TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS FOR FIRE HYDRANT WET SYSTEM

1.0 GENERAL

This document shall be read in conjunction with all relevant commercial documents. In case of contradiction between technical specification and other documents, data in technical specifications shall prevail.

2.0 All work under this contract shall be carried out in accordance with the Technical Specification and the latest revisions of Indian Standards, Codes, Indian Electricity Rules and also Regulations and Norms of West Bengal Fire Services.

3.0 SCOPE OF WORK

3.1 Preparation of fire fighting scheme drawings and submission to West Bengal Fire Services and obtaining their approval prior to execution of work.

Supply and design data assistance, fabrication, erection, painting, testing and commissioning of the Fire Hydrant System with mechanical and electrical equipment, instrumentation, pipes, valves, fittings, supports, cables etc complete in all respects, and preparation & submission of drawings/calculations/other documents to concerned authorities & obtaining interim & final Approval/Sanction/NOC (No Objection Certificates) from West Bengal Fire Services, during and after execution of work as required.

4.0 TECHNICAL PARAMETERS

4.1 Brief Description of Fire Hydrant System

4.1.1 Full Scheme (For general information of the tenderer)

1 (One) No. Fire Pump Hydrant 1 (one) No. jocky pump (each electric motor driven) and 1 (one) no. Diesel Engine driven Fire Pump shall be installed in the pump room, pumping water from the underground water tank. The common outlets of fire pump delivery system shall cater to the following:

i) Internal fire hydrants in each floor and on roof.

ii) External Fire Hydrants.

iii) First Aid Hose Reels in each floor.

At the top of each Wet Riser an Air Vessel assembly with Air Relief Valve, a Drain-valve, pressure gauge etc shall be provided to take care of pressure surges and also for letting out entrapped air in the system.

4.2 Operation

Fire Hydrant System & Sprinkler System
Water supply header and main pipe up to hydrant valve/landing valves shall be kept pressurised by the jockey pump which shall start automatically on receiving the impulse from the pressure switch in case of any pressure drop in the header. It shall stop at a preset pressure as soon as pressure builds up in the header.

For smaller fires, first aid hose reel would be used; while hydrant valve would be used for bigger fires.

In the event of fire out break, opening of hydrant valve/hose reel will result in fall of pressure in the header and electric motor driven fire pump shall come into operation automatically through the impulse from the pressure switch. The fire pump shall be stopped manually only.

In case the electric driven main fire pump fails to start; the diesel engine driven pump shall come into action automatically on further fall of pressure and receiving impulse from pressure switch.

The setting of the pressure switches shall be done keeping the above sequence in consideration.

5.0 SPECIFICATION (TECHNOLOGICAL)

5.1 Pumps

a) Motor driven fire pumps:

End suction type, horizontally mounted centrifugal pump (as per IS 1520), TAC approved, each capable to deliver 150 cum/hour (2500 lpm) of clear water at minimum 70 M TDH, coupled to a suitably electric motor mounted on a common base frame and antivibration pads coupling, coupling guard and fixing bolts etc. Motor HP to be suitably selected to suit minimum discharge and residual head at the top most hydrant. The characteristic curve should have a large range of discharge points for different heads.

5.2 Diesel Engine driven Fire Pump

End suction type, horizontally mounted centrifugal pump (as per IS 1520), to deliver 150 cum/hour of clear water at minimum 70 M TDH, coupled to a diesel engine, continuously rated of suitable horse power, direct injection, four stroke, water cooled type complete with coupling, coupling guard common base frame, antivibration pads, instrument panel with RPM indicator, pressure gauge, radiator with engine cooling system, fuel tank, tool kit, air filtration unit, exhaust piping with silencer, engine shut-down mechanism, starting mechanism, for both automatic & manual mode, Exide heavy duty batteries with charging system etc. The engine shall be provided with an adjustable governor to control the engine speed within 10% of its rated speed under any condition of load up to the full load rating.

Note:

a) Above pumps shall be capable of furnishing not less than 150% of rated discharge capacity at a head of not less than 65% of the rated head. The shut-off head shall not exceed 120% of rated head.
b) Diesel engine/motor shall be of continuous rating type and its rating shall be at equivalent to the maximum horse power required as per curve requirement.

c) The pump sets with cushy foots shall have to be installed on RCC floor already constructed and cost of the required civil works viz chipping of floor & concrete base etc (as required), shall be included in the quoted price of respective pump sets.

5.3 C I Sluice Valve

C I components of the sluice valve shall be of Grey cast iron conforming to IS 210. The valves shall be flanged having solid wedge gate valve, inside screw, hand wheel with open-close indications etc all conforming to IS 780 but of nominal pressure rating of PN 1.6 as per TAC norms.

Test Pressure at manufacturers works

Flange drillings shall normally be as per IS 1538. However, if the manufacturer drills the flanges to other standard specifications, the valves shall be supplied with a pair of matching flanges, nuts, bolts, washers, rubber insertion etc and such flanges shall have inside threads to suit pipes of same nominal size as that of the valve.

The quoted price of the valves shall also include cost of arrangement for securing the valves in `open' or `closed' positions by padlock/rivetted strap, where required per TAC norms.

5.4 G M Valves

Gun metal components of the peets valves i.e. Gate Valves, Check Valves i.e. non-return valves, and Globe valves etc shall be of Gun Metal conforming to Grade 2 of IS 318. The valves shall be having flanged or screwed ends, hand wheel with open-close indications etc all conforming to Class-2 Valves of IS 778 (ISI marked) or imported as per ASTM.

5.5 C I non return valves

C I reflux valves, i.e. swing check type non-return valves, shall be conforming to IS 5312. Test pressures shall be same as per CI sluice valves.

5.6 M S Pipes and Fittings

All M S pipes shall be as per IS 1239 (heavy/medium quality as mentioned in the schedule of items upto 150 mm N B, as per IS 3589 (minimum 6 mm thick) above 150 mm N B, and the fittings shall be of all welded construction, butt weld type flanges shall conform to IS 6392 and gaskets of synthetic moulded rubber approved by Fire Standard.

All pipes outside the building shall be laid underground at a depth of 1 mtr (approx) and laying shall be as per layout drawing, excavation, back filling of earth, cutting holes in existing structure where necessary, providing puddle collars/pipes as required & making good the damages including making the concerned portion of the structure water tight.
Erection of over ground piping shall be complete with necessary pipe supports hangers with MS angles/plate/nut bolts/clamps etc with fabrication as required including providing MS puddle pipes/collars as required for punctures through walls/slabs etc.

Erection of pipe lines shall also include chipping of wall; making holes inside RCC or brick walls, slabs and necessary civil works for restoration of the surface after completion of erection. The quoted tender rate shall include all the above works, as well as the cost of route markers for under ground pipe lines as per following specifications.

Route marker with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) of size 60 cm x 60 cm at bottoms and 50 cm x 50 cm at the top with a thickness of 10 cm including inscription duly engraved as required (spacing approx 15 mtrs or as directed at site). No extra payment will be made on this account.

5.7 a) Pressure Gauges

Pressure gauges with controlling cocks etc shall be of approved make having pressure range, bourdon material and dial size as specified in schedule of items.

b) Pressure Switches

Pressure switches with accessories shall be of approved make and design and shall actuate (‘cut-off’ and/or ‘make contact’ as required) at pre-set pressures.

5.8 Landing Valves (Hydrant Valve)

Gun metal landing valve (internal/external Fire-Hydrants) with oblique type single outlet as per schedule of quantities complete with hose coupling adaptor of 63 mm size, instantaneous spring lock arrangement and blank cap with chain conforming to IS 5290. External Fire-Hydrants to be provided with stand posts as specified in schedule of quantities. Orifice plates may be provided where inlet pressure is required to be reduced as per WBFS requirement.

5.9 Branch Pipe

Gun metal, short type, instantaneous pattern branch pipe to suit fire hose delivery coupling of 63 mm size complete with G M nozzle of 20 mm nominal size conforming to IS 903.

5.10 Hose with Coupling

63 mm nominal internal dia hose, rubber lined wooven-jacketted coupling with Type-II (Reinforced Rubber lined type) of IS 636, fire fighting delivery hose 15 M long each, fitted with gun metal coupling of 63 mm size with multi serrated tail and double instantaneous spring lock arrangement comprising of male half at one end and female half at other end complete with rubber cup washer and conforming to IS 903.
5.11 **Hose Reel**

Swinging hose reel conforming to IS 884 & comprising of 3 ply rubber hose of length specified in schedule of items, 20 mm (3/4") nominal bore (25 kg/cm²/350 psi bursting pressure), mild steel pressed reel with 170 degree swinging, nozzle of G M chromium plated, with non-jamming controlling handle which shall stay at the ‘ON’ ‘OFF’ position as set, wall brackets with ‘U’ shaped reel carrier made of C I complete with 25 mm NB G M valve at the inlet, and orifice plates (if necessary for reducing pressure).

5.12 **Air Vessel**

Mild steel air vessel adequate size to take care of pressure surges during operation of the system and venting of entrapped air in the system shall be complete with air relief valve, pressure gauge, drain valve and shut off valve at the inlet.

5.13 **Valve Chamber**

Valve chamber of adequate size to accommodate external valves shall be constructed as directed per site condition.

5.14 **Fire-Brigade Connections**

Fire-Brigade connections (inlets) to Riser and Under Ground Reservoir shall be with two numbers of 63 mm instantaneous inlets for each connection as per TAC norms. Other aspects of the connection shall be as per IS 904.

5.15 **Painting**

All external steel surface shall be thoroughly cleaned to remove rust, scale etc before applying the primer.

a) All underground piping shall be provided protective wrappings as per TAC norms.

b) All over ground piping/hose boxes/landing valves/hose reel, M S frames etc shall be painted with two (2) coats of RED LEAD primer or equivalent followed by two coats of Post Office Red coloured Synthetic enamel finish paint.

c) All other equipment shall be given a red oxide/zinc chromate primer and two (2) coats of synthetic enamel.

6.0 **SPECIFICATION (ELECTRICS)**

6.1 **Controls**

i) Electric Motor driven fire & jockey pumps & diesel engine driven fire pump shall start automatically through preset pressure switches in proper sequence as elucidated in Cl. 4.2 above.

ii) Stopping of all fire pumps shall be manual only.

iii) Audio visual alarm shall be sounded when fire pumps start/starts.

iv) Power supply 'ON' indication shall be provided in the Fire Pump Control Panel.
6.2 **A C Motors**

All A C motors shall be approved type & totally enclosed fan cooled and shall have Class B insulation with degree of protection IP 55 conforming to IS 325 and frame. All motors shall be suitable for both DOL and STAR/DELTA starting, as required. The motor terminal box shall be suitable for receiving aluminium cables and suitable for positioning on the motor body at intervals 90 degree as required for the particular application. The motors shall have also two distinct terminals for earthing. All the motors shall be suitable for 415 V (-15% to +5% variation) 3 phase 50 HZ plus minus 3% AC supply.

6.3 **Motor Control Centre (M C C)**

The M C C shall be made of sheet steel of thickness not less than 2 mm, totally enclosed, self supporting, floor mounted dust and vermin proof cubicle type construction with multitier compartmental arrangement with degree of protection IP 54.

It shall have a series of panels of uniform height placed side by side with front access for operation as well as cabling. MCC panel shall be completely front wired type having all device/termination etc, approachable from front without any requirement of back access for maintenance repairs and cabling. Provision of cable entry shall be from the top or bottom to match with cable layout of the pump room.

Main fire pump motors shall have star/delta or DOL starting as per TAC requirement. The motor control circuit shall be provided with test facilities so that it is possible to test the control circuit with the main motor circuit disconnected. Control voltage shall be 240 V, A C single phase derived from an isolating transformer.

The main busbar of the M C C shall be of electrical grade copper and shall have continuous current rating as required but in no case less than the current rating of incoming switch fuse unit. The busbars shall be easily accessible from the front of the cubicle and shall be colour coded as per IS for phase identification. An copper earth busbar of adequate cross sectional area shall be provided in the bottom or top part of the cubicle and shall run for the entire length of the MCC.

Start/stop push button, auto/manual selector switch and indication shall be provided and the MCC for control of the motors.

Incomer cubicle shall incorporate voltmeter, ammeter with respective selector switches, power factor meter and phase indication lamps.

Each outgoing cubicles shall have ammeter with selector switch and on/off, trip indication lamps. Ammeters for incoming/outgoing cubicles, for motors it shall be suppressed scale type beyond full load rating upto 8 times of full load current for taking care of starting current kicks.

6.4 **Diesel Engine Control Panel**

The control panel shall be made of sheet steel of thickness not less than 2 mm, totally enclosed, self-supporting, floor mounted, dust and vermin proof cubicle type with degree of protection IP 54.

The following features shall be incorporated in the control panel:
i) Contactors, relays, timers etc for applying automatic starting pulses to the diesel engine on receipt of a command signal from the pressure switch with starting sequence consisting of three electrical pulses of 5 second duration each spaced at 5 second apart.

ii) Main ON/OFF isolator with DC circuit fuses and main ON indication.

iii) Boost cum trickle automatic battery charger with fuse protection for AC charging circuit (trickle/boost), Auto/Manual selector switch for charging, charging current meter, volt meter etc.

iv) Indication/Alarm for the pump "RUN" condition, Annunciation for engine fault condition, alarm cut off switch and reset switch for fault conditions.

v) Engine start switch, engine stop switch together with Auto/Manual switch for engine starting and indication showing failure to start on 'AUTO'.

vi) Engine RPM indication from in built tachometer with engine.

6.5 Cables

All power cables shall be multi core, 1100 V grade, PVC insulated, PVC sheathed, aluminium conductor cables manufactured and tested as per IS 1554 and ISI marked.

All control cables shall be multi core, 1100 V grade, PVC insulated and overall PVC sheathed with copper conductor manufactured and tested as per relevant IS and ISI marked.

Armoured power and control cables shall be only considered.

6.6 Installation accessories and earthing materials

One lot of installation accessories and earthing material shall be installed for equipment and cables and earthing of equipment.

6.7 Power supply

For M C C one 415 V, A C 3 phase and neutral 50 HZ feeder of adequate capacity shall be made available at the M C C incomer.

If the equipment is required to operate at any other voltage, necessary transformers & converters shall be included in the scope of the tenderer.
LIST OF APPROVED MANUFACTURERS

The contractor shall use materials in their works subject to inspection prior to despatch, by Owner or his authorised representative of any materials, as deemed necessary in accordance with the following list. All materials not otherwise specified shall be in accordance with the latest Indian Standard Specification, where such exists and prior approval of Owner/Architect. The contractor shall be bound to offer sample of materials, which are claimed to be conforming to IS Specifications, for testing at an approved Test Laboratory.

Contractor shall purchase all materials from the makers or their authorized stockists only. Necessary documentary evidences must be produced to the Owner or their authorised representative on demand. Contractor shall be bound to supply items of any make of the items as per the choice of the Owner without any extra price.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Materials</th>
<th>Name of Brand</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Electrical Motor Driven Fire Pump</td>
<td>Mather &amp; Platt/GRONDFO/CRI</td>
</tr>
<tr>
<td></td>
<td>Pump</td>
<td>Kirloskar (KEC)/NGEF/CROMPTON.</td>
</tr>
<tr>
<td></td>
<td>Motor</td>
<td>KEC/NGEF/CROMPTON.</td>
</tr>
<tr>
<td>2.</td>
<td>Electrical Motor Driven Jockey Pump</td>
<td>Mather &amp; Platt/GRONDFO/CRI</td>
</tr>
<tr>
<td></td>
<td>Pump</td>
<td>Kirloskar/KEC/NGEF/CROMPTON.</td>
</tr>
<tr>
<td></td>
<td>Motor</td>
<td>KEC/NGEF/CROMPTON.</td>
</tr>
<tr>
<td>3.</td>
<td>Diesel Engine Driven Fire Pump</td>
<td>Mather &amp; Platt/GRONDFO/CRI</td>
</tr>
<tr>
<td></td>
<td>Pump</td>
<td>Kirloskar/Ashok Leyland/CUMMINS/GREAVES</td>
</tr>
<tr>
<td></td>
<td>Engine</td>
<td>Kirloskar/Ashok Leyland/CUMMINS/GREAVES</td>
</tr>
<tr>
<td>4.</td>
<td>Antivibratory Pads</td>
<td>Approved quality and make.</td>
</tr>
<tr>
<td>5.</td>
<td>C I Valves</td>
<td>Audco/Upadhyay/Kirloskar</td>
</tr>
<tr>
<td>6.</td>
<td>G M Valves</td>
<td>Leader/Kitz/Zoloto</td>
</tr>
<tr>
<td>7.</td>
<td>Hydrant valves, Fire Brigade connections, GM branch pipes, couplings etc</td>
<td>Ghosh Engg/Minimax/Fireshield or any good brand with ISI Certification</td>
</tr>
<tr>
<td>8.</td>
<td>Fire Hoses</td>
<td>`Jayashree’ or other approved make with ISI mark.</td>
</tr>
<tr>
<td>9.</td>
<td>Hose Cabinet</td>
<td>Good quality fabricated as per specification (sample cabinet to be approved).</td>
</tr>
<tr>
<td>Sl. No.</td>
<td>Materials</td>
<td>Name of Brand</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>10.</td>
<td>First Aid rubber hose (for swinging hose reel)</td>
<td>Approved quality and make.</td>
</tr>
<tr>
<td>13.</td>
<td>Pressure Gauge</td>
<td>H Guru/Fiebig.</td>
</tr>
<tr>
<td>15.</td>
<td>Auto Transfer Switch</td>
<td>Havell’s/GE/Emerson.</td>
</tr>
<tr>
<td>16.</td>
<td>Indicators Lamps</td>
<td>Essen/L &amp; T/Siemens.</td>
</tr>
<tr>
<td>18.</td>
<td>Portable Extinguishers</td>
<td>Approved make bearing relevant ISI marking on body as well as the 1st charge of chemicals/gases.</td>
</tr>
<tr>
<td>19.</td>
<td>Star Delta/DOL Starter</td>
<td>L &amp; T/Siemens/Schneider/ABB.</td>
</tr>
<tr>
<td>20.</td>
<td>Contractors (Main and Auxiliary)</td>
<td>L &amp; T/Siemens/Schneider/ABB.</td>
</tr>
<tr>
<td>21.</td>
<td>a) Bimetal O/L Relay with single phasing preventor, combined unit</td>
<td>L &amp; T/Siemens/Schneider/ABB.</td>
</tr>
<tr>
<td></td>
<td>b) Single phasing preventor (Negative sequence current sensing type)</td>
<td>L &amp; T/Siemens/ABB/Siemens.</td>
</tr>
<tr>
<td>22.</td>
<td>650/1100V grade PVC insulated copper wires and flexible cables</td>
<td>Finolex/Havell’s/Polycab.</td>
</tr>
<tr>
<td>23.</td>
<td>Voltmeter, Ammeter Selector Switch</td>
<td>Kaycee.</td>
</tr>
<tr>
<td>24.</td>
<td>Steel Conduits (conforming to IS in all respects)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Galvanised</td>
<td>BEC/NIC/AKG.</td>
</tr>
<tr>
<td></td>
<td>b) Black Enamelled</td>
<td>BEC/NIC/AKG.</td>
</tr>
<tr>
<td>25.</td>
<td>MCCB and Accessories</td>
<td>L&amp;T (D-Sine)/Schneider (Compact NSX)/ABB (T-Max)/Siemens (3 VL).</td>
</tr>
<tr>
<td>27.</td>
<td>MCB DB, MCB</td>
<td>ABB/Schneider/Siemens.</td>
</tr>
<tr>
<td>27.</td>
<td>Piano Switch/Sockets</td>
<td>Anchor/SSK.</td>
</tr>
</tbody>
</table>

All the materials shall be ISI marked wherever available from the list of manufacturer given above, wherever the ISI marked materials are not available, the materials shall be from the best quality available in the market, subject to submission of satisfactory test report with prior approval from the Owner/Architect.