SLOVENSKI STANDARD
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Alarmni sistemi - Nadzorni sistemi s TV zaprtega kroga za varnostne aplikacije - 5-3. del: Video prenos - Prenos analognih in digitalnih video signalov

Alarm systems - CCTV surveillance systems for use in security applications - Part 5-3: Video transmission - Analogue and digital video transmission

Alarmanlagen - CCTV-Überwachungsanlagen für Sicherungsanwendungen - Teil 5-3: Videoübertragung - Analoge und digitale Videoübertragung

Systèmes d'alarme - Systèmes de surveillance CCTV à usage dans les applications de sécurité - Partie 5-3: Transmission vidéo - transmission vidéo analogique et numérique

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ICS:

13.320	Alarmni in opozorilni sistemi	Alarm and warning systems
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English version

Alarm systems - CCTV surveillance systems for use in security applications - Part 5-3: Video transmission - Analogue and digital video transmission

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CENELEC

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

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Foreword

This document (EN 50132-5-3:2012) has been prepared by CLC/TC 79, "Alarm systems".

The following dates are fixed:

– latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2013-05-15
– latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2015-05-15

This document, together with EN 50132-5-1:2011 and EN 50132-5-2:2011, supersedes EN 50132-5:2001.

This document is a revision of the former video transmission standard EN 50132-5:2001 with only one additional new Clause 9, ´High resolution video interface standards & transmission requirements´.

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

– Part 1: System requirements;

– Part 5-1: Video transmission – General video transmission performance requirements;

– Part 5-2: Video transmission – IP video transmission protocols;

– Part 5-3: Video transmission – Analogue and digital video transmission;

– Part 7: Application guidelines.

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Introduction

The European Electrotechnical Standardisation Organisation for Alarm Systems together with many governmental organisations, test houses and equipment manufacturers has defined a common framework for Surveillance Video Transmission in order to achieve interoperability between products.

EN 50132-5 is divided into 3 independent subparts:

– Part 5-1: Video transmission – General video transmission performance requirements;

– Part 5-2: Video transmission – IP video transmission protocols;

– Part 5-3: Video transmission – Analogue and digital video transmission.

Each subpart offers its own (sub)clauses on scope, references, definitions, requirements.

1 Scope

The purpose of the transmission system in a closed circuit television (CCTV) installation is to provide reliable transmission of video signals between the various CCTV equipments in security, safety and monitoring applications.

Along with high-resolution video interfaces and transmission, the analogue video signals are still in use today for video transmission and offer interlaced scanning and the film aspect ratio of 4:3.

The complexity of a video transmission system varies in accordance with the requirements of the installation.

Examples of the different types of video transmission systems covered by this European Standard are as follows:

a) using dedicated cable transmission media:

- coaxial cable;
- twisted pair cable;
- fibre optic cable;

b) using wireless transmission methods:

- microwave;
- infrared;
- radio transmission;

NOTE 1 These transmission methods apply to non-compressed video signals.

NOTE 2 Multiple analogue video signals may be combined in one physical transmission path using multiplexing techniques.

c) using analogue high-resolution video interfaces:

- VESA and VGA;

d) using digital uncompressed high-resolution video interfaces:

- HDMI;
- DVI.

This European Standard specifies the minimum requirements for the specification and testing of the performance of a video transmission channel involving transmitter, receiver or intermediate devices associated with the selected transmission media, for use in CCTV surveillance systems.

Video transmission equipment may be combined with additional functions, e.g. for audio or data transmission. These functions are not included in this European Standard.

This European Standard covers the transmission of colour and black and white video signals in accordance with the former CCIR Report 624-4, 625 lines, 50 fields per second and today ITU-R Report BT.624-4.

IP based video transmission is covered in EN 50132-5-1 and EN 50132-5-2.

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.

EN 50130-4, *Alarm systems – Part 4: Electromagnetic compatibility – Product family standard – Immunity requirements for components of fire, intruder, hold up, CCTV, access control and social alarm systems*

EN 50130-5:2011, *Alarm systems – Part 5: Environmental test methods*

EN 50132-1:2010 + corr. Jun. 2010, *Alarm systems – CCTV surveillance systems for use in security applications – Part 1: System requirements*

EN 60065, *Audio, video and similar electronic apparatus – Safety requirements (IEC 60065)*

EN 60068-1:1994, *Environmental testing – Part 1: General and guidance (IEC 60068-1:1988 + corr. Oct. 1988+ A1:1992)*

EN 60950-1, *Information technology equipment – Safety – Part 1: General requirements (IEC 60950-1)*

EN 61000-6-3, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments (IEC 61000-6-3)*

EN 62315-1:2003, *DTV profiles for uncompressed digital video interfaces – Part 1: General (IEC 62315-1:2003)*

CCIR Recomm. CMTT 567-3:1990 / ITU-T Recomm. J.61:1990, *Transmission performance of television circuits designed for use in international connections*

CCIR Report 624-4:1990 / ITU-R report BT.624-4:1990, Characteristics of television systems

VESA, *DisplayPort Standard*, Version 1.1a (January 11, 2008)

VESA Monitor Timing Specifications, *Industry Standards and Guidelines for Computer Display Monitor Timing (DMT),* Version 1.0, Revision 11 (May 1, 2007)

VESA, *Video Signal Standard (VSIS)*, Version 1, Rev. 2 (December 12, 2002)

VESA, *Enhanced Display Data Channel (E-DDC) Standard*, v.1.1 (March 24, 2004), pages 17-18

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1
analogue
continuous electrical signal that carries information in the form of variable physical values, such as amplitude or frequency modulation and that moves through a continuous range of settings or levels

3.1.2
analogue components
video signals in which a continuously variable voltage or current (rather than a set of digital numbers) represents a pixel

3.1.3
analogue interface
interface between a video source and a video input in which pixel colours are determined by the voltage levels on three output lines (RGB)

Note 1 to entry: Theoretically, an unlimited number of colours can be supported by this method (24 bits per pixel allows 16 777 216 colours). The voltage level on any line varies between 0 V (for black) to about 700 mV (for maximum brightness).

3.1.4
analogue monitor
video monitor which accepts analogue signals such as composite video, RGB & sync, Y/C, YUV and any combination of these formats

Note 1 to entry: The signals transmitted to an analogue monitor are usually between 0 V and 1 V and use 75-Ω coaxial cables.

3.1.5
aspect ratio
relationship of width and height of an image

EXAMPLE For standard CCTV monitor, the aspect ratio is 4:3. The HD video format has an aspect ratio of 16 to 9 (16:9).

3.1.6
average picture level
average signal level with respect to blanking during the active picture time, expressed as a percentage of the difference between the blanking and reference white levels

3.1.7
bandwidth
frequency range of a signal

3.1.8
blanking level
voltage level produced at the end of each horizontal picture line which separates the portion of the video signal containing the picture information from the one containing the synchronizing information

3.1.9
channel
specified frequency band for the transmission and reception of signals

3.1.10
chroma
depth or saturation of colour

Note 1 to entry: The (B, D, G, H, I) PAL video signal contains two pieces that make up what you see on the screen: the black and white (luma) part, and the colour part, where chroma is the colour part and can be further broken down into two properties of colour: hue and saturation; described as single pel representing one of the two colour difference signals related to the primary colours in the manner defined in the bit stream. The symbols used for the colour difference signals are Cr and Cb.

3.1.11
chrominance
data that represents one of the two colour difference signals Cr and Cb in a video picture, which can be further broken down into two properties of colour: hue and saturation

Note 1 to entry: See also chroma in 3.1.10.

3.1.12
chrominance signal
part of the video signal that contains the colour information

Note 1 to entry: In composite video, the chrominance signal is multiplexed at a higher frequency than the signal and transmitted down the same cable. In S-VHS, this signal is transmitted along a separate cable.

3.1.13
colour depth
number of bits used for a pixel, determining the maximum number of colours that can be displayed at one time

3.1.14
component
CCTV system in which chrominance and luminance are distributed separately

3.1.15
component analogue
unencoded output of a camera or recorder, etc., consisting of three primary colour signals: red, green, and blue (RGB) that together convey all necessary picture information

Note 1 to entry: In some component video formats, these three components have been translated into a luminance signal and two colour difference signals, for example, Y, B-Y, R-Y.

3.1.16
component colour
structure of a video signal wherein the R', G', and B' signals are kept separate from each other or wherein luminance and two band-limited colour-difference signals are kept separate from one another

Note 1 to entry: The separation may be achieved by separate channels, by time-division multiplexing or by a combination of both.

3.1.17
component video
analogue component
video which exists in the form of three separate signals, all of which are required in order to specify the colour picture completely

Note 1 to entry: Most CCTV video signals consist of combined (composite) video signals, composed of luminance (brightness) information, chrominance (colour) information, and sync information.

Note 2 to entry: Component video comes in several varieties: RGB (red, green, blue), YUV (luminance, sync, and red/blue) and Y/C (luminance and chrominance), used by S-Video systems.

3.1.18
composite
a) CCTV system in which chrominance and luminance are combined into a single signal, as they are in PAL;
b) any single signal comprised of several components

3.1.19
composite analogue
encoded video signal, such as PAL video, that includes horizontal and vertical synchronizing information

3.1.20
conductance
real (non-reactive) part of the admittance of a circuit, where admittance is the reciprocal of impedance

3.1.21
conducted interference
interference that occurs because of inductive or capacitive coupling

3.1.22
conductor losses
power losses due to the resistance of conductors

3.1.23
connector
attachment on the end of a cable that allows interconnection to other cables

3.1.24
decibel
measure of the power ratio of two signals

Note 1 to entry: It is equal to ten times the logarithm of the ratio of the two the iris.

3.1.25
distortion
changes in luminance or chrominance of a video signal producing improper contrast, faulty luminance levels, twisted images, erroneous colours and snow

3.1.26
frequency response
measure for the quality of reproduction of various frequencies by a circuit or device

Note 1 to entry: If the frequency response of a video processor is adequate, there is no deterioration in image quality at the bandwidth extremes. For PAL video, the bandwidth is 5,5 MHz.

3.1.27
gain
measure of amplification expressed in dB

3.1.28
impedance
input and output characteristic of an electrical system measured in ohms with CCTV systems having 75-Ω impedance throughout

3.1.29
insertion loss
diminishment of a video signal's strength by the inclusion of an electronic device into a transmission line

3.1.30
luminance
measurement of the intensity of light in a colour

Note 1 to entry: Luminance corresponds to the Y value in YUV colour space.

3.1.31
modulate
change or vary some signal parameter such as varying the amplitude of a signal for amplitude modulation or the frequency of a signal for frequency modulation

EXAMPLE A modulator is the circuit that modulates the signal.

3.1.32
monitor
device that converts electronic signals into the video image that was generated by the camera and lens

3.1.33
multiplexing
process of integrating different video, audio or data signals into one

3.1.34
noise
undesired signal(s) that corrupts the original video signal and may reduce image quality, which is unrelated to the original signal

EXAMPLE Video noise is generally manifested as snow, graininess, ghost images or picture static induced by external sources such as power-lines, electric motors, fluorescent lamps, etc.

3.1.35
output
current, voltage, power, or driving force delivered by a circuit or device

3.1.36
output impedance
impedance that a device presents to its load

3.1.37
peak-to-peak
amplitude (voltage) difference (as displayed on an oscilloscope) between the most positive and the most negative peaks of an electrical signal

3.1.38
phase alternate line
phase of the colour carrier is alternated from line to line, taking four full pictures for the colour to horizontal phase relationship to return to the reference point

3.1.39
physical transmission path
combination of the transmission medium and necessary amplifiers and other equipment to form a transmission path with one or more transmission channels

3.1.40
pixel depth
number of bits used for a pixel, determining the maximum number of colours that can be displayed at one time

3.1.41
resistance
real (non-reactive) part of the impedance of a circuit

3.1.42
return loss
difference between the power incident upon a discontinuity in a transmission system and the power reflected from the discontinuity

3.1.43
root mean square
measure of the effective level of a video signal or alternating current

3.1.44
saturation
intensity of colour

3.1.45
signal level
r.m.s. voltage measured during the r-f signal peak, expressed either in microvolts referred to an impedance of 75 Ω, or in dBmV, the value in decibels with respect to a reference level of 0 dBmV, which is 1 mV across 75 Ω

3.1.46
signal to noise ratio
signal expressed in decibels that relates how much stronger a signal is than the background noise

3.1.47
staircase
test signal commonly used to check luminance gain linearity

3.1.48
subcarrier
signal that is modulated by colour information to form a chrominance signal

3.1.49
S-video
composite video signal separated into the luminance (Y) and the chrominance (C)

3.1.50
sync
means of synchronizing signals with timing pulses to insure that each step in a process occurs at exactly the right time

EXAMPLE Horizontal Sync determines exactly when to begin each horizontal line; vertical Sync determines when to start at the top-left of the screen for a new field.

3.1.51
television lines

maximum number of changes between light and dark on a picture across 3/4 of the width results in the resolution of a CCTV system, measured in TVL

3.1.52
termination

load at the end of a cable or signal line used to match the impedance of the equipment being used to prohibit signal reflections back toward the source

3.1.53
terminate
provide termination for a signal line, or several signal lines, at the end of a cable

3.1.54
test pattern
chart or special video signal sample for checking overall performance of a CCTV system containing various combinations of lines and geometric shapes by viewing a monitor for fidelity of the output pattern

3.1.55
test signal generator
instrument providing a variety of known test and synchronization signals for the characterization of CCTV systems

3.1.56
transmission
electrical transfer of a signal, message, or other form from one location to another for example the transfer of a video waveform from point to point by conductive cable or fibre

3.1.57
transmission channel
combination of the transmission medium and necessary amplifiers and other equipment to form a connection between video equipment in a CCTV system

3.1.58
transmission media
physical means used for the transmission of video signals, such as cable transmission

3.1.59
transmission methods
means used for the transmission of video signals, such as wireless or wired transmission

3.1.60
transmission system
combination of equipment and media that provide the transmission of video signals between the various CCTV equipment

3.1.61
vectorscope
specialized oscilloscope which demodulates the video signal and allows visual checking of the phase and amplitude of the colour components of a video signal

3.1.62
video graphics array
analogue signal with TTL level separate horizontal and vertical sync at a 15-pin connector with a horizontal scan frequency of 31,5 kHz and vertical frequency of 70 Hz (Mode 1, 2) and 60 Hz (Mode 3)

3.1.63
video signal

electrical signal that includes all the information present in the television picture together with the necessary synchronizing signals

3.1.64

video switcher

device that accepts inputs form a variety of video sources and allows the operator to select a particular source to be sent to the switcher output(s)

3.1.65
waveform monitor
oscilloscope designed especially for viewing the waveform of a video signal

3.2 Abbreviations

For the purposes of this document, the following abbreviations apply.

APL	Average Picture Level
B	Blue
C	Chrominance
Cb	blue-difference chroma components
CCIR	Comité Consultatif International des Radiocommunications (International Radio Consultative Committee)
CCTV	Closed Circuit Television
Cr	red-difference chroma components
CVS	Composite Video Signal
dB	Decibel
DC	Direct Current
DDC	Display Data Channel
DDWG	Digital Display Working Group
DMT	Display Monitor Timing