

Employer
SAKO BRNO A.S.

Project
Modernization of WtE Plant SAKO

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PART III, APPENDIX E4

SPECIFICATIONS FOR EMPLOYER'S EXISTING CCTV SYSTEM



PART III, APPENDIX E4 SPECIFICATIONS FOR EMPLOYER'S EXISTING CCTV SYSTEM

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1. INTRODUCTION

This appendix provides the as-built documentation for the Employer's existing CCTV system. The technology uses CCTV systems from three manufacturers:

- 1-Siemens
- 2-Samsung
- 3-HIKVision

The list of existing technology cameras is as follows:

(CCTV SIEMENS - SISTORE MX, no recording):

1. Camera KA1N
Monitoring combustion chamber of boiler 2 through a sight glass
2. Camera KA2N
Monitoring combustion chamber of boiler 3 through a sight glass
3. Camera KA3N
The console is fixed to the hall structure in front of the watermark at boiler 2 and monitors the watermark level.
4. Camera KA4N
The console is fixed to the hall structure in front of the watermark at boiler 3 and monitors the watermark level.
5. Camera KA5N
The console is fixed on the side wall of the switch room substation in SO 103 at a height of approx. 9 m - opposite the end of the boiler 2 slag conveyer. The camera monitors the end of the slag conveyer and the point where the slag falls from this hopper onto the unsorted slag dump.
6. Camera KA6N
The console is fixed on the side wall of the switch room substation in SO 103 at a height of approx. 9 m - opposite the end of the boiler 3 slag conveyer. The camera monitors the end of the slag conveyer and the point where the slag falls from this hopper onto the unsorted slag dump.
7. Camera KA7N
The console is fixed on the side wall of SO 101 under the crane track over boiler 2 hopper
The camera will monitor the hopper room and its immediate surroundings.
8. Camera KA8N
The console is fixed on the side wall of SO 101 under the crane track over boiler 3 hopper
The camera monitors the space of the hopper itself and its immediate surroundings.
9. Camera KA9N
The console is fixed on the side wall of the J1 crane cabin in SO101. The camera will monitor the area of the waste bunker.
10. Camera KA10N

The console is fixed on the side wall of the J2 crane cabin in SO101. The camera monitors the waste bunker area - the area where material is fed to the waste bunker.

11. Camera KA11N

The console is mounted on the wall in the waste shredder hall in SO 401. The camera monitors the area of the waste shredder hall - the area where material is fed to the waste bunker.

12. Camera KA12N

The console is fixed to the wall in the turbine hall in SO 401. The camera monitors the area of the turbine hall.

13. Camera KA13N

The console is mounted on the wall in the final waste sorting hall in SO401. The camera monitors the final sorting line area.

14. Camera KA20

The console is fixed to the structure of the connecting bridge between SO106 and the office building and sanitary facilities. The camera monitors the bunker gate area.

(CCTV Tipa or HKVision, no recording):

15. Camera K7.1 In the boiler hall building, in the view direction of extractor K3 feeding and level

16. Camera K7.2 In the boiler hall building, in the view direction of extractor K3 to the slag room (thermal camera 2021)

17. Camera K7.3 In the boiler hall building, in the view direction of extractor K2 feeding and level

18. Camera K7.4 In the boiler hall building, in the view direction of extractor K3 to the slag room (thermal camera 2021)

19. Camera K5.3 In the lime preparation building, view of the lime pumps

Slag room cameras (CCTV-Hajtr, no recording):

20. skvara_1 is fixed above the entrance door in the slag room area and monitors the crane handling zone during slag loading.

21. skvara_2 is fixed above the door to the boiler K area 1 in the slag room area and monitors the crane handling zone when loading slag and conveyors.

Slag room crusher (CCTV-Hajtr, no recording):

22. drtic_1 is fixed above the conveyor and monitors the conveyor belt.

23. drtic_2 is located above the crusher hopper and monitors the hopper

24. volná-plocha roof SO401 monitors the open area (part of the temperature monitoring system - open area) syst. HIKVision
25. thermal camera - hopper K2 - HIKVision
26. thermal camera - hopper K3 - HIKVision
27. thermal camera- view of waste storage, direction towards J1- HIKVision
28. thermal camera, view of waste storage, direction towards J2 - HIKVision
29. thermal camera, view of waste storage hopper, crusher HIKVision
30. grab storage zone at J1 - HIKVision
31. grab storage zone at J2 - HIKVision

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2. AS-BUILT DOCUMENTATION FOR EXISTING CCTV SYSTEM

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1. TECHNICAL REPORT

1.1 INTRODUCTION

The camera system (CCTV) design in SAKO Brno, a.s. Jedovnická 2 is the matter of this design documentation. Relevant cabling lines, locations of individual system parts, their mutual interconnection and relationship to the existing PTV system and to other systems in the plant are parts of this design.

Locations of individual systems and their mutual relationship correspond with the investor's data and with valid standards.

1.2 BASIC DATA FOR THE PREPARATION OF THE DOCUMENTATION

The design documentation was based on:

- Ground plans of individual floors and BO
- Investor's requirements for technical characteristics of the designed systems
- Fire report dated on 28.02.08 – prepared by KOVOPROJEKTA BRNO, a.s.
- As-built documentation – ESS, ACS, CCTV
- Consultation with the Employer's representative held on 21.2.2006
- Consultation with the design chief engineer and with compilers of consequential professions

1.3 USED STANDARDS

At the realization of weak current equipment following ČSN standards have to be respected (have been used for the preparation of the design documentation):

ČSN 33 2000-3	Electrical regulations for the electric equipment – determination of basic characteristics
ČSN 33 2000-4-41 ed.2	LV electric installations - Part 4-41: Safety protection measures – Electric shock protection
ČSN 33 2000-5-51 ed.2	Electric installations in buildings – Part 5-51: Selection and construction of electric equipment - general regulations
ČSN 33 2000-5-52 ed.2	Electrical regulations for the electric equipment – Part 5-52: Selection of systems and installation of power lines
ČSN 33 2000-5-54 ed.2	LV electric installations – Part 5-54: Selection and construction of electric equipment - Earthing, safety conductors and safety interconnection conductors
ČSN 33 2000-6	LV electric installations – Part 6: Revisions
ČSN EN 50 132-1	Alarm systems – CCTV watching systems to be used in safety applications
ČSN EN 50174-3	Information technology – Cable lines - Part 3: design preparation and constructions outside the buildings
ČSN EN 50173-1	Information technology – Universal cable systems – Part 1: General requirements and office ambient
ČSN EN 50346	Information technology – Installation of new cable lines – Testing of installed cable lines
ČSN EN 50174-2	Information technology - Installation of cable lines - Part 2: Installation planning and installation procedures in buildings

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ČSN EN 50310	Use of common interconnection and earthing system in buildings equipped with the information technology equipment
ČSN EN 50174-1	Information technology – Installation of new cables – Part 1: Specification and quality assurance

2. TECHNICAL SOLUTION OF THE DESIGN

2.1 INTRODUCTION

In the building there is installed the existing industrial camera system (PTV) that serves the production staff for the visualisation of technology processes and also supports the plant security guard.

For the needs of other operation the possibility of “life” displaying in selected sites must be kept because of the coordination of the controlling motion in dependence on the displayed scene (e.g. control of cranes in the waste container hall).

The new-installed technology of the combustion boilers and of the energetic centre requires an “extension” of the existing PTV system with 15 fixed colour cameras installed on sites that need technology process watching including the installation of the new video-signal line and of the appropriate supply.

The relocation of the existing control room and re-build of the technology control elements of the control room require also the installation of new LCD monitors of CCTV that will be integrated to the new control technology.

According to the Investor's requirement a digital record **is** installed anew. To this digital record all existing and new installed cameras **are** connected. The digital record **are** connected to the LAN network. According to actual requirements the camera records can be displayed simultaneously with the life images from the PC cameras that are connected to the LAN network, with installed SW client.

Individual camera records can be controlled (on the communication level) from the upgrade system MM8000.

2.2 DESCRIPTION OF THE SOLUTION

Because of an inadequacy of the existing installed PTV technology and because of relatively big number of function faults of some parts of the existing PTV system (notified by the Employer) it is designed to install a new CCTV system based on the platform IP. Selected elements of the existing PTV system **are** consequently integrated to the new one. In case of other Employer's requirements the designed CCTV system will be simply extensible.

The installation of 15 fixed colour cameras is designed anew. In BO 102 – Boiler room hall – there **are** installed 2 cameras for watching the combustion chambers of the new installed boilers. These cameras **are** installed in special air-cooled covers. 2 cameras watch the water-glass of the boilers. In BO 103 – Slag separation hall – there **are** installed 2 cameras for watching the slag systems of the boilers. In BO 101- Waste container hall – there **are** installed 2 cameras for watching the boiler charging door, 1 camera for watching the waste container and 1 camera for watching the waste container filling. There **is** used 1 existing camera for watching the arrivals and departures of trucks to the waste container. In BO 401 – Final sorting and turbine hall – there **are** installed 1 camera for watching the new control room, 1 camera for watching the turbine hall, 1 camera for watching the sorting line, 1 camera for watching the waste grinder hall and 1 camera for watching the arrivals and departures of trucks to the sorting line and to the waste grinder hall. Except the control room, all cameras **are** installed in protective covers.

The video signals from cameras KA1N and KA2N (are intended for watching the combustion chambers of the boilers) in BO 102 **are** led by the coaxial cables RG59 to the distribution box with the supporting technology of the cover cooling, as well as video-signal adapters, coax/optic converters and overvoltage protections for video-distributions. The video signals **are** next led by the optic cables to the new main RD CCTV switchboard in the new control room in SO 401 and in addition by the coaxial cables RG59 to the videomatrix in the switchboard RD4.2 in **the room next to the** existing control room in BO 106.

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The video signals from IP cameras KA3N and KA4N (are intended for watching the water-glass of the boilers) in BO 102 there **are** led by the coaxial cables RG59 and by the twisted, screened, 4-pair cables F/UTP to the distribution box with the converter coax / optics and converter 100 Base-TX / 100 Base-FX. . The video signals **are** next led by the optic cables to the new main CCTV switchboard RD CCTV that **are** located in the new control room in BO 401.

The video signals from IP cameras KA5N and KA6N (are intended for watching the slag systems of the boilers) **are** led by the coaxial cables RG59 and by 4-pair cables F/UTP to the distribution boxes with installed converters coax / optics and the converters 100 Base-TX / 100 Base-FX. The video signal **are** next led by the optic cables to the new main RD CCTV switchboard in the new control room in BO 401.

In BO 103 the video signal from the IP cameras KA5N and KA6N (are intended for the boiler slag system monitoring) **are** led by coaxial cables RG59 and by 4-pair cables F/UTP to the boxes with installed overvoltage protections for the video-switchboards and for the converters 100 Base-TX/100 Base-FX. The video signal **are** led by optic cables to the new main switchboard RD CCTV in the new control room in BO 401 and by coaxial cables RG59 to the videomatrix in the switchboard RD4.2 in **the room next to the** existing control room in BO106.

In the new main RD CCTV switchboard that **are** located in the new control room in SO 401 the video signal from IP cameras KA3N to KA6N **are** converted from the optical transmission medium to the metallic one. The video signal from IP cameras KA1N and KA2N **are** decoder-converted to IP signal. Here the IP signals from the cameras KA1N to KA6N **are** connected to the LAN-CCTV network.

The video signal from IP cameras KA7N to KA10N (located in BO 101) **are** led by the coaxial cables RG59 to the switchboard RD4.2 in **the room next to the** existing control room in BO 106. In this control room the video signal from appropriate cameras **are** branched to the videomatrix that **are** work the video signals for crane operators in Waste container hall and connected to the digital recorder that **are** connected to LAN-CCTV network. Local monitors M8, M9 and control keyboards OSJ1 and OSJ2 in the crane operator's working place on the videomatrix **are** connected to the videomatrix. The crane operators can monitor the area that **are** watched by appropriate cameras connected to the videomatrix.

The video signals from IP cameras KA11N to KA15N (located in BO 401) **are** led by twisted, screened, 4-pair cables F/UTP directly to the new main RD CCTV switchboard in BO 401. The video signal **are** connected to the LAN-CCTV network. The video signal from the camera KA11N **is** in addition led by the coaxial cable RG59 **to the monitor M14 located in the cabin of crusher and next** to the videomatrix in the switchboard RD4.2 in **the room next to the** existing control room in BO 106.

The video signal from the existing camera KA20 (is intended for watching the Waste container hall) **is** led by the coaxial cables RG59 to the distribution box with the converter coax / optics. The video signal **is** next led by the optic cable to the switchboard RD4.2 in **the room next to the** existing control room in BO 106. There **is** the video signal converted from the optical transmission medium to the metallic one and branched to the videomatrix that **are** work the video signals for crane operators in Waste container hall and connect them to the digital recorder that **is** connected to the LAN-CCTV network.

The video signal from the other existing PTV system cameras (**are** integrated to the new system) **are** led by the existing coaxial cables RG59 to the switchboard box RD4.2 in **the room next to the** existing control room in BO 106. In this control room the video signal from appropriate cameras **are** connected to a digital recorder that **is** connected to the LAN-CCTV network.

Together with coaxial or 4-pair cables F/UTP for the video signals always one twisted, screened, 4-pair cable F/UTP **is** installed – a reserve.

The control room in SO 401 **are** a new centre of the integrated CCTV system. The necessary CCTV technology **are** installed in a new 19" box. In two CCTV working stations in the new control room there **are** implemented the software for recording and visualisation of the videos from the IP cameras (SW **are** compatible with the SW of digital recorders installed in **the room next to the** existing control room in BO 106) and to the LAN network connected PC with installed SW client for the camera records monitoring.

The recording and visualisation SW will be record video events at defined parameters for the maximum of 48 hours.

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SW client installed on specified PCs (are connected to the LAN network) will enable to monitor the recorded images on sites that are integrated to LAN-CCTV (this application will be implemented there) and to check specified workers by means of a shot from a selected camera in the system – even without direct connections of selected cameras to the CCTV monitors.

Individual camera records can be controlled (on the communication level) from the upgrade system MM8000.

As the main CCTV switchboard in the control room BO 401 **is** represent a logical and physical centre of the LAN-CCTV network, there **are** also installed necessary network active elements. The switchboard **are** interconnected (by single-mode optic cables) with the existing PTV switchboard in **the room next to the** existing control room in BO 106, possibly with the switchboard RD4.2, and with the existing main switchboard of the structured cabling RD2 in the social and administration building. The interconnection of the switchboard of the structured cabling RD2 in the social and administration building with the switchboard RD4.2 in **the room next to the** existing control room in BO 106 **is** the redundancy one.

2.3 CAMERA TYPES AND LOCATIONS

CAMERA KA1N

Type 1 camera **is** installed in a special air cooled cover IP66 that **is** equipped with a dust and dirt barrier on the sight glass. The camera cover **is** installed by the help of a camera holder (relevant for a respective cover) and a fastening adapter to the structure of the boiler 2. This camera **monitor** (through the sight glass) the combustion chamber of the boiler 2. The camera **is** equipped with the F=4~12mm F1.2 1/2" objective – a possibility of an optimal setup of the observed scene depending on the camera/sight glass positioning.

CAMERA KA2N

Type 1 camera **is** installed in a special air cooled cover IP66 that **is** equipped with a dust and dirt barrier on the sight glass. The camera cover **is** installed by the help of a camera holder (relevant for a respective cover) and a fastening adapter to the structure of the boiler 3. This camera **monitor** (through the sight glass) the combustion chamber of the boiler 3. The camera **is** equipped with the F=4~12mm F1.2 1/2" objective – a possibility of an optimal setup of the observed scene depending on the camera/sight glass positioning.

CAMERA KA3N

Type 2 camera **is** installed in an air-conditioned protective cover IP66, on a relevant bracket for the respective cover. The bracket **is** fixed to the hall construction, in front of the water-glass of the boiler 2. This camera **monitor** the water-glass level. The camera **is** equipped with the F=2.8~11mm F1.4 1/3" objective - a possibility of an optimal scene monitoring.

CAMERA KA4N

Type 2 camera **is** installed in an air-conditioned protective cover IP66, on a relevant bracket for the respective cover. The bracket **is** fixed to the hall construction, in front of the water-glass of the boiler 3. This camera **monitor** the water-glass level. The camera **is** equipped with the F=2.8~11mm F1.4 1/3" objective - a possibility of an optimal scene monitoring.

CAMERA KA5N

Type 2 camera **is** installed in an air-conditioned protective cover IP66, on a relevant bracket for the respective cover. The bracket **is** fixed to the side-wall of the switchroom in BO 103, in the height of approx. 9 m – opposite to the end of the slag elevator of the boiler 2. The camera **monitor** the end of the slag elevator and the place of landing the slag in the unsorted slag yard. The camera **is** equipped with the F=4~12mm F1.2 1/2" objective – a possibility of an optimal setup of the observed scene.

CAMERA KA6N

Type 2 camera **is** installed in an air-conditioned protective cover IP66, on a relevant bracket for the respective cover. The bracket **is** fixed to the side-wall of the switchroom in BO 103, in the height of approx. 9 m – opposite to the end of the slag elevator of the boiler 3. The camera **monitor** the end of the slag elevator and the place of landing the slag in the unsorted slag yard. The camera **is** equipped with the F=4~12mm F1.2 1/2" objective – a possibility of an optimal setup of the observed scene.

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CAMERA KA7N

Type 2 camera **is** installed in an air-conditioned protective cover IP66, on a relevant bracket for the respective cover. The bracket **is** fixed to the side-wall of SO 101, under the crane runway, above the hopper of the boiler 2. The camera **monitor** the hopper and its direct neighbourhood. The camera **is** equipped with the F = 3~8mm F1.0 1/3" objective – a possibility of an optimal setup of the observed scene.

CAMERA KA8N

Type 2 camera **is** installed in an air-conditioned protective cover IP66, on a relevant bracket for the respective cover. The bracket **is** fixed to the side-wall of SO 101, under the crane runway, above the hopper of the boiler 3. The camera **monitor** the hopper and its direct neighbourhood. The camera **is** equipped with the F = 3~8mm F1.0 1/3" objective – a possibility of an optimal setup of the observed scene.

CAMERA KA9N

Type 2 camera **is** installed in an air-conditioned protective cover IP66, on a relevant bracket for the respective cover. The bracket **is** fixed to the side-wall of the crane-operator's cab J1 in BO101. The camera **monitor** the waste pit. The camera will be equipped with the F = 3~8mm F1.0 1/3" objective – a possibility of an optimal setup of the observed scene.

CAMERA KA10N

Type 2 camera **is** installed in an air-conditioned protective cover IP66, on a relevant bracket for the respective cover. The bracket **is** fixed to the side-wall of the crane-operator's cab J2 in SO101. The camera **monitor** the waste pit – the waste pit filling area. The camera **is** equipped with the F = 3~8mm F1.0 1/3" objective – a possibility of an optimal setup of the observed scene.

CAMERA KA11N

Type 2 camera **is** installed in an air-conditioned protective cover IP66, on a relevant bracket for the respective cover. The bracket **is** fixed to the wall of the disposer hall in BO 401. The camera **monitor** the disposer hall – **the waste pit** area. The camera **is** equipped with the F = 2.8~11mm F1.4 1/3" objective – a possibility of an optimal setup of the observed scene.

CAMERA KA12N

Type 2 camera **is** installed in an air-conditioned protective cover IP66, on a relevant bracket for the respective cover. The bracket **is** fixed to the wall of the turbine hall in BO 401. The camera **monitor** the turbine hall. The camera **is** equipped with the F = 2.8~11mm F1.4 1/3" objective – a possibility of an optimal setup of the observed scene.

CAMERA KA13N

Type 2 camera **is** installed in an air-conditioned protective cover IP66, on a relevant bracket for the respective cover. The bracket **is** fixed to the wall of the waste final sorting hall in BO401. The camera **monitor** final sorting lines. The camera **is** equipped with the F = 2.8~11mm F1.4 1/3" objective – a possibility of an optimal setup of the observed scene.

CAMERA KA14N

Type 2 camera **is** installed in an air-conditioned protective cover IP66, on a relevant bracket for the respective cover. The bracket **is** fixed to the construction of the shelter above the access area to the final waste sorting hall in BO401. The camera **monitor** vehicles in front of the final waste sorting hall. The camera **is** equipped with the F = 2.8~11mm F1.4 1/3" objective – a possibility of an optimal setup of the observed scene.

CAMERA KA15N

Type 2 camera **is** installed on an internal bracket, non-covered. The bracket **is** fixed under the lower ceiling, on the wall of the new control room in SO 401. The camera **monitor** the service workplaces in the control room and a staff move in this area. The camera **is** equipped with the F = 3.5~8mm F1.4 1/3" objective – a possibility of an optimal setup of the observed scene.

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CAMERA KA20

The existing camera of TC 554AX type **is** installed in the existing air-conditioned protective cover TC 9388-4, on a relevant bracket for the respective cover. The bracket **is** fixed to the connection bridge construction – between BO106 and the administration and social building. The camera **monitor** the service workplaces in the control room and a staff move in this area.

Technical parameters of the designed cameras

Colour camera, type 1

Supply voltage:	12 V DC, approx. 330 mA, 24 V AC, 50 Hz, approx. 300 mA $\pm 10\%$,.
Input:	5.0 W
Sensor:	1/2" CCD 625 lines, 50 fields/s, 50 Hz
Sensitivity:	0,11lux
Video-outlet:	1.0 Vpp (75 Ω), BNC
Remote control:	RS485 and RS232
Range of operation temperatures:	-10 to +50 °C

Colour IP camera, type 2

Supply voltage:	24 V AC $\pm 10\%$, 50 Hz, Power Over Ethernet (PoE), 500 mA max.
Input:	6.0 W
Sensor:	1/3" CCD 540 lines
Sensitivity:	0,4 lux
Video-outlet:	1.0 Vpp (75 Ω), BNC
LAN connection:	RJ45 (10 BaseT Ethernet, 100 BaseTX Fast Ethernet, auto-sensing, full/hal duplex)
Image format:	QCIF (176x144), CIF (352x288), 2CIF (704x288), 4CIF (704x576): max 25 ips
Image compression:	MJPEG or MPEG4, user configurable image frame quality, streaming up to 25 images per sec.
Range of operation temperatures:	-10 to +50 °C

For the camera locations see the layout floor drawings of appropriate SOs.

2.4 CCTV LINES

Inside the appropriate building object of SAKO Brno, a.s. the coaxial cables RG59, screened twisted 4-pair cables F/UTP and multi-mode and single-mode optic cables **are** installed in separate cable lines – mainly in metal cable troughs that **are** fixed to walls and ceilings by hangers and outriggers. They can be possibly installed on steel structures. Trough branches **are** mainly made of armoured pipes that **are** fixed to walls, ceilings, possibly to steel structures. They **are** possibly installed in plastic or wire installation troughs, fixed on the walls.

A part of the cable lines **are** made of metal cable troughs that **are** installed in common cable trays / in common cable ascending for the weak current distributions.

The cables in protected escape ways **are** installed in pipes, concealed, in fire-separated troughs or in fire lower ceilings.

Installation of the cables and CCTV lines, their side-runs and crossings, as well as side-runs and

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crossings with other existing electric cables and networks are done in compliance with all valid ČSN and must not be exposed to unwanted electromagnetic, heat and other effects that could disturb the transmission or damage the cabling.

For the detail design of the lines see the ground plans of individual floors and BO.

2.5 ADMINISTRATION CENTRE

19" box – capacitive high of 45U, base dimensions 600x600mm, installed in the new control room in BO 401 – are become the centre of the CCTV system in SAKO Brno, a.s.

The RD CCTV box **is** installed in the corner of the new control room BO 401. In this box there **are** installed optic/metallic converters, video signal active adapters, IP coders, converters 100 Base-TX / 100 Base-FX , metallic patch panels, optic switchboards (terminations of video signal optic cables and backbone cables of the LAN-CCTV network), active elements of the LAN-CCTV network.

19" box RD4.2 in **the room next to the** existing control room in BO 106 and the main structured cabling switchboard RD2 in the Administration and social building **are** the secondary CCTV centres.

Necessary overvoltage protections for video distributions, active video signal adapters, optic/metallic converters, videomatrix (that will work the video signals for crane operators in Waste container hall), digital recorders, optic distributions (terminations of the backbone cables of the LAN-CCTV network), active LAN-CCTV elements **are** installed in switchboard box RD4.2 in BO 106.

The existing PTV equipment (installed in the existing 19" box) in the existing control room will be dismantled after the operation of boiler K1 is finished.

The existing structured cabling switchboard RD2 in the Administration and social building **is** extended with an optic switchboard (termination of backbone cables of the LAN-CCTV network) and with active LAN-CCTV network elements.

The existing switchboard of the structured cabling RD1 in the administration building **is** completed with active elements of LAN-CCTV network.

2.6 MONITORS

Monitor M1

Type 1 monitor **is** hang on a telescopic hinge under the ceiling of the new control room in BO 401 – above the service workplace of the boiler 2. The operator can see only the KA1N camera view (combustion chamber of the boiler 2) on this monitor.

Monitor M2

Type 1 monitor **is** hang on a telescopic hinge under the ceiling of the new control room in BO 401 – above the service workplace of the boiler 3. The operator can see only the KA1N camera view (combustion chamber of the boiler 3) on this monitor.

Monitor M3

Type 1 monitor **is** hang on a telescopic hinge under the ceiling of the new control room in BO 401 – above the service workplace of the boiler 2. The operator can see only the KA3N camera view (water-glass of the boiler 2).

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Monitor M4

Type 1 monitor **is** hang on a telescopic hinge under the ceiling of the new control room in BO 401 – above the service workplace of the boiler 3. The operator can see only the KA4N camera view (water-glass of the boiler 3).

Monitor M5

Type 2 monitor **is** installed in the new control room in BO 401, in the service workplace of the boiler 2, in the area that is reserved for the CCTV operator. The operator can see selected camera views on this monitor. This monitor also serve as the video-server operator's monitor and will display possible alarm information.

Monitor M6

Type 2 monitor **is** installed in the new control room in BO 401, in the service workplace of the boiler 3, in the area that is reserved for the CCTV operator. The operator can see selected camera views by the help of the SW client installed on the respective PC.

Monitor M7

Type 3 monitor **is** installed on a rack in the crane-operator's cab J1. The crane-operator can see selected camera views that can be selected by the help of the control keyboard OS J1.

Monitor M8

Type 3 monitor **is** installed on a rack in the crane-operator's cab J2. The crane-operator can see selected camera views that can be selected by the help of the control keyboard OS J2.

Monitor M9

Type 5 monitor **is** installed in **the room next to the** existing control room in BO 106, in the box RD4.2. If necessary, the operator can see selected camera views on this monitor. This monitor also serve for the operator of the digital recorders that are installed in the box RD4.2.

Monitor M10

Type 4 monitor **is** installed on the desk of the director of the incinerator division. It **is** possible to see selected camera views on this monitor (according to the level of the access licence) by the help of the SW client installed on the respective PC.

Monitor M11

Type 4 monitor **is** installed on the desk of the service chief. It **is** possible to see selected camera views on this monitor (according to the level of the access licence) by the help of the SW client installed on the respective PC.

Monitor M12

Type 4 monitor **is** installed on the desk of the service chief. It **is** possible to see selected camera views on this monitor (according to the level of the access licence) by the help of the SW client installed on the respective PC.

Monitor M13

Type 4 monitor **is** installed on the desk in the gatehouse. It **is** possible to see selected camera views on this monitor (according to the level of the access licence) by the help of the SW client installed on the respective PC.

Monitor M14

Type 3 monitor **is installed on a table in the cabin of crusher. The crusher-operator can see only cameras observed the waste pit area.**

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Technical parameters of the designed monitors

Colour professional LCD monitor, type 1

Diagonal: 21,3"
 Format: 4:3
 Dimensions: 499 x 410 x 100 mm
 Weight: 8 kg
 Supply: 230V/50 Hz
 Input: 50W
 Display surface dimensions: 432x324 mm (1600x1200 pixels)
 Brightness: 300 cd/m2
 Contrast: 1000:1
 Response time: 8 ms
 Observation angle /V: 178/178°
 Interface: RGB-analogue / DVI-digital/Composite / Y/C

Colour LCD monitor, type 2

Diagonal: 21,3"
 Format: 4:3
 Dimensions: 465 x 453 x 209 mm
 Weight: 9,7 kg
 Supply: 230V/50 Hz
 Input: 70W
 Display surface dimensions: 432 x 324 mm (1600x1200 pixels)
 Brightness: 300 cd/m2
 Contrast: 1000:1
 Response time: 8 ms
 Observation angle H/V: 178/178°
 Interface: DVI-I + VGA

Colour LCD monitor, type 3

Diagonal: 15"
 Format: 4:3
 Dimensions: 349.0 x 272.0 x 62.5 mm
 Weight: 6,9 kg
 Supply: 230V/50 Hz
 Input: 50W
 Display surface dimensions: 1024x768 pixels
 Brightness: 250 cd/m2
 Contrast: 500:1
 Response time: 5 ms
 Observation angle H/V: 70/60°
 Interface: 1x VGA/DVI, 1x S-Video, 2x Video BNC looped

Colour LCD monitor, type 4

Diagonal: 19"
 Format: 4:3
 Dimensions: 354 x 412 x 264 mm
 Weight: 6,0 kg
 Supply: 230V/50 Hz
 Input: 36 W
 Display surface dimensions: 1280x1024 pixels

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Brightness: 300 cd/m2
 Contrast: 800:1
 Response time: 5 ms
 Observation angle H/V: 170/170°
 Interface: 1x VGA/DVI

Colour Rack LCD monitor with keyboard, type 5

Diagonal: 17"
 Format: 4:3
 Dimensions: 44.45 × 476.25 × 555.75 mm
 Weight: 14,7 kg
 Supply: 230V/50 Hz
 Input: 50W
 Display surface dimensions: 1280x1024 pixels
 Interface: 1x VGA

2.7 CCTV SUPPLY

Supply network

Cameras: 24V AC, SELV
 CCTV equipment: 1NPE AC 50Hz, 230V-TN-S
 12V DC, SELV

Electric shock protection acc. to ČSN 33 2000-4-41

Automatic disconnection from the supply.
 Safe voltage (system operational voltage is 12V DC / 24V AC).

The whole CCTV integrated system is supplied from one phase L1, one PE safety conductor and one neutral wire N.

In the BO 401, in the switchroom on the floor ±0,000m there is installed a new LV switchboard intended for the supply of the CCTV – RP1 CCTV system. This switchboard is supplied from a distribution that will be backed up from the central UPS – from the switchboard RZN, field 1, outlet 823.

In the room next to the existing control room in BO 106, there is installed a new switchboard intended for the supply of the CCTV – RP2 CCTV system. This switchboard is supplied from a distribution that will be backed up from the central UPS – from the switchboard RZN, field 2, outlet 863. Power cables of the existing equipment of the CCTV system are re-laid to the switchboard RP2 CCTV and will be used in the future.

Power cables of the switchboards RP1 CCTV and RP2 CCTV, marked CCTV-W201 and CCTV-W202, are solved within the framework of the heavy current distributions in PS407.

Both – existing and new-installed CCTV equipment are supplied from the switchboards RP1 CCTV and RP2 CCTV. For the supply of the CCTV equipment the cables of CYKY-J type are used. These cables are installed either together with the heavy current distributions, or separately.

Power outlets 230V/6A(10A) for the CCTV supply are equipped with surge arresters, class III.

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2.8 AMBIENT ACC. TO ČSN 33 2000-5-51

External effects (ambient type) for individual internal and external areas have been determined in the "Protocol on external effects" prepared by an expert committee of TKB Kovoprojekta Brno according to ČSN 33 2000-3 and ČSN 33 2000-5-51. This Protocol is a part of the "Accompanying Report" of the building permit documentation.

2.9 FIRE PRECAUTIONS

All ceiling and walls breakthroughs, as well as fire cell limits, **are** prepared as fire stops. On inlets and outlets through the walls and ceilings the cables **are** treated with a uniform fire system – specified in the building part.

Each fire breakthrough must be equipped with a label with the company data and with the date of the installation.

2.10 REQUIREMENTS TO EMPLOYER

Employer should be, in co-operation with provider, work up current maintenance plan for CCTV system with description requirements for cleaning cameras, regular system inspection and regular electro – revision.

As well should be designate a person responsible for the operation of the CCTV system, advice CCTV system to "UOOU", person delegate for maintenance and the operation appliance.

The employer must advice the local fire brigade of the commissioning of EFA

If the employer is not able to provide the maintenance and the operation with his/her workers, he/she must contract these works with other company.

2.11 MEASUREMENT CHECK

After the installation of all cameras, cables, switchboards, sockets and other components is finished, a visual check of the whole system **was** done. Also the completeness and accuracy of marking of sockets and switchboard panels **were** checked. Consequently all necessary functional tests of the system **were** done and the system will be commissioned.

With new installed cameras the camera tests **were** done.

All installed outlets and backbone LAN-CCTV structured cabling interconnections **were** measured and evaluated in compliance with ČSN EN 50173 and ČSN EN 50346.

Measured values **were** entered to the measurement protocols that **were** parts of the as-built documentation **of maker**.

Also the starting revision of earthing the switchboard racks and new installed CCTV supplies **were** a part of the hand-over of maker.

2.12 WASTE DISPOSAL

To meet his/her supply contract provisions the supplier of the electric assembly work must provide the waste disposal acc. to the Law No.106/2005 of the Code on the wastes and according to the executive edicts No. 381, 383, 376/2001 and 115/2002.