

**TECHNICAL SPECIFICATIONS
FOR
FIRE SPRINKLER INSTALLATION
IN THE WAREHOUSES
FOR
MEDICAL STORES LTD- HEAD OFFICE ON
MUKWA ROAD, LUSAKA**

**DH ENGINEERING CONSULTANTS LTD
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TECHNICAL SPECIFICATION

AUTOMATIC SPRINKLER SYSTEM

4.1 SCOPE

The works involves supply, installation and setting to work of an automatic sprinkler installation as follows:

- A 215 m³ water supply tank providing 60 minutes of usable water cover
- A sprinkler fire pump set consisting of one electric, one diesel and jockey pump, test arrangement and all controls as per ASIB Requirements
- Sprinkler mains piping up to and including an Installation Control Valve (ICV) intended to serve two separate sprinkler systems in each Warehouse.
- Sprinkler system within the sprinkler pump house with attendant flow switch wired to pumphouse control panel.

The sprinkler system will be designed to Ordinary Hazard Group 3 in all areas and to meet Loss Prevention Council (LPC) Regulations and British Standards 5306-2;1990.

All fire equipment including pumps, fire control panels, flow switches, pressure switches, diesel fire pump control panels must be fabricated by reputable fire equipment specialists, specifically to meet the requirements of the L.P.C and ASIB.

No locally assembled equivalents will be accepted.

Where a specific manufacture and type is specified, this shall be provided as indicated, unless substitution is approved by the Engineer in writing.

Prior to any materials being ordered and prior to any works commencing, full working drawings of the works must be submitted to the Engineer for approval.

A period of at least two weeks should be allowed for this process.

4.2 PIPING AND FITTINGS

4.2.1 The entire installation shall be executed in solid drawn medium weight plain end steel piping to SABS 62 1989.

Formed bends made on an approved bending machine and using suitable formers shall be used in place of specials.

Four types of joints used:

- a) Taper screw pipe ends into taper screwed fittings. These may be used for all pipe connections except as hereafter specified.
- b) Grooved union piping system using standard couplings compliant with the requirements of the Loss Prevention Council. At least one joint shall be provided in every 18 metres of straight pipe runs, while in short runs, detachable joints shall be provided in sufficient numbers to enable any length of piping to be removed without disturbing fixed joints unnecessarily

- c) Steel flanges to BS 10. 1962, table 'D' screwed to pipes. These shall be used in pipes above 50mm nominal bore for the same purposes as specified in (b) above.
- d) Electrical arc welding may be used for the following purposes:
 - 1. For attaching branches to sprinkler distribution provided the requirements of B.S. 5306-2 are adhered to.
 - 2. For attaching flanges to piping.

No joints shall be made inside masonry or walls.

The centreline of flange bolts shall be at maximum possible angle from the vertical (e.g. horizontal)

All screwed joints shall be made with an approved con-setting plastic or graphite compound, applied to male thread portions only.

Before making joints, all burrs and welding scale shall be removed from the pipe ends.

4.2.2 The underground piping shall be galvanized and shall be coated with two applications of bitumen epoxy and laid with 150mm dry river sand all round.

4.2.3 Supporting Pipes

All pipes shall follow the building surfaces and shall be neatly, rigidly and permanently fixed, in such positions that space is available for subsequent dismantling and for domestic cleaning, and further so that dripping on electrical equipment is prevented.

4.3 **SPRINKLER POSITIONS**

All sprinkler heads shall be positioned as near as possible to the positions shown and to ensure compliance with the L.P.C. Rules and or B.S. 5306 Part 2, incorporating BS EN 12845.S

Sprinkler heads shall be positioned by any portion of the structure, or other services.

4.4 **SPRINKLER HEADS**

All automatic sprinkler heads shall be of the conventional type and make approved by the, L.P.C. Rules and / or B.S. 5306 and shall be of the type actuated by the shattering of glass or "Quartzoid" bulb when heated. The operating temperature shall be 65/74°C. they shall be suitable for upright, or side-wall installation. All heads shall be brass where exposed as specified on the bill of quantities.

4.5 MAIN SPRINKLER CONTROLS (INSTALLATION CONTROL VALVE)

Two Installation Control Valves (I.C.V.) of the size indicated on the drawings and of a type and make approved by the L.P.C. Rules (Automatic Sprinkler Installations) shall be fitted in the positions shown, one for each Warehouse.

The installation control valve set shall be complete with proprietary trim and have the following main components:

- Sprinkler stop valve wheel installed below the alarm valve
- A water motor alarm gong
- An alarm test valve.
- A 50 mm bore drain and running pressure test valve.
- An alarm shut-off cock, strapped open.
- Two 125mm diameter pressure gauges, range 0-10 bars fitted to read supply pressure and sprinkler respectively and labelled accordingly. Three way shut-off cocks shall be fitted before each gauge so that, when inadvertently shut-off, the gauge shall not retain any pressure.
- ICV Location signage

4.6 FLOW TEST UNITS

An 80 mm flow test pipe of approved manufacture shall be provided. The discharge from the test unit shall be piped away to the nearest drain point.

4.7 HYDRAULIC ALARM

A water motor alarm bell shall be provided and installed above or near the main controls as indicated. It shall be designed to ensure smooth starting after prolonged idleness, using maintenance free bearings of the anti-friction type.

4.8 DRAIN POINTS

Drain cocks of 50mm diameter minimum bore shall be provided as required to enable the system to be drained. These shall be of the gate valve type.

4.9 FLOW SWITCHES

An approved vane type waterflow switch (with retard) as model VSR-F by 'Potter Electrical Signal Co.' shall be supplied and installed by the Sprinkler Sub-Contractor as indicated and on the basis of one unit per Installation Control Valve. A 25mm drain pipe with test valve shall be fitted just beyond the flow switch to allow for testing and piped to the nearest drain point.

This is in addition to the flow switch required in the pump house to serve the pumphouse sprinkler protection.

4.10 ZONE MONITORING VALVES

Will not be required at this stage.

4.11 NON-RETURN VALVES

Non-return valves shall be of approved type complete with replaceable neoprene seal, or equal approved.

4.12 FIRE PUMPS

A Containerised Fire Pump set as specified on the drawings shall be by a fully approved manufacturer.

Two centrifugal fire pumps shall be provided and installed as indicated. The materials used shall be cast iron castings, bronze impellers, bronze wearing rings, EN 8 steel shafts, bronze glands, mechanical seals, ball and roller bearings, or equal approved.

An automatic bleed shall be provided between pump discharge and suction to prevent overheating when pump is operating against a closed discharge.

The pump characteristics shall be in accordance with F.O.C. Rules for OH Group 3 installations having a minimum capacity of 2900 litres per minute against a head of 8.0 bar.

Maximum friction loss, reservoir to valves via pumps	0.5 bar
Pressure loss to design point	3.5 bar
Pressure required at design point	2.0 bar
Static 'lift'	1.5 bar
Safety	<u>0.5 bar</u>
Total	8.0 bar

Characteristic curves showing pump capacity; head and efficiency shall be submitted by tenderers.

The electric pump shall be direct coupled to drip proof squirrel cage rotor induction type electric motors suitable for Star-delta starting, of ample power and suitable for 380 volts, 3-phase, 50Hz electrical supply.

A Diesel Tank providing a minimum of 8 hrs fuel supply for the Diesel Tank is to be provided.

A pump motor starter shall be provided and installed in the switchboard(s) specified below.

Automatic stopping of the pumps shall not be permissible. Stopping shall be manual only.

A red warning light shall be provided in the valve chamber to indicate when the pump is running.

Both pump sets shall be mounted on substantial steel bases, aligned, doweled, levelled and bolted.

Gland drains shall be piped outside the pump chamber as indicated.

The pump set shall be manufactured to ASIB/BS/EN standards.

4.13 PRESSURE MAINTAINING ('JOCKEY') PUMP

One only pressure-maintaining pump shall be provided and installed as indicated. This shall be of the multi-stage, vertical spindle type and shall be suitable for automatic operation by water pressure switch on the test arrangement specified below. The duty shall be approximately 40 litres per minute at 5.5 bars.

4.14 SPRINKLER RESERVOIR (175m³ NOMINAL; 215m³ ACTUAL)

The sprinkler system will draw from a 215m³ reservoir located as shown on the drawings.

The tank will be split into two sections, each section having independent suction, inlet and drain connections. The tank shall be of galvanised sectional steel as "Abeco" or equal approved and be split into two distinct sections of equal capacity.

Each tank shall be provided with access ladders and a manhole each to facilitate maintenance.

Each tank shall be provided with a minimum 50m float valve supplied and connected by others.

The tanks shall be erected on concrete plinths to details supplied by the Engineer.

4.15 CONTROLS

Both pumps specified in Clause 4.12 and 4.13 above shall be energised for automatic starting at all times and shall be controlled by three pressure switches connected into a proprietary sprinkler test arrangement set installed in the pump room as indicated.

The pressure-maintaining pump shall automatically cut in and out in order to maintain system pressure at approximately 0.5 bars above main fire pump cut in pressure. It's prime function is to maintain system pressure and to prevent false alarms.

The duty electric motor driven pump shall start when the system pressure on the pressure gauge in the pump room falls to approximately set point (to be determined on site) and shall continue until manually stopped in the pump room.

The standby Diesel driven pump shall start if the system pressure gauge in the pump room falls a further 0.5 bar and shall continue running until manually stopped.

A Float Switch is to be provided in the Storage Tank to prevent dry running of both pumps

4.16 ELECTRICAL

4.16.1 General

The complete electrical installation shall comply in every respect with I.E.E. Wiring Regulation 6th Edition, C.A.S. Wiring Rules No. CC1/64, the local Supply Authority Regulation and L.P.C. Rules. These shall be regarded as the operative Codes of Practice.

4.16.2 **Fire Pump Switchboard**

The switch boards shall be water / dust proof to IP 55 and constructed from 14 S.W.G. sheet metal with vertically hinged doors all finished in epoxy coating. It shall contain a main isolator, all starters, protective gear and indicator lights necessary to complete the installation. All circuits shall be clearly labelled, ferruled, and the following notice shall be provided:

**“SPRINKLER PUMP MOTOR SUPPLY – NOT TO BE SWITCHED OFF
IN THE EVENT OF FIRE”**

Wiring between items of electrical equipment including the pressure switches and the warning light at the valves, shall be carried out using SWA/PVC/SWA. All electrical equipment and metalwork shall be efficiently bonded and earthed to an earth bar mounted on the switchboard.

All equipment shall be suitable for operation on 220/380 volt, 3-phase, 50Hz supply.

A suitable electrical supply will be provided and terminated by others at the main isolator specified above.

Power supply to the new sprinkler control panels shall be provided.

4.17 **MONITORING PANEL**

A Signal Back to the Main Fire Alarm Panel to indicate the Sprinkler pump is running must be provided.

4.18 **SPARES**

The Contractor shall fit a sprinkler spares cabinet (steel cabinet with lock and key) located adjacent to the I.C.V, containing the following:

- Sixteen automatic sprinkler heads of each type used for the installation.
- One spanner to fit said heads.
- A set of recommended pump spares from the manufacturer

4.19 **TESTS**

The following tests shall be executed in the completion of the installation in the presence of the Engineer.

- A static pressure test at the lowest point on each system to 1.5 times the maximum operating pressure.
- A discharge test on any sprinkler outlet to be decided by the Engineer.

- The Sub-Contractor shall provide a hose connection and length of 25 mm hose to lead the discharge to outside the building.
- Running pressure test as required by L.P.C Rules
- Test of the hydraulic alarm system.

4.20 AS FITTED DRAWINGS AND HYDRAULIC CALCULATIONS

The contractor shall supply one hard copy and one soft copy of the operation manuals, hydraulic calculations and the as fitted drawings.

Hydraulic calculations of the system will be provided for approval, prior to installation.

In addition, a framed block diagram will be provided indicating the position of each device and mounted in a robust frame and located on the wall of the room where the fire control panel is located.

4.21 GUARANTEES AND WARRANTIES

All work performed and all material and equipment supplied and installed shall be guaranteed for a period of 12 months from date of handover.

The contractor will attend to all defects within this period and provide in house training and servicing of the equipment as required.

The contractor is to provide a sample service and maintenance contract for approval at the end of the 12 months guarantee period.

Further to the above the full cost of any replacement of parts, labour etc will be provided free of charge during this initial one-year period.