



DEPARTMENT OF PUBLIC WORKS

FIRE SECURITY

**STANDARD TECHNICAL
SPECIFICATION**

FOR A

PUMP INSTALLATION

FOR AUTOMATIC SPRINKLER FIRE EXTINGUISHING

SYSTEM

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**STANDARD TECHNICAL SPECIFICATION FOR A PUMP INSTALLATION FOR A
AUTOMATIC SPRINKLER FIRE EXTINGUISHING SYSTEM**

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STANDARD TECHNICAL SPECIFICATION

FOR A

PUMP INSTALLATION

FOR A

AUTOMATIC SPRINKLER FIRE EXTINGUISHING SYSTEM

1. GENERAL

This Standard Specification deals only with the general technical aspects of a pump installation for a automatic sprinkler fire extinguishing system. Tenderers are therefore referred to the Supplementary Specification of the particular scheme for specific technical requirements applicable to the site and the service.

Unless specified otherwise in the Supplementary Specification for the particular scheme a dual pumping plant shall be provided having one pump driven by a diesel engine and the other by an electric motor.

Where a single system is required, the pump is always to be driven by a diesel engine.

the pump installation shall include for a booster pump.

2. THE INSTALLATION

The complete installation shall conform to the Rules and Regulations (latest edition) as laid down by the Automatic Sprinkler Inspection Bureau (A S I B), hereinafter called the "Rules".

3. THE PUMPS

Where a dual pumping plant has been specified the two pumps shall be identical, irrespective of the driving process.

The pump shall be of sufficient capacity to deliver the required quantity of water at the necessary pressure for the particular fire hazard and the height of the uppermost sprinkler, as stated in the Rules.

Particulars of the type of fire hazard and the height of the uppermost sprinkler will be stated in the Supplementary Specification for the relevant scheme.

The pump shall be of such a type and design that it shall not be necessary to remove either the pump or the motor in order to gain access to the impeller, nor to remove the impeller from the pump casing.

4. THE DIESEL ENGINE

The diesel engine for the pump shall be of a type approved by the Automatic Sprinkler Inspection Bureau and the performance shall comply with the demands of the pump. Unless specified otherwise in the Supplementary Specification for the particular service, the engine may be either water or air-cooled.

If the engine is air-cooled, the contractor shall supply and install the necessary air duct to the engine. Unless specified otherwise, the building contractor will provide the necessary aperture in the wall, including the grill and sub-frame. The required size of the grill inlet shall be provided by the supplier of the engine.

Should the ventilation of the pump chamber appear to be insufficient for the operation of an air-cooled engine, the supplier shall advise the Department of any additional requirements, which are necessary.

The exhaust system of the engine shall be taken through the wall of the pump house. A sleeve shall be provided for this.

The method of starting the engine shall be according to the most recent requirements of the Automatic Sprinkler Inspection Bureau.

5. THE ELECTRICAL MOTOR

The electrical motor for the pump shall be of a type approved by the Automatic Sprinkler Inspection Bureau and the performance shall comply with the demands of the pump.

The motor shall be suitable for a power supply of 400 volt, 50 Hertz unless specified otherwise in the Supplementary Specification for the service.

Starting shall be by means of a star/delta starter only.

6. THE ALIGNMENT

The steel frame for the driving motor or the engine shall be bolted to a concrete base which, unless stated otherwise, will be supplied by others.

Detailed drawings of the combination bases shall be submitted to the Department for approval before the bases are cast. The building contractor will also be responsible for the grouting of the bases as well as the plastering and finishing of the concrete bases.

After foundation bolts have been finally screw up and all piping has been completed and coupled up, the alignment of the pump and motor shall be carefully checked and adjusted where necessary.

The radial and axial alignment as measured on the perimeter of the flexible coupling shall be not more than 0,075mm.

After the alignment has been checked and accepted by the Engineer the pump and motor or engine shall be fitted with two dowl pegs to ensure that the correct alignment will be maintained.

The contractor shall provide all equipment and accurate measuring instruments for the alignment of the pump and motor.

The flexible coupling mentioned above shall be provided with a removable sheet iron guard.

7. PRESSURE GAUGES

Two pressure gauges are required for each pumping installation. The gauges shall be at least 100mm in diameter and fitted with porcelain faces.

The one gauge shall be fitted on the suction side of the pump and the other on the delivery side so as to indicate pressures of - 100KPa to 150 KPa and 0 to 1500 KPa respectively. The gauges shall be mounted on a steel mounting as close as possible to the pumps, without limiting the working space around the pumps. The steel mounting shall be constructed of 120mm X 55mm X 13g/m channel iron and of such height that the face of the meter is just above the top of the relevant pipe. The mounting shall be bolted firmly to the floor of the pumphouse. The coupling between the pipes and the gauges shall be by means of a brass U-tube fitted with brass stopcocks, or other approved means, so that the gauges can be removed when the system is under pressure.

8. ELECTRICAL CONTROLS

The controls for both the diesel engine and the electric motor, if specified, shall conform to the requirements of the Automatic Sprinkler Inspection Bureau.

Over and above these requirements an ammeter shall be provide on each phase of the power supply to the motor. An automatic switch, which will stop both the engine and the motor, if the water supply tank is empty, is required. An additional alarm is required if any one of the two compartments of the water tanks has less than 2/3 of its volume.

The control equipment shall be mounted on separate bases at least 300mm in height.

9. FUEL TANK

Notwithstanding the contents of paragraph 2549.23.2 of the Rules the capacity of the fuel tank shall be sufficient for the engine to run at maximum output for at least the following periods:

| | |
|-----------------|---------|
| Extra low risk | 4 hours |
| Normal risk | 6 hours |
| Extra high risk | 8 hours |

10. BOOSTER PUMP AND MOTOR

The booster pump, motor and control equipment shall conform to the requirements of the Rules. Notwithstanding the contents of paragraph 2541.22 of the Rules the output of the booster pump shall be not less than 10 L/ mm and capable of raising the pressure in the system to 850KPa, unless specified otherwise.

The booster pump and motor shall also be fitted with an hour meter.

11. LAYOUT OF PUMP ROOM

The layout of the pump room shall conform to the requirements of the diagrammatic layouts attached hereto for either a double or single pumping system.

12. SWITCHING-ON PRESSURE

The switching-on pressure for both the normal pump and the booster pump as well as the switching-off pressure for the latter are stated in the Supplementary Specification for this service.

13. BATTERIES

All batteries for the control and regulating systems, including the diesel engine, shall be of the nicklecadmium type.

The capacity of the battery for the starter of the diesel engine shall be sufficient for at least 15 starting cycles as described in paragraph 2549.36.6 of the Rules.

Tenderers shall provide a certificate from the supplier of the batteries in which he confirms that he is aware of the charging requirements of the batteries and is satisfied with the battery-charger, which is included in the offer.

14. TANKS

The pump installation shall include a pressed steel tank unless specified otherwise.

The tank shall be of sufficient size for the relevant fire-hazard and height of the uppermost sprinkler.

In the determination of the size of the tank it shall, unless specified otherwise, be assumed that there will be no inflow during a fire. If specific dimensions are stated, the contractor shall nevertheless ensure that the capacity conforms to the requirements of the Rules.

The tank shall be mounted on 230mm walls or on a steel frame. Unless stated otherwise in the Supplementary Specification, the mounting will be provided by others. The contractor for the pumps shall, in the case of a mounting on walls provide 6mm x 150mm steel plates between the tank and the walls for the full length of the tank. The tank shall conform to CKS 114 except that the plates may be somewhat larger than 1,2m x 1,2m. The contractor shall, immediately after the contract has been awarded to him, notify the Department what the actual dimensions of the plates are so that the mountings can be provided at the correct distances.

All the pipe connections to the tank shall be flanged. The tank shall have a dividing plate so that there are two equal compartments. The division plate shall be provided with 80mm diameter holes at 500 mm centres immediately above the waterline.

The sizes of the suction pipe outlets shall conform to the requirements of the Rules. Each outlet shall have an approved vortex inhibitor.

The tank shall have 4 manholes (two at each end) complete with 4 sets of inner and outer steel ladders (a total of 8 ladders). Each compartment of the tank shall be provided with two sets of ladders and the ladders shall be firmly fixed to the tank.

The ladders shall be galvanised as specified for the tank. Unless specified otherwise each half of the tank shall have an 80mm diameter inlet with approved ballvalve, 100mm overflow, 80mm flushing pipe and a water level indicator. Provision shall be made in the roof of the tank for two "tank empty" electrodes and two electrodes for switching off the

pumps when the tanks are almost empty unless the contractor envisages some other form of “no flow” switching off.

The roof shall consist of roofing plates with a minimum thickness of 3mm. The roofing plates shall be of such a height over the ball valves so as to allow for the movement of the ball and the arm.

The tank plates, roofing plates and connections shall be galvanised to SABS 763.

15. DRAINAGE

Unless there is a satisfactory drainage pump inside the pump room, all drain pipes from pump glands, the tank flush pipes, drain pipes from pumping equipment and the flow test pipe shall be taken through one of the external walls of the pump room.

16. PIPES AND VALVES IN THE PUMP CHAMBER

All piping up to 150mm diameter in the pump chamber shall, unless specified otherwise, be galvanised mild steel medium class, in accordance with SABS 62. Where the thread, after jointing, protrudes, this shall be given a prime coat followed by one coat of aluminium paint. Pipes larger than 150mm diameter shall be flanged and galvanised after manufacture. Gate valves shall be flanged and conform to SABS 664 Class 1A. The valves shall close clockwise with an indicator to show whether the valve is open or closed.

All valves shall be fitted with straps and padlocks.

Non-return valves shall be “Hydrostop” as supplied by Messrs. Steelmetals of Isando or of some other approved type.

Reducers on suction pipes shall be eccentric and fitted so as to obviate air pockets.

Reducers on delivery pipes shall be concentric. An approved coupling shall be provided adjacent to the suction of each pump.

All piping shall, as far as possible, be secured to walls. Where this is not possible, the pipes shall be firmly fixed to steel supports attached to the floor.

17. ELECTRICAL CONNECTION

Unless specified otherwise in the Supplementary Specification for this service, a 3 phase 4 core electrical connection will be provided by others as a supply to the control panel in the pump room where one or more of the pumps are to be driven by an electric motor.

The connections of the incoming cable to the switchboard, installation and connecting of all other cables shall be the responsibility of the sprinkler contractor.

The Department will also supply a single-phase 15-amp power plug and lights in the pump room. The nominal voltage of the power supply will be stated in the Supplementary Specification.

Where a motor for the pump is not required, only electric lighting and the standard 15-amp power plug will be provided.

18. ELECTRICAL WIRING AND EQUIPMENT

All electrical wiring and equipment shall conform to the Department's Standard Specification for Electrical Equipment and Installation of Mechanical Services except where it may be contrary to the requirements of the Automatic Sprinkler Inspection Bureau.

18.1 Special attention shall be given to complying with the following:

18.1.1 The Standard Regulations for the Wiring of Premises as amended.

18.1.2 The Factories, Machinery and Building Works Act of 1941, as amended.

18.1.3 The Mines and Industries Regulations, Government Notice No. R1609 dated 28 th. September 1962, as amended.

18.1.4 The local Municipal by-laws and regulations as well as the regulations of the local Supply Authority.

18.1.5 The local fire regulations.

18.1.6 The Post Office regulations, where applicable.

18.1.7 The regulations of the Gas Provisioning Authority where applicable.

18.2 Attention shall also be given to the Department's requirements in regard to:

18.2.1 Conduits.

18.2.2 Cable brackets and cable straps.

18.2.3 Cable and cablejointing.

18.2.4 Wiring.

18.2.5 Control boards. It is also, inter alia, a Departmental requirement that control boards shall be provided with a 20mm wide border on the front side and that no equipment shall protrude beyond this border. Unless otherwise specified, control boards shall be provided with hinged front panels.

18.2.6 All instruments and switches shall be clearly labelled.

18.2.7 All instruments shall be provided with fuses.

18.2.8 All electronic equipment shall be protected against voltage changes in the current.

18.2.9 The provision of final drawings and manuals on completion.

The attention of contractors is drawn to the fact that unless specified otherwise, all conduits and cable brackets shall be taken along the walls and the ceiling of the pump room and then dropped vertically to the desired point below.

19. ALARMS

Audible alarms and flashing lights shall be provided on the outside of the pump room or pump house and also at the caretaker's quarters.

Red flashing lights shall come into operation when the driving agent of the pump switches on. Amber flashing lights shall come into operation when the booster pump begins to operate.

Additional alarm points may be required, such requirements being described in the Supplementary Specifications.

The alarms for the water level warning shall be clearly distinguishable from the fire alarms.

20. OPERATING INSTRUCTIONS

Operating instructions in which the operating procedures and any emergency procedures is stated in English and another official language shall be framed under perspex in a robust 25mm kiasat, metal or other approved frame and neatly secured to a wall in the pump room.

21. INSTALLATION OPERATING AND MAINTENANCE INSTRUCTIONS

Full installation operating and maintenance instructions shall be supplied in triplicate 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. Equipment will not be accepted until this information has been handed to the Department.

22. INFORMATION REQUIRED WITH TENDER

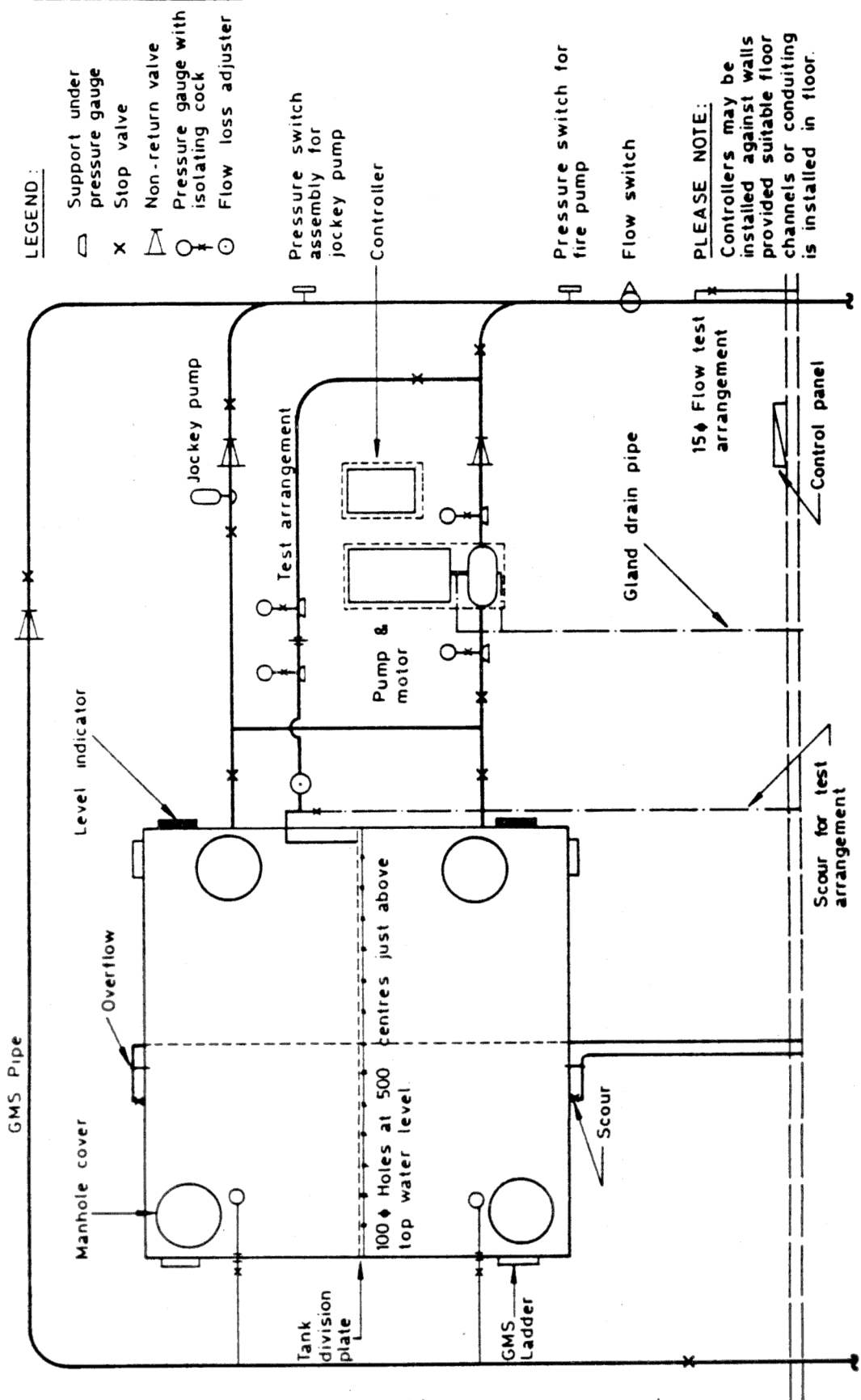
Tenderers shall supply the information as requested in the Schedule of Equipment and Materials which is attached to this specification as an annexure, together with their tender.

Should a Tenderer fail to do so his tender may be disqualified.

23. MAINTENANCE 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 five years at the sole discretion of the Department.

**ANNEXURE A TO THE STANDARD TECHNICAL SPECIFICATION
FOR A PUMP INSTALLATION FOR AN AUTOMATIC SPRINKLER
FIRE EXTINGUISHING SYSTEM : PUMP ROOM LAYOUT WITH A
SINGLE FIRE PUMP**



LEGEND :

- Support under pressure gauge
- X Stop valve
- △ Non-return valve
- Pressure gauge with isolating cock
- Flow loss adjuster

Pressure switch assembly for jockey pump

Controller

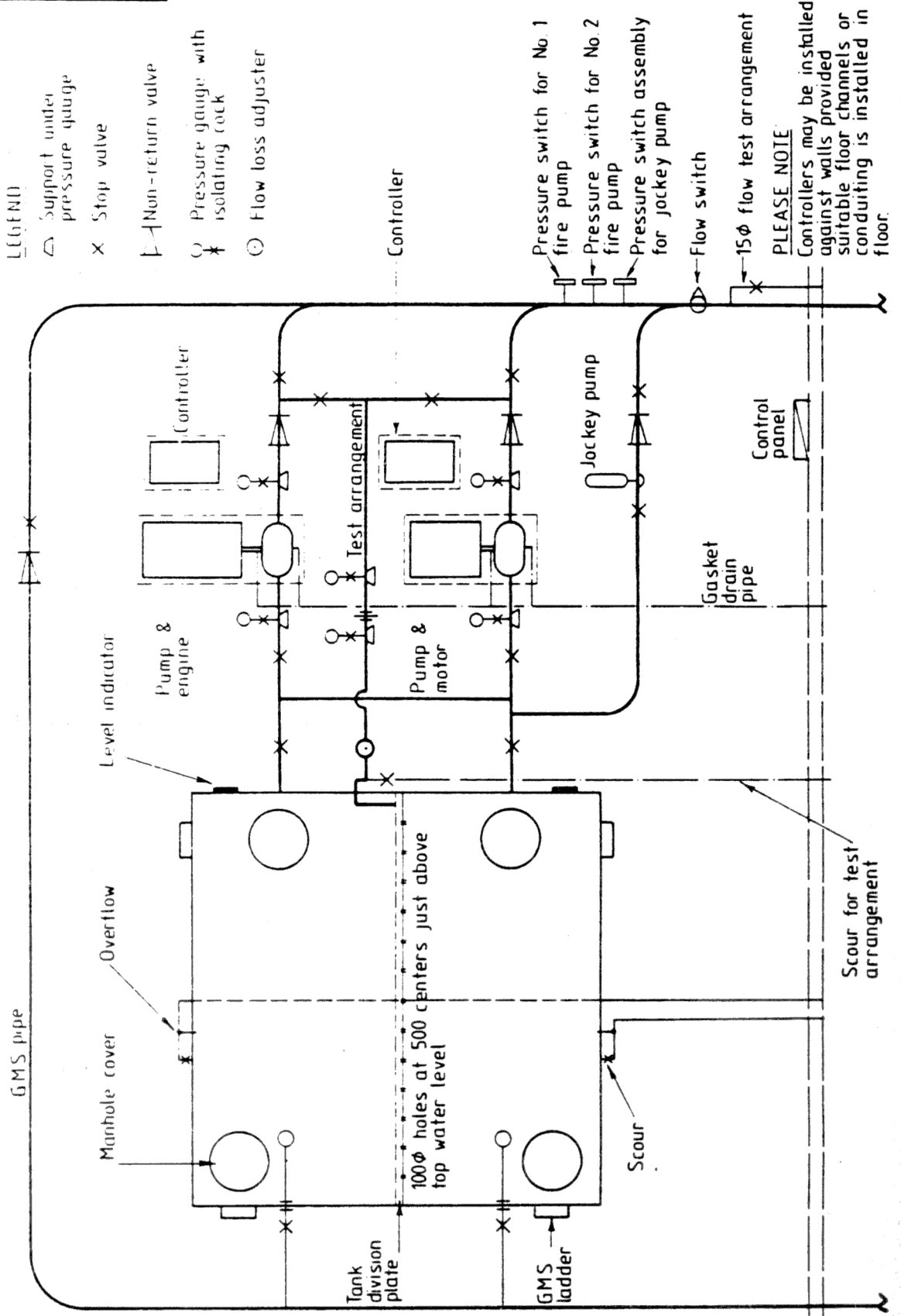
Pressure switch for fire pump

Flow switch

PLEASE NOTE:

Controllers may be installed against walls provided suitable floor channels or conduiting is installed in floor.

ANNEXURE B TO THE STANDARD TECHNICAL SPECIFICATION
FOR A PUMP INSTALLATION FOR AN AUTOMATIC SPRINKLER
FIRE EXTINGUISHING SYSTEM : PUMP ROOM LAYOUT WITH
TWO FIRE PUMPS



LEGEND

- Support under pressure gauge
- × Stop valve
- ┌─┘ Non-return valve
- Pressure gauge with isolating cock
- Flow loss adjuster

Controller

Pressure switch for No. 1 fire pump
Pressure switch for No. 2 fire pump
Pressure switch assembly for jockey pump
Flow switch

15φ flow test arrangement

PLEASE NOTE

Controllers may be installed against walls provided suitable floor channels or conduiting is installed in floor.

GMS pipe

Level indicator

Pump & engine

Controller

Test arrangement

Pump & motor

Jockey pump

Gasket drain pipe

Control panel

Manhole cover

Overflow

100φ holes at 500 centers just above top water level

Tank division plate

GMS ladder

Scour

Scour for test arrangement

ANNEXURE C TO THE STANDARD TECHNICAL SPECIFICATION FOR A PUMP

INSTALLATION FOR AN AUTOMATIC SPRINKLER FIRE EXTINGUISHING SYSTEM

SCHEDULES OF EQUIPMENT AND MATERIALS

| Item No, 1 | Pump |
|------------|---|
| (a) | Make_____ |
| (b) | Manufacturer's Model No_____ |
| (c) | Country of Origin_____ |
| (d) | Type of Pump_____ |
| (e) | Diameter of suction pipe_____ mm |
| (f) | Diameter of delivery pipe_____ mm |
| (g) | Yield at specified delivery head_____ l/s |
| (h) | Power absorbed at spindle_____ kW |
| (i) | Efficiency of pump at rating stated above _____ % |
| (j) | Maximum delivery head with pump at rated operating speed and outlet valve closed kPa_____ |
| (k) | Diameter of shaft_____ mm |
| (l) | Shaft material_____ |
| (m) | Pump casing material_____ |
| (n) | Number of impellers_____ |
| (o) | Impeller material_____ |
| (p) | impeller size_____ |
| (q) | Does the pump have a horizontal split casing_____ Yes/no* |
| (r) | Type of bearings_____ |
| (s) | Type of flexible coupling_____ |
| (t) | Make of coupling_____ |
| (u) | (W) Size of coupling_____ mm |
| (v) | Details of gland or bearings_____ |

| Item No, 2 | Engine for Fire Pump |
|------------|------------------------------|
| (a) | Make_____ |
| (b) | Manufacturer's Model No_____ |
| (c) | Type of engine_____ |
| (d) | Country of origin_____ |

- (e) Number of cylinders _____
- (f) Bore and Stroke of cylinder _____ mm
- (g) Rated power under specified conditions _____ kW
- (h) Speed _____ r p m
- (i) Method of cooling _____ water/air
- (j) Type of fuel filter _____
- (k) Full load efficiency of engine _____ %
- (l) Fuel consumption at full load _____ l/hr
- (m) Recommended fuel and oil _____
- (n) Type of regulator _____
- (o) Type of thermostatic valve _____
- (p) Type of oil pressure relief valve _____
- (q) Total mass of engine _____ kg
- (r) Fan V-belts _____
- (s) Number of V-belts _____
- (t) Are spare parts available in South Africa _____

Item No, 3

Control Equipment for Engine

- (a) Manufacturer _____
- (b) Size of base _____ m x _____ m
- (c) External dimension of cabinet _____ m x _____ m x _____ m

Item No, 4

Motor for Fire Pump

- (a) Make _____
- (b) Manufacturer's Model No _____
- (c) Type of motor _____
- (d) Country of origin _____
- (e) Driving speed _____ r p m
- (f) Rated power _____ kW
- (g) Amperage at full load _____ Amp
- (h) Total mass of motor _____ kg

Item No, 5

Control Equipment for Motor

- (a) Manufacturer _____
- (b) Size of base _____ m x _____ m
- (c) External dimensions of cabinet _____ m x _____ m x _____ m

Item No,6

Booster Pump and Motor

- (a) Make of pump _____
- (b) Country of origin of pump _____
- (c) Make of motor _____
- (d) Country of origin of motor _____
- (e) Type of motor and number of phases _____
- (f) Rated power of motor _____ kW
- (g) Pumping yield at 20m head _____ l/m
- (h) 25m head _____ l/m
- (i) Material of casing _____
- (j) Material of impeller _____
- (k) Type of glands _____
- (l) Type of bearings in pump and motor _____
- (m) Make and type of starter _____
- (n) Maximum starting current _____ amp
- (o) Amperage at full load _____ amp
- (p) Total mass of pump and motor _____ kg

Item No,7

Battery

- (a) Make _____
- (b) Battery type _____
- (c) Country of origin _____
- (d) Does the battery have a built in monostat? _____
- (e) Guarantee period _____
- (f) Number of batteries? _____

(g) Total capacity _____ Amp hr.

Item No,8

Battery Charger

- (a) Make _____
- (b) Country of origin _____
- (c) Type of charger offered _____
- (d) Maximum charging capacity _____ Amp
- (e) Recharging time _____ hr\ _____

(The recharging should reach approximately 80% of battery capacity within 7 hours.)

Note: Tenderers are reminded that the charger should be of constant potential type designed to limit the Charging current to meet the specification of the battery supplier.

Item No 9

Pressure Switches

- (a) Make _____
- (b) Country of origin _____
- (c) Model Number _____
- (d) Voltage of pressure switch _____

Item No 10

Electrical Work

- (a) Name of the firm that will undertake the electrical work _____

Item No 11

Tank

- (b) Make _____
- (c) Size of plates _____ m x _____ m x _____ m
- (d) External dimensions of tank _____ m x _____ m x _____ m
- (e) Gross capacity _____ l
- (f) Type of depth indicator _____

Item No 12

Pipe work and Fittings

- (a) Size of suction pipe _____ mm
- (b) Size of drainage pipe _____ mm
- (c) Material of non-return valve _____
- (d) Size of sluice valve _____ mm
- (e) Make of pressure gauges _____
- (f) Country of origin of pressure gauges _____
- (g) Diameter of pressure gauges _____ mm
- (h) Diameter of copper pipes to gauges _____ mm