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Title: BS EN IEC 62676-5 Video surveillance systems for use in security applications

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

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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UK Vote

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

PROJECT NUMBER:

IEC 62676-5 ED2

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2024-11-29

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79/691/RR

IEC TC 79 : ALARM AND ELECTRONIC SECURITY SYSTEMS

SECRETARIAT:

France

SECRETARY:

Mr Jean-François LIGNEREUX

OF INTEREST TO THE FOLLOWING COMMITTEES:

HORIZONTAL FUNCTION(S):

ASPECTS CONCERNED:

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TITLE:

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

NOTE FROM TC/SC OFFICERS:

According 79/691/RR

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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/XXX/FDIS	79/XXXRVD

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.

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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

272

INTRODUCTION

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

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

279 Part 1: System requirements

280 Part 2: Video transmission protocols

281 Part 3: Analog and digital video interfaces

282 Part 4: Application guidelines

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

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

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

290

291

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 61966-2-1, *Multimedia systems and equipment - Colour measurement and management - Part 2-1: Colour management - Default RGB colour space - sRGB*

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 62676-2-3, *Video surveillance systems for use in security applications – Part 2-3: Video transmission protocols – IP interoperability implementation based on Web services*

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

ISO 12233, *Digital cameras — Resolution and spatial frequency responses*

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

ISO 15739, *Photography – Electronic still-picture imaging – Noise measurements*

330 ITU-R Recommendation BT.601, *Studio encoding parameters of digital television for standard*
331 *4:3 and wide-screen 16:9 aspect ratios*

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

334 **3 Terms, definitions and abbreviations**

335 **3.1 Terms and definitions**

336 **3.1.1**

337 **4k**

338 image size format with approximately 4 000 horizontal pixels defined as SMPTE 2036
339 (3 840 × 2 160 UHD TV)

340 **3.1.2**

341 **aperture**

342 opening of lens diaphragm through which light passes

343 **3.1.3**

344 **bit rate**

345 amount of digital signal in a second

346 **3.1.4**

347 **C/CS mount**

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

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

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

354 **3.1.5**

355 **colour temperature**

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

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

359 [SOURCE: IEC 60194:2015, 24.1355]

360 **3.1.6**

361 **compression**

362 process of reducing the size of data (image or video)

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

365 **3.1.7**

366 **compression ratio**

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

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

369 [SOURCE: IEC 62676-1-1:2013, 3.1.28, modified – In the definition, "files, images or videos"
370 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.

[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 (3.1.31).

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

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

415 **3.1.17**

416 **frame rate**

417 number of frames per second

418 **3.1.18**

419 **F-number**

420 iris opening of a lens defined as a ratio between the focal length of the lens and its iris opening

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

423 **3.1.19**

424 **gain**

425 camera function to amplify the electronic signal

426 **3.1.20**

427 **gamma correction**

428 correction of the linear response of a camera to compensate for the monitor screen non-linear
429 response

430 Note 1 to entry: It is measured with the exponential value of the curve describing the non-linearity. A typical
431 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
432 the overall system to respond linearly (i.e. unity).

433 **3.1.21**

434 **global shutter**

435 image read-out method of the image sensor where the exposure timing of all visible lines is the
436 same

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

440 **3.1.22**

441 **group of pictures**

442 **GOP**

443 set of video images in an encoded video stream consisting of reference images (I-frames),
444 predicted images (P-frames) and bi-directional images (B-frames)

445 **3.1.23**

446 **H.264**

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

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

452 **3.1.24**

453 **H.265**

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

456 **3.1.25**

457 **high definition**

458 **HD**

459 image size format expressing sizes higher than standard definition (SD) television with aspect
460 ratio of 16:9 defined as SMPTE ST 296 (1280 × 720) and SMPTE ST 274 (1920 × 1080)

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

3.1.26

high dynamic range

HDR

dynamic range of a camera system measured according to 5.4.3 that reaches a minimum value of 70 dB.

Note . If the dynamic range of a camera is lower than 70dB it shall not be called HDR. The use and meaning of 'wide dynamic range' or WDR in a camera specification is identical to HDR.

Note The terms super- and extreme-dynamic or -wide dynamic range including the acronyms SWDR, EDR, EWDR shall not be used together with cameras that fall under the scope of this standard

'Ultra-High Dynamic Range (UHDR) or ultra wide dynamic range (UWDR) or Enhanced dynamic range' (EDR) shall only be used at 140dB and more. If the DR of a camera is lower than 140dB, it is not allowed to specify the camera as such

3.1.27

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".]

3.1.28

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]

3.1.29

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]

3.1.30

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

3.1.31

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.

3.1.32

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]

3.1.33**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]

3.1.34**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.

3.1.35**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

3.1.36**IR spectrum**

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

3.1.37**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]

3.1.38**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.]

3.1.39**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

3.1.40**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.]

3.1.41**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.

3.1.42**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 (3.1.97) is a camera technology that expands the actual dynamic range.

3.1.43**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.]

3.1.44**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.]

3.1.45**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.

3.1.46**monotonicity**

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

3.1.47**megapixel****MP**

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

3.1.48**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]

3.1.49**M-JPEG**

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

3.1.50**multi-exposure**

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

3.1.51**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]

3.1.52**opto-electronic conversion function****OECF**

relationship between input luminance and output levels for an opto-electronic image capture system

3.1.53**optical axis**

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

3.1.54**optical density**

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

3.1.55**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.

3.1.56**patch**

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

3.1.57**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)

3.1.58**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.]

3.1.59**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.

3.1.60**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".]

3.1.61**progressive scanning**

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

3.1.62**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.

3.1.63**quantum efficiency**

efficiency of converting number of photons into electrons

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

3.1.64**radiated spectrum**

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

3.1.65**reflectance**

property which reflects the incoming light

3.1.66**resolution**

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

3.1.67**resolution**

<related to format> description of the size of a digital image in pixels (e.g. 720P, 1080P, 640 × 480), pixels per inch or number of pixels of a video-frame, monitoring device, printout

3.1.68**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.

3.1.69**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]

3.1.70**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.

3.1.71**sharpness**

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

3.1.72**shooting condition**

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

3.1.73**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

3.1.74**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).

3.1.75**sine-based**

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

3.1.76**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.

3.1.77**spatial frequency response****SFR**

measurement which uses slanted edges of a test chart's objects and describes the transfer functions of a camera system

3.1.78**specification item**

item specified in a camera specification data sheet

3.1.79**sRGB**

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

**Documents**

Document Sharing Hub

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

723 **3.1.80**

724 **standard camera settings**

725 common settings for measuring the performance and image quality of the camera

726 **3.1.81**

727 **standard definition**

728 **SD**

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

731 **3.1.82**

732 **standard deviation**

733 positive square root of the variance

734 [SOURCE: IEC GUIDE 115:2007, 3.8]

735 **3.1.83**

736 **standard dynamic range**

737 **3.1.84 dynamic range of a camera system measured according to 5.4.4 that reaches a**
738 **valued less than 70 dB.**

739 **target plane**

740 plane that passes through the chart plane which a camera observes

741 **3.1.85**

742 **test target**

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

745 **3.1.86**

746 **transmittance**

747 ratio between the amount of light passing through a transparent area and the amount of light
748 before the transparent area entry

749 **3.1.87**

750 **tungsten illuminants**

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

753 **3.1.88**

754 **TV lines**

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

758 **3.1.89**

759 **TV field**

760 interlaced television image which consists of only odd or only even lines

761 **3.1.90**

762 **TV frame**

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

3.1.91**ultra-high dynamic range****UHDR**

dynamic range of a camera system measured according to 5.4.4 that reaches a minimum valued of 140 dB.

Note 1 to entry: If the dynamic range of a camera is lower than 140dB it shall not be called UHDR. The use and meaning of 'ultra-wide dynamic range' or UWDR in a camera specification is identical to UHDR.

3.1.92**uncompressed**

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

3.1.93**video authentication**

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

3.1.94**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.

3.1.95**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

3.1.96**white chart**

test chart that is uniformly white

3.1.97**wide dynamic range****WDR**

see high dynamic range (HDR).

3.2 Abbreviations

CCD charge coupled device

CIE Commission Internationale de l'Éclairage (International Commission on Illumination)

CIF common intermediate format

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

809	GPU	graphical processing unit
810	HD	high definition
811	HDR	high dynamic range
812	HDMI	high definition multimedia interface
813	HTTP	hypertext transfer protocol
814	IEEE	Institute of Electrical and Electronics Engineers
815	IP	internet protocol
816	IR	infra-red
817	ISO	International Organization for Standardization
818	JPEG	Joint Photographic Experts Group
819	kB	kilobytes
820	kb/s	kilobits per second
821	LED	light emitting diode
822	MB	megabytes
823	Mb/s	megabits per second
824	MP	megapixel
825	MPEG	Moving Picture Experts Group
826	MTF	modulation transfer function
827	ND	neutral density
828	NTP	network time protocol
829	NTSC	National Television System Committee
830	OECF	opto-electronic conversion function
831	PAL	phase alternating line
832	PTZ	pan/tilt/zoom
833	SD	standard definition
834	SDI	serial digital interface
835	SDR	standard dynamic range
836	SFR	spatial frequency response
837	SHA	secure hash algorithm
838	SMTP	simple mail transfer protocol
839	S/N	signal to noise
840	SNR	signal to noise ratio
841	SSL	secure socket layer
842	TCP/IP	transmission control protocol / internet protocol
843	UDP	user datagram protocol
844	UHDR	ultra-high dynamic range
845	VGA	video graphic array
846	VSS	video surveillance system
847	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

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.

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

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

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

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

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

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

895 **4.2.1.3.3 Pixel number**

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

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

901 – Approximate number of effective pixels: a rounded number of the product of the number of
902 horizontal pixels and the number of vertical pixels.

903 – Number of effective pixels: the actual product number of horizontal and vertical pixels (H ×
904 V) an electronic picture is made of, produced by the sensor.

905 – Total number of pixels: usually is not indicated, but may be accompanied by the number of
906 effective pixels.

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

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

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

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

911 Effective number of pixels (1080HD mode): 1 920 (H) × 1 080 (V) ≈ 2,1 MP

912 **4.2.1.3.4 Television system**

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

915 – Colour: NTSC

916 – Colour: PAL

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

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

919 **4.2.1.3.5 Colour television image pickup system**

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

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

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

924 – The number of image sensors (one or three).

925 – Colour coding method, or Colour Filter Array (CFA).

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

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

928 **4.2.1.3.6 Capture frame rate**

929 This indicates the number of frames that can be captured and read from an image sensor per
930 second. For analogue systems a TV frame is composed of two TV fields, which are based on
931 the interlaced scanning (even and odd lines). For digital systems, a frame is composed of all
932 active pixels making a single image unless it is interlaced scanning, e.g. 1080i.

933 Measuring method is described in 5.4.9.

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

937 EXAMPLE 1: 29,97 fps

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

939 **4.2.1.3.7 Scanning system**

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

942 EXAMPLE 1: 2:1 Interlaced scanning

943 EXAMPLE 2: Progressive scanning

944 **4.2.1.3.8 Scanning frequency**

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

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

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

949 **4.2.1.3.9 Shutter mode**

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

952 EXAMPLE 1: Global shutter

953 EXAMPLE 2: Rolling shutter

954 **4.2.2 Maximum resolution**

955 **4.2.2.1 Description**

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

960 Measuring method is described in 5.4.2.

961 **4.2.2.2 Item indication**

962 [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(1280 × 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 Low light performance**4.2.3.1 Description**

This indicates the lowest light level for which the camera delivers acceptable images.

4.2.3.2 Item indication

[Low Light Performance]

4.2.3.3 Content indication

The lowest light level for which the camera delivers acceptable images shall be expressed in Lux (for visible light only) or in mW/m² for IR sensitive cameras.

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]

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

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 5.4.3.

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 5.4.4.

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 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 5.4.5.

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.

1111 4.2.12.2 Item indication

1112 [Image Processing Performance]

1113 4.2.12.3 Content indication

1114 EXAMPLE: 600 MP/s

1115 4.3 Lens**1116 4.3.1 Focal length****1117 4.3.1.1 Description**

1118 Distance from the second principle plane of a lens to the point where light-rays coming from
1119 infinity, and parallel to the optical axis, are focusing.

1120 4.3.1.2 Item indication

1121 [Focal Length]

1122 4.3.1.3 Content indication

1123 It is expressed as f [mm]

1124 EXAMPLE: Focal Length $f = 2$ mm to 10 mm

1125 4.3.2 Relative aperture (F-number)**1126 4.3.2.1 Description**

1127 The relative aperture, also designated as F-number, is the ratio of the effective diameter of a
1128 lens (entrance pupil) to its focal length.

1129 4.3.2.2 Item indication

1130 [Aperture Ratio]

1131 4.3.2.3 Content indication

1132 $F = f / D$, where f is focal length and D is the diameter of the entrance pupil.

1133 EXAMPLE 1: Aperture Ratio 1:1,4

1134 EXAMPLE 2: F1,4

1135 EXAMPLE 3: F1,6 (Wide) to F4,7 (Tele)

1136 EXAMPLE 4: 1:1,8 (Fixed)

1137 4.3.3 Field of view**1138 4.3.3.1 Description**

1139 The Field of View (FOV) describes the region seen by a sensor and depends on the sensor size
1140 and the focal length of the optical system. Usually, the FOV is calculated for the diagonal, but
1141 it can also be reported for the horizontal field of view (HFOV) and the vertical field of view
1142 (VFOV) directions.

1143 4.3.3.2 Item indication

1144 [Field of View]

4.3.3.3 Content indication

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

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

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

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]

1176 4.3.6.3 Content indication

1177 Indicate the mount types for the lens.

1178 EXAMPLE 1: C/CS mount

1179 EXAMPLE 2: CS mount

1180 EXAMPLE 3: S mount

1181 4.3.7 Image flare**1182 4.3.7.1 Description**

1183 Unwanted increase of signal in the image plane of an optical system, caused by the scattering
1184 and reflection of a proportion of the radiation (light) which enters the system through its normal
1185 entrance aperture where the radiation may be from inside or outside the field of view of the
1186 system.

1187 Measuring method is described in 5.4.8.

1188 4.3.7.2 Item indication

1189 [Image Flare]

1190 4.3.7.3 Content indication

1191 Indicate the signal level increase in dark areas on the test chart as a percentage of the diffuse
1192 white signal from the white areas on the test chart.

1193 EXAMPLE: Image Flare: 8 %

1194 4.4 Input / Output**1195 4.4.1 Video output****1196 4.4.1.1 Description**

1197 This indicates the output of a video signal, from a camera. If digital video is referred to, the
1198 format and connectivity should be indicated. If analogue video is referred to, such as composite
1199 video signal, the format, output level and impedance should be indicated.

1200 Any video output for installation purpose that is used mainly for view angle adjustment, focus
1201 adjustment, etc. shall be indicated as “monitor output”.

1202 Compliant Video Signal interfaces, specifications and measuring method shall refer to
1203 IEC 62676-3.

1204 4.4.1.2 Item indication

1205 [Video Output] or [Monitor Output]

1206 4.4.1.3 Content indication

1207 Signal type, level, output impedance, connector type, location, etc.

1208 EXAMPLE 1: PAL VBS 1,0Vp-p 75 Ω

1209 EXAMPLE 2: NTSC 1,0Vp-p 75 Ω

1210 EXAMPLE 3: DVI/HDMI (1080iHD)

1211 EXAMPLE 4: SDI (3 Gb/s)

1212 **4.4.2 Auto-iris lens output**

1213 **4.4.2.1 Description**

1214 This indicates an output for control of an auto-iris lens. Control method or video signal and
1215 supply voltage shall be indicated.

1216 **4.4.2.2 Item indication**

1217 [Auto-iris Lens Output]

1218 **4.4.2.3 Content indication**

1219 Specify auto-iris control types and connector types

1220 EXAMPLE 1: Video output VS 1,0 Vp-p

1221 Supply voltage 9 V DC

1222 Connector 4P

1223 EXAMPLE 2: DC output

1224 Connector 4P

1225 **4.5 Video output format**

1226 **4.5.1 Image format standard**

1227 **4.5.1.1 Description**

1228 This indicates the basic image formats and digital sampling system, if applicable for HD. The
1229 supported SMPTE standards shall be listed.

1230 **4.5.1.2 Item indication**

1231 [Image Format Standard]

1232 **4.5.1.3 Content indication**

1233 Indicate the supported image or video format standards such as SMPTE standards.

1234 EXAMPLE: SMPTE 274M-2008 , 1920 × 1080, Progressive, 16:9

1235 SMPTE 296M-2001, 1280 × 720, Progressive, 16:9

1236 **4.5.2 Colour representation**

1237 **4.5.2.1 Description**

1238 This indicates which colour representation system the camera complies to.

1239 **4.5.2.2 Item indication**

1240 [Colour Representation]

1241 **4.5.2.3 Content indication**

1242 Indicate the supported standards for colour representation.

1243 EXAMPLE: colour representation: ITU-R BT.709

1244 4.5.3 Output image pixel number**1245 4.5.3.1 Description**

1246 This indicates the number of pixels of the data of a single output image.

1247 4.5.3.2 Item indication

1248 [Output image pixel number]

1249 4.5.3.3 Content indication

1250 Indicate the abbreviation of a general image format, or horizontal and vertical pixel numbers.

1251 – In case of an original format, this shall be stated, and horizontal and vertical pixel numbers
1252 shall be specified.

1253 – If more than one size is available, they shall be listed.

1254 – If pixel numbers differ depending on different compression formats, the compression format
1255 shall also be specified.

1256 EXAMPLE: JPEG: 1280 × 960, VGA (640 × 480), QVGA (320 × 240), 1280 × 720 (image cropped)

1257 MPEG-4: 4CIF (704 × 576), CIF (352 × 288)

1258 4.5.4 Output image lines**1259 4.5.4.1 Description**

1260 This indicates the lines of the output image of the camera which may be filtered,
1261 re-formatted or re-sampled from the original pixel number of the image sensor.

1262 4.5.4.2 Item indication

1263 [Output Image Lines]

1264 4.5.4.3 Content indication

1265 The horizontal lines and vertical lines shall be indicated by number of lines.

1266 EXAMPLE: Horizontal lines: 300 lines, Vertical lines: 200 lines

1267 4.6 Pan and tilt**1268 4.6.1 Rotation angle****1269 4.6.1.1 Description**

1270 This indicates maximum rotation angle.

1271 4.6.1.2 Item indication

1272 [Rotation Angle]

1273 4.6.1.3 Content indication

1274 EXAMPLE: Horizontal: ±175° with the front as 0°

1275 Vertical: Up 20° to down 60° or +20° to –60° with a horizontal view as 0°

1276 Pan Range 360° continuous rotation

1277 4.6.2 Rotation speed**1278 4.6.2.1 Description**

1279 This indicates rotation speed when pan or tilt is operating. In general, it should be indicated if
1280 it is proportional speed depending on the inclination of PTZ joystick. The maximum achievable
1281 speed when using preset positioning should also be indicated.

1282 4.6.2.2 Item indication

1283 [Rotation Speed]

1284 4.6.2.3 Content indication

1285 EXAMPLE: Horizontal rotation speed 180°/s, vertical rotation speed 90°/s.

1286 Variable Pan/Tilt Speed 0,2°/s to 120°/s

1287 Pre-position Speed 120°/s

1288 Proportionality Pan /Tilt to Zoom 1:1

1289 Optical Zoom Movement Speed < 5 s (Wide to Far)

1290 4.6.3 Preset position function**1291 4.6.3.1 Description**

1292 This indicates the function to store a position of pan/tilt, zoom/focus position of lens, camera
1293 setting condition, etc.

1294 4.6.3.2 Item indication

1295 [Preset Function]

1296 4.6.3.3 Content indication

1297 Indicate the function capable of storing or the number of stored items. It should also indicate
1298 the speed of achieving preset positions, combining pan, tilt and zoom functions.

1299 EXAMPLE: Pan/tilt position, zoom/focus position 256 positions

1300 120°/s preset recalls

1301 Max. number of tours, presets and duration: 2 tours, 32 presets, 30 min.

1302 4.6.4 Preset position accuracy**1303 4.6.4.1 Description**

1304 This indicates the accuracy of returning to a preset position and placement of a privacy mask.

1305 4.6.4.2 Item indication

1306 [Preset Position Accuracy], [Privacy Mask Accuracy]

1307 4.6.4.3 Content indication

1308 EXAMPLE: $\pm 0,5^\circ$, $\pm 0,01^\circ$

1309 4.6.5 Audible noise**1310 4.6.5.1 Description**

1311 This indicates the noise during pan tilt zoom operation.

1312 4.6.5.2 Item indication

1313 [Audible Noise]

1314 4.6.5.3 Content indication

1315 EXAMPLE: < 65 dBmW

1316 4.7 Network**1317 4.7.1 Network interface****1318 4.7.1.1 Description**

1319 This indicates the method for connecting to a network.

1320 4.7.1.2 Item indication

1321 [Network Interface]

1322 4.7.1.3 Content indication

1323 Indicate the standard, type, connector, etc.

1324 EXAMPLE 1: LAN

1325 Standard IEEE 802.3

1326 Type 10BASE-T, 100BASE-TX, 1000BASE-T

1327 Connector RJ-45

1328 EXAMPLE 2: Wireless LAN

1329 Standard IEEE 802.11a, b, g

1330 4.7.2 Image and video compression format**1331 4.7.2.1 Description**

1332 This indicates the format of the compression in order to reduce the amount of digital video data
1333 for recording or transmission, etc. Image compressions work in two dimensions ($H \times V$), and
1334 the result is a compressed image expressed in kilobytes [kB] or megabytes [MB]. Video
1335 compressions work in three dimensions ($H \times V \times \text{time}$), and the result is a compressed video
1336 stream expressed in kilobits per second [kb/s] or megabits per second [Mb/s].

1337 4.7.2.2 Item indication

1338 [Video Compression Format] or [Image Compression Format]

1339 4.7.2.3 Content indication

1340 Indicate the abbreviation of the format according to the related international standard. If more
1341 than one format is available, they shall be listed.

1342 NOTE See a list of compression formats published as international standards in IEC 62676-1-1:2013, 6.1.3.6.

1343 EXAMPLE: JPEG, JPEG-2000, MPEG-2, MPEG-4, H.264, H.265, M-JPEG, raw format, unc

4.7.3 Bit rate control**4.7.3.1 Description**

This indicates a function to control the image or video compression ratio.

It mainly consists of Constant Bit Rate control (CBR) that keeps the bit rate constant, irrespective of the amount of moving content within the camera view, by varying the compression ratio or frame rate, etc. and Variable Bit Rate control (VBR) that maintains the compression ratio by varying the amount of video data depending upon the moving content within the camera view.

4.7.3.2 Item indication

[Bit Rate Control]

4.7.3.3 Content indication

Indicate Constant Bit Rate control (CBR)/Variable Bit Rate control (VBR) switchable capability, bit rate setting, etc.

- For MPEG and M-JPEG, the bit rate control should indicate the amount of bits in a second. A ratio of how much the maximum bit rate exceeds the set bit rate may be indicated.
- For JPEG, a unit time should be indicated, unless the unit time of the bit rate control is 1 s.

EXAMPLE 1: JPEG: Bit rate control is available.

(Unit time for controlling amount is 1,5 s)

MPEG-4: Bit rate setting available. 64 kb/s to 6 Mb/s

EXAMPLE 2: 64 kb/s, 128 kb/s, 256 kb/s, 512 kb/s, 1 024 kb/s, 2 048 kb/s, 4 096 kb/s

/unlimited CBR function available

EXAMPLE 3: Constant Bit Rate control setting is available.

128 kb/s to 4 Mb/s (Maximum data over set value: within 10 %)

EXAMPLE 4: M-JPEG: Bit rate control is available.

4.7.4 Maximum frame rate**4.7.4.1 Description**

This indicates the maximum number of image frames per second.

4.7.4.2 Item indication

[Maximum Frame Rate]

4.7.4.3 Content indication

[Maximum Frame Rate]

EXAMPLE 1: 30 frames/s

EXAMPLE 2: 15 fps

1377 4.7.5 Maximum number of encoding streams**1378 4.7.5.1 Description**

1379 This indicates the maximum number of parallel encoding streams the camera can output into
1380 the network with the same or different qualities (resolution and frame rates) at the same time.
1381 If the maximum frame rate or resolution cannot be applied, this shall also be specified.

1382 4.7.5.2 Item indication

1383 [Maximum Number of Encoding Streams]

1384 4.7.5.3 Content indication

1385 EXAMPLE 1: MPEG-4 2 simultaneous outputs, 12 fps 720p

1386 EXAMPLE 2: MPEG-4 2 streams (4CIF), JPEG (4CIF) 1 stream

1387 4.7.6 Multicast streaming**1388 4.7.6.1 Description**

1389 This indicates the support of multicast streams according to IEC 62676-1-2:2013, 6.6.

1390 4.7.6.2 Item indication

1391 [Multicast Streaming Support]

1392 4.7.6.3 Content indication

1393 EXAMPLE: H.264 2 streams ≤ 6 Mb/s (1080HD) + 2 Multicast Streams supported

1394 4.7.7 Maximum number of connections**1395 4.7.7.1 Description**

1396 This indicates the maximum number of concurrent connections and video the camera is able to
1397 offer at the same time to clients using the unicasting method.

1398 4.7.7.2 Item indication

1399 [Maximum Number of Connections]

1400 4.7.7.3 Content indication

1401 EXAMPLE: Maximum Number of Connections: 3

1402 4.7.8 Total encoding performance**1403 4.7.8.1 Description**

1404 The total capability of the camera hardware to encode multiple image streams as combination
1405 of frame rate and resolution shall be specified.

1406 4.7.8.2 Item indication

1407 [Encoder Performance]

1408 4.7.8.3 Content indication

1409 EXAMPLE: 250 MP/s 8 streams @ 1080p15 (8 × 1920 × 1080 × 15)

1410 (1 stream @ 4k 30fps (1 × 3840 × 2160 × 30))