

**SLOVENSKI
STANDARD**

SIST EN 50132-2-1:1999

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Alarm systems - CCTV surveillance systems for use in security applications --
Part 2-1: Black and white cameras

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English version

**Alarm systems - CCTV surveillance systems
for use in security applications
Part 2-1: Black and white cameras**

Systèmes d'alarme - Systèmes de
surveillance CCTV à usage dans
les applications de sécurité
Partie 2-1: Caméras noir et blanc

Alarmanlagen
CCTV-Überwachungsanlagen
für Sicherheitsanwendungen
Teil 2-1: Schwarzweiß-Kameras

This European Standard was approved by CENELEC on 1996-12-09. 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.

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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 CENELEC Technical Committee TC 79, Alarm Systems.

The text of the draft was submitted to the Unique Acceptance Procedure (UAP) and was approved by CENELEC as EN 50132-2-1 on 1996-12-09.

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) 1998-02-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1998-02-01

For products which have complied with the relevant national standard before 1998-02-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2003-02-01.

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

NOTE: Except for part 7, already published, and the present part 2-1, all other parts of the EN 50132 series are still under consideration.

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Introduction

The purpose of the camera equipment in a Closed Circuit Television (CCTV) installation is to provide quick and reliable pictorial information in security, safety and monitoring applications.

The television camera in a CCTV installation is a device that converts light stimuli pertaining to an image into electrical signals utilizing the physical and chemical properties of photosensitive materials.

A black and white television camera transforms the varying luminance levels of the image focused on the photosensitive device into varying voltage levels at the camera output. It comprises the following main components:

- imaging device
- synchronisation circuits
- amplification circuits
- power supply circuits
- control and interfacing circuits

Although the lens is not regarded as part of the CCTV camera but belonging to the camera equipment, this standard may also be used for CCTV cameras that have a lens physically integrated in their design.

For application of television cameras in a CCTV system, see EN 50132-7, Application guidelines.

1 Scope

This standard lays down the minimum requirements for the specification and testing of black and white CCTV cameras used in CCTV surveillance systems for security and safety applications.

Cameras may be installed with additional features in order to enhance their function to provide the operator with reliable and easily detectable information. These features are not included in this standard, however, it is the responsibility of the specifier to determine the suitability of these features for the application.

Tamper protection and detection are not covered by this standard. When defined as a system requirement, tamper protection and detection methods as specified in the relevant system standard shall be applied.

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2 Normative references and bibliography

2.1 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.

EN 50130-4	1997	Alarm systems - Part 4: Electromagnetic compatibility Product family standard: Immunity requirements for components of fire, intruder and social alarm systems
prEN 50130-5	1996	Part 5: Environmental test methods
EN 50132-7	1996	Alarm systems - CCTV surveillance systems for use in security applications - Part 7: Application guidelines
EN 60065	1993	Safety requirements for mains operated electronic and related apparatus for household and similar general use (IEC 60065:1985 + A1:1987 + A2:1989 + A3:1992, mod)
EN 60950	1992	Safety of information technology equipment, including electrical business equipment (IEC 60950:1991, mod)
IEC 60068-1	1988	Environmental testing - Part 1: General and guidance
IEC 60068-2		Part 2: tests
IEC 60068-2-1	1990	Test A: Cold
+ A1	1993	
+ A2	1994	
IEC 60068-2-2	1974	Test B: Dry heat
+ A1	1993	
+ A2	1994	
IEC 60068-2-3	1969	Test Ca: Damp heat, steady state
+ A1	1984	SIST EN 50132-2-1:1999
IEC 60068-2-6	1982	Test Fc & Guidance: Vibration, sinusoidal
+ A1	1983	
+ A2	1985	
IEC 60068-2-18	1989	Test R & Guidance: Water
+ A1	1993	
IEC 60068-2-27	1987	Test Ea & Guidance: Shock

IEC 60068-2-30 + A1	1980 1985	Test Db & Guidance: Damp heat, cyclic (12 + 12 hour cycle)
IEC 60068-2-42	1982	Test Kc: Sulphur dioxide test for contacts and connections
IEC 60068-2-52	1984	Test Kb: Salt mist, cyclic (sodium chloride solution)
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)
CCIR Report 624-4	1990	Characteristics of television systems
CCIR Recom. 567-3	1990	Transmission performance of television circuits designed for use in international connections

2.2 Bibliography

EBU technical publication Tech. 3238, methods for measuring the main characteristics of television cameras.

Technische Pflichtenhefte der öffentlich-rechtlichen Rundfunkanstalten in der Bundesrepublik Deutschland.

3 Definitions and abbreviations

3.1 Definitions

For the purpose of this standard the following definitions apply:

3.1.1 **acceptable picture:** The low light picture produced by a camera that still provides sufficient contrast, whilst the picture noise produced by the camera remains at the specified level.

3.1.2 **aspect ratio:** The width to height ratio of the sensitive area on the imaging device that is used to form a camera picture.

3.1.3 **automatic black circuit:** An optional circuit in the camera that brings the darkest part in the scene to black level.

3.1.4 **automatic light control (ALC):** An optional circuit in the camera that automatically adjusts the camera sensitivity to changing light conditions in order to maintain the composite video output signal within defined limits.

3.1.5 **black level:** The electrical signal level in a composite video signal representing optical black.

3.1.6 **blanking level:** The electrical signal level in a composite video signal of the front and back porch of the synchronising signal.

3.1.7 **camera sensitivity:** Imaging device illumination necessary to produce a defined composite (colour) video signal amplitude with a defined signal to noise ratio [EN 50132-7].

3.1.8 **CCTV camera:** A unit containing an imaging device producing a video signal from an optical image [EN 50132-7].

3.1.9 **CCTV camera equipment:** A unit containing a CCTV camera plus appropriate lens and necessary ancillary equipment [EN 50132-7].

3.1.10 **composite video signal (CVS) :**The picture component (video), black reference (blanking) and the synchronisation components (synchronisation).

3.1.11 **contrast transfer function (CTF):** The complex function of frequency response relating the output signal of the camera to the spacial frequency of the test chart projected on the imaging device of the camera.

3.1.12 **electronic iris:** An automatic electronic shutter which varies the camera sensitivity in relation to the varying light conditions in order to maintain the video output signal within defined limits [EN 50132-7].

3.1.13 **electronic shutter:** An arrangement in the camera which changes its sensitivity by electronically controlling its exposure time [EN 50132-7].

3.1.14 **gamma correction:** Non-linear signal processing that establishes correct grey scale reproduction on the picture tube.

3.1.15 **imaging device:** A device that converts an optical image into an electrical signal [EN 50132-7].

3.1.16 **imaging device illumination:** The level of illumination (illuminance) at the photosensitive surface of the imaging device [EN 50132-7].

3.1.17 **image sensor size:** The size of the light sensitive surface of the imaging device. The value is expressed in inches and refers to the diameter of the glass tube from which the camera tubes were constructed [EN 50132-7].

NOTE: Some examples of the size are:

- 1-inch for 12,8 x 9,6 mm (16 mm diagonal);
- 2/3-inch for 8,8 x 6,6 mm (11 mm diagonal);
- 1/2-inch for 6,4 x 4,8 mm (8 mm diagonal);
- 1/3-inch for 4,8 x 3,6 mm (6 mm diagonal).

3.1.18 **lens:** An optical device for projecting an image of a desired scene onto the photo sensitive surface of the imaging device [EN 50132-7].

3.1.19 **picture signal:** The part of the composite video signal that contains the picture information.

3.1.20 **pixel:** An acronym for **picture element**, which is the smallest sample of an image [EN 50132-7].

NOTE: The sample may be a discrete sample produced by a solid state imaging device or a digitised sample.

3.1.21 **scene brightness:** The observed brightness of the scene, dependent on the scene illumination and scene reflectance [EN 50132-7].

3.1.22 **scene illumination:** The level of illumination (illuminance) on the area to be kept under surveillance [EN 50132-7].

3.1.23 **scene reflectance:** The proportion of the scene illumination reflected by that scene [EN 50132-7].

3.1.24 **synchronising signal:** A signal that, when fed to cameras, makes the cameras generate pictures synchronously.

NOTE: Following are examples of synchronising methods:

- Mains lock synchronises the camera vertical scanning frequency and phase with the mains.
- V-lock synchronises the camera vertical scanning frequency and phase with an external V-synchronisation signal.
- H-lock synchronises the camera horizontal scanning frequency and phase with an external H-synchronisation signal.
- Genlock synchronises the camera horizontal and vertical frequencies and phases with an external composite synchronisation signal.
- CVS-lock synchronises the camera horizontal and vertical frequencies and phases to the synchronisation pulses in an external composite video signal.

3.1.25 **tv lines:** The resolution of television equipment expressed as the number of lines relative to the picture height. For a number of N lines (normally alternate black and white lines) the width of each line is 1/N times the picture height.

3.1.26 **white clipper:** A circuit within a camera limiting the maximum white excursions of the video output signal to a defined level.

3.2 Abbreviations

3.2.1 **AGC:** Automatic gain control

3.2.2 **ALC:** Automatic light control

3.2.3 **CCD:** Charge coupled device

3.2.4 **CCIR:** Comité Consultatif International des Radiocommunication (International Radio Consultative Committee).

3.2.5 **CCTV:** Closed circuit television

3.2.6 **CVS:** Composite video signal

3.2.7 **CTF:** Contrast transfer function

3.2.8 **EBU:** European broadcasting union

3.2.9 **EMC:** Electromagnetic compatibility

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3.2.10 **ND:** Neutral density

4 Requirements

The minimum requirements and specification items are defined as follows:

4.1 Imaging device

4.1.1 Type: The type of imaging device shall be specified, typical examples are Vidicon tube, interline transfer CCD sensor, frame transfer CCD sensors, image intensifier coupled sensors.

4.1.2 Size: The width and height of the photo sensitive area and the equivalent diagonal value shall be specified.

4.1.3 Number of active pixels: If the imaging device is constructed of a matrix of pixels, the number of pixels in the horizontal and vertical directions forming the displayed image shall be specified.

4.2 Video signal output

4.2.1 The standard source impedance of a camera shall be $75 \text{ Ohms} \pm 5 \%$ on the unbalanced coaxial output. The return loss shall be better than 20 dB in the frequency range 0,1 to 5 MHz.

4.2.2 The signal polarities shall be positive going for the video signal and negative going for the synchronisation signal.

4.2.3 The nominal amplitude of the Composite Video Signal (CVS) shall be $(1 \pm 0,15) V_{pp}$.

4.2.4 The picture signal component (video) of the CVS, measured from the blanking level to reference white level across a 75 Ohms load impedance shall be $(0,7 \pm 0,1) V_{pp}$ (full video).

4.2.5 The maximum picture signal for peak white (white clipper) shall be limited to $(0,85 \pm 0,05) V_{pp}$.

4.2.6 The synchronising signal component of the CVS, measured across a 75 Ohms load impedance shall be $(0,3 \pm 0,05) V_{pp}$.

4.2.7 The DC voltage in the terminated camera output shall not exceed $(0 \pm 2) \text{ V}$.

4.3 Automatic gain control (AGC)

The control range of the AGC circuit shall be expressed in dB.

4.4 Gamma correction

The gamma correction factor of a camera shall be specified. This factor shall have a value between 0,7 and 0,45. The gamma correction factor normally remains constant over the full gain control range of the camera, any deviation from this condition shall be specified.

4.5 Sensitivity and signal to noise ratio

Sensitivity and signal to noise ratio are interrelated. For correct interpretation of this performance requirement, the specification shall comprise three items:

- Sensitivity for -6 dB output;
- Sensitivity for full video;
- Signal to noise ratio

4.5.1 Sensitivity at -6 dB output for acceptable picture: The sensitivity of a camera shall be specified in lux as sensor illumination (without lens) for the point where the camera produces $(0,35 \pm 0,05) V_{pp}$ video output under the test conditions specified

4.5.2 Sensitivity for full video: The sensitivity of a camera shall be specified in lux as sensor illumination (without lens) for the point where the camera produces full video. The signal to noise ratio of the camera, at which this sensitivity is reached, shall be stated together with the sensitivity.

4.5.3 Signal to noise ratio The signal to noise ratio of a camera operating at minimum AGC gain shall be specified together with the sensor illumination to achieve this condition

4.5.4 The signal to noise ratios specified in 4.5.2 and 4.5.3 shall be better than 40 dB (weighted).

4.6 Limiting resolution

The limiting resolution of a camera shall be specified at the same sensor illumination level as that stated for the signal to noise ratio measurement of 4.5.3.

Where the resolution of a camera is reduced at low light levels, the resolution at the low light levels must also be specified at the -6 dB video output level as defined in 4.5.1.

4.7 Contrast Transfer Function (CTF)

The modulation depth in the camera output signal shall be specified in accordance with the test requirements.

4.8 Black level

The black signal level of the camera output shall be between 0 and 0,1 V.

4.8.1 Automatic black level: The black level of a camera may be automatically adapted by referring the darkest spot of the image to the black level. The smallest spot size as a percentage of the total image area to maintain the black level must be $\geq 2\%$.

4.9 Automatic light control (ALC) range

The control range of the camera's ALC shall be specified as the ratio of the sensor illumination for -6 dB output to the maximum sensor illumination for which the automatic gain control is at minimum gain and the automatic shutter control is at highest speed.

The ratio is expressed as, e.g. 1:10 000.

4.10 Synchronisation

The synchronisation standard of a camera shall comply with the CCIR recommendation 624-4, 625 lines, 50 fields per second, 2:1 interlace.