

**AHMEDABAD MUNICIPAL CORPORATION**  
**(ENGINEERING DEPARTMENT-NORTH ZONE)**



**REPAIRING AND RENOVATION OF LATE SHREE AMRUTBHAI  
MAGANLAL PATEL PARTY PLOT AT T.P.S. NO.11 RAKHIYAL , F.P. NO.85/P  
IN SARASPUR-RAKHIYAL WARD, NORTH ZONE, AHMEDABAD**

**TENDER DOCUMENT**

***Volume -1***

**Part E - Technical Specification For Fire Fighting Work**

**Client-**  
**Municipal Commissioner**  
Ahmedabad Municipal Corporation.  
Sardar Patel Bhavan, Danapith,  
Ahmedabad

# **TECHNICAL SPECIFICATIONS FOR** **FIRE FIGHTING WORKS**

**SECTION – 1**  
**TECHNICAL SPECIFICATIONS FOR FIRE FIGHTING WORKS**

**1.0 FIRE HYDRANT SYSTEM:**

**1.1 GENERAL:**

This specification and scope of works as detailed herein covers the following activities and services in respect of all the equipment's of fire protection system.

The specifications for the supply, installation, testing and commissioning of the components and accessories of the Fire Fighting System, shall be in accordance with these Specifications. For items not included in these Specifications and the Special conditions, the installation shall be done in accordance with the latest ISI Standard/CPWD specifications (Part – V) / NBC-Part IV/Local Fire Services prevailing rules and regulations

For items not covered by any of the above, the installation shall be done as directed by the Engineer-in-charge and as per sound engineering practices.

**1.2 FIRE WATER SOURCE:**

Fire Fighting RCC water storage 1 No. tank of 50 Cu.m capacity has to be provided by civil contractor within the Complex. A pump house has to be provided by the civil contractor adjacent to the fire storage tank where various firewater pumps and associated equipments would be located and terrace tank of 5,000 ltr. Capacity has to be provided by civil contractor.

**1.3 FIRE PUMPS & ACCESSORIES:**

**PUMP CONSTRUCTION:**

The electrical pump shall be designed for continuous operation and shall have continuously rising head characteristics without any zone of instability. The pump shall conform as per IS- 1520-1660, IS-9079, IS-325 and shall be of the following construction:

Sl. No.	Pump	Horizontal End Suction Pump Description
1.	Casing	Cast Iron/Cast Steel
2.	Impeller	Bronze
3.	Shaft	Stainless Steel
4.	Bearings	Heavy duty Ball/ Roller Bearings
5.	Base Plate	Cast Iron/ Fabricated M.S.
6.	Flanges	Conforming to ISS 1536/1960
7.	Packing	Mechanical Seal
8.	Max. Speed	2900 RPM Electrical Motor & 1800 RPM for diesel engine
9.	Driver	TEFC
10.	Starter	DOL /Star Delta as Per BOQ

· Pump and driver shall be mounted on a single bedplate and directly driven through flexible coupling.

· The pumps shall be capable of delivering not less than 150 % of rated capacity at a head of not less than 65% of the rated head. The shut off head of pump shall not exceed 120% of the rated head. The drive motor shall be continuous rating type and its rating shall be at least equivalent to the horse power required to drive the pump at 150% of its rated discharge.

## 1.4 Pump Set Specification

· SITC of 25HP, 2880 RPM, 900 LPM, 65 Mtr Head, jacket type horizontal open well submersible fire mono set, delivery pipe size : 100mm, Two stages with cast iron construction materials, S.S. Shaft, copper rotor, cast iron stainer with Lead cable 10 mtrs 2 x 3 x 4.0 sqmm and complete with 100mm NRV and 100mm Butterfly valve.

### **1.5 MODE OF OPERATION:**

- a) The Pressurization Pump shall maintain pressure in the system and shall operate only on account of slow pressure loss. In case of sudden pressure loss the Pressurization Pump shall not operate. The pump shall start when the water pressure in the system falls to a pre-set value (about 0.35 kg./cm<sup>2</sup> below normal system pressure) and shut down when the system pressure reached the set value. Both limits shall be adjustable.
- b) Main Electric Fire Pump shall operate on account of sudden pressure loss. So long as Main Electric Fire Pump is working, other Fire Pump will not operate. The pump shall start when the water pressure falls to a pre-set value in the system (about 1 kg./cm<sup>2</sup>)
- c) The Diesel Fire Pump will start on sudden pressure loss, only in case supply to Main Electric Fire Pump is not available or within a pre-set time the Main Electric Fire Pump fails to start or fails during operation. No other pump will be working when Diesel Engine Fire Pump is in operation.
- d) A three attempts starting facility will be provided for diesel pump.
- e) The Terrace Pumps will start on sudden loss of pressure only when both the Fire Pumps have either failed to start or exhausted water.
- f) Only one pump will be working at a time. In manual mode more than one pump can be started.

### **1.6 PRESSURE AIR VESSEL:**

To compensate for slight losses of pressure in the system and to provide an air cushion for counteracting pressure surges/water hammer in the pipe work air vessel conforming to IS: 3844 shall be furnished in the pump room near fire pump. The air vessel shall normally be half full with water and remaining filled with air, which shall be under compression when the system is in normal operation.

Pressure vessel shall be fabricated out of 8 mm (Minimum) thick mild steel sheet for shell and the ends shall be dished. The tank should be duly painted with two coats of approved thick enamel paint. The following accessories shall be supplied with pressure vessel and size of the pressure vessel shall be 250X1200 mm.

- a) Gun Metal isolation valve (stop valve) – 65mm Dia
- b) Gun Metal drain valve – 40mm Dia
- c) Pressure gauge with isolation valve – 1 Set
- d) Gun Metal valve – 25mm Dia
- e) Air release valve – 25 mmDia

## **SECTION – 2**

### **TECHNICAL SPECIFICATIONS FOR ELECTRICAL MAIN PANEL**

#### **2.1 GENERAL:**

Work shall be carried out in accordance with the specifications; Indian Electricity Act 1910 as amended upped date, and rules and regulations of local electricity authority, regulations of the Fire Insurance Company and Indian Standard Code of practice no. IS 732-1963 (revised)

#### **2.2 MAIN FIRE PUMP PANEL**

Fabricating, supplying, erection, testing and commissioning of cubicle type floor mounted panel made from 14 CRCA Sheet complete with contactors, Auxiliary contacts, indicating lamps, multifunction meter, fuses, automatic star delta/DOL type motor starter including connections complete as required for Fire hydrant pump, Jockey pump, Terrace pump, 01 No Battery charger complete in all respect including necessary control wiring as per the details given in BOQ:

#### **2.3 CONTROL PANEL ENGINE**

- a) 15 Amp Battery charger with trickle and boost facility
- b) 0-30 Volts DC volt meter--1 No
- c) 0-20 Amps ammeter--1 No
- d) Auto starting contactor with relay
- e) Auto/ Manual selector switch with push button for manual start--1 No
- f) Buzzer--1 N0
- g) LED type Indication Lamp--4 No
- h) Push Button--2 No

#### **2.4 STANDARDS AND CODES:**

The Distribution boards shall comply with the latest edition of relevant Indian Standards and Indian Electricity Rules and Regulations.

## **2.5 CONSTRUCTION FEATURES:**

The power supply and control panel shall be metal enclosed sheet steel cubical indoor type, dead front, floor mounting/wall mounting type. The panel shall be totally enclosed, completely dust and vermin proof, Gaskets between all adjacent units and beneath and all covers shall be provided to render the joints dust proof. All doors and covers shall be lockable. All mild steel sheets used in the construction of panels shall be 2mm thick except for shrouds & partitions it shall be of minimum 1.6mm thick and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet metal shall be seam welded, all slag grounded off and welding pits wiped smooth with plumber metal.

All panels and covers shall be properly fitted and square with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with check nuts. Self-threading screws shall not be used in the construction of control panels. Base channel shall of 75mm x 75mm x 5mm thick shall be provided at the bottom. Minimum clear space of 200mm between the floor of panel and bottom most units shall be provided.

The panels shall be of adequate size with a provision of 25% spare space to accommodate possible future additional switchgear. Knockout holes of appropriate size and number shall be provided in the control panels in conformity with the location of incoming and outgoing conduits/cables, all equipment such as meters and indicating lamps, etc shall be located adjacent to the unit with which it is associated and care shall be taken to achieve a neat and symmetrical arrangement. Facility shall be provided for termination of cables from both above and below the control panel. Where cables enter below, cables boxes shall be fitted at the rear and arranged in tiers to facilitate making connections to the upper and lower units. Clamps shall be provided to support the weight of the cables. All incoming and outgoing feeders shall be brought out to a terminal block of adequate size at suitable location inside the control panel. All wiring inside the control panel shall be color-coded and labeled with approved plastic beads for identification. Circuit diagrams showing the arrangement of circuits shall be pasted on the inside of the panel door and covered with transparent plastic sheet and all labeling shall be provided on the front face of the panel board.

## **2.6     CIRCUIT COMPARTMENTS                     :**

Each circuit breaker, contractor and relay shall be housed in a separate compartment and shall be enclosed on all sides. Sheet steel hinged lockable door shall be duly interlocked with the breaker in the 'ON' position. Safety interlocks shall be provided to prevent the breaker or Contractor from being drawn out when the breaker is in ON position. Instruments and indicating lamps shall not be mounted on the panel compartment door. Sheet steel barriers shall be provided between the tiers in a vertical section.

## **2.7     INSTRUMENT COMPARTMENT                     :**

Separate and adequate compartments shall be provided for accommodating instruments, indicating lamps, control contractors and control fuses etc. These shall be accessible for testing and maintenance without any danger of accident contact with live parts of the circuit breaker and bus bar.

## **2.8     BUS BAR CONNECTION:**

The bus bar and interconnections shall be of aluminum and of rectangular cross sections suitable for full load current for phase bus bars and half rated current for neutral bus bars and shall be extensible on either side. The bars and interconnections shall be insulated with PVC sleeve tapes and color-coded. All bus bars shall be supported on unbreakable, non-hygroscopic-insulated supports at regular intervals, to withstand the forces arising in case of short circuit in the system. Bus bars shall be provided in separate chamber and no holes shall be drilled in bus bars. If holes have to be drilled for making connections, additional cross section of bus bars shall be provided to cover up the holes drilled in the bus bars..

All connections between the bus bar and breaker and between breaker and contactor shall be through aluminum strips of proper size to carry full rated current and shall be insulated with PVC sleeves.



## **2.9 TERMINALS:**

The outgoing terminals and neutral links shall be brought out to a terminal block suitably located in the control panels. The current transformer for instruments, metering and for protection shall be mounted on the bus bars. Separate cable compartment shall be provided for incoming and outgoing cables.

## **2.10 WIRE WAYS :**

A horizontal wire way screwed covers shall be provided at the top to take in the connecting control wiring different vertical sections.

## **2.11 CABLE COMPARTMENTS:**

Cable compartments of adequate size shall be provided in the control panels for easy termination of all incoming and outgoing cables entering from bottom or top. Adequate and proper supports shall be provided in cable compartments to support cables. All incoming and outgoing terminals shall be brought out to terminal blocks in the cable compartment.

## **2.12 MATERIALS:**

All materials shall be of the best quality complying with the appropriate Indian Standard specifications, Materials used shall be subject to the approval of the EIC and sample of the same shall be furnished where required.

## **2.13 SELECTOR SWITCH:**

When called for, selector switches of rated capacity shall be provided in control panels, to give the choice of operating equipment in selective mode.

## **2.14 SWITCHES:**

Switches beyond 63 amps shall be SDFU type and shall be of AC 23 duty as per IS: 4064-1978 as amended upto date. It shall be complete with suitable HRC cartridge type fuses of appropriate rating. The switch handles shall be located at the front.

**2.15 HRC FUSES:**

Fuses shall be high Rupturing capacity and shall be in accordance with IS: 3208 - 1962 and having rupturing capacity of not less than 20 MVA at 415 volts. The back up fuse rating of each motor/heater/equipment shall be so chosen that the fuse does not operate on starting of motor/heater/equipment. Fuses shall be of the same make as the switches.

**2.16 STARTERS:**

Each motor shall be provided with a starter of suitable rating. Starter shall be in accordance with IS: 1822 - 1967. Direct on line/star delta starters shall be provided for motors as specified in the BOQ.

All starters shall have auxiliary contacts for inter locking, control & indication. Starters (contactors) shall have 3 main and 4 auxiliary contacts and shall be air break type suitable for making and breaking contact. For design consideration of contactors, the starting current of connected motor shall be assumed to be 6 times the full load current of the motor in case of direct-on-line starters and 3 times the full load current of the motor in case of star delta starters. In case of soft starters the current shall be limited to 1.8 times.

Main and auxiliary contacts shall be silver or silver alloy. The insulation for contractor coils shall be of class "E". Operating coils of contractors shall be suitable for  $230 \pm 10\%$  volts AC, 50 cycles supply system. The contactor shall drop out when voltage drops to 90% of the rated voltage. The housing of the contactors shall be heat resistant and having high impact strength.

**2.17 CURRENT TRANSFORMER:**

Current Transformer shall be of minimum accuracy class 1.5 and suitable VA burden for operation for the connected meters and relays.

**2.18 SINGLE PHASE PREVENTOR :**

Single-phase preventor shall be provided as per schedule of quantities and shall be in conformity with relevant ISI standards. Single-phase preventor shall act when the supply voltage drops down to 90% of the rated voltage or on failure of one or more phases.

#### **2.19 TIME DELAY RELAYS:**

Time delay relays shall be adjustable type with time delay adjustment from 0-180 seconds and shall have one no. Auxiliary contacts for indicating lamp connection.

#### **2.20 INDICATING LAMP AND METERING:**

All meters and indicating lamps shall be in accordance with the relevant IS. The meters shall be flush mounted and draw out type. The indicating lamp shall be LED type. Each main panel shall be provided with operated ammeter of suitable range with three Nos. CTs of suitable ratio with three way and off selector switch, phase indicating lamps, and other indicating lamps as called for. Each phase indicating lamp shall be backed up with 5 amps fuse and toggle switch.

#### **2.21 TOGGLE SWITCH:**

Toggle switches, where called for, shall be in conformity with IS: 3854-1969 and shall be of 5 Amps rating.

#### **2.22 PUSH BUTTON STATIONS:**

Push button station shall be for manual starting and stopping of motors/equipment as called for. Red and Green color push buttons shall be provided for starting and stopping operations. Start or stop indicating flaps shall be provided for push buttons. Push buttons shall be suitable for panel mounting/projection mounting and accessible from front without opening door, lock lever shall be provided for stop push button. One set of normally open and one set of normally closed contacts shall be provided in push button stations. The push buttons contacts shall be suitable for 15 Amps current capacity.

#### **2.23 SYSTEM CONTROLLER:**

For controlling operation of pumps as per para 1.5 and indicating fault , system controller shall be provided. The system controller shall consist of relays timer, contactors etc. and shall be designed to operate the fire pumps with interlocking and fault indication as described in Para 1.5 . Annunciation window shall be provided to indicate following faults.

- (i) Low water level in UG tank.
- (ii) Low water level in terrace tank.
- (iii) Main pump failed to start.
- (iv) Main pump failed during operation.
- (v) Diesel pump failed to start.
- (vi) Diesel pump failed during operation
- (vii) Supply to main pump failed
- (viii) Supply to Pressurization Pump failed
- (ix) Supply to Terrace Pump failed.

Suitable sensors, differential pressure switches, monitors shall be provided at respective location. The control system shall be operational on 12 Volt / 24 Volt DC batteries of engine starting. Battery chargers shall be provided to ensure that the batteries remain charged. Batteries shall be sealed maintenance free type. All necessary control wiring for automatic operation pumps through system controller shall be provided at no extra cost.

#### **2.24 CABLES:**

1. The cables shall be XLPE insulated PVC sheathed 1100 V grade confirming to to IS: 7098 part -I amended upto date. Cable shall be laid in suitable metallic trays suspended from ceiling , or mounted on walls.

#### **2.25 EARTHING:**

1. The earth work shall bne carried out in conformity with CPWD Specifications for Electrical works (Part-I), Internal 2005.
2. Armouring of cables shall be connected to the body of the equipments/switch board at both the ends.

**SECTION – 3**  
**FIRE HYDRANT SYSTEM AND ACCESSORIES**

**3.1 HYDRANT SYSTEM:**

Hydrant system shall comprises of Main fire pump, diesel engine driven pump, jockey pump, terrace pump and associated instruments, cabling, piping, valves, control panel etc and any other component required to complete the system in all respect. A network of hydrant mains should cover various areas as specified.

**3.2 INTERNAL HYDRANT:**

- a) The internal hydrant system (wet riser) shall be provided at every floor/platform level and at landing staircases. The hydrant point shall be directly tapped from riser pipes in accordance with the statutory requirement.
- b) One Single headed gunmetal landing valve with 63 mm dia outlet and 80 mm dia inlet conforming to IS-5290 with cast iron wheels shall be provided. Landing valve shall have flanged inlet and instantaneous female type outlets.
- c) First Aid Hose Reel Drum directly tapped from the Wet Riser pipe with 25 mm dia gunmetal gate valve and fittings etc. with 30 meters of 20 mm dia high-pressure rubber pipe with shut off nozzle.
- d) Internal Hydrant shall be gunmetal Single headed landing valve, 2nos of 63 mm dia. 15 meter long RRL Hose Pipe confirming to IS-636 complete with ISI marked male and female coupling and one number 63 mm dia ISI marked gunmetal short branch pipe with nozzle.
- e) M.S. Frame of size 2100 X 1200 mm size or as per the site condition with glass front door and locking arrangements shall be provided at each landing. M.S. Frame shall be constructed out of 14 gauge (2 mm) mild steel sheet with 5 mm glass in the door with FIRE HOSE CABINET written with red paint on the glass and duly painted in approved finish. The cabinet shall be sufficient enough to accommodate first-aid hose reel and 2 Nos. RRL hoses of 63 mm dia & 15 meter long, 1 No Landing Valve and Branch Pipe 1 No.

- f) The hydrant riser shall be terminated with air release valve at the highest points to release the trapped air in the piping network.

### **3.3 FIRE BRIGADE INLET CONNECTION:**

Fire brigade inlet connection shall be of gun metal with four/ two Nos. 63 mm dia instantaneous type inlets with leak proof built in type check valves and 150 mm dia flanged outlet connections feeding to the main fire grid. The Fire Brigade inlet shall conform to IS-904.

### **3.4 HOSE REEL:**

- a) Swinging hose reels conforming to IS-884 shall be with thermoplastic (textile reinforced) type –2 hose of 20 mm (3/4") diameter as per IS: 12585. The reel shall be fabricated out of heavy gauge pressed mild steel capable of swinging up to 170-degree rotation. The movement of the reel shall be friction less and shall be provided with suitable bearings. Gunmetal packing glands shall be provided with adjustable nuts. The water flow rate shall not be less than 24 LPM and range of Jet shall not be less than 6 mtr.
- b) The swinging hose reels shall be complete with the following accessories.
  - i. Shut-off nozzle of gun metal duly chromium plated complete with control valve
  - ii. Wall bracket with U shape reel carrier made out of cast iron.
  - iii 25 mm dia G.M. isolation valve.—1 No
  - iv 30 Meter 20 mm dia water hose Thermoplastic (textile reinforced) Type - 2 as per IS: 12585

### **3.5 HYDRANT PIPING:**

- a) All piping laid shall be of following materials:
  - (i) MS/GI heavy class ('C' class) confirming to IS: 1239 for sizes upto 150mm.
  - (ii) Welded black steel pipe, class 2, conforming to IS: 3589, for sizes greater than 150 mm. These pipes shall be factory rolled and fabricated from minimum 6.35mm thick M.S. sheet for pipes upto 350mm dia.

- (iii) Electric welding joints shall be provided in the MS/GI pipe work. Flanged joints shall be provided for connections to valves, pumps, air vessels etc. and also on straight lengths at suitable points to facilitate erection and subsequent maintenance. Gasket thickness shall not be less than 3 mm.

Pipe dia	Flange Thickness
200 mm	24 mm
150 mm and 125 mm	22 mm
100 mm and 80 mm	20 mm
65 mm	18 mm
40 mm and below	16 mm

- b) GI pipe of Heavy class as per BOQ shall be used for wet riser, Terrace Tank connection & drain for pumps.
- c) All piping shall be black steel unless otherwise stated. Pipes shall be given one primary coat of red oxide paint & 2 coats of synthetic enamel paint of approved color before being installed. Pipes shall be sloping towards drain points.
- d) Fittings shall be new and from reputed manufacturers, fittings shall be of malleable casting of pressure rating suitable for the piping system. Fittings used on welded piping shall be of the welded type. Flanges shall be new and from standard manufacturers. Supply of flanges shall include bolts, washers gaskets etc as required.
- e) Tee-off connection shall be through reducing tees, wherever possible. Otherwise ferrules welded to the main pipe shall be used. Drilling and tapping of the walls of the main pipe shall not be resorted to.
- f) All equipment and valve connections shall be through flanges (Welded or screwed for mild steel).
- g) All welded piping is subjected to the approval of the EIC and sufficient number of flanges and unions shall be provided.

- h) Gate valves/water type Butterfly valves shall be provided as required or as shown in the applicable shop drawings conforming to the following specification:
- i) Gate valves shall conform to IS-780/1969, Flanges to IS-1536 or as required. Valves shall have non-rising spindles unless otherwise specified and shall be suitable for 21 Kg/Sq cm test pressure. Tailpieces shall be used where required.
- j) Butterfly valves shall conform to BS-5155, MSS SP 67 & API 609 and designed to fit without gaskets between mating flanges. The valves shall be suitable for flow in either direction and seal in both directions. The valve shall be of integral molded design.
- k) Check valves shall be provided as required or as shown on the drawings and conform to the following specifications:

<u>Size</u>	<u>Connection</u>	<u>Ends</u>
12 mm to 50 mm	Gun Metal	Screwed Female
65 mm and above	C.I. Flanged	

Strainers shall be preferably of the approved type with C.I. bodies designed to the test pressures specified for the gate valves. Strainers shall have removable bronze screen with 3mm perforations and a permanent magnet. Strainers shall be provided with flanges or threaded sockets as required. They shall be designed so as to enable blowing out accumulated dirt and facilitate removal and replacement of screen without disconnection of the main pipe. All strainers shall be provided with equal size isolating gate valves with rising spindles so that the strainer may be cleaned without draining the system. Strainers shall be provided on the suction side of each pump; and wherever shown in the drawings.



### **3.6 PIPING INSTALLATION:**

3.6.1 The drawings indicate schematically the size and location of pipes.

Pipes runs and sizes may, however, be changed to meet the site conditions. The contractor on the award of the work shall prepare detailed working drawings showing the cross section, longitudinal section, detail of fittings, locations of isolating drain and air valves etc. They must keep in view the specific openings in buildings and other structures through which the pipes are designed to pass. The EIC before commencement of work will approve this working drawing.

3.6.2 Piping shall be properly supported on or suspended from stands, clamps, hangers etc, as specified and as required. The tender shall adequately design all the brackets, saddles, clamps, hangers etc and be responsible for their structural integrity.

3.6.3 Pipe supports shall be of steel, adjustable for height and primer coated with rust preventive paint and finish coated black. Where pipe and clamp are of dissimilar material, a gasket shall be provided in between.

3.6.4 Pipe supports in pump house shall be floor mounted and of mild steel/GI. Spacing of pipe supports shall not exceed the following:

<b><u>Pipe Size (mm)</u></b>	<b><u>Spacing (M)</u></b>
20 to 25	2.00
32 to 125	2.50
150 to above	3.00

Pipe hangers shall be fixed on walls and ceilings by means of metallic raw plugs.

3.6.5 Vertical risers shall be parallel to walls and column lines and shall be straight and plumb. Risers passing from floor to floor shall be supported at each floor by clamps or collars attached to pipe and with a 12mm thick ribbed rubber pad or any other approved resilient material. Where pipes pass through the terrace floor, suitable curbing shall be provided to prevent water leakage. Risers shall also have a suitable concrete pipes support at the lowest point.

- 3.6.6 Pipes sleeves of 50mm on larger diameter shall be provided wherever pipes pass through wall and the annular space filled with lead wool and finished with retaining rings.
- 3.6.7 Piping work shall be carried out with minimum disturbance to the other works being done at the sites. A program work shall be chalked out in consultation with the EIC and approved by him.
- 3.6.8 Piping layout shall take due care for expansion and contraction in pipes.
- 3.6.9 All pipes using screwed fitting shall be accurately cut to the required sizes and thread in accordance with IS-554 and burrs removed before laying. Wherever reducers are to be made horizontal runs, eccentric reducers shall be used if the piping is to drain freely, in other location, concentric reducers may be used.
- 3.6.10 Air Vessel shall be provided at all high points in the piping system for venting.
- Discharge from the air valves shall be piped through an equal sized M.S. pipe to the nearest drain or floor waste or as shown.
- 3.6.11 Where mild steel pipes are to be buried under ground the same shall be treated with anticorrosive treatment before laying. The top of the pipes shall be not less than 100 cms below the ground level. Where this is not practicable, permission of the Engineer-in-charge shall be obtained for burying the pipes at lesser depth. Masonary or C.C. blocks shall be provided for supporting the pipes at interval as mentioned in Para 3.6.4. After the pipes have been laid, the trench shall be refilled with the excavated soil in layers of 20 cm. and rammed and any extra soil shall be removed from the site of work by the contractor.

Note:- I HAVE ALSO GONE THROUGH TECHNICAL SPECIFICATIONS FOR THE ITEMS AND UNIT (AS PER STANDARD P.W.D. TECHNICAL SPECIFICATION FOR THE ITEMS & UNIT AND ALSO I HAVE THE BOOK OF THE SAME) AND AGREE TO ABIDE BY THEM. IN CASE OF WHERE THERE IS NO TECHNICAL SPECIFICATION FOR THE ANY ITEMS AVAILABLE, SPECIFICATION GIVEN BY THE ENGINEER-IN – CHARGE / MANUFACTURER’S STANDARD SPECIFICATION SHALL BE FOLLOWED AND FOR THE SAME I AGREE TO ABIDE BY THEM.

**Seal and Signature of the Bidder**