TENDER

FOR

SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF FIRE FIGHTING SYSTEM FOR NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI

PART-III
PRICE BID

TENDER NO. HLL/ID / 14/37
MAY 2014

HLL Lifecare Limited
(A Government of India Enterprise)
एचएलएल लाइफ़केयर लिमिटेड
(भारत सरकार का उद्यम)

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1 COMMERCIAL CONDITIONS

1.0.1 The tendered rate shall inter alia be deemed to include for the provision of all materials, process, operation and special requirements detailed in the particular specification irrespective of whether these are mentioned in the description of equipment schedule and Bill of quantities or not. It is an express condition of the contract that the tendered rates for various items in the Bill of Quantities shall be deemed to include for the full, entire and final condition of the contractor respective items of the works in accordance with the provision of the contract.

1.0.2 The tendered rate shall include for all taxes, duties, etc. as applicable and shall be quoted on the works contract basis for **Supply, installation, testing and commissioning of Fire fighting system for New regional office building of HLL at Kharghar, Mumbai**

1.0.3 The tendered rate shall remain firm and free from variation due to rise in the cost of materials/equipment, labour or any other reasons whatsoever during the contract period and valid extension on the case may be.

1.0.4 The quantum of excise duty included in the tendered price, the rate at which they were assumed etc. shall be indicated in the tender.

1.1 UNIT RATES

1.11 Only approved work will be measured on completion and priced as per rates quoted against the respective items.

1.2 BRIEF DESCRIPTION OF PRICING

1.2.1. Unforeseen difficulties for which provision has not been made in the tender will in no way relieve the successful tenderer from the full execution of the work.

1.2.2 The price quoted shall be the final amount for this finished work.

1.3 INCOME TAX

Any payment to the contractor as per contract, will be made after deducting income tax as per the rules and regulations.

1.4 SALES TAX AND EXCISE DUTY

The tenderer shall clearly indicate sales tax, service tax in case of proprietorship, Excise and other duties as applicable in his offer for carrying out this work.

1.6. SUBMISSION OF BILL

1.6.1. The contractor shall from time to time prepare and submit interim bills of the work executed and on completion of the contract, he shall prepare and submit the final bill. The measurements sheets in support of the interim and final bills shall be prepared by the contractor on the basis of measurements taken by him jointly with the project engineer and the said measurement sheets shall be submitted by him with the relevant bill.

1.7. EXTRA ITEMS

The contractor is bound to carry out any items of work necessary for the completion of the job even though such items may not have been included in the schedule of probable quantities or rates, such items being necessary or essential for completing the job. Variation order in respect of such additional items and their quantities will be issued in writing by the employer.

1.7.1 All shavings, cuttings and other rubbish as it accumulates from time to time during the progress of work and on completion including that of the sub-contractors and special tradesman and all materials condemned by the project engineer shall be cleared and removed from the site by the contractor without any extra charge.

1.7.2 All measuring steel taps, scaffolding, ladders instruments and tools that may be required for taking measurements shall be supplied by the contractor.

1.8. OVER TIME WORK

If the contractor is required to work night or on holidays in order to maintain the time schedule he shall take prior approval from the Engineer-in-charge. He should also provide and maintain at his own cost sufficient lights as may be necessary to enable the work to proceed satisfactorily during the night.

1.8.1. The contractor shall give full facilities to all other contractors working on site. He shall also arrange his programme of work so as not hinder the progress of other trades. The decision of the Engineer-in-charge on any point of dispute between the various parties shall be final and binding.

1.8.2. It is specifically pointed out that the contractor shall not be entitled to any compensation whatsoever on account of delay in procurement or supply of controlled materials and the rates quoted in the contract are fixed till the completion of the contract.

1.8.3. The contractor shall co-operate with other agencies appointed by the owners for the work to proceed smoothly with the least possible delay and to the satisfaction of the owners, architects and the consultants.

1.8.4. The owners shall provide a source for power supply at one convenient point at site. The contractor shall at his own cost install a separate meter at the said source and lay additional cables from the said source also at his own cost. For the electricity consumed by the contractor he shall pay the owner the actual cost at the rate charged by the local authority for power for constructional purposes. The contractor shall also obtain the necessary permit for utilizing power for constructional purposes.

2 SPECIAL CONDITIONS

2.1. EXECUTION WORK

2.1.1. The whole of the work as described in the contract (including bills of materials, specification and all drawings pertaining thereto) and as advised by the Engineer-in-charge from time is to be carried out and completed in all parts to the entire satisfaction of the Employer. Any minor details of construction which are obviously and fairly intended, or which may not have been definitely referred to in this contract, but which are usual construction practice and essential to the work, shall be included in this contact.

2.2. CERTIFICATE OF COMPLETION

2.2.1 The contractor shall intimate to the Engineer-in-charge in writing as and when the works are completed and put into beneficial use in order to enable the consultants to check certify to the owners to take over the plants.

2.2.2 The work shall not be considered as completed and put into beneficial use until the consultants have certified in writing that the same has been completed and put into beneficial use.

2.2.3 The defects liability period of one year shall commence from date of such completion or any specific date mentioned therein.

TECHNICAL SPECIFICATIONS
FOR
FIRE FIGHTING SYSTEM

1.0 TECHNICAL SPECIFICATIONS FOR FIRE FIGHTING SYSTEM

1.1 General

Work under this subhead is time-bound and has to be completed within the time limit set in the tender. Work shall be executed in accordance with an agreed schedule which shall be submitted by the tenderers along with offer and agreed to by owners.

1.2 Scope of Work

The scope of work in this subhead shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely do all work relating to the supply, installation, testing & commissioning of Fire Fighting & Sprinkler System Works of new building for HLL Building Kharghar at Mumbai as described herein after and shown on the drawings. The scope of work in general shall include the following.

i) Fire Fighting Pumps & Accessories and related electrical works

ii) External & Internal Fire Hydrant System.

iii) Sprinkler system.

iv) Fire Detection System.

v) Hand Held appliances.

Without restricting to the generality of the foregoing, the work shall include the following:

A Hydrant System Covering the entire complex and consisting of the following:

A. Five number of Pumps - One number Main electric Pump of 2850 LPM at 70 M head, One number sprinkler electric Pump of 1800 LPM at 70 M head, one number Diesel Standby Pump for Hydrant Systems of 2850LPM at 70 M head, One number Terrace Pump of 450 LPM at 70 M head, and a Jockey Pump for System pressurization of 180 LPM at 70 M head.

B. Other piping system ancillaries such as Suction and Delivery Headers, Air Vessel, Pressure Gauges, Pressure Switches, Pump Panel etc. as required.

C. External Hydrant Ring Main with single headed Yard Hydrants, RRL Hose,

Branch Pipes, etc. all housed in a Hose Box.

D. Internal Hydrant system where required with single headed landing valves accompanied by 1 number swinging type Hose Reel, 2 numbers RRL Hoses, Branch Pipe etc. all housed in the niche. Bidder shall provide front frame with shutter for niche.

E. Sprinkler system as indicated in the drawing.

F Hand appliance as per Bill of Quantities.

G. To obtain the approval of the relevant drawings before actual installation at site and to get the complete installation inspected and passed by the concerned authorities, as may be necessary as per local bye laws. (Any fee payable to the local bodies for such activities shall be reimbursed by the CLIENT/CONSULTANT on production of receipt).

1.3 Contractor's Experience

1.3.1 Contractors shall engaged specialist agency only for this work of Fire Fighting systems.

1.3.2 The selected specialist agency must have sufficient experience in the execution of turn-key projects as specified.

1.3.3 Contractor must submit with the tender a list of similar jobs carried out by him as required along with the name of works, name and address of clients, year of execution, capacity of plant and value of work.

1.4 Technical Information

1.4.1 Contractor shall submit along with the tender copies of detailed specifications, cuts, leaflets, and other technical literature of equipment and accessories offered by him.

1.4.2 Contractor's attention is specially invited to the special conditions and other clauses in the agreement which required the contractor to :-

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.

1.5 Exclusions

1.5.1 Work under this contract does not include the following work:-

1.5.2 Electrical cables upto incoming motor control centre.

1.6 **Site Accessibility**

1.6.1 The equipments are to be located in pump house located within the Service block.

1.6.2 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.

1.6.3 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 placed in position without any difficulty.

1.7 **Approvals**

The contractor shall prepare all submission drawings and obtain all approvals of fire fighting works from fire fighting authorities.

1.8 **System Description**

1.8.1 The Hydrant System shall comprise of AC motor driven pump set, standby diesel pump set, jockey pump set for pressurization with all required accessories including valves, special fittings, instrumentation, control panels and any other components required to complete the system in all respects.

1.8.2 The Hydrant System shall be semi automatic in action and shall be laid covering the entire area externally and all the floors internally with independent piping system. For the Sprinkler System, a separate piping system shall be installed.

1.8.3 The Hydrant System shall be kept pressurized at all times. The proposed Jockey Pump shall take care of the leakages in the system, pipe lines and valve glands.

1.8.4 The pressure in the hydrant pipe work shall be kept constant at 7 Kg/cm^2. In the event of fire when any of the hydrant valve in the network is opened, the resultant fall in header pressure shall start the AC motor driven fire pump through pressure switches automatically. There shall be one Diesel Engine Driven pump as standby for hydrant system. In case of failure of electricity or failure of Electric Pump to start on demand, the standby Diesel Pump shall automatically take over.

1.8.5 However, shutting down of the pump set shall be manual except for the Jockey Pump which shall start and stop automatically through pressure switches. In addition to auto start arrangements, the main pump shall also have an over-riding manual starting facility by push button arrangement.

1.8.6 The piping for the hydrant system in the yard shall be laid in soil 1 Metre deep or in rectangular Trench. The pipe laid in soil shall be protected as specified in para 1.9.3 below. The scope of work includes necessary excavation of trench and back filling the same. The scope of work also includes necessary watering, ramming, removing the surplus earth from the site and construction of brick

pedestal at 3 Mtrs intervals of size as indicated in the Bill of Quantities. Pipes shall be cleaned before wrapping and coating.

1.8.7 The yard hydrants shall be placed at a regular spacing of 30m - 45m centre to centre. The following accessories are proposed near each yard hydrant.

i) One no. gunmetal single headed hydrant valves.
ii) Two nos. RRL Hoses of size 63mm dia x 15m long.
iii) One nos. gunmetal Branch pipe.

Gun metal hydrant valve, RRL hose and gunmetal branch pipe will be accommodated in an aluminium hose box mounted on brick pedestals.

1.8.8 The Internal Hydrant System shall be provided at points as indicated on the drawing on each floor.

1.8.9 The hydrant point shall be directly tapped from the Riser pipes, and shall be furnished with required accessories such as

i) One no. gunmetal single headed hydrant valves.
ii) Two nos. RRL Hoses of size 63mm dia x 15m long.
iii) One no. first aid Dunlop hose reel full swinging type 20mm dia x 30m long.
iv) One no. gunmetal Branch pipe.

The hydrant risers shall be terminated with air release valve at the highest points to release the trapped air in the pipe work. At each tapping from the Riser an Orifice Plate shall be located in the lower floors to reduce the pressure at no extra cost.

1.8.10 Sprinkler system shall be distributed so as to cover 10–12 sq. m area with one sprinkler.

Sprinkler risers shall be provided with instantaneous control valve with alarm gang. The alarm valve assembly shall be complete with all accessories as required for the performance.
A suitable drainage arrangement with bye pass valves shall be provided to facilitate maintenance of sprinkler pipe work.

1.8.11 To compensate for slight losses of pressure in the system and to provide an air cushion for counteracting pressure surges/water hammer in the underground pipe work Air Vessels shall be furnished in the pump room near fire pumps. The air vessel shall be normally partly full of water and the remaining being filled with air which shall be under compression when the system is in normal operation.

1.9 GENERAL SPECIFICATIONS

1.9.1 Pipes and Fittings

Pipes upto 150mm dia shall conform to IS-1239. Pipes with dia 200mm and above (6mm thick) shall confirm to IS-3589. All pipes shall be I.S.I. marked. Fittings for black

steel pipes shall be malleable iron suitable for welding or approved type cast iron fittings with tapered screwed threads.

1.9.2 **Jointing**

Joint for black steel pipes and fittings shall be metal-to-metal tapered thread or welded joints. A small amount of red lead may be used for lubrication and rust prevention in threaded joints.

Joints between C.I. or black steel pipes, valves and other apparatus, pumps etc. shall be made with C.I. or M.S. flanges with appropriate number of bolts. Flanged joints shall be made with 3mm thick insertion rubber gasket.

Note: Joints for pipes and fittings upto 50mm diameter shall be threaded joints using Teflon Tape or equivalent bonding tape on the threads. Joints for pipe and fittings above 50mm diameter shall be welded joints.

1.9.3 **Pipe Protection**

a) All pipes in under ground masonry trenches/service tunnels, above ground and in exposed locations shall be painted with one coat of red oxide primer and two or more coats of synthetic enamel paint of approved shade.

b) Pipes in wall chases shall be protected from corrosion by 2 coats of bituminous paints.

c) Protection of Underground Pipes:

The underground steel pipes shall be protected by coating and wrapping. The coating and wrapping shall be done, in general, as per IS:10221-1982.

It specified in Bill of Quantities, the proprietary pipe protection system shall be provided as per the Manufacturers recommendation. The proprietary system shall be of approved make.

1.9.4 **Installation of Pipes**

All pipes shall be adequately supported from ceiling or walls by structural clamps fabricated from M.S. structural e.g. rods, channels, angles and flats. All clamps shall be painted with one coat of primer and two coats of black enamel paint. The contractor shall provide inserts at the time of slab casting or provide suitable anchor fasteners.

The pipe supports or hangers shall be designed to withstand combined weight of pipe, pipes fittings, fluid in pipe and insulation. Pipe supports shall be of steel and coated with rust preventing paint and finished with two coats black enamel paint. The maximum spacing for pipes supports shall be as below:

Pipe (MM)	**Spacing (MTR)**	**Size of support**
Up to 25	2.0	6mm

32 to 65	2.4	8mm
75 to 125	2.7	10mm
150 & above	3.0	12mm

Pipes supports shall be spaced at maximum interval of 1.5 mtrs. on either side of heavy fitting and valves. Wherever piping passes through walls, pipes sleeves of diameter larger than that of piping shall be provided. Pipe sleeves shall be of steel or cast iron pipe.

The underground piping shall be supported with cement concrete blocks of suitable size and strength provided at an interval of 2.5 mtrs. The pipes shall be laid at 1 mtr depth (top of the pipe) and trench excavated for sufficient width. The rate for pipe shall include the scope of excavation/refilling the trench. 1:2:4 concrete thrust blocks are also to be provided at turning of pipe. The cost of installation includes concrete pedestals etc. as required and to be included in the item rate.

1.9.5 **Orifice Flanges**

Contractor shall provide orifice flanges fabricated from 6mm thick stainless steel plates on the branch lines feeding different zones/floors so as to allow required flow of water at a pressure of 3.5 kg/sq.cm. for each hydrants and 2 bar at installation valve for sprinkler system. The contractor shall design the orifices to ensure the required pressure. No extra cost shall be paid for the orifice plate.

1.9.6 **Valves & Other Accessories**

1.9.6.1 **General**

Each valve body shall be marked with cast or stamped lettering giving the following information's:

a) The manufacturer's name or trade mark
b) The size of the valve
c) The guaranteed working pressure

Isolating valves on the water supply lines shall be full bore ball valve type for pipe diameters upto 50mm. For 65mm dia and above these shall be butterfly valves.

1.9.7 **Full Way Ball Valve**

The valves shall be of full bore type and of quality approved by the Consultant/Owner. The body and ball shall be of copper alloy and stem seat shall be of Teflon.

1.9.8 **Sluice Valve (SV)**

It shall be of IS 780 standards. Construction shall be of inside screw, non-rising stem for water purpose and flanged type. Pressure class shall be of PN 1.0 and tested to 15

kG/Sq.cm pressure. Seat ring shall be of gun metal as per IS 318. Gasket packing shall be of CAF / Graphited asbestos

1.9.9 **Non-Return Valves**

Non-return valves are to be IS:778-1984 manufactured from gun-metal or dezincification resistant brass.

1.9.10 **Drain Valve**

Drain Valves are to be provided at all low points in the system for draining the water. These shall be 40mm dia full way ball valve fixed on 40mm dia black steel pipe.

1.9.11 **Inspection & Testing Assembly**

Inspection and testing of the sprinkler system shall be done by providing an assembly consisting of gunmetal valves, gunmetal sight glass, bye-pass valve.

1.9.12 **Flow Switch**

Flow switch shall be provided on sectional mains and branch lines as indicated on drawings, or necessary and required and directed by the Engineer-in-charge.

Flow switch should be suitable to actuate at a minimum of flow and shall be suitable for connection to a central annunciation panel.

1.9.13 **Pressure Switches**

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

1.10 **External Fire Hydrants**

Yard Hydrant valves shall be single headed as per IS : 5290. The valve shall be complete with hand wheel, quick coupling connection spring loaded type and gun metal blank cap. The Yard Hydrant shall be laid on 125 and 100mm dia pipe as per standards. Hydrant Ring Main, branched off to 80 mm dia and Stand Post of 80mm dia.

1.11 **Internal Landing Valves**

The internal landing valves shall be single-headed made of gun metal and conforming to IS:5290. It shall be complete with hand -wheel, quick coupling connection spring loaded type and blank cap.

1.12 **Hose pipes, Branch Pipes and Nozzles**

Hose Pipe: Hose pipe shall be rubber lined woven jacketed and 63mm in diameter. They shall conform to type-2 (Reinforced rubber lined) of IS:639-1979. The hose shall be sufficiently flexible and capable of being rolled.

Each run of hose pipe shall be complete with necessary coupling at the ends to match with the landing valve or with another run hose pipe or with Branch pipe. The couplings shall be of instantaneous spring lock type.

Branch Pipe: Branch pipe shall be of gunmetal 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.

Nozzle : The nozzle shall be of copper or gunmetal, 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.

End couplings, branch pipes, and nozzles shall conform to IS:903-1985. two hoses of 15 mtr. Lengths with couplings shall be provided with each external (yard) hydrant. One nozzle and one branch pipe with coupling shall be provided with each yard hydrant.

1.13 **External Fire Hose Cabinet**

The external fire hose cabinet to accommodate the hose pipes, branch pipe nozzle and the hydrant outlets shall be fabricated from 1.5m thick sheet steel. This shall be lockable and provided with center opening glazed doors.

The support for hose cabinet shall be of brick work up to a height of 0.5m above ground level. The depth of footing for this support shall be minimum 50cm below ground level, resting on leveling course of minimum 10cm of PCC (1:5:6). The brickwork shall be plastered in cement mortar (1:6). The hose cabinet shall be painted red and stove enameled.

1.14 **Internal Fire Hose Cabinet**

Each internal fire hydrant valve shall be housed in a nitch of size indicated on drawings. Each internal fire hose Cabinet shall hold single headed hydrant, 2 Hoses, 2 Branch pipes and 1 no. Dunlop hose reel mounted on a drum.

A) The cabinet shutters & frames shall be fabricated from boxed steel sections and MS plate 2mm thick.

B) The front glass of shutters shall be 5.0 mm thick clear glass and shall be held by means of rubber. Locking arrangement shall also be made with one number of mortice lock of approved make. A separate Key Box of 2 mm thick MS sheet with glass facing shall be provided.

C) The Shutter shall be given a powder coat finish in post office red colour.

1.15 **Hose Reel**

The hose reel shall be directly tapped from the riser through a 25 mm 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 IS:884. The rubber tubing shall be of approved quality and the nozzle shall be 6 mm dia shut off type.

1.16 **Brigade inlet Connections**

Two sets of 4 ways collecting head Fire Brigade connection shall be provided at the location indicated in the drawing.

The inlet to the riser shall be with 150mm dia sluice valve and non-return valve. The scope shall include providing necessary reducers, tees bends and special fittings as required. Necessary enclosure made of 2mm thick sheet metal with support shall be provided, as in the case of hose cabinets.

1.16 **AUXILIARY PUMPING EQUIPMENT (Jockey Pump)**

1.16.1 **Scope**

This section covers the details of requirements of the auxiliary equipment necessary for the operation of the fire pumps and the wet-riser system.

1.16.2 **Drive**

The pump shall be directly driven from the electric motor. Flexible coupling and coupling guard shall be provided.

1.16.3 **Capacity**

The discharge and head of the jockey pump shall be as mentioned in Bill of Quantities.

Jockey pump shall be Horizontal type. The pump casing shall be of cast iron and parts like impeller, sleeve, wearing ring etc. shall be of non-corrosive metal like bronze, brass or gunmetal. The shaft shall be of stainless steel.

Bearings of the pump shall be effectively sealed to prevent loss of lubricant or entry of the dust or water. The pump casing shall be designed to withstand 1.5 times the working pressure.

1.16.4 **Motor**

The motor shall be squirrel cage A.C. induction type suitable for operation on 415 volts 3 phase 50 Hz, system. The motor shall be totally enclosed fan cooled type confirming to protection clause IP 21 of IS 4691. The class of insulation shall be B, synchronous speed shall be 3000 RPM/1500 RPM. The motor shall conform IS 325-1978 and rated for continuous duty.

1.16.5 **Motor Starter**

The motor starter shall be automatic star delta type with overload trip, but without under voltage/no volt trip. Starter shall conform to IS 1822-1967.

2.0 MAIN ELECTRIC FIRE PUMP

2.1 **Scope**

This section covers the details of requirements of the motor, starter and pump for the electrically operated fire pump.

2.2 **General**

The electric fire pump shall be suitable for automatic operation complete with necessary electric motor and automatic starting gear, suitable for operation on 415 volts, 3 phase, 50 Hz. AC system. Both the motor and the pump shall be assembled on a common base plate of fabricated MS channel type or cast iron type.

2.3 **Drive**

The pump shall be only direct driven by means of a flexible coupling. Coupling guard shall also be provided.

2.4 **Fire Pump**

The fire pump shall be horizontal split casing centrifugal type. It shall have a capacity to deliver 2850 LPM as specified, developing adequate head so as to ensure a minimum pressure of 3 Kg per sq.cm at the highest and the farthest outlet. The delivery pressure at pump outlet shall be not less than 7 Kg. Per sq.cm. in any case.

The pump shall be capable of giving a discharge of not less than 150 percent of the rated discharge, at a head of not less than 65 percent of the rated head. The shut off head shall be within 120 percent of rate head.

The pump casing shall be of cast iron to grade FG 200 to IS:210 and parts like impeller, shaft sleeve, wearing ring etc., shall be of non-corrosive metal like bronze/brass/gunmetal. The shaft shall be of stainless steel.

Bearing of the pump shall be effectively sealed to prevent loss of lubricant or entry of dust or water.

The pump shall be provided with a plate indicating the suction lift delivery head, discharge speed and number of stages. The pump casing shall be designed to withstand 1.5 times the working pressure.

2.5 **Motor**

The motor shall be squirrel cage A/C induction type suitable for operation on 415 volts 3 phase 50 Hz system. The motor shall be totally enclosed fan cooled type conforming to protection clause IP 21 vide I.S. 4691. The class of insulation shall be B. The motor shall be rated for continuous duty as per relevant IS and shall have a horsepower rating necessary to drive the pump at 150 percent of its rated discharge.

2.6 **Motor Starter**

The motor starter shall be automatic star Delta type conforming to IS:1822-1967. The starter shall not incorporate under voltage or overload trip or single-phase preventor. The starter assembly shall be suitably integrated in the power control panel for the wet riser system.

Each pump shall be provided with vibration isolating pads of appropriate size.

3.0 DIESEL FIRE PUMP

3.1 Scope

This section covers the details or requirements of the stand by fire pump operated by a diesel engine.

3.2 General

The diesel pump set shall be suitable for automatic operation complete with necessary automatic starting gear, for starting on wet battery system and shall be complete with all accessories. Both engine and pump shall be assembled on a common bed place, fabricated with mild steel channel.

3.3 Drive

The pump shall be only direct driven by means of a flexible coupling. Coupling guard shall also be provided.

3.4 Fire Pump

The fire pump shall be horizontal split casing centrifugal type. It shall have the capacity to deliver 2850 LPM as specified, developing adequate head so as to ensure a minimum pressure of 3 kg. Per sq.cm. at the highest and the farthest outlet. The delivery pressure at the pump outlet shall be not less than 7 kg. Per sq.cm. in any case. The pump shall be capable of giving a discharge of not less than 150% of the rated discharge at a head of not less than 65% of the rated head. The shut off head shall be within 120% of the rated head. The shaft shall be of stainless steel. The pump shall be provided with mechanical seal. The pump casing shall be designed to withstand 1.5 times the working pressure.

Bearings of pump shall be effectively sealed to prevent loss of lubricant or entry of dust or water.

3.5 Diesel Engine

Engine Rating:-

The engine shall be cold starting type without the necessity of preliminary heating of the engine cylinders or combustion chamber (for example, by wicks, cartridge, heater plugs etc.). The engine shall be multi cylinder/vertical, 4-stroke cycle, water-cooled, diesel engine, developing suitable HP at the operating speed specified to drive the fire pump. Continuous capacity available for the load shall be exclusive of the power requirement of auxiliaries of the diesel engine, and after correction for altitude, ambient, temperature and humidity for the specified environmental conditions. This shall be at least 20% greater than the maximum HP required to drive the pump at its duty point. It shall also be capable of driving the pump at 150% of the rated discharge at 65% of the rated head. The engine shall be capable of continuous non-stop operation for 8 hours. The

engine shall have 10% overload capacity for one hour in any period of 12 hours continuous run.

The engine shall accept full load within 15 seconds from the receipt of signal to start. The diesel engine shall conform ton B.S. 649/IS 1601/IS 10002, all amended up to date.

3.6 Cooling System

The engine cooling system shall be radiator water cooled system. The radiator assembly shall be mounted on the common baseplate. The radiator fan shall be driven by the engine as its auxiliary with a multiple fan belt. When half the belts brake remaining belts must be capable of driving the fan. Cooling water shall be circulated by means of an auxiliary pump of suitable capacity driven by the engine in a closed circuit.

3.7 Fuel System

The fuel shall be gravity fed from the engine fuel tank to the engine driven pump. The engine fuel tank shall be mounted either over or adjacent to the engine itself suitably wall mounted on brackets. The fuel filter shall be suitably located to permit easy servicing.

The engine fuel tank shall be welded steel construction (3mm thick) and of capacity sufficient to make the engine to run on full load for at least 8 hours. The tank shall be complete with necessary supports, level indicator (protected against mechanical injury), inlet, outlet, over flow connections drain plug and piping to the engine fuel tank. The outlet should be so located as to avoid entry of any sediment into the fuel line of the engine. A semi rotary hand pump filling the engine fuel tank together with hose pipe 5 mtr. Long with a foot-valve etc. shall also form part of the scope of work.

3.8 Lubricating Oil System

Forced feed Lubricating Oil system shall be employed for positive lubrication. Necessary Lubricating Oil filters shall be provided and located suitably for convenient servicing.

3.9 Starting System

The starting system shall comprise of necessary battery/batteries, starter motor of adequate capacity and axle type gear to match with the toothed ring fly wheel. Suitable metallic relay to protect starting motor from excessively long cranking runs shall be included within the scope of the work. The metallic relay protection shall be integrated with engine protection system.

The capacity of the battery shall be suitable for meeting the needs of the starting system but not less than 180 AH.
The battery capacity shall be adequate for 10 consecutive starts without recharging with cold engine under full compression.

The scope shall cover all cabling, terminals, initial charging etc.

3.10 **Exhaust System**

The exhaust system shall be complete with silencer suitable for indoor installation, and silencer piping including bends and accessories needed. The exhaust pipe shall protrude outside the pump room. The total backpressure shall not exceed the engine manufacturer's recommendations. The exhaust piping shall be suitably supported and the pipe used shall be of medium class MS pipe.

3.11 **Engine Shut Down Mechanism**

This shall be manually operated and shall return automatically to the starting position after use.

3.12 **Governing System**

The engine shall be provided with an adjustable governor to control the engine speed within 5% of its rated speed under all conditions of load up to full load. The governor shall be set to maintain rated pump speed at maximum pump load.

3.13 **Engine Instrumentation**

Engine instrumentation shall include the following :-

a. Lubricating Oil Pressure Gauge

b. Lubricating Oil temperature gauge

c. Water temperature gauge

d. Water pressure gauge

e. Tachometer

f. Hour meter

g. Starting key

The instrument panel shall be suitably mounted on the engine.

3.14 **Pipe Work**

The piping for exhaust outlet as well as fuel piping between fuel tank ad the engine shall be with Medium class M.S.

3.15 **Anti Vibration Mounting**

Suitable vibration mounting duly approved by engineer-in-charge shall be employed for mounting the unit so as to minimize transmission of vibration to the structure. The isolation efficiency achievable shall be clearly indicated in the report, which will be submitted to engineer-in-charge before installation.

3.16 **Battery Charger**

Necessary float and boost charger shall be incorporated in the control section of the power and control panel to keep the battery under trickle condition. Ammeter to indicate the state of charge of the batteries shall be provided.

4.0 **POWER AND CONTROL PANEL AND OTHER CONTROL COMPONENTS**

4.1 **Scope**

This section covers the detailed requirements of the power and the control panel for the wet riser system, and also for the various control components in the system.

4.2 **Power and Control Panel**

4.2.1 **Constructional Requirements**

General Features

The power and control panel shall be totally enclosed, free standing floor mounted cubicle type, fabricated out of sheet steel not less than 2mm thick. Where ever necessary, additional stiffening shall be provided by angle iron framework. General construction shall be of compartmentalization and sectionalisation such as mains incomes, electric fire pump, diesel fire pump, pressurization pump, and control, so that there is no mix up of power and control wiring and connections in the same sections as far as possible. The panel shall also have the space for cable allays. The space for cable alleys shall be at least 200mm wide to the entire depth of panel. The panel shall be front operated type with all connections accessible from the front. Front doors shall be hinged type. Back doors shall be hinged type or removable type for inspection. The door hinges shall be of concealed type. The doors for busbar chamber shall be of removable type with the help of bolts. The doors shall be provided with quick fixing doors knobs with indication. The general arrangement of the panel shall be got approved before fabrication the cubicle construction shall be to IP 21 as per IS:2147.

4.2.2 **Cable entries and gland plates**

All cable entries shall be through gland plates which are removable and sectionalized. Where heavy cables are brought in and terminated, suitable clamps shall be incorporated to relieve the stress on the glands due to the weight of the cable. Cable entries may be from top or bottom depending on the equipment layout and cable scheme as approved.

4.2.3 **Busbar and Connections**

The busbars shall be air insulated, and of aluminium of high conductivity electrolytic quality (grade E 91 E to IS: 5082) and of adequate cross section. Current density shall not exceed 1.3 amps. Per sq.cm. All connections to individual circuits from the busbars shall preferably be with solid connections. The busbars and the connections shall be suitable covered with PVC sleeves or in an approved manner. Busbars shall be

suitably supported using non-hygroscopic insulated supports. High tensile bolts and spring washers shall be provided at busbar joints.

4.2.4 Earthing Arrangement

GI strip 25mm x 5mm shall be run at the rear of the board. 2 nos. earth terminals shall be provided at the ends of the GI strip for connection to earth system.

4.2.5 Terminal Blocks and Small Wiring

Terminal blocks shall be of heavy duty type and generally not less than 15 amps 250V grade upto 100V, and 600V grade for the rest of the functions. They shall be easily accessible for maintenance. All control wiring inside the panel shall be with PVC insulated copper conductor of 2.5 sq.mm. size and 600V grade conforming to IS:694-1977. Suitable colour-coding may be adopted. Wiring harness shall be neatly formed and run preferably function wise, and as far as possible segregated voltage wise. Identification ferrules shall be used at both ends of the wires.

4.2.6 Instruments and Lamps

All indication lamps and instruments shall be flush mounted type in front of the panel. The voltmeter and ammeter shall be of size 100mm nominal (dial size) conforming to clause 1.5 of IS 1248 for accuracy.

Current transformers shall be provided with ammeters.

Indicating lamps to indicate the availability of electric supply shall be provided at the incoming section. Necessary indicating lamps for alarm indications and battery charging shall be provided in the respective sections.

All indicating lamps and meter shall be protected with HRC cartridge type fuses.

4.2.7 Labels

All internal components shall be provided with suitable identification labels. Suitably engraved labels shall be fixed at the panel for all switches, instrument push buttons, indicating lamps etc.

4.2.8 Painting

The entire panel shall be given a primer coat of red lead after degreasing and phosphating treatment and 2 coat of final paint of approved shade before assembly of various items.

4.3 Equipment Requirements

4.3.1 General

The power and control panel shall comprise individual section for the various equipments of the system and controls, in a combined cubicle type design. All switches, MCCBS, MCBS and fuse/fuse switch units shall be conforming to relevant IS.

4.3.2 **Incomer Section & outgoing section**

(A) Incomer section:

1 no. 630 amps TP MCCB unit complete. One set of 96 mm square digital Ammeter (0-400 Amps) complete with selector switch and CTS. One set of 96 mm square digital Voltmeter (0 - 500 V) complete with control fuses and selector switch. One set of phase LED indicating lights with control fuses. One set of 4 strips of 800 Amps aluminium busbars.

(B) **Outgoing feeder**

(i) Three numbers of 300 Amps TP MCCB (35 KA, Ics = Icu) unit complete, S P Preventer, ML 4 type Contactor for star delta starting, start and stop push buttons, auto-manual switch, digital Ammeter with CTS, ASS, LED phase indicating lights, Auxillary Contactors for interlocking/sequence of operation, control terminals complete in all respect with interconnections for Hydrant Pump and sprinkler pump.

(ii) Two numbers of 63 Amps rated TP MCCB (25 KA, Ics = Icu) unit- complete, ML 1.5 type Contactor for D O L starting with overload relay, start and stop button, digital Ammeter, CTS and selector switch, phase indicating lights, Auxillary contacts for interlocking/sequence of operation, control terminals complete in all respect for Jockey Pump.

C Control Wiring from Pressure Switches of different settings in Hydrant and Jockey Pumps, for sequence of operation shall be included to complete the system.

D Colour code with ferrule marking shall also be made.

E The cabling shall be XLPE insulated and aluminium / copper conductor cable of 1100 volts grade conforming to IS as required from Fire Pump Board to motor and cable of suitable size as per BOQ.

4.3.3 **Electric Fire Pump Section**

This section shall incorporate the following facilities.

a. Suitable capacity MCCBS
b. Control system components and equipment such as relays, contractors, timers etc. for automatic operation.

c. Starter Unit, Current Transformer and digital ammeter.

d. LED Indication lamps, their fuses, terminal block, push buttons, control and selector switches etc. are as required.

e. Pump lock out devices due to faults or abnormalities as specified in operating sequence.

f. Visual/audio alarms, indications and communications facility as specified in operating sequence.

g. Necessary inter-connection and control wiring etc.

4.3.4 **Engine Section**

The engine section shall incorporate the following facilities:

i. Control system components and equipment such as relays, contractors, timers etc. for automatic operation.

ii. Instruments, indicator lamps, fuses terminal blocks, push buttons, control and selector switches etc. as are required.

iii. Engine shut down and block out devices due to faults or abnormalities as specified.

iv. Visual/audio alarms and indications as specified.

v. Inter-connection and control wiring etc.

4.3.5 **Auxiliary Pump Section**

The auxiliary pump section for jockey pump shall incorporate the following:

a. TP&N MCBS.
b. Control system components such as relays, times, contractors, etc. as are necessary for functional requirements.
c. Starter unit, current transformer and ammeter.
d. Indication lamps, fuses, terminal blocks, push buttons selector, switch etc. as required.
e. Inter-connections and control wirings etc.

4.3.6 **Control Section**

This section shall incorporate the following:-

a. Control components integrating the various sections, so as to satisfy the functional requirements.

b. Battery charger unit with boost/float chare facility with voltmeter, capable of independently charging 2 sets of batteries at a time.

c. Visual/audio alarms, not covered in individual sections.

d. Lamps healthy test facility.

e. Instruments, indicating lamps, push buttons, fuse terminal blocks etc. as are required.

f. Test facility to simulate operation of hydrants.

4.4 Other Control Components

4.4.1 Pressure Switches

Pressure switches shall be provided for switching on and off the pressurization pump at preset pressures and also for switching off the fire pump at preset 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.

4.4.2 Power Supply for Controls

In order to ensure that the control systems remains co-operational at all times the control system shall be designed for 24 VDC operation fed from the battery. This shall be independent of the starting battery for the engine i.e. battery shall remain trickle charged at all times from the separate battery charger at the control section.

5.0 Electrical Work and Earthing

Scope

This section covers the detailed requirements of electrical works including earthing, for the materials installation.

Electric power supply shall be terminated in the incoming switch gear of the power and control panel by the Department. All further connections to the various components of the system shall be the responsibility of the contractor, for a complete and working system, satisfying all the functional requirements.

The scope shall particularly include the following :

Power and Control Panel(s) as given in relevant section.
All inter-connections with multi-core armoured copper cables of size suitable between various control units and control panel(s).

All power cable connections with multi-core armoured aluminium cables of size as specified in BOQ, between panels, motors etc.

Necessary earthing with 2 Nos. G.I. plate electrodes and loop earthing.

The work shall be carried out conforming to CPWD General Specifications for electrical works part-I (Internal) amended up to date and part-II (External) amended upto date.

6.0 Sprinkler System

6.1 Sprinkler Heads

Sprinkler heads shall be of quartzoid bulb type with bulb, valve assembly yoke and the deflector. The sprinklers shall be approved make and type.

6.2 Types

6.2.1 **Conventional Pattern**

The sprinklers shall be designed to produce a spherical type of discharge with a portion of water being thrown upwards to the ceiling side of wall extras. The sprinklers shall suitable for erection in upright position or pendant position.

A. **Spray Pattern**

The spray type sprinkler shall produce a hemispherical discharge below the plane of the deflector.

B. **Ceiling (flush) Pattern**

These shall be designed for use with concealed pipe work, these shall be installed pendant with plate or base flush to the ceiling with spray head below the ceiling.

C. **Side Wall Sprinklers**

These shall be designed for installation alongwith the walls of room close to the ceiling. The discharge pattern shall be similar to one quarter of sphere with a small proportion discharging on the wall behind the sprinklers.

6.2.2 **Construction**

i) **Bulb:-** Bulb shall be made of corrosion-free material strong enough to with stand any water pressure likely to occur in the system. The bulb shall shatter when the temperature of the surrounding air reaches a predetermined level.

ii) **Valve assembly:-** Water passage of the sprinkler shall be controlling assembly of flexible construction. The valve assembly shall be held in position by the quartzoid bulb. The assembly be stable and shall withstand pressure surges or external vibration without displacement.

iii) **Yoke:-** The yoke shall be made of high quality gun metal. The arms of yoke shall be so designed as to avoid interference with discharge of water from the deflector. The sprinkler body shall be coated with an approved anti corrosive treatment if the same is to used in corrosive conditions.

iv) **Deflector:-** The deflector shall be suitable for either upright or pendent erection. The deflector shall be designed to give an even distribution of water over the area protected by each sprinkler.

D) **Colour Code**

The following colour code shall be adopted for classification of sprinkler according to nomination temperature ratings.

Sprinkler Temperature Rating	**Colour of the Bulb**
68 deg. C	Yellow

E. **Size of Sprinklers Orifices**

The sprinklers shall be of 15mm nominal bore size.

6.2.3 **Pipes and Fittings**

Pipes for sprinkler system shall be of black steel conforming to I.S. 1239 (medium class).

Fittings for black steel pipes shall be malleable iron suitable for welding or approved type cast iron fittings with tapered screwed threads.

6.2.4 **Jointing**

Joint for black steel pipes and fittings shall be metal to metal tapered thread or welded joints. A small amount of red lead may be used for lubrication and rust prevention in threaded joints.

Joints between G.I. or black steel pipes, valves and other apparatus, pumps etc. shall be made with G.I. or M.S. flanges with appropriate number of bolts. Flanged joint shall be made with 3mm thick insertion rubber gasket.

6.2.5 **Pipes Protection**

All pipes above ground and in exposed locations shall be painted with one coat of red oxide primer and two or more coats of synthetic enamel paint of approved shade.

Pipes in chase or buried underground shall be painted with two coats of hot bitumen.

6.2.6 **Pipe Supports**

All pipes shall be adequately supported from ceiling or walls from structural clamps fabricated from M.S. structural e.g. rods, channels, angles and flats. All clamps shall be painted with one coat of primer and two coats of black enamel paint. The contractor shall provide inserts at the time of slab casting or anchor fastner later.

6.2.7 **Valves**

Sluice valves of sizes 80mm and above shall be double flanged cast iron conforming to I.S. 780. Check valve shall be of cast iron double flanged conforming to I.S. 5312.

Valves on pipes 65mm and below shall be heavy pattern gunmetal valves with cast iron wheel seat tested to 20 kg/sqcm. pressure. Valves shall conform to I.S. 778.

1. **Air Valves**

   25mm dia screwed inlet cast iron single acting air valves on all high points in the system or as shown on drawings.

2. **Drain Valves**

50mm dia black steel pipe conforming to I.S. 1239 medium class with 50mm gunmetal full way valve for draining and water in the system in low pockets.

6.2.8 **Installation Control Valve**

Installation control valves shall comprise of the followings:

a) One-man stop valve of full way pattern with gunmetal pointer to indicate where open/shut.

b) One automatic alarm valve fitted with handle & cover.

c) One hydraulic alarm motor and gong for sounding a continuous alarm upon out-break of fire. One combined waste and testing valve including 5mtr of tubing and fittings.

d) Alarm stops valve.

e) Strainer

f) Drain plug

g) Padlock and strap

h) Wall box for installation of valve.
I) All other accessories as required.

6.3 **Pressure Gauges**

Burden type pressure gauges conforming to IS/BS specifications shall be provided at the following locations:

a. Just above alarm valve.

b. Just below alarm valve, on the installation stop valve.

c. One pressure gauge on delivery side of each pump.

d. Required number of pressure gauges on pressure tank.

6.4 **Installation of Piping**

a. All above ground piping shall be installed on suitable to pipe hangers/supports as required. The hangers shall be made of MS angles, channels etc. and painted to the required finish with suitable synthetic enamel paint. The maximum spacing of piping supports shall be as follows:

i)	20mm to 32mm dia	2.5 mtr.
ii)	40mm to 65mm dia	3.0 mtr.
iii)	65mm & above	3.0 mtr.

Piping shall be so installed that the system can be thoroughly drained. All the pipes shall be arranged to drain to the installation drain valve. In case of basement and other areas where the pipe work is below the installation drain valve/auxiliary valves of the following sizes shall be provided.

20mm dia valve for pipes up to 50mm dia

25mm dia valves for 65mm dia pipe

32mm dia valves for pipes larger than 65mm dia

Piping shall be of screwed type upto 50mm diameter. Welding of joints will be allowed for pipes of above 50mm dia.

The entire piping shall be pressure tested by hydrostatic method upto a pressure of 1.5 times the working pressure. The piping shall be slowly charged with water so that all the air is expelled from the piping by providing a 25mm inlet with a stop cock. The piping shall be allowed to stand full of water for a period of 2 hours and then the piping shall be put under pressure by means of manually operated test pump or by a power driven test pump. The pressure gauges used for testing shall be accurate and shall preferably the calibrated before the testing is carried out. All the leakage's and defects in joints revealed during the testing shall be rectified to the entire satisfaction of the Engineer-in-charge. The system may be tested in sections/parts as the work of erection of piping proceeds. The piping shall with stand 1.5 times the working pressure for at least 2 hours.

7.0 Operating Sequence for the Fire Fighting System

7.1 The operating pressure in the mains is to be maintained at 7.0 kg/cm^2.

7.2 The jockey pump shall start automatically the moment pressure drops to 6.5 kg/cm^2 because any leakage or minor draw-off from the system and stop when the pressure reaches 6.5 kg/cm^2 again.

7.3 In case, after the start of jockey pump, the pressure still keeps on falling, the main fire pump shall start at 6.0 kg/cm^2 by triggering of the pressure switch. Jockey pump shall stop when main pump starts.

7.4 In the event of electrical or mechanical failure of main fire pump to start, the diesel engine driven pump shall cut in when the pressure in the mains fall down to 5.5 kg/cm^2. The main electric pump shall then be locked out.

7.5 If within a preset period the standby pump fails to start or fails to develop adequate pressure, the control system shall shut down the standby pump and lock it out and given an audiovisual indication to that effect at the control panel.

7.6 Jockey pump shall be shut down automatically when the fire pump electric or diesel, is operating. Necessary integration of pipe work and controls shall be provided for the purpose. A timer may be employed where necessary to distinguish between slow fall of pressure due to system leaks and sudden fall of

pressure due to fire duty by opening of valves and thus prevent parallel start up of both pressurization and fire pumps.

7.7 The control panel shall have status selection for each of the pumps for “automatic” as well as “manual” operation.

7.8 Pumps when under “manual” status shall be operated manually through relevant push buttons.

7.9 The fire pumps once started shall not be stopped automatically.

7.10 The fire pumps shall be locked out for operation both for “manual” and “automatic” operations, once the low water controls operates and furnish an audio and visual alarm on the panel the audio alarm can be silenced by accepting the alarm. The visual alarm shall be individual for each equipment. It shall be flashing type and on acceptance remain steady. A reset button shall be provided for each pump for returning the pump for fire duty.

7.11 Over load or under voltage/no volt trip devices for electric fire pump shall not be provided in the starter. LED type indication lamps to indicate the availability of power shall be provided.

7.12 Once tripped the electric fire pump shall remain locked out for operation irrespective of the position of its operational status selection switch. Look out indication shall be available on the panel.

7.13 Return to normal operational availability shall be feasible only by manual re-set of locked out units by operation of appropriate push buttons.

7.14 When fire pumps are brought into operation an audible tone from turbine type alarm operated by water flow in the mains shall be provided to indicate the healthiness of the system. The healthy running alarm shall not be silenced till the fire pump is shut down, but the tone may be mellowed by the operation, if required.

7.15 Alarm for failure and lock out of any pump shall distinct from “healthy” alarm. Failure alarms shall be loud and can be silenced on acceptance.

7.16 Repeat indication of various audio and visual indications on a slave remote panel in fire control room in terminal building shall be available. The slave Remote panel shall have indication lamps to show the status of :

a) Power healthy in fire pump room.
b) Jockey pump ‘ON’

c) Main pump ‘ON’

The slave Remote panel shall also have a hooter, which shall sound in case, any pump is ‘ON’. The slave Remote panel shall have a provision to reset the hooter with the help of a push button.

8.0 Testing

8.1 Testing on Completion of Installation

The entire system shall be tested after completion of installation as per the operating sequence specified.

8.2 Schedule of Inspection

Testing of fittings/equipments shall be carried out either at site or at works in the presence of a CLIENT/CONSULTANT's representative given below:

1.	Pumps, motors and engine	-	Inspection by Client/Consultant at Manufacturers works before dispatch.
2.	Electrical panel	-	Inspection by Client/Consultant at Manufacturers works before dispatch.
3.	Pipes	-	Visual inspection at site for ISI mark.
4.	Various valves	-	Visual inspection at site for ISI mark.
5.	SFUs, MCBs etc.	-	Type test certificates.
6.	Sprinklers	-	Test certificate from independent test laboratories.
7.	Fire hose, hydrant, extinguisher etc.	-	Visual inspection at site for ISI mark.

Approvals It shall be the responsibility of the contractor to obtain the approval of drawings and to get the installation inspected and passed by any concerned authorities, as may be necessary as per local by laws, any fee payable to the local bodies for such activities shall be reimburse by the Client/Consultant on production of receipt.

9.0 Standards and Codes

1.	IS – 1648 – 1961	Code of Practice for fire safety of building (general) fire fighting equipment and maintenance.
2.	IS – 3844 – 1966	Code of practice for installation of internal fire hydrant.
3.	IS – 2217 – 1963	Recommendation for providing first aid and fire fighting arrangement in public buildings.
4.	IS – 2190 – 971	Code of practice for selection, installation and maintenance of portable first fire appliance.
5.	IS – 3589	Electrically Welded Steel pipes (Medium class)
6.	IS – 1239	Mild steel tubes, Tubulers and other wrought steel fittings (Medium class)
7.	IS – 780	C.I. Double flanges sluice valve.
8.	IS – 778	Gun Metal Valves
9.	IS – 909 – 1965	External fire hydrant (underground)
10.	IS – 5290 – 1969	Internal Landing Valve
11.	IS – 884 – 1969	First and hose reel
12.	IS – 934 – 1976	Specification for portable chemical fire extinguisher soda acid type.
13.	IS – 2873 – 1969	Specification for fire extinguisher for carbon dioxide
14.	IS – 2189 & 2109	Automatic fire alarm system or BSS 3116.
15.		National building code

TECHNICAL DATA

(Hydrant System)

(To be submitted along with the tender)
Note: Refer list of preferred makes of items in Section IV. (Please attach catalogue, etc. of items from the original supplier).

1 Diesel engine driven pump

1.a Pump details
Make
Type
Model
Overall dimensions
Weight (Kgs)
Material
Pump casing
Impeller
Shaft sleeve
Base plate
Type and material of steel
Operating speed (R.P.M.)
Head (Mtr)
Efficiency
Performance curves (whether enclosed with the tender).
Yes/No

1.b Engine details
a) Make
b) Model
c) HP
d) RPM
e) SFC
Oil consumption
Weight
Overall dimension
Exhaust pipe dia

2 Battery & Battery Charger
Make of battery charger
Make of batteries
Model No. of batteries
Voltage
AH
No. of batteries
Model No. of battery charger

3 Electric motor driven pump

1.a Pump details

Make
Type
Model
Overall dimensions
Weight (Kgs)
Material
Pump casing
Impeller
Shaft sleeve
Base plate
Type and material of steel
Operating speed (R.P.M.)
Head (Mtr)
Efficiency
Performance curves (whether enclosed with the tender).
Yes/No

1.b Motor details

a) Make
b) Model
c) HP
RPM
Weight
Overall dimension
Class of insulation

4 Jockey pump

1.a Pump details

Make
Type
Model
Overall dimensions
Weight (Kgs)
Material
Pump casing
Impeller
Shaft sleeve
Base plate
Type and material of steel
Operating speed (R.P.M.)
Head (Mtr)
Efficiency
Performance curves (whether enclosed with the tender).
Yes/No

1.b Motor details

a) Make
b) Model
c) HP
d) RPM
g) Weight
h) Overall dimension
i) Class of insulation

5 Makes and model numbers of following items

MS Pipe	:
GI & MS fittings	:
Valves	:
Strainer	:
Instrumentation	:
Pressure guage	:
Pressure switch	:
Hardware	:
Paint	:
Polymeric mix	:
Hydrant valve	:
CP hose	:
Branch pipe	:
Hose Reel	:

TECHNICAL DATA
(Sprinkler system)

(To be submitted along with the tender)
Note: Refer list of preferred makes of items in Section IV. (Please attach catalogue, etc. of items from the original supplier).

Alarm valve
Make
Model No.
Size

Sprinklers
Make
Model No.
Size

'Y' strainer
Make
Model No.
Size

MS pipes
Make
Model No.

APPROVED MAKES OF ITEMS

HYDRANT/ SPRINKLER/ DETECTION SYSTEMS

Motor	: Kirloskar/ Siemens/ ABB/ Cromption Greaves
Pump	: Kirloskar/ Mather & Platt/ KSB/ Beacon
Diesel Engine	: Kirloskar/ Cummins/Greaves
MS Pipe	: Tata/ Jindal/SAIL/GST/Zenith
GI & MS fittings	: Tube weld/Tube products/Punjab steel/TNT
Valves	: Kirloskar / Kalpana / Updhaya / Leader / Advance
Strainer	: Sant/ Emerlad/ Teleflo/ Jaypee/ Grandpix
Pressure guage	: Fiebig/ H.Guru
Pressure switch	: Indfoss/ Switzer/Schneider
Hydrant valve & Fire brigade point	: Newage/ Steelage/ Arihant/ Shah Bhogilal
Branch pipe	: Newage/ Arihant/ Shah Bhogilal
CP hose	: Newage/ Shah Bhogilal/ Pyroline
Hose Reel	: Newage/ Chathariya/ Shah Bhogilal
Hose cabinet	: Newage/ Zenith/Shah Bhogilal
Hardware	: TATA/ Sundaram fasteners/GKW
Paint	: Asian/ ICI/ Nerolac/Berger
Polymeric mix	: IWL
Fire extinguisher	: Ceasefire/ Minimax / Safex / Bharat / Safeguard.
Alarm valve	: HD / Tyco (UL listed)
Sprinkler	: HD/ Tyco (UL listed)

Electrical Works

Voltmeter and Ammeter	:AE / MECO / UNIVERSAL/ RISHAB / ENERSOL
Selector Switch, Push Buttons, Emergency Switches	: KAYCEE / L & T / GE / BCH

Current Transformer	: AE / KAPPA / PRECISE / ADVANCE / GILBERT MAXWELL / INDCOIL
HRC Fuses	: L & T / GE / SIEMENS / ABB
MCB	: L & T (HAGER) / SCHNEIDER - (MULTI9) / SIEMENS - (BETAGARD) / ABB (S - 270 RANGE) / LEGRAND (LEXIC)
Main / Sub Distribution Board	: L & T (HAGER) / SCHNEIDER / SIEMENS / ABB / LEGRAND (LEXIC)
RCBO	: L & T (HAGER) / SCHNEIDER / SIEMENS / ABB / LEGRAND (LEXIC)
FRLS PVC insulated copper conductor single / multi core stranded wires of 650 / 1100 volt grade	: L & T / FINOLEX / PARAGON (ELEKTRON) / SKYTONE / BATRA HENLEY / POLYCAB
MS Conduit / PVC Conduit	BEC / AKG / ATUL PIPE
Contactors	L & T / SCHNEIDER - TESYS / SIEMENS / ABB (A RANGE)
Starter	L&T / SIEMEMS/ABB/ SCHNEIDER / LEGRAND
Moulded Case Circuit Breaker	L&T(D SHINE) / SIEMENS (SENTRON) / SCHNEIDER COMPACT - NS / ABB (TMAX) / LEGRAND (DPX)
VCB / SF6	ABB / ANDREW YULE / AREVA / SIEMENS
Push Buttons	ABB / SIEMENS / L&T / TELEMECHANIQUE / SCHNEIDER
Protection Relays	ABB / AREVA / L&T / SCHNEIDER / SIEMENS
Timers	ABB / SIEMENS / L&T / TELEMECHANIQUE / GE
Indicating Lights	ABB / SIEMENS / L&T / AE / VAISHNAV / SCHNEIDER

Indicating Instruments	RISHABH / CONSERVE / L&T / YOKINS INSTRUMENTS / ENERCON
KWH Meters	HPL INDIA (SOCOMAC) / L&T / CONSERVE / SECURE / YOKINS INSTRUMENTS
HT Cable	CABLE CORPORATIONOF INDIA / UNIVERSAL / GLOSTER / FINOLEX / GEMSCAB
LT Cable	CABLE CORPORATION OF INDIA / UNIVERSAL / GLOSTER / FINOLEX / GEMSCAB
Cable Glands	DOWELS / CROMPTION / BICO / SIEMENS / COMET / RAYCHEM
ACB	SCHNEIDER MASTERPACT(NW) / SIEMSNS (SENTRON-3WT) / ABB - EMAXPR 121 / L&T UNIPOWER(UN RS2 . 5GC)
Selector Switch	KAYCEE / L&T / SIEMENS / BCH / GE
Battery	EXIDE / STANDARD / AMCO / HBL - NIFE / PANASONIC / CUMINS PULSELITE
Battery Charger	VOLSTAT / AMARARAJA / CHHABBI / CALDYNE / LABOTECK / JAKSON
Termination Kit	CABSEAL / 3M / RAYCHEM / DENSON
Cable Lugs	DOWEL / CROMPTION / BICO / SIEMENS / COMET / CABSEAL

BILL OF QUANITIES

ABSTRACT

SEC.	DESCRIPTION OF ITEM	AMOUNT (Rs.)
1	**HYDRANT SYSTEM**	
2	**FIRE EXTINGUISHERS**	
	GRAND TOTAL	

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
1.0	**HYDRANT/SPRINKLER SYSTEM**				
1.1	Supply, installation, testing and commissioning of Diesel Engine driven main fire pump suitable for automatic operation and consisting of following: complete in all respect as required. (a) End suction, top discharge, back pull out centrifugal pump of cast iron body and bronze impeller with stainless steel shaft, mechanical seal to ensure a minimum pressure of 3.5 kg/sq.cm.at highest and farthest outlet at specified flow of 2850 lpm at 70 m. head conforming to IS 1520				
	(b) Suitable HP, 1500 RPM water cooled with radiator, diesel engine conforming to relevant BS & IS standard complete with auto starting mechanism, 12 volts/24 Volts electric starting equipment, Diesel Tank , exhaust pipe extended up to 1 m. outside pump house duly insulated with 50 mm. thick glass wool with 1.0 mm. thick aluminium sheet cladding, residential silencer, instruments and protection as per specification, stop solenoid for auto stop in the event of fault with audio indications, painted with posts office red colour etc. as required. (c) M.s.fabricated common base plate coupling, coupling guard, (d) Suitable cement concrete foundation duly plastered with anti vibration pads and foundation bolts etc. as required.	set	1		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
1.2	Supply, installation, testing and commissioning of Electric driven main fire pump suitable for automatic operation and consisting of following: complete in all respect as require. (a) Centrifugal, end suction pump top discharge back pull out made of cast iron body & bronze impeller with stainless steel shaft, mechanical seal to ensure a minimum pressure of 3.5 kg/sq.cm. at highest and farthest outlet at specified flow of 2850 lpm at 70m,. head conforming to IS 1520.				
	(b) Suitable HP SO cage induction motor, TEFC, synchronous speed 2900 RPM, suitable for operation on 415 volts, 3 phase 50 Hz. AC with IP 55 protection for enclosure, horizontal foot mounted type with Class-'F' insulation, conforming to IS- 325. (c) M.S. fabricated Common base plate, coupling, coupling guard, vibration eliminator, suitable rcc foundation and foundation bolts etc. as required.	set	1		
1.3	Supply, installation, testing and commissioning of Electric driven sprinkler pump suitable for automatic operation and consisting of following: complete in all respect as require. (a) Centrifugal, end suction pump top discharge of cast iron body & bronze impeller with stainless steel shaft, mechanical seal to ensure a minimum pressure of 3.5 kg/sq.cm. at highest and farthest outlet at specified flow of 1800 lpm at 70m,. head conforming to IS 1520.				

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
	(b) Suitable HP SO cage induction motor, TEFC, synchronous speed 2900 RPM, suitable for operation on 415 volts, 3 phase 50 Hz. AC with IP 55 protection for enclosure, horizontal foot mounted type with Class-'F' insulation, conforming to IS- 325. (c) M.S. fabricated Common base plate, coupling, coupling guard, vibration eliminator, suitable RCC foundation and foundation bolts etc. as required.	set	1		
1.4	Supply, Installation, testing and commissioning of electric driven pressurization (Jockey) pump suitable for automatic operation and consisting of following: complete in all respect as required. (a) End suction, top discharge, back pull out centrifugal pump of cast iron body and bronze impeller with stainless steel shaft, mechanical seal and flow of 180 lpm at 56 m. head conforming to IS : 1520.				
	(b) Suitable HP SQ cage induction motor TEFC type suitable for operation of 415 volts, 3 phase 50 Hz. AC with IP 55 class of protection for enclosure, horizontal foot mounted type with Class-'F' insulation, conforming to IS : 325, and also with a delay timer of max 30 sec to avoid frequent starts. © M.S. fabricated Common base plate, coupling, coupling guard, vibration eliminator, foundation bolts etc. as required. (d) Suitable cement concrete foundation duly plastered with anti vibration pads etc. as required.	set	1		
1.5	Main Fire Pump Panel				

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
	Supply, Installation, Testing & Commissioning of Fire Pump Panel, cubicle type, made out of 2mm thick CRCA sheet, totally enclosed, IP42, free standing, floor mounting, dust and vermin proof, powder coated, indoor, compartmentalised, suitable for operation on 3 phase and neutral, 415 V, 50Hz AC system, including internal wiring with suitable size wires, rotary handle, spreader etc. The panel shall include supply & installation of following switchgears, metering instruments and accessories as per specification.				
	INCOMER				
	1 No. 125A, FP, SDFU with suitable rating HRC fuse / Copper link for capacity of 150A.				
	BUSBARS				
	1 Set of 200 Amp TPN busbars of high conductivity electrolytic quality Aluminium alloy.				
	INSTRUMENTS				
	1 No Three phase Digital voltmeter, Acc. Class 1				
	1 No Three phase Digital ammeter, Acc. Class 1				
	1 Set of phase indicating lamps, LED type, RYB.				
	1 Set of ON, OFF indicating lamps, LED type.				
	2 Set of 2A 10kA C curve SP control MCB.				

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
	1 Set of 125/5A, Class 1.0, 10VA, Cast Resin CT for metering.				
	OUTGOING				
	Main Electrical Fire Pump				
	1 No. 100A, FP, SDFU with suitable rating HRC fuse / Copper link for capacity of 125A.				
	1 No Fully automatic Star/Delta starter of suitable rating for 415V, 50Hz, 3 phase main electrical fire pump **(approx. one pump 50HP)**. The starter shall have ON, OFF push button, ON, OFF indication lamp, complete with all accessories and internal wiring required for automatic and manual operation.				
	Jockey Pump				
	1 No. 32A, FP, SDFU with suitable rating HRC fuse / Copper link for capacity of 63A.				
	1 No Fully automatic DOL starter of suitable rating for 415V, 50Hz, 3 phase Jockey pump (approx. 7.5HP). The starter shall have ON, OFF push button, ON, OFF, Trip LED indication lamp, thermal over load relay, single phase preventor, complete with all accessories and internal wiring required for automatic and manual operation.				
	Spare				
	1 No. 32A, FP, SDFU with suitable rating HRC fuse / Copper link for capacity of 63A. .				

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
	Necessary control cabling between the feeders of Fire pump, jockey pump, sprinkler pump, booster pump shall be done and all required accessories shall be provided for the automatic operation of the Fire pump as per statutory requirement.				
	Diesel Engine Control				
	Diesel engine control consisting of:				
	1 No. 16A DP C curve control MCB, 16A On/off control switch.				
	Auto / manual selector switch, 3 attempt starting device, push button etc.				
	All required timers, relays, fuses and accessories for automatic operation of diesel engine.				
	Indication lamp for high water temperature, engine fail to start, engine On indication, high/low lube oil pressure.				
	Necessary control wiring for start / stop solinoid, line / oil pressure switch, temperature switch etc.				
	Battery Charger suitable for 12 V / 24 V DC with boost and trickle selector switch, 0 -15 V / 0 - 30 V DC volt meter, 0 - 20 A DC Ammeter.				
	6 panel annunciation window for fault indication with hooter, accept & reset push button.				
	The system shall include all accessories to control the operation of sprinkler pump, main electric pump, diesel pump, jockey pump, booster pump in auto sequence as per the specification.	Set	1		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
1.6	Sprinkler Pump Panel				
	Supply, Installation, Testing & Commissioning of Sprinkler Pump Panel, cubicle type, made out of 2mm thick CRCA sheet, totally enclosed, IP42, free standing, floor mounting, dust and vermin proof, powder coated, indoor, compartmentalised, suitable for operation on 3 phase and neutral, 415 V, 50Hz AC system, including internal wiring with suitable size wires, rotary handle, spreader etc. The panel shall include supply & installation of following switchgears, metering instruments and accessories as per specification.				
	INCOMER				
	1 No. 125A, FP, SDFU with suitable rating HRC fuse / Copper link for capacity of 150A.				
	BUSBARS				
	1 Set of 200 Amp TPN busbars of high conductivity electrolytic quality Aluminium alloy.				
	INSTRUMENTS				
	1 No Three phase Digital voltmeter, Acc. Class 1				
	1 No Three phase Digital ammeter, Acc. Class 1				
	1 Set of phase indicating lamps, LED type, RYB.				
	1 Set of ON, OFF indicating lamps, LED type.				
	2 Set of 2A 10kA C curve SP control MCB.				
	1 Set of 125/5A, Class 1.0, 10VA, Cast Resin CT for metering.				
	OUTGOING				
	Sprinkler Pump				
	1 No. 100A, FP, SDFU with suitable rating HRC fuse /				

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
	Copper link for capacity of 125A.				
	1 No Fully automatic Star/Delta starter of suitable rating for 415V, 50Hz, 3 phase main electrical fire pump **(approx. one pump 40HP)**. The starter shall have ON, OFF push button, ON, OFF indication lamp, complete with all accessories and internal wiring required for automatic and manual operation.				
	Booster Pump				
	1 No. 32A, FP, SDFU with suitable rating HRC fuse / Copper link for capacity of 63A.				
	1 No Fully automatic DOL starter of suitable rating for 415V, 50Hz, 3 phase Jockey pump (approx. 10 HP). The starter shall have ON, OFF push button, ON, OFF, Trip LED indication lamp, thermal over load relay, single phase preventor, complete with all accessories and internal wiring required for automatic and manual operation.				
	Spare				
	1 No. 32A, FP, SDFU with suitable rating HRC fuse / Copper link for capacity of 63A.				
	Necessary control cabling between the feeders of Fire pump, jockey pump, sprinkler pump, booster pump shall be done and all required accessories shall be provided for the automatic operation of the Fire pump as per statutory requirement.				

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
	The system shall include all accessories to control the operation of sprinkler pump, main electric pump, diesel pump, jockey pump, booster pump in auto sequence as per the specification.	Set	1		
1.7	a) Supplying, Installation, testing and commissioning of electric driven pump (terrace pump) sets suitable for automatic operation and consisting electrical control panel with DOL Starter and accessories of the following complete in all respect as required				
	Pump rated for 450 lpm, 35m head Monobloc type, C.I body volute type coupled with suitable HP SQ cage induction motor,sychoronous speed 2900rpm, suitable for operation on 415V, 3phase 50Hz, AC with IP 55 class of protection for enclosure, horizontal foot mounted type with class F insulation,				
	M.S. fabricated common base plate, coupling, coupling guard, foundation bolts etc. as required.				
	Suitable cement concrete foundation duly plastered with anti vibration pads.	set	1		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
1.8	Supply and Laying of following size XLPE insulated PVC sheathed Aluminium / copper conductor armoured cable direct in masonry open duct, wall surface, cable tray etc to the incoming and out going of fire pump panel to pumps including necessary termination using glands & lugs, necessary connections etc as required.				
1.8.1	3.5 x 50 sqmm Aluminium cable	m	50		
1.8.2	4 x 16 sqmm Aluminium cable	m	100		
1.8.3	4 x 1.5 sqmm copper control cable	m	200		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
1.8.4	2 x 1.5 sqmm copper control cable	m	200		
1.9	Supply, installation, testing and commissioning of pressure gauge 0-200 PSI (0 - 14 Kg) range, 3/8" BSP bottom entry, 4" dial weather proof with stainless steel internals, siphon tube amd ball valve including fittings, etc. complete as required	no	4		
1.10	Supply, installation, testing and commissioning of industrial type pressure switch having 1/4" BSP(F) connection IP:32 enclosure protection, phosphor bronze bellows as sensing element, SDPT contact system, switch rating 6A Inductive/lOA resistive 380 V AC, 0.2A Inductive/10A resistive 250V DC suit with ball valve etc. complete as required.	no	4		
1.11	Supplying and fixing air vessel ade of 250 mm dia 8 mm thick MS sheet, 1200 mm. In height with air release valve on top and flanged connection to riser, drain arrangement with 25 mm dia Gun metal wheel valve, with required accessories, pressure gauge and painting with synthetic enamel paint of approved shade as required.	set	1		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
1.12	Providing, laying, testing & commissioning of 'C' class heavy duty GI pipe conforming to IS 3589 and 1239 including drop forged fittings like elbows, tees flanges, tapers, nuts bolts, gaskets etc.., fixing the pipe on the wall/ceiling with suitable clamps and painting with primer and two or more coats of synthetic enamel paint of required shade complete as required.				
1.12.1	150 mm dia	m	66		
1.12.2	100 mm dia	m	32		
1.12.3	65 mm dia	m	10		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
1.13	Providing, laying, welding, testing & commissioning of 'C' class medium duty MS pipe including drop forged fittings like elbows, tees flanges, tapers, nuts bolts, gaskets etc.., fixing the pipe on the wall/ceiling with suitable clamps and painting with primer and two or more coats of synthetic enamel paint of required shade complete as required.				
1.13.1	80 mm dia	m	17		
1.13.2	65 mm dia	m	57		
1.13.3	40 mm dia	m	101		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
1.13.4	25 mm dia	m	111		
1.14	Providing, laying, testing & commissioning of 'C' class heavy duty GI pipe conforming to IS 3589 / 1239 including drop forged fittings like elbows, tees flanges, tapers, nuts bolts, gaskets etc. in ground including excavation & providing cement concrete blocks as supports, anticorrosive wrapping coating min 2mm thick as per IS10221, refilling the trench with compaction etc. of following sizes complete as required.				
1.14.1	150 mm dia	m	137		
1.14.2	80 mm dia	m	9		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
1.15	Supplying, fixing, testing & commissioning of dual plate non-return valve of following sizes confirming to IS : 5312 complete with rubber gasket, GI bolts, nuts, washers etc. as required.				
1.15.1	150 mm dia	no	3		
1.15.2	65 mm dia	no	1		
1.16	Supplying, fixing, testing & commissioning of foot valve complete with bolts, nuts, washers and rubber gaskets etc. conforming to IS:4038 (ISI marked) of sizes:				
1.16.1	150 mm dia	no	3		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
1.16.2	65 mm dia	no	1		
1.17	Supplying and fixing, testing & commissioning of double flanged Sluice valve of Standard - BS 5163 / IS14846 Size Range 32 to 1500mm Pressure Ratings PN10, PN16 End Connection Flanged, flange connection following sizes as required				
1.17.1	150 mm dia	no	4		
1.17.2	100 mm dia	no	1		
1.17.3	80 mm dia	no	3		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
1.17.4	65 mm dia	no	8		
1.18	Supply, installation, testing and commissioning of Bronze Gate valve conforming to IS:778 (ISI marked) of sizes:				
1.18.1	25 mm dia	no	16		
1.19	Supply, installation, testing and commissioning of gun metal fire hydrant valve, single headed oblique type 63 mm instantaneous outlets with female socket for hose connection and inlet side with flange suitable for 100 mm pipe flange, valve conforming to 1S:5290 complete with blank cap chain, etc	no	18		
1.20	Supplying and fixing First-aid Hose Reel with MS construction spray painted in Post office Red, conforming to IS 884 with up to date amendments, complete with the following as required. (a) 30 m. long 20 mm (nominal internal dia water hose Thermoplastic (Textile reinforced) Type-2 as per IS: 12585	set	8		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
	(b) 20 mm (nominal internal) dia gun metal globe valve & nozzle. (c) Drum and brackets for fixing the equipments on wall. (d) Connections from riser with 40 mm dia stop valve (gun metal) & M.S. Pipe				
1.21	Supplying and fixing 63 mm dia, 15 mtr. Long RRL hose pipe with 63 mm dia Male and Female Gun metal couplings duly binded with GI wire, rivets etc. conforming to IS 636 (type-A) as required.	no	36		
1.22	Supplying & fixing 63 mm dia Gun metal branch pipe with 20 mm (nominal internal diameter) size Gun Metal nozzle conforming to IS 903, suitable for instantaneous connection to inter-connect hose pipe coupling as required.	no	18		
1.23	Supply, installation, testing and commissioning of hose boxes wall/pedestal type of size 750 x 250 x 600 mm made out of 16 SWG MS sheet steel with front side glass, locking arrangement and painted with approved colour completed as required and as per specifications.	no	18		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
1.24	Supply, installation, testing and commissioning of Fire brigade collective breaching with 4 nos. of (twin Siamese) 150 mm flanged out let connection and built in check valves complete as required.	set	1		
1.25	Supply, and fixing of Air release valve all riser pipes as per specification	set	2		
1.26	Supply, and fixing of priming tank 500liters made of suitable thick MS painted and with all connections and valves as per specification	set	1		
1.27	SITC of Sprinkler Alarm Valve with water motor gong, test valves, drain valves complete with all accessories, set of pressure gauges, supports, etc of following sizes.				
1.27.1	100 mm	no	6		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
1.28	Supplying and fixing Orifice Plate made of 6 mm thick, stainless steel with orifice of required size in between flange & landing valve of external and internal hydrant to reduce pressure to working pressure of 3.5 Kg / cm2 complete as per specifications as required.	no	18		
1.29	Supplying, fixing, testing & commissioning Ball Valve Regular bore type with Nickel plated Brass body with female thread(DIN EN ISO 228), hand lever operated				
1.29.1	25 mm dia	no	4		
1.3	Supply, installation, testing, and commissioning of sprinkler bulbs pendant type having a temperature rating of 68 degree centigrade	no	168		
1.31	Supplying, fixing, testing & commissioning of Sprinkler Flexible Hose 1000 mm in length, Unbraided, UL Listed along with all necessary accessories like Nipple threaded, Reducing Nipple threaded, Large Bracket with Bolt, Small Bracket with Bolt, Meter Square Bar etc complete as per spec.	no	143		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
	TOTAL FIRE HYDRANT/SPRINKLER SYSTEM				
2.0	**PORTABLE FIRE EXTINGUISHERS**				
2.1	Supply and fixing of ABC type Water type Fire Extinguisher 9 litres on wall with hook plate and anchor fastening of ISI marked with internal plastic lining and solid drawn body with 60 grams CO2 cartridge with gun metal plunger and 1.0 M long discharge hose confirming to IS 940 and complete in all respects including initial fill with CO2.	no	18		
2.2	Supply & fixing of of Carbon-dioxide extinguisher on wall of ISI marked 4.5 Kg capacity made of high pressure seamless steel cylinder (CCE marked) confirming to IS 2878, 8149. complete with wheel type valve with one meter long braided high pressure discharge hose complete in all respects including initial fill with CO_2 gas.	no	10		
2.3	Supply and installation of ABC Dry Chemical powder type 5 Kg capacity each made of high pressure steel cylinder wall mounting type with hook plate and anchor fastening, ISI marked, complete with wheel type valve internal discharge tube 1 M long high pressure wire braided discharge hose discharge horn, having a jet length of 8m with discharge time of 10 sec fully charged with ABC powder, including all accessories conforming to IS 2171.	no	5		

FIRE PROTECTION SYSTEM FOR THE CONSTRUCTION OF NEW REGIONAL OFFICE BUILDING OF HLL AT KHARGHAR, MUMBAI					
Item no.	**Item description**	**Unit**	**Quantity**	**Rate (Rs. in words & in figures)**	**Amount (Rs. in words & in figures)**
2.4	Fire brand type fire bucket 9 ltrs filled with dry sand painted in red and marke "FIRE" with suitable support stand for 5 necessary hooks etc	no	5		
	TOTAL FOR FIRE EXTINGUISHERS				
	GRAND TOTAL FOR FIRE PROTECTION SYSTEM				