SECTION 21 1200 – FIRE SUPPRESSION STANDPIPES

PART 1 - GENERAL`

1.1 INTRODUCTION

A. The scope of work for the Fire Protection System outlined in this section of the specification includes the systems design verification, supply, installation, testing, commissioning and handing over of Hydrant and Sprinkler section Fire Protection System.

B. The Fire Protection System must comply with the standard acceptable authority requirements TAC, NBC. The local Fire authorities and GPCB authorities, CFO guidelines and subject to approval by the Employer's Representative.

C. The entire work shall be carried out in a manner consistent with good engineering practice. Take into account all site conditions including space allocation for Fire Protection System while designing the system and selecting the equipment.

D. Be responsible for engaging a qualified, competent and experienced Fire Protection System specialist to perform the system design verification, preparation and submission of system proposal, obtaining approvals from relevant authorities and site supervision for installation, testing and commissioning.

E. Perform the system design verification based on the criteria / data and technical requirements specified in this section / drawings and the local Authorities regulations / requirements.

F. Provide system which comprises products of manufacturers who have designed, developed and used these products successfully for a period of at least for last five years.

G. Test reports / certificates/ Handover documents shall be in accordance with the requirements laid down by the Users / local Authorities.

1.2 SCOPE OF FIRE PROTECTION SYSTEM

A. Scope of works listed below shall not be considered as comprehensive description but only as an indication of the extent of works.

B. Provision of Design Verification, detailed calculation, selection of equipment, working drawings , builder work drawings, supply, installation, testing, commissioning and handing over for the complete Fire Protection System to the requirement as stipulated in this specification and local government authority shall be included.

C. Tank and equipment layout shall comply with the space allocated for the same and as allocated in the Tender drawings.

D. Static testing of plant shall be provided.

E. Testing and commissioning of installation under normal operational conditions shall be conducted.

F. Priming and finishing coats painting to all metal pipe work and equipment as per the standards.

G. As-built drawings and operation / maintenance manual as detailed elsewhere in the specification shall be provided.

H. Seal the gaps between pipe sleeves and pipe work / conduit, etc. if any as per fire zoning.

I. Two year warranty and maintenance service from the date of handover of the works shall be included in the offer.

J. DESIGN CONFIRMATION

1. Confirm the space provided for various equipment in the tender drawings is adequate to install and maintain all equipment.
2. If the spaces provided in the tender drawings are inadequate to install the equipment, it shall be clearly indicated in the tender itself.

K. DESIGN CONFIRMATION

1. Confirm in writing that the design on which this tender is prepared has been verified and it meets with the requirements of all Government. Semi-Government, Municipal and other Authorities, whose permission would become necessary for the completion of the Project.
2. Confirm the design is verified and is shall maintain the specified design condition as per specifications and drawings.

1.3 SYSTEM DESCRIPTION

A. Fire Protection Water Supplies and storage

1. Fire Suppression System will be designed based on most Stringent requirements of TAC & local CFO requirements, NBC-2016 and NFPA, as applicable and shall not contain HCFCs and Halons.
2. The base scheme for the Fire Protection systems will employ the use of the city water service with an additional tap to supply water from a tanker truck if required.
3. All the tanks will be split into at least two sections to provide the ability to maintain the tanks without shutting the system down.

B. Hazard Classification

1. For detail Refer Table indicated on legend drawing.
2. Classification as per NBC Table 07

C. Type of Systems / Equipment Proposed:

1. Centralized firewater tank and fire pump equipment room.
2. Wet riser cum down comer system
3. Yard hydrants with external ring main.
4. Diesel engine driven standby pump.
5. All pumps shall be connected to fire alarm system control panel for control and monitoring the status of Fire pumps.

D. Fire Protection Systems

1. An electrically fed jockey pump (with standby) will maintain system pressure and a diesel fire pump will provide a complete back up to the entire standpipe systems
2. Additional pumps will be required at roof to provide the required system pressures throughout the building.
3. Pressure reducing valves/Orifice plates will be located throughout where the system pressure exceeds normal operating pressures.
4. Hose reels fed from the standpipe systems will be provided at each stair landing as per the building code.

1.4 APPLICABLE CODES AND STANDARDS

A. Tender specifications, drawings, schedules, general and special conditions of the Contract apply to this Section.

Serial No.	Code No.	Code
1	NBC Part – IV	National Building Code of India; Part IV Fire & Life Safety
2	TAC	Tariff Advisory Committee fire protection manual Part-I.
3	IS-1239 / IS 3589	Specification for MS / GI Pipes
4	IS 778	Specifications for Gun Metal gate, globe & check Valves for water supply
5	IS 4927	Specifications for Canvas Hose Pipes.
6	IS 903	Specifications for Branch pipes Fire hose couplings and auxiliary equipment's
7	IS-5290	Specifications for hydrant landing valves.
8	IS-4853	Recommended practice for radiographic inspection of fusion welded butt joints in steel pipes
9	IS-636	Specifications for no-percolating flexible firefighting hose pipes.
10	IS 9137	Specification for horizontal end suction centrifugal pump.
11	BS 1965 Part I	Specification for butt-welded Pipe Fittings.
12	IS 8423	Controlled percolating hose for firefighting.
13	IS 2871	Branch pipe, universal for firefighting purposes
14	IS 884	First aid hose reel for fire fighting
15	IS 5131	Dividing Breeching with Control for Fire Brigade Use
16	IS 2002	Steel plates for pressure vessels for intermediate and high temperature service including boilers

17	IS: 6392	Steel pipe flanges
18	IS 908	Specification for fire hydrant, stand post type
19	IS:8432	Tubes, Tracheotomy (rubber or plastics)
20	IS 903	Specification for fire hose delivery couplings, branch pipe, nozzles and nozzle spanner.
21	IS 11149	Rubber Gaskets
22	IS 6912	Copper and copper alloy forging stock and forgings
23	IS 210	Grey Iron Castings
24	IS 1367	Technical Supply Conditions for Threaded Steel Fasteners
25	IS 5312	Swing Check Type Reflux (Non-Return] Valves for Water Works
26	IS 10221	Coating and wrapping of underground mild steel pipelines - Code of practice

1.5 SUBMITTALS

A. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

C. Project Record Documents: Record actual locations of components and tag numbering.

D. Operation and Maintenance Data: Include installation instructions and spare parts lists.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. Extra Valve Stem Packings: Two for each type and size of valve.

F. Submit catalogue information, design calculations and samples complete with full technical data and shop drawings for the entire system, test certificates, etc. and any other information required by the Employer’s Representative for acceptance prior to commencement of installation.

G. Detailed shop drawings for sprinkler system shall be prepared and submitted to the Employer’s Representative for approval before starting the work.

H. Samples: Provide samples of various types of pipes valves, pipes, insulation, control wires etc

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.

2. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. WORKMANSHIP

1. The workmanship shall be best of its kind and shall conform to the specifications, as below or Indian Standard Specifications in every respect or latest trade practices and shall be subject to approval of the Owner's Site Representative.

2. All materials and/or Workmanship which in the opinion of the Owner's Site Representative / Architect / Employer's Representative is defective or unsuitable shall be removed immediately from the site and shall be substituted with proper materials and/or workmanship forthwith no extra cost to owner.

D. MATERIALS

1. All materials shall be best of their kind and shall conform to the latest Indian Standards.

2. All materials shall be of approved quality as per samples and origins approved by the Owner's Site Representative / Architect / Employer's Representatives.

3. As and when required by the Owner's Site Representative / Employer's Representative, arrange to test the materials and/or portions of works at his own cost to prove their soundness and efficiency.

4. If after tests any materials, work or portions or work are found defective or unsound by the Owner's Site Representative / Employer's Representative, remove the defective material from the site, pull down and re-execute the works at his own cost to the satisfaction of the Owner's Site Representative / Employer's Representative.

5. To prove that the materials used are as specified, provide the Owner's Site Representative with original vouchers on demand.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.

2. Protect valves against damage to threaded ends and flange faces.

3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.

2. Protect from weather. Store indoors and maintain temperature higher than ambient dew point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use hand wheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, specialties and equipment from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.8 COORDINATION WITH AUTHORITIES

Coordinate with CFO/ Local Fire authorities for necessary approvals, preliminary NOC and final NOC.

PART 2 - PRODUCTS

2.1 PIPING WORK

GENERAL REQUIREMENTS

A. All materials shall be of the best quality conforming to the specifications and subject to the approval of the Consultants.

B. Pipes shall be securely fixed to walls and ceilings by suitable for vertical piping supports should be galvanized clamps and supports (galvanised after fabrication) and for horizontal pipes gripple hanger supports shall be provided at intervals specified. Only approved type of anchor fasteners shall be used for RCC slabs and walls / floors etc.

C. The system shall be provided with suitable drainage arrangement with drain valves complete with all accessories.

D. Pipe accessories such as gauges, meters, control devices, etc. shall have the same working pressure rating as the associated pipe work. All pipe work shall be free from burrs, rust and scale and shall be cleaned before installation. All personnel engaged on welding operations must possess a certificate of competence issued by an acceptable / recognized authority.

E. PAINTING

All Hydrant and Sprinkler pipes shall be painted with post office red colour paint. All M S 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. Painting shall be expertly applied; the paint shall not over run on surfaces not requiring painting such as walls, surfaces etc. Nuts, bolts and valves shall be also painted.

F. EXCAVATION

Excavation for pipe lines shall be in open trenches to levels and grades shown on the drawings or as required at site. Pipe lines shall be buried with a minimum cover of 1 meter or as shown on drawings.

Wherever required Contractor shall support all trenches or adjoining structures with adequate timber supports, shoring and strutting.

On completion of testing in the presence of the Project Manager and pipe protection, trenches shall be backfilled in 150 mm layers and consolidated.

Contractor shall dispose off all surplus earth as directed by the Project Manager.

G. ANCHOR / THRUST BLOCK

Contractor shall provide suitably designed anchor blocks in cement concrete/steel support to cater to the excess thrust due to work hammer and high pressure.

Thrust blocks shall be provided at all bends, tees and such other location as determined by the Project Manager.

Exact location, design, size and mix of the concrete blocks/steel support shall be as shown on the drawings or as directed by the Project Manager prior to execution of work.

H. PRESSURE GAUGE

Pressure gauge shall be provided near all individual connections of the hydrant system with isolation valves and near each flow switch assembly of the sprinkler system. Pressure gauge shall be 100 mm dia gunmetal bourdon type with gunmetal isolation ball valve, tapping and connecting pipe and nipple. The gauge shall be installed at appropriate height for easy readability.

I. JOINTING

1. Welded Joints

Joints between MS pipes and fittings shall be Butt joint made with the pipes and fittings having “V” groove and welded with electrical resistance welding in an approved manner. But welding without “V” groove shall not be permitted. (SOCKET WELD FOR X DIA)

2. Flanged joints (For equipments and valves)

Flanged joints with flanges conforming to IS: 6392 shall be provided on

a. Straight runs at intervals not exceeding 25-30m on pipe lines mm of 50 dia and above and as directed by the Project Manager.

b. For jointing all types of valves, appurtenances, pumps, connections with other type of pipes, to water tanks and other places necessary and as required for good engineering practice and as shown/noted on the drawings.

c. Flanges shall be with GI bolts and nuts and 3mm insertion gasket of natural rubber conforming to IS: 11149.

3. Unions (upto 50 mm dia)

Approved type of dismountable unions shall be provided on pipe lines of 40 mm dia and smaller dia, in locations similar to those specified for flanges wherever applicable.

2.2 FIRE HYDRANT SYSTEM

A. PIPES AND FITTINGS

1. Underground/Outside pipes shall be Galvanized Steel conforming to IS: 1239 (heavy class) duly wrapped and coated as per IS: 10221 with welded joints. The coating / wrapping protection shall be tested.
2. Pipes for risers ,Basements, headers and floor branches inside the building shall be Galvanized Steel conforming to IS:1239 (heavy class) up to 150 mm dia. Pipes 200mm dia. and above shall conform to IS 3589 with 6 mm thick walls.
3. Electro resistant welded pipe to be use pressure exceeding 16kg/cm2.
4. Joints in risers- All risers shall. be installed with grooved couplings with necessary fittings .Horizontal & branch floor piping shall be screwed up to 50mm dia. and grooved joints for Higher pipe sizes shall be used.
5. All pipes above ground and in exposed locations shall be painted with two coat of Etching type primer and two or more coats (each of 75 microns) of synthetic enamel paint of approved shade.
6. Pipes shall be initially brushed to remove all foreign matter before applying paint / primer.
7. Pipes (buried) shall be initially brushed to remove all foreign matter and apply 2 coats of primer over the pipe. Primer shall be allowed to dry until the solvent evaporates, and surface becomes tacky. Tape 4mm thick and 150/250mm wide shall then be wound in a spiral fashion and bonded completely to pipe by thermo fusion process. Overlap shall be maintained at 15mm.

Following pressure rating criteria to be followed while selecting the pipes

TABLE: PRESSURE RATING TABLE FOR PIPE, VALVES AND ACCESSORIES

Sr. No.	Description	Pressure Rating
1	Pipes in pump room	PN 16
2	Riser	PN 16
3	All horizontal pipe work after orifice (on each floor level)	PN 10

B. VALVES

1. Valves shall be provided at locations as indicated in drawings and as required.
2. All valves are to be located for easy access. All valves shall be rated properly to suit the pressure rating for the piping system, where the valves are being installed and shall be supported wherever necessary with Hot dipped galvanized MS brackets.
3. Valves shall comply with IS: 14846 (Class I) for C.I sluice valves and IS: 778 for G.M valves and tested.
4. Valves & flanges shall be of same material that of the pipe.
5. All Valves shall be factory tested at 1.5 times the design working pressure for the piping system, where the valves are being installed.

C. Gate Valve/Globe Valve.

1. Gates valves used in high pressure (head) piping shall be made of Stainless Steel 316 / Brass/ GM/ C.I and of suitable class as indicated in specifications, drawings & schematics or higher if required.

2. Supplying, fixing and testing shall correspond to IS: 778-1984, Specifications for Copper Alloy Gate, Globe and Check Valves for Water Works.
3. Valves shall be tagged with permanent label under hand wheel indicating type or duty.
4. All valves shall have manufacturer's test certificate indicating the date of shop test and other quality control tests with the material used for the same.
5. Gate valves shall be of the size as specified in the BOQ.

D. Foot Valves:

1. Foot valves shall be cast iron body, brass disc and strainer of approved quality as specified in BOQ.
2. Foot valves shall be of spring loaded or flapper type depending on the requirement.
3. Valves shall be tested physically for free operation before being mounted or assembled to the pipeline.

E. Butterfly Valves:

1. The butterfly valve shall be suitable for waterworks and rated for Pressure requirement as mentioned in the Schedule of quantities.
2. The body shall be of cast iron to IS: 210 in circular shape and of high strength to take the water pressure. The disc shall be heavy duty cast iron with anti corrosive epoxy or nickel coating.
3. Butterfly valves shall be slim seal, short wafer type with standard finish. Valves shall be suitable for mounting between flanges drilled to ANSI 125.
4. Valve shall consist of disc pivot and driving stem shall be in one piece centrally located. Disc shall move in bearings on both ends with 'O' ring to prevent leakage.
5. The valve seat shall be replaceable of high grade elastomer EPDM or nitrile rubber with hard backing. The elastomer rubber shall have a long life and shall not give away on continuous applied water pressure. Spindle shall be AISI 41 steel.
6. The valve is closed position shall have complete contact between the seat and the disc throughout the perimeter
7. Valve for normal application shall be suitable for a working pressure to suit the application and service and shall be complete with flow control lever and notches, factory machined companion flanges and bolts and nuts.
8. Valves shall conform to BS 5155 with electro steel nickel coated SG Iron (N) and seat material EPDM3.
9. 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.

F. Check Valves (Non-Return Valves):

1. Swing Check Valves /Sluice Valves 80mm dia and above shall be Cast Carbon Steel Double flanged type with SS internal parts non-rising spindle.
2. Sluice valves below ground shall be provided with caps suitable for operation by a wheel.
3. Non Return Valves in exposed locations e.g. pump house etc. shall be provided with Cast Iron Wheels.

4. Valves on G.I. Pipes 65 mm and below shall be heavy pattern gun-metal valves.
5. Valves shall confirm to and marked IS: 5312.
6. Valves shall be measured by numbers and shall include matching flanges, rubber gaskets, bolts, nuts, washers and all items necessary and required and as given in the specifications to complete the work to the satisfaction of Owner/ Architect/ Employer's Representative.

G. Ball Valves

1. The ball valve shall be made forged brass and suitable for test pressure of pipe line. The valve shall be internally threaded to receive pipe connections.
2. The ball shall be made from forged brass and machined to perfect round shape and subsequently chrome plated.
3. The seat of the valve body-bonnet gasket and gland packing shall be of Teflon.
4. The handle shall be provided with PVC jacket. The handle shall also indicate the direction of 'open' and 'closed' situations.
5. The gap between the ball and the teflon packing shall be sealed to prevent water seeping.
6. The handle shall also be provided with a lug to keep the movement of the ball valve within 90°. The lever shall be operated smoothly and without application of any unnecessary force.
7. Normal size of a ball valve shall be that, corresponding to the size of the pipe to which it is fixed

H. Ball Valves with float valve (For Storage Tanks)

1. Ball valves with floats to be fixed in storage tanks shall consist of cast brass lever arm having copper balls (26 SWG) screwed to the arm integrally.
2. The copper ball shall have bronze welded seams. The closing/opening mechanism incorporating the piston and cylinder shall be non-corrosive metal and include washers.
3. The size and construction of ball valves and float shall be suitable for desired working pressure operating the supply system.
4. Brass valves shall be supplied with brass hexagonal back nuts to secure them to the tanks and a socket to connect to supply pipe.
5. Ball valves shall generally conform to IS specification No.1703-1977. Weight of ball cock and the size of the ball cock shall be as per IS specification.

I. GUN METAL VALVES

1. Gun metal Valves shall be used for smaller dia pipes, and for threaded connections. The Valves shall bear certification as per IS:778
2. The body and bonnet shall be of gun metal to IS:318. The stem gland and gland nut shall be of forged brass to IS:6912. The hand wheel shall be of cast iron to IS:210.
3. The Hand wheel shall be of high quality finish to avoid hand abrasions. Movement shall also be easy. The spindle shall be non rising type.

J. Y-Strainers

1. Strainers shall be preferably of the approved 'Y' type with C.I. construction.

2. Strainers shall have a removable stainless steel (24 gauge) screen with 3mm perforations and a permanent magnet.

3. Strainers shall be provided with flanges. They shall be designed so as to enable blowing out accumulated dirt and facilitate removal and replacement of all screens without disconnection of the main pipe.

K. Pressure Relief Valves

Each System shall be provided with a Pressure Relief Valves. The Valve shall be spring actuated and set to operate as per field requirement. The Valve shall be constructed of bronze and provided with an open discharge orifice for releasing the water. The Valve shall be open lift type.

L. Pressure Switch

The pressure switches shall be employed for starting and shutting down operation of pumps automatically, dictated by line pressure. The Pressure Switch shall be diaphragm type. The housing shall be die cast aluminum, with SS 316 movement, pressure element and socket. The set pressure shall be adjustable.

The Switch shall be suitable for consistent and repeated operations without change in values. It shall be provided with IP: 55 water and environment protection.

2.3 External Hydrants

A. Contractor shall provide external hydrants conforming to IS:5290. The hydrants shall be controlled by a gunmetal valve. Hydrants shall have instantaneous type 63mm instantaneous female type coupling, gun metal cap and chain.. The hydrants shall be single outlet conforming to IS: 908 to required height to bring the hydrant to correct level above ground.

B. Alongside each hydrant, there shall be a hose box to accommodate two numbers of C.P. collapsible hoses each of 63mm dia. and 2 Nos of 15 M long conforming to IS:8423 complete with instantaneous ISI marked Gun-Metal Male & Female couplings(IS:903) and 1 No. 63mm dia. ISI marked Gun-Metal Short Branch Pipe with nozzle (IS:903).

C. Install orifice plate flanges on all hydrants having excessive pressure (more than 5.5 bar), Orifice plates shall be fabricated from 6 mm thick brass plates with plain central hole without burrs.

D. The hose cabinet shall be of size to accommodate the following:

1. Single/Double headed yard hydrant valve
2. Hose pipe (2 length of 15 m)
3. Branch pipes, nozzles (2 sets)
4. Fire man's axe
5. Orifice plate
6. Drain in the bottom plate.

E. Each hose cabinet shall be conspicuously painted with the letters “FIRE HOSE”.

2.4 INTERNAL HYDRANTS

A. Contractor shall provide on each landing and other locations as shown on the drawings double headed gunmetal landing valve with 100 mm dia inlet as per IS:5290, with shut off valves having

cast iron wheels as shown on the drawings. Landing valve shall have flanged inlet and instantaneous female type outlets as shown on the drawings.

B. Contractor shall provide for each internal fire hydrant station two numbers of 63 mm dia. 15 m long rubberized fabric lined hose pipes with gunmetal male and female instantaneous type coupling machine wound with copper wire (hose to IS:636 type 2 and couplings to IS:903 with IS certification), fire hose reel, gunmetal branch pipe with nozzle to IS:903.

C. Suitable fire door shall be provided for fire shaft on each floor. Fire door SIZE and specification from vendor.

D. Install orifice plate flanges on all hydrants having excessive pressure (more than 5.5 bars).

E. Orifice plates shall be fabricated from 6 mm thick brass plates with plain central hole without burrs.

F. The bore of the orifice shall be designed and calculations to be submitted to the Employer's Representative for approval.

G. Branch pipes shall be gunmetal type of 63 mm dia with nozzle of 20 mm dia, as per IS 903

H. Hose cabinet shall be of glass fronted with hinged door & lock. The cabinet shall be made of 16 gauge thick MS sheet and spray painted to shade No. 536 of IS:5.

I. Hose cabinets shall be SS 304 with hinged door and lock for FOH areas

J. The hose cabinet shall be of size to accommodate the following:

1. Landing Valves (Single/double headed)
2. Hose pipe
3. Hose reel (36 mtr.)
4. Branch pipes, nozzles (2 sets)
5. Orifice Plate.
6. Fire man's axe and hand appliances
7. Fire extinguishers

2.5 First Aid Hose Reels

A. Contractor shall provide standard First-aid Hose Reel with 20 mm dia. high pressure braided rubber hose 36 M long with gun-metal, chromium plated adjustable jet spray nozzle and manual operating valve, all mounted on circular hose reel of heavy duty mild steel construction with Cast Iron Bracket, finished with reda nad black enamel, having a swivel hinge which can swing upto 170 degrees.

B. Hose reel drum shall strictly conform to IS: IS:884-1969. A lock shield type isolating valve shall be installed on the fire hose reel supply piping adjacent to each hose reel.

2.6 Branch Pipe, Nozzle

A. Branch pipes shall be of gun metal with loaded tin bronze ring at the discharge and to receive the nozzle and provided at the other with a leaded tin bronze ring to fit into the instantaneous coupling.

B. Nozzle shall be of spray type of diameter of not less than 16 mm and not more than 25 mm.

C. Nozzle shall be of loaded tin bronze branch pipe and nozzle shall be of instantaneous pattern conforming to Indian Standard - 903.

2.7 Fire Hose Cabinets (FHC) Concealed type

A. Cabinets shall be concealed type made of masonry construction, sized to accommodate valve(s), hose reel assembly, hoses, multipurpose dry chemical extinguisher and fire accessories.

B. External cabinets shall be primer-coated, cold-rolled sheet steel, or anodized extruded Aluminum construction.

C. All fire cabinets shall be painted stove enameled fire red paint (shade No. 536 of IS:5). The inside of the cabinet shall be white baked enamel.

D. Fire shaft shall have shutter fabricated by M.S/S.S (as per SOQ) powder coated sheet or fully welded construction of 16 gauge with glass-fronted door (glass shall be 2mm thick) with locking arrangement.

E. Cabinet shall have “FIRE HOSE” written on it prominently (size as given in the schedule of quantities).

F. Door shall be in two leaves with necessary stiffeners. Shutter shall be powder coated finish of `Red’ out side and `White’ inside and on the glass label of “FIRE” shall be stuck. The letter size shall be min. 75 mm height. There shall be built in breakable glass type feature to keep key.

G. Cabinet surfaces in contact with the walls shall not be powder coated but instead given two coats of anti-corrosive bitumastic paint.

H. External Hose Cabinet: The hose cabinet shall be of size to accommodate the following:

1. Single headed yard hydrant valve
2. Hose pipe (2 lengths of 15 m)
3. Branch pipes, nozzles
4. Fire man's axe

I. Internal Hose Cabinet

Internal fire hose cabinets shall not be provided; however following accessories shall be mounted in the shaft with suitable anchors and bolts.

1. Landing Valves (double headed)
2. Hose pipe (2 length of 15M)
3. Hose reel (36.0 mtr.)
4. Branch pipes, nozzles
5. Fire man's axe and hand appliances

2.8 Fire Hose Pipe

A. Rubber reinforced lined fire hose pipe (as per IS:636 or IS:8432) of 63mm dia and length as described in BOQ.

B. The Fire Hose Pipe shall be rated for burst pressure of 35.7 kg/sq cm without undue leakage or sweating. Hose shall be complete with ISI marked brass male and female coupling (IS:903) bound and riveted to hose pipe with copper rivets and 1.5mm copper wire.

2.9 FIRE BRIGADE CONNECTIONS

A. Fire brigade connection shall be as per IS: 5131.

B. Provide four numbers of 63mm NB gunmetal Fire Brigade type instantaneous inlets with built in check valves and 150 mm dia. flanged outlet connection with butterfly and check valves.

C. The collecting heads shall be connected to fire water wet risers for the use of local Fire Brigade. Fire brigade connection shall be enclosed in a suitably sized glass fronted box mounted at a suitable position.

D. It shall be connected to the storage tank with a 150 mm fire brigade pumping connection.

E. This connection shall not be taken directly into the side of the storage tank, but arranged to discharge not less than 150 mm above the top edge of the tank such that the water flow can be seen.

F. The connection shall be fitted with stop valve in a position approved by the Employer's Representative.

G. An overflow connection discharging to a drain point shall be provided from the storage tank.

H. The fire brigade connection shall be located as to make the inlets accessible from the outside of the building.

I. The size of the wall box kept beside the inlet shall be adequate to allow hose to be connected to the inlets, even if the door cannot be opened and the glass has to be broken.

J. Each box shall have fall of 25mm towards the front at its base and shall be glassed with wired glass with "FIRE BRIGADE INLET" painted on the inner face of the glass in 50 mm size block letter.

K. Each such box shall be provided with a steel hammer with chain for breaking the glass.

L. In addition to the emergency fire brigade connection to the storage tank, a 150mm common connection shall be taken from the four 63mm instantaneous inlets direct to hydrant main so that the fire brigade may pump to the hydrants in the even of the hydrant pumps being out of commission.

M. The connection shall be fitted with a sluice valve and reflux valve. Location of these valves shall be as per the approval of the Employer's Representative.

N. Two way collecting head with two numbers 63 mm instantaneous type inlets shall be connected to the sprinkler header.

2.10 Drain Valves

A. Provide G.I. Pipe as per IS:1239 heavy class with necessary gate / ball valve for draining water in the system as indicated in the drawing.

2.11 Air Release Valves

A. Air release valve shall be 25 mm screwed inlet GM single acting type and shall be fixed on all high points in the system (wet riser) with ball valves or as shown on drawings Conforming to IS 4736:1968

2.12 Air Vessel

A. 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 sets come into operation.

B. Air vessel shall conform to IS: 2002.

C. It shall be normally half full of water, when the system is in normal operation.

D. Air vessel shall be fabricated with 8 mm thick M.S. plate with dished ends and suitable supporting legs.

E. It shall be provided with one 100 mm dia flanged connection from pump, one 25 mm drain with valve, one water level gauge and 25 mm sockets for pressure switches.

F. The air vessel shall be tested to pressure for 12 hours at 2 times the operating pressure or 1.5 times the shut-off.

2.13 Auto air vent

A. Every wet riser shall be provided with an air cushion tank at its top most point. The air cushion shall be provided with an automatic air release cock, 20 mm dia drain pipe, drain valve and shut off valve.

B. Valve Chambers

Provide suitable brick masonry chamber of size as indicated in bill of quantities in cement mortar 1:5 on cement concrete foundation 150mm thick of PCC 1:5:10 mix, 15mm thick cement plaster inside and outside finished with a floating coat of neat cement with Cast Iron heavy duty frame and cover including excavation, back filling complete.

C. Pressure reducing Valve (UL listed)

Providing, Fixing, Testing and Commissioning of Ductile Iron body UL Listed FM Approved Pressure Reducing Valve assembly Diaphragm Nylon Fabric Reinforced, Natural Rubber, Diaphragm cover fasteners as Galvanised carbon steel, Pilot valve of Brass and Stainless Steel with Nylon fabricated reinforced natural rubber, strainer of Brass and S.S, with all necessary accessories such as pressure gauge, consumables complete in all respects.

The valve shall comply with ANSI Class 150 (ANSI 300) pressure rating/ flange standard, globe (angle), style valve.

The valve shall maintain accurate control of the downstream pressure regardless of fluctuation in flow or upstream pressure.

Prior to shipment, testing shall include UL (pending approval) approved hydrostatic pressure tests and a Singer full function and operation test.

D. Orifice Plates

1. For restricting pressure in the system, orifice plates of appropriate sizes shall be fitted at all floor levels, at the branching points from Riser Main.
2. The Diameter of such orifice shall not be less than 50% of the dia of pipe into which it is to be fitted, which shall not be less than 50mm dia.
3. These orifice plates must be of stainless steel with plain central hole without burrs, and the thickness shall be 3mm for pipe size up to 80 mm, 6 mm for pipes from 80 to 125 mm dia and 9 mm for pipes greater than 125 mm dia.
4. Such orifice plate must have a projecting identification tag.
5. The orifice plate shall fitted not less than two pipe internal diameters downstream of the outlet from any elbow or brand.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION AND TESTING OF FIRE PROTECTION SYSTEM

A. INSTALLATION GENERAL (HYDRANT)

1. Scope of work under this section comprises of furnishing all equipment, appliances, materials, labour necessary and required to install/ modify Wet Riser Fire Hydrant System / Components as required by the drawings, specified herein or given in the bill of quantities.
2. Without restricting to the generality of the foregoing the Fire Hydrant System shall include the following: -

   a. Galvanized iron, Class C (heavy) (wrapped and coated for underground piping) mains including valves, fittings, grooved, yard hydrants and appurtenances, as specified.

   b. Galvanized iron, Class C (heavy) pipe mains/risers internal exposed including valves, fittings, flanges and appurtenances, as specified.

   c. Landing valves, hose reels, hose cabinets, hose pipes, orifice plate, branch pipes.

   d. Fire brigade connection and connections to pumps and appliances.

   e. Fire Pumps, Jockey Pump, Electric Motors, Diesel Engine Pumps, Booster Pumps Control Panels, Valves, Air Vessels, Cabling and accessories, as specified.

3. All materials shall be conforming to specifications and subject to the approval of the Owner/ Architect/Employer's Representative.
4. Pipe and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workman like manner.

   a. Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

   b. Pipe work shall cause minimum disturbance to the existing services, buildings, roads and structure

   c. The entire piping work shall be organized in consultation with other agencies work, so that area can be carried out in one stretch.

d. Pipes shall be securely fixed to Brick/RCC walls and ceilings by suitable clamps / hangers / brackets at intervals specified. Only approved type of anchor fasteners shall be used.

e. Valves and other appurtenances shall be so located that they are easily accessible for operations, repairs and maintenance.

f. Construction of fire water tanks are not part of this package.

g. No jute will be allowed in threaded joints.

h. If header piping is less than 50mm then shoe joints is to be provided.

i. Cut-outs in the floor slab for installing the various pipes area are indicated in the drawings. Contractor shall carefully examine the cut-outs provided and clearly point out wherever the cut-outs shown in the drawings do not meet with the requirements.

j. Pipe sleeves, larger diameter than pipes, shall be provided wherever pipes pass through walls and slab and annular space filled with fibreglass and finished with retainer rings.

k. All pipes shall be accurately cut to the required sizes in accordance with relevant BIS codes and burrs removed before laying. Open ends of the piping shall be closed as the pipe is installed to avoid entrance of foreign matter.

l. Where reducers are to be made in horizontal runs, eccentric reduces shall be used for the piping to drain freely. In other locations, concentric reduces may be used.

3.2 JOINTING

A. Welded Joints: Joints of G.I. pipe of size 50 mm and above shall be butt welded or flanged. Joints of G.I. pipes less than 50 mm dia. shall be with conventional heavy class screwed pipe and fittings. Joints between G.I. pipes and fittings shall be made with the pipes and fittings having “V” groove and welded with electrical resistance welding in an approved manner. But welding without “V” groove shall not be permitted. All joints in the pipeline with screwed fittings shall be seal welded after testing and the weld plus the adjoining portion shall be given two coats of zinc rich primer.

B. Flanged joints (50mm dia and above). All flanges shall conform to IS: 6392-2003 Table 17 as applicable. Flanged joint shall be made with 3 mm thick insertion rubber washer/ gaskets, bolts and nuts conforming to IS: 1367 (Galvanized). Straight runs at intervals not exceeding 25-30m on pipe lines of 50 mm dia and above and as directed by the Employer’s Representative. For jointing all types of valves, appurtenances, pumps, connections with other type of pipes, to water tanks and other places necessary and as required for good engineering practice and as shown/noted on the drawings. Flanges shall be with GI bolts and nuts and 3mm insertion gasket of natural rubber conforming to IS: 11149.

1. Unions (up to 50 mm dia): Approved type of dismountable unions shall be provided on pipe lines of 40 mm dia and smaller dia, in locations similar to those specified for flanges.
2. Grooved flexible couplings and fittings of approved manufacturer shall be provided for all risers piping.

3.3 GENERAL WELDING REQUIREMENTS.

A. All welding shall be generally in accordance with B.S. 4515: 1965 (Specification for field welding of Carbon steel pipelines.) This will be modified where appropriate for other materials and may be relaxed or varied by order of the Employer’s Representative, provided there is a reasonable request for an alternate.

B. Tack welds shall be performed by fully qualified welders and all tack welds shall be of a length equal to twice the pipe thickness and shall fully penetrate the pipe walls.

C. Where welding is carried out in the proximity of inflammable materials special precautions shall be taken to prevent risk of fire or other damage to the building fabric.

D. Where oxyacetylene cutting equipment or any welding plant is being used by an operative for any of the works defined in the contract documents, then fire extinguishers shall be

E. supplied and carried as part of the equipment. The operators of cutting and welding equipment shall be trained in the use of the fire extinguishers which they carry and all extinguishers shall be fully charged and ready for use. In all cases, extinguishers shall be positioned immediately adjacent to the position where cutting and welding is being carried out and shall be readily accessible for use in the event of an emergency.

F. All accommodation, benches, tools, welding plant, acetylene, oxygen or electricity, filler rods and electrodes, which are necessary for installations where welding is required shall be provided as part of this contract.

G. Welding shall not be done at a temperature of 5 degrees Centigrade or below unless the parent metal is preheated by torches or other approved means until it is warm to the hand (about 27 degrees C) for about 150mm either side of the joint. No welding shall be done below minus 18 degrees C. After preheating, the heated portion including the welded joints shall be covered with muffs or suitable insulation materials to allow cooling free from draughts. Any open ends of the pipe or assembly shall be effectively sealed to prevent heat flow by convection

H. All welded pipe assemblies shall be constructed so that individual welded joints do not affect each other. The distance between the centres of adjacent welds shall be not less than twice the bore diameter of the pipe.

I. No welded joints shall be left partially completed. Any joints tacked in position must be promptly finished within the working day. The Employer’s Representative will reject all work not done in accordance with this instruction.

J. Where work is rejected, pipes must be machine cut at least 150 mm either side of rejected welds and proper weld preparation must be used on the shortened sector. Where shorter fill-in sections are required because of such rejection and reworking, then new full sized lengths must be supplied.

K. Where pipes with longitudinal seams are specified, pipe seams shall be arranged such that adjacent seams are opposed 45 deg. from each side of top dead centre and branches shall be made only with weldable fittings.

L. All filler metals which are coated shall be protected from excessive moisture changes. Filler materials or flexes which show any sign of deterioration shall not be used. If requested by the Employer’s Representative samples of filler rods to be used shall be submitted to him for approval before any work is done on site. These may be submitted, without additional cost, to an independent testing laboratory for verification.

3.4 TESTS FOR WELDER QUALIFICATION

A. The purpose of the welder's qualification tests is to determine the ability of the welders to make sound and acceptable welds. Before any site welding on the contract is allowed, each proposed welder shall carry out the tests required in the presence of the certifying agency.

B. Any weld test specimens which have been suitably marked and approved shall be kept on site by a responsible person, so that they can be produced at any time, at the request of the Employer's Representative.

C. All accommodation, benches, tools, welding plant, acetylene, oxygen, electricity, test pieces, filler rods, electrodes, facilities for cutting and grinding, polishing, bending and examining, which are necessary for welders qualification tests shall be provided. In the absence of any facilities for inspecting the welds, the Employer's Representative may submit the finished samples to an independent laboratory for testing at no additional cost

D. Under no circumstances shall a welder be employed on the contract, either on or off the site for welding operations other than those for which that welder is qualified.

E. Copies and records of all test reports shall be promptly given to and kept by the Employer's Representative.

F. Even welders holding a certificate for welding are to be tested at this job site in full accordance with the specifications.

3.5 TESTING OF WELDED PIPE WORK INSTALLATION

A. Testing of welded pipe work installation shall be by nondestructive test method.

B. If a weld fails the testing requirements, then two additional welds made by the same operative shall be tested, at no cost to the contract. If both additional welds are successful then, in the case of destructive testing, the cost of making good shall be at no cost to the contract.

C. If either of the two additional welds fails the test requirements, then further tests on other or all of the welds made by that operative shall be carried out, at the Employer's Representative's discretion. All costs resulting from either of the two additional welds failing the test requirements shall be at no cost to the Contract.

D. If either of the two additional welds fails, then the operative concerned shall not make any further welds on any service unless approved by the Employer's Representative. The detailed requirements concerning testing shall be as follows:

E. Non-destructive testing (Die penetration testing) shall be carried out by a specialist company approved by the Employer's Representative, at no additional cost.

3.6 WRAPPING PYPKOTE / COATEK

A. Surface Preparation - The pipe surface shall be cleaned by a wire brush.

B. Application of Primer - Primer is to be applied on pipes immediately after cleaning. This is to prevent any further accumulation of rust on the pipe. This is a cold applied primer and is applied by brush.

C. Application of Bitumanistic 4 mm Tape - After the primer is applied on the pipe, it is allowed to dry for about 30 min. till it becomes touch dry. Before adhering the tape to the pipe, it is advisable to gently heat the primer coated pipe by a run of LPG torch. Remove the bottom polyethylene from the tape & then heat bottom surface of the tape by LPG torch or any heat source & start wrapping the tape to the pipe by heating the primer coated pipe & by removing the bottom polyethylene from the tape before wrapping better adhesion between the tape & pipe is obtained. Overlaps are maintained with a minimum of 15.0 mm.

D. Tape coating of weld joints - The tape is applied over the weld joints after the necessary welding & testing methods of the joints is completed. The procedure for application of tape shall be the same as bare pipe procedure. Overlaps on each side of the weld joints shall be 50 mm.

E. A final coat of White wash with water based cement paint is done immediately over the entire coated pipe.

3.7 EXCAVATION

A. Excavation for underground pipe lines shall be as required at site. Pipe lines shall be buried to a minimum depth of 1000 mm. The type of soil to be considered is soft soil.

B. Wherever required, support all trenches of adjoining structures with adequate timber supports.

C. On completion of testing and coating & wrapping trenches shall be refilled and compacted with excavated earth in 15 cms. Layers and consolidated to restore ground condition to original status. Prior to excavation ensure that no adjoining structure or pipeline is affected / damaged.

3.8 PAINTING

A. All Hydrant and Sprinkler pipes shall be painted with post office red color paint. All G.I 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.

B. Painting shall be expertly applied; the paint shall not over run on surfaces not requiring painting such as walls, surfaces etc. Nuts and bolts shall be painted black, while valves shall be painted blue.

3.9 MAINTENANCE

A. General

1. Provide the following free maintenance for a period of twenty four (12) months after handing over the Fire Protection System to client (i.e. during warranty period)
2. Examinations: Bi-Weekly, including adjustments, cleaning and lubrication of equipment.
3. Replacement: Replace components when required, using parts produced by original manufacturer.
4. Spare Parts: Provide necessary spare parts; maintain locally an inventory of all wearing parts of the system.
5. Call Backs: Provide 24-hour emergency call back service at no expense to Owner.
6. Records: Maintain complete maintenance records including check charts, lubrication logs and activity logs; provide check charts and activity logs.

B. Extended Service Contract

1. At time of Bid, submit cost for full maintenance contract i.e. after the expiry of 12 month warrantee and free maintenance period.

2. Service: Provide examinations, logs, replacements and spare parts as specified for maintenance, including cleaning of tanks, equipment and machinery spaces required to maintain the water output quality and quantity as per design.

END OF SECTION 21 1200