

FIRE FIGHTING SYSTEM TENDER DOCUMENT

FOR

PROJECT: LIBRARY, JHAGADIYA

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**PART – A – TECHNICAL SPECIFICATION FOR FIRE
FIGHTING**

1. GENERAL

1.1 SCOPE OF WORK

Work under this sub head is time-bound and has to be completed within the time limit set in tender Work shall be executed in accordance with an agreed schedule which shall be submitted by the bidder along with offer and agreed to by Consultant / Engineering in charge by CLIENT.

The scope of work in this sub head shall consist of furnishing all labor, materials, equipment and appliances necessary and required to completely do all work relating to the supply, installation, testing & commissioning of Fire Fighting System as described herein after and shown on the drawings. The scope of work in general shall include the following.

- a) Providing firefighting and fire alarm system as per NBC2016 / IS code and as per requirement of local CFO (Authority Having jurisdiction).
- b) External / Internal Fire Hydrant System (3.5 kg/cm² pressure at most remote location)
- c) Sprinkler system.
- d) All type of civil work including excavation, cutting, drilling, back filling etc.
- e) Clean agent-based gas suppression system for HT and LT panel (MCC)
- f) Preparation of Shop drawing.
- g) To getting Fire NOC from Authority.
- h) Preparation as built Drawing

1.2 TECHNICAL INFORMATION

- I. Contractor shall submit along with the tender copies of detailed specifications, cuts, leaflets and other technical literature of equipment and accessories for approval from Consultant / Engineering in charge by CLIENT.
- II. Contractor's attention is specially invited to the special conditions and other clauses in the agreement which required the contractor to:
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 - a) Submit detailed shop drawings.
 - b) Use material of specific makes and brands
 - c) Obtain all approvals from Fire Fighting authorities.

- d) Execute the entire work on a turn-key basis so as to provide a totally operating plant.

1.3 SITE ACCESSIBILITY

- I. The equipment must be carried from the goods receiving station to the site in an extremely careful manner to prevent damage to the equipment building or existing services.
- II. Contractor must visit the site and familiarize himself with above problems to ensure that the equipment offered by him are of dimensions that they can be carried and planed in position without any difficulty.

1.4 APPROVALS

The contractor shall prepare all submission drawings, documents, Video recording etc. as required and obtain all approvals of firefighting works from firefighting authorizes/local CFO.

1.5 QUALITY CONTROL AND SURVEILLANCE

After erection at site the complete fire protection system shall be subjected to hydro test at 1.5 times of Design pressure for 24 hours to show satisfactory performance inline & as per applicable standards & to be approved by local fire authorities.

1.6 PAINTING AND COATING

I. Above Ground piping

- a) Piping to be laid above ground shall be supported on pipe rack / supports. Rack/ support details shall have to be approved by Consultant / Engineering in charge by client.
- b) Surface of over ground pipes except galvanized pipes shall be thoroughly cleaned of mill scale, rust etc. by wire brushing.
- c) Above ground piping for all the system shall be painted with one coat of rich zinc primer & two coat of Synthetic Enamel paint of approved shade.

II. Buried Pipe Line

Pipe lines to be laid in trenches /underground shall be protected against corrosion by means of 4mm thick anti-corrosive tape.

Application:

- The various layers of materials shall be applied as follows:
- Cleaning of exterior steel pipe surface with wire brush such that all rust, mill scale is removed.
- Application of a continuous and uniform primer film with a dry thickness not less than 25 – 30 microns.
- Application of a helicoidally wrapping of a 4 mm thick tape pulled into contact with the primer with proper tension in order to avoid an excessive penetration 15 mm overlap shall be provided. The application shall be in accordance with IS: 10221.
- Painting & coating shall be as per specifications

1.7 GENERAL SPECIFICATIONS FOR FIRE FIGHTING SYSTEM.

1. General requirements

All materials shall be of the best quality conforming to the specifications and subject to the approval of the Consultant / client.

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. Pipes shall be securely fixed to walls and ceilings by suitable clamps and supports (galvanized after fabrication) at intervals specified. Only approved type of anchor fasteners shall be used for RCC slabs and walls / floors etc.

Valves and other accessories shall be so located that they are easily accessible for operations, Repairs and maintenance. Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workman like manner.

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.

2. Piping and accessories

a) Pipe

G.I Pipe

Galvanized Iron (GI) pipes as per IS: 1239 heavy grade (Class C) suitably lagged on the outside to prevent soil corrosion. G.I. pipes buried below ground shall also be suitably be lagged with 2 layers of 400-micron polythene sheet over 2 coats of bitumen.

shall be as per IS: 1239, Part-II (heavy grade) while pipelines above 10 mm dia. shall be as per I.S.:3589 (6mm thick). All pipe clamps and supports shall be fabricated from MS steel sections and shall be factory galvanized before use at site. Welding of galvanized clamps and supports shall not be permitted.

Pipes shall be hung by means of expandable anchor fastener of approved make and design. The hangers and clamps shall be fastened by means of galvanized nuts and bolts. The size/diameter of the anchor fastener and the clamps shall be suitable to carry the weight of water filled pipe and dead load normally encountered.

Hangers and supports shall be thoroughly galvanized after fabrication. The selection and design of the hanger & support shall be capable of carrying the sum of all concurrently acting loads. They shall be designed to provide the required supporting effects and allow pipeline movements as necessary. All guides, anchor braces, dampener, expansion joint and structural steel to be attached to the building/structure trenches etc. Shall be provided. Hangers and components for all piping shall be approved by the Consultant / Client.

The piping system shall be tested for leakages at 2 times the operating pressure or 1.5-time shutoff pressure, whichever is highest including testing for water hammer effects. Flanged joints shall be used for connections for vessels, equipment, flanged valves and also on two straight lengths of pipelines of strategic points to facilitate erection and subsequent maintenance work.

For pipes underground installation the pipes shall be buried at least one meter below ground level and shall have 230 mm x 230 mm masonry or concrete supports at least 300 mm high at 3m intervals. Masonry work to have plain cement concrete foundation (1 cement: 4 coarse sand: 8 stone aggregate) of size 380 x 380 x 75 thick resting on firm soil. Mains

below ground level shall be supported at regular intervals not exceeding 3.0 metres and shall be laid at least 2.0 metre away from the building.

b) Pipe fittings

Pipe fittings mean tees, elbows, couplings, unions, flanges, reducers etc. and all such connecting devices that are needed to complete the piping work in its totality. Ductile Iron / Cast Iron / Forged steel screwed type fitting shall be used for all pipes size.

c) Procedure for pipe coating

- Surface Preparation - The pipe surface shall be cleaned by a wire brush.
- Application of Primer - Pypkote / Coatek or approved 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.
- Application of Pypkote / Coatek 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 12.5 mm.
- 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.
- A final coat of White wash with water based cement paint is done immediately over the entire coated pipe.

d) Pipe joining

• Welding joints

All welded joints shall be full-penetration butt welds, properly aligned and free from cracks, porosity, or other defects. an approved manner.

After completion of welding, all welded portions shall be thoroughly cleaned and made good by applying zinc-rich cold galvanizing paint or approved corrosion-protective coating to restore the galvanizing layer.

Welded joints shall be visually inspected and, if required by the Consultant / Client, shall be subjected to non-destructive testing prior to pressure testing of the system.

All welded joints shall successfully withstand the hydrostatic pressure test specified for the piping system without leakage.

- **Flanged joints**

Flanged joints with flanges conforming to IS: 6392 shall be provided on Straight runs at intervals not exceeding 25-30 m on pipe lines of 50 mm dia and above and as directed by the Project Manager.

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.

- **Rigid type**

"Installation Ready" rigid joints shall be designed for direct "stab" installation onto grooved pipe without prior disassembly of the coupling. Housings shall be cast with offsetting, angle-pattern bolt pads.

Housings shall be cast with offsetting, angle pattern bolt pads to provide system rigidity and support and hanging in accordance with NFPA 13.

Rigid couplings shall require visual pad-to-pad verification of complete installation. Tongue and recess type couplings which require the use of a torque wrench to achieve the exact required gap between housings are not permitted.

Grooved Fittings: Various fitting i.e. Tee, reduced, elbow, reducing tee, etc. shall be of forged steel and suitable for grooved fitting. The grooved fitting shall be of the same make as of mechanical coupling.

3. Fire brigade connection:

A fire brigade connection with inbuilt non-return valve shall be provided to facilitate the fire brigade to pump water into the installation by using

their own equipment's (Four-way 100 mm dia. connection to the system) shall comprise of four instantaneous pattern 63 mm dia. male inlets with caps and chains.

4. Air valves:

The contractor shall provide 20 mm dia. Screwed inlet G.M. single acting air valve on all high points in the system or as shown on drawings.

5. Y-strainer:

Y-type strainers of cast carbon steel/fabricated steel with SS-316 baskets shall be provided. The screen diameter of perforations shall be 2.0 mm. The strainer should be so designed that pressure drop under 50% clogged condition shall not exceed 5 mwc. The ends of the strainer shall be flanged drilled to ANSI B16.5, 150#. Strainer shall be with pressure rating of PN25.

6. Relief valve:

Relief valve shall be provided on the delivery header. The relief valve shall have adjustable setting in range suitable for operating range of the pump. The relief valve outlet shall be led back to the tank. The valve shall be 150# rated. Relief valve body shall be cast steel conforming to ASTM A216 Gr. WCB. Relief valve sizing shall be done considering pump characteristics. Relief valve shall be with pressure rating of PN25.

7. Ball and Butterfly Valves:

Ball and butterfly valves conforming to the following specifications shall be provided as shown on Drawings:

- Ball valve: Size – 15 to 40 mm
- Construction – Bronze ASTM B62
- Ends – Screwed
- Butterfly valve: Size – 50 mm and above
- Construction – Body cast iron
- Ends - Flanged
- Pressure rating: PN 25/PN16

Type and requirements shall be as indicated in Schedule of Quantities. Valves shall have non-rising spindles unless specified otherwise and shall

be suitable for PN 16 rating. Butterfly valve should be of wafer type long neck construction single stem design with center lugs to ensure proper alignment of pipe flanges. Mount valve onto flanges only after flanges have been welded to pipes using a tool piece and cooled down to room temperature to prevent damage to resilient seat. The rubber liner should be fully supported by the valve flanges. Appropriate dimensions and thickness of Flanges and Bolts, as per the Flange Tables ANSI B16.5 (#150 class), should be used. The flanges should be properly aligned with each other so that bolts are exactly perpendicular to the flanges. Evenly tighten the flange bolts to secure the valves. Counter flanges with nut-bolts and gaskets shall be provided by valve manufacturer.

Butterfly valves shall be of cast iron conforming to BS 5155 with nylon coated disc black nitrile seat and shaft material SS. Up to 150 mm diameter shall be lever operated 200 mm diameter and above shall be gear operated.

8. Fire Hose Reels:

Contractor shall provide standard fire hose reels with 25 mm dia. high pressure PVC nylon braided hose of 40 meters length with S.S. shut-off nozzle with 8 mm bore & with circular hose reel wall mounted type of heavy-duty mild steel construction & M.S. brackets. Hose reel shall conform to IS-884-1969. The hose reel shall be connected directly to the G.I. Pipe riser through an independent connection with a S.S. Ball valve for isolating purpose.

9. Hydrants:

Hydrants inside the building shall be located on every landing of the floor furnished with required accessories such as hosepipes with instantaneous gunmetal couplings and short pattern branch pipes located in hose cabinets. The hose cabinets shall be of wall/column mounting type, constructed out of 16-gauge MS sheets.

The internal hydrants (Landing Valves) shall be of single headed type taken out from 150/100 mm dia. riser through suitable tapping. The outlets shall be of gunmetal and conform to IS-5290. The Hose reels shall be firmly held against the wall by suitable heavy brackets and supports. The hose reel shall be swinging type (180 degrees) and the entire Drum reel etc. shall be as per IS: 3876. The hose tubing shall be of best quality (shut off)

and the shut off nozzle shall be 8 mm dia. The equipment shall be out of one of the approved makes only.

The hydrant main shall be laid in the form of ring main. The hydrant risers shall be terminated with air release valves at the highest points to release the trapped air in the pipe work.

10. Non-Return Valves:

Non-return valves are to be IS: 778-1984 manufactured from gun-metal or dezincification resistant brass. NRV Shall be Dual Plate type PN. 25 with ISI marked complete with nuts, bolts, washers, gaskets etc.

11. Pressure Switches:

Pressure switches shall be differential type for operation of all pump sand for the various duties and settings required. Pressure switches shall before heavy-duty operation and of approved make. All pressure switches shall be factory calibrated.

Pressure switches shall be provided for switching on and off the pressurization pump at present pressures and also for switching off the fire pump at present pressure. Being the main component for initiating the signal for the operation of the pumps, the pressure settings shall be totally reliable, sturdy in construction and of long life. The pressure settings shall be adjustable.

12. Pressure Gauges:

Pressure gauge shall be constructed of die cast aluminium and shall be stove enameled. They shall be weather proof with an IP-55 enclosure. They shall be stainless steel bourdon type pressure gauges with a scale range from 0 to 16 Kg/cm² and shall be constructed as per IS-3624. Pressure gauges shall be 100 mm dia. size. Gauge to be made of SS 304. Glycerin to be filled in for needle.

13. ABC Type Fire Extinguisher:

ABC Type fire extinguisher shall be squeeze grip type, minimum MAP 50%, Fire rating capacity - 4A, 55B. Fire extinguisher shall be working at 15 KG/cm² and Hydro tested at min 35 Kg/cm².

14. CO2 Type Fire Extinguisher

CO2 Type fire extinguisher shall 4.5 Kg Fire rating capacity – 21B. Fire extinguisher shall be working at 60 KG/cm² and Hydro tested at min 250 Kg/cm². Extinguisher shall IS 15683 approved.

-----: End of FFTG Specifications: -----

