public works

Department:
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REPUBLIC OF SOUTH AFRICA

PW339

DEPARTMENT OF PUBLIC WORKS

FIRE SECURITY

STANDARD TECHNICAL SPECIFICATION

FOR AN

EVACUATION COMMUNICATION SYSTEM

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STANDARD TECHNICAL SPECIFICATION FOR
EVACUATION COMMUNICATION SYSTEMS

1. GENERAL

This Standard Technical Specification forms part of, and shall be read with the Conditions of Contract, Supplementary Specification, schedules, drawings and other parts that form part of the tender/contract documents. The supplementary specification with its schedules and drawings shall take precedence over this Standard Technical Specification.

2. SCOPE

This Standard Specification deals only with the general technical aspects of evacuation communication systems. Tenderers are therefore referred to the Supplementary Specification for the particular scheme for any specific technical requirements applicable to the site and service.

Small items of equipment forming part of the system are not covered by this specification. However, the department still requires that the complete installation comply with the highest standard of design and fire protection practice.

The completed system and its components shall be in accordance with the following:

3. STANDARDS AND SPECIFICATIONS

3.1 The installation shall be erected and tested in accordance with the latest issues and amendments of the following Acts, Regulations and Specifications:

3.2 SANS 10142: "Code of Practice for the Wiring of Premises".

3.3 The Occupational Health and Safety Act, 1993 (Act 85 of 1993).

3.4 The Local Government Act 1998 (Act 10 of 1998 (Gauteng), municipal by-laws and any special requirements of the local supply authority.

3.5 The Fire Brigade Services Act 2000 (Act 14 of 2000).

3.6 The National Building Regulations and Building Standards Act 1996 (Act 29 of 1996)

3.7 The Post Office Act 1998 (Act 124 of 1998).

3.8 The Electricity Act 1996 (Act 88 of 1996).

3.9 The Regulations of the local Gas Board where applicable.

3.10 The National Water Act 1998 (Act no. 36 of 1998).

3.11 The Water Services Act 1997 (Act no. 108 of 1997).

3.12 The General Authorizations (Water act).

3.13 The Environmental Conservation Act 1998 (Act no. 73 of 1989).

3.14 The National Environmental Management Act 1998 (Act no. 107 of 1998) and

3.15 The Relevant SANS publications.

3.16 The department's Standard Technical Specification for an Automatic Fire Alarm Installation (PW 336).

3.17 The department's Standard Specification for Electrical Installations and Electrical Equipment pertaining to Mechanical Services (PW 331).

4. MATERIALS AND EQUIPMENT

4.1 Materials for which a SANS specification exists, shall be in accordance with such a specification and shall bear the SANS mark.

4.2 All materials and equipment used on the contract shall be new and of the very best of their types and kind.

4.3 All items of equipment shall be completely compatible.

4.4 The equipment shall preferably be manufactured in this country.

4.5 Replacement units shall be available for the equipment and the complete maintenance of equipment shall be undertaken locally.

4.6 Recording and control equipment shall be housed in completely enclosed, vermin-proof cabinets.

4.7 All items of equipment shall be fitted with nameplates containing information such as serial numbers, model numbers, type numbers, manufacturer's name, etc. This information together with the description of each and every piece of equipment shall be listed in the maintenance manual.

4.8 All components and PC boards shall also be marked with type numbers and descriptions and this information shall be contained in the maintenance manual.

4.9 No equipment without detailed specifications and/or testing results will be allowed.

5. INSTALLATION

Unless specified otherwise in the Supplementary Specification, the evacuation installation shall consist only of a system of sounders, bells and sirens, without voice communication, where such an installation will meet the requirements of SANS 10400 for the particular occupation, size and height of the building.

Buildings of such height, floor areas and particular occupation as laid down in SANS 10400 requiring a comprehensive emergency evacuation communication shall be provided with a system of speakers for voice communication and, if required, sounders and bells.

It shall be possible to activate audible alarms and where required, voice communication from the main control centre to –

i. individual zones;

ii. any combination of zones;

iii. all zones together ("All call").

Manual selection of pre-selected alarms (either voice or tone) shall be possible for all above-mentioned combinations.

Unless specified otherwise in the Supplementary Specification, a dedicated emergency telephone system shall form an integral part of the complete installation but shall not be directly connected to the main evacuation

communication system and shall be provided with its own stand-by battery power supply.

The whole system shall be self-supporting, i.e. it must not depend on other power supplies, wiring, functions, etc.

6. DESIGN AND TENDER DRAWINGS

A suitable layout for the evacuation communication installation showing the positions of the main control panel, the main control unit, speakers and/or bells and sirens, as well as emergency telephones, has been indicated on the Department's tender drawings referred to in the Supplementary Specification.

Should the tenderer propose an alternative layout or recommend changing the number and positions of speakers to that specified in the departmental design, full particulars and design considerations shall be submitted with his tender.

Tenderers shall include configuration diagrams of the proposed system with their tender submissions.

The information given shall be sufficient to identify clearly the apparatus and devices he proposes using. Any special features should be adequately explained.

7. DRAWINGS TO BE PROVIDED DURING INSTALLATION

Block plans and schematic layouts shall be prepared neatly and clearly and submitted to the Department for approval.

During the course of the contract, the contractor is required to provide detail drawings of his equipment and layout to the Department before installation.

8. MAIN CONTROL PANELS

8.1 The main control panel for an evacuation system without voice communication shall be provided with the following control buttons, audible alarms and alarm acceptance buttons:

8.1.1 An amber illuminated push button for every zone to activate an alert signal to all sounders and sirens in that particular zone.

8.1.2 A red illuminated push button for every zone to activate an evacuation signal to all sounders and sirens in that particular zone.

8.1.3 An amber and a red illuminated push button to activate an 'all call' alert signal or an 'all call' evacuation signal respectively to all the sounders and sirens in the building or complex.

8.1.4 A green LED to indicate that the mains power is on.

8.1.5 A green LED to indicate that the stand-by battery supply system is sound.

8.1.6 A red LED to indicate a fault on any of the zone circuits.

8.1.7 An audible alarm to indicate a fault or current supply failure and an alarm accept button to cancel the audible alarm.

8.1.8 A white illuminated lamp test push button.

The 'ALERT' and 'EVAC' push button switches shall be electronically interlocked (different priority) to avoid simultaneous selection of both the alert and evacuation modes.

The control panel shall be neatly constructed and installed in the console, if provided, or on a heavy gauge sheet metal cabinet with high quality enamel finish or other finish as specified in the

Supplementary Specification.

8.2 The main control panel for an evacuation system with voice communication shall be provided with the following control buttons, audible alarms, alarm acceptance buttons and other evacuation control equipment:

8.2.1 An amber illuminated push button for every zone to actuate an alert signal to all speakers in the particular zone.

8.2.2 A red illuminated push button for every zone to actuate an evacuation signal to all speakers in the particular zone.

8.2.3 An indigo illuminated push button for every zone to transmit vocal messages from the microphone to all the speakers in the particular zone.

8.2.4 A set of push buttons as described above, for an 'all call' facility from each of the above-mentioned modes to all the speakers in the building or complex.

8.2.5 A green LED to indicate that the mains power is on.

8.2.6 A green LED to indicate that the uninterruptible power supply is sound.

8.2.7 A red LED to indicate a fault on any of the zone circuits.

8.2.8 An audible alarm to indicate a circuit fault alarm or current supply failure and an alarm acceptance button to cancel the audible alarm.

8.2.9 A white illuminated lamp test push button.

The 'MIC', 'ALERT' and 'EVAC' push button switches shall be electronically interlocked (different priority) to avoid simultaneous selection of the different modes in the same zone. The order of priority shall be that the microphone takes precedence over the evacuation signal and the evacuation signal takes precedence over the alert signal unless specified otherwise in the Supplementary Specification.

8.3 The main control panel whether for a system of only sounders and sirens or a system also with voice communication shall also meet the following requirements:

8.3.1 The panel shall be manufactured from anodised aluminum unless specified otherwise in the Supplementary Specification.

8.3.2 All push buttons, switches and indicators shall be installed and mounted in a professional way on the panel and the function of each push button shall be properly indicated by engraving.

8.3.3 Provision shall be made for a set of unconnected push button switches on the control panel for every five zones or part thereof for future expansion unless specified otherwise in the Supplementary Specification.

8.3.4 The final configuration of the main control panel shall be discussed and finalised with the Department prior to the manufacture thereof.

9. AUXILIARY CONTROL PANEL

An auxiliary control panel will not be required unless specifically specified in the Supplementary Specification.

(**NOTE:** *Such a panel will normally only be required in cases where a building is not manned after hours or for particular security problems or where the fire brigade will endanger themselves if they were to stay at the main control panel which might not be at ground level or close to an entrance.)*

An auxiliary control panel shall be a repeat of all the functions of the main control panel.

If such a panel is to be mounted on the exterior of a building, its design and finish shall be suitable for such use. The door shall be tamper-proof with a key in a glass-fronted box with a spring-loaded limit

switch at the back of the red painted glass. The breaking of the glass shall raise an audible alarm in a position as specified in the Supplementary Specification.

10. MAIN CONTROL UNITS

10.1 The main control unit for an evacuation system with only sounders and sirens and no voice communication shall meet the following requirements:

10.1.1 The control unit shall be housed in a heavy gauge sheet metal cabinet with a high quality baked enamel finish or other finish as specified in the Supplementary Specification. The cabinet shall be neatly manufactured and be provided with a full-face lockable door. Provision shall be made for the necessary indicator LED's in the door. Provision shall be made in die cabinet for one extra zone for every five zones or part thereof, or as specified in the Supplementary Specification.

10.1.2 Provision shall be made in the control unit for monitoring all circuits for open circuits and short circuits. As a minimum of three wires are required to obtain two separate identifiable tones, each circuit will require two end of line resistances but one single fault signal for each range of sounders or sirens will be sufficient.

10.1.3 A green LED shall be provided on the control cabinet door for each circuit to indicate that the circuit is healthy and a red LED for each circuit to indicate that the circuit is open and an amber LED to show that there is a short on that particular circuit.

10.2 The main control unit for an evacuation system with voice communication shall meet the following requirements:

10.2.1 The automatic monitored evacuation communication system shall be of modular design to facilitate future expansion or alterations on site.

10.2.2 All control equipment shall be mounted in shelf units in cabinets with lockable armoured glass doors. The cabinets shall be installed away from walls to ensure access to any wiring at the back. Should the available space be inadequate, the cabinets shall be provided with castors to facilitate the moving of the cabinets away from the wall.

10.2.3 All line amplifiers, zone amplifiers and speaker circuits shall be monitored continuously. In case of a short circuit, the line shall be disconnected automatically from the relevant amplifier without affecting the balance of lines or zones connected to the same amplifier.

A general fault condition shall be relayed to the main control panel in case of a circuit fault. Light emitting diodes on the faceplate or printed circuit shall indicate the faulty circuits.

10.2.4 An emergency microphone shall be installed at the amplifier cabinet.

10.2.5 The main control unit whether for a system with only sounders and sirens or for a system with speakers, shall also be provided with suitable terminals for incoming and outgoing lines. The terminals shall be clearly grouped and marked with a label strip for identification so as to simplify installation and connection of wires on site by installation personnel. All outgoing and incoming terminals and all other equipment in the control panel shall be suitably labelled to simplify maintenance and installation, and all panel-mounted equipment shall likewise be labelled. Outgoing and incoming power and field wiring shall be individually and correspondingly numbered at each point of termination.

11. CONTROL EQUIPMENT FOR EVACUATION COMMUNICATION SYSTEMS WITH VOICE COMMUNICATION

The following control equipment for an evacuation communication system with voice communication shall be properly installed in the racks provided in the cabinet for the control unit:

11.1 Switching units: Switching of microphones and other input devices shall be facilitated by means of a matrix-switching unit. The switching in or out of any device shall not be audible even when the system is operated at the maximum volume setting.

11.2 Signal routing unit: The signal routing unit shall be of modular design and shall be incorporated into the equipment rack.

The signal routing unit shall incorporate facilities for the selection of each individual evacuation zone via push button selection on the evacuation zone selection panel.

It shall be possible to automatically connect on a matrix basis, the emergency warning

ALERT signal;
the EVACUATION signal; and the
MICROPHONE

to any of the evacuation zones simultaneously.

The signal routing unit shall incorporate priority-switching facilities, which shall automatically switch the annunciation to the highest priority as follows:

1. Priority 1: MICROPHONE (main zone selection panel) which overrides.

2. Priority 2: EVACUATION tone which overrides.

3. Priority 3: Fire warning (ALERT) tone.

Should the contractor submit a software-controlled system, he shall ensure that the system is not in operation should a microprocessor fail. The system shall have a back-up microprocessor to ensure redundancy to a certain degree. Microprocessor- controlled equipment shall have a MTBF (MEAN TIME BEFORE FAILURE) of at least 20 000 hours.

11.3 Tone generators: The alert signal shall have a lower fundamental frequency of 700 Hz and an upper fundamental frequency of 1 kHz which shall be switched at a frequency of 1,5 Hz and a duty cycle of 25%.

The evacuation signal shall be a “slow whoop” tone sweeping within 500 Hz to 1 200 Hz continuously for evacuation purposes.

The generator shall be connected via the signal route unit to the amplifiers.

11.4 The Amplifiers: The amplifiers shall be of modular design as required for the complete loudspeaker evacuation system.

The required minimum amplifier ratings shall be 50 watt RMS unless specified otherwise in the Supplementary Specification. The successful tenderer shall ensure adequate amplifier power ratings to drive all speakers at maximum power tapping of any selected zone plus an allowance of 20% for possible additional speakers and the matching of the load and amplifier impedances.

The contractor shall ensure that the output from the amplifiers is adequate to ensure that all tone and messages over the loudspeakers will be clearly audible.

All amplifiers shall be supervised and shall cause automatic transfer of the associated amplifier to a stand-by amplifier in the event of a failure.

The amplifier system shall have a minimum of one stand-by amplifier for every five amplifiers or part of that number.

The system shall provide a fault indication on the zone selection control panel in case of an amplifier failure.

The frequency responses of the amplifiers shall be from 50 Hz to 20 Hz within the band ± 3 dB.

The inter-modulation distortion shall be less than 1% at maximum output.

No damages shall be caused to the circuitry of the amplifier when either of the following conditions exists:

1. the load is changed from open to short circuit;

2. any of the conductors of the distributed system is connected to the ground. The amplifier output shall be capable of feeding a 100 V loudspeaker distribution line.

12. SPEAKERS

Evacuation speakers shall be rated at least 2 watt RMS except where specified otherwise in the Supplementary Specification and be provided with three tappings for final adjustment on site and shall be supplied complete with back boxes.

The sensitivity of the speakers shall be not less than 86 dB(A) ±3 dB(A) at 1 metre with an input of 1 watt unless specified otherwise in the Supplementary Specification.

The speakers need not be heat and weather resistant except for speakers mounted on the outside.

The design of the speakers shall be such that the speakers could be used under humid conditions without impairing the quality of tone or voice reproduction and with heat variations between minus 10° C and plus 70° C.

Industrial speakers shall have a minimum output of 15 watt RMS and shall be fitted with purpose-made hot dipped mounting brackets and sprague connections.

Unless specified otherwise in the Supplementary Specification, speakers inside the building shall be surface mounted against concrete ceilings or walls and flush mounted in suspended ceilings.

All speakers shall be of a type and manufacture acceptable to the department.

13. SOUNDERS AND SIRENS

The sounders and/or sirens shall operate off a 24 V DC power supply.

Each sounder used for internal installation shall produce an alarm at a sound level of at least 105 dB(A) at one metre. The current draw-off per sounder shall not exceed 25 milli amps.

The sounder shall be housed in an ABS plastic case with ingress protection to IP 65. The case shall be red unless specified otherwise in the Supplementary Specification.

The unit shall be suitable for surface mounting on a wall or ceiling and shall be provided complete with mounting facilities.

Each siren used for external operation shall produce an alarm at a sound level of at least 112 dB(A) at 1 metre.

The siren shall be mounted in a weatherproof housing and shall be provided with purpose-made hot dipped brackets and sprague connections.

The sounders and/or sirens shall be capable of being set for a minimum of 10 different tones and the volume shall be adjustable at each unit to achieve a good distribution of sound in the system

Two very distinct tones meeting the following criteria are required:

1. Alert tone (stutter tone): rapid intermittent tone at approximately 450 Hz at 0,2 second cycles, ie 0,1 second on and 0,1 second off;

2. Evacuation tone (slow whoop): slowly ascending from 500 to 1 200 Hz at 2,5 second cycles with a completely off period of 0,5 seconds with continuous repeats of the same sequence until silenced. Small changes in the frequency and time intervals stipulated will be permitted.

14. WARNING BUZZER

The warning buzzer on the control panel to indicate a fault alarm shall have a sound level of approximately 65 dB(A) at 1 metre and shall operate off the system supply.

Should the system supply have a too high voltage, provision shall be made for reducing the voltage to suit the operating voltage of the buzzer.

15. LIGHT EMITTING DIODES (LED'S)

The light emitting diodes on the control panels shall be 3 mm diameter high brilliance long life flush LED's with bayonet or screw mountings for easy replacement.

The LED's mounted on the control units may be of a smaller diameter.

LED's with solder connections are not acceptable.

16. EMERGENCY TELEPHONE SYSTEM

16.1 General: Unless specified otherwise in the Supplementary Specification, an emergency telephone system shall form an integral part of the evacuation system but shall operate entirely independently of any other system. The master station shall be located on or near the main control panel of the evacuation system on a console or on a worktable unless specified otherwise in the Supplementary Specification.

If an auxiliary control panel is required for the main evacuation system, an additional master station will be required for the emergency telephone system.

The system shall be of modular design so that the system can be extended at a future date. The master station shall be capable of being connected to all the substations specified or shown on the drawings plus provision for an extension of 20% more substations unless specified otherwise in the Supplementary Specification.

Should the number of substations exceed the capacity of the master station, one or more master stations shall be provided in close proximity to each other.

16.2 Master station: The master station shall be of a neat, well-engineered construction and shall be provided with a power on switch, power on LED indication, volume controls and station-select or call buttons with

LED's.

Unless specified otherwise in the Supplementary Specification, sub-to-sub communication will not be a requirement.

Post office red is the preferred colour for the master station.

16.3 Substation: The substation will consist of a simple handset, which will make contact with the master station when the handset is lifted from its mounting. The handset, mounting and spiral wire should be post office red.

16.4 Mounting box: The mounting box for the substation shall be either recessed or surface mounted as specified in the Supplementary Specification.

The mounting box shall be approximately 230 mm wide x 100 mm deep x 350 mm high, manufactured from steel with a hinged door, chromed handle and magnetic door catch.

The box shall be sprayed post office red and the door shall have a smoked perspex section.

16.5 Extension speaker: An extension speaker to hear a call-in tone in another room shall be provided if so specified in the Supplementary Specification.

16.6 Power supply, conduits and wiring: These have been specified elsewhere in this specification.

17. ELECTRICITY SUPPLY

Unless specified otherwise in the Supplementary Specification, a single phase 230 Volt, 50 Hz, AC supply 15 amp power plug outlet will be provided by others in the room for the control equipment.

<u>If this is not adequate for the equipment offered, the tenderer shall state his requirements in his tender.</u>

Notwithstanding any reference to a nominal rating of 230 Volt supply all equipment connected directly to the mains supply shall operate satisfactorily and without any reduction of its effective life at the voltage supplied by the local authority.

All equipment connected to the mains supply shall be equipped with over-voltage protection and spike arrestors to prevent damage to such equipment by lighting or other spikes, or damage due to overvoltage.

18. UNINTERRUPTIBLE POWER SUPPLY (UPS)

An emergency evacuation communication system with voice communication shall be provided with an uninterruptible power supply unit complying with SANS 1474.

The UPS shall be provided with volt and amp meters for both incoming and outgoing supplies.

The continuous power rating of the unit shall be at least 120% of the total maximum amplifier demand determined in accordance with the sub-clause dealing with amplifiers.

The power supply particulars of the unit offered by the tenderer shall be stated in the Schedule of Particulars and Information from Tenderers.

To ensure high quality stabilised power to the system, the evacuation system shall be fitted with an integral solid state power supply unit.

The batteries shall be acceptable to the Department of Public Works and be of a totally sealed lead cell type. Tenderers shall furnish the Department with a certificate from the UPS supplier that the batteries and the UPS offered are completely compatible in all respects.

The batteries shall be of sufficient capacity to maintain the evacuation system fully operational for a period of two hours in the quiescent mode and be able to operate the total operational load for a further period of one hour.

The charging rate shall be such that 80% of the battery capacity is reached within 10 hours after a break in the mains supply.

19. STAND-BY BATTERY SUPPLY

The stand-by battery supply systems for the sounder and siren system and that of the emergency fire telephone systems shall be kept entirely separate from each other and any other battery supply system used in the building or building complex.

Unless specified otherwise in the Supplementary Specification, the sounder and siren system shall operate off a 24 Volt supply and the telephone system on the supply voltage required for the particular system offered.

Each power pack shall be able to accept an incoming single phase supply as described under “electrical supply” and shall be equipped with transformers, rectifiers, condensers and integrated circuits for the supply of stabilised power to the respective circuits.

The battery charges shall be able to deliver the full charging current to discharged batteries and thereafter the chargers shall automatically vary the charging current to the batteries as may be required by battery voltage conditions. Batteries shall not be subjected to overcharging.

The battery chargers shall be protected against reverse polarity and short circuits on the DC supply side.

Upon loss of mains power, the power supply units shall automatically revert to battery power, where after the systems shall remain fully operational for a period of one hour. The units shall automatically revert back to mains power when the mains power is restored and manual resetting of the units shall not be necessary.

The power supply shall be equipped with the following indications on the front of the unit:

1. “MAINS ON” - green LED

2. “CHARGER FAULT” - amber LED

Batteries shall be mounted in a separate ventilated padlockable cubicle. Batteries shall be mounted in such a way that contamination of other equipment by batteries cannot take place. Batteries shall be in a special plastic container to contain any possible spillage. Any supply fault, charging fault or low battery voltage shall be transmitted to the console or control panel so that an alarm can be generated.

Every charger shall be provided with a voltmeter and an amp meter.

Batteries shall be of the sealed lead acid type and the sizes of the batteries to be used shall be indicated on a label in the battery cubicle.

Batteries shall be charged to 80% of their capacity within 10 hours. The supplier of the battery chargers must provide a certificate in which he confirms that the battery chargers are suitable for the batteries offered.

20. CIRCUIT WIRING

All wiring associated with the evacuation communication system shall be carried out in compliance with the requirements of the Standard Specification for Electrical Equipment and Installations for Mechanical Services of the department.

The cross-sectional area of the wires shall not be less than 0,8 square mm in the case of an evacuation communication system with speakers, except for the very furthest speakers where the total current is low and not less than 0,5 square mm for an evacuation system with only sounders and sirens and for the emergency

telephone system even though voltage loss may prove that thinner wires will meet the voltage requirements of the operating devices. The calculated voltage loss as calculated according to the maximum possible demand shall nevertheless not exceed 5% of the nominal voltage.

It shall be the responsibility of the contractor to ensure that the wire sizes are adequate for the equipment he proposes using and shall submit his calculations for approval before commencing with the actual wiring.

The insulation shall be of the fire retardant type and shall be white unless specified otherwise. The wiring for a speaker system shall be in conduits and trunking entirely separate from that of any other system.

The wiring for a sounder and siren system may be in the same conduits and trunking as for the emergency telephone system but entirely separate from that of any other system.

Wiring in horizontal trunking shall be secured at 2 metre intervals or less and wiring in vertical trunking at intervals not exceeding 1,5 metre.

21. CONDUITS AND TRUNKING

The quality of materials and the methods of installation of conduits, conduit accessories and trunking shall be carried out in compliance with the requirements of the Standard Specification for Electrical Equipment and Installations for Mechanical Services of the department.

The contractor for the emergency evacuation communication and emergency telephone systems shall be responsible for the supply and installation of all conduits, conduit accessories, wiring trunking and cable trays, as may be necessary or required for the system unless specified otherwise in the supplementary specification.

Steel conduit and conduit accessories shall be cast in or built into the building structure in new buildings. No surface mounting will be acceptable in new buildings or structures.

Surface mounted conduit and conduit accessory work will be allowed only in existing buildings.
Steel conduit and conduit accessories surface mounted on building structures, steelwork and woodwork, shall be done neatly and in straight lines and shall be firmly fixed by means of saddles at a maximum distance of 2 metres and at a distance not exceeding 150 mm before and after each 90º bend.

M4 machine screws shall be used for fixing of spacer saddles onto steelwork. Suitable holes shall be drilled and tapped in the steelwork for this purpose.

Steel conduit and conduit accessories, surface mounted in roof spaces of buildings or structures with pitch roofs, shall follow the roof structural elements.

The conduits and conduit accessories for the wiring of circuits exposed to the elements and in the roof spaces shall be of galvanised mild steel. Conduits and accessories for these applications shall comply with SANS 1065 and shall be hot-dip galvanised.

Conduit installations shall be done in such a way that the circuit wiring can be done without interruption and without T-joints.

Trunking shall be fitted throughout with covers.

PVC trunking shall not be used unless specifically specified otherwise in the Supplementary Specification.

No wiring trunking may be used in microfilm vaults and in high risk areas such as fuel, oil, tyre, paint, wood, paper, cardboard box storage areas, record rooms and vaults.

22. FIRE BRIGADE SIGNALLING FACILITY

A fire brigade signalling facility shall be provided if not already included in a main fire detection system and if so specified in the Supplementary Specification.

The transmitting equipment for signalling a fire alarm to the local fire brigade shall be in accordance with the Standard Technical Specification for an Automatic Fire Alarm Installation (PW 336).

23. COMPLETENESS OF SYSTEM

In outlining the Department's requirements, small items which may be of a proprietary nature, will, for obvious reasons, have been omitted but, notwithstanding this, it is the full responsibility of tenderers to include all equipment necessary to present on completion, an installation conforming to the latest techniques of highly sophisticated engineering practice.

24. COMMISSIONING AND HANDING OVER TESTS

On commissioning of the system, the contractor shall ensure that speakers have been wired to be in phase and line impedances to match. The same sound level shall be maintained on all speakers. The installation shall be tested, calibrated and adjusted, including the setting of the taps on the speakers.

The contractor shall do his own complete commissioning tests before the actual first takeover tests are done. This is to satisfy himself that everything is working and is in accordance with the specification.

The handing over test of the system shall be done in the presence and to the satisfaction of an authorised representative of the Department.

This test shall include a check of the level of sound produced, the establishing of zones and zone identification, checking fault alarm signals, checking the telephone sound and position identification and any secondary test as may be deemed necessary.

25. CLEARING OF SITE

All rubbish and loose material resulting from the work done on this contract shall be removed by the contractor on completion and the site left neat and orderly.

26. BLOCK PLANS AND MIMIC PANELS

The Supplementary Specification will clearly state whether a block plan or mimic panel will be required for the identification of the positions of speakers, sounders, telephones and other equipment.

If a block plan or mimic panel has been provided for a detection system for the same building or complex, the positions of the speakers, sounders, telephones and other evacuation equipment shall be indicated thereon.

If a block plan has been specified in the Supplementary Specification for this system only it shall be as specified in such specification. Unless specified otherwise the block plan shall be printed on white, non-transparent, heat resistant plastic, not less than 0,08 mm thick mounted behind 4 mm clear perspex on 16 mm chipboard in a meranti frame with 19 mm quadrants to keep the perspex in position.

If a mimic panel has been specified in the Supplementary Specification for this system, it shall be as specified therein. If not specified otherwise, the mimic panel shall consist of 24 mm x 24 mm or 48 mm x 48 mm press-fit removable press-fit carbonate blocks, alternatively anodised aluminium squares not bigger than 120 mm x 120 mm screwed to a sub-frame. High brilliance 3 mm flush LED's shall be fitted in each zone to indicate than an alert signal (amber), an evacuation signal (red) has been generated and, if required, an indigo LED to indicate that voice communication has been made to the particular zone.

Generally a graphic display on a computer monitor will not be required. If such a system has been specified in the Supplementary Specification, the positions of speakers, sounders, telephones and major equipment should be indicated thereon. Notwithstanding the provision of such a graphic display a block plan should be provided for the eventuality that the computer may be down during an emergency.

27. OPERATING INSTRUCTIONS

The tenderer shall make provision for framed operating instructions in English which clearly state the procedure to be followed in the event of a fire alarm. These instructions must be framed under perspex in a robust 25 mm meranti or metal or other approved frame and must be neatly displayed adjacent to the control or indicator panels.

In the case of the control panel the instruction chart must also indicate the procedure to be followed if a fault alarm is indicated.

28. INSTALLATION OPERATING AND MAINTENANCE MANUALS

Four neatly bound manuals with full installation operating and maintenance instructions shall be supplied with each system and shall include schematics and detailed wiring drawings with a full component list indicating not only component values but sources of supply. The installation will not be accepted until these manuals have been handed to the Department.

29. MAINTENANCE OF INSTALLATION

The tenderer for this contract shall allow in his tender price for the maintenance of the complete installation for a period of twelve months, starting from the date of the first takeover of the contract by the Department.

It is a specific requirement of this contract that the contractor shall allow for quarterly inspection visits during the twelve months maintenance period and that he shall submit full reports for each such visit. The reports shall contain the status of the system as well as the faults which occurred on the system during the previous three months.

The reports shall be submitted to the Department within seven days of the service. Serious faults shall immediately be reported to the Department and the consulting engineer by telephone.

No maintenance or repair work shall be done on site without the knowledge and approval of the User Department.

30. COMPREHENSIVE MAINTENANCE, SERVICING AND REPAIR CONTRACT

After the completion of the required maintenance period the Department may insist on entering into a comprehensive maintenance contract with the installer for a period which may vary between one and three years at the sole discretion of the Department.

31. INFORMATION TO BE OBTAINED FROM THE SUPPLEMENTARY SPECIFICATION

General information regarding the positions of sounders, sirens, speakers, telephones, control equipment, control panels and/or consoles and specific deviations from this specification, will be provided in the Supplementary Specification.

Prospective tenderers shall also ensure that they have to correct information regarding the following:

31.1 Whether the system required is a system with only sounders and sirens or whether it is a system with speakers for voice communication.

31.2 Whether an emergency telephone system is required.

31.3 Whether a console has already been allowed for elsewhere in the contract or whether a console is required for the evacuation system only and if full details of the requirements for such a console have been provided.

31.4 If special finishes to control panels and cabinets are required.

31.5 Whether there are any deviations in the priority of the various signalling modes.

31.6 Whether the number of spare button switches should be in the ratio of 1 to 5 or whether a particular number of spare switches should be provided.

31.7 Whether an auxiliary control panel is required.

31.8 The number of spare zones that are to be provided for.

31.9 The extent of provision to be made in the control unit and in the design of the wiring circuits for possible future extension.

31.10 Whether different tones to that specified in this specification are required.

31.11 Whether the minimum amplifier rating required differ from the rating of 50 watt RMS specified in this specification.

31.12 Whether the speaker rating and sensitivity differ from this specification.

31.13 Whether the specifications for sounders, buzzers and sirens in the Supplementary Specification differ in any way from that specified in this specification.

31.14 The provision to be made for future extensions to the emergency telephone system, should this differ from the requirement of an allowance of 20% for more substations.

31.15 The required colour of the master telephone station if this is not to be post office red.

31.16 Whether any extension speakers are required on the emergency telephone system.

31.17 Whether there are any deviations in the Supplementary Specification regarding power supply, uninterruptible power supply or stand-by battery supplies from this specification.

31.18 Whether a different maximum allowable voltage drop has been specified in the Supplementary Specification.

31.19 Whether conduits, conduit accessories and trunking are included in this contract or whether these will be provided by others.

31.20 Whether PVC trunking would be acceptable. (Note: PVC trunking may not be used unless specifically specified otherwise in the Supplementary Specification.)

31.21 Whether a fire brigade signalling facility is required or whether this has already been allowed for in the specification for a fire detection system.

31.22 What the requirements are in respect of block plans, mimic panels and possible graphic displays on a computer monitor.

Where no specific departures from this specification have been made in the Supplementary Specification, it shall be accepted that this Standard Specification will apply fully as specified.

32. SCHEDULES OF PARTICULARS AND INFORMATION FROM TENDERERS

THE SCHEDULES WHICH ACCOMPANY THIS TENDER NOTICE FORM AN INTEGRAL PART OF IT AND MUST BE DULY COMPLETED IN EVERY DETAIL, FAILING WHICH THE TENDER IN QUESTION MAY BE REJECTED.

Under no circumstances will statements such as the following be acceptable to the Department:

"See attached pamphlets."
"Refer to catalogue."
"Data to follow."
"As given by supplier, etc."
Some items allowed for in these schedules may not necessarily be required for the particular project and should be ignored.

Equipment offered and listed in the schedules must be capable of performing the specified duties and shall comply in all respects with the requirements of the specification.

SHOULD it transpire that such equipment, even when offered by make, model and/or type, is unsuitable of meeting or performing in accordance with the specification requirement in any respect, the contractor or subcontractor shall nevertheless be responsible for any additional costs incurred in providing the required or suitable equipment.

Whenever a specific make, model or type of equipment has been prescribed in the specification and the tenderer offers an alternative or equal make or type of equipment in his tender, the department will, on acceptance of such a tender, inform the prospective contractor in writing as to the make and/or type of equipment accepted. HOWEVER, it should be noted that the use of words "OR EQUAL" by the tenderer is to be discouraged and could lead to the disqualification of the tender.

THE CONTRACTOR WILL NOT BE ALLOWED TO SUPPLY EQUIPMENT OTHER THAN THAT OFFERED IN HIS TENDER WITHOUT THE WRITTEN APPROVAL OF THE DEPARTMENT.

ANNEXURE A TO THE STANDARD SPECIFICATION FOR EVACUATION COMMUNICATION SYSTEMS

SCHEDULES OF PARTICULARS AND INFORMATION FROM TENDERER

SCHEDULE NO 1: EMERGENCY EVACUATION COMMUNICATION SYSTEM WITH SPEAKERS

ITEM	PARTICULARS	INFORMATION FROM TENDERER
1.1	CONTROL PANEL	
	Manufacturer	
	Country of origin	
	Type or model	
	Is the equipment acceptable to the Department of Public Works?	Yes/No
	Has the equipment previously been installed for the Department of Public Works?	Yes/No
	State where	(a) (b)
	Are there any deviations from the specification?	Yes/No
	Furnish particulars	
1.2	MAIN CONTROL UNIT	
	Supplier	
	Manufacturer	
	Country of origin	
	Type or model	
	Total input power at 230 V, 50 Hz	W
	Is the equipment acceptable to the Department of Public Works?	Yes/No
	Has the equipment previously been installed for the Department of Public Works?	Yes/No
	State where	(a) (b)

ITEM	PARTICULARS	INFORMATION FROM TENDERER
	Are there any deviations from the specification?	Yes/No
	Furnish particulars	
1.3	AMPLIFIERS	
	Manufacturer	
	Country of origin	
	Type or model	
	Total installed amplifier power in equipment room	Units at W each
	Frequency response	Hz to Hz
	Output line voltage	V
	Is the equipment acceptable to the Department of Public Works?	Yes/No
	Has the equipment previously been installed for the Department of Public Works?	Yes/No
	State where	(a) (b)
	Are there any deviations from the specification?	Yes/No
	Furnish particulars	
1.4	EVACUATION SPEAKERS	
	Manufacturer	
	Country of origin	
	Type (eg polyamide phenolic)	
	Sensitivity at 1 metre	dB(A) ± dB(A)
	Power tappings (state tappings)	W W W
	Is the equipment acceptable to the Department of Public Works?	Yes/No
	Has the equipment previously been installed for the Department of Public Works?	Yes/No

ITEM	PARTICULARS	INFORMATION FROM TENDERER
	State where	(a) (b)
	Are there any deviations from the specification?	Yes/No
	Furnish particulars	
1.5	RACK WIRING	
	Specialist installer	
	Supplier of cable	
	Manufacturer of cable	
	Trade name of cable	
	Wiring type	
	Core size	mm sq
	Type of insulation	
1.6	SPEAKER WIRING	
	Specialist installer	
	Supplier of cable	
	Manufacturer of cable	
	Trade name of cable	
	Wiring type	
	Core size	mm sq
	Type of insulation	
	Are connectors compatible with wiring?	Yes/No
	Type of connectors	
1.7	UNINTERRUPTIBLE POWER SUPPLY	
	Manufacturer	
	Country of origin	
	Type or model	
	Rating at 0,8 power factor	kVA
	Overload rating at 200% full load	kVA
	Battery back-up period at full rated load (note minimum required)	minutes
	Frequency stability	%

ITEM	PARTICULARS	INFORMATION FROM TENDERER
	Voltage regulation	%
	Distortion	%
	Crest factor ratio	%
	Battery manufacturer	
	Battery type	
	Total installed battery capacity	amp hours
	Total overall efficiency at full load	%
	Total heat load of system	watts
	Supply circuit breaker size	amps
	Is the equipment acceptable to the Department of Public Works?	Yes/No
	Has the equipment previously been installed for the Department of Public Works?	Yes/No
	State where	(a) (b)
	Are there any deviations from the specification?	Yes/No
	Furnish particulars	
1.8	STEEL CONDUITS	
	Manufacturer	
	Country of origin	
	Type	
1.9	STEEL TRUNKING	
	Manufacturer	
	Country of origin	
	Type	

SCHEDULES OF PARTICULARS AND INFORMATION FROM TENDERER (CONTINUED)

SCHEDULE NO 2: EMERGENCY EVACUATION COMMUNICATION SYSTEM WITH SOUNDERS AND SIRENS

ITEM	PARTICULARS	INFORMATION FROM TENDERER
2.1	CONTROL PANEL	
	Manufacturer	
	Country of origin	
	Type or model	
	Is the equipment acceptable to the Department of Public Works?	Yes/No
	Has the equipment previously been installed for the Department of Public Works?	Yes/No
	State where	(a) (b)
	Are there any deviations from the specification?	Yes/No
	Furnish particulars	
2.2	CONTROL UNIT	
	Manufacturer	
	Country of origin	
	Type or model	
	Is the equipment acceptable to the Department of Public Works?	Yes/No
	Has the equipment previously been installed for the Department of Public Works?	Yes/No
	State where	(a) (b)
	Are there any deviations from the specification?	Yes/No
	Furnish particulars	

ITEM	PARTICULARS	INFORMATION FROM TENDERER
	Can the control panel monitor the siren circuits?	Yes/No
2.3	SOUNDERS	
	Manufacturer	
	Country of origin	
	Type or model	
	Is the equipment acceptable to the Department of Public Works?	Yes/No
	Has the equipment previously been installed for the Department of Public Works?	Yes/No
	State where	(a) (b)
	Are there any deviations from the specification?	Yes/No
	Furnish particulars	
	What is the maximum sound level at 1 m?	d(A)
	Can the sound level be set individually?	Yes/No
	What is the current consumption of one unit at maximum output?	milli amps
	How many different tones are available on each unit?	
2.4	SIRENS	
	Manufacturer	
	Country of origin	
	Type or model	
	Is the equipment acceptable to the Department of Public Works?	Yes/No
	Has the equipment previously been installed for the Department of Public Works?	Yes/No

ITEM	PARTICULARS	INFORMATION FROM TENDERER
	State where	(a) (b)
	Are there any deviations from the specification?	Yes/No
	Furnish particulars	
	What is the maximum sound level at 1 m?	dB(A)
	Can the sound level be set individually?	Yes/No
	What is current consumption of one unit at maximum output?	milli amps
	How many different tones are available on each unit?	
2.5	BATTERY CHARGER	
	Make	
	Country of origin	
	Type of charger offered	
	Maximum charging capacity	amps
	Recharging time for batteries supplied	hours
	Have all the specified meters been provided?	Yes/No
	Is the equipment acceptable to the Department of Public Works?	Yes/No
	Has the equipment previously been installed for the Department of Public Works?	Yes/No
	State where	(a) (b)
	Are there any deviations from the specification?	Yes/No
	Furnish particulars	
	(The recharging should reach approximately 80% of battery capacity within 10 hours. Tenderers are reminded that the chargers should be of the constant potential type design to limit the charging current to meet the specification of the battery supplier.)	

ITEM	PARTICULARS	INFORMATION FROM TENDERER
2.6	BATTERIES	
	Make	
	Battery type	
	Country of origin	
	Guarantee period	years
	Number of batteries	
	Total capacity	amp hours
2.7	CIRCUIT WIRING	
	Manufacturer	
	Country of origin	
	Type	
	Does it bear the SANS mark?	Yes/No
	Does it bear a BS mark?	Yes/No
2.8	STEEL CONDUITS	
	Manufacturer	
	Country of origin	
	Type	
2.9	STEEL TRUNKING	
	Manufacturer	
	Country of origin	
	Type	

SCHEDULES OF PARTICULARS AND INFORMATION FROM TENDERER (CONTINUED)

SCHEDULE NO 3: EMERGENCY TELEPHONE SYSTEM

ITEM	PARTICULARS	INFORMATION FROM TENDERER
3.1	EMERGENCY TELEPHONES	
	Specialist installer	
	Supplier of cable	
	Manufacturer of cable	
	Trade name of cable	
	Core size	mm sq
	Type of insulation	
	Country of origin: Handsets Control panel	
	Manufacturer: Handsets Control panel	
	Type or model: Handsets Control panel	
	Is the equipment acceptable to the Department of Public Works?	Yes/No
	Has the equipment previously been installed for the Department of Public Works?	Yes/No
	State where	(a) (b)
	Are there any deviations from the specification?	Yes/No
	Furnish particulars	

ITEM	PARTICULARS	INFORMATION FROM TENDERER
3.2	BATTERY CHARGER	
	Make	
	Country of origin	
	Type of charger offered	
	Maximum charging capacity	amps
	Recharging time for batteries supplied	hours
	Have all the specified meters been provided?	Yes/No
	Is the equipment acceptable to the Department of Public Works?	Yes/No
	Has the equipment previously been installed for the Department of Public Works?	Yes/No
	State where	(a) (b)
	Furnish particulars	
	(The recharging should reach approximately 80% of battery capacity within 10 hours. Tenderers are reminded that the chargers should be of the constant potential type design to limit the charging current to meet the specification of the battery supplier.)	
3.3	BATTERIES	
	Make	
	Battery type	
	Country of origin	
	Guarantee period	years
	Number of batteries	
	Total capacity	amp hours
3.4	CIRCUIT WIRING	
	Manufacturer	
	Country of origin	
	Type	
	Does it bear the SANS mark?	Yes/No
	Does it bear a BS mark?	Yes/No

ITEM	PARTICULARS	INFORMATION FROM TENDERER
3.5	STEEL CONDUITS	
	Manufacturer	
	Country of origin	
	Type	
3.6	STEEL TRUNKING	
	Manufacturer	
	Country of origin	
	Type	