

# **TECHNICAL SPECIFICATION**

## **FOR**

### **FIRE FIGHTING WORKS**

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**1 Scope of work**

The scope of work of fire protection works shall be all as described in Schedule 'A' and all as specified here-in-after.

**2 Appointment of Specialist Vendor for Fire Protection works.**

The Contractor shall appoint the Specialist Vendor for Fire Protection Works on the basis of the following criteria:

The Fire Fighting Vendor should have executed Hydrant System works whose value should exceed the amount quoted by the Contractor for this project.

The vendor should be engaged in this line for at least five years.

Contractor will quote as per specialist Vendor and ensure that the tender is submitted in proper manner.

**3 Co-ordination with other Services**

The Contractor and his specialist agency shall be required to co-ordinate his activities with all other services such as Electrical, water and Civil.

**4 Exclusions**

The Contractor shall however furnish all details and relevant data required for design and detailed engineering of all such civil work.

**5 Drawings**

The drawings issued are indicative only and are issued for guidance only. The Contractor shall prepare and submit shop drawings/data sheets of all the relevant materials used in the systems. The Contractor also shall prepare the drawings of all the fabricated items used in the system and before execution of the same, the drawings shall be got approved by the Engineer.

**5.1 Supply of Drawings and Technical Documents**

The Contractor shall provide to five sets of :

Approved final/As built Drawings including, but not limited to fabrication, structural general arrangement/layout, erection /installation drawing, wiring circuits/diagrams etc.

Maintenance and repair manuals of all equipments incorporated in the system.

Illustrated spare part list along with sources of supply.

Operation manuals / working instructions.

Test Schedules, Test reports as per relevant IS code for equipments.

Detailed Technical Specifications / Data of various equipments / assembled parts actually supplied.

## **6 System Testing**

The Contractor shall arrange interim / stage inspection during execution of the works as and when so called for and shall carry out any rectification/modification as may be required by the

Soon after the work is completed, the Contractor shall inform in writing for getting the complete system including all sub-systems and instrumentation control panels etc. thoroughly inspected and tested for satisfactory performance. After satisfactory completion of tests of the Systems Contractor shall be required to carry out all start up trials of the Systems provided by him.

Any defects noticed during these tests shall be speedily rectified by the Contractor.

Note : The size and capacity of various equipments selected are tentative and contractor will redesign/check before placing order to vendors to ensure that model /capacity selected by him gives net output of water quantity and pressure level as asked or in the schedule economically.

## **7 Commissioning of the Systems**

After completion of the start –up trials and duly tested the Accepting Officer may instruct the Contractor for commissioning of the Systems. All the equipments/items in the system shall be operated to establish proper sequencing /synchronization and coordinated working of the equipments/ items. Any defect noticed during this period shall be promptly rectified by the Contractor.

## **8 Deputing of Personnel at Site.**

The Contractor shall depute one qualified Engineer of this trade at site as his Project Engineer for Fire Protection Works during the currency of the Contract for handling the erection, testing and commissioning of his Systems on full time basis. He shall be present in all site meetings for appraisal of progress and site instructions till work is completed and commissioned.

## **9 Performance Certificates of Vendor Equipments**

The Contractor shall be required to submit the Performance certificate from the manufacturer of the equipments procured by him. Individual item or batch certificates shall

be provided as applicable.

### **9.1 Training of Employer's Staff**

The Contractor/Specialized Sub Contractors, shall undertake to train free of cost at least two personnel before taking over of the Systems.

### **9.2 Approval by Local Fire Authority**

It shall be the responsibility of the Contractor to get all works in his scope approved from the Local Fire Authority as applicable before and after completion of work

The Contractor shall also bring to the notice any deviations from Local Fire Authority/Building Bye Laws Norms for the Systems that he shall install as well as architectural features that may be a hindrance to approval from the Local Fire Authority.

The Contractor shall get his shop drawings approved from the Local Fire Authority before start of work.

### **9.3 Samples**

The Contractor shall be required to produce samples of the following items for approval, which shall be carefully maintained at site after approval. The Contractor shall use only those items whose samples have been approved.

Pipes and fittings, Hydrant, Swinging type Hose Reel, RRL Hose, Gun Metal Gate Valve, Pipe supports and clamps. All types of Fire Extinguishers, cast Iron Valves, Pressure Gauge, Pressure Switch, Gaskets, Nuts, Bolts, Response Indicators, Manual Call Box, Hooter cum Speaker, Conduit, Cable etc.

### **9.4 Hydrant System Testing**

At the time of taking over, the Hydrant System shall fulfill the following acceptance tests:

The Pressure Switch shall be set at  $6.5\text{Kg/cm}^2$  at the lower limit and  $7.0\text{Kg/cm}^2$  at the upper limit. The system drain valve shall be opened to cause a drop in the pressure. The Jockey Pump shall start as soon as the pressure gauge needle falls down to  $6.5\text{Kg/cm}^2$ . The Jockey Pump shall also stop automatically when the system has been pressurized again upto  $7.0\text{Kg/cm}^2$ .

The main Electrical Pump shall be set to start at  $5.5\text{Kg/cm}^2$ . The test Line in the Pump House shall be fully opened to cause a drop of pressure in the System. At first the Jockey Pump shall start when the pressure drops to  $6.5\text{Kg/cm}^2$ . Drop in the pressure upto  $6\text{Kg/cm}^2$  should be allowed to test automatic start-up of the Main Pump. In addition to Alarm in case Main Pump does not start, the Standby Pump shall come into operation automatically after further drop of  $1\text{Kg/cm}^2$  pressure and interlocking the Main Electrical Pump.

The Electrical Pump shall continue to run atleast for 5 minutes and register a rise in the pressure upto  $7.0\text{Kg/cm}^2$ . The Electrical Pump shall be stopped manually by pressing the stop button.

After having the system got fully charged at 7.0Kg/ cm<sup>2</sup> an external Hydrant Valve using hose and branch pipe is opened. When the pressure has dropped to 5Kg/ cm<sup>2</sup> , the Electric Main Pump shall come into operation automatically. After the Main Pump has run for 5 minutes, the power supply in the Pump House shall be switched off. The Standby Pump shall automatically come into operation immediately when the pressure drops further by another 1Kg/ cm<sup>2</sup> .

## **Fire Pumps**

### **9.5 General**

The Pumps shall be single stage (or multi stage for Jockey Pumps) designed for continuous operation and shall have a continuously rising head characteristic without any zone of instability.

The head vs capacity, input power vs capacity characteristics, etc. shall match to ensure load sharing and trouble free operation throughout the range.

In case of accidental reverse flow through the pump the driver shall be capable of bringing the pump of its rated speed in the normal direction from the point of maximum possible reverse speed.

The motor shall have a 15% margin of power rating over the rated pump input power.

In case the Pump and Motor are from different manufacturers, the Contractor under this specification shall assume full responsibility in the operation of the pump and the drive as one unit.

An automatic air release valve shall be provided to vent air from the pump. This valve shall be located at the highest point in the discharge line between the pump and the discharge check valve.

Pumps coupled with motor on a common platform shall perform smoothly without any excessive noise or vibration.

### **9.6 Pumps Casing**

The casing shall be capable of withstanding to the maximum pressure developed by the pump at the pumping temperature.

### **9.7 Impeller**

The impeller shall be of bronze and the bush shall also be of stainless steel.

### **9.8 Pump**

The pumps shall be horizontal end suction type for Main Pumps and multi stage pump for the Jockey Pumps.

The impeller shall be secured to the shaft and shall be retained against circumferential movement by keying, pinning or lock rings.

All screwed footners shall tighten in the direction of normal rotation.

All Pumps shall be provided with Mechanical Seal.

#### **9.9 Shaft**

Shaft size shall be selected on the basis of maximum combined shear stress.

This shaft shall be of stainless steel ground and polished to final dimensions and shall be adequately sized to withstand all stresses from rotor weight, hydraulic loads, vibrations and torques coming in during operation.

Length of the shaft sleeves must extend beyond the outer faces of gland packing or seal and plate so as to distinguish between the leakage between shaft and shaft sleeve.

Shaft sleeves shall be securely fastened to the shaft to prevent any leakage or loosening. Shaft and shaft sleeve assembly should ensure concentric rotation. The sleeve shall be of stainless steel.

#### **9.10 Pump Shaft – Motor Shaft Coupling**

All shafts shall be connected with adequately sized flexible couplings of suitable approved design. Necessary guards shall be provided for the couplings.

#### **9.11 Base Plate**

A common base plate mounting both for the pump and drive shall be provided. The base plate shall be of rigid construction, suitably ribbed and reinforced.

Base plate and pump supports shall be so constructed and the pumping unit so mounted as to minimize misalignment caused by mechanical forces such as normal piping strain, hydraulic piping thrust etc.

#### **9.13 Vibration & Balancing**

The rotating elements shall be so designed to ensure least vibration during start and throughout the operation of the equipment. All rotating components shall be statically and dynamically balanced at workshop.

#### **9.14 Electric Motors**

The motor shall be designed not to draw starting current more than 3 times normal running current. It shall be designed for continuous full load duty. The motor shall be full load duty and shall be capable of handling the required starting torque of the pumps. Speed of motor shall be compatible with the speed of the pump.

The cooling fans shall be directly driven from the motor shaft.

Motors shall be enclosed type and shall have a dust tight construction with suitable means of breathing and of drainage to prevent accumulation of water from condensation.

All components shall be of adequate mechanical strength and robustness and shall be constructed of metal unless otherwise approved.

The rating and design shall conform to relevant IS specification.

The motors shall be Squirrel Cage TEFC Induction type.

The motors shall be wound for Class –F insulations, and the winding shall be vacuum impregnated with heat and moisture resisting varnish, and glass wool insulated to withstand tropical conditions.

Two independent earthing points shall be provided on opposite sides of the motor for bolted connections.

415 Volt power terminals shall be suitable for receiving 1.1kv grade armoured power cables.

The cable boxes and terminations shall be designed to enable easy disconnection and replacement of cables.

Motor shall be suitable for +/- 10% variation in voltage and +/- 3% variation in frequency.

#### **9.15 HOSE CABINET**

The internal hose cabinet shall accommodate the Hose Pipes, Branch Pipe, Nozzle First aid Hose Reel and Hydrant Outlets and shall be fabricated from 2mm thick or 14mm gauge MS / Aluminium sheet as specified in Bill of Quantities. This shall have lockable centre opening

glazed doors as per the requirement and as per Architectural details. Where the niche for wet riser is provided with shutters, separate hose cabinet as above may be displaced with.

The hose cabinet shall be painted past office red and stove enameled and words FIRE written in front glazed portion.

#### **9.16 AIR VESSEL FOR FIRE PUMPS**

- i) An air vessel fabricated from 10mm MS sheet with 10mm dished end and GI suitable supporting legs shall be provided in the pump house. Air vessel shall be provided with a 100mm dia flanged connection from pump, one 50mm dia drain with valve, one gunmetal water level gauge and 50mm sockets for pressure switches, the vessel shall be 450mm x 2000mm dia high and tested or 1.5 times of the working pressure or 18 kg/sqcm, whichever is greater, with spring loaded GM air release valve with 25mm ball valve / gate valve along 4 inch pressure dial gauge.
- ii) The fire pumps shall operate on drop of pressure in the mains automatically or manually.

#### **9.17 HOSE PIPES, BRANCH PIPES AND NOZZLES**

a) **Hose Pipes.**

Two numbers Hose Pipes shall be rubber lined woven jacketed and 63mm in dia. 15m long. They shall conform to type A (Reinforced rubber lined) of IS: 636-1979. The hose shall be sufficiently flexible and capable of being rolled.

b) **Branch Pipes**

Branch pipe shall be of Copper, Gunmetal or Aluminium alloy as given in BOQ 63mm dia and be complete with male instantaneous spring lock type coupling for connection to the hose pipe. The branch pipe shall be externally threaded to receive the nozzle.

c) **Nozzle**

The nozzle shall be of Copper or Gunmetal, as specified in BOQ 20mm in (internal) diameter. The screw threads at the inlet connection shall match with the threading on the branch pipe. The inlet end shall have a hexagonal head to facilitate screwing of the nozzle on to the branch pipe with nozzle spanner.

d) End Couplings, Branch pipe and Nozzles shall conform to IS: 903-1985.

e) Two CP hoses of 15m length with couplings shall be provided with each External (Yard) Hydrant. Two RRL hoses of 15m length, as specified, with couplings shall be provided with each Internal Hydrant. One nozzle and one branch pipe with coupling shall be provided with each Yard Hydrant and Internal Hydrant.

## **9.18 PIPE SUPPORTS**

a) All pipes shall be adequately supported from ceiling or walls from existing / new inserts by Structural clamps fabricated from GI Structural e.g. Rods, Channels, Angles and Flats as per details given in drawings and specification. All clamps shall be painted with one coat of red lead and two coats of black / approved shade Enamel paint of pre-approved brand.

b) Where inserts are not provided, the Contractor shall provide anchor fasteners. Anchor fastener shall be fixed to walls and ceilings by drilling holes with Electrical drill in an approved manner as recommended by the manufacturer of the fasteners (HILTI / FISHER).

## **9.19 PIPE TESTING**

All pipes in the system shall be tested to a hydraulic pressure of 1.5 times of the working pressure or minimum of 18 kg/sqcm without drop in the pressure for at least 24 hours.

Rectify all leakages, make adjustment and retest as required.

## **9.20 ANCHOR BLOCK**

Contractor shall provide suitable cement concrete, anchor blocks of ample dimensions at all bends, tee connection and other places required and necessary

for overcoming pressure thrusts in pipes. Anchor blocks shall be of cement concrete 1:2:4 mix (1 cement : 2 coarse sand : 4 stone aggregate 20 mm nominal size).

## **9.21 VALVES**

### **a) Valves, Gauge and Orifice plates**

- i) Sluice Valves above 65 mm shall be of Cast Iron body and Bronze / Gunmetal seat. They shall conform to type PN 1.6 of IS: 780-1980, valves up to 65mm shall be of Gunmetal Full way Valve with wheel tested to 20 kg/sq cm class II as per IS: 778-1971. Valve wheels shall be of right hand type and have an arrow head engraved or cast thereon showing the direction for turning open and closing. All exposed or above ground valves of 65mm dia and above shall be slim-seal butterfly valves marked IS: 13095 with matching flanges.
- ii) Non-return valves shall be of Cast Iron body and Bronze / Gunmetal seat. They shall conform to class of IS: 5312 and have flanged ends. They shall be swing check type in horizontal runs and lift check type in vertical runs of piping. They shall not be spring-loaded type.

The Internal Hydrant outlet shall comprise "Single Headed Single Outlet Gunmetal Landing Valve" conforming to type 'A' of IS: 5290-1977. Separate valve on the head shall form part of the landing valve construction.

A GM cap with chain is provided on one head of the outlet. The hydrant will have an instantaneous pattern female coupling for connecting to Hose Pipe.

The Landing Valve shall be fitted to a Tee connection on the wet riser at the landing. With GI nut, bolt and double washer.

## **9.22 VIBRATION ELIMINATORS**

All suction and delivery lines shall be provided with double flanged reinforced neoprene flexible pipe connectors. Connectors should be suitable for a working pressure of each pump. Length of the connector shall be as per manufacturer's details.

## **9.23 PIPING FOR PUMPS**

- a) Pipes for suction and delivery shall be galvanized / MS tube (heavy duty) conforming to IS: 1239 up to 150 mm dia and as per IS: 3589 for dia 200mm and above or as specified in bill of quantities. The flanges shall be GI or MS.
- b) Full way and check valves 65mm dia and below shall be gunmetal tested 20 kg/sq cm pressure certified and conforming to IS: 778.



- c) Suction strainer or foot valves shall be CI, conforming to IS: 4038-1979, as specified in bill of quantities.
- d) Joints  
All pipes and fittings shall be provided with flanged joints, with either screwed or welded complete and jointed with 3.0mm thick gasket complete with all GI nuts, bolts and washers etc.
- e) Testing  
All GI pipes shall be tested to hydrostatically for a period of 24 hours to a pressure of 16 kg/sq cm without drop in pressure.

## **11 Control Panel**

### **11.1 General**

The Panel shall be fabricated with 16 SWG for Doors and Covers and 14 SWG for frame and of CRCA MS Sheet Construction with Red Oxide Primer and finally with approved colour paint to be stove enameled. The bus bar shall be of aluminum with PVC sleeving of appropriate colour code, have a minimum current carrying capacity of 400 Amps. Colour shade shall be RAL 7032 as per DIN and shall be powder coated.

The Panel should be cubical compartmentalized type with separate cable chamber and Bus bar Chamber. The Control terminals and Power terminals should be separated and necessary ferrule marking, Colour code shall be followed. A space for 300mm shall be provided at the Bottom of the panel and necessary MS channel for the foundation shall be provided.

The Busbar calculation shall be made for 1 Amp/mm<sup>2</sup> for Aluminum. The necessary interlocks shall be provided as per system description. The fuse switch/switch fuse unit shall be IS:4064-1978 and HRC fuse links shall be IS:2208-1962 or IS : 9224-1979.

The Contractor shall submit the drawings, interconnections diagram for approval of the Client /Consultant. Drawings shall indicate cable inlets, outlets, chamber dimensions and front and side elevations. Further, the Contractor shall also submit complete schematic of the electrical circuits for all pumps from the point of cable entry upto supply to the pumps. This drawing shall take into account all fuses, contractors, switches, meters etc.

The apparatus and circuits in the panels shall be so arranged as to facilitate their operation and maintenance and at the same time to ensure the necessary degree of safety.

Provision shall be made in the panel for terminating the incoming cables as required in the single line diagram. Only Top entries shall be permitted and all cables shall be provided with cable terminations.

Provision shall also be permanently earthing the frames and other metal parts of the switchgear by two independent connections.

### 11.3 Fire Fighting Accessories

#### Piping

Pipes of the following types (depending upon the description of item) shall be used:

GI pipes conforming to IS:1239, ISI marked (heavy grade, as required) for pipes of sizes 150mm NB and below).

#### Piping (for Pipes upto 250mm dia)

The pipes shall be manufactured by Electric Resistant Welded (ERW) /High Frequency Induction Welding or Hot Finished Welded process. The sulphur and phosphorus requirements in steel shall not be more than 0.05 percent each. The tubes shall be manufactured from hot rolled steel skelps / strips conforming to IS: 10748.

The following manufacturing tolerances shall be permitted on the tubes and sockets:

Thickness : Shall not be less than 10 percent

Weight : Shall not vary by more than 10 percent either way.

The pipes shall satisfy the following table with regard to diameter, thickness and weight or tube.

Screwed tubes shall be supplied with threads as per IS: 554. Each tube shall be tested for hydrostatic test for leak tightness as an in process test at the manufacturer's works. The finished pipe shall be tested for Tensile Strength, Elongation, Bend Test and Flattening Test.

#### Piping (for Pipes from 250mm dia onwards)

The pipes shall be manufactured by Electric Resistant Welded (ERW) Electric Fusion Welding or Induction Welding process. The sulphur and phosphorus requirements in steel shall not be more than 0.05 percent each. The tubes shall be manufactured from hot rolled steel scalps/strips conforming to IS : 10748 by butt welding longitudinally or spirally. The weld shall be continuous. The pipes shall conform to the Tensile Test, Hydraulic Pressure Test and Mechanical Tests as per IS:3589. The pipes shall also conform to the requirements of the Outside pipe dia as laid down in IS : 3509. The tolerances on the pipe body shall not vary more than 0.75 percent of that prescribed in the above mentioned Code. All pipes shall be of minimum 6mm wall thickness. Pipes shall be supplied with bevel edging.

MS/GI pipe up to 150mm dia shall have all fittings as per IS: 1239, part II (heavy grade) while pipes above 150mm dia shall be as per IS : 3589 inclusive of IS marking.

For MS/GI pipes up to 50mm dia screwed jointing shall be adopted, while for pipes above 50mm dia welded or flanged connections shall be used. Only electro galvanized nuts/bolts shall be used.

The different type of pipes /fittings shall conform to the following:

Type of Pipe/ (Dia)	Size	Grade	Ends/Fitting	Code
MS / GI Pipes	Upto 50mm dia	Heavy	Screwed	IS: 1239 (Part I)
MS / GI Fittings	Upto 50mm dia	Heavy	Screwed	IS: 1239 (Part II)
MS / GI Pipes	Above 50mm dia and upto 150mm dia	Heavy	Bevel, Butt Welded, Flanged, 3 layers	IS: 1239 (Part I)
MS Fittings	- do -	Heavy, machine formed from IS marked Heavy Grade Pipes	- do -	IS: 1239 (Part II)
Type of Pipe/ (Dia)	Size	Grade	Ends/Fitting	Code
MS Pipes	Above 150mm dia	6mm wall thickness	Bevel, Butt Welded, Flanged, 3 layers	IS: 3589
MS Fittings	- do -	Schedule 40	- do -	IS : 3589

Hangers and supports shall be capable of carrying the sum total of all concurrently acting loads. They shall be designed to provide the required supporting effects and allow pipelines movements as necessary. Hangers and components for all piping shall be approved by the Engineer in Charge. Anchoring fasteners shall be rated to take minimum 0.4 ton load and shall be as per approved make. Hangers shall be at 3.0 M intervals. Additional supports shall be provided at bends etc. Angles for pipe supports should not be less than 40 x 40 x 6mm size. Cutting shall be by gas cutter. All cut edges and weld surfaces shall be grounded to a smooth finish.

The piping system and components shall be capable of withstanding 150 percent of the working pressure including water hammer effects and test pressure upto 11.0kg/cm<sup>2</sup>.

Flanged joints shall be used for connections to vessels, equipment, flanged valves and also on suitable straight lengths of pipeline of strategic points to facilities erection and subsequent maintenance work.

All pipe to pipe receiving edges shall be bevel finished to a clean edge by a electric grinder. A requisite gap determined by the thickness of the weld electrode shall be given between the joints before start of welding.

Weld Electrodes shall be of approved make, of grade and type as suitable for the job. This shall be satisfied by the Consultant before start of welding.

Weld Electrodes shall be of approved make, of grade and type as suitable for the job. This shall be satisfied by the Consultant before start of work.

Joints shall be given a first weld in full width without burrs on the full dia of the pipe. Welding shall be carried out vertically from the surface to be welded. Weld fluxes shall not be so plastic such as to fall or drip down.

After application of first coat the weld shall be ground and then another layer of welding shall take place. The weld shall also be cleaned by grinding. Similarly, a third weld shall also be applied.

All pipe cutting shall be by oxy acetylene gas welding only. The cut surface shall be cleaned and ground by a electric grinder before further welding.

For supports angle pieces shall be cut by oxy acetylene gas and cleaned by electric grinder. All cutting for bolt inserts shall be by electric drill.  
Hydrant

Hydrant valve shall be as per IS : 5290 of gun metal. The valve shall be oblique type complete with hand wheel, quick coupling connection, spring and gun metal blank cap as per IS : 5290. The hydrant shall be fixed on Hydrant Riser through a 80mm dia spool piece at approx. 1.2mtr from floor level. The Hydrant shall be IS marked. Orifice plate in 6mm thick stainless steel with orifice of 32/40/50mm dia shall be provided with each Hydrant.

The Hydrant shall be constructed from gun metal as per IS, and finished to a smooth polish on screwed ends. The Hydrant shall have screwed inlet of 75mm dia, flanged type with 4 nos holes. The outlet shall be 63mm female instantaneous oblique type. The spindle shall be of gun metal with cast iron wheel. The Hydrant shall have a PVC plug with chain fixed to the main body of the Hydrant. The Hydrant shall conform to IS : 5290. The Hydrant shall be

tested to 25 kg/cm<sup>2</sup> test pressure. All threaded joints shall be sealed with Hold tile. The tug shall be wing type.

At each hydrant point (landing valve) two heights of hose pipe of 15 Meter length and 63 mm dia shall be provided. The hose pipe shall be non-percolating type conforming to IS: 636 and be coupled to a branch with a nozzle of 12.5 mm dia.

### **First Aid Hose Reel**

The Hose Reel shall be drum type with hub wheel ties. The supply pipe shall be of copper and be a part of the suspension assembly. The drum shall rotate freely on the assembly. The drum shall be fabricated from GI sheet of minimum 18 guage thickness.

The hose reel shall be directly tapped from the riser through a 25mm dia pipe, the drum and the reel being firmly held against the wall by use of dash fasteners. The Hose Reel shall be swinging type ( 180 degrees) and the entire Drum, Reel etc shall be as per and IS : 884 including marking. The rubber tubing shall be of IS : 444 marked and rayon double braided. The nozzle shall be 6mm dia gun metal rotating head shut off type. A Ball Valve shall be used to shut off the water supply to the Hose Reel.

### **External Hose Cabinets**

Each hydrant / Fire Brigade inlet shall be housed in a Hose Cabinet . The Hydrant Cabinet shall hold single headed hydrant, 2 nos. Hoses and 1 no. Branch pipes or Fire Brigade

inlets.

The sheet shall be powder coated with red paint. The words "Yard Hydrant", "Hydrant" etc. shall be painted in white (or red on the glass) in 75mm high letters. The hose box shall be lockable with socket spanner. All horizontal surfaces shall be sloped adequately with water discharge holes. Vents shall also be located on sides of the Hose Box.

A brick pedestal with brick wall complete with plaster shall also be constructed for supporting the hose box. All surfaces shall be plastered with 1:4 ratio (1 cement : 4 fine sand) mortar.

### **Air Vessel**

The Air Vessel shall be provided to compensate for slight loss of pressure in the system and to provide an air cushion for counter acting pressure surges whenever the pumping set comes into operation. It shall be normally partly full of water, the remaining being filled with air which will be under compression when the system is in normal operation. Air vessel shall be fabricated from 8mm thick MS Plate with dished ends and suitable supporting legs. It shall be provided with a 100mm dia flanged connections from pump, one 50mm drain with valve, one water level gauge and 25mm sockets for pressure switches. The air vessel shall be hydraulically tested to 20.0kg/cm<sup>2</sup> pressure for 30 minutes. All valves shall be Ball Valves in gunmetal.

The Vessel shall be at least 1.5M long (excluding dished ends) and shall be of 450mm dia. Air Vessels of Hydrant Risers shall have smaller dia.

### **Fire Brigade Inlet**

Fire Brigade Inlet Connection shall be taken directly to the Riser. It shall comprise of three instantaneous male inlet coupling with plug and steel chain. The Inlet shall have a dual plate wafer type non return valve and a Butterfly Valve on the line upto the Riser. The Fire Brigade Inlet shall be complete with necessary components like special fittings of medium quality MS bends, flanged tees etc. The plug shall be of moulded PVC.

Fire Brigade Inlet for Tank Filling by Fire Brigade shall be four way with gun metal instantaneous male inlet coupling connection for connection with Fire Brigade vehicles.

The inlets shall be provided with ABS Quality by Plastic Blank caps with chain and arrangement for attaching the blank cap & chain to the FB inlet.

### **System Drainage**

The system shall be provided with suitable drainage arrangements with GI piping of 40mm dia, complete with all accessories, and provided with 40mm dia ball valve.

### **Valve Pits**

A masonry pit of internal dimension of 1.0 x 1.0 x 1.0M depth shall be built to

accommodate each of the valves placed externally. Walls shall be with fly ash cement brick work in cement mortar 1:5 (1 cement : 5 fine sand) with SFRC medium duty 10MT grade designation manhole cover with frame (560cm internal dia conforming to IS : 12592). The Top Slab RCC shall be of 1:2:4 mix (1 cement : 2 coarse sand : 4 graded same aggregate 20mm nominal size) and inside plastering with cement mortar 1:3 (1 cement : 3 coarse sand) 12mm thick. The manhole chamber shall be internally finished with commercial grade white glazed tiles.

### **Pressure Gauge**

The Pressure Gauge shall be constructed of die cast aluminum. It shall be weather proof with an IP 55 enclosure. It shall be a stainless steel Bourden tube type Pressure Gauge with a scale range from 0 to 16 kg/cm square and shall be constructed as per IS : 3624.

### **Painting**

All Hydrant pipes shall be painted with post office red colour paint. All pipes shall first be cleaned thoroughly before application of primer coat. After application of primer coat two coats of enamel paint shall be applied. Each coat shall be given minimum 24 hours drying time. No thinners shall be used. Wherever required all pipe headers shall be worded indicating the direction of the pipe and its purpose such as "TO RISER NO. 1" etc.

### **Butterfly Valve**

The Butterfly Valve shall be suitable for waterworks and tested to minimum of 20kg/sq cm pressure. The Valves shall fulfill the requirements of AWWA (American Water works Association) C 504, API 609 and MSS –SP-67.

The body shall be of cast iron to IS : 210 in circular shape and of high strength to take the minimum water pressure of 20 kg/cm<sup>2</sup>. The disc shall be heavy duty ductile iron with anti corrosive epoxy or nickel coating.

The valve seat shall be of high grade nitrile rubber and shall be teflon coated or silicon coated. The Valve in closed position shall have complete contact between the seal and the disc throughout the perimeter. The elastomer rubber shall have a long life and shall not give away on continuous applied water pressure. The shaft shall be of EN 8 grade carbon steel.

The Valve shall be fitted between two flanges on either side of pipe flanges. The Valve edge rubber shall be projected outside such that they are wedged within the pipe flanges to prevent leakages. The flap shall be of ductile iron and nylon coated.

The Valves shall be supplied with manual gear operated opening/closing system by lever as required by the specifications.

### **Couplings**

Couplings shall be of gun metal, machined and polished to requirements. Both Male and

female couplings shall be fitted into each other smoothly and without any unnecessary force. Couplings shall IS: 903 marked with the name of the manufacturer. The coupling shall be tested to 25 kg/cm<sup>2</sup> test pressure. The Male couplings shall be provided with lugs for inserting female coupling. The lugs of the coupling shall be wing type.

### **Branch Pipe**

The Branch Pipe shall be constructed from Gunmetal alloy and finished to a smooth polish. The Branch shall have hook for control and grip type handle for holding. The Branch pipe shall be able to give straight steam. The Branch shall be as per IS: 903. The Branch Pipe shall be tested to 20 kg/cm<sup>2</sup> pressure.

## **11.4 Codes and Standards**

The following codes and standards and their subsequent modifications shall apply for the design, manufacture, shop testing, erection, fabrication at site, testing and trial operation of piping, valves and specialties requirements:

IS : 554 Dimensions for pipe threads where pressure tight joints are required on the threads.

IS : 638 Sheet rubber jointing and rubber insertion jointing.

IS : 778 Copper alloy gate, globe and check valves for water work purposes.

IS : 780 Sluice valves for water works purposes (50mm to 300mm)

IS: 901 Couplings, double male and double female, instantaneous pattern for fire fighting.

IS:1239 Mild steel tubes, tubulars and other wrought (Part 1 and II) steel fittings.

IS : 884 Swinging type wall mounted hose reel with drum.

IS : 388 hose tubing

IS: 4038 Foot valves for water-works purposes.

IS : 5290 Landing valves.

IS : 10221 Anti corrosion treatment for underground MS pipes

IS : 5312 Swing check type reflux (non-return) valves.

## **12.5 Payment to Specialist Agency**

All payment to be made to specialist agency shall be made by the contractor directly. The liability of Government for payment against this schedule shall not extend beyond payment condition specified in the Contract.

The entire fire fighting system shall be tested as per relevant I.S for which all arrangements shall be catered by Contractor. The system shall be tested and clearance from Fire advisor obtained. In case of failure of testing contractor shall be at liability to get retested after rectification required and get the clearance from Fire Advisor.

### **CRADLE (FACADE ACCESS SYSTEM) :**

- .1 The tenderer is to get the design, assessment & fabrications of the Cradle (façade access system) as given in Schedule 'A' Section XIII from one of the manufacturers mentioned in **Appendix 'E'**. The drawings of the system consisting of working platform and movable suspension file are attached with the tender for guidance.