DEPARTMENT OF PUBLIC WORKS

FIRE SECURITY

STANDARD TECHNICAL SPECIFICATION

FOR A

PUMP INSTALLATION

FOR AUTOMATIC SPRINKLER FIRE EXTINGUISHING SYSTEM

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Ref. F.P.O/82/6E
# STANDARD TECHNICAL SPECIFICATION FOR A PUMP INSTALLATION FOR A AUTOMATIC SPRINKLER FIRE EXTINGUISHING SYSTEM

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- **Annexure A**: Pump Room Layout with a single fire pump.
- **Annexure B**: Pump Room Layout with two fire pumps.
- **Annexure C**: Schedules of Equipment and Materials.
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 an 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 -100 KPa 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 provided 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 diagramatic 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 coal collowed 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.


18.1.4 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 kiaat, 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.
LEGEND:

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

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

- Tank division plate
- GMS Pipe
- Manhole cover
- Overflow
- Level indicator
- Jockey pump
- Pressure switch for fire pump
- Flow switch

Please Note:
Controllers may be installed against walls provided suitable floor channels or conduit is installed in floor.

100° Holes at 500 centres just above top water level

GMS Ladder

Scour

Test arrangement

Pump & motor

Controller

Gland drain pipe

15° Flow test arrangement

Scour for test arrangement

Control panel
10Ø holes at 50Ø centers just above top water level

GMS pipe

Manhole cover

Overflow

Level indicator

Pump & engine

Controller

Test arrangement

Controller

Gasket drain pipe

Flow switch

15Ø flow test arrangement

Pressure switch for No 1 fire pump

Pressure switch for No 2 fire pump

Pressure switch assembly for jockey pump

Jockey pump

Control panel

PLEASE NOTE

Controllers may be installed against walls provided suitable floor channels or conduits are installed in floor.
## ANNEXURE C TO THE STANDARD TECHNICAL SPECIFICATION FOR A PUMP

### INSTALLATION FOR AN AUTOMATIC SPRINKLER FIRE EXTINGUISHING SYSTEM

### SCHEDULES OF EQUIPMENT AND MATERIALS

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<tr>
<td>(b) Manufacturer’s Model No_</td>
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<tr>
<td>(c) Country of Origin_</td>
<td></td>
</tr>
<tr>
<td>(d) Type of Pump_</td>
<td></td>
</tr>
<tr>
<td>(e) Diameter of suction pipe_ mm</td>
<td></td>
</tr>
<tr>
<td>(f) Diameter of delivery pipe_ mm</td>
<td></td>
</tr>
<tr>
<td>(g) Yield at specified delivery head_ l/s</td>
<td></td>
</tr>
<tr>
<td>(h) Power absorbed at spindel_ kW</td>
<td></td>
</tr>
<tr>
<td>(i) Efficiency of pump at rating stated above_%</td>
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</tr>
<tr>
<td>(j) Maximum delivery head with pump at rated operating speed and outlet valve closed_kPa</td>
<td></td>
</tr>
<tr>
<td>(k) Diameter of shaft_ mm</td>
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<td>(l) Shaft material_</td>
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<td>(m) Pump casing material_</td>
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</tr>
<tr>
<td>(n) Number of impellers_</td>
<td></td>
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<tr>
<td>(o) Impeller material_</td>
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<tr>
<td>(p) Impeller size_</td>
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<tr>
<td>(q) Does the pump have a horizontal split casing_ Yes/no*</td>
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<tr>
<td>(r) Type of bearings_</td>
<td></td>
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<tr>
<td>(s) Type of flexible coupling_</td>
<td></td>
</tr>
<tr>
<td>(t) Make of coupling_</td>
<td></td>
</tr>
<tr>
<td>(u) (W) Size of coupling_mm</td>
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<tr>
<td>(v) Details of gland or bearings_</td>
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<td>(b) Manufacturer’s Model No_</td>
<td></td>
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<tr>
<td>(c) Type of engine_</td>
<td></td>
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<tr>
<td>(d) Country of origin_</td>
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</table>
(e) Number of cylinders

(f) Bore and Stroke of cylinder mm

(g) Rated power under specified conditions kW

(h) Speed rpm

(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

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<th>Control Equipment for Engine</th>
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<td>(a) Manufacturer</td>
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<td>(b) Size of base m x m</td>
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</tr>
<tr>
<td>(c) External dimension of cabinet m x m x m</td>
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<th>Item No, 4</th>
<th>Motor for Fire Pump</th>
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<tr>
<td>(b) Manufacturer’s Model No</td>
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<tr>
<td>(c) Type of motor</td>
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<tr>
<td>(d) Country of origin</td>
<td></td>
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<tr>
<td>(e) Driving speed rpm</td>
<td></td>
</tr>
<tr>
<td>(f) Rated power kW</td>
<td></td>
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<td>(g) Amperage at full load Amp</td>
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<tr>
<td>(h) Total mass of motor kg</td>
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</table>
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 ________________________________

Fire Pump Inst. 82 6E
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<th>Pipe work and Fittings</th>
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<td>(a) Size of suction pipe</td>
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<tr>
<td>(b) Size of drainage pipe</td>
<td>mm</td>
</tr>
<tr>
<td>(c) Material of non-return value</td>
<td></td>
</tr>
<tr>
<td>(d) Size of sluice valve</td>
<td>mm</td>
</tr>
<tr>
<td>(e) Make of pressure gauges</td>
<td></td>
</tr>
<tr>
<td>(f) Country of origin of pressure gauges</td>
<td></td>
</tr>
<tr>
<td>(g) Diameter of pressure gauges</td>
<td>mm</td>
</tr>
<tr>
<td>(h) Diameter of copper pipes to gauges</td>
<td>mm</td>
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