

STANDARD

PART 20.07

CCTV SYSTEMS

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STANDARD

PART XX

CCTV SYSTEMS

EXECUTION, CONDITIONS, QUALITY, REGULATIONS,
STANDARDS, DELIVERIES, PROVISIONS

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| Edition: 01 | Valid from: date of approval |
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If printed, the copies are not controlled. Printing date: 7.10.2022

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1 General

1.1 Introductory Provisions

This part of the Mondi Štětí a.s. Standard is binding for tangible and intangible deliveries of camera systems (hereafter CCTV) to the Mondi Štětí a.s. plant

CCTV deliveries are used for the following operational needs – monitoring of production and operational processes, security camera systems. CCTV systems can be

Edition: 01

If printed, the copies are not controlled.

Printing date: 7.10.2022

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linked to other systems – alarm security systems, electrical fire alarm systems, where they respond to, for example, alarm conditions.

The publication of this part of the Standard does not deny the validity of national standards for deliveries, especially electrical standards and standards. Czech national standards also apply to delivery parameters that are not mentioned in this Standard.

Parts of the Standard are available in Czech and English versions in the form of an electronic document.

This part of the Mondi Štětí a.s. Standard applies to deliveries of:

1. CCTV projects with links to other fields
2. CCTV equipment consisting of:
 - a CCTV recording device – DVR with HDD, PC,
 - cameras,
 - power supply and backup,
 - communication interface,
3. CCTV Service and Maintenance.

1.2 Terms and Abbreviations

Mondi Štětí a. s. **Standard** - quality system document containing a set of requirements of Mondi Štětí a. s. for the scope and quality of deliveries and services.

Part of **the Standard** - part of the Mondi Štětí a. s. Standard, issued in the form of a separate workbook, setting out the requirements for the scope and quality of deliveries and services in one field or type of activity.

Abbreviations Used

PD project documentation
CCTV Closed circuit television
DVR digital video recorder
NVR network video recorder

Terminology Used

- **CCTV surveillance equipment** - equipment consisting of hardware and software elements of the CCTV system, completely assembled and operational, used to monitor a defined security zone
- **CCTV camera** – a unit containing a sensing element that creates a video signal from an optical image
- **CCTV camera assembly** – a set containing a CCTV camera with a suitable lens and necessary accessories

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- **Camera housing** - a housing that provides physical protection or environmental protection for the camera, lens and additional equipment
- **Camera sensitivity** - the level of illumination of the sensing element, necessary to create a defined amplitude of the composite (color) video signal in the CCTV system
- **Sensing element** – a device that converts an optical image into an electrical signal
- **Lens** – an optical device designed to project an image of the desired scene onto the photosensitive surface of the sensing element
- **CCTV system** - a system consisting of camera equipment, monitoring and associated equipment for transmission and control purposes that may be necessary for the surveillance of a protected area
- **Corrective maintenance** – emergency service activity on the system or part of it, carried out in response to a malfunction
- **Corrective maintenance report** – a document detailing the requirement for normal or emergency corrective maintenance and indicating the corrective actions carried out as required by the standard ČSN EN 50 132-7
- **Identification** - with a person height of 1.7m occupying at least 100% (PAL) of the image height, the quality and detail of the image should be sufficient to enable identification of the individual beyond any doubt
- **Examination** - with a person height of 1.7 m occupying at least 400% (PAL) of the image height, the image quality should be sufficient for a court investigation
- **Monitoring** – with a person height of 1.7 m occupying at least 5% (PAL) of the image height, the quality and detail of the image should be sufficient to detect the number, direction and speed of movement of people in a wide area, provided that their presence is known, i.e. there is no need to look for them
- **Observation** - with a person height of 1.7m occupying between 25-30% (PAL) of the image height, the level of image detail should be sufficient for the visibility of the characteristic features of the individual, such as the distinctiveness of clothing, and enabling the observation of activities in the vicinity of the event
- **Recognition** - with a 1.7m tall person occupying at least 50% (PAL) of the screen height, viewers can determine with a high degree of confidence whether the person on the screen is the same person they saw before
- **Risk assessment** – a systematic procedure for determining the effects of the consequences of hazards and threats depending on their probability; the result of the performed analysis provides the basis for risk assessment in the risk management process
- **Risk management** – creation of procedures and guidelines aimed at effective management of possible events and their adverse consequences
- **Risk management process** – the systematic application of management strategies, procedures and practices for use in the process of formulating, identifying, analyzing, evaluating, accessing, monitoring and communicating risks
- **System design** – system design specification, including elements to determine its location, site plan, viewing angles, detection distance and length, and design of the

control room

- Surveillance video systems, hereinafter referred to as SVS, are designed to capture images of the scene, process and display them to the operator along with information for efficient and easy use. The issue of SVS is addressed by the standard ČSN EN 62676 - Surveillance video systems for use in security applications. A SVS is a combination of imaging equipment, lighting, image processing equipment connectivity, etc., selected and installed to meet the customer's security surveillance requirements.

1.3 Regulations and Standards

- Act No. 101/2000 Sb. on the protection of personal data
- Alarm systems standards - CCTV surveillance systems:
 - ČSN EN 50 132-1 Alarm systems - CCTV surveillance systems - part 1: System Requirements
 - ČSN EN 50 132-7 Alarm systems - CCTV surveillance systems - part 7: Instructions for applications (further on in the text also application standard)
 - ČSN EN 62676-1-2 Surveillance video systems for use in security applications - Part 1-2: System Requirements - Performance requirements for video transmission.
- ČSN 33 2130 - Electrical regulations. Internal electrical distribution
- ČSN 34 2100 - Electrical regulations ČSN. Regulations for overhead communication lines
- ČSN 33 2300 - Regulations for internal distribution of communication lines
- ČSN 33 2000-3 - Electrotechnical regulations - Electrical equipment - Part 3: Determination of basic characteristics
 - ČSN 33 2000-4-41 ed.2- Low voltage electrical installation - Part 4-41: Protective measures to ensure safety - Protection against electric shock
 - ČSN 33 1500 - Electrotechnical regulations - Revision of electrical equipment

1.4 General CCTV System Design Procedure

A CCTV system is a combination of imaging equipment, lighting, interconnection, image processing equipment, etc. selected and installed to meet the customer's security surveillance requirements.

The requirement for the delivery and installation of CCTV equipment may arise from the rule in the following cases:

- The requirement to ensure increased security of the building and property
- Request for monitoring processes – production, handling, movement of equipment and people, etc. (e.g. for the purpose of increasing OSH)
- On the basis of the investor's decision on the need to equip the object/premises with CCTV, e.g. following the requirements of the insurance company, etc.

1.4.1 Recommended procedure for implementing CCTV

The procedure described below is primarily intended for the design of a CCTV security system. **When designing a CCTV system with a different purpose, the outline shall be used in proportion to the desired purpose.**

- A threat assessment and risk analysis should be carried out prior to CCTV design. Threats and hazards to objects are to be identified and their likelihood and impact assessed. These pose a risk to objects or the organization.
- Assessment examples:
 - cost of losses
 - the value of things located in the locality
 - the impact of the interruption of activities in the locality
 - location
 - the quality and extent of existing physical security
 - situating the locality according to the riskiness of the environment in terms of crime
 - influence of climatic conditions
 - occupancy
 - the location has been uninhabited for a long time
 - the presence of security services
 - location accessible to the public
 - history of theft, robbery and threats
 - a history of thefts, robberies and threats in the locality is documented
 - if so, what was the method of attack for previous threats

The results of this assessment will be used as a basis for deciding what type of CCTV system to design and install.

- Choice of security levels according to risk assessment for individual parts of the CCTV system: The choice of security levels for the VSS and its elements is based on the risk assessment. A different level of security may be chosen for different

functions according to operational requirements but must be consistently applied in all parts of the system. For CCTV systems, 4 levels of security are introduced, similarly to the PZTS system, but they are presented differently:

- **level 1 - low risk** - CCTV system designed to monitor low risk situations, SVS has no protection and no access restrictions,
 - **level 2 - low to medium risk** - a CCTV system designed to monitor low to medium risk situations, the SVS has a low level of protection and low access restrictions,
 - **level 3 - medium to high risk** - CCTV system designed for monitoring medium to high risk situations, the SVS has a high level of protection and high access restrictions,
 - **level 4 - high risk** - a CCTV system designed to monitor high risk situations. The SVS has a very high level of protection and very high access restrictions.
- Tour of the site to familiarize yourself with the specifics of the site - access restrictions, location of key elements and types, environmental influences
 - CCTV system design including site plan - PD processing - device selection and determination of functional properties according to chapter 6 of the application standard
 - Creating a schedule of testing
 - Installation, commissioning and handover
 - System documentation

If the implemented CCTV system includes video recording processing, it is necessary to proceed in accordance with the requirements of Act No. 101/2000 Sb. on the protection of personal data. The processing of a recording made with the help of a surveillance video system is subject to a notification obligation pursuant to §16 of Act No. 101/2000 Sb. This notification is submitted to the Office for Personal Data Protection (ÚOOÚ). By virtue of Act No. 101/2000 Sb., the ÚOOÚ has been established as the executor of the supervisory authority for the area of personal data.

In order to specify all obligations related to the operation of the CCTV system, the authority issued a manual - Operation of CCTV systems - Methodology for fulfilling the basic obligations imposed by the Personal Data Protection Act. This manual is intended to facilitate the preparation and operation of the CCTV system in order to meet all legal requirements arising from Act 101/2000 Sb.

In order to fulfill the notification obligation, the CCTV system administrator must fill out the ÚOOÚ registration form. The authority is obliged to process the registration within 30 days. The notification must include the following information:

- identification of administrator data,
- purpose of processing,
- categories of the subjects of data and personal data,
- sources of personal data,
- description of the processing method,

- place of personal data processing,
- recipient,
- a description of the measures to ensure the protection of personal data according to Section 13.

Failure to comply with the notification obligation is considered an administrative infraction and the administrator may be fined up to CZK 5,000,000. According to Section 11 of Act No. 101/2000 Sb. the operator of the CCTV system is obliged to inform the subject about the method of processing and storage of personal data and about the persons who have access to this data. In addition, if the subject (employee) is on the premises regularly, the operator of the CCTV system must obtain consent from the employee to process personal data through the CCTV system. The law describes how personal data should be secured to prevent unauthorized access to personal data, and the CCTV system administrator is obliged to take appropriate measures.

The monitored area must be marked with information signs before entering the monitored area. These signs do not have a prescribed shape and must contain at least an image of the camera and the information "The area is monitored by a CCTV system with recording". This sign must be legible.

1.4.2 The interface between the CCTV system and other disciplines

The CCTV system forms a comprehensive system that connects to other fields in the following points:

- **Electrical LV** - powering CCTV equipment - equipping the switchboard with the necessary circuit breaker, providing local power sources in the case of a larger system
- **Controlled devices** - the interface consists of a DVR / NVR equipped with an alarm contact, which are used to control other devices (e.g. transmission of alarm information to the EMS, to the PCO / surveillance center, automatic actions - notification, activation of acoustic signaling, switching of lighting, etc.).

2 Implementation of the CCTV system

2.1 Specification of operational requirements

Operational requirements clearly state what the customer expects from the functions the system is supposed to perform. For this reason, an "Operational Requirements" document should be executed, where the purpose of the CCTV system is defined. In case of agreement between the supplier and the customer, the operational requirements can be incorporated into the project documentation.

This involves determining the following points:

- **Basic purpose / functionality** – site monitoring, detection, recording of attacks
- **Definition of restriction of supervision** - may result from legal or municipal regulations, restrictions on private premises, etc. (e.g. Act No. 101/2000 Sb. on the Protection of Personal Data)
- **Definition of the monitored location** – building, exterior, interior or separate area
- **Definition of monitored activities** – intended targets, their speed, observation category, external detection requirements
- **Functional properties of the system / image** - key characteristics of the properties, degree of image resolution, definition of the scope of the analysis function
- **Opening hours**
- **Local conditions**
- **Ability to operate under adverse conditions**
- **Monitoring and image storage** - where and by whom the image is supposed to be monitored, what should be recorded, recording retention time, access definition, definition of handling of stored footage
- **Export of image recording** – for short sections, for long sections, determining the compatibility of the exported recording
- **Routine activity** – setting the standard operating mode
- **Operational response** – determining the persons responsible for the response, defining the type of response needed, defining target times
- **Operator workload** – defining the number of screens; the number of alarm events that the operator can handle; the number of active cameras that the operator must handle
- **Training** – definition of required training
- **Expansion** – definition of possible future expansion and connection with other systems

2.1.1 System operating criteria

They contain provisions for:

- Operating procedures – e.g. automation options
- Alarm Response - Alarm indication must take priority over all events
- System response times

2.2 Device selection and functional characteristics

As part of the selection of system components, it is necessary to review whether the designed components and subsequently the whole set meets the operational requirements according to point 1.4..

2.2.1 Camera selection

When choosing a camera, it is necessary to comply with the operational requirements, e.g. in the following points:

- White balance for color cameras
- Dynamic range and sensor noise
- Corresponding data protection regulations – e.g. masking
- Length of exposure time based on the speed of the monitoring target
- Spectral sensitivity as a function of illumination
- Possibility of external synchronization
- Possibility of remote calibration of sensing properties
- Backup power
- Pan, tilt and zoom cameras - preposition, home field, shutter speed, aperture

2.2.2 Choice of lens and camera housing

The choice of a suitable lens is as important as the choice of camera, as it very significantly affects the functionality of the system.

The following must be taken into account when choosing a lens:

- Aperture number - automatic or electric aperture is recommended
- Features of the imaging device - possible reduction of the image - requirement for a wider field of view
- Possible requirement for a lens with a protective layer, or cover
- Specification of necessary filters (e.g. UV)
- Environmental conditions – cover type, cover heating, wiper

2.2.3 Coverage of the monitored location / number of cameras

The area of interest must be defined in the site plan. The level of detail required for a given activity must be determined for each location so that the number of cameras for the entire area can be determined depending on the described site plan.

The actual number will depend on the types of cameras selected (static, PTZ), lenses and especially on local conditions.

2.2.4 Field of view - object size

The size of the object on the screen is defined in the application standard in relation to the PAL resolution. For the current most common applications of cameras with megapixel resolutions, these data are converted using a conversion table, e.g. as follows:

For 1080p resolution, the percentage equivalents of height to screen are as follows:

- Examination 150%
- Identification 40%
- Reconnaissance 20%
- Observation 10%
- Finding 10%
- Monitoring 5%

2.2.5 Field of vision - additional conditions

The location of the camera must be determined by the interest of achieving the optimal shot and should not be a compromise just for the ease of mounting.

However, they must take into account the following parameters:

- Presence of foliage
- Possibility of glare depending on the daily conditions
- Space lighting - interference from external sources
- Reflections from glass surfaces
- Billboards
- Other activity in view

For the installation of the camera for the purpose of identification, the optimal position is at head height. From another position, a full view of the person's face is not guaranteed.

2.2.6 Lighting

Evaluation of the level, direction and spectral characteristics to determine the need for additional lighting.

In the case of a request for additional lighting, the number, type, location and power must be determined taking into account other parameters (light efficiency, shape of the space, reflectivity of the material, loss of power over time...see point 6.9 of the application standard)

2.2.7 IP video device

The various functions of the CCTV system can be provided either by physically separate elements or by devices that combine multiple functions. These functions can be distributed over a network.

2.2.8 Protection against sabotage / sabotage detection

The protection of cameras consists, on the one hand, in the appropriate type of fixing and placement so that it is difficult for intruders to change its field of view. Furthermore, in risky cases, it is possible to use anti-vandalism covers.

The protection of the system elements (DVR, NVR, switch, source, control and display elements) consists in placing the installed elements in a secure area with access control to the object and the installed system.

2.2.9 System integration

System integration is influenced by user requirements, depending on whether it will be integration within the security application of one manufacturer or individual integrations where a complete system specification is needed for the integrator.

CCTV system integration can include video streaming, control, time synchronization, configuration, other interfaces.

2.3 Image presentation

2.3.1 Types of display devices

The imaging devices will be designed according to the nature of the video monitoring tasks at the CCTV surveillance site. This involves determining the number, size and parameters of display monitors.

Currently, the standard is LCD monitors with a resolution of at least 1600x900 and a connection using VGA, DVI, or HDMI. The most commonly used sizes are 19" to 24".

2.4 Video signal transmission

Video signal can be transmitted and used in analog form or as a digital data stream, it can be compressed or uncompressed. Each of the video signal types can be converted to another. The conversion should be as little as possible so that the quality of the video signal is not lost.

The CCTV transmission subsystem must provide reliable transmission of the video signal while also allowing the transmission of associated control signals, events and status signals.

Subsystems for analog uncompressed video consist of dedicated cable distributions as standard – coaxial cables, twisted pair cables, optical cables. Microwave, radio or infrared transmission is possible wirelessly. Multiple analog video signals can be combined into a single transmission path by the method of multiplexing.

For high-resolution analog video transmission, dedicated cabling is required for VGA signals.

For uncompressed digital HD video, transmission in accordance with the HDMI and DVI standards is recommended. These types of video transmission are common for connecting quality monitors over short distances of around 15m or more.

For the possibility of remote access, high definition image, digital recording and reproduction, integration, scope adjustment and other purposes of the video transmission system, it is preferred to use IP video. In order to use IP video, it is necessary to assess whether the PC network is capable of transmitting the required amount of information, especially video data streams with minimal delay, loss and jitter. These performance requirements for IP networks define the principles of network design. When designing IP video, suppliers are obliged to proceed according to ČSN

EN 62676-1-2 Surveillance video systems for use in security applications - Part 1-2: System requirements - Performance requirements for video transmission.

2.4.1 Choice of classes of IP video functional properties

The ČSN EN 62676-1-2 standard defines performance classes of levels 1-4 in the following parameters:

- Time accuracy of the video transmission data stream T1 to T4
- Interconnection - timing requirements I1 to I4
- Bandwidth throttling capability C1 to C4
- Video data streams prioritization P1 to P4
- Maximum network losses, latency, jitter S1 to S4 and M1 to M4
- Monitoring of the link interval: security level 1 to 4 (clause 4.2.2. of the standard)

2.4.2 Mutual cooperation

When requesting a combination of video transmission devices from different manufacturers and their joint operation, it is necessary to pay attention to their compatibility. Therefore, the supplier must choose video transmission devices that comply with the ČSN EN 62676-1-2 standard - for full interoperability of video data flow transmission, data flow control, event search, detection and description of network devices in one cabinet assembly, the supplier must (integrator) choose a high-level video IP protocol. If the IP video network is operated together with the IT network, it is required that the administrator of Mondi Štětí a.s. be in charge of managing both networks

2.5 Transmission connections by metallic cable

The most common form of analog connection over a fixed line is an RG59 coaxial cable terminated with BNC connectors, which is suitable for transmission over a distance of up to 200 m.

Furthermore, cables with twisted pairs are used for analog and digital transmission, i.e. cat.5 or cat.6 consisting of 4 pairs of twisted copper wires.

For longer-distance transmissions, optical cable routes are used, providing high capacity, high transmission speed and low delay, low attenuation, immunity to electromagnetic interference, immunity to eavesdropping.

2.6 Wireless connection

In the case of hard-to-implement cable connections, it is possible to deal with video transmission using a wireless connection using the following solutions:

- Analog radio frequency - up to 30 m in a building / up to 100 m outside (without line of sight) - 2.4 / 5 GHz
- WIFI - up to 30 m in the building / up to 100 m outside - 2.4 / 5 GHz
- WiMAX (IEEE 802.16e) – up to 50 km

2.7 IP transmissions

In a packet-based network, the functionality of any streaming video device or application depends on the quality of service provided to that particular application. Adequate quality standards and functional values must be met to support video transmissions and acceptable quality of video streaming services. Quality from a network point of view is mainly defined by the following factors:

- **Bandwidth** - the size of the possible stream of the video data stream (1Mbps to 10 Gbps). Some compression algorithms can reduce the required bandwidth.
- **Latency or delay** - the time it takes for a packet to pass through the network. Live video is sensitive to delay. The maximum latency must be in accordance with the operational requirements of the ČSN EN 62676-1-2 standard
- **Jitter or delay changes** - the continuity with which packets arrive at their destination. Jitter buffers can temporarily delay incoming packets to compensate for jitter, but only for some delay options. These memories are limited and excessive memory storage may result in additional lag. The maximum jitter must be in accordance with ČSN EN 62676-1-2.
- **Packet loss** – Packets can be lost due to collisions on the LAN, congested network lines, or many other reasons. Even small percentage packet losses will degrade video quality. The video stream uses the UDP protocol, which does not provide retransmission of packets. Maximum packet loss must be in accordance with ČSN EN 62676-1-2.
- **Redundancy, Alternate Routing and Protective Switching** – Identifying and replacing a broken link or data stream to enable reliable video transmission via alternate paths.

2.8 Characteristics of video functional properties

2.8.1 Image compression

It should always be determined by the operational requirements for each camera shot, not by the capacity of the proposed system. The suitability of the level should be determined using image quality tests specific to the purpose of the camera shot.

2.8.2 Frame rate

The desired frame rate should be determined for each individual camera shot taking into account the following factors:

- Threat to the desired shot defined in the risk assessment
- the purpose of the camera as defined in the operational requirements
- predicted activity in the observed space
- camera shot
- permanence / changeability of frequency by external stimulus (alarm)
- camera with or without operator

2.8.3 Camera Resolution

It must be determined based on the purpose of the camera according to operational requirements and required coverage. The camera should be able to achieve this resolution without a digital zoom.

2.9 Storage characteristics - storage space

The total storage space requirement of a digital CCTV recorder should be determined before installing the system. The basis for the required storage size (HDD capacity) is the following parameters:

- Image size
- Number of frames per second
- Number of cameras
- Operating hours of the CCTV system
- Record retention period
- Storage management

2.10 Image saving and export

2.10.1 Compressed video data format

Compressed data in special formats make it impossible for the Police Corps of the Czech Republic to use record. Therefore, the use of standard compression formats is required (see ČSN EN 50132-5-1).

2.10.2 Encryption

The video recording must not be encrypted. The CCTV format may contain checksums or other means to ensure that data changes can be detected. If they are used, the image information must not change.

2.10.3 Basic metadata (time, date, camera identifier)

Being able to correctly determine the time when the image was captured is often essential for the use of CCTV in police investigations. Therefore, the data contained in CCTV must allow a timestamp and camera identifier to be associated with each image and sound sample. For CCTV without sound, the timestamp must not have a resolution of less than one second.

The CCTV format must specify any time offsets applied to the time data and provide a way to convert each time data to local time.

The time must be automatically updated relative to UTC when changing to summer savings time.

If accurate timing is required, it should be assessed whether a time server is used that complies with EN 50 132-5-1.

2.10.4 Multiplexing format

If the CCTV contains multiple video streams, the CCTV files must include metadata that allow for the streams to be demultiplexed.

The format is allowed to contain other data streams that are not essential for extracting video and audio samples with their time data. Additional data streams can remain protected, but it is recommended that their format be published so that they can be decoded independently of the SW manufacturer.

2.10.5 Image enhancement

If the system provides enhancement tools such as sharpening, brightening or enlarging a certain part of the image, then any applied enhancements must not change the original recording.

2.10.6 Export image recording

To allow reproduction and export, the following should be observed:

- CCTV data exported from the recorder must not show a loss of quality of individual frames, change frame rate or sound quality. There should be no duplication or loss of images. The system should not include any format conversion or compression, as this could reduce the usability of the content.
- Metadata must be exported with the image
- There must be simple instructions at the operator's place
- Option to export images from specified cameras in periods specified by the user
- The device must allow data to be exported without affecting the recording function

Records can be exported:

- To removable media (DVD, CD, USB drive, etc.)
- Removable HDD
- Over the network, via USB interface, fire wire
- SW applications needed to play the recording should be exported together with the recording

2.10.7 Playback of exported video recordings

If the exported format meets a commonly available standard, the SW player does not need to be exported. In case the manufacturer uses a specific SW for playback, this SW should e.g.:

- Allow variable playback speed of recording, stop, pause, forward and reverse frame by frame
- Display single cameras as well as multiple cameras while maintaining the aspect ratio of the image
- Display a single camera in maximum resolution
- Enable time-synchronized playback
- Clearly display the time and date and other information associated with the displayed image without obscuring the image

2.11 CCTV configuration of the control workplace

2.11.1 Control room

If there is a requirement for CCTV for real-time monitoring, camera control, system management or other requirements, a control workplace room allowing for the fulfillment of these functions should be specified. The control workplace can be a single workstation or a large operation center as needed.

Digital video monitors will be used to display the image for the crew.

2.11.2 Number, size and placement of monitors

In the control room

- 1) An appropriate number of CCTV channels must be presented to the operator
- 2) The camera footage must be presented to the operator in a size sufficient for him to be able to perform surveillance tasks (e.g. identification of persons, area violation, etc.)
- 3) The operator must be positioned so that he can clearly see the information on the monitor

2.11.3 Monitors and screens mounted on the workstation and outside the workstation

Monitors that are used for close-up CCTV viewing are usually called incident or spot monitors and are placed on a workstation. They allow for detailed viewing of displayed footage and provide the greatest likelihood that the operator will receive information accurately and on time. The monitor should be placed directly in front of the operator at a distance of approx. 0.5-1.5 m and should be of sufficient size.

It is advisable to install 2 to 4 monitors so that 1 monitor is the primary one and the others are overview.

Monitors can be installed on a counter or on the video wall for more shots. These monitors are then commonly used as overview monitors. Depending on the viewing distance and the size of the monitor, each monitor can display the image of several cameras - 4, 9 or 16.

2.11.4 Recommended screen sizes

For choosing a monitor size, the primary factor is the distance between the monitor and the user. As a general rule, the viewing distance should be three to five times the diagonal of the monitor. The exact sizing depends on the purpose of the CCTV system.

For Mondi's needs, 24" full HD LCD monitors suitable for an observation distance of approx. 2.5-3 m are used as basic. For larger control rooms, 32" monitors are used.

2.11.5 Number of camera images per operator

The number of camera views presented to the operator must be determined at the system design stage. Ability to handle the number of camera views presented to the operator must be ensured. Factors to consider when approving the number of shots to be presented:

- Purpose of observation
- Risk arising from an event that will not be detected
- Activity type and a target within the image
- Expected frequency of events
- How long the operator is likely to monitor the event
- Operator skill
- Other tasks performed by the operator

2.11.6 Number of operating stations

The operational requirement is to establish the number of workstations and associated equipment within the control workplace. The required analysis must be carried out on the basis of the expected peak activity. The 4 main aspects are:

- Expected number of alarms / events during the period
- Desired response time between event and operator interaction
- Expected time for the operator to return to normal monitoring after responding to an event
- The number of cameras / locations that are the subject of monitoring

The time required for the operator to handle the alarm depends on:

- The nature of the alarm / event - the need to guide the guard / emergency unit or the ability to handle the alarm based on the view of the alarm location
- Agreed standard alarm notification procedure

2.11.7 Device layout

The following criteria should be used when deploying equipment:

- The control panel should be ergonomically designed with special attention to monitor placement to avoid reflections from external light sources on the monitors
- Video storage devices and recording media should be located in protected areas inaccessible to unauthorized persons
- Workstations must be adequately protected against misuse by unauthorized persons either by access control or software authorization

2.11.8 Provision of backup power supply

The need for backup power must be determined based on a risk assessment. On its basis, the need, type and capacity of backup power supply is defined. For a backup power supply using a UPS, the necessary capacity must be calculated based on the consumption of the connected equipment for the required time.

2.11.9 Operating temperature

CCTV system design must consider maintaining a suitable environment and operating temperature.

2.11.10 Protection against lightning and discharges

If there is a risk of electrical interference / lightning strike, suitable protection should be provided as required. Suitable earthing points should be provided for the

equipment as required by the set of standards EN 50 174, EN 62 305-3 and EN 62 305-4.

2.12 Defining the testing schedule

2.12.1 Purpose of the testing schedule

A test plan must be prepared in writing to evaluate all expected functions and features of the CCTV system. This evaluation must cover any specific requirements identified at the design stage.

The testing plan must be the basis for:

- Acceptance of the installed CCTV system
- Periodic system / functional verification

2.12.2 User acceptance testing / inspection

User Acceptance Testing (UAT) is a process where the relevant operator assesses the user interfaces and controls to ensure that they have been correctly supplied by the assembly company. The UAT should contain all the specified features within the operator controls, including image quality assessment, PTZ controls, camera response, camera shot selection and event response. The UAT must be written in relation to the operational requirements to ensure that all specifications stated in the operational requirements are functionally tested within the UAT.

2.12.3 Technical acceptance testing

If a specific resolution, frame rate or other display quality level is specified in the operational requirements, it should be determined using appropriate tests that these requirements are met throughout the image chain.

As part of the technical acceptance procedure, the procedure is according to points 13.3.2. until 13.2.13 (reasonably according to the prose requirements) of the standard ČSN EN 50 132-7 ed.2.

It involves checking the following points:

- Display quality - verification of display quality
- Contrast
- Camera Resolution
- Color reproduction
- Face identification / exploration / reconnaissance / observation / detection / monitoring
- License plate identification

2.13 Documentation content - before installation

During the development stage of the CCTV system, the following documentation should be created:

- Risk assessment
- Operational requirements
- Design specification, object plan

- Testing schedule

2.14 System installation and acceptance

2.14.1 Acceptance test at the manufacturer

The manufacturer's acceptance test (FAT) is the quality verification method required in the order. FAT is necessary in case of any major modification or adaptation of standard products to customer requirements. FAT takes place in the presence of the customer's representative. A record is drawn up of the acceptance, which documents the degree of completeness and the achievement of the required properties.

2.14.2 Assembly progress

The installation company must review and evaluate all existing documentation and verify that site conditions are still consistent with the final design. If any change in local risk assessment conditions is identified, the operating conditions and system design must be re-examined to ensure that the intended system solution meets the operational requirements. If this is not possible, the design process must be restarted.

All relevant safety requirements must be assessed before work begins. These may vary according to the nature of the premises and may involve the use of special installation equipment when working in hazardous locations.

CCTV mounting methods must be applied by trained technicians who are familiar with the manufacturer's mounting requirements and have good industry practice. If there are relevant certifications, the assembly company must be duly certified.

Any changes to the site plans, assembly plans, system design must be included in the final documentation and must be approved by the investor.

2.14.3 Certification of compliance with standards

Installation certification in the case of installation of a CCTV system according to ČSN EN 50 132-7 ed.2 must provide the customer with a certificate of conformity stating that the CCTV system was installed in accordance with operational requirements and meets the standard ČSN EN 50132-1.

If the system is declared to comply with all legal and administrative regulations, national or European standards, such declarations must be included in the certificate of conformity.

2.14.4 User acceptance testing, acceptance and handover

User Acceptance Testing (UAT) must ensure that the system installation conforms to specifications and must be agreed upon by both the customer and the supplier. The depth and conditions of the tests must be carried out in accordance with the operational requirements and must include all equipment installed by the installation organization. The examination procedure may be requested before the commencement of acceptance.

A record is drawn up of the acceptance, which documents the degree of completeness and the achievement of the required properties. All non-conformances

must be recorded on the non-conformance list, including the procedure and deadline for the removal of non-conformances.

The existence and quality of accompanying documentation will be checked for all elements, i.e. manuals, assembly, installation and acceptance instructions, wiring diagrams, etc.

After a successful UAT, the system can be considered accepted and the client must sign a handover report stating that the CCTV system has been installed in accordance with the general and operational requirements and is working accordingly and that the client has been given sufficient instructions and training to ensure correct activities.

2.15 Final documentation

Part of the acceptance of the CCTV system is documentation, which must be accurate, complete and unambiguous. It must provide adequate information on the installation, acceptance, operation and maintenance of the CCTV system.

The documentation includes:

- Documentation of the actual implementation of the CCTV system - report, layouts, diagrams, interface descriptions
- System acceptance documentation
- Accompanying documentation of individual elements of the CCTV system
- Documentation proving compliance of the used elements with legal regulations

2.16 Maintenance

A service contract is concluded for each installed CCTV system within the Mondi premises to ensure regular maintenance and emergency service. The contracting organization must have an emergency on-call service in accordance with the requirements of the contract.

In the event of an emergency intervention, the technician must determine the cause of the malfunction and then perform one or more of the following actions:

- Repair the CCTV system and leave it in full working order
- Temporarily/temporarily repair the system with the customer's consent
- With the customer's consent, disconnect the non-repairable part of the system and immediately start steps leading to the elimination of the defect and bringing it to a fully operational state. A record approved by the customer must be made about non-functional and disconnected parts
- In the event of a failure on the video transmission system, confirm the status and transfer the system to an alternate route (if any) with customer approval

The emergency intervention report must contain information on all activities carried out and must be confirmed by the customer's representative. The customer will receive a copy.

For regular maintenance, the contracting organization must have a sufficient number of expert technicians to carry out the planned inspection and maintenance program of the CCTV system.

As part of a regular check, it is checked whether the system showed deviations from the normal operating state. Subsequently, a visual and functional inspection of the CCTV system is carried out:

- Matching the number and type of cameras, incl. lenses and accessories with documented condition
- Condition of cabling and cable routes
- Location and condition of warning labels
- Checking the physical condition of the fastening of individual elements of the CCTV system
- Inspection of seals and packings
- The image quality of each camera and the correct choice of display (check for possible condensation)
- Operation of all imaging and recording equipment
- Checking automatic functions and remote-control functions
- Interface functions with alarm systems
- Additional lighting operation

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3 Other

3.1 Other Equipment

With the devices that are supplied to Mondi Štětí a. s. as novelties and the company is not equipped for their maintenance, it is necessary to supply diagnostic and other equipment (programming and communication means, computers, programs, gauges, testers, documents for the training of maintenance workers).

3.2 Amendment of Standard

For a specific case, the Standard can be supplemented with other requirements. These requirements must be discussed with company representatives and the results of the meeting documented.

Changes in this case are verified and approved by the same functions that verified and approved the Standard.

3.3 Suppliers and Manufacturers

The list of preferred suppliers of CCTV systems and their components is managed by Mondi maintenance, which always provides an up-to-date list.

Currently (valid for the years 2015 - 2020), cameras and other components from the Dahua company, which is now the agreed standard for CCTV systems, are delivered to the Mondi plant.

However, each delivery must be consulted with Mondi representatives, it is appropriate and also necessary depending on the Mondi computer network, which is an integral part of digital CCTV systems and where changes may occur (network structure, cabling, etc.).