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Technical requirements of video monitoring system for physical protection of nuclear material and nuclear facilities

CHINA ATOMIC ENERGY AUTHORITY

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Technical requirements of video monitoring system for physical protection of nuclear material and nuclear facilities

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Foreword

Annex A of this standard is informative.

In case of any doubt about the contents of English translation, the Chinese original shall be considered authoritative.

Technical requirements of video monitoring system for physical protection of nuclear material and nuclear facilities

1 Scope

This standard specifies the technical requirements of video surveillance system for physical protection of nuclear material and nuclear facilities in fixed locations (hereinafter referred to as "video surveillance system").

This standard is applicable to the design and acceptance of video surveillance system in the new build, expansion and renovation projects for physical protection of nuclear material and nuclear facilities in fixed locations.

2 Normative references

The following normative documents contain provisions which through reference in this text, constitute provisions of this standard. For dated references, subsequent amendments (excluding corrections), or revisions, of any of these publications do not apply to this standard. However parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

GB 8702 Controlling limits for electromagnetic environment

GB/T 15211 Security alarm equipments - Environmental adaptability requirements and test methods

GB/T 15408 Technical requirement of power - supply for security & protection system

GB 16796 Safety requirements and test methods for security alarm equipment

GB/T 25724 Technical specifications for surveillance video and audio coding

GB/T 28181 Technical requirements for information transport, switch and control in video surveillance network system for public security

GB/T 30148-2013 Security alarm equipments - EMC immunity requirements and test methods

GB 50198-2011 Technical code for project of civil closed circuit monitoring television system

GB 50348-2004 Technical code for engineering of security & protection system

EJ/T 1054 Physical protection of nuclear material and nuclear facilities

GA/T 1127-2013 General technical requirements for cameras used in security video surveillance

IEC 62676-3 Video surveillance systems for use in security applications - Part 3: Analog and digital video interfaces

ITU-T H.264 H Series: Audiovisual and multimedia systems, Infrastructure of audiovisual service-Coding of moving video: Advanced video coding for generic audiovisual services

ITU-T H.265 H Series: Audiovisual and multimedia systems, Infrastructure of audiovisual service-Coding of moving video: High efficiency video coding

3 Terms and definitions

For the purpose of this part, the following terms and definitions apply.

3.1 picture quality

security systems with detection, delay and response functions to prevent damage to nuclear facilities and nuclear materials, as well as to prevent theft, robbery or unauthorized activities on the transfer and use of nuclear materials

3.2 analog video

the baseband signal of approximately 6 MHz or higher bandwidth based on the current television format (PAL color system, 625 line black-and-white CCIR, 2:1 interlaced scanning)

3.3 digital video

the digital signal with a strict time sequence obtained by processing an analog video signal using digital technology or digitally converted from an optical image, presented as a specific data structure capable of characterizing original image information

3.4 video check alarm

the video surveillance system can automatically recall the real-time image associated with the alarm zone to check the field status when an alarm occurs. Meanwhile the historical image before and after the alarm can also be recalled to find out the cause of the alarm.

3.5 action with alarm

when an alarm event occurs, devices other than the alarm device are activated. (such as video check to alarm, lighting control, etc.)

3.6 picture quality

the optical image quality that can be distinguished by the observer; which usually covers the number of pixels, resolution and signal to noise ratio, with the last one being dominant

3.7 high definition video surveillance system

the video surveillance system with the image resolution of digital system greater than or equal to 1920×1080 , and the image horizontal resolution of analog system greater than or equal to 800TVL

3.8 image delay

the time difference between the on-site real-time image that the terminal displays and the occurrence of on-site events

3.9 control delay

the time needed from the terminal giving a control instruction to the front-end device starting the corresponding action

3. 10 thermal infrared imager

the device that converts infrared radiation on the surface of an object into a distinguishable image signal through an infrared optical system, an infrared detector and an electronic processing system; for the thermal imager that needs to provide quantitatively the surface temperature of an object, the pseudo-color coding of grayscale image is generally required to improve the intuition of temperature indication.

4 Abbreviations

The following abbreviations are applicable to this document:

CVBS: Composite Video Blanking and Sync

DLP: Digital Light Processing

HDMI: High Definition Multimedia Interface

HD-SDI: High Definition Serial Digital Interface

LCD: Liquid Crystal Display

LED: Light Emitting Diode

SNR: Signal to Noise Ratio

SVAC: Surveillance Video and Audio Coding

ONVIF: Open Network Video Interface Forum

PSIA: Physical Security Interoperability Alliance

5 General

5.1 The scheme, structure and function of the video surveillance system shall be determined according to the level of physical protection and the design basis threat, and shall meet the requirements of physical protection alarm check, video surveillance, the defense-in-depth and balanced protection.

5.2 The video surveillance system shall feature in safety, reliability, extensibility and flexibility, so as to be economical, technologically advanced and reliable in practical use.

5.3 The video surveillance system shall apply comprehensively the advanced and mature technologies such as video capture, image processing/control/display/storage, multimedia, computer network, system integration, etc.

5.4 The equipment used in the video surveillance system shall comply with the requirements of national laws, regulations and relevant standards.

6 System design requirements

6.1 Normativity and practicability

The design of the video surveillance system shall be based on actual surveys of the site, and shall be designed according to factors including the physical protection level, design basis threats, environmental conditions, video management requirements, safety requirements of each limited access area, investment scale, maintenance and identification, and control mode. The system design shall guarantee the timely check of alarm events and surveillance of protected objects and important areas, and comply with the requirements for the effectiveness evaluation of the physical protection system and the product standards/specifications, instructions and project owner's requirements in management and application.

6.2 Advancement and interchangeability

The design of video surveillance system shall adopt the proven and advanced equipment, which shall have certain interchangeability, allowing for capacity expansion and/or modification of the system.

6.3 Accuracy and real-time capability

The video surveillance system shall be able to conduct accurate and real-time surveillance on protected targets under on-site environmental conditions with selected equipment, and shall be able to clearly display and/or record usable images of protected targets according to the design requirements.

6.4 Integrity

6.4.1 The system shall maintain the integrity and real-time capability of the original video and audio information, which means that the final video and audio information for display/storage/replay shall be consistent with the original scene after being technically processed. To be more specific, the maximum similarity (subjective assessment) to the original scene shall be maintained in terms of color reducibility, image contour reducibility (grayscale), event successiveness, and audio characteristics, etc., and the delay between the real-time display of back-end video and audio information and the occurrence of on-site events shall be kept within a reasonable range.

6.4.2 The video coverage on the site shall be reasonably distributed to obtain complete video image information of the site without any blind areas in the target area.

6.4.3 When the surveilled on-site audio information needs to be checked, the system may support the audio check.

6.5 Linkage compatibility

The video surveillance system shall be able to act in conjunction with systems such as intrusion detection alarm system and access control system. The video surveillance system and other systems shall be designed in an integrated manner. It shall provide the corresponding interface to facilitate the construction of the physical protection integrated management system and accept the management of the integrated management system. Each system shall be compatible with each other and be able to work independently. The video surveillance system shall be capable of operating independently to accomplish all management functions of the system in the event of an integrated management system failure or outage.

7 System functional requirements

7.1 System composition and classification

7. 1. 1 System composition

The video surveillance system consists of five sections of front-end, transmission, control, display and storage. The front-end section is used to collect video image signals in locations like physical protection system perimeter, access facilities, protected targets and the central alarm station, etc. The transmission section is used to transmit front-end video image signal to the central alarm station or the security duty room. The control section is used for display switching of all video image signals and the control of front-end pan and tilt head equipment. The display section is used for video image display and the storage section is used for video image signal storage.

7.1.2 System classification

7.1.2.1 The video surveillance system can be divided into analog system (stored as digits) and digital system according to video signal types.

7.1.2.2 The analog system (stored as digits) refers to the video surveillance system that adopts analog signals in sections of front-end, transmission, control and display, and digital signals in the storage section. The system topological graph is shown in Figure A.1.

7.1.2.3 The digital system refers to video surveillance system that adopts digital signals in sections of front-end, transmission, control, display and storage. Based on different transmission modes, the digital system can be divided into three types: IP network, non-IP network and hybrid, in which:

- a) IP network digital video surveillance system refers to the video surveillance system in which the video signals captured at the frond-end are transmitted and stored through IP network, such as the system composed of network camera, analog camera with the encoder, network cable, network storage equipment and other related equipment. The system topological graph is shown in Figure A.2.
- b) Non-IP network digital video surveillance system refers to the video surveillance system in which the video signals captured at the frond-end are transmitted and stored by means other than IP network, such as the system composed of HD-SDI camera, coaxial HD camera, coaxial cable, video storage equipment and other related equipment. The system topological graph is shown in Figure A.3.
- c) Hybrid digital video surveillance system refers to the system formed by combining IP network and non-IP network digital video surveillance systems, such as the system composed of HD-SDI cameras, coaxial cables, encoders, network cameras, network cables, video storage devices and other relevant devices. See Figure A.4 and A.5 for the system topological graph.

7.2 Functional requirements

7. 2. 1 Functional overview

The system shall have basic functions of video signal capture, transmission, switching control, display, storage and replay.

7. 2. 2 Capture of video image signals

7. 2. 2. 1 The layout of the front-end image capture equipment shall be consistent with the setting of the detection area. The video image signals shall cover the entire surveillance area and there shall be no blind area. 7. 2. 2. 2 Video images shall be of sufficient resolution under the premise of meeting the illuminance requirements. The end of each protection area (or the most unfavorable area) of the perimeter shall enable people to clearly identify round items in black or white with a diameter of 30cm, or equilateral triangles and square items with side length of 30cm. It shall be ensured that the facial features of intruders can be identified at the personnel access, and the vehicle license numbers can be identified at the vehicle access.

7.2.2.3 The system shall take into account the possible adverse effects on the video surveillance check image caused by natural conditions such as direct sunlight, clouds, strong wind, rain and snow, sand and dust, frost and fog, under which conditions the corresponding remedial measures shall be taken.

7. 2. 2. 4 The video capture equipment shall be capable of capturing the images of the limited access area in a clear and effective manner. The image resolution shall meet the high definition video standard, and the video image resolution shall be larger than or equal to 1920×1080 pixels.

7.2.2.5 The system shall be capable of conducting self-checking. It can generate alarming signals automatically when there is image loss, signal blocking or external interference, etc. Failure of a single camera shall not lead to malfunctions of other cameras.

7. 2. 2. 6 The lens performance of the video capture device shall fit for the surveillance scope, so as to ensure that the images captured meet the requirements.

7. 2. 2. 7 For poor environmental conditions such as absence of light, zero luminosity, strong light source interference, smoke and fire, haze or when hidden imaging is necessary, the thermal infrared imager camera should be selected. The noise equivalent temperature difference of the thermal infrared imager camera shall be less than or equal to 50mK, and the effective pixels of the detector shall be no less than 640×480 .

7.2.2.8 When necessary, audio capture device shall be adopted and the capture scope shall match the surveillance scope.

7.2.3 Signal transmission

7. 2. 3. 1 Video signals shall be transmitted through dedicated lines or networks for physical protection video instead of wireless media.

7.2.3.2 Whatever transmission mode is used, it shall guarantee the consistency and integrity of the video signal output and input.

7. 2. 3. 3 Signal transmission shall guarantee the image quality and accuracy of the control signals.

7.2.3.4 When digital video signals are transmitted by network, the network transmission shall meet the bandwidth requirements for the video capture equipment and management terminal connected to the monitoring room of the central alarm station with a margin included. The recommended bandwidth of network transmission nodes shall be less than or equal to 45% of its nominal transmission bandwidth. The recommended bandwidth estimation method is as follows:

- a) For the video surveillance system with video storage device installed in the monitoring room, the recommended network bandwidth required for the front-end device connected to the monitoring room is calculated as (the number of video channels connected to the system × the single-channel video nominal code rate) + (the number of video channels allowed to be displayed concurrently × single-channel video nominal code rate);
- b) For video surveillance system with video storage device installed at the front-end, the average network bandwidth required for the front-end device to be connected to the video storage device is the number of video channels connected to the system × the single channel video nominal code rate;
- c) The recommended network bandwidth required for the front-end device and video storage device connected to the monitoring room is calculated as (the number of video channels allowed to be displayed concurrently × the single-channel video nominal code rate) + (the number of video channels allowed to be concurrently replayed× the single channel video nominal code rate);
- d) The recommended network bandwidth required for the management terminal connected to monitoring room is the number of video channels displayed concurrently times the single channel video code rate; the network bandwidth of the monitoring room is the number of concurrently connected video channels times the single channel video code rate;
- e) The reserved network bandwidth is determined according to the application of the system. It shall generally include bandwidths for other service data transmission and service expansion, and redundant bandwidth required for normal network operation.

7. 2. 3. 5 When digital video signals are transmitted by IP network, the delay of the image information of the video dedicated for physical protection shall be less than or equal to 500 ms, the delay of the control information shall be less than or equal to 300 ms, the IP packet delay jitter less than or equal to 50 ms, and the IP packet loss rate shall be less than or equal to 1×10^{-3} .

7. 2. 3. 6 When digital video signals are transmitted by a non-IP network, the image information delay shall be less than or equal to 250 ms.

7.2.3.7 The information delay of the analog video surveillance system and the digital video surveillance system shall comply with the following provisions:

- a) The information delay between the terminals of the front-end capture device and the monitoring room video control device shall not exceed 2 s.
- b) The action-with-alarm response time of the video surveillance system shall not exceed 4 s.

7. 2. 4 **Control**

7.2.4.1 The operation control of the video surveillance system shall be conducted on the console of the monitoring room. The video surveillance system shall provide interfaces and protocols compatible with the integrated management system and accept the unified management of the integrated management system.

7.2.4.2 In case that integrated management system shuts down due to fault or abnormity, the video surveillance system shall ensure independent operation and accomplish all the functions of the system.

7.2.4.3 The system shall be capable of being operated manually or automatically, and remotely controlling various actions of the cameras, pan/tilt head, lenses, protective covers, etc.

7. 2. 4. 4 The system shall be capable of manually switching or automatically switching by programming all video signals and may realize fixed or time sequence display on a designated monitor or large screen.

7.2.4.5 The system shall have a linkage interface with the intrusion detection alarm system, the access control system and other relevant systems. When an intrusion or illegal break-in occurs, the system shall be able to provide the video signals of corresponding areas within specified response time, display and record the information.

7. 2. 4. 6 The system shall have a power-outage protection function. When the external power supply fails, the system shall be capable of saving all programming settings, equipment numbers, time, addresses and other relevant information.

7.2.4.7 The system shall keep appropriate redundancy in addition to meeting the basic functional requirements.

7.2.4.8 The system may have appropriate sub-control measures, including video control equipment or software, video display equipment, etc.

7.2.4.9 The video surveillance system shall be kept in clock synchronization with the physical protection integrated management system.

7. 2. 5 Image display

7. 2. 5. 1 The system shall be capable of clearly displaying the video signals captured by all front-end devices. The resolution of the display devices shall be no lower than that of the video capture signals, and no less than 1920×1080 pixels.

7.2.5.2 Under the condition that the illumination of the working environment of the camera is satisfied, the image quality of the system shall meet the following requirements:

- a) When the transmission and display equipment are in good working condition, the system video image quality shall be evaluated according to the Five-level Damage Evaluation System. The quality of analog video and digital video images shall be no less than 4 points as described in 3.1.9 and 3.1.10 of GB 50198-2011;
- b) The signal to noise ratio (SNR) is no less than 45 dB;
- c) The horizontal resolution is no less than 800 TVL;
- d) The gray level is no less than 10;
- e) The frame rate is no less than 15 fps, and the image frame rate of real-time display shall be greater than or equal to 25 fps.

7. 2. 5. 3 All images of the system shall have text labels or messages indicating the source, date, time and operational status of images.

7.2.5.4 Decoding equipment shall support high-definition video image output display, and its decoding capability shall be compatible with high-definition video images.

7. 2. 6 **Processing and storage/replay of video signals**

7.2.6.1 The display and storage of video shall be carried out simultaneously, with a video distribution device equipped if necessary.

7. 2. 6. 2 The centralized storage, distributed storage or a combination of both shall be selected as the storage scheme according to the characteristics of the site, management requirements, system scale, and the condition of the transmission equipment.

7. 2. 6. 3 The way of storing video image signals shall be digital storage. Parameters such as the number of cameras, the format of the captured video, the resolution and the coding rate in the video surveillance system shall be statistically analyzed, the storage capacity requirements of the video storage and the total bandwidth of the storage shall be calculated, and a reasonable storage scheme shall be developed.

7.2.6.4 The recording devices of analog video, non-IP network digital video may be digital video equipment with coding and decoding functions, or digitally encoded for storage in network storage devices. The recording device of the network digital video may be a network video recorder, a disk array and the like. Video storage devices shall meet the following stipulations:

- a) It shall support the retrieval of stored image data in various ways, such as according to the source of image, the recording time, and the category of alarm event, and the access of the same data resource by multiple users at the same time;
- b) It shall meet both the real-time storage and backup storage requirements, and should support the remote disaster recovery, data migration and remote mirroring;
- c) It shall possess system characteristic information that cannot be modified (such as system "timestamp", tracking files or other hardware measures) to ensure the integrity of the system record data;
- d) It shall support time synchronization;
- e) It shall have the logging function.

7. 2. 6. 5 For alarm events, the video surveillance system shall be capable of conducting video check to alarm. The real-time video images shall pop up to enable the personnel on duty to determine the cause of alarm. Based on this, the linkage popup of video images before and after the alarm may be set. The length of the image recording before and after the alarm shall be determined according to the requirements of alarm judgment by the personnel on duty, and shall include at least 7 s before and 7 s after the occurrence of the alarm event.

7.2.6.6 The mode of site video image storage in the video surveillance system shall comply with the following provisions:

- a) Site with the intrusion alarm: The video image signal of the site where the alarm occurred shall be recorded in real time for the investigation of alarm causes. The alarm video may be recorded in real time for 10 s before and 5 minutes after the alarm. The storage frame rate of real-time recording after the alarm shall be no less than 25 fps, and the video playback resolution shall be no less than 1080P. For the time with no alarm, the storage frame rate of the surveillance video shall be no less than 15 fps, and the video playback resolution shall be no less than 15 fps, and the video playback resolution shall be no less than 1080P;
- b) Site of access points: The video image signal of the site of access points shall be recorded in real time. The image signal shall ensure that people's faces can be identified. The storage frame rate of the video shall be no less than 25 fps, and the video playback resolution shall be no less than 1080P.
- c) Nuclear material production or storage places or important sites with protection: The video image signal of the site shall be recorded in real time. The image signal shall ensure that people's faces can be identified. The storage frame rate of the video shall be no less than 25 fps, and the video playback resolution shall be no less than 1080P.
- d) Other sites with surveillance: The image information of personnel and vehicles in other sites of surveillance such as regional and road surveillance shall be recorded in real time. The storage frame rate of surveillance video shall be no less than 15 fps, and the video playback resolution shall be no

less than 1080P. The video playback resolution of infrared thermal imaging camera shall be consistent with the resolution of the captured images.

e) Video image storage: The retention time of continuous surveillance image of the perimeter shall be no less than 15 days. The retention time of continuous monitoring image of access points and important locations shall be no less than 30 days. Video recordings identified as true intrusion alarms shall be permanently stored and off-site archiving using different media shall be considered.

7.2.6.7 Video surveillance system shall record all sources of images, recording time, dates, events and other information of the system.

7.2.6.8 The system shall be able to correctly replay the recorded images and sounds. The videos and audios shall be able to be recorded and replayed simultaneously, and the replay effect shall satisfy the information integrity requirements. The system shall be able to correctly retrieve the time and place of the recorded information.

7.3 Video intelligent analysis

Video intelligent analysis system should be used in the video surveillance system as an assistant technique for identification, intrusion detection, illegal behavior detection or system management.

8 System equipment requirements

8.1 **Basic requirements**

8.1.1 System equipment shall meet the functional requirements of physical protection video check and surveillance, requirements of site environment and electromagnetic compatibility, and the technical requirements of current national standards, nuclear industrial standards and other relevant standards.

8.1.2 High-definition video equipment shall be chosen as system equipment. The performance of various supporting equipment of the system shall be coordinated with its technical requirements to ensure that the image quality of the high-definition system meet the system performance indicators.

8.1.3 GB/T 25724 or video coding/decoding standards such as ITU-T H.264 and ITU-T H.265 shall be adopted for system equipment involved in video coding/decoding.

8.1.4 Digital equipment in the system involving IP network for information exchange, transmission and control shall comply with GB/T 28181, or ONVIF, or PSIA.

8.1.5 Digital equipment involving non-IP networks in the system should comply with IEC 62676-3 and other relevant standards.

8.2 Front-end image capturing equipment

8. 2. 1 The front-end section includes one or more cameras and their matching lenses, pan and tilt head, protective covers, etc. According to different video signal output interfaces, cameras can be divided into analog cameras (such as CVBS, YPbPr and other output interfaces), network interface digital cameras (such as Ethernet output interfaces) and non-network interface digital cameras (such as HD-SDI, HDMI, etc.). Based on varying structures, cameras can be divided into gun cameras, dome cameras, speed dome cameras and integrated pan and tilt cameras. Based on different image sizes, they can be divided into standard definition cameras, quasi-high definition cameras, high definition cameras and ultra-high definition camera.

8. 2. 2 A high-definition camera shall be selected as the camera of the physical protection video surveillance system. In addition to special cameras such as thermal infrared cameras, the resolution of the images captured by analog cameras shall be no less than 800 TVL, and the resolution of the images captured by digital cameras shall be no less than 1920 \times 1080 pixels.

8. 2. 3 The cameras selected in the IP network HD video surveillance system shall comply with the requirements of 5.1, 5.2, 5.3.1, 5.3.4 in GA/T 1127-2013. The cameras selected in the non-IP network digital video surveillance system shall comply with related requirements of 5.1, 5.2.1, 5.3.1, 5.3.3 in GA/T 1127-2013.

8.2.4 Camera lens shall satisfy the requirements of high definition cameras' capturing of high definition images.

8.3 Transmission (switching) equipment

8.3.1 Transmission equipment shall meet the requirements of high definition video transmission. Related equipment and the bandwidth shall guarantee the transmission of high definition images.

8. 3. 2 The throughput of the IP network transmission (switching) equipment shall meet the requirements of the product technical documents. The delay (data frame of 1518B) shall be less than or equal to 500μ s, and the delay jitter shall be less than or equal to 5μ s. The packet loss rate should be less than or equal to 1×10 -4.

8.3.3 Transmission cables shall be compatible with transmission (switching) equipment and transmission distance.

8.4 Display equipment

A professional monitor and a large screen such as a liquid crystal display (LCD) splicing screen or a DLP splicing screen or LED splicing screen may be selected as the display equipment. The resolution of the display equipment shall be greater than or equal to the resolution of the system's real-time images and playback images.

8.5 Video switching control device

A matrix or an all-in-one or a software control platform may be selected as the video switching control device. The video switching control device shall be able to switch and control the high-definition video signals, and shall have a suitable interface for high-definition video input and output.

8.6 Video storage equipment

Digital storage devices such as digital video recorder, network video recorder, hybrid video recorder or disk array should be selected as video storage equipment, which shall meet the requirements of high definition video image storage.

8.7 Power supply

8. 7. 1 Scope of power supply

The scope of power supply of the video surveillance system shall include system equipment of front-end, transmission, control, display and storage as well as auxiliary lighting equipment.

8. 7. 2 General power supply requirements

8. 7. 2. 1 The power supply of video surveillance system shall meet the requirements of EJ/T 1054.

8. **7**. **2**. **2** The power supply level and mode of the auxiliary lighting equipment of the video surveillance system shall be consistent with those of the video surveillance system.

8.7.3 Requirements for the primary power supply

8.7.3.1 The primary power shall be supplied by the grid and shall be set at 1.5 times the full-load power consumption of the combined load. The quality of the primary power supply shall meet the relevant requirements of GB/T 15408.

8.7.3.2 When the main power is supplied by local power sources, the power for the camera and video switching control device shall be supplied by the in-phase power source; or measures shall be taken to ensure image synchronization.

8. 7. 4 Backup power supply

8.7.4.1 For the Category I or II physical protection system, the backup power supply for the video surveillance system shall be a combination of the uninterrupted power supply (UPS) and the diesel generator unit. The system shall be powered by UPS before the generator unit is put into normal operation. For the Category III physical protection system, the backup power supply for the video surveillance system can be either the UPS or the diesel generator unit.

8. **7**. **4**. **2** UPS shall be fully charged under normal circumstances and automatically charged when the voltage drops below the specified level.

9 Installation requirements

9.1 Installation

The installation of front-end equipment shall satisfy the requirements of GB 50198-2011.

9.2 Cable routing

Cable routing shall meet the requirements of 3.11 in GB 50348-2004.

9.3 Other requirements

The installation of control and display recording devices shall meet the safety requirements and management and application requirements.

10 Safety requirements

10.1 The equipment used in the video surveillance system shall comply with the safety requirements specified in GB 16796 and related product standards.

10.2 The mechanical structure of any part of the video surveillance system shall be of sufficient strength to meet the requirements of the service environment and prevent any personnel injury due to mechanical instability, movement, protrusions and sharp edges.

10.3 The information security of the transmission process shall meet the following requirements: digital video surveillance system of the network type shall manage and bind the network ports of all access devices in the system; the system shall use firewall, intrusion detection system, vulnerability scanning tool, virus killing and other measures to improve the security of network communication.

10.4 Health protection and environmental protection shall meet the requirements of 12.2.

10.5 System grounding shall meet the requirements of Clause 13.

10.6 The safety of equipment application in special environment shall meet the requirements of 14.2, 14.3 and 14.4.

11 System reliability requirements

The Mean Time between Failure (MTBF) for the equipment employed in the system shall be no less than 100,000h.

12 Electromagnetic compatibility requirements

12.1 Anti-electromagnetic interference

Equipment used in the system shall meet the following requirements and the system shall function normally during the test.

- a) The supply voltage adaptability test shall be conducted according to the method given in GB/T 30148-2013, Clause 7, and the test result shall meet the requirements of GB/T 30148-2013, 7.4;
- b) The voltage dips and short interruption immunity test shall be conducted according to the method given in GB/T 30148-2013, Clause 8, and the test result shall meet the requirements of GB/T 30148-2013, 8.4;
- c) The electrostatic discharge immunity test shall be conducted according to the method given in GB/T 30148-2013, Clause 9, and the test result shall meet the requirements of GB/T 30148-2013, 9.4;
- d) The radio-frequency (RF) electromagnetic fields radiation immunity test shall be conducted according to the method given in GB/T 30148-2013, Clause 10, and the test result shall meet the requirements of GB/T 30148-2013, 10.4;
- e) The radio-frequency field -induced conducted disturbances immunity test shall be carried out according to the method given in GB/T 30148-2013, Clause 11, and the test result shall meet the requirements of GB/T 30148-2013, 11.4;
- f) The electrical fast transient/burst immunity test shall be conducted according to the method given in GB/T 30148-2013, Clause 12, and the test result shall meet the requirements of GB/T 30148-2013, 12.4;
- g) The surge (shock) immunity test shall be conducted according to the method given in GB/T 30148-2013, Clause 13, and the test result shall meet the requirements of GB/T 30148-2013, 13.4.

12.2 Electromagnetic radiation protection

The external electromagnetic radiation power of the system equipment that is close to or directly accessed by operation personnel shall meet relevant health and environment protection standards in GB 8702.

13 Requirements for lightning protection and grounding

13.1 For the design of the system, the equipment used shall meet the lightning protection requirements for electronic equipment.

13.2 The system shall include lightning protection measures, and shall be equipped with power lightning protection device and signal lightning protection device or isolation devices.

13.3 The system shall be equipotential grounded. The grounding devices shall satisfy the two-fold requirements on anti-interference and electrical safety for the system and shall not be short circuited to or connected with the neutral wires of the strong current grid. The individual grounding resistance shall be no greater than 4 Ω and the cross-section area of the grounding conductor shall be larger than 25 mm².

13. 4 The lightning protection and grounding design of outdoor installations and wires shall be established on the basis of the lightning protection requirements of buildings and be in compliance with the requirements of relevant national and industrial standards.

14 Requirements for environmental adaptability

14.1 The environmental adaptability of the system equipment shall meet the requirements of GB/T 15211.

14.2 The protection measures for video equipment shall adapt to the site environment, reaching the corresponding protection level. The system equipment used in the radiation environment shall be radiation-resistant. Relevant protection measures shall be taken for system equipment operating at excessively high or low temperature and/or excessively high or low atmospheric pressure, and/or in the condition of strong corrosion and high humidity.

14.3 The system equipment operating in salt spray environment in coastal region shall be capable of resisting salt spray corrosion. The protection measures for system equipment used in flammable and explosive environment shall comply with relevant national standards.

14. 4 Relevant anti-interference or isolation measures shall be adopted for system equipment working in the environment with interference sources such as sound, light, heat and vibration.



Annex A (informative) Classification of video surveillance systems

See Figure A.1 for the topological graph for analog system (stored as digits).

Figure A.1 Topological graph for analog system (stored as digits) See Figure A.2 for the topological graph for IP network digital video surveillance system.



Figure A.2 Topological graph for IP network digital video surveillance system See Figure A.3 for the topological graph for non-IP network digital video surveillance system.



Figure A.3 Topological graph for non-IP network digital video surveillance system

See Figure A.4 and Figure A.5 for the hybrid digital video surveillance system. Figure A.4 shows that the video signals of the non-IP network digital camera and the IP network digital camera are stored separately after passing the transmission equipment, and share the video switching control equipment and the display equipment. As indicated in Figure A.5, the video signal of the non-IP network digital camera, upon passing the transmission equipment, will be subject to video coding and be connected to IP network following which videos will be jointly managed, stored and displayed for the non-IP network digital camera and the IP network digital camera.



Figure A.4 Hybrid model (1)



Figure A.5 Hybrid mode (2)