# DEPARTMENT OF PUBLIC WORKS

# FIRE SECURITY

# STANDARD TECHNICAL SPECIFICATION

# FOR A FIXED CARBON DIOXIDE

# FIRE PROTECTION INSTALLATION

STS 8
REF: FPO 3E
JANUARY 1999

**FPO 3E**

**REVISED JANUARY 1999**

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## 1. INTRODUCTION

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 a fixed carbon dioxide fire protection installation. 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 complies with the highest standard of design and fire protection practice.

## 3. STANDARDS AND REGULATIONS

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

3.1 The wiring of premises (SABS 0142).

3.2 Occupational Health and Safety Act (Act 85 of 1993/4 as amended).

3.3 Local municipal by-laws and regulations.

3.4 Local fire regulations.

3.5 Regulations of Telkom.

3.6 Regulations of the local electrical supply authorities.

3.7 National Building Regulations Act 103 of 1977 (SABS 0400) and any amendments thereto

3.8 The most recent edition of the National Fire Protection Associations (NFPA) publication No 12 for Carbon Dioxide Extinguishing Systems.

*(Note: Table A-1-9.5(b) (Metric) of the 1993 Edition is incorrect and shall not be used for design purposes)*

3.9 The Department's Standard Technical Specification for an Automatic Fire Alarm Installation, FPO/ 82/5E (latest revision).

3.10 The Department's Standard Technical Specification for Security Equipment, FPO 9E (latest revision).

3.11 The Department's Standard Technical Specification for the Electrical Equipment and Installation for Mechanical Services as amended.

In all cases the most recent amendments of the standards and regulations shall apply.

## 4. MATERIALS AND EQUIPMENT

4.1 Material for which a SABS specification exists shall be in accordance with such a specification and shall bear the SABS mark.

4.2 All materials and equipment used on the contract shall be new and of the very best of their respective 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 Replacements 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. THE INSTALLATION

Unless specified otherwise in the Supplementary Specification, the installation shall be for a total flooding system with a fixed supply of carbon dioxide connected to fixed piping with nozzles arranged to discharge gas into an enclosed space or enclosure about the hazard.

The system shall be activated by an alarm signal from detectors on a dedicated fire detection system or on a system also serving other areas in the same premises, all as described more fully in the Supplementary Specification.

## 6. DESIGN AND TENDER DRAWINGS

The fixed carbon dioxide fire extinguishing installation was designed as specified in the Supplementary Specification. However, all design aspects not specifically mentioned therein shall comply with the National Fire Protection Association (NFPA) Publication No 12 (latest edition).

A suitable layout for the required carbon dioxide installation has been indicated on the Department's tender drawings referred to in the Supplementary Specification.

The drawings indicate the layout of the gas pipes and discharge nozzles in specific positions.

Should the tenderer propose an alternative layout, pipe sizes or other discharge nozzles, or recommend changing the quantity of carbon dioxide as specified in the Departmental design, full particulars and calculations shall be submitted with his tender.

Information shall be provided regarding the location and function of the detection devices, operating devices, auxiliary equipment, and electrical circuitry, if used.

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

## 7. DRAWINGS TO BE PROVIDED BY CONTRACTOR

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

Layout drawings of equipment, including the arrangement of gas cylinders shall be drawn to scale and be fully dimensioned.

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

Wiring diagrams with the numbers and sizes of conductors shall be provided. The numbers of numbers of terminals and corresponding conductors shall agree.

## 8. OPERATION OF THE SYSTEM

The system shall be fully automatic, but provision shall be made for emergency manual operation.

While there is no one in the protected area, the system will normally be in the automatic mode. As soon as someone enters the protected area the door lock, which is described elsewhere, shall activate a buzzer which will remain in operation until the key switch on the status panel is switched to the manual mode. Likewise, the buzzer will remain switched on after the door has been locked until the key switch is switched to the automatic mode.

Automatic Mode

When in the automatic mode the gas protection system will be activated by a detection system. Two signals from separate detector circuits are necessary for the release of gas.

As soon as the first electronic signal Is received, ie first knock, an alarm bell will ring. A visual “Fire” alarm will flash on the alarm panel in the control room and will change to a steady light when the alarm is accepted. The acceptance of the alarm will de-activate the two tone whistle on the alarm panel and silence the alarm bell. If another signal is received the procedure shall be repeated if the signal is received from the same circuit or from a circuit In another zone. An "Alarm Reset" switch will switch off all the light emitting diodes (LED’s).

The first signal will activate devices to close doors and release any asbestos blankets and relays to close ventilators and fire dampers and/or shut down air-conditioning systems. Simultaneously an evacuation warning will be activated in the protected zone or zones. All relays and wiring form part of this contract.

If an addressable detection system is used, the alarm indications may appear differently but must provide the same facilities.

On the receipt of the second signal, ie second knock, from a second circuit in the same zone a time delay relay with a delay of 30 seconds will be activated. Should a longer time delay be required, this will be specified in the Supplementary Specification

With the second signal the bell alarms will switch off, the sirens will sound inside and outside the protected area and the two-tone whistle alarms in the Control Room will be reactivated. A "System Activated" sign on both the status and the control panel will indicate that the system has come into

operation and after a delay of 30 seconds, or such other periods as may be specified, the gas will be released.

To switch off the alarms and sirens an "Alarm Accepted" button must be pressed.

Should another detector signal be received the procedure will be repeated.

Turning the "Alarm Reset" key switch will not restore the system during a fire.

Manual Mode

If the system is switched to the manual mode the first detector signal will still sound the bell alarms, and the fire signal and flashing evacuation sign will still be activated.

It will, however, be necessary to release the gas by switching to the automatic mode or to activate the hand control. The manual release of gas can still take place without a prior alarm being activated. Even with the system in the automatic mode, the gas can still be released manually.

## 9. DETECTION OF FIRES

The detection of fires shall be by means of an automatic fire detection system in accordance with the most recent edition of the Department's Standard Technical Specification for an Automatic Fire Alarm installation FPO/82/5E.
Unless specified otherwise in the Supplementary Specification, the following requirements shall be met:

9.1 Each area or zone to be protected shall be served by a minimum of two alarm circuits. Each circuit shall have a minimum of two conventional detectors and the system shall not be actuated until two separate alarm signals have been received.

If addressable detectors are used, a minimum of one detector on each of the circuits will be sufficient.

With an addressable system the two circuits may serve more than one zone.

9.2 Where the ceiling area is irregular or if the area to be protected is larger than the maximum area permitted for a single detector, as specified in the Department's Standard Specification for an Automatic Fire Alarm Installation, additional detectors will have to be installed.

As two alarms are necessary to activate the system, twice as many detectors are needed than for an ordinary fire detection installation.

9.3 In the case of low ceilings the detectors shall be recessed into the ceiling or be provided with protective grills.

9.4 The detectors in diesel driven stand-by electrical plant rooms shall be of the combined fixed temperature and rate of temperature rise type.

The requirements as stipulated in the Supplementary Specification shall always take preference.

## 10. ACTUATING DEVICES

All actuating devices shall be in accordance with the requirements of the National Fire Protection Association (NFPA)or the Loss Prevention Council (LPC).

Actuating devices include carbon dioxide releasing devices or valves, discharge controls, and shut-down equipment, all of which are necessary for the successful performance of the system.

Operation shall be by mechanical, electrical or pneumatic means as specified in the Supplementary Specification. An adequate source of energy shall be used.

The activation of the system by means of detonators will not be allowed unless specifically specified otherwise in the Supplementary Specification.

All devices shall be designed for the conditions under which they will operate and shall not be readily rendered inoperative or susceptible to accidental operation. Devices shall be normally designed to function properly from -30 degrees Celsius to 65 degrees Celsius or marked to indicate temperature limitations.

All devices shall be located, installed or suitably protected so that they are not subject to mechanical, chemical, or other damage which would render them inoperative.
If so specified in the Supplementary Specification, the installation shall be provided with a normal manual operation facility. The operation of such a facility shall require human action, where a lever or pull handle will directly actuate the release mechanism of the cylinder valves.

The normal manual control device for actuating the release of gas shall be located so as to be easily activated at all times including the time of fire.

The manual control(s) shall be of distinct appearance and clearly recognisable for the purpose intended. The operation of one control shall be all that is required to bring about the full operation for the release of gas in the particular zone.

Operation of this device shall not cause the time delay to recycle.

An emergency manual operation facility shall be provided on all systems to activate the valves controlling the release and distribution of gas in the event of the failure of the normal manual or automatic actuation. This does not apply to slave high pressure cylinders.

The emergency means shall be easily accessible and located close to the valves controlled.

The Supplementary Specification shall stipulate whether a time delay and pre-discharge alarm for emergency control are required based on the nature of the hazard and safety requirements. Where no time delay or pre-discharge alarm for emergency manual method of actuation has been specified, it shall be ascertained that the hazard area and adjoining areas where carbon dioxide may accumulate are clear of all personnel prior to operation of this device. These devices shall be clearly marked to indicate this with an appropriate warning notice.
Manual control shall not require a pull of more than 180 N nor a movement of more than 375 mm to secure operation. At least one manual control for activation shall be provided and shall be positioned not more than 1,2 m above the floor.

All manual operating devices shall be identified as to the hazard they protect, the function they perform and the method of operation.

All manual control devices shall be provided with a clear indication whether the valve is open or shut.

**10.1 Cylinder Valve Operation**

The operation of opening cylinder valves shall take place at the valve and by an approved means, as described in the Supplementary Specification.

Full particulars of the specified method, together with detailed drawings shall be submitted with the tender. Whatever method is employed, it must be smooth, positive and robust. There shall not be any fine adjustments associated with the actual movements of the valve which could interfere with its clear opening.

**10.2 Valve release mechanism**

The release mechanism used shall hold the cylinder valves in the closed position and shall be so designed that it holds the valve opening device firmly in the readiness position at all times without the risk of metal fatigue or accidental operation through vibration or jarring, yet be sufficiently sensitive to be instantly tripped by either manual or automatic operation as required, without undue force. The system shall be in accordance with the requirements of the aforementioned authorities and also be acceptable to the Department.

**10.3 Directional valves**

In cases where fire zones are subdivided, the carbon dioxide gas system shall be fitted with directional valves, as approved by the Department/Engineer, in the positions indicated on the drawings, close to the cylinder bank. The manifolds from the cylinders are to be so arranged that, in combination with the directional valves, they pipe the correct quota of gas to the respective hazards.

It shall be possible to remove each valve from its pipeline without having to dismantle the line. The directional valves shall be of a straight through type and shall open fully within a 90 degree spindle movement. The manual or automatic operation of the carbon dioxide system shall open the particular directional valve serving the hazard to be flooded, immediately prior to the release of gas.

## 11. DISTRIBUTION SYSTEMS

Piping and fittings, unless specified otherwise in the Supplementary Specification, shall be special quality wrought or mild steel suitable for the pressure rating of the carbon dioxide systems and all piping shall be solid drawn.

All pipes and fittings on a high pressure system shall be certified for a minimum bursting pressure of 34,5 MPa. On a low pressure system the corresponding pressure shall be 12,4 MPa. The installed system shall, in the case of a high pressure system, be tested for 4 hours at a pressure of 17,5 MPa. For a low pressure system the test pressure shall be 6 MPa. The method of test is described more fully under “Pressure Testing of the Installation”.

Welded joints, screwed or flanged fittings (malleable iron, steel or ductile iron) shall be used. Flush bushings shall not be used. If hexagonal bushings are used, more than one pipe size reduction shall be provided to maintain adequate strength.

Suitably flared, compression-type, or brazed fittings shall be used with copper or brass tubing, where these have been specified In the Supplementary Specification because of corrosive conditions. Where brazed joints are used, the brazing alloy shall have a melting point of 540 degrees Celsius or higher.

All piping and fittings shall be installed in accordance with good commercial practice and the piping layout shall be such as to reduce frictional losses to a reasonable minimum and care shall be taken to avoid possible restriction due to foreign matter and faulty fabrication.

All pipe lines shall be firmly bracketed to walls and ceilings to the satisfaction of the Department.

The piping system shall be securely supported with due allowance for expansion and contraction and shall not be subject to possible damage.

Pipe support spacing shall not exceed the following limits for the various diameters:

| Nominal Pipe Size mm | Maximum Spacing for Steel Pipes m | Maximum Spacing for Copper Pipes m |
|---|---|---|
| 15 | 1,5 | 1,2 |
| 20 and 25 | 2,1 | 1,8 |

| | | |
|---|---|---|
| 32 and 38 | 2,7 | 2,4 |
| 50 | 3,0 | 2,7 |
| 65 and 80 | 3,6 | 3,0 |
| 100 and larger | 4,0 | 3,0 |

All cut pipes shall have the ends reamed before assembly.

On completion of the installation, it will be necessary for a minimum amount of compressed air, nitrogen or carbon dioxide gas to be released through the system to prove that all piping is free of restrictions and that the nozzles are functioning correctly. Such quantity shall be decided by the total volume of all piping serving the hazard under test plus sufficient gas to provide a continuous discharge from all nozzles for a period of 5 seconds.

In systems where valve arrangement introduces sections of closed piping, such sections shall be equipped with pressure relief devices or valves, or shall be designed to prevent entrapment of liquid carbon dioxide or gas. The pressure relief devices shall operate between 16 MPa and 20 MPa on high pressure systems and 3 MPa on low pressure systems. Where pressure operated cylinder valves are used, a means shall be provided to vent any cylinder gas leakage from the manifold but which will prevent loss of gas when the system operates.

All pressure relief devices shall be of such design and so piped that the discharge of carbon dioxide therefrom will not injure personnel or be otherwise objectionable.

## 12. VALVES

All valves shall be suitable for their intended use, particularly with regard to flow capacity and operation. They shall only be used within the temperature range and other conditions for which they are rated or approved.

Valves on high pressure systems constantly under pressure shall have a minimum bursting pressure of 40 MPa while those not under constant pressure shall have a minimum bursting pressure of at least 35 MPa. Valves used on low pressure systems shall withstand a hydrostatic pressure of 12,4 MPa without permanent distortion.

Valves shall not be subject to mechanical, chemical or other damage.

Valves shall be rated in terms of equivalent length of pipe or tubing sizes with which they will be used. The equivalent length for cylinder valves shall include syphon tube, valve, discharge head and flexible connector.

## 13. DISCHARGE NOZZLES

Discharge nozzles shall take up as little room as possible. Full particulars of the equipment offered must be given with the tender. Shape and dimensions should be stated.

Discharge nozzles shall be suitable for the use intended and shall have approved discharge characteristics. The discharge nozzle consists of the discharge orifice and any associated horn, shield or baffle. Discharge nozzles shall be of adequate strength for use with the expected working pressures, be able to resist normal mechanical damage, and constructed to withstand expected temperatures without deformation.

Discharge orifices shall be of corrosion-resistant metal.

Discharge nozzles shall be permanently marked to identify the nozzle; showing the equivalent single orifice diameter regardless of shape and number of orifices. This equivalent diameter shall refer to the discharge orifice diameter of the 'Standard" single orifice type nozzle having the same

flow rate as the nozzle in question. The marking shall be readily discernible after installation. The 'Standard' discharge orifice is an orifice having a rounded entry with a coefficient of discharge of not less than 0.98.

The discharge nozzles shall be located to achieve the best results and shall be selected and so positioned that the discharge will not unduly splash flammable liquids or create dust clouds that might spread the fire, create an explosion or otherwise adversely affect the contents of the enclosure. Nozzles vary in design and discharge characteristics and shall be selected on the basis of their suitability for the use intended.

A minimum of two nozzles shall be provided for any room, or any enclosure, no matter how small.

Discharge nozzles shall be provided with frangible discs or blow-out caps where clogging by foreign materials is likely. These devices shall provide an unobstructed opening during system operation.

All nozzles shall be firmly bracketed to wall and ceiling to the satisfaction of the Department.

## 14. ODORISER CONTAINERS

Odoriser containers shall be installed immediately after each directional valve as well as after the manifold. In the case of a simple system without direction valves, the odoriser container will still be required immediately after the manifold.

## 15. CARBON DIOXIDE GAS STORAGE

The carbon dioxide gas shall be stored in 27 to 45 kg capacity high pressure rechargeable steel cylinders which comply with the latest issue of SABS Specification 50.

The gas cylinder or cylinder bank shall be located in the position indicated on the drawing.

Adequate working space shall be provided between each two rows of cylinders.

A mesh-covered steel enclosure with 2 m x 0,8 m lockable gate shall be formed around the gas cylinder bank, allowing for sufficient working space, except where a special room has already been provided for this purpose.

Each cylinder valve shall be fitted with a frangible safety disc to release pressure in the cylinder, should this pressure exceed the safety margin. The cylinders shall be adequately mounted and secured with suitable clamps to a rack to be provided for the purpose including facilities for convenient individual servicing or content weighing.

Automatic means shall be provided to prevent the loss of gas from the manifold if the system comes into operation while any cylinder is removed for maintenance.

Each cylinder must be connected to the cylinder manifold by means of a solidly constructed copper loop and manifold check valves. The cylinders must be manifolded in such a way that the correct amount of gas is piped through the directional valve(s) to the hazard it is intended to protect.
In the case of low pressure systems, the special requirements in the Supplementary Specification and the requirements of Clause 1-8.6 of NFPA 12 shall be strictly adhered to.

In the multiple cylinder system, all cylinders supplying the same manifold outlet for distribution of gas shall be interchangeable and of one select size.

A stand-by gas cylinder bank shall be provided unless specified otherwise in the Supplementary Specification.

Notwithstanding Clause 1-8.1.3 of NFPA 12 it will not be necessary for the stand-by gas cylinder bank to be connected permanently to the pipes unless otherwise described in the Supplementary Specification.

The number of cylinders needed for stand-by must be sufficient for the greatest single risk or group of risks, that need protection at one time. The cylinders shall be provided with a lockable frame.

For applications where the normal temperature of the enclosure is below -18 degrees Celsius, a 2% increase in the calculated total quantity of carbon dioxide shall be provided for each degree below -18 degrees Celsius.

It will not be necessary to provide for extra carbon dioxide to maintain the concentration in the case of surface fires unless specified otherwise in the Supplementary Specification.

## 16. CONTROL PANELS AND ALARM SIGNALS

### 16.1 Status Panels

The status panel shall be placed next to the door on the outside of the particular area to be protected. The panel shall be of stainless steel or aluminium with a matt finish on which the labelling is engraved. The panel shall fit on an enamelled or stainless steel cabinet.

The panel shall be equipped with the following:

16.1.1 A key switch to change the mode from automatic control to manual control or vice versa. The key for the key switch must not be removable in the manual position.

16.1.2 Two green LED's to indicate that the system is in the automatic mode.

16.1.3 Two amber LED's to indicate that the system is in the manual mode.

16.1.4 A key switch to isolate the system.

16.1.5 Two amber LED's to indicate that the system has been isolated.

16.1.6 Two red warning LED's to indicate the release of carbon dioxide.

16.1.7 A buzzer that will indicate that the unlocking or locking of the access door does not agree with the mode switch on the status panel. (The buzzer need not be housed in the same cabinet).

16.1.8 A switch to silence the buzzer.

16.1.9 A lamp test switch shall be provided.

16.1.10 Two amber LED's to indicate a fault on the system.

16.1.11 Local control by means of a Manual Break Glass Unit .

16.1.12 The appropriate titles shall be provided for each light and switch.

In the case of more than one zone, a separate status panel shall be provided for each zone.

### 16.2 Remote Status Panel

Should there be more than one entrance to a gas protected room, one or more remote status panels shall be provided.

These panels shall be identical to the status panel except that the two key switches for changing the status and isolating the system shall be omitted.

Such panels are not required at fire escape doors used solely as emergency exits.

**16.3 Main control panel**

The main control panel shall be constructed in the same manner as the status panel. If a console is provided the panel may be mounted on it and a separate steel cabinet will not be required.

The following switches and indicator lights shall be provided on the control panel:

16.3.1 Two green LED's to indicate that the main power supply is on.

16.3.2 All the indicator lights on the status panel shall be repeated on the main control panel. Should there be more than one zone, and therefore more than one status panel, the lights for each zone shall be kept separate.

16.3.3 A two-tone whistle alarm and an amber warning light shall switch on immediately should any of the following faults occur:

16.3.3.1 Deviation or interruption of the normal power supply.

16.3.3.2 Failure or interruption of the battery charger.

16.3.3.3 Fault on the circuits serving the gas release equipment.

16.3.3.4 Fault on the detector circuits. (If the detection system for the gas protection system forms part of an addressable detection system for the building, a separate fault alarm will not be required)

16.3.4 A key switch shall be provided on the main control panel for each of the zones, so that any zone can be isolated. It must be impossible to remove the key switch in the ‘off’ position. This key switch shall override the key switch on the status panel if in the ‘off’ position and the LED’s on the status panel shall light up accordingly.

16.3.5 A green and a red indicator LED shall be provided to show whether the air-conditioning system or systems disconnecting relays have respectively been activated or not.

16.3.6 The condition of the stand-by batteries shall be indicated as ‘Fault', 'Low’, 'Full' or ‘Loading’. The levels at which these indications are to come into operation shall be determined in conjunction with the Engineer.

16.3.7 Two red LED’s for each pressure switch on the gas distribution pipe to indicate that gas is being discharged.

16.3.8 A buzzer to indicate that gas is being discharged.

16.3.9 An ‘Alarm Accepted’ push button switch shall switch off all fault and fire alarms.

16.3.10 An ‘Alarm Reset’ key switch shall restore all indications on the panel to their normal status if there is no fire or fault.

16.3.11 A lamp test switch shall be provided.

## 17. AUDIBLE ALARMS

It shall be possible to operate all audible alarms from the auxiliary power supply.

17.1 Bell alarms shall be 150 mm in diameter and, unless specified otherwise in the Supplementary Specification, one bell alarm shall be installed in each room protected by gas.

17.2 Sirens shall be installed inside and outside the protected room as shown on the drawings or as described in the Supplementary Specification. Sirens shall, unless specified otherwise in the Supplementary Specification, produce an alarm at a sound level of at least 105 dB (A) at 1 m and it shall be possible to step down their output.

The alarm shall be a slow whoop slowly ascending from 500 Hz 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 deviations in the frequency and time intervals stipulated will be permitted.

17.3 The buzzer referred to in 16.1.7 at the entrance to a protected zone shall be able to maintain a minimum sound level of 75 dB (A) at 1 m, to indicate a status difference between door lock and status panel.

17.4 Two-tone whistle alarms shall be provided on the main control panel. The action of the whistle alarm shall be as follows:

Fire Alarm - a lower frequency intermittent whistle
Fault Alarm - a higher frequency continuous whistle

The two-tone whistle alarm shall have a minimum sound level of 75 dB (A) measured 3 m away from the alarm and maintain frequencies of 500 Hz and 1 000 Hz.

If the surrounding noise level is higher than 55 dB (A), then the two-tone whistle alarms' sound level shall be at least 20 dB (A) higher than the maximum recorded surrounding noise level.

## 18. VISUAL ALARMS

The flashing Indicator LED's on the panel shall flash at 20 to 30 flashes per minute with an on/off ratio of between 2:1 and 4:1.

## 19. WARNING NOTICES

**19.1 Gas warning notices:**

Gas warning notices shall be affixed inside and outside of those spaces where concentration of carbon dioxide gas can accumulate, as well as in adjacent areas where carbon dioxide could migrate or leak.

These notices shall have legible white lettering at least 30 mm high on a red background.

19.1.1 Notice in protected space:

**WARNING**
**CARBON DIOXIDE GAS**
**WHEN ALARM OPERATES VACATE IMMEDIATELY**

19.1.2 Notice at an entrance to a protected space:

**WARNING**
**CARBON DIOXIDE GAS**
**WHEN ALARM OPERATES DO NOT**
**ENTER UNTIL VENTILATED.**

19.1.3 Notice in a nearby space:

**CAUTION**
**CARBON DIOXIDE DISCHARGE INTO A**
**NEARBY SPACE MAY COLLECT HERE.**
**WHEN ALARM OPERATES VACATE IMMEDIATELY.**

19.1.4 Notice at carbon dioxide storage room:

**CAUTION**
**CARBON DIOXIDE GAS**
**VENTILATE THE AREA BEFORE ENTERING.**
**A HIGH CARBON DIOXIDE GAS CONCENTRATION**
**MAY OCCUR IN THIS AREA**
**AND MAY CAUSE SUFFOCATION.**

19.1.5 Notices to be provided at every manual actuation station:

**WARNING**
**ACTUATION OF THIS DEVICE WILL CAUSE**
**CARBON DIOXIDE TO DISCHARGE.**
**BEFORE ACTUATING, BE**
**SURE PERSONNEL ARE CLEAR OF THE AREA.**

**19.2 Evacuation signs:**

An evacuation sign shall be placed, if possible, above or otherwise next to all doors giving exit from the protected room. The sign must not be legible under normal circumstances, but on receipt of the first fire detection signal, the sign shall become legible - illuminated by a flashing light. The lettering shall be at least 40 mm in height and the wording as follows:

**CARBON DIOXIDE**

**EVACUATE**

*(Note: This is in additional to the notices specified in Clause 19.1.1).*

## 20. ELECTRICAL 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(s) for the control equipment.

Notwithstanding any reference to a nominal rating of 230 Volt supply all equipment connected directly to the main 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 lightning or other spikes, or damage due to over-voltage.

## 21. STANDBY BATTERY POWER SUPPLY

The standby battery power supply for the carbon dioxide protection installation shall be kept separate from any other system in this contract, except for the detectors on the carbon dioxide protection installation which may be directly connected to a main fire alarm detection system with its own standby battery power supply.

Unless specified otherwise in the Supplementary Specification, the system shall operate off a 24 Volt supply.

The 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 contract circuits.

The battery charger shall be able to deliver the full charging current to discharged batteries, and thereafter the charger 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 charger shall be protected against reverse polarity and short circuits on the DC supply side.

The power pack of the control panel shall regulate the supply voltage.

Upon loss of mains power, the power supply unit shall automatically revert to battery power, whereafter, the system shall remain fully operational for a period of 24 hours, as well as the total alarm load for a further period of one hour. The unit shall automatically revert back to mains power upon mains power restoration and manual resetting of the unit shall not be necessary.

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

| | | | |
|---|---|---|---|
| (a) | "MAINS ON" | - | green LED |
| (b) | "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 volt meter 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 8 hours.

The supplier of the battery charger must provide a certificate in which he confirms that the battery charger is suitable for the batteries offered.

## 22. ELECTRICAL CLEARANCES

All systems components shall be so located as to maintain a minimum clearance of 200 mm from electrical conduiting or equipment. Where a greater clearance is indicated on the Departmental drawings specified in the Supplementary Specification, the greater clearance shall be adhered to.

## 23. CIRCUIT WIRING

All wiring associated with the carbon dioxide fire protection installation 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 for control equipment shall not be less than 0,5 square mm even though calculated voltage losses may prove that thinner wires will meet the voltage requirements of the operating devices. It shall be the responsibility of the Contractor to ensure that the wire sizes are adequate for the equipment he proposes using.

The insulation shall be of the fire retardant type.

The wiring shall be in circuits and trunking separate from any other fire protection security or electrical service.

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

## 24. CONDUITS AND TRUNKING

The quality of the 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 carbon dioxide fire protection installation shall be responsible for the supply and installation of all conduits, conduit accessories and trunking 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 minimum distance of 2 m and at a distance not exceeding 150 mm before and after each $90^0$ 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 the control circuits exposed to the elements and in the roof space shall be of galvanised mild steel. Conduits and accessories for these applications shall comply with SABS 162 and shall be hot-dip galvanised to SABS 763.

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

No PVC conduits or trunking shall be used on the carbon dioxide fire protection system.

Trunking shall be fitted throughout with covers.

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

## 25. DOORS AND DOOR EQUIPMENT

Unless otherwise specified in the Supplementary Specification, doors will be provided by others – but locks and door closers, as specified in the Supplementary Specification, form part of the contract for the gas protection system.

Locks and door closers shall comply with the requirements of the most recent issue of the Department's Standard Specification for Security Equipment, FPO 9E.

The access door to a gas protected area or zone shall be provided with a two-way monitored lock, PWD Sample 24 MS, as described in the above-mentioned Specification and an approved door closer, with a door holding facility, that will automatically close the door as soon as gas is released.

Escape doors shall be provided with alarm escape locks, PWD Sample 127, as described in the above-mentioned Specification and with approved door closers unless specified otherwise in the Supplementary Specification.
*(Note: Under special conditions a PWD Sample 128 lock may be required).*

Should access to a zone be through a zone that is already protected, then the aforementioned door shall be provided with a PWD Sample 24 MS lockset, with thumb turn on both sides of the lock, as well as a door closer that will be activated by either system in the two zones.

Door closers are not required on strong-room doors that are within a protected area.

In the case of double doors, sequential door selectors must be provided.

## 26. MONITORING OF DOORS

Where three or more doors with locks that can be monitored, as DOW samples 23, 24, 127 and 128, are used, a monitoring panel shall be provided in accordance with Clause S 330 of the Department's Standard Specification for Security Equipment.

## 27. AUTOMATIC SHUTTERS

Automatic closing shutters shall be provided at all fixed ventilation openings. These shall close automatically by means of a gas flow trip or other approved method.

## 28. ASBESTOS BLANKETS

Asbestos blankets shall be provided on the inside of louvered doors or other openings that cannot be protected by automatic closing shutters or dampers.

The asbestos blankets shall normally be rolled up above the door opening, but shall drop down immediately by means of a gas flow trip or other approved method.

The asbestos blankets shall adequately seal the ventilation openings.

## 29. DAMPERS

Unless specified otherwise in the Supplementary Specification, approved dampers will be provided by others in all air-conditioning and ventilation ducts entering or leaving the protected areas.

The dampers shall close on the release of trips activated by an approved method.

The necessary relays shall be provided under this contract.

Where an air-conditioning unit serves only the protected area, the system shall switch off as soon as gas is released or as soon as the fire detection system comes into operation.

## 30. SCREENING NOZZLES

Where openings cannot be closed off adequately by the above-mentioned means, screening nozzles shall be provided. The gas required for such protection shall be in addition to the normal requirements for total flooding.

## 31. VENTING

Normally sufficient relief venting exists due to leakages through doors, windows and dampers, but the successful tenderer shall advise the Department within 14 days of the acceptance of his tender whether additional venting facilities are required and whether the enclosures should be strengthened.

The successful tenderer shall also advise the Department whether the relief openings for explosion venting are adequate.

## 32. WEIGHING IN SITU

Provision, in the form of an overhead rail, shall be made for weighing of the cylinders in situ.

When weighing, each cylinder will first be disconnected at the valve from its copper loop and operating mechanism. The cylinder bank shall be installed with this procedure in view, i.e. there must be no obstructions in the finished installation.

Alternative methods for determining the quantity of carbon dioxide will be considered, provided full particulars are submitted with the tender.

Tenderers are, however, required to allow in their tender for weighing facilities, unless specified otherwise in the Supplementary Specification.

## 33. SLEEVES, DUCTS AND PIPE SUPPORTS

Where sleeves, ducts and pipe supports have been indicated on the Departments drawings, these will be provided by others unless specified otherwise in the Supplementary Specification. The proposed installation shall be routed to adhere to these provisions, particularly where provision for wooden boxing has been made.

The contractor shall submit, with his detailed working drawings, his requirements for any other sleeves that may be necessary.

## 34. PAINTING

Painting of all portions of the carbon dioxide installation shall be carried out by the contractor in the appropriate basic colour and with indicator bands in accordance with SABS 0140 (Part III).

Should a different basic colour be required, this will be specified in the Supplementary Specification.

Before painting is undertaken, the work is to be thoroughly cleaned of all rust, scale, etc by wire brushing with a stiff wire brush wherever necessary.

The pipes and ancillary equipment shall be given an undercoat of first quality zinc chromate primer, followed, when thoroughly dry, by two coats of high gloss first quality enamel. The carbon dioxide cylinders shall be painted light Brunswick Green as No HO 7 of SABS 1091.

## 35. BREATHING APPARATUS

Breathing apparatus acceptable to the Department shall be provided with the installation. The breathing apparatus shall be supplied with a suitable lockable box which shall be mounted against the wall near the main entrance to each protected area and the gas storage room as stipulated in the Supplementary Specification.

The breathing apparatus shall be supplied with an oxygen cylinder with a 10 minute capacity.

## 36. MONITORING THE DISCHARGE OF GAS

The discharge of gas shall be monitored on the supply pipes of each of the gas protected zones by means of pressure switches. Tees shall be provided on the gas supply pipes to accommodate the pressure switches.

An increase in pressure shall activate a signal which is to be relayed to a control panel on the console.

An audible alarm shall be sounded and two red LED's indicating the affected zone, shall glow until cancelled by means of a reset switch.

The wiring of this monitoring system shall be monitored in itself for short circuits and discontinuity in the circuit.

## 37. FIRE BRIGADE SIGNALLING FACILITY

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

The transmitting equipment for the signalling of a fire alarm to the local fire brigade shall be in accordance with FPO/82/5E (latest edition).

## 38. 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 fire engineering practice.

## 39. PRESSURE TESTING OF THE INSTALLATION

The pipe work and the manifold shall be tested hydraulically to 20 MPa for four hours on a high pressure installation after all the nozzles have been removed and the openings sealed off. In the case of a low pressure installation, the test pressure shall be 6 MPa.

After the test, the pipes shall be drained and compressed air passed through the pipe system to ensure that all the water and moisture has been cleared. Care shall be taken that the water is led away as not to cause any damage.

## 40. COMMISSIONING AND HANDING OVER TESTS

The testing of the system shall be done in the presence and to the satisfaction of an authorised

representative of the Department.

After the whole system has been completed compressed air shall be released to clear all gas pipes and nozzles as described in the section dealing with the distribution system.

The test shall include the checking of the operation of all the detectors, the tripping of all electronic devices and the release of carbon dioxide. The complete alarm function with the time delay shall be demonstrated.

Unless specified otherwise in the Supplementary Specification the system must be checked by releasing all the gas in the cylinders protecting the area that needs the most gas.

If less carbon dioxide is required for the final test than that provided for the system, this will be stipulated specifically in the Supplementary Specification.

Pilot cylinders shall be provided for the testing of each of the other individual zones.

The release of gas manually shall be tested with compressed air.

The contractor shall provide all materials required for testing and any additional gas cylinders required for re-testing at his cost, should the first test not be successful.

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

## 41. CLEARING OF SITE

All rubbish and loose material resulting from work done on this contract shall be removed by the Contractor on completion.

## 42. BLOCK PLANS

The block plans shall be drawn to a suitable scale, printed on unbleachable material, and mounted and framed behind a 4 mm clear “Lexan" or some other scratch resistant material.

The various zones, with the corresponding reference numbers of the zone indications, shall be drawn on the block plans.

The block plans shall be installed at the main panel.

The layout of the block plans must be discussed with the Department before final manufacture.

## 43. OPERATING INSTRUCTIONS

The Tenderer shall, if specified in the Supplementary Specification, allow for framed operating instructions of the procedure to be followed in the event of a fire. These instructions shall be printed on 0,05 plastic printing film and neatly mounted behind 4 mm perspex where indicated, alongside the control and status panels, where they are clearly visible and legible.

In the case of the control panel, the instruction chart shall also state clearly the procedure to be followed in the event of a ‘Fault' alarm.

## 44. INSTALLATION OPERATING AND MAINTENANCE MANUAL

Four copies of a manual giving complete information on the operation and maintenance of the

installation shall be provided.

The manual shall include schematics and detailed wiring drawings with a full component list indicating not only component values, but sources of supply.

General layout drawings of the installations, as actually installed, shall be included in the maintenance manual.

Unless these manuals are supplied timeously to the Department, the system will not be accepted.

## 45. 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 (12) months, starting from the date of the first delivery of the contract to the Department.

It is a specific requirement of this contract that the Contractor shall allow for quarterly inspection visits during the 12 month maintenance period, and that he shall submit full reports for each such visit. The reports shall contain the status of the systems well as the faults, which occurred on the system during the previous three months.

The reports shall be submitted to the Department within seven (7) days of the service. Serious faults shall immediately be reported to the Regional Representative 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.

## 46. 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.

## 47. INFORMATION TO BE OBTAINED FROM THE SUPPLEMENTARY SPECIFICATION

General information regarding the areas to be protected such as the sizes of rooms; positions of doors, windows and other openings; sizes and positions of automatic shutters and asbestos blankets, positions of breathing apparatus and specific deviations from this specification will be provided in the Supplementary Specification and tender drawings.

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

47.1 Whether the detectors are on a dedicated system or on a system serving the whole complex and possibly provided by others.

47.2 The concentration of gas required and the rate of discharge for every zone or protected area.

47.3 Whether a stand-by gas cylinder bank is required or not. If not specifically mentioned otherwise in the Supplementary Specification it shall be accepted that such a gas cylinder bank is required, but need not be permanently connected to the pipe work.

47.4 Whether the facility for “Normal Manual Operation” is required or not.

47.5 Whether there are any specific requirements regarding the actuation devices.

47.6 Whether a time delay and pre-discharge alarm for “Emergency Manual Control” is required.

47.7 Whether the main electrical supply point will be provided by others.

47.8 If not specifically mentioned otherwise in the Supplementary Specification, it shall be accepted that the system and the standby battery supply shall operate at 24 Volt.

47.9 Whether doors are to be provided by the contractor for the carbon dioxide fire protection installation.

47.10 Whether dampers are to be supplied by the contractor for the fire protection installation

47.11 If not specifically mentioned otherwise in the Supplementary Specification, it shall be accepted that facilities for weighing the cylinders are required.

47.12 Whether a fire brigade signalling facility has been included in the contract.

47.13 Whether less carbon dioxide will be required in the final test than specified in Clause 4.

## 48. SCHEDULE OF PARTICULARS AND INFORMATION FROM TENDERERS

THE SCHEDULE WHICH ACCOMPANIES THIS TENDER NOTICE, FORMS 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."

Equipment offered and listed in the Schedule 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 A FIXED CARBON DIOXIDE FIRE PROTECTION INSTALLATION**

**SCHEDULE OF PARTICULARS AND INFORMATION FROM TENDERER**

| ITEM | PARTICULARS | INFORMATION FROM TENDERER |
|---|---|---|
| | | |
| **1** | **MAIN 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)<br><br>b) |
| | Are there any deviations from the specification? | Yes / No |
| | Furnish particulars | |
| | | |
| **2** | **STATUS 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)<br><br>b) |
| | Are there any deviations from the specification? | Yes / No |
| | Furnish particulars | |

| ITEM | PARTICULARS | INFORMATION FROM TENDERER |
|---|---|---|
| | | |
| **3** | **STATUS REPEATER 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)<br><br>b) |
| | Are there any deviations from the specification? | Yes / No |
| | Furnish particulars | |
| | | |
| **4** | **OUTPUT UNITS** | |
| | Manufacturer | |
| | Country of origin | |
| | Type or model | |
| | Are the units compatible with gas control units? | 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)<br><br>b) |
| | Are there any deviations from the specification? | Yes / No |
| | Furnish particulars | |

| ITEM | PARTICULARS | INFORMATION FROM TENDERER |
|---|---|---|
| | | |
| **5** | **ELECTRONIC PROTECTION** | |
| | Has electronic protection been provided? | Yes / No |
| | By what means? | |
| | 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)<br>b) |
| | | |
| **6** | **GAS CYLINDER VALVE** | |
| | 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)<br>b) |
| | | |
| **7** | **DIRECTIONAL VALVE** | |
| | 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)<br><br>b) |
| | | |
| **8** | **CARBON DIOXIDE GAS CYLINDER** | |
| | Manufacturer | |
| | Country of origin | |
| | Does it have the SABS or BS approval? | Yes / No |
| | | |
| **9** | **ODORISER CONTAINER** | |
| | 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)<br><br>b) |
| | | |
| **10** | **DISCHARGE NOZZLE** | |
| | 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)<br><br>b) |
| | Are there any deviations from the specification? | Yes / No |
| | Furnish particulars | |

| ITEM | PARTICULARS | INFORMATION FROM TENDERER |
|---|---|---|
| | | |
| **11** | **DISTRIBUTION PIPES** | |
| | Manufacturer | |
| | Country of origin | |
| | Bursting pressure | MPa |
| | | |
| **12** | **ASBESTOS BLANKET** | |
| | Manufacturer | |
| | Country of origin | |
| | 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)<br><br>b) |
| | | |
| **13** | **BELL ALARMS** | |
| | Manufacturer | |
| | Country of origin | |
| | Sound output at 1 metre | dB |
| | 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)<br><br>b) |
| | | |
| **14** | **BUZZER** | |
| | Is it incorporated in the status control and repeater panels? | Yes / No |
| | Sound level at 1 metre | db |
| | Manufacturer | |
| | Country of origin | |
| | Type or model | |

| ITEM | PARTICULARS | INFORMATION FROM TENDERER |
|---|---|---|
| | 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)<br><br>b) |
| | | |
| **15** | **SIREN** | |
| | Is it weatherproof? | Yes / No |
| | Sound level at 1 metre | dB |
| | 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)<br><br>b) |
| | Are there any deviations from the specification? | Yes / No |
| | Furnish particulars | |
| | | |
| **16** | **ILLUMINATED EVACUATION SIGN** | |
| | 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)<br><br>b) |
| | Are there any deviations from the specification? | Yes / No |
| | Furnish particulars | |
| | | |
| **17** | **AIR DUCT DAMPER** | |
| | Manufacturer | |
| | Country of origin | |
| | Method of resetting | |
| | 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)<br><br>b) |
| | Are there any deviations from the specification? | Yes / No |
| | Furnish particulars | |
| | | |
| **18** | **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)<br><br>b) |

| ITEM | PARTICULARS | INFORMATION FROM TENDERER |
|---|---|---|
| | Are there any deviations from the specification? | Yes / No |
| | Furnish particulars | |
| | (The recharging should reach approximately 80% of battery capacity within 8 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). | |
| | | |
| **19** | **BATTERIES** | |
| | Make | |
| | Battery type | |
| | Country of origin | |
| | Guarantee period | years |
| | Number of batteries | |
| | Total capacity | amp hours |
| | | |
| **20** | **CIRCUIT WIRING** | |
| | Manufacturer | |
| | Country of origin | |
| | Type | |
| | Does it bear the SABS mark? | Yes/ No |
| | Does it bear the BS mark? | Yes/ No |
| | | |
| **21** | **STEEL CONDUITS** | |
| | Manufacturer | |
| | Country of origin | |
| | Type | |
| | | |
| **22** | **STEEL TRUNKING** | |
| | Manufacturer | |
| | Country of origin | |
| | Type | |

| ITEM | PARTICULARS | INFORMATION FROM TENDERER |
|---|---|---|
| **23** | **SAMPLE 24 MONITORED LOCKS WITH MICROSWITCH** | |
| | 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)<br><br>b) |
| | | |
| **24** | **DOOR CLOSERS FOR SINGLE DOOR WITH DOOR HOLDING FACILITY** | |
| | 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)<br><br>b) |
| | | |
| **25** | **DOORS CLOSERS FOR DOUBLE DOORS WITH DOOR HOLDING FACILITY AND INTEGRAL DOOR SELECTOR** | |
| | 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)<br><br>b) |

| ITEM | PARTICULARS | INFORMATION FROM TENDERER |
|---|---|---|
| | | |
| **26** | **DETECTION 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)<br><br>b) |
| | Are there any deviations from the specification? | Yes / No |
| | Furnish particulars | |
| | Does the panel comply with EN 54 and / or BS 5839 Part A? | Yes / No |
| | State which | |
| | | |
| **27** | **IONISATION DETECTORS AND BASES** | |
| | 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)<br><br>b) |
| | Do detectors and bases comply with BS 5445 and/or EN 54? | Yes / No |
| | State which | |

| ITEM | PARTICULARS | INFORMATION FROM TENDERER |
|---|---|---|
| **28** | **HEAT DETECTORS AND BASES** | |
| | 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)<br><br>b) |
| | Are there any deviations from the specification? | Yes / No |
| | Furnish particulars | |
| | Do detectors and bases comply with BS 5445 and/or EN 54? | Yes / No |
| | State which | |
| | | |
| **29** | **FIRE BRIGADE SIGNALLING FACILITY** | |
| | 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)<br><br>b) |
| | Is the equipment compatible with the receiving equipment of the local fire Brigade? | Yes / No |