Corps of Engineers
Europe District

Specifications for Project

New installation of a PA/MSN and clock system in Bldg's # T-233, T234 and T-283, Elementary/High School, Lajes, Azores

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SPECIAL CONDITIONS

1. Applicable Regulations

- NFPA 101 – Life Safety Code
- Accident prevention directives of the trade associations
- Fire prevention directives
- Installation instructions of the manufacturer

2. Standards for materials

All materials shall be new, shall conform with current applicable industry standards and shall be IMQ labeled, where applicable, unless otherwise indicated.
Defective or damaged materials shall be replaced or repaired prior to final acceptance in a manner which meets the approval of the Contracting Officer at no additional cost to the Owner.
All equipment and material shall comply with the latest standards for EIA/TIA, IEEE, NEC, ANSI and ASTM, UNI, VDE, EN, IEC and ISO.
The National Electric Code and CEI and IEC norms shall apply as minimum requirements only and not as design criteria.
All applicable local, State and Building Industry, Consulting Service, International construction standards and practices shall be followed.

If any equipment described in this specification is not anymore available on the market the newer substitution product shall be provided.

WORK DESCRIPTION

The following project covers the new installation of an intercom and PA loudspeaker system and the replacement of the existing clock system (main clock and slave clocks) in the Elementary / High School, as mentioned on first page, in Lajes, Azores.

The following work shall be performed:

1. Removal work

In all buildings the existing PA loudspeakers systems shall be removed in all office rooms, classrooms, training rooms, corridors and exterior walls.

The existing intercom shall remain. The new PA central station in central office (room 301) of the building shall be fully removed.

2. PA loudspeaker and clock system

The combined head station of the existing intercom (shall remain) and new PA system shall be installed in central office area (301, 301A-D).
All intercom call points and loudspeakers are controlled from there.

The PA loudspeaker system – consisting of loudspeakers in the corridors, stairwells, multi-purpose room and in the outdoor area – shall be replaced.
The existing intercom and new PA loudspeaker systems are to be linked together.

Using the intercom call points in the classrooms, offices, gym etc. it must be possible to establish a voice connection between any two points throughout the entire building.

Using the intercom call points in the school's admin office and in the office of the school Principal, a group call (actuation of all intercom call points and PA loudspeakers) can be triggered for each school area.

The areas of the PA loudspeaker system are divided into corridors/stairwells, gym, media center, multipurpose room and outdoor area.

3. Installation work

Installation work includes all materials and work required for the installation of the above described systems, e.g. dismantling and re-assembly of various types of suspended ceiling, the making and closing of penetrations, making of cable trenches, installation of cable trough wire raceways, fire protection work, repairs, scaffolding, clean-up, as built-drawings etc., as well as cordoning off and safety measures during excavation work.

The following work shall be performed:

- Replacement of the PA loudspeaker system (interior and exterior) incl. supply network in E30 (fire rated cable).
- Replacement of PA loudspeaker system central station
- Replacement of the existing clock system with main clock and slave clocks.
- Connecting of the break signal (from the clock system) and the later fire alarm signal (from the fire alarm main panel) to the PA loudspeaker and intercom system.
- Control for an evacuation signal (only possible through the call point in the school admin and school director's office) and connection to the PA loudspeaker system and intercom system.

4. General

Damage caused by the contractor shall be repaired by the contractor without extra remuneration.

It is recommended that the Contractor inspect the site conditions prior to the submission of bid.

The contractor must, where necessary, take suitable action to protect existing cables, lines and fittings against damage, e.g. by detecting with metal detector etc.

Work shall be scheduled and carried out in such a way as to ensure that school operations are interrupted as little as possible and that no interruption exceeds 2 hours. This must be coordinated at least 24 hours in advance with the COR and the School Principal.
(Only in the case of work outside the US school vacation)

Approval for such shutdowns and interruptions shall be requested in advance from COR and shall only be permissible if approved by the COR. The contractor must ensure strict compliance with the agreed arrangements.

Costs for all work and services described in this work description shall be calculated with the items of these specifications unless these services are listed separately in the specifications.

Technical details and scope of work are contained in the drawings and the specifications.

Item	Description

SPECIFICATIONS

1. REMOVAL WORK

1.1 Dismantling work

Dismantling work includes the disconnection, removal of all accessories such as conduits, ducts, hangers, receptacles, boxes, fixing and mounting equipment, if not otherwise specified.

Material and devices that can be reused shall be handed over to the COR against receipt.

All dismantled and removed material shall become the property of the Contractor, and shall be hauled off and disposed of IAW regulations.

The following removal work is planned only for the PA and clock system.

Removal work

- All PA loudspeakers incl. suppling network.
- Wall/floor mounted cabinets with intercom central station, PA system and master clock.

Item	Description
1.1.10	Components for PA loudspeaker system and master clock, consisting of: – Electro-acoustic amplifiers – Master clock – Telecom distribution panel, surface mounted – UPS behind each amplifier rack (belongs to the school) shall be removed completely, reusable material turned in to the local school manager against receipt, other material hauled off and disposed IAW regulations.
1.1.20	Wall- and ceiling mounted loudspeakers belonging to the PA system (indoor and outdoor) shall be removed workmanlike and turned in to local facility manager. Installation height up to 3.5 m above finished floor. Damaged loudspeakers shall be disposed of IAW regulations.
1.1.30	Communications cables (only exposed installation), 2 pair to 40 pair existing type and mode of installation, complete with all insulating conduits, small cable ducts, fixing and installation material.
1.1.40	Communications cables (only exposed installation), 40 pair to 100 pair existing type and mode of installation, complete with all insulating conduits, small cable ducts, fixing and installation material.
1.1.50	Plastic cable duct up to 65 x 110 mm, complete with fixing and installation material.
1.1.60	Communications distribution board, surface mounted,

Item	Description
	equipped with up to 300 pairs, shall be fully removed.
1.1.70	Existing loudspeakers of multipurpose room shall be checked for proper functioning. Defect loudspeakers shall be removed and disposed of. Installation height approx. 4.0 m above FFL.
1.1.80	Removal of electrical power outlets (complete electrical installation) behind existing PA/intercom rack in room 301. Removal shall include conduits and channels for electrical cables. The contractor needs to find out if this individual branch circuit is needed anymore. If not, remove the electrical feeder from the electrical panel.

Item	Description

2. PA- LOUDSPEAKER SYSTEM

2.1 Installation:

The following components of the intercom and PA loudspeaker system shall be furnished and installed ready for operation together with all required installation and mounting material.
All cables for the installation of the loudspeakers shall be with carried out with wiring cable (E30/FE180).
The fastenings of the cables and wiring must comply with the fire protection regulations.

The following regulations must be observed during the installation of the intercom and PA loudspeaker system:

- IEC 60849 (VDE 0828 - Part 1) :
  PA emergency warning systems
- EN 50174 (VDE 0800 - Part 174) :
  IT installation of cable systems
- EN 60065 (VDE 0800 + VDE 0860) :
  Safety regulations for mains-operated electronic devices and their accessories
- IEC 92/53 :
  Safety regulations for audio, video and similar devices
- 72/23/EWG :
  Low-voltage guideline.

Item	Description
	The following items are required for the installation of the PA loudspeaker system and shall be installed in coordination with the school management, if necessary after school hours or on Sundays and holidays.
	Prior to the start of work, the location of all intercom call points, loudspeakers, substations and main control stations etc. shall be determined and marked with the local representative of the COR and the School Management.
	The existing and to be demolished PA system is fed by 110 V electrical power. *The new Public Announcement system shall be a 220V powered system. For that purpose it's necessary to deliver a 230/380V supply cable to the Central PA head station and to the substations from the nearest available point.*
	19" – wall mounted / floor standing cabinet
2.1.10	Floor mounted cabinet for 45 height modules, consisting of:
	1 ea. Cabinet base frame of aluminum, die-cast aluminum sections.
	1 ea. Front door with 3 mm single-pane safety glass with holes at sides (diameter approx. 3 mm) for air entry for optimum air throughput in cabinets with high percentage of active equipment, incl. ergonomically formed S-shaped handle with lock.
	1 ea. Rear panel.
	2 ea. Side panels
	1 ea. Base, ventilated, height approx. 100 mm; with ventilation slots (front/back and left/right) and appropriate filter inserts;

cont. 2.1.10

Item	Description
	Fan roof, modular type, as roof plate with cutout foran mounting and cable entry, equipped with 2 fans, thermostat-control and perforated ventilation pin, fully wired and connected ready for operation;
	Swivel frame for 19" built-in components, swivel area up to 180 degrees, height for 36 modules, with masks to cover the remaining free space at the sides, incl. required mounting set for swivel frame with 180 degree hinges.
	System frame construction, for mounting in the bottom row of hinges, as empty field, for the installation of an UPS (item 2.1.30) with heavy-load supporting system.
	Mounting plate, dimensions H/W = approx. 1300 x 790 mm, installed in rear area of cabinet;
	Cable holding rail, mounted in the upper rear area of cabinet
	Equipment base plate, perforated, with drawable, admissible weight approx. 50 kg, dimensions W/D = approx. 671 x 500 mm, incl. telescopic rails and telescopic rails and built-in equipment:
.	LSA-PLUS-1 connection modules, 20 pair for a total of 340 pairs, incl. labels and lettering, with mounting trays and raceways as cable management raceways, mounted on the mounting plate in the rear area of the cabinet.
	Connection and marshalling of incoming and outgoing weak current cables as halogen-free cable and/or cable with functional endurance; approx. 300 pairs are to be connected.
	Grounding type receptacle block, 5-outlet type, with overvoltage protection and interference suppressor filter, without switch, mounted in the rear part of the cabinet on the frame and/or on the mounting plate;

cont. 2.1.10

Item	Description
	Equipotential bonding of all built-in parts and devices incl. furnishing of the required material, shall be fabricated.
	Cabinet dimensions: approx. H/W/D = 2000x800x600mm, hang on wall ready for operation, with wall fixing angle, incl. all devices, built-in components etc. from items 2.1.20 to 2.1.60 etc. incl. the entire wiring, the connection and fixing material and the other switchgear and fuse protection required for the proper operation and function of this system, complete with all accessories, shall be installed and connected ready for operation, incl. the connections and the required connection cables to the existing nearest electrical system (sub distribution in electrical room etc.), and the appropriate fuse protection, type C 16 A etc., which is to be installed there; with cable jumpering duct for covering the cable lead-ins.
	All built-in components must be fabricated in German and English.
	Make./Type: RITTAL / TS8-Series
	Location: IAW instructions of COR

Item	Description
	Components for PA loudspeaker / clock system
2.1.20	Digital, central system processor
	Digital, microprocessor controlled central unit for controlling and monitoring all system functions. Multichannel audio control and system routing system with manual and automatic control functions, modular configuration, equipped with the required hardware and software functions: Key performance features: 4 x 4 audio/switch matrix for PA loudspeaker system and ProSound, digital 24-bit audio signal processing, dynamic range > 100 dB, logic control matrix with 10 inputs and 7 outputs, floating, modular, state-of-the-art multi-channel technology. Simultaneous paging in various zones, 100 priority steps for priority management of music, messages, bell, alarm emergency microphone, built-in digital generator for bell signals and as option: digital direct recording and playback of texts up to max. 4 minutes, message stacking if circuits are occupied for feedback suppression. PC-software under Windows 95 / 98 TM with graphic user interface for configuration (on line/off line) operation and test, with menu, automatic recognition of connected hardware components, password protection on several levels, editing via display call points. Inputs for direct connection of call points, microphones, CD, tuner, tape, mixing panel, etc, with digital remote controllable level adjusters and filters per channel for sound control (3-band EQ, Lo/Hi Shelving, Lo/Hi Cut, parametric equalizer), acoustic control and with real-time display.

Item	Description
cont. 2.1.20	
	Outputs for connection to power amplifier or location audio systems, with digital, remote controllable output adjusters and integrated delays up to 340 ms per channel of period balancing in acoustically difficult surroundings. Manual and automatic control functions, programmable macros for control of messages, gong and alarm signals, text replay, background music, LCD text output, monitoring, source changeover, etc. several functions as sequences combinable with logical connections and temporal processes, whereby complex control processes can be applied to a single action, triggering by special function keys at call points, control inputs or internal time control. Security features: Self monitoring IAW EN 60849 – electro acoustic emergency warning systems Monitoring of all internal functions as well as the connection call points, the amplifiers, the control system and the interface lines. Signal generator and analysis for pilot tone monitoring of audio patch with connecting lines automatic error logging (option) error messages in plain text of call point displays REMOTE configuration, control, maintenance, software update via modem Digital loudspeaker monitoring (option) with the measuring criteria: ground fault, line interruption, line short circuit, impedance Transitionless changeover to emergency power operation. Power management for reduction of power consumption and for maximum operation period in battery mode. Other features: System main clock, quartz controlled, (DCF 77 – Option), integrated control for 40 slave clocks, easy to operate switching computer (500 switch events programmable) for time control of events, calendar

Item	Description
cont. 2.1.20	
	Sound level adjustors for all inputs and outputs, incl. internal signals, remote controllable, pre-programmable panic level for emergency messages Automatic fade out and fade in of background music during message and other signal that have high priority Monitor bus and monitor amplifier for listening to power amplifiers and internal inputs and outputs Status LED displays for error, operation, battery and mains 19" chassis (2 height units) CE-Approval Inputs and outputs: 4 audio inputs, universally configurable, up to 16 call points connectable, electronically symmetric, transformer optional, with pilot tone monitoring and monitor bus 4 audio outputs, electronically symmetric, transformer optional, with pilot tone monitoring and monitor bus 10 ground-free, bipolar control inputs with freely definable functions 7 floating control outputs with freely definable functions Slave clock output with pole changer impulses Error reporting output (READY / FAULT) for remote display of device faults, floating Monitor output for loudspeaker or headset connection DCF 77 receiver input, 2-wire connection 2 inputs slots with board ID recognition for: 2-channel call point module for the connection of 2 x 4 call points MIC/LINE + 2 AUX input module for external audio sources of all types, with pilot tone monitoring 2-channel MIC/LINE input modules for microphones, mixing panel, etc., compressor/limiter selectable, with pilot tone monitoring 2 channel AUX input module for CD, tape, tuner, with pilot tone monitoring MIC/LINE + call point module for the connection of 4 call points and microphone, mixing panel etc., 2 output slots with board ID recognition for: 2-channel LINE output module,

Item	Description

cont. 2.1.20

0 dB / +6 dB output sound level

1 control slot with board ID recognition for:
8 I/O control modules, with 8 floating control inputs and 7 floating outputs, programmable, incl. one slave clock output with polarity change impulses, for logic signals 0 V / 24 V, with fail-safe circuit

Interfaces:
RS-232 and wireless IrDA interface for PC connection
RS-485 remote interface for amplifier of DPA 4000 series and DCS 400 control system
Optional serial interface for control of external devices and as interface to other building systems

Technical data:

Voltage supply:	24 V DC, -10 / +30 %
Rated power input:	500 mA
Max power input:	6.7 A
Audio inputs:	Call points +6 dBu
MIC	-54 dBu ... -14 dBu
LINE	-24 dBu ... +16 dBu
AUX	-10 dBu ... +12 dBu
Audio outputs:	0 dBu / +6 dBu
Transmission range:	20 ... 20 kHz +/- 0.5 dB
Dynamic:	> 100 dB
Harmonic distortion:	< 0,01 %
Data format:	18 bit AD, 64x oversampling
	20 bit DA, 8x oversampling
	24 bit internal
Sampling rate:	48 kHz
Security check:	EN 60065.
EMV-test:	EN 50081-1/EN 50082-1

Control unit equipped with:
Inputs:
1x NRS 90234 call point input
DCF77 receiver
Controller Board:
1x DCS 401, digital Controller Board
Output relay:
2x DCS 408, line relay board with
2x DCS 412, digital input contacts

Item	Description
cont. 2.1.20	Connection terminal: 1x NRS 90226, connection field 2x with RJ45 Network: 1x NRS 90241 network module Software licenses: 1x software code Gong 1x software code Text 1x software code Clock 1x software code Safety 1x software code Line Monitoring Make: DYNACORD PROMATRIX Type: DPM 4000 shall be furnished and installed ready for operation.
2.1.30	Power amplifier 400 W IAW IEC 268-3, equipped with the required functions for the specified system: Key features: – Random high and low ohm loudspeaker systems operable, i.e. optionally 100 V or low 4-Ohm loudspeakers can be connected. – By using a remote input module (Option) the power amplifier can be controlled and monitored remotely. – Mains and emergency power supply operation with remote control. Security features: – Fault message IAW DIN/IEC 849 (electro acoustic emergency warning systems DIN EN 60849) – Remote operation and monitoring (option: NRS 90222) – Ground fault monitoring IAW DIN/VDE 0800 and pilot tone monitoring (Option: NRS 90224) – 24 V emergency power supply – CE-Approval

Item	Description
cont. 2.1.30	

Other features:

- Input (XLR) line 0 dBu, electr. symm./ transformer (Option: NRS 90208), level adjuster
- Remote switch on for mains and emergency power supply with switch-on current limiter, integrated standby power pack
- Output rating 400 W IAW IEC 268-3, end step idling proof and short-circuit proof
- 100 V loudspeaker system, symmetric ground free, optionally 70 V, 50 V or low resistance 4 Ohm
- D- and E relays for single call / mandatory reception
- Switch-on noise suppression
- Mains switch
- Test key "Test" for emergency switchover
- Groundlift switch
- Active temperature controlled ventilation
- Status LED displays for operation (ready), standby,
  ground fault and test
- Mains voltage section switch: 115/230 V AC
- LED analysis display from -13 dB to 0 dB and Clip
- Monitor output, electr. symm., transformer optional (NRS 90227)
- 19" rack (3 height units)

Technical data:

Nom. input level:	0 dBu = 775 mV, electr. symm
Nom. input impedance:	> 10 kOhm
Nom. output power:	400 W IAW IEC 268-3
Nom. load impedance:	25 Ohm/100 V 12.5 Ohm/70 V 6.25 Ohm/50 V 4 Ohm/40 V

Item	Description
cont. 2.1.30	

Transmission range: 60 - 20,000 kHz +/-3 dB
Harmonic distortion: < 1% at 1 kHz and nom. load
Fault voltage (A): < -56 dBu
Noise voltage distance: 98 dB (A)
Monitor output: 2 V/600 Ohm
Voltage supply: 230 V/115 VAC,50/60 Hz
Safety class 1
Emergency power supply: 24 V DC / 0.6 - 17.3 A
Size (W x H x D):
19" (483 mm) x 3 HU (132 mm) x 345 mm
Inst. depth: 400 mm (with connectors)
Weight: 16.7 kg
Color: charcoal gray

Safety test: EN 60065 (VDE 0860)
EMV-test: EN 50081-1/EN 50082-1
EN 60555-2

Power amplifier each equipped with:

Inputs:
1x NRS 90222
Ground fault and pilot monitoring:
1x NRS 90224

Make: DYNACORD or approved equal
Type: DPA 4120

Item	Description

2.1.40 Power pack

19" power pack withdrawable unit IAW regulations EN 60065 (electric safety), EN 50081/50082 (EMV law). Primary switched mode power supply unit, short-circuit-resistant, with forced ventilation through DC fan for operating voltage power supply of 24 V dc current consumers in PA systems.
Front side, coverable main mains switch, status display LEDs for mains and battery. Outputs for mains remote switching on of end amplifiers, equipped with the required hardware and software functions for the specified system:

- Main voltage 104 – 127 V AC / 207 – 253 V AC, internal
- Changeover type, with smooth start-up
- Battery input for emergency power supply
- Mains output via connector for non-heating devices,
  switched max. 1A
- Delayed control output for triggering of alarm and gong
- Output direct 24 V max. 4 A
- Output 24 V switched
- Uninterruptible emergency power supply possible through connection of external battery module
- Output for consumers to be supplied without interruption, max. 4 A
- Output for mains failure recognition (Power Fail)

Technical data:

Operating voltage:	230V AC / 115V AC
Battery voltage:	24 V DC (-10 % - +30 %)
Nom. output voltage:	24V DC.
Nom. output current:	4 A
Size: (WxHxD):	483x88x330 mm / 2 HU
Inst. depth with connector:	400 mm
Weight:	7 kg

Item	Description
cont. 2.1.40	Color: charcoal gray Safety test: EN 60065 (VDE 0860) EMV-test: EN 55022 (B) / EN 50082-1 / EN 61000 4-2...4-6 ENV 50204 Make: DYNACORD or approved equal Type: DPP 4004
2.1.50	Battery charging unit 24 V/4 A Fully automatic charging unit with primary switch controller for constant I/U battery charging in continuous battery power supply. Integrated battery monitoring mode with 5x LED display and floating group fault reporting contact for control of overvoltage, exhaustive discharge of battery, mains- and battery voltage, loading circuit and short circuit and polarity reversal. Temperature tracking of the charging voltage in active standby operation; volt-/ampere meter with 3-digit LCD-display Operating voltage: 230 V/115 V +10% -15%, 50 - 60 Hz Safety class: I Nom. output voltage: 24 V Nom load. current: 4 A Size: (WxHxD): 483 x 88 x 335 mm / 2 HU Weight: 4.5 kg Color: black, Make: DYNACORD or approved equal Type: DEM 313

Item	Description
2.1.60	Battery unit 19" unit with VDS approval batteries, IAW applicable standards DIN 57 510, DIN 43 534, DIN 43 539 part 5 and VDE 0510. Fully maintenance free, location independent lead batteries in pasted plate and fleece technology with electrolyte in special separators. Safety elements for limiting of output currents (line protection) and relays for switching off consumers (exhaustive discharge). Size: (WxHxD): 483 x 178 x 360 mm / 4 HU Weight: 37 kg Make: DYNACORD or approved equal Type: DEM 316
2.1.70	Universal input module, for 8 mixable and level-adjustable inputs and 8 individual outputs with level adjustor. Technical data: – Supply voltage 24 V DC (21.6 .. 31.2 V DC) – Nom. power input (24 V) 700 mA – Max. power input (24 V) 975 mA – Audio inputs 4 x MIC / LINE, 4 x AUX, 1 x MIX IN – MIC/LINE inputs XLR jacks, electr. symmetric, transformer optional – Nom. input level MIC: -60 .. -10 dBu / 0.8 mV .. 245 mV LINE: -30 .. +20 dBu / 25 mV .. 7.75 V – Max. input level MIC: +11 dBu / 2.75 V LINE: +30 dBu / 24.5 V – Input impedance MIC: 3.6 kOhm LINE: 10 kOhm

Item	Description
cont. 2.1.70	
	– Common mode rejection > 50 dB
	– Limiter oper. range -10 dBu.. +20 dBu (MIC/LINE 1)
	– AUX inputs each 2x cinch, asymmetric
	– Nom. input level -6 dBu and/or +4 dBu / 390 mV and/or 1.23 V, internally configurable
	– Max. input level +15 dBu and/or +25 dBu / 4.4 mV and/or 13.8 V
	– Input impedance > 19 kOhm
	– MIX input 2 x cinch, asymmetric
	– Nom. input level: 0 dBu/775 mV
	– Max. input level: +21 dBu/8.7 V
	– Input impedance: 22 kOhm
	– Audio inputs: master output A/B XLR jacks, electr. symmetric, transformer optional
	– Nom. output level: 0 dBu/775 mV
	– Max. output level: +21 dBu/8.7 V
	– Output impedance: < 120 Ohm
	– Nom. load impedance: 600 Ohm
	– Send output 2x cinch, asymmetric
	– Nom. output level: 0 dBu/775 mV
	– Max. output level: +21 dBu/8.7 V
	– Output impedance: < 100 Ohm
	– Direct outputs Phoenix Micro-Combicon plug connector, asymmetric
	– Nom. output level: 0 dBu/775 mV
	– Max. output level: +21 dBu/8.7 V
	– Output impedance: < 100 Ohm
	– Frequency response 20 Hz - 20 kHz (-1.0 dB)
	– Signal / noise distance: > 100 dB
	– Harmonic distortion MIC/LINE: < 0.03 % (without transformer)
	– < 0.08 % (with transformer)

Item	Description
cont. 2.1.70	– Harmonic distortion: AUX < 0.01 % – Sound adjuster: LO ± 15 dB / 60 Hz – HI ± 15 dB / 13 kHz – Low Cut 85 Hz / 12 dB per octave edge steepness – Size 483 x 43.6 x 351 (W x H x D in mm), 19", 1 HU – Weight: 4.7 kg / 10.4 lbs – Options NRS 90233 input transformer (121 682) NRS 90227 output transformer (121 679) NRS 90256 RS-485 Interface (121 785) NRS 90258 RS-232 Interface (121 790) Make/Type: Dynachord DRM 4000
2.1.80	Wireless microphone system Professional UHF Diversity receiver for wireless audio transmission incl. pilot tone (32.768 kHz) for better operational reliability and avoidance of switch on/off noises; 9.5" casing, 1 HU; over 1400 user programmable frequencies, pre-programmable frequency groups with up to 24 compatible channels. Predictive diversity with cross fading of active antennas. Frequency search, switchable (Mic-/Line level) symmetric XLR and jack outputs, LED-display for audio level, Tone Key Squelch, LCD. Including professional UHF microphone, wireless with exchangeable microphone caps and over 1400 user programmable frequencies pre-programmable frequency groups with up to 24 compatible channels; incl. pilot tone (32.768 kHz) for better operational reliability and avoidance of switch on/off noises; Input amplifier controller, backlit LCD with battery status display and frequency code. Locking of on/off switch and frequency possible. Make/Type: Shure SLX Location: Gym / multipurpose room

Item	Description
2.1.90	Wireless headset Stirrup microphone with subminiature capacitor capsule, ball characteristic 20 to 20,000 Hz; idle sensitivity 2 mV/Pa; including two equalizing capsules and foam wind protection. Transmitter to connect headset to above described receiver. Make/Type: Shure Beta 53 and SLX Location: Gym / multipurpose room

Item	Description
	Components for music input (as Option)
2.1.100	19" desktop mounted unit for general sound system of the school building, consisting of: – 1 ea. 19" module for equipping with 2 sound carrier withdrawable modules, for mounting 2 withdrawable units, with XLR connection, for mains or 24 V battery operation, power supply 230 VAC / 50 Hz / 55 VA with power switch, weight approx. 4.5 kg, front plate 2 HM / 425 mm wide. – 1 ea Tuner / cassette player withdrawable unit with: – Tuner with 18 memory units (12 x FM, 6 x AM), digital display, station search, tuning-LED. – Cassette unit with autoreverse. – 1 ea. CD player withdrawable unit with slot-in loading mechanism, random play, scan and repeat function, display title / time, device impactproofed. 19" desktop mounted unit, shall be furnished fully ready for operation incl. all required system-compatible accessories. Make/Type: MONACOR / PA-1200EX / PA-1200RT / PA-1120CD or approved equal

Item	Description
2.1.110	Preamplifier unit for signal amplifying between the 19" desktop mounted unit and the PA system, consisting of the following components: – 1 ea. Pre-amplifier for installation in a switchbox, for sound level amplification of sound carrier signals, amplification 23 dB (adjustable), output nominal level +6dB, max. output level +15 dB (4.4 Veff), max. input level +14 db (4.0 Veff), min. input level –17db (0.11 Veff), input impedance 2 kOhm, power supply 18 – 32 V DC/20 mA, dimensions approx. 49 x 49 mm. – 1 ea. Surface mounted enclosure with rear panel, double, breakproof and double cover frame. – 1 ea XLRn connection, installed in horizontal cover. – 1 ea. Blank panel cover for pre-amplifier. – lumpsum Wiring between XLR connection and preamplification incl. connection of 4-core connecting cable to PA system. – 1 ea. Connecting cable between XLR connections preamplifier / module unit. Complete unit shall be furnished and installed ready for operation on wall. Make/Type: Audio Vertrieb Blumberg / LVV + accessories or approved equal

Item	Description

Call points

In the office rooms, desktop call points shall be used mostly.
The call points must be equipped with monitoring of line, microphone and loudspeakers. The connection to the subscriber plug-in card shall be via 2-wire technology.
An electret microphone allows voice comprehension from a distance of up to 7 m. The call points include an electronic loudness control. An optical display indicates the connection status.
The assembly can be surface mounted or flush mounted as required.
The new PA/MSN loudspeaker system shall be combined system together with the existing intercom in the school.

PA loudspeakers

2.1.120

In-ceiling loudspeakers, round 6 watt,
moisture-impregnated broadband loudspeaker system,
front and assembly ring of plastic, loudspeaker cover of metal, quick and easy assembly using special-purpose clips, for wall thickness from 1 to 20 mm and bayonet lock, cable holding strap to facilitate connection,
with 100 volt transformer 6 W.

Technical data:

Nominal/music load:	6/8 watt
Adaptations:	1.5 / 3 / 6 watt
Sound pressure (1W/1kHz-1m):	90 dB
Maximum sound pressure:	98 dB
Transmission range (-3dB):	100 Hz - 20 kHz
Color:	white (RAL 9010)
Weight:	approx. 0.9 kg
Dimensions	built-in Ø: approx. 171mm.

incl. fabrication of installation openings in existing ceiling panels (fiber panels) with suitable installation reinforcement, complete with all accessories, shall be installed and connected ready for operation with all accessories.

Item	Description
	Before the installation, the wattage shall be adjusted to either 6 watt or 3 watt depending on room size and site conditions Make/type: WHD / DLS 12-T12 or approved equal Location: Corridors
2.1.130	Built-in panel loudspeakers technical data as described in above item, however for installation in panel ceiling module 100, complete with panel ceiling mounting frame und fire resistant cover.
2.1.140	Loudspeaker, 6 watt, for wall mounting, flat type square type with facing panel as perforated sheet metal cover, ball-impact proof, 1-way type, with 100 volt transformer 6 watt. <u>Technical data:</u> Nominal/music load: 6/8 watt Adaptations: 1.5 / 3 / 6 watt Impedance: 8 Ohm (without transformer) Sound pressure (1W/1kHz-1m): 91 dB Maximum sound pressure: 106 dB Transmission range (-3dB): 100 Hz -23 kHz Color: white (RAL 9016) Weight: approx. 1.3 kg Dimensions W/H/D: approx. 260x175x51 mm, Type: Casing of plastic, perforated sheet "white" shall be installed complete with all accessories and connected ready for operation. Make/type: WHD / ZL 135 BWS-T6 or approved equal Location: Class rooms

Item	Description

2.1.150

Loudspeaker, 6 watt,
for wall mounting, flat type
with convex perforated sheet metal cover,
1-way type,
with 100 volt transformer 6 watt.

Technical data:

Nominal/music load:	6 watt
Adaptations:	1.5 / 3 / 6 watt
Impedance:	8 Ohm (without transformer)
Sound pressure (1W/1kHz-1m):	90 dB
Maximum sound pressure:	98 dB
Transmission range (-3dB):	180 Hz - 20 kHz
Color:	white (RAL 9016)
Weight:	approx. 2.0 kg
Dimensions W/H/D:	approx. 250x280x67 mm,
Type:	Enclosure of plastic with convex perforated metal sheet cover "white"

shall be installed complete with all accessories and connected ready for operation.

Make/type: LA WL 106
or approved equal.

Location: Stairwells

Item	Description

2.1.160

Column-type loudspeaker 25 watt
moisture-impregnated 2-way loudspeaker system with 4 wideband chassis and 2 horn tweeters, suitable for high-quality loudspeaker performance outdoors and indoors for particularly difficult acoustic conditions and long reverberation times, weatherproof enclosure of aluminum, loudspeaker cover of metal, quick and easy assembly using 2 metal angles or tripod fixing with 1/2" thread,
incl. 2 step switches, accessible from front, for impedance selection and treble dampening,
with 100 volt transformer 25 W.

Technical data:

Rated load:	25 watt
Adaptations:	6.25 / 12.5 / 25 watt
Impedance:	8 Ohm (without transformer)
Sound pressure (1W/1kHz-1m):	95 dB
Maximum sound pressure:	109 dB
Transmission range (-3dB):	260 Hz -21 kHz
Color:	white (RAL 9002)
Weight:	approx. 5.1 kg
Dimensions (H/W/D):	approx. 595x 96x80 mm
Equipped with:	4x wideband loudspeakers 2x horn tweeters crossover filter 12dB/Oct.
Accessories:	incl. 2 fixing brackets
Connection:	Clamp connection plate on the rear
Other:	2 step switches, accessible from front, for impedance selection and treble dampening.
Degree of protection:	IP 54

shall be installed complete with all accessories and connected ready for operation.

Make/type: WHD / TS 25 S1-T25
or approved equal

Location: Gym

Item	Description
2.1.170 .	Guard, basket type for the above described column loudspeaker, ball-impactproof, of round wire, wire diameter at least 4 mm, painted white (RAL 9002), with at least 6 fixing points, mesh width maximum 5 x 5 cm, shall be installed complete and ready for operation.
2.1.180	Sound-projector loudspeaker, round, 12 watt, moisture-impregnated wideband loudspeaker system, suitable for indoor and outdoor use, all parts weatherproof, quick and easy assembly using swing-type fixing brackets of metal, with 100 volt transformer 12 W.

Technical data:

Power input:	15 watt
Power adjustment:	15/7.5/3.75/1.87/0 W
Resistance adjustment:	666/1333/2666/5332 □
Frequency range:	280 - 11,000 Hz
SPL 1W/1m	121.46 dB
SPL Pmax/1m	133 dB
Size	Ø 209x272 mm
Color:	beige
Weight (net)	1.9 kg
Fastening	V2A U-fastener
Connection	2-core cable and turn switch
Radiation angle hor./vert.	140° / 140°
Nom. impedance chassis	20 □ at least 20 □
Grouping rating	7.91 dB
Loudspeaker type	Re-entrant horn speaker

shall be installed complete with all accessories and connected ready for operation.

Make/Type: LA DK 115
or approved equal

Location: outdoor area

Item	Description
2.1.190	Sound-projector loudspeaker, round, 25 watt, moisture-impregnated wideband loudspeaker system, suitable for indoor and outdoor use, all parts weatherproof, quick and easy assembly using swing-type fixing brackets of metal, with 100 volt transformer 25 W.

Technical data:

Rated load:	25 watt
Settings:	6.25 / 12.5 / 25 watt
Impedance:	4 Ohm (without transformer)
Sound pressure (1W/1kHz-1m):	90 dB
Maximum sound pressure:	104 dB
Transmission range (-3dB):	100 Hz - 20 kHz
Color:	white (RAL 9010)
Weight:	approx. 2.6 kg
Dimensions:	diameter approx. 176 mm height: approx. 250 mm depth: approx. 257 mm

shall be installed complete with all accessories and connected ready for operation.

Make/type: WHD / SP 25/2-T25
or approved equal

Location: outdoor area

Item	Description
	Other work
2.1.200	Flasher lamp of ABS material, color light gray hood of acrylic glass, hood color transparent, flasher power: 6 joule to 10 joule, rated voltage 230 V AC, power input approx. 21 VA, degree of protection IP 55, flash tubes fixed with stainless steel clips against vibration and shock, incl. basket guard of steel, color white, shall be installed ready for operation, incl. cabling to the connection relay of the intercom system. Make/Type: Pfannenberg / PMB2010 + basket guard or approved equal Location: Music room and Gym/multipurpose room, PB 900
2.1.210	Interface connection relay for intercom system, for control of flasher lamps via a floating contact, contact load approx. 0.5 A / 250 V AC, installed in a compatible surface-mounted housing of plastic, incl. required wiring of call point to interface connection relay and 230V connection.

Item	Description
2.1.230	The following work shall be carried out: – Lettering for all distribution boards, switchgear and control cabinets etc. in German and English. – Start-up and test run of the intercom and PA loudspeaker systems, incl. adjusting and regulating. – Instruction of operating personnel (service and user) regarding the intercom and PA loudspeaker system. – Preparation of a test record on the instruction of the operating personnel with list of names.

Item	Description

3. CLOCK SYSTEM

3.1 Dismantling work

3.1.10 Master clock, installed in separate enclosure, shall be removed workmanlike and handed over against receipt to the local DPW.

3.2 Installation:

The following components of the clock system shall be furnished and installed ready for operation together with all required installation and mounting material.

The following items are required for the installation of the clock system and shall be carried out in coordination with the school management, if necessary after school hours or on Sundays and holidays.

Prior to the start of work, the location of all slave clocks and the master clock etc. shall be determine and marked with the local representative of the COR and the School Management.

The following specifications are based on the following make:
NÖLPP-Informations-Systeme GmbH, 65817 Eppstein, Germany, Tel. 0049.6198.57990

Item	Description
3.2.10	Radio-controlled master clock, software controlled, for installation in 19" rack, with 3 slave-clock lines and 2 signal current circuits; slave clock lines optionally with Second-pulse, minute-pulse, ½-minute-pulse and DCF77-pluse diagram output; with automatic line current measurement device with alarm signal in case of short circuit; adjustable fully automatic summer/winter time conversion; fully automatic resetting of the slave clocks after an interruption such as e.g. short circuit or power failure; pulse voltage can be switched to 12 volt or 24 volt; output current with integrated power pack max. 400 mA this corresponds to approx. 65 slave clocks with each 6 mA; signal current circuit with 325 switch times ON/OFF or pulse switching with public holiday, annual and weekly program, free blockbuilding, maximum 8 block programs via block date; running accuracy without radio control approx. 0.4 seconds/day; with built-in power supply unit 230 V AC, enclosure: aluminum withdrawable unit for 19" module rack (3 HUs and / 24 modules), size W/H/D = approx. 121.5 x 129 x 170 mm weight approx. 1200 g, incl. DCF77 radio receiver, incl. a chipcard for saving the switch times, storage capacity approx. 2 MB, type IAW ISO 7816, Main clock shall be installed ready for operation in the existing rack. Type: K-FZDA3-S2 or approved approved equal.
3.2.20	Line amplifier for installation in 19" rack, to extend the clock system by up to approx. 80 slave clocks each approx. 30 mA power supply, power supply 230 / 24 V AC, power input approx. 60 VA, nominal current 2.5 A, enclosure of aluminum, withdrawable cassette for 19" mounting rack (3 height units / 24 module spacings), size W/H/D = approx. 121.5 x 129 x 170 mm,

Item	Description
	shall be installation ready for operation in existing mounting rack. Type: K-TELNU-BOOST19
3.2.30	Analog slave clock, for indoors, single face round type, of ABS plastic casing, white (RAL 9001), with a face diameter of 300 mm, white face with black hands and black Arabic numerals incl. black minute markers, convex non-dazzle and impactproof cover to protect the face and hands, dimensions T/D = approx. 320 x 50 mm, for connection to a main clock serial impulse telegram (Telnu), impulse voltage 12 volt / 24 volt, changeover type, power input approx. 30 mA, connection via 2-core shrouded cable for power supply and transmission of the impulse diagram; shall be installed complete with all required accessories and connected ready for operation.
3.2.40	Analog slave clock as described in previous item, however face diameter 400 mm, ball-impact proof type with guard, for installation in gym / multipurpose room, entrance hall and cafeteria.
3.2.50	Analog slave clock, for indoors, single face round type, of ABS plastic casing, white (RAL 9001), with a face diameter of 300 mm, white face with black hands and black Arabic numerals incl. black minute markers, convex non-dazzle and impactproof cover to protect the face and hands, dimensions T/D = approx. 320 x 120 mm, with wall bracket, length approx. 160 mm, for connection to a main clock serial impulse telegram (Telnu), impulse voltage 12 volt / 24 volt, changeover type, power input approx. 30 mA,

Item	Description
	connection via 2-core shrouded cable for power supply and transmission of the impulse diagram; shall be installed complete with all required accessories and connected ready for operation.
3.2.60	Programming of the radio-controlled master clock incl. all required ancillary work, incl. saving of data of the switch times specified by the user on the existing chipcard of item 3.2.10. The chipcard shall be handed over against written receipt to the school principal/user.
3.2.70	The following work shall be carried out: – Lettering for the distribution boards, switch and control cabinets etc. in German and English. – Commissioning and test run of the clock system – Instruction of operating personnel (service and user) regarding the clock system. – Preparation of a test record on the instruction of the operating personnel with list of names.

4. INSTALLATION WORK

The following items are required in addition for the installation of the intercom and PA loudspeaker system and shall be installed in coordination with the school management, if necessary after school hours or on Sundays and holidays.

Cable routing ducts (cable trays, raceways, conduits etc.) shall be installed below the ceilings in the plenum (ceiling/suspended ceiling height up to 3.0 m), and in the walls (corridors and classrooms etc.) up to an installation height of 3.00 m.
In the gyms the installation height is up to 5 m.

Appropriate fixed and mobile scaffolding shall not be remunerated extra and shall therefore be included in the item price.

The cables of the intercom and PA loudspeaker system shall be installed in the main and secondary routes in the plenum area of the corridors on wire trays and/or with group fixing; where there is no suspended ceiling, cables shall be installed in cable trays. The following methods of installation shall also be used:

- in the ducts and conduits that are to be installed;
- in existing empty conduit/draw-in systems.

Cables to the individual call points and/or junction boxes of the call points shall be installed preferably inside the classrooms above the suspended ceilings. From the suspended ceiling to the call points the cable and wiring shall be routed in cable ducts approx. 18/19 mm in the classrooms and office rooms

Note on cables:
The cabling of the loudspeakers must correspond to the individual loudspeaker lines and must therefore always be installed as separate cable lines.
It is not permitted to group the individual loudspeaker lines in a shared cable or to group them together with the intercom system!

Item	Description
4.1.10	Distribution box, surface mounted, capacity: 120 pair LSA-PLUS-1, size: H/W/D = approx. 330 x 330 x 125 mm, closed and removable metal enclosure, degree of protection IP 40, equipped with 5 connection modules 20 pair LSA-PLUS-1, solderless type, incl. labels and lettering, with locking as lock set Q3, incl. 2 keys, shall be installed complete with all accessories and connected ready for operation. Labeling shall be fabricated in German and English. Make/Type: Quante / VKA 4 - DIN or approved equal
4.1.20	Distribution box, surface mounted, capacity: 240 pair LSA-PLUS-1, size: H/W/D = approx. 550 x 330 x 125 mm, closed and removable metal enclosure, degree of protection IP 40, equipped with 6 connection modules 20 pair LSA-PLUS-1, solderless type, incl. labels and lettering, with locking as lock set Q3, incl. 2 keys, shall be installed complete with all accessories and connected ready for operation. Labeling shall be fabricated in German and English. Make/Type: Quante / VKA 8 - DIN or approved equal
4.1.30	Identification plate for distribution boxes, with white surface and black engraved lettering, shall be furnished and installed on distribution cover.
4.1.40	Connection of all weak current cables, (also E30 cable), to the LSA-Plus connection modules of the distribution cabinets.

Item	Description
	Cables and wiring
4.1.50	Communications cable, halogen-free and flame-retarding IAW VDE 0472, J-H(St)H 2 x 2 x 0.6 mm BD, shall be furnished and installed in sections in existing cable ducts, on cable raceways and wire raceways and in suspended ceiling with standard group fixing, and connected ready for operation. Use: interfacing of flashing lights and clocks
4.1.60	Communications cable, halogen-free and flame-resistant, with insulating rating FE180 and functional endurance E30, JE-H(St)H 2 x 2 x 0,6 mm BD – E30/FE180, cable shall be furnished and installed in sections with approved fixing as group fixing E30-E90 for ceilings and walls, fixing spacing maximum 0.60 m, cable shall be connected fully ready for operation. Purpose: loudspeaker cable Make: Dätwyler or approved equal.
4.1.70	Communications cable, halogen-free and flame-resistant, with insulating rating FE180 and functional endurance E30, JE-H(St)H 4 x 2 x 0,6 mm BD – E30/FE180, cable shall be furnished and installed in sections with approved fixing as group fixing E30-E90 for ceilings and walls, fixing spacing maximum 0.60 m, cable shall be connected fully ready for operation. Purpose: Intercom call points Make: Dätwyler or approved equal.

Item	Description
4.1.80	Communications cable, halogen-free and flame-retarding IAW VDE 0472, J-H(St)H 100 x 2 x 0.6 mm BD - E30/FE180, shall be furnished and installed in sections in existing cable ducts, on cable raceways and wire raceways and in suspended ceiling with standard group fixing, drawn into conduit and connected ready for operation.
4.1.90	Plastic sheathed cable NYM-J 3 x 1.5 mm², in sections, shall be furnished, installed concealed, in existing cable ducts, on cable and wire raceways and in suspended ceilings with standard group fixing, and connected ready for operation.
4.1.100	Plastic sheathed cable NYM-J 3 x 2.5 mm², in sections, shall be furnished, installed concealed, in existing cable ducts, on cable and wire raceways and in suspended ceilings with standard group fixing, and connected ready for operation.
4.1.111	Plastic sheathed cable NYY-J 5 x 16 mm², as new feeder for the PA/Intercom system, connected to a 3 pole main circuit breaker at a 220/380 V power source. shall be furnished, installed concealed, underground in cable trench, including civil work, with wall penetration and sealing, in new or existing cable ducts, on cable and wire raceways and in suspended ceilings with standard group fixing, and connected ready for operation.
4.1.110	Cable splice shall be made with 10 pair telephone cable between the Deutsche Telekom main distribution and the intercom central station in the floor mounted cabinet, incl. connection of all cores to existing LSA-PLUS modules on both sides.

Item	Description
	Cable ducts and conduits
4.1.120	Fire protection duct I 30 IAW MLAR 03/2000 for the installation of wiring systems in the required corridors and stairwells. Hermann type duct I 30 with fastening set, Hermann type clips and fire-resistant dowels KDN 30 mm for a fixing spacing of 600 mm. Material: Fire rated lightweight construction board Color: white, impregnated Dimensions: Exterior 170 x 195 mm (W x H) Interior 120 x 170 mm (W x H) shall be furnished and installed for corridor crossings and required routings in corridor. Make Dätwyler, Type Pyrosys I 30 or approved equal
4.1.125	Sheet steel wiring duct as cable routing duct, dimensions approx. 65 x 170 mm, consisting of bottom and top section, top section of steel, indoor, color cream white, incl. all other required system related accessories and fixing material, installation on masonry, concrete and stud walls. Make/Type: Tehalit / BRSN 70170 or approved equal

Item	Description
4.1.130	Wiring duct, cable management duct, approx. 19 x 18 mm, halogen-free, self-extinguishing, flame retarding, consisting of bottom and top section, color cream-white, incl. all required system-compatible accessories and fixing material. Make/Type: Tehalit / LFH 20020 or approved equal
4.1.140	Wiring duct, cable management duct, approx. 40 x 57 mm, halogen-free, self-extinguishing, flame retarding, consisting of bottom and top section, color cream-white, incl. required fittings such as inner and outer corners, end caps, flat angles, tee and cross pieces, and all other required system-compatible accessories and fixing material. Make/Type: Tehalit / LFH 40060 or approved equal
4.1.150	Wiring duct, cable management duct, approx. 60 x 110 mm, halogen-free, self-extinguishing, flame retarding, consisting of bottom and top section, color cream-white, incl. required fittings such as inner and outer corners, end caps, flat angles, tee and cross pieces, and all other required system-compatible accessories and fixing material. Make/Type: Tehalit / LFH 60110 or approved equal

Item	Description
4.1.160	Aluminum conduit IAW VDE 0605, rigid, nominal size 25 (outside 25.0 mm / inside 22.1 mm), high compressive strength, minimum compressive strength 1250 N/5 cm, incl. required bends and sockets, shall be installed in sections with compatible fixing clamps (U-clips). Installation height up to approx. 3 m. Make/Type: Fränkische / Alu Steck-ES 25 or approved equal
4.1.170	Aluminum conduit IAW VDE 0605, rigid, nominal size 40 (outside 40.0 mm / inside 36.6 mm), high compressive strength, minimum compressive strength 1250 N/5 cm, incl. required bends and sockets, shall be installed in sections with compatible fixing clamps (U-clips). Installation height up to approx. 3 m. Make/Type: Fränkische / Alu Steck-ES 40 or approved equal

Item	Description
	Electrical Panel/Junction boxes
4.1.180	Surface mounted distribution with door, degree of protection IP54, 4-row, equipped with: 1 ea. Cut-out switch 3 or 4 pole, rated current 40A, rated voltage 230 VAC. 4 ea. Surge arrester 1 pole, type 2, rated voltage 250 VAC. 6 ea. Circuit breaker 1 or 2 pole, rated current 16A, rated voltage 230 VAC. 18 ea Terminal blocks, for wires up to 2.5 mm² 5 ea Double terminal blocks, for wires up to 16 mm² Distribution shall be furnished, installed ready for operation in the central office room (301) with all cables connected. **Above item is an option. Electrical panel is not necessary if it's part of phase I, intercom system.**
4.1.190	Junction box, surface mounting type, size approx. 80 x 80 x 40 mm, with 8 screw terminals up to 2.5 mm², shall be installed fully ready for operation in the suspended ceiling, incl. labeling.
4.1.200	Junction boxes, surface mounted with functional endurance E30, enclosure of special, halogen-free thermo-set material, size approx. 100 x 100 x 50 mm, with 5-pole clamp body of special-purpose ceramics, clamp area of 0.5 mm to 1.5 mm², shall be fixed ready for operation in the suspended ceiling area, etc., fixed with approved dowels, connected with E30 cable terminals and the cover of

Item	Description
	the junction boxes labeled with loudspeaker line numbers. Make/Type: Spelsberg / WKE 2 – E30 or approved equal Purpose: Cabling of PA loudspeakers
4.1.210	Provide electrical “SCHUKO” outlets for PA and intercom system. Minimum 3 electrical circuits (for each system) shall be connected to the panel described under item 4.1.180. Location: Next to/behind the new PA/Intercom racks

Item	Description
	Drilled openings and penetrations
4.1.220	Wall breakthroughs and exterior wall breakthroughs for the installation of lines, cables etc. shall be fabricated. Walls consisting of concrete, masonry and light construction walls of various materials. Diameter of breakthroughs approx. 20 mm, breakthrough thicknesses from 20 cm to 40 cm. All openings shall be closed after the completion of the installation work. The removed material shall become the property of the Contractor and shall be disposed of IAW regulations.
4.1.230	Core drilling in concrete, reinforced, shall be fabricated, diameter of drilled opening up to 50 mm, wall/ceiling thickness from 15 cm to 35 cm. The removed material shall become the property of the Contractor and shall be disposed of IAW regulations.

Item	Description
	Cable fire-stops
4.1.240	Fire stops to prevent spread and transmission of fire, resistant against deformation, aging and corrosion, suitable for subsequent installation of cables, fire resistance period 90 minutes, in masonry walls and in ceilings and walls of concrete or reinforced concrete, maximum size of remaining gap to be sealed in opening: 0.05 m², for cables, lines or conduits, to be fully installed with all accessories. Bidder must supply official certificates for the fire safety system that he is tendering.
4.1.250	Extra-over for electrical installation work and/or re-switching work after the end of school hours and/or on Saturdays and Sundays.
4.1.260	For preparing of technical documentation, maintenance instructions and as-built drawings: – 3 sets of technical documentation and maintenance instructions in German and English language for the newly installed systems, each set bound. – Drawings (as-built plans) shall be prepared in scale 1:100 separately for each trade. Drawings shall contain exact measurements, dimensions etc. Text shall be in German and English. One reproducible original and 3 blueprints of each drawing shall be submitted, each in bound form.

Item	Description
	5. OTHER WORK
	The following items are required in addition for the installation of the intercom and PA loudspeaker system and shall be installed in coordination with the school management, if necessary after school hours or on Sundays and holidays.
	Wiring shall be installed in suspended ceilings, on walls and in attic. Installation height up to 3 m.
	Appropriate fixed and mobile scaffolding shall not be remunerated extra and shall therefore be included in the item price.
5.1.10	Work required for the installation of cables and wiring: – Opening and closing of existing cable ducts for cable installation. – Making of required penetrations in walls and ceiling and fire-resistant closing of these penetrations. – Fabrication of wall chases and closing of these chases. – After the closing of wall chases, plaster and painted surfaces shall be repaired in same finish and color and existing surfaces and flush with these surfaces. The removed material shall become the property of the Contractor.

Item	Description
5.1.20	Suspended ceiling - in sections - in the form of panel ceiling module 100 and module 200 IAW requirements, shall be removed, stored workmanlike and reinstalled after the completion of the installation work, incl. cleaning of the ceiling panels, tiles etc. Fixing material and damaged panels shall be replaced in same material, size, finish and color as existing. Approx. 10% of the specified quantity shall be calculated for the replacement of the damaged panels. The work scope amounts to approx. 20 sqm ceiling area for removal and reinstallation.
5.1.30	Suspended ceiling - in sections - in the form of mineral fiber ceiling module 625 and module 1225 IAW requirements, shall be removed, stored workmanlike and reinstalled after the completion of the installation work, incl. cleaning of the panels etc. Fixing material and damaged ceiling panels shall be replaced in same material, size, finish and color as existing. Approx. 20% of the specified quantity shall be calculated for the replacement of the damaged ceiling panels. The work scope amounts to approx. 45 sqm ceiling area for removal and reinstallation.
5.1.40	Edge profiles of existing suspended ceiling shall be recessed workmanlike for mounting the vertical wiring ducts; recesses to exactly accommodate the widths of cable duct that are to be installed, incl. all required system compatible ancillary work.
5.1.50	For the clearing and putting back of equipment, objects, devices, apparatuses in the work area, incl. the removal, re-assembly or moving of magnetic strips, tackboards, pictures etc. in the area of the installation work.

Item	Description
5.1.60	Penetrations shall be made in ceilings, floor, walls and exterior walls, incl. making of wall chases, for the removal and installation of lines, cables etc. After the removal and installation work, all openings shall be closed with concrete B-25. Concrete joints shall be pretreated with wash primer. Openings shall be insulated permanently watertight, Walls, floors and ceilings of concrete, masonry and light-construction walls of various building materials. After the closing of the breakthroughs, tile, floor covering, screed, plaster and painted surfaces shall be repaired/touched up as required to match adjoining surfaces in color, finish and material. Finish must also be flush. The same applies for the wall chases, however these chases shall be additionally lined with lathing. The removed material shall become the property of the Contractor and shall be disposed of IAW regulations. In addition, suspended ceilings shall be opened as required and closed again after the completion of the installation work. Wall, floor and ceiling surfaces etc. damaged due to removal and installation work shall be repaired as described above. Insulation to protect against fire at electrical lines within wall and ceiling penetrations etc., as well as within fire sections shall be fabricated and installed, complete with all accessories.

Item	Description
5.1.70	Temporary protective covering for gym floor to protect against damage during installation work in the gym, the entire floor surface in the work area shall be covered full surface with sturdy plastic sheet and particleboard. For work in the wall area, the floor covering shall be extended from the wall to a depth of at least 5 m into the room. In such cases the entire wall length shall be protected in this manner in each case. Work shall include: – Laying of tear-resistant reinforced plastic sheet without eyes over the entire surface of the existing floor covering. – Temporary fixing of the plastic sheet with fabric adhesive tape at several points. – Flat-pressed board, board thickness at least 16 mm, shall then be laid cleanly on top of plastic sheet. Area of protective covering: approx. 150 sqm Boards shall be installed with tight butt jointed, if necessary fixed together with flat-steel straps. The protection cover shall be moved several times as required by the installation work. Mobile scaffolding shall be used for the installation work. The material shall remain the property of the contractor and shall be removed completely after the completion of work. Item shall include cleaning of the entire surface with suitable cleaning agents in wet cleaning procedure after removal of covering. The contractor shall be liable for any damage caused to floor, walls, sports appliances and doors. Any such damage shall be repaired by the contractor at his expense.

Item	Description
	Prior to the start of work, a record (written and photographic) shall be made in the presence of the COR of any existing damage (floors, walls etc.).
5.1.80	For the following work: Thorough clean-up of areas and rooms used by the contractor. All used rooms and corridors shall be cleaned at least once a day and at the end of each work day, debris shall also be hauled off daily. Dust protection walls, working and protective scaffolds for inside and outside – for a working height as required shall be erected, maintained for the entire duration of work and removed, incl. protective and covering material according to requirements. All materials shall remain the property of the contractor. Hoisting equipment, tools etc. shall be provided, otherwise as described above. All installations, objects, devices, apparatuses etc. shall be protected against dust nuisance with plastic sheet.

Item	Description

6 PLASTER AND PAINTING WORK

The following items are required in addition for the installation of the intercom and PA loudspeaker system and shall be installed in coordination with the school management, if necessary after school hours or on Sundays and holidays.

Appropriate fixed and mobile scaffolding shall not be remunerated extra and shall therefore be included in the item price.

6.1.10

Interior patch-plaster work
as finish plaster in sections on walls,
and on ceiling surfaces,
t = at least 5 to 15 mm,
slow setting gypsum plaster with admix,
shall be applied to walls, plaster on adjoining surfaces in existing thickness, plaster fabric worked in, surfaces prepared for painting and smoothed.

A synthetic plastic gypsum key shall be applied to surfaces in advance.

The new plaster surface shall be fully plastered to smooth finish with finish plaster.
One coat of substrate conditioner shall be applied to the patch-plastered surface.

Note:
Dowel holes and broken-open plaster resulting from cable duct and intercom call point removal work shall be patch plastered.

6.1.20

Existing wall plaster surfaces shall be spackled in sections
with plastic latex spackling compound and rubbed down, in several coatings.

A primer paint shall be applied in advance and surface abraded. Substrate: resin enamel paint.

This procedure shall be repeated until the surfaces are smooth and even.

Item	Description
cont. 6.1.20	
	Note: Uneven wall surfaces in the area of the former surface mounted electrical installation shall be spackled and prepared for painting.
6.1.30	Emulsion paint-coat, shall be furnished and applied to prepared wall plaster surfaces, newly plastered or fully spackled surfaces, in sections, to opaque finish IAW DIN 18363, with one deep-penetrating primer one primer coat, one intermediate coat and one final coat, surface: silk finish. Proposed color: light color to match existing wall paint coats.
6.1.40	Tear-resistant plastic tarpaulins, with nylon fabric reinforced inlay and reinforced edge, for multiple protective covering of work areas, shall be provided and fixed. Covering of floor areas etc. The tarpaulins shall remain the property of the contractor.
6.1.50	Plastic sheet plus adhesive strips, for complete covering of fitments, shall be furnished, spread out, maintained, and disposed of after completion of work. The plastic sheet shall remain the property of the contractor.

End of section