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Interested committees:

Title: BS IEC 62676-5 Ed.1.0 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 international discussions in which the UK has taken an active part. Your comments on this draft are welcome and will assist in the preparation of the consequent standard. There is a high probability that this text could be adopted by CENELEC as a reference document for harmonization or as a European Standard. Recipients of this draft are requested to comment on the text bearing in mind this possibility.

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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	Comment (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.	



COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: IEC 62676-5 ED1	
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IEC TC 79 : ALARM AND ELECTRONIC SECURITY SYSTEMS	
SECRETARIAT: France	SECRETARY: Mr Olivier Lanen
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	
☒ SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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:

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CONTENTS

1	SCOPE.....	10
2	NORMATIVE REFERENCES	10
3	TERMS, DEFINITIONS AND ABBREVIATIONS	11
3.1	TERMS AND DEFINITIONS	11
3.2	ABBREVIATIONS	20
4	DESCRIPTION OF VIDEO SURVEILLANCE CAMERA SPECIFICATION ITEMS.....	22
4.1	GENERAL	22
4.2	CAMERA.....	22
4.2.1	<i>Image Sensor</i>	22
4.2.1.1	Description	22
4.2.1.2	Item Indication.....	22
4.2.1.3	Content Indication	22
4.2.1.3.1	Type	22
4.2.1.3.2	Image Scanning Area	22
4.2.1.3.3	Pixel Number.....	23
4.2.1.3.4	Television System	23
4.2.1.3.5	Colour Television Image Pickup System.....	23
4.2.1.3.6	Image format standard.....	24
4.2.1.3.7	Colour representation	24
4.2.1.3.8	Capture Frame Rate	24
4.2.1.3.9	Scanning System.....	24
4.2.1.3.10	Scanning Frequency	24
4.2.1.3.11	Shutter mode.....	24
4.2.2	<i>Maximum Resolution</i>	25
4.2.2.1	Description	25
4.2.2.2	Item Indication.....	25
4.2.2.3	Content Indication	25
4.2.3	<i>Minimum Illumination</i>	25
4.2.3.1	Description	25
4.2.3.2	Item Indication.....	25
4.2.3.3	Content Indication	25
4.2.4	<i>Signal to Noise Ratio (SNR, S/N Ratio)</i>	26
4.2.4.1	Description	26
4.2.4.2	Item Indication.....	26
4.2.4.3	Content Indication	26
4.2.5	<i>White Balance</i>	26
4.2.5.1	Description	26
4.2.5.2	Item Indication.....	26
4.2.5.3	Content Indication	26
4.2.6	<i>Electronic Shutter</i>	26
4.2.6.1	Description	26
4.2.6.2	Item Indication.....	27
4.2.6.3	Content Indication	27
4.2.7	<i>Electronic Sensitivity Up (Slow Shutter)</i>	27
4.2.7.1	Description	27
4.2.7.2	Item Indication.....	27
4.2.7.3	Content Indication	27
4.2.8	<i>Dynamic Range (DR)</i>	27
4.2.8.1	Description	27
4.2.8.2	Item Indication.....	27
4.2.8.3	Content Indication	27
4.2.9	<i>Visible Dynamic Range (VDR)</i>	27
4.2.9.1	Description	27
4.2.9.2	Item Indication.....	28
4.2.9.3	Content Indication	28
4.2.10	<i>Infra-Red Illumination Operating View Distance</i>	28
4.2.10.1	Description	28
4.2.10.2	Item Indication.....	28
4.2.10.3	Content Indication	28
4.2.11	<i>Day/Night mode (D/N)</i>	28
4.2.11.1	Description	28
4.2.11.2	Item Indication.....	28

4.2.11.3	Content Indication	28
4.3	LENS	29
4.3.1	<i>Focal Length</i>	29
4.3.1.1	Description	29
4.3.1.2	Item Indication	29
4.3.1.3	Content Indication	29
4.3.2	<i>Relative Aperture (F-number)</i>	29
4.3.2.1	Description	29
4.3.2.2	Item Indication	29
4.3.2.3	Content Indication	29
4.3.3	<i>Field of View</i>	29
4.3.3.1	Description	29
4.3.3.2	Item Indication	29
4.3.3.3	Content Indication	29
4.3.4	<i>Image Distortion</i>	29
4.3.4.1	Description	29
4.3.4.2	Item Indication	30
4.3.4.3	Content Indication	30
4.3.5	<i>Iris Control</i>	30
4.3.5.1	Description	30
4.3.5.2	Item Indication	30
4.3.5.3	Content Indication	30
4.3.6	<i>Mount type</i>	30
4.3.6.1	Description	30
4.3.6.2	Item Indication	30
4.3.6.3	Content Indication	30
4.3.7	<i>Image Flare</i>	30
4.3.7.1	Description	30
4.3.7.2	Item Indication	30
4.3.7.3	Content Indication	30
4.4	INPUT / OUTPUT	31
4.4.1	<i>Video Output</i>	31
4.4.1.1	Description	31
4.4.1.2	Item Indication	31
4.4.1.3	Content Indication	31
4.4.2	<i>Auto-iris Lens Output</i>	31
4.4.2.1	Description	31
4.4.2.2	Item Indication	31
4.4.2.3	Content Indication	31
4.5	PAN AND TILT	31
4.5.1	<i>Rotation Angle</i>	31
4.5.1.1	Description	31
4.5.1.2	Item Indication	31
4.5.1.3	Content Indication	31
4.5.2	<i>Rotation Speed</i>	32
4.5.2.1	Description	32
4.5.2.2	Item Indication	32
4.5.2.3	Content Indication	32
4.5.3	<i>Preset Position Function</i>	32
4.5.3.1	Description	32
4.5.3.2	Item Indication	32
4.5.3.3	Content Indication	32
4.5.4	<i>Preset Position Accuracy</i>	32
4.5.4.1	Description	32
4.5.4.2	Item Indication	32
4.5.4.3	Content Indication	32
4.5.5	<i>Audible Noise</i>	32
4.5.5.1	Description	32
4.5.5.2	Item Indication	32
4.5.5.3	Content Indication	33
4.6	NETWORK	33
4.6.1	<i>Network Interface</i>	33
4.6.1.1	Description	33
4.6.1.2	Item Indication	33
4.6.1.3	Content Indication	33
4.6.2	<i>Output Image Pixel Number</i>	33
4.6.2.1	Description	33

4.6.2.2	Item Indication	33
4.6.2.3	Content Indication	33
4.6.3	Output Image Resolution	33
4.6.3.1	Description	33
4.6.3.2	Item Indication	33
4.6.3.3	Content Indication	34
4.6.4	Image and Video Compression Format	34
4.6.4.1	Description	34
4.6.4.2	Item Indication	34
4.6.4.3	Content Indication	34
4.6.5	Bit Rate Control	34
4.6.5.1	Description	34
4.6.5.2	Item Indication	34
4.6.5.3	Content Indication	34
4.6.6	Maximum Frame Rate	35
4.6.6.1	Description	35
4.6.6.2	Item Indication	35
4.6.6.3	Content Indication	35
4.6.7	Maximum Number of Encoding Streams	35
4.6.7.1	Description	35
4.6.7.2	Item Indication	35
4.6.7.3	Content Indication	35
4.6.8	Multicast Streaming	35
4.6.8.1	Description	35
4.6.8.2	Item Indication	35
4.6.8.3	Content Indication	35
4.6.9	Maximum Number of Connections	35
4.6.9.1	Description	35
4.6.9.2	Item Indication	35
4.6.9.3	Content Indication	36
4.6.10	Total Encoding Performance	36
4.6.10.1	Description	36
4.6.10.2	Item Indication	36
4.6.10.3	Content Indication	36
4.6.11	Internal Image Processing Performance	36
4.6.11.1	Description	36
4.6.11.2	Item Indication	36
4.6.11.3	Content Indication	36
4.6.12	Image Stream Delay (Latency)	36
4.6.12.1	Description	36
4.6.12.2	Item Indication	36
4.6.12.3	Content Indication	36
4.6.13	Camera Storage (Local Storage)	36
4.6.13.1	Description	36
4.6.13.2	Item Indication	36
4.6.13.3	Content Indication	37
4.6.14	Audio Function	37
4.6.14.1	Description	37
4.6.14.2	Item Indication	37
4.6.14.3	Content Indication	37
4.6.15	Network Protocol	37
4.6.15.1	Description	37
4.6.15.2	Item Indication	37
4.6.15.3	Content Indication	37
4.6.16	Camera Time synchronisation and localisation	37
4.6.16.1	Description	37
4.6.16.2	Item Indication	38
4.6.16.3	Content Indication	38
4.7	NETWORK SECURITY	38
4.7.1	General Description	38
4.7.2	Authentication	38
4.7.2.1	Description	38
4.7.3	Item Indication	38
4.7.4	Content Indication	38
4.7.5	Video Authentication and Watermarking	38
4.7.5.1	Description	38
4.7.5.2	Item Indication	38

4.7.5.3	Content Indication	39
4.8	GENERAL	39
5	MEASUREMENT METHODS OF VIDEO SURVEILLANCE CAMERA SPECIFICATION ITEMS	39
5.1	SETTING OF STANDARD SHOOTING CONDITION	39
5.1.1	<i>General</i>	39
5.1.2	<i>Common Standard Shooting Condition</i>	39
5.1.2.1	Lighting Condition	39
5.1.2.2	Environmental Condition	40
5.1.2.3	Relation of Illuminance and Luminance (Informative)	40
5.1.2.4	Field Angle	40
5.1.2.5	Lens Iris	40
5.1.2.6	Standard Camera Settings	41
5.2	VIDEO SIGNAL QUANTIZATION LEVEL	41
5.2.1	<i>General</i>	41
5.2.2	<i>Digital Video Signal Quantization Level</i>	41
5.2.3	<i>Other Quantization Levels</i>	42
5.3	MEASUREMENT ENVIRONMENT	42
5.3.1	<i>General</i>	42
5.3.2	<i>Test Chart</i>	42
5.3.2.1.1	Positioning of the camera	44
5.3.3	<i>Software for Measurement</i>	45
5.3.3.1	Image Display	45
5.3.3.2	Image Measurement	45
5.4	MEASURING METHODS	45
5.4.1	<i>General</i>	45
5.4.2	<i>Resolution</i>	45
5.4.2.1	General	45
5.4.2.2	Camera Setting Conditions	45
5.4.2.3	Visual Resolution Method	46
5.4.2.3.1	Test chart	46
5.4.2.3.2	Measuring Method	47
5.4.2.4	Spatial frequency response (SFR) method	47
5.4.2.4.1	Test-chart	47
5.4.2.4.2	Test conditions	48
5.4.2.4.3	Sine-based spatial frequency response (s-SFR) measurement	48
5.4.2.4.4	Sine-based spatial frequency response (s-SFR) analysis algorithm	49
5.4.2.4.5	Presentation of results	52
5.4.3	<i>Minimum Illumination</i>	52
5.4.3.1	Camera Settings	52
5.4.3.1.1	Test chart	52
5.4.3.1.2	Measuring Method	53
5.4.4	<i>Dynamic Range</i>	54
5.4.4.1	Camera Settings	54
5.4.4.2	General	54
5.4.4.3	Test chart	55
5.4.4.4	Measuring the test target	56
5.4.4.5	Measuring method	57
5.4.4.6	Calculation of the camera dynamic range	57
5.4.4.6.1	Luminance OECF	57
5.4.4.6.2	Camera dynamic range	58
5.4.4.6.3	Determining $L_{\max}$	58
5.4.4.6.4	Determination of incremental gain	58
5.4.4.6.5	Determination of the signal to noise ratio	59
5.4.4.6.6	Determining $L_{\min}$	59
5.4.4.7	Check monotonicity	59
5.4.4.8	Presentation of the result	59
5.4.4.9	Example of the result	59
5.4.5	<i>Visible Dynamic Range (VDR)</i>	61
5.4.5.1	Camera Setting Conditions	61
5.4.5.1.1	All settings except video compression	62
5.4.5.1.2	Setting to obtain best result (to be noted)	62
5.4.5.2	Test chart	62
5.4.5.3	Measuring Method with gray scale test chart	62
5.4.5.4	Calculation using OECF method	63
5.4.6	<i>Infra-Red Illumination Operating View Distance</i>	63

5.4.6.1	General	63
5.4.6.2	Camera Settings.....	63
5.4.6.3	Test chart.....	64
5.4.6.4	Measuring Method	64
5.4.6.5	Conversion measurement method (Informative).....	66
5.4.6.5.1	Conversion measurement method using electronic shutter	66
5.4.6.5.2	Influence of shading	66
5.4.7	Image Distortion	67
5.4.7.1	General	67
5.4.7.2	Line geometric distortion.....	67
5.4.7.3	Measuring Method	67
5.4.7.3.1	Apparatus and hardware.....	67
5.4.7.3.2	Test Conditions	68
5.4.7.4	Grid chart and Camera positioning.....	68
5.4.7.4.1	Design and characteristics.....	68
5.4.7.4.2	Basic settings and influencing factors	68
5.4.7.5	Determination of geometric distortion	68
5.4.7.5.1	Line geometric distortion	68
5.4.7.5.2	i	69
5.4.7.5.3	i	69
5.4.8	Image Flare	70
5.4.8.1	General	70
5.4.8.2	Camera setup for the test	70
5.4.8.3	Arrangement of measuring equipment.....	70
5.4.8.3.1	Conditions of shooting	70
5.4.8.4	Test Chart	71
5.4.8.5	Image flare apparatus.....	71
5.4.8.6	Measuring procedure.....	73
5.4.8.6.1	General	73
5.4.8.6.2	Calculation of luminance levels.....	73
5.4.8.6.3	Measurement procedure	75
5.4.8.6.4	Reporting of the results	75
5.4.9	Capture Frame Rate	75
5.4.9.1	General	75
5.4.9.2	Test setup	76
5.4.9.3	Test equipment.....	76
5.4.9.4	Test procedure for visual inspection.....	77
5.4.9.5	Test procedure for software analysis.....	77
5.4.9.6	Frame Rate Calculation	77
ANNEX A	(NORMATIVE) SINE WAVE STAR TEST CHART	79
ANNEX B		81
B.1	GENERAL	81
B.2	DECLARATION OF THE HAZARD DISTANCE	81
B.3	OTHER INFORMATION TO BE DECLARED	82
B.4	ITEM INDICATION	82
B.5	CONTENT INDICATION	82
ANNEX C	(INFORMATIVE) LOW LIGHT PERFORMANCE METHOD	83
C.1	GENERAL	83
C.1.1	<i>Test Chart</i>	83
C.1.2	<i>Capturing a reference image</i>	84
C.1.3	<i>Capture of the test images</i>	84
C.1.4	<i>Image Quality aspects affected by low light</i>	84
C.1.5	<i>Presentation of the results</i>	86
C.2	EXAMPLE FOR GENERATING A SINGLE PERFORMANCE VALUE FROM MEASURED RESULTS	86
C.3	DESCRIPTION OF TEST CHART EXAMPLE	87
ANNEX D		91
(INFORMATIVE)	STREAMING BITRATE (BIT-STREAM)	91
D.1	GENERAL	91
D.2	DESCRIPTION.....	91
D.3	UNCOMPRESSED AND COMPRESSED VIDEO STREAMS	91
D.4	CONTENT INDICATION	92
D.4.1	<i>Video streaming in a system</i>	92

D.4.2	Network Traffic Analysis (NTA)	92
D.5	MEASURING THE VIDEO STREAMING	92
D.5.1	The procedure of measuring streaming bitrate in a system	92
ANNEX E		95
E.1	MEASUREMENT PROCEDURE FOR IP VIDEO LATENCY	95
E.2	LATENCY OF THE VIEWING LIVE VIDEO OF AN IP DIGITAL SYSTEM	95
E.3	DESCRIPTION	95
E.4	VISUAL PERCEPTION OF THE LATENCY	96
E.5	MEASUREMENT PROCEDURE FOR IP VIDEO LATENCY	97
E.6	CONTENT INDICATION	98
ANNEX F		99
F.1	TEST CHART MEASUREMENT OF MOVING OBJECTS	99
F.2	MOVING OBJECTS AND THE EFFECTS ON THE IMAGE SENSOR	99
F.3	DESCRIPTION	99
F.4	PROJECTED PIXEL SHIFT (PPS) DUE TO MOVING OBJECTS	99
F.5	CONTENT INDICATION	99
F.6	CALCULATING THE PROJECTED PIXEL SHIFT OF MOVING OBJECTS	100
F.7	CALCULATING THE PROJECTED PIXEL SHIFT OF MOVING OBJECTS AT VARIOUS ANGLES ...	101
F.8	ACCEPTABLE PPS	101
F.9	TEST CHART MEASURING OF MOVING OBJECTS	102
ANNEX G		105
G.1	SD/HD REFLECTIVE TEST CHART	105
ANNEX H		106
H.1	COMPATIBLE TEST TARGETS FROM UL 2802 FIRST EDITION, DATED SEPTEMBER 30, 2013 (WITH REVISIONS DATE JULY 16, 2014).	106
ANNEX I		107
I.1	IMAGE FLARE OF LIGHT SOURCE WITHIN THE FIELD OF VIEW	107
I.2	IMAGE FLARE OF LIGHT SOURCE OUTSIDE OF THE FIELD OF VIEW	107
BIBLIOGRAPHY		109
FIGURE 1	– TEST SET-UP FOR REFLECTIVE TEST CHART	43
FIGURE 2	– TEST SET-UP FOR TRANSPARENT TEST CHART	44
FIGURE 3	– TEST SET-UP FOR FIXTURE WITH LAMPS	44
FIGURE 4	– ALIGNMENT OF THE CAMERA WITH THE TARGET PLANE USING A MIRROR	45
FIGURE 5	– IEC 61146-1 NO.4 AND NO.5 (RESOLUTION CHART)	46
FIGURE 6	– ISO 12233:2000 RESOLUTION TEST CHART	46
FIGURE 7	– SINE WAVE MODULATED STARBURST PATTERN TEST CHART	48
FIGURE 8	– THE STAR IS DIVIDED INTO 8 SEGMENTS FOR THE ANALYSIS	49
FIGURE 9	– RADIUS BY RADIUS EQUIVALENT TO FREQUENCY BY FREQUENCY THE STAR IS ANALYSED.	50
FIGURE 10	– THE PIXELS ALONG A SPECIFIC RADIUS ARE LOCATED	50
FIGURE 11	– DIGITAL CODE VALUES ARE COLLECTED ALONG ONE RADIUS AS A FUNCTION OF THE ANGLE	51
FIGURE 12	– CALCULATION OF THE CONTRAST OF THE SINE CURVE.	52
FIGURE 13	– EXAMPLE OF GRAY SCALE TEST CHART	53
FIGURE 14	– EXAMPLE OF OECF TRANSPARENT TEST CHART	53
FIGURE 15	– EXAMPLE OF LAMP FIXTURE	

FIGURE 16 –POSSIBLE ARRANGEMENTS OF LUMINANCE LEVELS	56
FIGURE 17 –GRAPHICAL PRESENTATION OF RESULTS.....	61
FIGURE 18 – EXAMPLE OF SIGNAL LEVEL	62
FIGURE 19 – GRAPHICAL PRESENTATION OF RESULTS.....	63
FIGURE 20 – WHITE CHART	64
FIGURE 21 – CAMERA POSITIONING	65
FIGURE 22 – VIDEO LEVEL	65
FIGURE 23 – CONVERSION MEASUREMENT USING ELECTRONIC SHUTTER	66
FIGURE 24 — REGULAR GRID (SOLID LINES) IN THE SCENE IS DISTORTED AND THE RED DIAMONDS MARK THE POSITION OF THE INTERSECTIONS IN THE IMAGE PRODUCED BY THE CAMERA.....	67
FIGURE 25 — LINE GRID PATTERN CHART	68
FIGURE 26 — SCHEMATIC DRAWINGS FOR MEASURING THE HORIZONTAL LINE DISTORTION.....	69
FIGURE 27 — SCHEMATIC DRAWINGS FOR MEASURING THE VERTICAL LINE DISTORTION.....	70
FIGURE 28 — EXAMPLE TEST CHART WITH MULTIPLE BLACK AREAS (“DOT PATTERN CHART”).....	71
FIGURE 29 — SETUP IMAGE FLARE DEVICE.....	72
FIGURE 30 — IMAGE FLARE LAMP FOR CAMERAS WITH SMALL FIELD OF VIEW (LARGE FOCAL LENGTH)	73
FIGURE 31 — IMAGE FLARE LAMP FOR CAMERAS WITH LARGE FIELD OF VIEW (SHORT FOCAL LENGTH)	73
FIGURE 32 — EVALUATION AREA.....	74
FIGURE 33 — FRAME RATE TEST TARGET	76
TABLE 1 – LIGHTING CONDITION.....	39
TABLE 2 – RELATION OF ILLUMINANCE AND LUMINANCE	40
TABLE 3 – STANDARD CAMERA SETTINGS.....	41
TABLE 4 – DIGITAL VIDEO SIGNAL QUANTIZATION LEVEL.....	41
TABLE 5 – CAMERA SETTINGS FOR RESOLUTION	45
TABLE 6 – CAMERA SETTINGS FOR MINIMUM ILLUMINATION	52
TABLE 7 – CAMERA SETTINGS FOR DYNAMIC RANGE.....	54
TABLE 8 – EXAMPLE RESULTS OF DYNAMIC RANGE MEASUREMENT.....	60
TABLE 9 – CAMERA SETTINGS FOR VISIBLE DYNAMIC RANGE.....	62
TABLE 10– CAMERA SETTINGS FOR IR ILLUMINATION OPERATING VIEW DISTANCE ...	64
TABLE 11 – CAMERA SETTINGS FOR IMAGE FLARE.....	70
TABLE 12 – CAMERA SETTINGS FOR CAPTURE FRAME RATE	76

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**VIDEO SURVEILLANCE SYSTEMS FOR USE
IN SECURITY APPLICATIONS –****Part 5: Data Specifications and Image Quality Performance for Camera
devices**

INTRODUCTION

The IEC Technical Committee 79 in charge of alarm and electronic security systems together with many governmental organisations, 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 system is divided into 5 independent parts:

Part1: System requirements

Part2: Video transmission protocols

Part3: Analog and digital video interfaces

Part4: Application guidelines

Part5: as above (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 the convenience for users, installers, integrators and maintenance companies, etc.

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 62676-5 shall define recommendation 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 standard 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.

Video surveillance cameras output may 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, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

IEC 62676-1-1: *Video surveillance systems for use in security applications – Part 1-1: System Requirements*

IEC 62676-1-2: *Video surveillance systems for use in security applications – Part 1-2: General Video Transmission Requirements*

IEC 62676-2-1: *Video surveillance systems for use in security applications – Part 2-1: Video Transmission Protocols – General Requirements*

IEC 62676-2-2: *Video surveillance systems for use in security applications – Part 2-2: Video Transmission Protocols – IP interoperability implementation based on HTTP and REST services*

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*

IEC 62676-4: *Video surveillance systems for use in security applications– Part 4: Application guidelines*

ISO 12233 Photography — Electronic still picture imaging — 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

ISO 17850 Photography — Digital cameras — Geometric distortion (GD) measurements

ISO 21550 Photography — Electronic scanners for photographic images — Dynamic range measurements

ISO/AWI 19093 Photography — Digital cameras — Measuring low light performance

ISO 18844/CD Photography — Electronic still picture imaging — Flare measurement techniques for digital camera systems

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

IEC 62471 Photobiological safety of lamps and lamp systems

IEC 60825-1: Safety of laser products — Part 1: Equipment classification and requirements

3 Terms, definitions and abbreviations

3.1 Terms and definitions

3.1.1

aperture

opening of lens diaphragm which light passes.

3.1.2

bit rate

amount of digital signal in a second.

3.1.3

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 1 inch in diameter with 32 threads per inch and the flange back distance where an image is projected on a sensor is 17.526 mm. The CS-mount is a newer standard which uses the same diameter and thread, but the flange back distance is 12.5mm.

3.1.4

colour temperature

measure of temperature of a solid 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 degrees kelvin (K).

Note 2 to entry: Referred from IEC 60194.

3.1.5

compression

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

Note 1 to entry: Modified from IEC 62676-1-1.

3.1.6

compression ratio

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

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

Note 2 to entry: Modified from IEC 62676-1-1 compression rate.

3.1.7

contrast

(related to image) difference in visual 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.

Note 2 to entry: Referred from IEC 62676-1-1.

3.1.8

dome cameras

cameras mounted inside a dome, usually protecting it from outside influences.

3.1.9

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.

Note 1 to entry: Referred from IEC 62232.

3.1.10

electronic shutter

arrangement in the camera changing its sensitivity by electronically controlling the exposure time of the image sensor.

Note 1 to entry: Modified from IEC 62676-4.

3.1.11

encoding streams

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

Note 1 to entry: Modified from IEC 62676-1-1 image streams.

3.1.12

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 1/25s or 1/30s.

180

181 **3.1.13**182 **exposure time**

183 length of time for which image sensor pixels are exposed to light.

184

185 **3.1.14**186 **flare**187 light falling on an image, in an imaging system, which does not emanate from the subject
188 point

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

190 Note 2 to entry: See also image flare (Clause 3.1.21).

191

192 **3.1.15**193 **frame**194 (related to image format) full frame of video as acquired in progressive mode or as
195 combination of two interlaced fields together.

196 Note 1 to entry: Modified from IEC 62676-2-1.

197

198 **3.1.16**199 **frame rate**

200 numbers of frames per second.

201

202 **3.1.17**203 **F-number**204 iris opening of a lens defined as a ratio between the iris opening and the focal length of the
205 lens.206 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
207 coming through the lens where lens with lower F-number transmits more light than the lens with higher numbers.

208

209 **3.1.18**210 **gain**

211 camera function to amplify the electronic signal.

212

213 **3.1.19**214 **gamma correction**215 correction of the linear response of a camera to compensate the monitor screen non-linear
216 response.217 Note 1 to entry: It is measured with the exponential value of the curve describing the non-linearity. A typical
218 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
219 the overall system to respond linearly (i.e., unity).

220

221 **3.1.20**222 **global shutter**223 image read-out method of the image sensor where the exposure timing of all visible lines are
224 the same.225 Note 1 to entry: Global shutter is a term associated with the CMOS image sensors where the image read-out is
226 usually sequential, i.e. line by line, which produces the so-called "rolling shutter" effect.

227

3.1.21

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).

3.1.22

illumination

(related to image sensor) level of illumination (illuminance) at the image sensor;

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

Note 1 to entry: Modified from IEC 62676-1-1.

3.1.23

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.

Note 2 to entry: Referred from IEC 62676-1-1.

3.1.24

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.

3.1.25

image flare

unwanted increase in signal of an output processed image / video resulting from light detected by an image sensor that does not emanate from a corresponding subject point. This includes light from inside and outside the field of view.

3.1.26

image processing

method to change or analyse (digital) images with algorithms or (software) procedures.

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

Note 1 to entry: Referred from IEC 62676-1-1.

3.1.27

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.

Note 1 to entry: Referred from IEC 62676-1-1.

3.1.28

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. The two fields make up a frame and the field and scanning rate are therefore twice the frame rate.

3.1.29**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 human eye sees.

3.1.30**IR spectrum**

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

3.1.31**iris**

variable aperture mechanism which regulates the amount of light passing through the lens onto the image sensor.

Note 1 to entry: Modified from IEC 62676-4.

3.1.32**JPEG**

a 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 ISO 10918 standard series

Note 2 to entry: Modified from IEC 62676-1-1.

3.1.33**JPEG-2000**

a newer common standard for image compression, defined by the Joint Photographic Experts Group, based on wavelet compression.

3.1.34**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;

(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) is a cumulative effect of network latency and encoding/decoding video compressed stream, of which the latter is usually more significant. An example of measuring method is described in Annex E (informative).

Note 2 to entry: Modified from IEC 62676-1-2 and 62676-2-1.

3.1.35**local tone mapping**

image processing technique to map luminance signal level according to the histogram which expands the visual contrast of the image.

3.1.36**luminance**

(related to video signal) the portion of a video signal which carries the brightness and contrast information.

Note 1 to entry: Referred from ISO/IEC 14165-321.

327 (related to light) photometric measure of the luminous intensity per unit area of light traveling
328 in a given direction

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

330 Note 2 to entry: Referred from IEC 62087-1.

331

332 **3.1.37**

333 **lux**

334 Light unit for measuring illumination.

335 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
336 1 m^2 . It is also known as lumen per square meter, or meter-candelas.

337

338 **3.1.38**

339 **monotonicity**

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

342

343 **3.1.39**

344 **MPEG**

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

347 EXAMPLE: Examples are MPEG-2 and MPEG-4.

348 Note 1 to entry: Referred from IEC 62676-1-1.

349

350 **3.1.40**

351 **multi-exposure**

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

354

355 **3.1.41**

356 **ND filter (neutral density filter)**

357 optical device that reduces the light intensity in the visible wavelength region.

358 Note 1 to entry: Referred from IEC 62087-3.

359

360 **3.1.42**

361 **Opto-Electric Conversion Function**

362 **OECF**

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

365

366 **3.1.43**

367 **optical axis**

368 axis that goes through the middle of the optical system..

369

370 **3.1.44**

371 **optical density**

372 logarithmic ratio of the intensity of transmitted light to the intensity of the light passing through
373 the substance.

374

375 **3.1.45**376 **Pan/Tilt/Zoom**377 **PTZ**

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

381 Note 1 to entry: Such a control may also include focus near/far function

382

383 **3.1.46**384 **patch**

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

387

388 **3.1.47**389 **pincushion distortion**

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

392

393 **3.1.48**394 **pixel**

395 smallest possible element of an image that contains information about luminance and colour.

396 Note 1 to entry: Acronym for picture element.

397 Note 2 to entry: Modified from IEC 62676-1-1.

398

399 **3.1.49**400 **Power over Ethernet**401 **PoE**

402 method of sending power from the network switch, over Ethernet copper cable, to the IP
403 device (typically a network camera).

404 Note 1 to entry: This is defined in IEEE standards 802.3(af/at).

405

406 **3.1.50**407 **privacy mask**

408 camera function blocking out or obscuring areas of an image for privacy reasons.

409 Note 1 to entry: Referred from IEC 62676-1-1.

410

411 **3.1.51**412 **progressive scanning**

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

415

416 **3.1.52**417 **quantization level**

418 number of levels used in converting analogue signal into digital.

419 Note 1 to entry: Since digital signals are always processed and described in the binary system, the quantization
420 levels are typically expressed as the power of 2, so that 8-bit system is equal to 256 levels of quantization, and a
421 10-bit system is equal to 1024 levels of quantization.

- 422
- 423 **3.1.53**
- 424 **quantum efficiency**
- 425 The efficiency of converting number of photons into electrons expressed in percentage.
- 426
- 427 **3.1.54**
- 428 **radiated spectrum**
- 429 wavelength of frequencies (spectrum) radiated with a particular light source.
- 430
- 431 **3.1.55**
- 432 **reflectance**
- 433 property which reflects the incoming light.
- 434
- 435 **3.1.56**
- 436 **resolution**
- 437 (related to visual resolution) measure of the ability of a camera or video systems to reproduce
- 438 detail from the original scene or image.
- 439 (related to format) description of the size of a digital image in pixels e.g. 720P, 1080P,
- 440 640X480 etc. pixels/inch or number of pixels of a video-frame, monitoring device, printout.
- 441
- 442 **3.1.57**
- 443 **rolling shutter**
- 444 image read-out method of the image sensor where the exposure timing of visible lines are
- 445 sequential, i.e. line by line,
- 446 Note 1 to entry: Rolling shutter produces unnatural distortions of moving objects.
- 447
- 448 **3.1.58**
- 449 **saturation**
- 450 device characteristic exhibited when a further change in the input signal produces no
- 451 additional change, or progressively less change, in the output,
- 452 Note 1 to entry: Referred from IEC 61888.
- 453
- 454 **3.1.59**
- 455 **sensitivity**
- 456 camera capability to detect light in the scene, measured in lux [lx]
- 457 Note 1 to entry: It's not the capability to detect light at the sensor module
- 458
- 459 **3.1.60**
- 460 **sharpness**
- 461 image quality factor that determines the amount of details an imaging system can reproduce.
- 462 Note 1 to entry: It's not the capability to detect light at the sensor module
- 463
- 464 **3.1.61**
- 465 **shooting condition**
- 466 conditions under which a camera system is setup to measure various parameters.
- 467

3.1.62**signal clipping**

electronic method of removing excessive signal levels in video, typically referring to bright details in a picture such as sun, head-lights or reflections of them.

3.1.63**Signal to Noise Ratio****SNR or S/N Ratio**

Ratio between the signal strength and the noise levels in an audio or video signal, which is typically expressed in deci-Bells (dB).

3.1.64**sine-based**

changes in a peridical function or pattern that occur gradually as a sinewave function.

3.1.65**Spatial Frequency Response****SFR**

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

3.1.66**specification item**

item specified in a camera specification data sheet.

3.1.67**sRGB**

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

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

3.1.68**standard camera settings**

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

3.1.69**standard deviation**

positive square root of the variance.

Note 1 to entry: Referred from IEC GUIDE 115.

3.1.70**target plane**

the plane that passes through the chart plane.

3.1.71**test target**

visible marker or plate that possesses patterns of colors or grey scale which provides a visual reference for adjustment or measurement.

516 **3.1.72**

517 **transmittance**

518 ratio between the amount of light passing through a transparent area and the amount of light
519 before the transparent area entry.
520

521 **3.1.73**

522 **tungsten illuminants**

523 Light sources which have tungsten filament that produces light, typically with colour
524 temperature of 3200°K.
525

526 **3.1.74**

527 **TV lines**

528 specification of an analogue camera's or monitors's horizontal resolution power where
529 horizontal is defined as the maximum number of alternating light and dark vertical lines that
530 can be resolved per picture height.
531

532 **3.1.75**

533 **TV field**

534 Interlaced television image which consists of only odd or only even lines.
535

536 **3.1.76**

537 **TV frame**

538 combination of two TV fields based on the interlaced scanning (even and odd lines).
539

540 **3.1.77**

541 **uncompressed**

542 base band digital signal that hasn't undergone video compression.
543
544
545

546 **3.1.78**

547 **wedge pattern**

548 pattern that typically consists of black lines on a white background which get narrower as they
549 come closer to each other on a test chart, used for resolution measurement.
550

551 **3.1.79**

552 **white balance**

553 electronic process used in video cameras to retain colours under different colour
554 temperatures.
555

556 **3.1.80**

557 **white chart**

558 test chart that is uniformly white.
559

560 **3.1.81**

561 **video authentication**

562 method embedding data into video to ensure the integrity of the video.
563

564

565 **3.2 Abbreviations**

566

567	CCD	Charge Coupled Device
568	CIF	Common Intermediate Format
569	CIE	Commission Internationale de l'Éclairage (International Commission on Illumination)
570	CMOS	Complementary Metal Oxide Semiconductor
571	dB	Decibel
572	DHCP	Dynamic Host Configuration Protocol
573	DNS	Domain Name System
574	DVI	Digital Visual Interface
575	FPS	Frames Per Second (frame rate)
576	FTP	File Transfer Protocol
577	GB	Giga Bytes
578	GPU	Graphical Processing Unit
579	HD	High Definition (1280 x 720, 1920 x 1080)
580	HDMI	High Definition Multimedia Interface
581	HTTP	Hypertext Transfer Protocol
582	IEEE	Institute of Electrical and Electronics Engineers
583	IP	Internet Protocol
584	IR	Infra Red
585	ISO	International Standards Organization
586	JPEG	Joint Photographic Experts Group
587	kB	Kilo Bytes
588	kb/s	Kilo bits per second
589	LED	Light Emitting Diode
590	MB	Mega Bytes
591	Mb/s	Mega bits per second
592	MPEG	Moving Picture Experts Group
593	ND	Neutral Density
594	NTP	Network Time Protocol
595	NTSC	National Television System Committee
596	OECF	Opto-Electronic Conversion Function
597	PAL	Phase Alternating Line
598	SD	Standard Definition
599	SDI	Serial Digital Interface
600	SFR	Spatial Frequency Response
601	SHA	Secure Hash Algorithm
602	S/N	Signal to Noise
603	SMTP	Simple Mail Transfer Protocol
604	SNR	Signal to Noise Ratio
605	SSL	Secure Socket Layer
606	TCP/IP	Transmission Control Protocol / Internet Protocol
607	UDP	User Datagram Protocol
608	VGA	Video Graphic Array
609		

610
611

612 **4 Description of video surveillance camera specification items**

613 **4.1 General**

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

619 Description items without a standard referenced or not listed at all in this standard should be
620 specified according to other published International standards including a reference to.

621

622 **4.2 Camera**

623 **4.2.1 Image Sensor**

624 **4.2.1.1 Description**

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

629 **4.2.1.2 Item Indication**

630 [Image Sensor]

631 **4.2.1.3 Content Indication**

632 **4.2.1.3.1 Type**

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

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

637

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

639 EXAMPLE 2: 1/2.5 type CMOS

640 EXAMPLE 3: 1/4″ CMOS

641 **4.2.1.3.2 Image Scanning Area**

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

- 646 • 1/2 Type (6.4 mm × 4.8 mm);
- 647 • 1/3 Type (4.8 mm × 3.6 mm);
- 648 • 1/4 Type (3.6 mm × 2.7 mm)

649 It should be indicated by horizontal (H) x vertical (V) dimensions of an image size (effective
650 image scanning area) in mm.

651 It may be described with the idiomatic descriptions in parallel.

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

654 Note 1 to entry: Some mega-pixels sensors may have multiples of different scanning areas depending upon the
655 selected video format and the mode of reading pixels.

656

657 EXAMPLE 1: 6.4 mm (H) × 4.8 mm (V) (1/2 Type, 4:3 mode)

658 EXAMPLE 2: 4.8 mm (H) × 3.6 mm (V) (1/3 Type, 4:3 SD mode)

659 EXAMPLE 3: 5.70 mm (H) × 4.28 mm (V) (1/2.5", 4:3 5MP mode)

660 EXAMPLE 4 : 4.22 mm (H) x 2.38 mm (V) (1/2.5", 16:9 HD mode)

661 4.2.1.3.3 **Pixel Number**

662 This indicates the number of pixels on the surface of an image sensor, comprising of photo
663 active and non-photo active pixels.

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

667 - Approximate number of the effective pixel number: A rounded number of the product of
668 horizontal pixels and vertical pixels number.

669 - Effective pixels number: The actual product number of horizontal and vertical pixels (H x V)
670 an electronic picture is made of, produced by the sensor.

671 - Total pixels number: It usually is not indicated, but may be accompanied with the effective
672 pixels number.

673

674 EXAMPLE 1: Total number of pixels: 811 (H) x 508 (V) , Approx.410,000 pixels

675 Effective number of pixels: 768 (H) x 494 (V), Approx.380,000 pixels

676 EXAMPLE 2: Total number of pixels: 2751 (H) x 2003 (V), Approx.5.5 MP,

677 Effective number of pixels (5MP mode): 2592 (H) x 1944 (V), Approx.5MP

678 Effective number of pixels (1080 HD mode): 1920 (H) x 1080 (V),

679 Approx.2.1MP

680 4.2.1.3.4 **Television System**

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

683 - Colour : NTSC

684 - Colour : PAL

685

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

687 EXAMPLE 2: Colour NTSC, 525/59.94i (59.94 interlaced TV fields)

688 4.2.1.3.5 **Colour Television Image Pickup System**

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

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

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

693 - The number of image sensors (one or three)

694 - Colour coding method, or Colour Filter Array (CFA)

695

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

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

698 4.2.1.3.6 **Image format standard**

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

701 EXAMPLE: SMPTE 274M-2008 , 1920x1080, Progressive, 16 : 9

702 SMPTE 296M-2001, 1280x720, Progressive, 16 : 9

703 4.2.1.3.7 **Colour representation**

704 This indicates which Colour representation system the camera complies to

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

706

707 4.2.1.3.8 **Capture Frame Rate**

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

712 Measuring method is described in Clause 5.4.9.

713 - Frame rate shall be indicated in [fps].

714 - When the frame rate varies depending on the imaging mode, such as cropping, the
715 condition(s) shall be indicated.

716

717 EXAMPLE 1: 29.97 fps

718 EXAMPLE 2: 30 fps (VGA) 15 fps (720-HD, When all of pixels are readout.)

719 4.2.1.3.9 **Scanning System**

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

722 EXAMPLE 1: 2:1 Interlaced scanning

723 EXAMPLE 2: Progressive scanning

724 4.2.1.3.10 **Scanning Frequency**

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

727 Frequencies of horizontal and vertical scanning shall be expressed in Hz.

728 EXAMPLE 1: Horizontal: 15.734 kHz, Vertical: 59.94 Hz

729

730 4.2.1.3.11 **Shutter mode**

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

734 EXAMPLE 1: Global shutter

735 EXAMPLE 2: Rolling shutter

736

4.2.2 Maximum Resolution

4.2.2.1 Description

This indicates a numeric value that describes the limit of details 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 Clause 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 4 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 to entry: 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. 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 x 480) or HD(1280 x 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 may differ to the result of "Visual resolution". Pixels of the image sensor are described in 4.2.1.3.3 Pixel Number and pixels of the output image size are described in 4.6.2 Output Image Pixel Number. The output signal resolution which may be different from the image sensor pixel is described in 4.6.3 Output Image Resolution in "lines".

Note 2 to entry: In IEC 62676-4, the required object size to monitor or detect etc. is expressed in "pixel" relates in this standard 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 recognized, while producing no less than 25 fps (30 fps). If the camera offers a Day- and Night mode the minimum illumination shall be specified for Colour- and Black&White-Mode separately

Measuring method is described in Clause 5.4.3.

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 lx 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 3100K for a halogen lamp, the IR part of the spectrum is also given.

EXAMPLE 1: Min. illumination 2.0lx (F1.8, 1/25 [s], Colour temp. 3100 K)

EXAMPLE 2: Min. Illumination 1.0lx (Day Mode), 0.03lx (Night Mode), F1.4, 1/30 [s],
Colour temp. 3100 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 or better then.

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 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 setup.

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

EXAMPLE: Automatic: ATW (Auto Tracking White Balance) 3200° K – 6000° K, one-push
Manual: R/B variable
Fixed: 3200° 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: 1/15s, 1/30s, 1/60s, 1/100s, 1/250s, 1/1000s

EXAMPLE 2: Auto/Manual (1/15s, 1/30s, 1/60s, 1/100s, 1/250s, 1/1000s)

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

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 second

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

EXAMPLE 3: 1/30 second, 1/15 second 1/7.5 second

4.2.8 Dynamic Range (DR)**4.2.8.1 Description**

This indicates the ratio between the maximum illumination which produces unclipped detailed image, just below the saturation level, and the minimum 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 minimum illumination is not of importance for the Dynamic Range, but is a major parameter for the Visible Dynamic Range (see 4.2.9). These maximum and minimum 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. It is expressed as a pure ratio or in decibels (dB) with 10-base logarithmic value.

Measuring method is described in Clause 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 10000 times.

4.2.9 Visible Dynamic Range (VDR)**4.2.9.1 Description**

This indicates the ratio between the maximum illumination which produces unclipped detailed image, just below the saturation level, and the minimum 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 minimum illumination is not of importance for the VDR, but it is a major parameter for the Dynamic Range (see Clause 4.2.8). These maximum and minimum 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 Clause 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-in 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 Clause 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) 10m (TYP level)
Viewing Distance (Corner) 5m (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 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)

4.3 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 in f [mm]

EXAMPLE: Focal Length $f = 2 \sim 10$ 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) – 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 mm, and f is the lens focal length in mm.

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

968 Measuring method is described in Clause 5.4.7.

969 **4.3.4.2 Item Indication**

970 [Image Distortion]

971 **4.3.4.3 Content Indication**

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

974 EXAMPLE: Image Distortion: 10%

975

976 **4.3.5 Iris Control**

977 **4.3.5.1 Description**

978 This indicates the lens iris control mechanism.

979 **4.3.5.2 Item Indication**

980 [Iris Control]

981 **4.3.5.3 Content Indication**

982 Indicate the iris control type for the lens.

983 EXAMPLE 1: DC driven iris

984 EXAMPLE 2: Video driven iris

985 EXAMPLE 3: Manual

986

987 **4.3.6 Mount type**

988 **4.3.6.1 Description**

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

990 **4.3.6.2 Item Indication**

991 [Mount type]

992 **4.3.6.3 Content Indication**

993 Indicate the mount types for the lens.

994 EXAMPLE 1: C/CS mount

995 EXAMPLE 2: CS mount

996

997 **4.3.7 Image Flare**

998 **4.3.7.1 Description**

999 Unwanted increase of signal in the image plane of an optical system, caused by the scattering
1000 and reflection of a proportion of the radiation (light) which enters the system through its
1001 normal entrance aperture where the radiation may be from inside or outside the field of view
1002 of the system.

1003 Measuring method is described in Clause 5.4.8.

1004 **4.3.7.2 Item Indication**

1005 [Image Flare]

1006 **4.3.7.3 Content Indication**

1007 Indicate the signal level increase in dark areas on the test chart in percent of the diffuse white
1008 signal from the white areas on the test chart.

1009 EXAMPLE: Image Flare: 8%

1010

1011 **4.4 Input / Output**

1012 **4.4.1 Video Output**

1013 **4.4.1.1 Description**

1014 This indicates the output of a video signal, from a camera. If digital video is referred to, the
1015 format and connectivity should be indicated. If analogue video is referred to, such as
1016 composite video signal, the format, output level and impedance, should be indicated.

1017 Any video output for installation purpose that is used mainly for view angle adjustment, focus
1018 adjustment, etc. shall be indicated as “monitor output”.

1019 Compliant Video Signal interfaces, specifications and measuring method are described in IEC
1020 62676-3.

1021 **4.4.1.2 Item Indication**

1022 [Video Output] or [Monitor Output]

1023 **4.4.1.3 Content Indication**

1024 Signal type, level, output impedance, connector type, location, etc.

1025

1026 EXAMPLE 1: PAL VBS 1.0Vp-p 75Ω

1027 EXAMPLE 2: NTSC 1.0Vp-p 75Ω

1028 EXAMPLE 3: DVI/HDMI (1080iHD)

1029 EXAMPLE 4: SDI (3 Gb/s)

1030 **4.4.2 Auto-iris Lens Output**

1031 **4.4.2.1 Description**

1032 This indicates an output for control of an auto-iris lens. Control method or video signal and
1033 supply voltage shall be indicated.

1034 **4.4.2.2 Item Indication**

1035 [Auto-iris Lens Output]

1036 **4.4.2.3 Content Indication**

1037 Specify auto-iris control types and connector types

1038

1039 EXAMPLE 1: Video output VS 1.0 Vp-p

1040 Supply voltage 9 V DC

1041 Connector 4P

1042 EXAMPLE 2: DC output

1043 Connector 4P

1044

1045 **4.5 Pan and Tilt**

1046 **4.5.1 Rotation Angle**

1047 **4.5.1.1 Description**

1048 This indicates maximum rotation angle.

1049 **4.5.1.2 Item Indication**

1050 [Rotation Angle]

1051 **4.5.1.3 Content Indication**

1052 EXAMPLE: Horizontal: $\pm 175^\circ$ with the front as 0°

1053 Vertical: Up 20° to down 60° or $+20^\circ$ to -60° with a horizontal view as 0°

1054 Pan Range 360° continuous rotation

1055 **4.5.2 Rotation Speed**

1056 **4.5.2.1 Description**

1057 This indicates rotation speed when pan or tilt is operating. In general, it should be indicated if
1058 it is proportional speed depending on the inclination of PTZ joystick, and also what is the
1059 maximum achievable speed when using preset positioning.

1060 **4.5.2.2 Item Indication**

1061 [Rotation Speed]

1062 **4.5.2.3 Content Indication**

1063 EXAMPLE: Horizontal rotation speed 180°/s, vertical rotation speed 90°/s.
1064 Variable Pan/Tilt Speed 0.2°/second - 120°/second
1065 Pre-position Speed 120°/second
1066 Proportionality Pan /Tilt to Zoom 1:1
1067 Optical Zoom Movement Speed <5 seconds (Wide to Far)
1068

1069 **4.5.3 Preset Position Function**

1070 **4.5.3.1 Description**

1071 This indicates the function to store a position of pan/tilt, zoom/focus position of lens, camera
1072 setting condition, etc.

1073 **4.5.3.2 Item Indication**

1074 [Preset Function]

1075 **4.5.3.3 Content Indication**

1076 Indicate the function capable of storing or the number of stored items. It should also indicate
1077 the speed of achieving preset positions, combining pan, tilt and zoom functions.
1078

1079 EXAMPLE: Pan/tilt position, zoom/focus position 256 positions
1080 120°/s preset recalls
1081 Max. Number of Tours, presets and duration :2 tours, 32 presets, 30 min.
1082

1083 **4.5.4 Preset Position Accuracy**

1084 **4.5.4.1 Description**

1085 This indicates the accuracy of returning to a preset position and placement of a privacy mask.

1086 **4.5.4.2 Item Indication**

1087 [Preset Position Accuracy], [Privacy Mask Accuracy]

1088 **4.5.4.3 Content Indication**

1089 EXAMPLE: $\pm 0.5^\circ$, $\pm 0.01^\circ$

1090 **4.5.5 Audible Noise**

1091 **4.5.5.1 Description**

1092 This indicates the noise during pan tilt zoom operation

1093 **4.5.5.2 Item Indication**

1094 [Audible Noise]