera technology that expands the actual dynamic range.

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3.1.42
luminance
<related to video signal> portion of a video signal which carries the brightness and contrast information

[SOURCE: ISO/IEC 14165-321:2009, 3.1.19, modified – The specific context "<related to video signal>" is added.]

3.1.43
luminance
<related to light> photometric measure of the luminous intensity per unit area of light travelling in a given direction

Note 1 to entry: Luminance is expressed in units of candelas per square metre (cd/m^2).

[SOURCE: IEC 62087-1:2009, 3.1.4, modified – The specific context "<related to light>" is added.]

3.1.44
lux
light unit for measuring illumination

Note 1 to entry: It is defined as the illumination of a surface when the luminous flux of 1 lumen falls on an area of 1 m^2. It is also known as lumen per square metre.

3.1.45
monotonicity
property where the output always increases or remains constant and never decreases as the input increases

3.1.46
megapixel
MP
image consisting of a total pixel number of 1 million or more effective pixels

3.1.47
MPEG
common standard used for coding and compression of moving images, defined by Moving Picture Experts Group in different versions

EXAMPLE MPEG-2 and MPEG-4.

[SOURCE: IEC 62676-1-1:2013, 3.1.93]

3.1.48
M-JPEG
video compression format in which each image frame is compressed separately in JPEG

3.1.49
multi-exposure
camera function that combines multiple images from different exposure timings to enhance the camera performance

3.1.50
neutral density filter
ND filter
optical device that reduces the light intensity in the visible wavelength region

[SOURCE: IEC 62087-3:2015, 3.1.10]

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3.1.51
opto-electronic conversion function
OECF
relationship between input luminance and output levels for an opto-electronic image capture system

3.1.52
optical axis
axis that goes through the middle of the optical system, perpendicular to the optical elements

3.1.53
optical density
logarithmic ratio of the intensity of transmitted light to the intensity of the light passing through the refractive substance

3.1.54
pan/tilt/zoom
PTZ
camera or function which refers to controlling a movable camera from a control point (typically with a PTZ keyboard, mouse, or touch-screen) to pan (left/right), tilt (up/down) and zoom (in/out)

Note 1 to entry: Such a control may also include a focus near/far and iris open/close functions.

3.1.55
patch
individual segment of a test chart consisting of multiple patches with various density of reflectance or transmittance

3.1.56
pincushion distortion
optical distortions of a lens when projecting an image on a sensor that appear like a pincushion (parallel lines appear projected towards the inside of the image centre)

3.1.57
pixel
smallest possible element of an image that contains information about luminance and colour

Note 1 to entry: Acronym for picture element.

[SOURCE: IEC 62676-1-1:2013, 3.1.107, modified – In the definition, "that contains information about luminance and colour" is added.]

3.1.58
Power over Ethernet
PoE
method of sending power from the network switch, over Ethernet copper cable, to the IP device (typically a network camera)

Note 1 to entry: PoE is standardized in IEEE 802.3af and IEEE 802.3at.

3.1.59
privacy mask
camera function blocking out or obscuring areas of an image for privacy reasons

[SOURCE: IEC 62676-1-1:2013, 3.1.115, modified – In the term, "mask" has replaced "masking". In the definition, "camera function" has been added before "blocking out".]

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3.1.60
progressive scanning
scanning system for video whereby each next line is scanned after the previous in consecutive order

3.1.61
quantization level
number of levels used in converting analogue signal into digital

Note 1 to entry: Since digital signals are always processed and described in the binary system, the quantization levels are typically expressed as a power of two, so that an 8-bit system is equal to 256 levels of quantization, and a 10-bit system is equal to 1 024 levels of quantization.

3.1.62
quantum efficiency
efficiency of converting number of photons into electrons

Note 1 to entry: Quantum efficiency is expressed as a percentage.

3.1.63
radiated spectrum
wavelength of frequencies (spectrum) radiated with a particular light source

3.1.64
reflectance
property which reflects the incoming light

3.1.65
resolution
<related to visual resolution> measure of the ability of a camera or video systems to reproduce detail from the original scene or image

3.1.66
resolution
<related to format> description of the size of a digital image in pixels (e.g. 720P, 1 080P, 640 × 480), pixels per inch or number of pixels of a video-frame, monitoring device, printout

3.1.67
rolling shutter
image read-out method of the image sensor where the exposure timing of visible lines is sequential, i.e. line by line

Note 1 to entry: Rolling shutter produces unnatural distortions of moving objects.

3.1.68
saturation
device characteristic exhibited when a further change in the input signal produces no additional change, or progressively less change, in the output

[SOURCE: IEC 61888:2002, 3.19]

3.1.69
sensitivity
camera capability to detect light in the scene

Note 1 to entry: Sensitivity is measured in lux [lx].

Note 2 to entry: It is not the capability to detect light at the sensor module.

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3.1.70
sharpness
image quality factor that determines the amount of detail an imaging system can reproduce

3.1.71
shooting condition
conditions under which a camera system is set up to measure various parameters

3.1.72
signal clipping
electronic method of removing excessive signal levels in video, typically referring to bright details in a picture such as sun, headlights or reflections of them

3.1.73
signal to noise ratio
SNR
S/N ratio
ratio between the signal strength and the noise levels in an audio or video signal

Note 1 to entry: Signal to noise ratio is typically expressed in decibels (dB).

3.1.74
sine-based
changes in a periodical function or pattern that occur gradually as a sine wave function

3.1.75
S mount
lens physical mount typically used for smaller form factor PCB (printed circuit board) or “board” cameras

Note 1 to entry: S mount lens uses M12 thread with 0,5 mm pitch and does not have flange back regulations.

3.1.76
spatial frequency response
SFR
measurement which uses slanted edges of a test chart's objects and describes the transfer functions of a camera system

3.1.77
specification item
item specified in a camera specification data sheet

3.1.78
sRGB
RGB colour space standard for use on monitors, printers and the Internet

Note 1 to entry: sRGB is standardized as IEC 61966-2-1.

3.1.79
standard camera settings
common settings for measuring the performance and image quality of the camera

3.1.80
standard definition
SD
image size format based on analogue television formats basically in 4:3 aspect ratio and sampled in 13,5 MHz with 720 horizontal pixels

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3.1.81
standard deviation
positive square root of the variance

[SOURCE: IEC GUIDE 115:2007, 3.8]

3.1.82
target plane
plane that passes through the chart plane which a camera observes

3.1.83
test target
visible marker or plate that possesses patterns of colours or grey scale which provides a visual reference for camera adjustment or measurement

3.1.84
transmittance
ratio between the amount of light passing through a transparent area and the amount of light before the transparent area entry

3.1.85
tungsten illuminants
light sources which have tungsten filament that produces light, typically with colour temperature of 3 200 K

3.1.86
TV lines
specification of an analogue camera's or monitor's horizontal resolution power where horizontal is defined as the maximum number of alternating light and dark vertical lines that can be resolved per picture height

3.1.87
TV field
interlaced television image which consists of only odd or only even lines

3.1.88
TV frame
combination of two TV fields based on the interlaced scanning (even and odd lines)

3.1.89
uncompressed
base band digital signal that has not undergone image or video compression

3.1.90
video authentication
method embedding data into video to ensure the integrity of the video

3.1.91
wedge pattern
pattern that typically consists of black lines on a white background which get narrower as they come closer to each other on a test chart

Note 1 to entry: The wedge pattern is used for resolution measurement.

3.1.92
white balance
electronic process used in video cameras to retain the appearance of colours as seen by the human eye under light of different colour temperatures

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3.1.93
white chart
test chart that is uniformly white

3.1.94
wide dynamic range
WDR
camera technology that expands the actual dynamic range and improves the visibility of dark and bright areas in one scene.

3.2 Abbreviations

CCD	charge coupled device
CIF	common intermediate format
CIE	Commission Internationale de l'Éclairage (International Commission on Illumination)
CMOS	complementary metal oxide semiconductor
dB	decibel
DHCP	dynamic host configuration protocol
DNS	domain name system
DVI	digital visual interface
FPS	frames per second (frame rate)
FTP	file transfer protocol
GB	gigabytes
GOP	group of pictures
GPU	graphical processing unit
HD	high definition
HDMI	high definition multimedia interface
HTTP	hypertext transfer protocol
IEEE	Institute of Electrical and Electronics Engineers
IP	internet protocol
IR	infra-red
ISO	International Organization for Standardization
JPEG	Joint Photographic Experts Group
kB	kilobytes
kb/s	kilobits per second
LED	light emitting diode
MB	megabytes
Mb/s	megabits per second
MP	megapixel
MPEG	Moving Picture Experts Group
MTF	modulation transfer function
ND	neutral density
NTP	network time protocol
NTSC	National Television System Committee
OECF	opto-electronic conversion function
PAL	phase alternating line

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PTZ pan/tilt/zoom
SD standard definition
SDI serial digital interface
SFR spatial frequency response
SHA secure hash algorithm
S/N signal to noise
SMTP simple mail transfer protocol
SNR signal to noise ratio
SSL secure socket layer
TCP/IP transmission control protocol / internet protocol
UDP user datagram protocol
VGA video graphic array
VSS video surveillance system
WDR wide dynamic range

4 Description of video surveillance camera specification items

4.1 General

For video surveillance cameras, including analogue and digital output cameras, network cameras and others with or without PTZ functionality, common items that should be specified in the product documentation such as datasheets are listed. If any of the description items below are specified for the camera, it shall be done according to the requirements of this document.

Description items without a referenced standard or not listed at all in this document should be specified according to other published international standards, including a reference to these standards.

4.2 Camera

4.2.1 Image sensor

4.2.1.1 Description

This indicates a device which converts an optical image into an electrical signal. Usually it is a solid state image acquisition device that has many photoelectric conversion elements placed on the surface where optical image is converted into electrical signal. The electrical signal is then read out in sequence.

4.2.1.2 Item indication

[Image Sensor]

4.2.1.3 Content indication

4.2.1.3.1 Type

This indicates an image sensor by type as a symbolic number, which is a legacy diagonal dimension in inches as an idiomatic description. Inches, using the symbol of double prime (″), may be used as a historical expression for optical format size.

A charge transfer drive system and semi-conductor technology type should be indicated.

EXAMPLE 1: 1/3 type Interline Transfer (IT) CCD

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EXAMPLE 2: 1/2,5 type CMOS

EXAMPLE 3: 1/4″ CMOS

4.2.1.3.2 Image scanning area

This indicates the scanning size of an effective image area of an image sensor. It is indicated by dimensions in horizontal and vertical directions, in millimetres. As a conventional idiomatic description, it may be called the diameter of an image pickup tube (originally “inch”). The relation between the idiomatic descriptions and general dimensions are as below:

- 1/2 Type (6,4 mm × 4,8 mm);
- 1/3 Type (4,8 mm × 3,6 mm);
- 1/4 Type (3,6 mm × 2,7 mm).

It should be indicated by horizontal (H) × vertical (V) dimensions of an image size (effective image scanning area) in millimetres.

It may be described with the idiomatic descriptions in parallel.

Inches, using the symbol of double prime (″), may be used as a historical expression for optical format size.

NOTE Some megapixel sensors can have multiples of different scanning areas depending upon the selected video format and the mode of reading pixels.

EXAMPLE 1: 6,4 mm (H) × 4,8 mm (V) (1/2 Type, 4:3 mode)

EXAMPLE 2: 4,8 mm (H) × 3,6 mm (V) (1/3 Type, 4:3 SD mode)

EXAMPLE 3: 5,70 mm (H) × 4,28 mm (V) (1/2,5″, 4:3 5MP mode)

EXAMPLE 4: 4,22 mm (H) × 2,38 mm (V) (1/2,5″, 16:9 HD mode)

4.2.1.3.3 Pixel number

This indicates the number of pixels on the surface of an image sensor, comprising photoactive and non-photoactive pixels.

The number of effective pixels indicates the number of pixels participating in the actual photoelectric conversion. The total number of pixels is a sum of the effective pixels and the pixels for synchronizing, blanking and optical black function around the effective area.

– Approximate number of effective pixels: a rounded number of the product of the number of horizontal pixels and the number of vertical pixels.
– Number of effective pixels: the actual product number of horizontal and vertical pixels (H × V) an electronic picture is made of, produced by the sensor.
– Total number of pixels: usually is not indicated, but may be accompanied by the number of effective pixels.

EXAMPLE 1: Total number of pixels: 811 (H) × 508 (V) ≈ 410 000 pixels

Effective number of pixels: 768 (H) × 494 (V) ≈ 380 000 pixels

EXAMPLE 2: Total number of pixels: 2 751 (H) × 2 003 (V) ≈ 5,5 MP,

Effective number of pixels (5MP mode): 2 592 (H) × 1 944 (V) ≈ 5 MP

Effective number of pixels (1 080HD mode): 1 920 (H) × 1 080 (V) ≈ 2,1 MP

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4.2.1.3.4 Television system

This indicates the rules related to the colour modulation method of analogue television signal, its scanning method and the frequency.

– Colour: NTSC
– Colour: PAL

EXAMPLE 1: Colour PAL, 625/50i (50 interlaced TV fields)

EXAMPLE 2: Colour NTSC, 525/59,94i (59,94 interlaced TV fields)

4.2.1.3.5 Colour television image pickup system

This indicates the method for acquiring a colour signal in a camera from the optical image.

It is described with the number of image sensors to be used, colour arrangement of filters, etc.

In video surveillance a single sensor is mostly used, while in broadcast there are three-sensor (R, G and B) cameras also.

– The number of image sensors (one or three).
– Colour coding method, or Colour Filter Array (CFA).

EXAMPLE 1: Single image sensor, Complementary (CYGM) colour filter array

EXAMPLE 2: Single image sensor, Bayer (RGB) colour filter array

4.2.1.3.6 Capture frame rate

This indicates the number of frames that can be captured and read from an image sensor per second. For analogue systems a TV frame is composed of two TV fields, which are based on the interlaced scanning (even and odd lines). For digital systems, a frame is composed of all active pixels making a single image unless it is interlaced scanning, e.g. 1 080i.

Measuring method is described in 5.4.9.

– Frame rate shall be indicated in frames per second [fps].
– When the frame rate varies depending on the imaging mode, such as cropping, the condition(s) shall be indicated.

EXAMPLE 1: 29,97 fps

EXAMPLE 2: 30 fps (VGA) 15 fps (720-HD, when all pixels are read out.)

4.2.1.3.7 Scanning system

This indicates the predetermined sequential method of reading pixels to convert signals from two-dimensional information (optical image) into an electrical signal in the image sensor.

EXAMPLE 1: 2:1 Interlaced scanning

EXAMPLE 2: Progressive scanning

4.2.1.3.8 Scanning frequency

This indicates the frequencies of horizontal and vertical scanning of the sensor pixels in order to produce the electrical video signal.

Frequencies of horizontal and vertical scanning shall be expressed in hertz [Hz].

EXAMPLE: Horizontal: 15,734 kHz, Vertical: 59,94 Hz

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4.2.1.3.9 Shutter mode

This indicates the capture timing of the image sensor. Typical CMOS sensors may have capture timing difference relative to the scanning frequency, which could result in “Rolling shutter” effect.

EXAMPLE 1: Global shutter

EXAMPLE 2: Rolling shutter

4.2.2 Maximum resolution

4.2.2.1 Description

This indicates a numeric value that describes the limit of detail visibility of the object. It is described by number of horizontal and vertical lines that can be resolved. Horizontal resolution is defined by the number of vertical lines relative to the image height. If a value varies depending on a camera setting, the setting condition should be indicated.

Measuring method is described in 5.4.2.

4.2.2.2 Item indication

[Resolution] or [Maximum Resolution]

4.2.2.3 Content indication

The horizontal resolution and vertical resolution shall be indicated by number of lines (equal to lw/ph: line width per picture height). For analogue cameras, it may be expressed as TV lines. The resolution of the centre and the average of the four corners shall be indicated.

EXAMPLE 1: Centre – Horizontal 600 lines, Vertical 600 lines

Corner – Horizontal 450 lines, Vertical 450 lines

EXAMPLE 2: (Analogue camera):

Centre – Horizontal 480 TV lines, Vertical 360 TV lines

Corner – Horizontal 360 TV lines, Vertical 270 TV lines

NOTE 1 This item represents the “Visual resolution”, which is the output result of the camera including the performance of lens, image sensor and signal processing, etc. and which is described in “lines” or “TV lines” to express how much the camera can actually resolve. In contrast, the Digital output (e.g. network camera, HDMI, SDI, etc.) expressed in pixels such as VGA(640 × 480) or HD(1 280 × 720), which actually is the “Format resolution”, describes the numeric value sampled but does not include the actual performance of components in the camera, and can differ from the result of “Visual resolution”. Pixels of the image sensor are described in 4.2.1.3.3 and pixels of the output image size are described in 4.5.3. The output signal resolution which can be different from the image sensor pixel is described in 4.5.4 in “lines”.

NOTE 2 In IEC 62676-4, the required object size to monitor or detect etc. is expressed in “pixels”, which relates in this document precisely to the maximum resolution in “lines”.

4.2.3 Minimum illumination

4.2.3.1 Description

This indicates the minimum visible light illumination necessary, expressed in lux, to obtain specified contrast of the video output level (expressed in %) at which an object can be determined, while producing no less than 25 fps (30 fps). If the camera offers a Day/Night mode the minimum illumination shall be specified for Colour- and Black&White-Mode separately

Measuring method is described in 5.4.3.

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4.2.3.2 Item indication

[Minimum Illumination]

4.2.3.3 Content indication

It shall be expressed in lux [lx] accompanied by F-number value of the lens, the accumulation (exposure) time, and measuring condition, all of which shall be indicated for visible light. The minimum illumination of a camera shall be specified at 30 % contrast (signal level difference between the white and black signal of the test chart), with electronic shutter equal to or shorter than 1/25 s (40 ms) or 1/30 s (33,3 ms). Contrary to the older standards, where the absolute output level was specified, the amplitude/contrast (difference between white and black) of the output level shall be measured in order to take into account the camera's AGC and to avoid adding set-up (black level) to artificially improve the minimum illumination number.

Since the colour temperature of the light source influences the result, it should be indicated.

For cameras offering true Day/Night mode by mechanically removing the IR cut-filter, the sensitivity should be expressed in lux as measured with a lux-meter for the visible part of the radiated spectrum. Since a camera sensor with removed IR cut-filter has extended sensitivity in the IR spectrum, by stating the light source equivalent colour temperature, relative to a black body radiator, for example 3 100 K for a halogen lamp, the IR part of the spectrum is also given.

EXAMPLE 1: Min. illumination 2,0 lx (F1,8, 1/25 [s], Colour temp. 3 100 K)

EXAMPLE 2: Min. illumination 1,0 lx (Day Mode), 0,03 lx (Night Mode), F1,4, 1/30 [s],

Colour temp. 3 100 K

4.2.4 Signal to noise ratio (SNR, S/N ratio)

4.2.4.1 Description

This indicates a ratio of rated video signal level voltage (S) to the noise level voltage (N) included in a video output signal.

4.2.4.2 Item indication

[SNR] or [S/N Ratio]

4.2.4.3 Content indication

It shall be expressed in dB (decibel) as equal to or better than a specified value.

EXAMPLE: SNR ≥ 48 dB

4.2.5 White balance

4.2.5.1 Description

This indicates the function of a colour camera to adjust colour balance to appear natural to the human eye, according to light sources. It is the function of the camera image processing algorithm to make colour adjustment of the scene illuminated with various colour temperature light sources so that when a white object is seen, it is reproduced white irrespective of the light sources.

4.2.5.2 Item indication

[White Balance]

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4.2.5.3 Content indication

Adjustment method should be specified by different modes, such as fully automatic, manual or one-push set-up.

Indicate the tracking range of colour temperature in which white balance can be adjusted automatically.

EXAMPLE: Automatic: ATW (Auto Tracking White Balance) 3 200 K to 6 000 K, one-push

Manual: R/B variable

Fixed: 3 200 K, indoor, outdoor

4.2.6 Electronic shutter

4.2.6.1 Description

This indicates the capability of electronically controlling the electronic shutter (exposure time) for the accumulation of light in the image sensor.

4.2.6.2 Item indication

[Electronic Shutter]

4.2.6.3 Content indication

Specify accumulation time (electronic shutter or exposure time).

When the electronic shutter is expressed as OFF, the actual electronic shutter shall be indicated.

EXAMPLE 1: 1/15 s, 1/30 s, 1/60 s, 1/100 s, 1/250 s, 1/1 000 s

EXAMPLE 2: Auto/Manual (1/15 s, 1/30 s, 1/60 s, 1/100 s, 1/250 s, 1/1 000 s)

EXAMPLE 3: OFF (1/30 s), 1/100 s

4.2.7 Electronic sensitivity up (Slow shutter)

4.2.7.1 Description

This indicates a value that increases sensitivity by extending accumulation of light in an image sensor, combining light of adjacent pixels in an image sensor, or adding up frame/field signal in a memory.

4.2.7.2 Item indication

[Electronic Sensitivity Up] or [Slow Shutter]

4.2.7.3 Content indication

Specify the value or electronic shutter.

Indicate if the resolution changes by combining pixels.

EXAMPLE 1: Sensitivity scale factor 4 times, electronic shutter 1/15 s

EXAMPLE 2: Twice, 4 times, 8 times, 16 times

EXAMPLE 3: 1/30 s, 1/15 s, 1/7,5 s

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4.2.8 Dynamic range (DR)

4.2.8.1 Description

This indicates the ratio between the highest illumination which produces unclipped detailed image, just below the saturation level, and the lowest illumination, just equal to the noise level. Scene details with the same amplitude as the noise are assumed to be just noticeable. The absolute output level that results from the lowest illumination is not of importance for the dynamic range, but is a major parameter for the visible dynamic range (see 4.2.9). These highest and lowest illuminations have to be reproduced simultaneously in one scene. Dynamic Range depends on the sensor design, its quantum efficiency and pixel size, number of exposures and its exposure range, the temperature and the optic quality of the lens used. Also, there are technologies that expand the dynamic range usually named as wide dynamic range (WDR). Dynamic range is expressed as a pure ratio or in decibels (dB) with 10-base logarithmic value.

Measuring method is described in 5.4.4.

4.2.8.2 Item indication

[Dynamic Range]

4.2.8.3 Content indication

Indicate in dB (decibel) or times.

EXAMPLE: Dynamic Range 80 dB or 10 000 times.

4.2.9 Visible dynamic range (VDR)

4.2.9.1 Description

This indicates the ratio between the highest illumination which produces unclipped detailed image, just below the saturation level, and the lowest illumination that can be output at 50 %. This output level of 50 % is chosen such that it is bright enough to produce usable picture and is therefore a good measure for the VDR. The signal to noise ratio of this lowest illumination is not of importance for the VDR, but it is a major parameter for the dynamic range (see 4.2.8). These highest and lowest illuminations have to be reproduced simultaneously in the same scene. Visible dynamic range depends on the sensor design, its quantum efficiency and pixel size, number of exposures and its exposure range, the temperature and the optic quality of the lens used. It is expressed as a pure ratio or in decibels (dB) with 10-base logarithmic value.

Measuring method is described in 5.4.5.

4.2.9.2 Item indication

[Visible Dynamic Range]

4.2.9.3 Content indication

Indicate in dB (decibel) or times.

EXAMPLE: Visible Dynamic Range 48 dB or 256 times.

4.2.10 Infra-red illumination operating view distance

4.2.10.1 Description

This indicates a distance between a camera and an object necessary to obtain specified video output level only using an infra-red (IR) illuminator built into a camera. This measurement

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method is based upon the image sensor's base material, and that the IR illuminator's wavelength matches the sensitivity of the image sensor.

Measuring method is described in 5.4.6.

4.2.10.2 Item indication

[Infra-Red Illumination Operating View Distance]

4.2.10.3 Content indication

Measured viewing distances may be indicated by a representative figure when having multiple measured results as "TYP level" (typical level). Also LED wavelengths should be indicated in nanometres (nm) to state visibility of the IR LED clearly. Lens specifications shall be indicated jointly in the case of a lens exchangeable camera.

EXAMPLE: Viewing Distance (Centre) 10 m (TYP level)

Viewing Distance (Corner) 5 m (TYP level)

(LED wavelengths 850 nm, F1,4, f = 12 mm)

4.2.11 Day/Night mode (D/N)

4.2.11.1 Description

This indicates the capability of the camera moving the IR cut-filter mechanically when changing from colour to black & white in low light and from black & white to colour in bright light.

4.2.11.2 Item indication

[Day/Night mode]

4.2.11.3 Content indication

Indicate the mechanism of IR cut-filter for Day/Night mode. If the IR cut-filter is mechanically moved, it can be expressed as True Day/Night Mode.

EXAMPLE 1: Day/Night Mode

EXAMPLE 2: True Day/Night Mode – mechanical IR cut-filter removal

EXAMPLE 3: Digital Day/Night Mode (non-mechanical)

4.2.12 Internal image processing performance

4.2.12.1 Description

The capability of the camera hardware to process images with the help of imaging algorithms to improve quality such as noise reduction, sharpening, image stabilization, multi-exposure, video analytics, etc.

4.2.12.2 Item indication

[Image Processing Performance]

4.2.12.3 Content indication

EXAMPLE: 600 MP/s

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4.3 Lens

4.3.1 Focal length

4.3.1.1 Description

Distance from the second principle plane of a lens to the point where light-rays coming from infinity, and parallel to the optical axis, are focusing.

4.3.1.2 Item indication

[Focal Length]

4.3.1.3 Content indication

It is expressed as f [mm]

EXAMPLE: Focal Length f = 2 mm to 10 mm

4.3.2 Relative aperture (F-number)

4.3.2.1 Description

The relative aperture, also designated as F-number, is the ratio of the effective diameter of a lens (entrance pupil) to its focal length.

4.3.2.2 Item indication

[Aperture Ratio]

4.3.2.3 Content indication

F = f / D, where f is focal length and D is the diameter of the entrance pupil.

EXAMPLE 1: Aperture Ratio 1:1,4

EXAMPLE 2: F1,4

EXAMPLE 3: F1,6 (Wide) to F4,7 (Tele)

EXAMPLE 4: 1:1,8 (Fixed)

4.3.3 Field of view

4.3.3.1 Description

The Field of View (FOV) describes the region seen by a sensor and depends on the sensor size and the focal length of the optical system. Usually, the FOV is calculated for the diagonal, but it can also be reported for the horizontal field of view (HFOV) and the vertical field of view (VFOV) directions.

4.3.3.2 Item indication

[Field of View]

4.3.3.3 Content indication

It is often provided as an angle of view [°] and can be calculated with

$$FOV = 2 \arctan (SensorSize / 2f),$$

where SensorSize is in millimetres, and f is the lens focal length in millimetres.

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EXAMPLE 1: Diagonal FOV 122°

EXAMPLE 2: Horizontal: 104°, Vertical: 85°

4.3.4 Image distortion

4.3.4.1 Description

Geometric distortion that basically derives from the variation of magnification in the image field.

Measuring method is described in 5.4.7.

4.3.4.2 Item indication

[Image Distortion]

4.3.4.3 Content indication

Percentage difference between a point on a regular grid around the centre of an image and the distance of the point to the centre in a real image.

EXAMPLE: Image Distortion: 10 %

4.3.5 Iris control

4.3.5.1 Description

This indicates the lens iris control mechanism.

4.3.5.2 Item indication

[Iris Control]

4.3.5.3 Content indication

Indicate the iris control type for the lens.

EXAMPLE 1: DC driven iris

EXAMPLE 2: Video driven iris

EXAMPLE 3: Manual

4.3.6 Mount type

4.3.6.1 Description

This indicates the lens mechanical mount type used for the camera system.

4.3.6.2 Item indication

[Mount type]

4.3.6.3 Content indication

Indicate the mount types for the lens.

EXAMPLE 1: C/CS mount

EXAMPLE 2: CS mount

EXAMPLE 3: S mount

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4.3.7 Image flare

4.3.7.1 Description

Unwanted increase of signal in the image plane of an optical system, caused by the scattering and reflection of a proportion of the radiation (light) which enters the system through its normal entrance aperture where the radiation may be from inside or outside the field of view of the system.

Measuring method is described in 5.4.8.

4.3.7.2 Item indication

[Image Flare]

4.3.7.3 Content indication

Indicate the signal level increase in dark areas on the test chart as a percentage of the diffuse white signal from the white areas on the test chart.

EXAMPLE: Image Flare: 8 %

4.4 Input / Output

4.4.1 Video output

4.4.1.1 Description

This indicates the output of a video signal, from a camera. If digital video is referred to, the format and connectivity should be indicated. If analogue video is referred to, such as composite video signal, the format, output level and impedance should be indicated.

Any video output for installation purpose that is used mainly for view angle adjustment, focus adjustment, etc. shall be indicated as “monitor output”.

Compliant Video Signal interfaces, specifications and measuring method shall refer to IEC 62676-3.

4.4.1.2 Item indication

[Video Output] or [Monitor Output]

4.4.1.3 Content indication

Signal type, level, output impedance, connector type, location, etc.

EXAMPLE 1: PAL VBS 1,0Vp-p 75 Ω

EXAMPLE 2: NTSC 1,0Vp-p 75 Ω

EXAMPLE 3: DVI/HDMI (1 080iHD)

EXAMPLE 4: SDI (3 Gb/s)

4.4.2 Auto-iris lens output

4.4.2.1 Description

This indicates an output for control of an auto-iris lens. Control method or video signal and supply voltage shall be indicated.

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4.4.2.2 Item indication

[Auto-iris Lens Output]

4.4.2.3 Content indication

Specify auto-iris control types and connector types

EXAMPLE 1: Video output VS 1,0 Vp-p

Supply voltage 9 V DC

Connector 4P

EXAMPLE 2: DC output

Connector 4P

4.5 Video output format

4.5.1 Image format standard

4.5.1.1 Description

This indicates the basic image formats and digital sampling system, if applicable for HD. The supported SMPTE standards shall be listed.

4.5.1.2 Item indication

[Image Format Standard]

4.5.1.3 Content indication

Indicate the supported image or video format standards such as SMPTE standards.

EXAMPLE: SMPTE 274M-2008 , 1 920 × 1 080, Progressive, 16:9

SMPTE 296M-2001, 1 280 × 720, Progressive, 16:9

4.5.2 Colour representation

4.5.2.1 Description

This indicates which colour representation system the camera complies to.

4.5.2.2 Item indication

[Colour Representation]

4.5.2.3 Content indication

Indicate the supported standards for colour representation.

EXAMPLE: colour representation: ITU-R BT.709

4.5.3 Output image pixel number

4.5.3.1 Description

This indicates the number of pixels of the data of a single output image.

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4.5.3.2 Item indication

[Output image pixel number]

4.5.3.3 Content indication

Indicate the abbreviation of a general image format, or horizontal and vertical pixel numbers.

– In case of an original format, this shall be stated, and horizontal and vertical pixel numbers shall be specified.
– If more than one size is available, they shall be listed.
– If pixel numbers differ depending on different compression formats, the compression format shall also be specified.

EXAMPLE: JPEG: 1 280 × 960, VGA (640 × 480), QVGA (320 × 240), 1 280 × 720 (image cropped)

MPEG-4: 4CIF (704 × 576), CIF (352 × 288)

4.5.4 Output image resolution

4.5.4.1 Description

This indicates the resolution of the output image of the camera which may be filtered, re-formatted or re-sampled from the original pixel number of the image sensor.

4.5.4.2 Item indication

[Output Image Resolution]

4.5.4.3 Content indication

The horizontal resolution and vertical resolution shall be indicated by number of lines.

EXAMPLE: Horizontal resolution: 300 lines, Vertical resolution: 200 lines

4.6 Pan and tilt

4.6.1 Rotation angle

4.6.1.1 Description

This indicates maximum rotation angle.

4.6.1.2 Item indication

[Rotation Angle]

4.6.1.3 Content indication

EXAMPLE: Horizontal: ±175° with the front as 0°

Vertical: Up 20° to down 60° or +20° to −60° with a horizontal view as 0°

Pan Range 360° continuous rotation

4.6.2 Rotation speed

4.6.2.1 Description

This indicates rotation speed when pan or tilt is operating. In general, it should be indicated if it is proportional speed depending on the inclination of PTZ joystick. The maximum achievable speed when using preset positioning should also be indicated.

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4.6.2.2 Item indication

[Rotation Speed]

4.6.2.3 Content indication

EXAMPLE: Horizontal rotation speed 180°/s, vertical rotation speed 90°/s.

Variable Pan/Tilt Speed 0,2°/s to 120°/s

Pre-position Speed 120°/s

Proportionality Pan /Tilt to Zoom 1:1

Optical Zoom Movement Speed < 5 s (Wide to Far)

4.6.3 Preset position function

4.6.3.1 Description

This indicates the function to store a position of pan/tilt, zoom/focus position of lens, camera setting condition, etc.

4.6.3.2 Item indication

[Preset Function]

4.6.3.3 Content indication

Indicate the function capable of storing or the number of stored items. It should also indicate the speed of achieving preset positions, combining pan, tilt and zoom functions.

EXAMPLE: Pan/tilt position, zoom/focus position 256 positions

120°/s preset recalls

Max. number of tours, presets and duration: 2 tours, 32 presets, 30 min.

4.6.4 Preset position accuracy

4.6.4.1 Description

This indicates the accuracy of returning to a preset position and placement of a privacy mask.

4.6.4.2 Item indication

[Preset Position Accuracy], [Privacy Mask Accuracy]

4.6.4.3 Content indication

EXAMPLE: ±0,5°, ±0,01°

4.6.5 Audible noise

4.6.5.1 Description

This indicates the noise during pan tilt zoom operation.

4.6.5.2 Item indication

[Audible Noise]

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