Grupa LOTOS S.A.	**TECHNICAL SPECIFICATION**	Spec. No. **3860**
	CCTV System	

Contents

1 Subject of specification 2
2 Scope of validity 2
2.1 Deviations 2
2.2 Exclusions 2
3 Hierarchy of documents 2
4 Definitions 2
4.1 Basic terms 2
4.2 Ambient Conditions 4
4.3 Electrical data 4
5 Description 4
5.1 Operation Principle 4
5.2 System Requirements 5
5.3 Recording of Video Materials 6
5.4 Transmission 7
5.5 Monitors 8
5.6 Operator Station 8
5.7 Field-mounted Equipment 8
5.8 Equipment Used in Hazardous Classified Areas 14
5.9 Electrical Supply 14
5.10 Warranty 14
5.11 Painting 14
5.12 Labelling 14
5.13 Services 14
5.14 Cables, Conductors, Secondary Items 15
5.15 Documentation 15
6 Acceptance of works 17
7 Relevant documents 17
8 Norms and standards 17
9 Enclosures 17
10 Record of changes 18

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1 Subject of specification

This specification used in conjunction with other technical specifications of LOTOS Group S.A. (GLSA) establishes the minimum requirements for the design and manufacture of video system (CCTV).

2 Scope of validity

This specification applies to the preparation of tender documents, inquiries and contracts concerning new investments and modernization projects planned by LOTOS Group S.A.
It shall also be a basis for preparing both detailed specifications and inquiries for individual or package unit supplies.

2.1 Deviations

Any deviation from this specification and the relevant specifications, standards and related documents including proposals, which the bidder claims to be economically and / or technically superior solutions, must be submitted in writing for review and approval by Grupa LOTOS SA. Non-approved exceptions are not acceptable by Grupa Lotos S.A.

The supplier must report in writing any ambiguity in this or any other specifications of Grupa LOTOS SA or non-compliance with the referred documents / standards and obtain a written explanation from Grupa Lotos SA.

2.2 Exclusions

The specification does not include:

- Requirements for low voltage power distribution system for CCTV (230VAC)
- Requirements for cable parameters
- Requirements for cable routing and laying.

Above mentioned exclusions are scope of separate specifications

3 Hierarchy of documents

In case of conflicts existing between this specification and other documents, the following order of precedence shall govern:

- The current Polish legislation
- Terms of purchase order / contract and other requirements agreed in writing with GLSA
- Data Sheets approved by GLSA
- This specification
- Other Specifications
- Drawings and other documents
- Standards

4 Definitions

4.1 Basic terms

GLSA – Grupa Lotos S. A.

CCTV - Closed-Circuit Television. A television system containing such elements as a camera set, control devices and equipment for picture transmission and recording, which are necessary for supervising of particular area.

OSD - On-Screen Display

CCD – Charge-Coupled Device. Technology changes information about picture from optical form to electrical signal.

AGC function - Automatic Gain Control. A section in an electronic circuit that has feedback, which is to regulate a level of visual signal in order to keep it within predetermined margins.

PTZ unit - PTZ unit allows to adjust the position ('pan' is side-to-side, 'tilt' is up-and-down) and focus ('zoom') of the camera using a remote controller.

Auto Iris - An automatic method of varying the size of a lens aperture changes amount of light going trough the lens and falling on CCD.

Zoom Lens - A lens system that may be effectively used as a wide angle, standard, or telephoto lens by varying the focal length of the lens.

UTP – Unshielded Twisted Pairs

DNR - (Digital Noise Reduction) digital noise reduction function in cameras, actively reduces the noise on the screen.

WDR - (Wide Dynamic Range) A feature that allows the camera to achieve a clean image with strong backlight. It allows to balance contrasts and eliminate bright and dark zones on the image. It allows for better picture under extreme lighting conditions (deep shadow or direct sunlight).

H.264 - Otherwise referred to as MPEG-4 Part 10 or MPEG-4 AVC (Advanced Video Coding) - the standard for encoding low-speed video sequences, adopted in 2003 as part of ISO MPEG-4.

Frame rate - A parameter that specifies the amount of video frames sent per unit of time.

IP Camera - camera that transmit images using a TCP / IP network protocol stream. The image is encoded and transmitted entirely by digital technology, which enables processing and lossless transmission over long distances.

Box Camera - internal use camera, external use requires enclosure, possibility to install different types of lenses of different manufacturers.

Bullet Camera - camera with integrated zoom or fixed focus lens, for outdoor use.

Dome Camera - camera with integrated zoom lens or fixed focus lens for internal use.

Resolution - The number of pixels that make up the image. The more pixel points the clearer the picture. In the case of analog video systems, this parameter sometimes determines the number of visible (distinguishable) horizontal lines of the image.

Watermark - Place hidden information in the encoded multimedia signal to detect modifications in the saved image.

Optical Zoom - Close-up of the subject obtained by changing the focal length of the lens does not result in loss of image quality.\

iSCSI - a technique for performing I / O operations on a remote machine's hard disk using TCP / IP.

4.2 Ambient Conditions

▪ Ambient temperature (max/min)	+36ºC/-25ºC
▪ Average monthly humidity (min/max)	70%/90%
▪ Elevation above sea level	1m
▪ Wind speed	26 m/s
▪ Snowfall	290mm
▪ Atmosphere	typical for refinery Grupa Lotos S. A. (marine, aggressive industrial, chemical and dusty)

4.3 Electrical data

Available power supply on site:

Frequency	50 Hz
UPS Low voltage	230 VAC TN-S

(the UPS shall ensure power back-up for all CCTV devices for 30 minutes)

5 Description

5.1 Operation Principle

5.1.1 Basic principles

A CCTV CCTV system is designed to monitor the area defined in the general terms and conditions of the contract. The system will be designed for use in LAN devices.

5.1.2 Architecture

The system shall enable permanent observation of selected area and recording images. In case of interfacing with other systems, picture recording shall start automatically immediately after receiving an alarm from:

- Fire Alarm and Detection System,
- Burglar Alarm System,
- Access Control System

The CCTV system shall ensure:

- simultaneous recording and playback of video images,
- access to images via PC stations connected to LAN network,
- day and night observation,
- over voltage protection for all CCTV equipment,
- quick and easy access to all camera and video directly from CCTV applications.

5.2 System Requirements

5.2.1 General

The proposed system must be IP-based and operate on the client-server architecture.

Stream recording must take place directly on i-SCSI arrays. In order to maintain a single matrix malfunction, the system must have redundant configuration capabilities, including the ability to create video recording logical subsystems that support one to four arrays.

The video recording software must be able to write metadata from intelligent image analysis with the classification of objects to the minimum vehicle and person, to quickly search archives after the fact.

The system must enable the CCTV application and its corresponding modules to control all PTZ camera functions, including:

- Create presets and patrol routes on PTZ cameras,
- Create advanced image analysis,
- Manage shutter speed, compression, frame rate,
- Management of additional functions such as WDR,
- Ability to manage privacy zones,
- Ability to manage alarm input / output from cameras,
- Manage the network adapter's parameters in the camera.

As the video system monitors technological processes and security, the automatic operation of this system requires a certain degree of reliability and availability. The supplier is required to propose a system in which reliability and availability are essential. As part of the booking, it must be possible to exchange system modules without interruption as soon as possible.

The supplier shall provide all the information necessary to evaluate the reliability of this system in the configuration it is proposing. The identification and location of faults in the system must be as automated as possible. Additionally, it must be possible to send an alarm to an external device. All control methods, handling procedures and maintenance must be designed to be easy to maintain and operate.

The proposed system shall be designed in accordance with PN-EN 50132-7 - Alarm systems - CCTV security systems - Part 7: Guidelines for use and in a way that the spare parts can be kept to a minimum.

5.2.2 Functional requirements

The proposed system must have at least the following functions:

- Configuration and management of all system components through the administrator panel,
- Camera management through a panel that allows to create a device tree that is assigned to a specific system user,
- Device statuses shall be represented by icons, including the disappearance of the network connection or the disappearance of the video signal,
- Customized individual tree for each user,
- Possibility to select a camera with a double-click or drag-and-drop technique from a location map, logical tree, or favorite tree,

- The system must have video wall management through a client application,
- Ability to manage selected system functions via PTZ keyboard,
- Advanced Timeline feature to easily search for recorded recordings with graphical presentation, in addition, timeline colors shall indicate the recording status - for example, normal recording, alarm recording, motion detection recording, protected recording and sound recording,
- Image search function for easy image changes to selected parts of the image,
- The ability to search for an investigation, allowing to use recorded data from Intelligent Image Analysis,
- Ability to display multiple windows with current or playback image,
- The ability to display an automatic "popup" when an alarm occurs, with the ability to play an audio message,
- Ability to assign individual user groups permissions to operate individual cameras for access to the current image, image or sound playback, metadata display or PTZ camera control,
- Monitoring the status of the entire system including cameras, computers, software and network devices,
- The ability to encrypt communication.

5.2.3 Time synchronization

The supplier must set up the time synchronization of all CCTV equipment, including servers, operator stations, cameras. Set the date and time in the lower right corner of the image on the cameras.

5.3 Recording of Video Materials

The video surveillance system must provide continuous video quality recording for a minimum of 21 days using a minimum RAID-5 array.

The maximum storage time for recordings is 90 days. After 90 days, the recordings should be automatically deleted.

Video material must be recorded directly on i-SCSI matrices. Software must be able to perform load balancing when writing to media, when a malfunction occurs on one of the arrays, the system must automatically switch over to the available resources on the system.

At the time of delivery of the video recording equipment, the vendor must provide the software manufacturer with a configuration that is up to date for the latest release. Documentation must include a documentary evidence of compliance with these requirements.

In order to ensure the quality of recorded video for the cameras, the minimum video stream rate shall be taken assuming that the frame rate of the newly designed cameras can not be less than 10, according to the table:

Table 1 - list of assumed streams from cameras

FPS	12 mpx Camera	5mpx Camera	3mpx Camera	2mpx Camera
25	16 Mbit/s	9 Mbit/s	6 Mbit/s	5 Mbit/s
15	12 Mbit/s	8 Mbit/s	5 Mbit/s	4,5 Mbit/s
10	10 Mbit/s	7 Mbit/s	4,5 Mbit/s	4 Mbit/s

The system shall have an interface for monitoring the recording state, in particular system time, estimated storage time, total recording stream, camera status (in addition to the number of cameras in the system that the cameras are offline to which cameras are currently recording video content).

All recordings must have built-in video encoding code that guarantees the integrity of the video signal and accompanying data. For each connected camera it is possible to select the number of images recorded per second and their quality.

The CCTV equipment shall be installed in an appropriate manner in accordance with the manufacturer's guidelines as well as in agreement with the GLSA.

5.3.1 Software

Software that is responsible for operating the CCTV system shall be installed at the time of installation in accordance with the latest Application Developer Guidelines to meet all hardware requirements as well as compatibility with existing devices on the site.

The supplier, upon delivery of the software, is required to provide appropriate licenses and software on a suitable medium.

5.4 Transmission

5.4.1 Twisted-pair cables

Wiring shall be made in UTP Cat6 or higher, the length of the connection must not exceed 90 meters.

All wires exiting the building and entering external cameras located on the posts or walls shall be equipped with surge arresters installed on both sides of the wiring. This includes power and video wiring. All outdoor mounted cameras must be grounded.

Wiring shall be made in accordance with the following requirements:

- The installation is to comply with IEC,
- The cables must be protected against mechanical influences according to the application and the place where they are to be operated,
- Take all precautions to avoid system interference,
- All wires / cables and terminals must be marked.

5.4.2 Fiber optic transmission equipment

In the case of using fiber optic transmission for communication with the camera, transmission shall be provided through a fiber optic converter.

The camera must be connect point-to-point with fiber-optic, in order to minimize the number of fiber optic fibers one fiber shall be used to transmit the image from one camera.

The fiber optic converter must be able to manage all its parameters in real-time through the appropriate administrator panel in the device, and available through a network connection.

The selection of equipment and its assembly must always be agreed with GLSA.

Recording equipment and active devices (converters) must be powered from a dedicated UPS at the distribution point.

5.4.3 Fiber optic cabling type

In order to ensure adequate coverage, one-mode fiber shall be used.

5.5 Monitors

Monitors shall have a minimum resolution of Full HD, must have a minimum of 24 months of manufacturer warranty, the date of manufacture of the delivered monitors can not be older than 12 months from delivery. Devices must be new without traces of use, in factory packaging.

All monitors must be designed to work 24/7/365 (twenty-four hours a day, seven days a week, three hundred and sixty five days a year).

Monitors must be mounted in such a way that they do not limit their functionality. Pay attention to the mounting height, the operator's distance to the monitor, as well as the external factors that can affect the quality of the projected image (eg close window distance).

5.6 Operator Station

Each operator station and its configuration must meet the recommended hardware requirements imposed by the Software Producer according to the latest version of the application available at the installation date on the market.

The supplier must prepare the operator station in accordance with the following requirements:

- Station certified for continuous operation 24/7,
- Select a suitable rack or tower enclosure, as required by the GLSA,
- Lock selected USB ports, protect against removable devices,
- Limitation of user rights, so that it is possible to use only CCTV applications or specified additional client applications,
- Automatic start up of computer after power failure,
- The ability to reconstruct the configuration at the time of software malfunction, settings from the day of hardware reception,
- The user may only have access to the folders indicated by the client,
- The user can not have features that allow to install software,
- The user can not have features that allow to configure the system.

It is permissible to install software to limit the permissions, this must be agreed with the GLSA.

5.7 Field-mounted Equipment

The process or safety area will be monitored at various points by means of video cameras. The number and location of video cameras shall be appointed and shown on drawings by Supplier.

When selecting and designing cameras, consider the requirements for the zones in which the units will be mounted:

1. **Inner zone - Office buildings, observation of communication lines.**

- Dome cameras,
- Video Analysis, which allows to save metadata from VA in recorded video,
- Variable-focus lenses with autofocus and motozoom,
- Hardware WDR,
- Minimum resolution FULL HD,
- Power over the PoE.

2. **Inner Zone - halls and industrial buildings.**

- Dome cameras or box cameras,
- Video Analysis, which allows to save metadata from VA in recorded video,
- Variable-focus lenses with autofocus and motozoom,
- Hardware WDR,
- Minimum resolution FULL HD,
- Power over the PoE or external power supply.

3. **External Zone - perimeter protection.**

- Box type cameras, or Bullet cameras in agreement with GLSA,
- Remote function for autofocus,
- Video Analysis, which allows to save metadata from VA in recorded video,
- Minimum resolution FULL HD,
- When using a Box camera, use the appropriate enclosure in accordance with the requirements of subsection 5.7.5,
- PoE is not allowed, except for Bullet cameras.

4. **External Zone - Protection of pedestrian and car passageways allowing entry into the premises.**

- Box type cameras, or Bullet cameras in agreement with GLSA,
- Remote function for autofocus,
- Video Analysis, which allows to save metadata from VA in recorded video,
- Minimum resolution FULL HD,
- Resolution, lens, and field of view of the camera must be selected so that the resolution is not less than 300 pixels per meter at the transition point,

- When using a Box camera, use the appropriate enclosure in accordance with the requirements of subsection 5.7.5,
- PoE is not allowed, except for Bullet cameras.

5. External Zone – Monitoring for larger areas with cameras witj a minimum 5 mpx resolution.

- Box type cameras, or Bullet cameras in agreement with GLSA,
- Remote function for autofocus,
- Video Analysis, which allows to save metadata from VA in recorded video,
- Minimum resolution FULL HD,
- When using a Box camera, use the appropriate enclosure in accordance with the requirements of subsection 5.7.5,
- PoE is not allowed, except for Bullet cameras.

5.7.1 Internal Dome Camera

The camera must have at least the following functions:

- Sensor size 1 / 2.8 "
- CMOS Sensor
- Number of active pixels 1920 x 1080 at 60 fps,
- Sensitivity no lower than 0.008 lux in day mode and 0.0015 lux in night mode for 30IRE image, with 1/25 sec., F1.4,
- Compression minimum H.264 and M-JPEG,
- Ability to generate at least 2 independent H.264 video streams in HD resolution
- Built-in WDR hardware (Digital WDR not allowed), dynamic range of at least 120 dB,
- Built-in image analysis processor, which must allow the use of the following algorithms (line crossing, motion direction, object classification, object abandonment, face detection, trajectory detection, sound detection, sabotage)
- Image analysis data recorded in the form of metadata recorded with the recorded material,
- The image analysis algorithm shall have advanced functions for calibrating and monitoring objects such as direction, color, object area, speed,
- User interface in Polish,
- Alarm input and output,
- At least 3 work profiles (configuration settings),
- It must be possible to change the operating profile by an external signal,
- Automatic gain control and the ability to manually adjust the gain level,
- Dynamic noise reduction,

- Support for hardware-level encryption, such as the factory-built Trusted Platform Module (TPM), which uses a cryptographic key to protect all recorded data,
- SD / microSD card slot,
- Adjustable and at least ten-fold electronic sensitivity boost,
- RJ-45 100 Base-TX Ethernet,
- Supported RTP, Telnet, UDP, TCP, IP, HTTP, HTTPS, FTP, DHCP, IGMP V2 / V3, ICMP, ARP, SMTP, SNTP, RTSP, 802.1x,
- Power PoE or external power supply,
- IP66, IK10.

5.7.2 External Camera – Box Type

The camera must have at least the following functions:

- Sensor format minimum 1 / 2.8 "inches,
- Remote focus capability,
- CMOS Sensor,
- Number of active pixels 1920 x 1080 at 60 fps,
- Sensitivity no worse than 0.0069 lux in day mode and 0.0008 lux in night mode for 30IRE, with 1/25 sec, F1.2,
- Compression minimum H.264 and M-JPEG,
- Ability to generate at least 2 independent H.264 video streams in HD resolution
- Built-in WDR hardware (Digital WDR not allowed), dynamic range of at least 120 dB,
- Built-in image analysis processor, which must allow the use of the following algorithms (line crossing, motion direction, object classification, object abandonment, face detection, trajectory detection, sound detection, sabotage)
- Image analysis data recorded in the form of metadata recorded with the recorded material,
- The image analysis algorithm shall have advanced functions for calibrating and monitoring objects such as direction, color, object area, speed,
- User interface in Polish,
- Alarm input and output,
- At least 3 work profiles (configuration settings),
- It must be possible to change the operating profile by an external signal,
- Automatic gain control and the ability to manually adjust the gain level,
- Dynamic noise reduction,
- Support for hardware-level encryption, such as the factory-built Trusted Platform Module (TPM), which uses a cryptographic key to protect all recorded data.
- SD / microSD card slot,
- Adjustable and at least ten-fold electronic sensitivity boost,

- RJ-45 100 Base-TX Ethernet,
- Supported RTP, Telnet, UDP, TCP, IP, HTTP, HTTPS, FTP, DHCP, IGMP V2 / V3, ICMP, ARP, SMTP, SNTP, RTSP, 802.1x .
- External Power Suplly
- Minimum 3 years warranty,

5.7.3 Speed PTZ cameras

The camera must have at least the following functions:

- Operating temperature range -40 ° C to + 50 ° C with IP66 protection class (for outdoor cameras).
- The camera must have an electronic image stabilization function
- The camera must have a minimum of 30x optical zoom
- Sensor format minimum 1 / 2.8 "inches,
- Remote focus capability,
- CMOS Sensor,
- Number of active pixels 1920 x 1080 at 60 fps,
- Sensitivity no less than 0.0077 lux in day mode and 0.0008 lux in night mode for 30IRE image, with 1/25 sec., F1.2,
- Compression minimum H.264 and M-JPEG,
- Ability to generate at least 2 independent H.264 video streams in HD resolution
- Built-in WDR hardware (Digital WDR not allowed), dynamic range of at least 120 dB,
- The camera must be capable of automatically tracking objects moving in the field of view of the camera,
- The camera must have a menu in Polish,
- Built-in image analysis processor, which must allow the use of the following algorithms (line crossing, motion direction, object classification, object abandonment, face detection, trajectory detection, sound detection, sabotage)
- Image analysis data recorded in the form of metadata recorded with the recorded material,
- The camcorder must be able to set programmable presets,
- The camera must have 4 alarm inputs and one relay output,
- Alarm input and output,
- At least 3 work profiles (configuration settings),
- It must be possible to change the operating profile by an external signal,
- Automatic gain control and the ability to manually adjust the gain level,
- Dynamic noise reduction,

- Support for hardware-level encryption, such as the factory-built Trusted Platform Module (TPM), which uses a cryptographic key to protect all recorded data.
- SD / microSD card slot,
- Adjustable and at least ten-fold electronic sensitivity boost,
- RJ-45 100 Base-TX Ethernet,
- Supported RTP, Telnet, UDP, TCP, IP, HTTP, HTTPS, FTP, DHCP, IGMP V2 / V3, ICMP, ARP, SMTP, SNTP, RTSP, 802.1x .
- External Power Supply
- Minimum 3 years warranty,

5.7.4 Camera Lenses

It is required to use lenses certified by the camera manufacturer, it is not allowed to use substitutes.

The selection of lenses will be made by the Supplier based on the requirements for the observation field of each of the cameras given in the relevant drawings and approved by GLSA. These lenses must be lenses with variable focal lengths.

5.7.5 Camera housings

This pre-wired assembly shall include a camera, vari-focal lens, outdoor housing. The package's sleek design and feed-through cabling make it a complete plug and play CCTV camera suitable for every day surveillance needs. The camera/lens assembly shall be pre-wired through the base of the housing with coax and power cabling.

Weatherproof camera housing shall be of heavy-duty design with thermostat-controlled heating and sunshield. Housing ingress protection shall be IP 65. Universal camera shall be provided with mounting set for axis-centric alignment as well as over voltage and lightning protection for the camera.

The camera assembly shall be located outside of hazardous classified area. If the camera assembly is to be located inside of the area (e.g. in compressor hall) than it shall be provided as explosion-proof in accordance with conditions described in clause 5.8.

5.7.6 Poles

Fully hot dip galvanised steel construction of height defined by Supplier can be applied for mounting of camera and pan/tilt assembly. The pole height shall ensure convenient plant observation. The base section shall be supplied with a flange plate to mount the mast to a concrete by means of anchor bolts. Mast shall be designed to withstand the specified wind forces. Fixing material shall be included in the scope of supply for mounting of the camera assembly. Cables shall be laid inside the pole The pole shall have an separate earthing connection point for external earthing connection (suitable for min. bolt size of M 10). Pole shall be earthed and equipped with a cooper lightning rod on its top. The rod shall be fixed to the pole with clamps belonging to the rod and provided permanent and reliable contact.

5.7.7 Brackets and adapters

The accessories required for mounting of camera, pan/tilt head and receiver/driver unit on pole, steel structure or wall are in supplier scope. All metal parts shall be protected against corrosion by means of hot deep galvanising and painting. Bolted or welded connections shall have suitable strength.

5.8 Equipment Used in Hazardous Classified Areas

All CCTV devises located in explosion hazardous classified area must be manufactured and tested in accordance with PN-EN standards (harmonised European standards) for explosion proof equipment. Proper equipment execution shall be proved in accordance with valid regulations. Explosion protection shall fulfil requirements given by Grupa LOTOS SA in relevant documents and specifying Zone, equipment group and temperature classes.

When installing typical (non EX) cameras at the border of a potentially explosive area, the distance between the zone and camera must be at least 1 meter.

5.9 Electrical Supply

Power supply for CCTV system (230VAC 50 Hz) shall be provided from an uninterruptible power supply (UPS). UPS shall be included in documentation and delivery being in scope of Supplier. UPS shall have function of remote monitoring uses LAN network for signal transmission.

The Supplier has to provide all the equipment necessary to generate the different voltage levels of power supplies needed internally by the video system. If not otherwise stated the power and distribution system of the CCTV system need not to be redundant. An output signal shall be provided to indicate an electrical failure in the power supply unit and in the power distribution system.

A backup power supply system is required and designed to operate the system for 30 minutes since the mains power fails.

5.10 Warranty

All delivered to GLSA devices and system components must come from Polish distribution channels authorized by the manufacturers and be covered by the manufacturer’s warranty. The warranty period for equipment must be 24 months from the date of final acceptance. The manufacturer's warranty period during the warranty period of the contractor can’t be less than 12 months from the final acceptance date. It is required to provide warranty cards for devices or other documents that entitle GLSA to a direct warranty claim from the manufacturer.

5.11 Painting

The painting is to be carried out in accordance with the requirements imposed by an industrial, chemical and sea atmosphere. Care is to be taken than all structural components are properly painted. Devices colour may be according to manufacturer standard.

5.12 Labelling

All CCTV equipment shall be labelled with the manufacturer's name and logotype to assure the integrity of the complete system. Every equipment shall be provided with a tag showing equipment specific number in accordance with documentation and related equipment numbering procedure.

Equipment manufactured as explosion-proof shall have imprinted symbol acc. to PN-EN standard.

The tag shall be marked by means of an imprint on the nameplates. Nameplates shall be stainless steel, non-corrosive alloy or rigid plastic, which shall be durably fixed to a non-removable part of the frame of equipment. The Supplier shall submit a tag proposal for Grupa LOTOS S.A. approval in prior to manufacturing.

5.13 Services

Services, which shall be provided by the Supplier:

- detail design
- system programming
- factory acceptance test and inspection
- packing and shipment
- assembling on site
- system test operation lasting form 7 till 28 days
- training of personnel (including system users, administrators and service staff) designated by GL
- preparation of operating manual, maintenance instruction and procedure describing reaction in case of different alarms
- maintenance during warranty period

Supplier shall posses a concession of Polish Ministry of Interior and Administration in the field of services related to technical protection measures of premises in accordance with art. 15 o the Act of August 22, 1997 on protection of persons and premises. Designer shall be entitled for the design by the designer presence on the list on qualified technical security personnel acc. to mentioned act. GLSA reserves the right for the acceptance of any subcontractor.

5.14 Cables, Conductors, Secondary Items

All cables, conductors, plugs, fixtures and mechanical protection devices shall be included in the Supplier's scope of supply. The cabling of the video system shall include all links required to equipment provided by Supplier, e.g. to operator desks, monitors, cameras etc. All cables and terminal blocks shall be labelled with a labelling system in accordance with GL SA procedure (standard 3770).

All outdoor equipment shall be delivered with cable glands. Moreover, equipment located in hazardous areas shall have ex-proof cable glands (see clause 4.8). Supplier shall do selection of cable glands strictly in accordance with cable nominal diameters given by cable manufacture.

Any potential interference between cables or external sources must be taken into account when designing and installing cables. In places where the cables may be subjected to mechanical or atmospheric damage, appropriate cable guards must be provided.

Changes in direction of cable pipes / cable routes must not impede the pulling of cables or wires. The number of cables or wires in cable pipes / cable routes must not exceed 70% of the maximum capacity.

All wires must have a single-colored outer insulation (wire coat). Cables can't be directly attached to metal surfaces - their position will be determined by means of insulated ducts, clamps or plastic strips.

In the case of installation of outdoor video cameras, the wiring shall be made in metal (vandal resistant) casing.

5.15 Documentation

Sets of documentation shall be delivered with the system by the Supplier for system acceptance and takeover:

1.Technical description including:

- Subject of design
- Law basis for preparation of the system design
- Description of protected premises containing its architecture and construction
- Partition into zones
- Design preconditions and list of relevant projects (including agreements with GL SA done in writing, plans for rooms' arrangement, electrical installation layouts etc.)
- Hazard analysis
- Regulations and standards selected as basis for determination of protection methods
- Description of system organization
- System description including details of used equipment
- Description of system installation including data of cables and mounting elements, cable arrangement details and installation hints.
- Information about power supply for control panels and peripheral devices
- Calculation of system power balance in respect to emergency power supply including list of norms and settlements taken for determination of time of emergency operation.
- Equipment list
- Information related to principles of operation, maintenance and services
- Remarks related to installation works
- Operating, installation and maintenance instructions
- List of relevant standards and other documents

2.Material Take-off

3.Cable List

4. Drawings

- description of graphical symbols
- block diagrams
- layout drawing showing equipment arrangement inside zones
- layout drawing showing equipment arrangement in guardroom
- connection (wiring) diagrams
- power supply single line diagrams
- panels arrangement drawings
- mounting examples

5. Post-completion documentation including revised drawings to reflect changes with equipment and wiring system

6. Start up check lists

7. Acceptance report

In prior to detail design the Supplier shall agree requirements for the system (i.e. system functionality, equipment locations, cable arrangement, interfaces with existing facilities) with representatives of GL

SA. The agreements shall be in written.
CCTV system for every application shall be designed and executed in accordance with standard PN-EN 50132-7.

6 Acceptance of works

After the completion of the subject of the order GLSA will make system functionality tests lasting from 7 till 28 days. Positive tests acceptance is needed for acceptance of work.

7 Relevant documents

Any "Technical Specification" issued by GRUPA LOTOS S.A. listed in Contract Files.

8 Norms and standards

It is in each case understood that quoted standards, regulations, directives and orders are of their latest editions, along with amendments, annexes and supplements in force.

Act of August 22, 1997 on protection of persons and premises (OJL of 1997, No. 114, item 740)

Minister of Economy, Labour and Social Policy order of March 12, 2003 on basic requirements for electric equipment (Journal of Laws No 49 pos. 414).

Minister of Infrastructure order of April 2, 2003 on evaluation of equipment conformity with basic requirements concerning electromagnetic compatibility, and method of its labelling (Journal of Laws No 90, pos. 848).

Minister of Economy, Labour and Social Policy order of July 28, 2003 on basic requirements for protective equipment and systems intended for use in explosion endangered zones (Journal of Laws No 143, pos. 1393).

PN-EN 50132-7 Alarm system. CCTV surveillance systems for use in security applications.

PN-EN 50014:2002U Electrical apparatus for potentially explosive atmospheres - General requirements

9 Enclosures

- Attachment No.1. Block diagram. CCTV configuration.

10 Record of changes

No.	Date	Description	Introduced by
1	30-11-2013 (rev. 1)	Review, update, standardize and changes to the Standard within scope of order No. OK/990/2012	Editorial board coordinated by T.Wróbel
-	31-08-2015	Page layout corrections, no contents changes.	T. Wróbel
2	26-06-2017 (rev. 2)	Adaptation of the standard to new conditions, standards and good practices used in the design and installation of alarm systems. Developed by PROESS S.C., order 4600008528.	Reviewed by: T. Wróbel K. Kowalczyk M. Piotrowski L. Gawroński Coordinated by: P. Gala
3	08-06-2018	In paragraph 5.3 RODE requirements was added The maximum storage time for recordings is 90 days. After 90 days, the recordings should be automatically deleted. In paragraph 5.8 - the distance to EX zone as 1m was added	P. Gala