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Alarm systems - CCTV surveillance systems for use in security applications - Part 4-1: Black and white monitors

Alarm systems - CCTV surveillance systems for use in security applications -- Part 4-1: Black and white monitors

Alarmanlagen - CCTV-Überwachungsanlagen für Sicherungsanwendungen -- Teil 4-1: Schwarzweiß-Monitore

Systèmes d'alarme - Systèmes de surveillance CCTV à usage dans les applications de sécurité -- Partie 4-1: Moniteurs noir et blanc

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EUROPEAN STANDARD

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**Alarm systems -
CCTV surveillance systems for use in security applications
Part 4-1: Black and white monitors**

Systemes d'alarme -
Systemes de surveillance CCTV à usage
dans les applications de sécurité
Partie 4-1: Moniteurs noir et blanc

Alarmanlagen -
CCTV-Überwachungsanlagen für
Sicherungsanwendungen
Teil 4-1: Schwarzweiß-Monitore

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This European Standard was approved by CENELEC on 1999-10-01. CENELEC members are bound to comply with the CEN/CENELEC internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 79, Alarm systems.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50132-4-1 on 1999-10-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2002-02-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2002-10-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annex A is normative.

EN 50132 will consist of the following parts, under the general title "Alarm systems – CCTV surveillance systems for use in security applications":

- Part 1 System requirements;
- Part 2-1 Black and white cameras;
- Part 2-2 Colour cameras;
- Part 2-3 Lenses;
- Part 2-4 Ancillary equipment;
- Part 3 Local and main control unit;
- Part 4-1 Black and white monitors;
- Part 4-2 Colour monitors;
- Part 4-3 Recording equipment;
- Part 4-4 Hard copy equipment;
- Part 4-5 Video motion detection equipment;
- Part 5 Video transmission;
- Part 6 (free);
- Part 7 Application guidelines.

Contents

	page
Introduction	5
1 Scope	5
2 Normative references.....	5
3 Definitions and abbreviations.....	6
3.1 Definitions	6
3.2 Abbreviations	8
4 Requirements	9
4.1 General	9
4.2 Scanning standard and synchronization.....	9
4.3 Visible diagonal of the display device	9
4.4 Input impedance	9
4.5 Input signal level and polarity.....	9
4.6 Interlace factor	9
4.7 Frequency response.....	9
4.8 Horizontal resolution	9
4.9 Modulation transfer function	9
4.10 Geometric distortion	10
4.11 Picture size stability.....	10
4.12 Black level stability.....	10
4.13 Grey scale	10
4.14 Interference and positional hum.....	10
4.15 Power supply.....	10
4.16 Electrical safety.....	10
4.17 X-ray radiation.....	10
4.18 Electro-magnetic compatibility (emission)	10
4.19 Electro-magnetic compatibility (immunity)	10
4.20 Environmental conditions	11
5 Test conditions	11
5.1 General	11
5.2 Test equipment	11
5.3 Test conditions	12
6 Performance tests.....	13
6.1 Input signal level test.....	13
6.2 Polarity of the input signal test	14
6.3 Video input termination	14
6.4 Synchronization.....	16
6.5 Picture size stability.....	16

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SIST EN 50132-4-1:2001
<https://standards.itech.ai/catalog/standards/sist/19af45f3207-45c0-93e4-4bf79fc7685/sist-en-50132-4-1-2001>

6.6	Black level stability.....	18
6.7	Grey scale	18
6.8	Frequency response.....	19
6.9	Interlace factor	22
6.10	Geometric distortion	23
6.11	Horizontal resolution.....	24
6.12	Modulation transfer function	25
6.13	Positional hum	26
6.14	Mutual interference.....	26
7	Environmental testing	27
7.1	Introduction.....	27
7.2	Selection of tests and severities	28
7.3	Dry heat (operational)	28
7.4	Dry heat (endurance)	30
7.5	Cold (operational).....	31
7.6	Damp heat, steady state (operational	32
7.7	Damp heat, steady state (endurance)	33
7.8	Damp heat, cyclic (operational)	34
7.9	Damp heat, cyclic (endurance)	35
7.10	Water (endurance).....	36
7.11	Sulphur dioxide (SO ₂) corrosion (endurance)	37
7.12	Salt mist, cyclic (endurance)	39
7.13	Shock (operational)	40
7.14	Vibration, sinusoidal (operational).....	41
7.15	Vibration, sinusoidal (endurance).....	42
7.16	Dust tightness (endurance).....	43
8	Documentation	44
9	Marking and labelling	45
Annex A	Test patterns (normative)	46
A.1	Window signal	46
A.2	Cross hatch signal	47
A.3	Linearity test pattern.....	48
A.4	Grey scale signal.....	49
A.5	Frequency burst signal.....	50
A.6	Checker board signal	50

Introduction

Video monitors are electronic devices able to transform signals generated by television cameras into visible images corresponding to those focused on the imaging device of a television camera or electronically generated signals.

A video monitor comprises the following main components:

- a) Display device, e.g. cathode ray tube, liquid crystal display, etc.;
- b) Video amplification circuits;
- c) Synchronization circuits;
- d) Power supply circuits;
- e) Control and interfacing circuits.

Reference should be made to the guidelines on the application of video monitors in CCTV systems.

1 Scope

This standard specifies the minimum requirements for the specification and testing of black and white video monitors used in 625-line CCIR standard closed circuit television (CCTV) surveillance systems for security applications.

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2 Normative references

This European standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

CCIR report 624-4		Characteristics of television systems
EN 50081-1	1992	Electromagnetic compatibility – Generic emission standard – Part 1: Residential, commercial and light industry
EN 50130-4 + A1	1995 1998	Alarm systems - Part 4: Electromagnetic compatibility - Product family standard: Immunity for components of fire, intruder and social alarm systems
EN 50132-7	1996	Alarm systems - CCTV surveillance systems for use in security applications – Part 7: Application guidelines
EN 60065	1998	Audio, video and similar electronic apparatus - Safety requirements (IEC 60065:1998, mod.)
EN 60068-1	1994	Environmental testing - Part 1: General and guidance (IEC 60068-1:1988 + corr. Oct.1988 + A1:1992)
EN 60068-2-1	1993	Environmental testing - Part 2: Tests - Tests A: Cold (IEC 60068-2-1:1990)
+ A1	1993	(IEC 60068-2-1:1990/A1:1993)
+ A2	1994	(IEC 60068-2-1:1990/A2:1994)

EN 60068-2-2	1993	Environmental testing - Part 2: Tests - Tests B: Dry heat (IEC 60068-2-2:1974 + 2A:1976)
+ A1	1993	(IEC 60068-2-2:1974/A1:1993)
+ A2	1994	(IEC 60068-2-2:1974/A2:1994)
EN 60068-2-6	1995	Environmental testing - Part 2: Tests - Test Fc: Vibration (sinusoidal) (IEC 60068-2-6:1995 + corr. March 1995)
EN 60068-2-18	2001	Environmental testing - Part 2: Tests - Test R and guidance: Water (IEC 60068-2-18:2000)
EN 60068-2-27	1993	Environmental testing - Part 2: Tests - Test Ea and guidance: Shock (IEC 60068-2-27:1987)
EN 60068-2-30	1999	Test Db and guidance: Damp heat, cyclic (12 + 12 hour cycle) (IEC 60068-2-30:1980 + A1:1985)
EN 60068-2-52	1996	Environmental testing - Part 2: Tests - Test Kb : Salt mist, cyclic (sodium chloride solution) (IEC 60068-2-52:1996)
EN 60529	1991	Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)
EN 60950	2000	Safety of information technology equipment (IEC 60950:1999 + corr. 2000, mod.)
HD 323.2.3 S2	1987	Environmental testing - Part 2: Tests - Test Ca: Damp heat steady state (IEC 60068-2-3:1969 + A1:1984)
IEC 60068-2-42	1982	Test Kc : Sulphur dioxide test for contacts and connections

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3 Definitions and abbreviations

3.1 Definitions

For the purposes of this standard, the following definitions and abbreviations apply.

3.1.1

average picture level

average signal level during active scanning time, excluding blanking and synchronization signals, integrated over one frame period. It is expressed as a percentage of the blanking (0 V) to reference white (0,7 V) range

3.1.2

aspect ratio

ratio of the frame width to the frame height. The frame is the total area occupied by the picture which is scanned while the picture is not blanked

3.1.3

black level stability

ability of a monitor to display a stable black level for scenes of varying levels of video content

3.1.4

composite video signal (CVS)

video output signal of a black and white (b/w) camera comprising the picture component (video), black reference (blanking) and the synchronization components (synchronization) [EN 50132-7]

3.1.5**control and interfacing circuits**

circuits in a CCTV monitor enabling the connection of the input video signal and enabling the control of e.g. contrast and brightness of the displayed picture

3.1.6**contrast ratio**

ratio of maximum luminance level of a white area in the picture to the luminance level of a subjective black

3.1.7**dc-restoration**

provision in a monitor to restore the dc-component of the video signal

3.1.8**geometric distortion**

aberration that causes the reproduced picture to be geometrically dissimilar to the original scene

3.1.9**grey scale**

dynamic range of luminance intensity available from the display device

3.1.10**horizontal resolution**

measure of the ability of the monitor to resolve picture detail in the line direction

3.1.11**interlace**

positioning of the scan lines of alternate fields so that the even field lines are vertically spaced between the odd field lines

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3.1.12**low frequency response**

ability of a monitor to display large areas of uniform luminance accurately in the field direction

3.1.13**mid frequency response**

ability of a monitor to display large areas of uniform luminance accurately in the line direction

3.1.14**modulation transfer function**

contrast at which a high frequency burst can be reproduced on the monitor screen

3.1.15**monitor size**

diagonal of the physical tube size, e.g. a 23 cm (9-inch), a 31 cm (12-inch) monitor

3.1.16**mutual interference**

phenomenon, sometimes visible on the monitor screen, when two or more monitors operating on different non synchronised signals are stacked or placed side by side

3.1.17**picture zones**

three zones on the picture tube used to evaluate picture performance:

Zone I is the central picture area defined by a circle equal to 80 % of the picture height.

Zone II is the area defined by a circle equal to the picture width.

Zone III is the area outside zone II.

Refer to Figure 1.

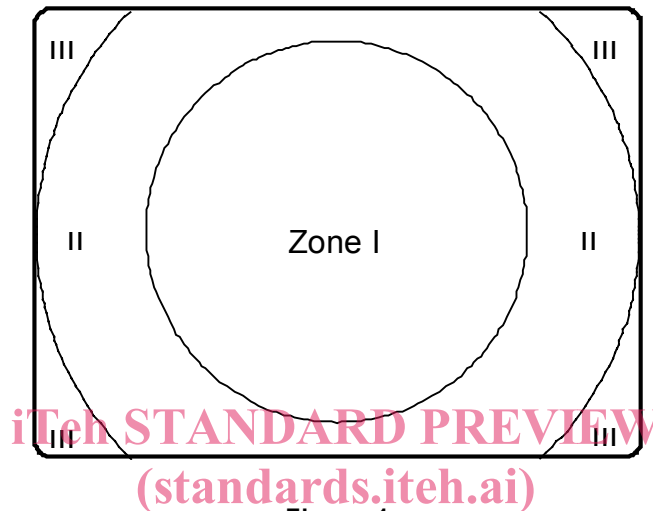


Figure 1

3.1.18**return loss**

reflection damping of the monitor input termination

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3.1.19**terminated input**

input with a termination of 75 Ω

3.1.20**transient response**

ability of the monitor to display a step function luminance transition occurring during a horizontal scan line

3.1.21**unterminated input**

input with high impedance, allowing more devices to be connected in parallel

3.1.22**visible display diagonal**

visible picture diagonal of the display device

3.2 Abbreviations

3.2.1 APL: Average picture level

3.2.2 CCIR: Comité Consultatif International des Radiocommunications (International radio consultative committee).

3.2.3 CCTV: Closed circuit television.

4 Requirements

4.1 General

The properties of the monitor shall be provided in a specification sheet covering at least the parameters listed in subclauses 4.2 to 4.20.

The specifications stated by the manufacturer shall be those determined under the standard operating conditions.

The monitor shall meet all performance specifications over the specified temperature range using only the external operator controls adjustment.

The minimum requirements and specification parameters are given in 4.2 to 4.20.

4.2 Scanning standard and synchronization

The scanning standard shall be in accordance with CCIR report 624-4.

The nominal horizontal frequency is 15,625 Hz and the nominal vertical frequency is 50 Hz, the capture range and holding range shall allow for at least (0 ± 2) % frequency deviation.

4.3 Visible diagonal of the display device

The visible picture diagonal of the display device shall be specified in centimetres.

4.4 Input impedance

The nominal input impedance shall be 75Ω per termination or $\geq 5 \text{ k}\Omega$ when the signal is unterminated. The return loss shall be $\geq 20 \text{ dB}$ in the frequency range of 0,1 MHz to 5 MHz.

4.5 Input signal level and polarity

The monitor shall operate to full specification with a composite video signal at the input of $1 V_{pp} \pm 50 \%$ terminated in 75Ω . The video white part shall be positive going, the synchronization negative going. The maximum superimposed dc-voltage on the terminated input shall be $(0 \pm 2) \text{ V}$.

4.6 Interlace factor

The degree of interlace of the two fields shall be $> 0,8$.

4.7 Frequency response

Low frequency (frame tilt), mid frequency (line tilt) and transient response shall be specified.

4.8 Horizontal resolution

The limiting resolution in zone I of the picture shall be specified at $(60 \pm 5) \text{ cd/m}^2$ and $(120 \pm 10) \text{ cd/m}^2$ screen luminance. The resolution shall be specified in the number of TV lines per picture height.

4.9 Modulation transfer function

The modulation transfer function for (400 ± 20) TV lines resolution in zone I of the picture shall be specified at $(60 \pm 5) \text{ cd/m}^2$ screen luminance.

4.10 Geometric distortion

The geometric distortion in the centre (zone I) of the picture shall be $\leq 2\%$ of the picture height.

4.11 Picture size stability

The percentage of variation of the full image size when switching from low to high brightness shall be specified.

4.12 Black level stability

The stability of the luminance of the black level shall be specified for the condition when the picture is switched between the display of a small white area to the display of a 50 % white area at 120 cd/m².

4.13 Grey scale

The minimum grey scale definition shall be 10 levels, including black and white, at a screen luminance of 120 cd/m² of the white part of the grey scale.

4.14 Interference and positional hum

The manufacturer shall state whether or not two or more monitors can be used asynchronously adjacent without visible mutual interference.

The positional hum in the displayed picture shall be less than 0,2 %.

4.15 Power supply

The power supply input voltage range and rated power consumption shall be specified.

4.16 Electrical safety

The monitor shall comply with the EN 60065 or EN 60950 safety requirements.

4.17 X-ray radiation

The X-ray radiation level of the monitor shall be in accordance with the requirements of EN 60950:2000, subclause 4.3.13.

4.18 Electro-magnetic compatibility (emission)

The radiated interference of the apparatus shall comply with the EN 50081-1 generic EMC emission standard.

4.19 Electro-magnetic compatibility (immunity)

The interference immunity of the apparatus shall comply with the EN 50130-4 EMC immunity standard for security equipment.

4.20 Environmental conditions

The apparatus shall withstand the environmental influences of the specified service environment.

The service environment is defined by selection of one of the four environmental classes:

- Class I: Indoor but restricted to residential/office environment.
- Class II: Indoor in general.
- Class III: Outdoor but sheltered from direct rain and sunshine, or indoor with extreme environmental conditions.
- Class IV: Outdoor in general.

As a minimum, the monitor shall withstand exposure to the environmental influences of the tests defined in clause 7 for the specified service environment.

Monitors of environmental class II or higher may be mounted in environmental housings to enable their application in environmental classes III or IV. The environmental housing shall then conform to the additional requirements for the related environmental class, while maintaining the specified environmental conditions for the monitor mounted in the housing.

5 Test conditions

5.1 General

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The test requirements are designed to determine the performance level of black and white CCTV monitors. The main operating parameters are described.

Monitors shall also conform to the current safety standards for electronic devices.

If a method of measurement and a standard exists for a given parameter, this has been used in the following tests.

If a method of measurement and standard does not exist for a given parameter, the method and standard indicated in this standard takes into account the objectivity, repeatability, and complexity of the tests.

5.2 Test equipment

Test equipment shall be calibrated to tolerances in relation to the required accuracy of the respective measurements.

The test equipment normally required is:

- a) Video wave form monitor or oscilloscope, preferably with facilities for triggering of the sweep from the field or line pulses of the video signal. Its input impedance shall be at least 1 M Ω . For some measurements it is essential that the oscilloscope has an adjustable delay relative to the field synchronization for the selection of individual TV lines. A marker pulse output indicating the selected line on a monitor is useful for measurements on individual TV lines.
- b) Luminance meter, indicating cd/m².
- c) Test signal generator capable of generating the test signals specified in 5.3.1.

5.3 Test conditions

5.3.1 Nominal input signal

Unless otherwise specified, all measurements shall be made with a composite video signal, having a nominal level of $(1 \pm 0,15) V_{pp}$.

The synchronizing signal shall be negative going and have a nominal amplitude of $(0,3 \pm 0,05) V_{pp}$. The picture signal shall be positive going. The amplitude of the picture signal with set-up, as measured from blanking level to reference white level, shall have a nominal amplitude of $(0,7 \pm 0,1) V_{pp}$. The black level set-up shall be between $0 mV_{pp}$ and $35 mV_{pp}$. The synchronization component shall be in accordance with CCIR report 624-4. When the input signal level is varied in a test, the ratio between video and synchronization signal in the composite video signal shall be maintained.

The input signal shall be supplied to the monitor by means of a 75Ω coaxial cable terminated at the monitor in $75 \Omega \pm 1 \%$.

The source impedance of the equipment used to transmit the test signal shall also be $75 \Omega \pm 1 \%$.

5.3.2 Test signals

Initially the monitor shall be set up using an electronically generated test picture signal. This signal may be a white window or grey scale with white reference.

The APL of the signal shall be 60 % or less and the composite video signal shall have the standard level as specified in 5.3.1.

The test signals used in this standard are:

- a) Window signal: The window signal to be used in specific tests within this standard shall generate a displayed rectangle having a 4/3 aspect ratio and an area equal to nominally 20 % of the normal active raster area (see Figure A.1). This signal may be generated electronically or by a TV-camera.
- b) Cross hatch signal, see Figure A.2.
- c) Linearity test pattern, see Figure A.3.
- d) Grey scale signal, see Figure A.4.
- e) Frequency burst signal, see Figure A.5.
- f) Checker board signal, see Figure A.6.

5.3.3 Test preparations

If provisions are available to switch the monitor for NORMAL SCAN/UNDERSCAN operation, the monitor shall be operated in the NORMAL SCAN mode.

If the monitor includes a switch for DC restoration ON/OFF, it shall be operated in the ON mode.

The aspect ratio of the displayed area shall be 4/3.

By means of the brightness and contrast controls, the black reference in the video signal shall be set to subjective black, and the white reference in the video signal set to the manufacturer's rated maximum luminance.

To allow for variations in black level, subjective black may be re-established by adjusting the brightness control only when switching to test signals of different APLs, unless specified otherwise.

Certain tests such as interlace, luminance stability, low and mid-frequency response, grey scale and contrast ratio, horizontal resolution, etc. are performed by means of a luminance meter or a TV camera focused on the monitor face plate. For these tests the ambient light falling on the display shall be ≤ 3 lux.

Some measurements require that white areas be displayed at approximately 50 % of the rated maximum luminance of the monitor; in these cases, the composite input video signal shall have a standard sync level of $0,3 V_{pp}$. The portion of the composite video input signal, as measured between blanking level and white level, shall be adjusted to have a value of $0,5 V_{pp} \pm 5 \%$. Because of the non-linear transfer characteristic of the display, the value of $0,5 V_{pp}$ shall be used instead of $0,35 V_{pp}$.

Certain tests require the use of a calibrated luminance meter; this meter shall have a defined acceptance angle such that it measures only the specified area without spill-over from the surrounding area. The luminance meter shall allow adjustment of the luminance levels to an accuracy of 10 %.

The television camera required in some tests shall be a black and white camera, of which the automatic gain control is switched to fixed minimum gain and gamma correction is switched to 1. The resolution of the camera shall be ≥ 500 TV lines, the contrast transfer function shall be between 80 % and 120 % at 400 TV lines.

5.3.4 Laboratory conditions

Unless otherwise specified, the atmospheric conditions in the laboratory shall be the standard atmospheric conditions for measurements and tests, specified in EN 60068-1:1994, 5.3.1, as follows:

Temperature : 15°C to 35°C

Relative Humidity : 25 % to 75 %

Air Pressure : 86 kPa to 106 kPa

6 Performance tests

6.1 Input signal level test

6.1.1 Principle

To verify the minimum and maximum signal amplitudes at the monitor input terminals.

6.1.2 Preparation

Connect a test signal generator providing a grey scale signal to the terminated monitor input. Monitor the amplitude and the blanking reference voltage of the input signal on a dc-coupled waveform monitor. Adjust the contrast control on the monitor to achieve the specified maximum screen brightness.

6.1.3 Test procedure

Vary the video test signal applied at the monitor input between the minimum and maximum voltage levels $1 V_{pp} \pm 50 \%$. At both minimum and maximum voltage level, superimpose a positive and negative dc-voltage on the video test signal such that the blanking level of the test signal reaches $+2 \text{ V}$ and -2 V .