

GUJARAT WATERSUPPLY & SEWERAGE BOARD**GANDHINAGAR**

(A WHOLLY OWNED GOVERNMENT OF GUJARAT UNDERTAKING)



Name of Work:“Comprehensive operation & maintenance of three phase submersible borewell pumping machineries with associated mechanical & electrical equipments, instruments & accessories etc. for 2 years @ Bhujiya Hill Campus of Bhuj Taluka for Smrutivan Society Corpus Fund under Deposit Work, District-Kachchh.

Estimated Cost : Rs. 1596660.80

VOLUME – II**Technical Specifications Volume**

Executive Engineer

Gujarat Water Supply & Sewerage Board

Public Health Mechanical Division,

Bhuj

GENERAL SPECIFICATIONS FOR SUPPLY OF EQUIPMENT**1.0 GENERAL**

This part covers conditions pursuant to the contract and will form an integral part of the contract. The following provisions shall supplement general conditions, detailed specification and requirements.

2.0 LIMIT OF CONTRACT

Equipment furnished shall be complete in every respect with all mountings, fittings, fixtures and standard accessories normally provided with such equipment and/or needed for erection, completion and safe operation of the equipment as required by applicable codes though they may not have been specifically detailed in the technical specification, unless included in the list of exclusions. All similar standard components/parts of similar standard equipment provided shall be interchangeable with one another.

3.0 ENGINEERING DATA

3.1 The contractor shall furnish complete engineering data of each set of equipment such as name of manufacturer, the type of model of each principal item of equipment proposed to be furnished and erected in the annexure, standard catalogues design, the specification number and the name of the project. If, the standard catalogue pages are submitted the applicable items shall be indicated therein. All titles, noting, markings, and writing on the drawing shall be in English. All dimensions should be in metric units.

3.2 All manufactured fabrication works in connection with equipment prior to the approval of the drawing shall be at the contractor's risk. The contractor may make any changes in the design which are necessary to make any equipment conform to the provisions and intent of the contract and such changes will again be subject to the approval by the GWSSB. Approval given to the contractor's drawing or works by the GWSSB shall not relieve the contractor from any of the responsibility and liabilities under the contract.

3.3 Drawings shall include all installation and detailed piping drawings wherever applicable. All piping 100 millimetre and larger shall be routed in details and smaller pipe shall be shown schematically or by isometric drawings. All drawings shall be fully corrected to agree with actual "As Built" construction.

4.0 DESIGN IMPROVEMENTS

4.1 GWSSB may propose changes in the specification of the equipment or quality thereof and if the parties agree upon any such changes the specifications shall be modified accordingly.

4.2 If any such agreed upon change is such that it affects the price and schedule of completion, the party shall agree in writing to the extent of any change in the price and/or schedule of completion before the contractor proceeds with the change. The following such agreement provision thereof shall be deemed to have been amended accordingly.

5.0 The following documents shall be sent by registered post to the GWSSB by contractor within 3 days from the date of dispatch, to enable the GWSSB to make progressive payments to the contractor.

INVOICE (3 copies)

PACKING LIST (3 copies)

TEST CERTIFICATE (3 copies)

5.1 The contractor shall prepare detailed packing list of all packages and containers, bundles & loose material forming each and every consignment dispatched to site. The contractor shall further be responsible for making all necessary arrangements or loading, unloading and other handling right from his work till the site and also till the equipment is erected, tested and commissioned. He shall be solely responsible for proper storage and safe custody of all equipment.

5.2 All fine, rental, demurrages, warfare and other expenses incurred due to delayed clearance of the material or any other reason shall be to the account of the contractor.

6.0 PROTECTION TO PLANT

6.1 All coated surfaces shall be protected against abrasions, impact, discolorations and any other damages. All exposed hatched portions shall be suitably protected with either a metallic or non-metallic protecting device. All ends of all valves and pipe manifold and conduit equipment connections shall be properly sealed with suitable device to protect them from damage. The parts which are likely to get rusted due to exposure to weather, shall also be properly treated and protected in a suitable manner.

7.0 MATERIALS HANDLING AND STORAGE

7.1 All the equipment furnished under the contract and arriving at the sites shall be properly received, unloaded, transported and stored in the storage spaces by the contractor at his cost.

7.2

Contractor shall be responsible for examining all the dispatches and notify the GWSSB immediately of any damage, shortage or discrepancy etc. for the purpose of the GWSSB information only. The contractor shall submit to the GWSSB every week a report detailing all the receipts during the work. However, the contractor shall be solely responsible for any shortages or damage in transit, handling and/or in storage and erection of the equipment at the site.

7.3

The contractor shall maintain an accurate and exhaustive record detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection of the GWSSB at any time.

7.4

All equipments shall be handled very carefully to prevent any damage or loss. No bare wires, ropes, strings etc. shall be used for unloading and/or handling of the equipment stored. They shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. The equipment from the stores shall be moved to the actual location of the appropriate times so as to avoid damage of such equipment at site.

7.5

All electrical panels, control gears, motors and such other devices shall be properly dried by heating before they are installed and energised. Motor bearings, slip rings, commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and shall be periodically inspected. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion due to prolonged storage.

All the electrical equipment, such as motors etc. shall be tested for insulation resistance at least once in three months from the date of receipt till the date of commissioning and record of such measured insulation values maintained by the contractor. Such records shall be kept open for inspection by the GWSSB.

7.6

The consumables and other supplies likely to deteriorate due to storage must be thoroughly protected and stored in a suitable manner to prevent damage or deterioration in quality by storage.

7.7

All the materials stored in the open or dusty location must be covered with suitable waterproof and flameproof covering material wherever applicable.

7.8

The contractor shall be responsible for making suitable indoor storage facilities to store all equipment which require indoor storage. Normally all the electrical

equipment, such as motors, control gears, generators, exciters and consumable like electrodes, lubricants etc. shall be stored in the closed storage space.

The GWSSB in addition may direct the contractor to move certain other materials which in GWSSB opinion will require indoor storage, to indoor storage areas which the contractor shall strictly comply with.

8.0 CONTRACTOR'S MATERIALS AT GWSSB SITE

8.1 The contractor shall bring to site all equipment, component, parts, materials, including construction equipment, tools and tackles for the purpose of the works under intimation to the GWSSB. Such goods from the time of their being brought shall not on any account be removed or taken away by the contractor or his sub-contractor without the written permission of the GWSSB. The contractor shall nevertheless be solely liable and responsible for any loss or destruction hereof and damage thereto.

8.2 The GWSSB shall have the lien on such goods for any sum or sums which may at any time be due to or owing to them by the contractor, under in respect of or by reasons of the contract. After giving a fifteen (15) days' notice in writing of his intention to do so, the owner shall be at liberty to sell and dispose of any such goods in such a manner as he shall think fit including public auction or private treaty and to apply the proceeds in or towards the satisfaction of such or sums due as aforesaid. After the completion of the works, the contractor shall remove from the site under the direction of the purchaser the materials such as construction equipment, erection tools, and tackle, scaffolding etc. with the written permission of the GWSSB. If the contractor fails to store or moves such materials, GWSSB to do so then the GWSSB shall have the liberty to dispose of such materials and credit the proceeds thereof to the account of the contractor.

9.0 FACILITIES TO BE PROVIDED BY THE GWSSB

9.1 SPACE:

The contractor shall advise GWSSB within fifteen (15) days from the date of acceptance of the letter of intent, about this exact requirement so space for carrying out electro-mechanical erection activities viz. storage area, pre-assembly and fabrication areas etc. The above requirements shall be reviewed by the GWSSB and as available will be given to the contractor. It will not be binding to owner GWSSB to spare the space if not available. In that case contractor shall have to make his own arrangements. The material once

supplied shall have to be stored and preserved by agency up till the commission Agency may deploy the person to protect the materials supplied by agency at their own cost.

10.0 CONSTRUCTION MANAGERMENTS

10.1 Time is the essence of the contract and the contractor shall be responsible for performance of his works in accordance with the specified construction schedule. If at any time the contractor is falling behind schedule, he shall make necessary action to make good for such delays by increasing his work force or by working overtime or otherwise accelerate the progress of the work to comply with the schedule and shall communicate such action in writing to the GWSSB satisfying that this action will compensate for the delay. The contractor shall not be allowed any extra compensation for such action.

11.0 CONTRACTOR'S COOPERATION WITH THE GWSSB

In case where the performance of the erection work by the contractor or the operation of the system facilities of the GWSSB such erection work of the contractor shall be scheduled to be performed only in the manner stipulated by GWSSB and the same shall be acceptable at all times to the contractor. The GWSSB may impose such restrictions on the facilities if provided to the contractor such as electricity, water etc. as the GWSSB may think fit in the interest of itself and the contractor shall strictly adhere to such restrictions and cooperate with the GWSSB it will be the responsibilities of the contractor to be provided all necessary temporary instrumentation and other measuring devices required during the start-up and operation of equipment systems which are erected by him. Before commissioning of any machine all old lubricants, greases etc. shall be thoroughly removed, the part cleaned of all deleterious material and shall be freshly lubricated by sealed lubricants, of exact specifications.

12.0 COOPERATION WITH OTHER CONTRACTORS (If Any) & FOR GWSSB

The contractor shall agree to cooperate with the GWSSB other contractor and consultants of GWSSB and freely exchange with them such technical information and economical design features to avoid unnecessary duplication of efforts. The contractor shall attend design coordination meetings at his own cost whenever required.

13.0 FIELD OFFICE RECORDS

13.1 The contractor shall maintain at his site office up to date copies of all drawings, specifications and other contract documents and any other supplementary data complete with all the latest revisions thereto. The contractor shall also maintain in

addition, the continuous records of all changes to the above contract documents, drawings, specifications, supplementary data etc. Affected at the field and on completion of his total assignment under the contract shall incorporate all such changes on the drawings and other engineering data to indicate as installed conditions of the equipment furnished and erected under the contract. Such drawings and engineering data shall be submitted to the GWSSB in required number of the copies.

14.0 DESIGN COORDINATION

14.1 The contractor shall be responsible for the selection and design of appropriate equipment to provide the basic coordinated performance of the entire system. The design requirements are detailed out in technical specifications. The design of various components, sub-assemblies and assemblies shall be done in such a way that it facilitates easy field assembly and maintenance. All the relating components shall be so selected that the natural frequency of the compact unit is not critical or close to the operating range of the unit.

15.0 QUALITY ASSURANCE PROGRAMME

To ensure that the equipment and services under scope of this contract whether manufactured or performed, within the contractor's work or at his subcontractor's premises or at the owner's site or at any other place of work are in strict accordance with the specifications. The contractor shall adopt suitable quality assurance programme for such activities at all points & such programme shall be outlined by the contractor and shall be finally accepted by the purchaser after discussions before the start of contract, and such agreed programme shall form part of the contract.

16.0 DEFECTS IN WORK OF OTHER CONTRACTOR

16.1 The GWSSB shall be notified promptly by the contractor of any defects in the other contractor works (if any), the GWSSB shall determine the corrective measures if any required to rectify this situation after joint inspection work and such decision by the GWSSB shall be binding on the contractor.

17.0 UNFORSEEN WORKING CONDITIONS

17.1

The contractor shall confirm all his field operations to those works which can be performed without subjecting the equipment and material to adverse effects, during inclement weather conditions, monsoon, storm etc. And during other unfavourable construction condition. No field activities shall be performed by the contractor under conditions which might adversely affect the quality and efficiency thereof, unless special precaution or measures are taken by the contractor in a proper and satisfactory manner in the performance of such works and with the concurrence of the purchaser. Such

unfavourable construction conditions will in noway relive the contractor of his responsibility to perform the works as per schedule.

18.0 PROTECTIVE GUARDS

- 18.1 Suitable guards shall be provided for protection of personnel on all exposed rotating and/or moving machine parts. All such guards with necessary spaces and accessories shall be designed for easy installation and removal for maintenance purposes.

19.0 WELDING

- 19.1 If the manufacture has special requirement relating to the welding procedures for welds at the terminals of the equipment to procedure procured by the owned separate specifications. The requirement shall be submitted to the GWSSB in advance of commencement of erection work.

20.0 NOISE AND VIBRATIONS

- 20.1 The equipment supplied and erection by the bidder will comply with best design and erection and its workings shall be within permissible noise and vibration levels.

21.0 EQUIPMENT BASES

21.1

A cast iron or welded steel base plates shall be provided for all rotating equipment which is to be installed on a concrete base unless otherwise agreed by the GWSSB. Each base plate shall support the unit, and its drive assembly shall be of an approved design with anchoring the units.

22.0 SHAFT ALIGNMENTS

All the shafts of rotating equipment shall be properly aligned to those of the machine equipment to as perfect an accuracy as practicable.

The equipment shall be free from excessive vibration so as to avoid overheating of bearing or other conditions which may tend to shorten the life of the equipment.

All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.

23.0 DOWELLING

All the drive motors and other equipment shall be suitably doweled after alignment of shaft with tapered machined dowels as per direction of the GWSSB.

24.0 PAINTING

All exposed metal parts of the equipment including piping, structures, railing etc. Wherever applicable after installation unless otherwise specified shall be surface protected and shall be first painted with at least primer paint used, after

thoroughly cleaning all such parts of all dirt, rust, axle greases, oils and

other foreign materials by wire brushing, scraping or sand blasting and the same being inspected

and approved for sand blasting and the same being inspected approved by the board for painting. After the above part shall be finished with two coats of alloyed resin machinery enamel paints. Quality of the finished paint shall be as per standards. So require valent and shall be of the colour as approved by the GWSSB.

25.0 COLOUR CODE FOR PIPE SERVICES

All pipe services wherever applicable are to be painted accordance with the owner's standard colour scheme by the contractor.

26.0 LUBRICATION

Equipment shall be lubricated by systems suitable for duty of the equipment. Lubricant level indicators wherever provided shall be furnished and parked to indicate proper levels under both stand still and operating conditions.

27.0 FIRST FILLING OF CONSUMABLES OIL AND LUBRICANTS

All the first fill of consumables such as oils, lubricants and essential chemicals etc. which will be required to put the equipment covered under the scope of the specifications into successful trial operation. They shall be furnished by the contractor unless specifically excluded under the in these specification and documents.

28.0 CHECKOUT CONTROL SYSTEMS

After completion of wiring and cable furnished under separate specifications and laid as per the terms noted by the board the contractor shall check out the operation of all control system for the equipment furnished and installed under these specification and documents.

29.0 EQUIPMENT PERFORMANCE GUARANTEE

The performance guarantees of the equipment under the scope of the contract are detailed separately in the technical specifications. These guarantees shall supplement the general performance guarantee provisions covered under general terms and conditions.

30.0 GUARANTEE

In the event of any emergency where in the judgment of the Board delay would cause serious loss or damage, repairs or adjustments may be made by the GWSSB or a third party chosen by the GWSSB without notice to the contractor or by surety. In the event such action is taken by the purchaser the contractors will be notified promptly and he shall assist whenever possible in making the necessary corrections. This shall not extinguish the contractor's liability under the terms and conditions of the contractor.

The cost of any special or general overhaul rendered necessary during the maintenance period due to the defect in the plant or defective work carried out the contractor the same shall be borne by the contractor.

In case of this effective parts which are not repairable at site but are essential for the commercial operation of the equipment, the contractor and the GWSSB shall naturally agree to a programme of replacement or renewal which will minimise interruption to the maximum extent, into operation of the equipment. At the end of guarantee period the contractor's liability except for the latest defects in respect of goods supplied by sub-contractor to the contractor where a longer guarantee (More than 12 months) is provided by sub - contractors, the owner shall be entitled to the benefit of such longer guarantee. Then provisions contained in this clause will not be applicable.

If the owner has not operated the equipment according to generally approved industrial practices and in accordance with the conditions of operations specified and in accordance with the operating manuals, if any.

31.0 RECOMMISSIONING TRIALS - TESTS START-UP

On completion of erection of the equipment and before start up each item of the equipment shall be thoroughly cleaned and then inspected jointly by the GWSSB and the contractor for correctness and completion of installation and acceptability for start-up, loading to initial pre-commissioning tests at site(s).

The list of pre-commissioning tests to be performed shall be as mutually agreed and include in the contractor's quality assurance programme. The contractor's commissioning / start up board specifically identified as far as possible and the contractor shall be responsible for carrying out all pre-commissioning tests. On completion of inspection checking after pre-commissioning tests are satisfactorily over, the complete shall be placed on initial operation during which period the complete equipment shall be operated integral with sub systems and supporting equipment as complete plant.

32.0 TRIAL RUN & OPERATION

The plant shall then be on trial operation during which period all necessary adjustments shall be made while operating over the full load range enabling the plant to be made ready for performance and guarantee tests.

The duration of trial operation of the complete equipment should be **three month (90 days)** of initial operation or any other duration as may be agreed to between the contractors. The trial

operation shall be considered successful provided that each item of equipment can operate continuously at the specified operating characteristics, for the period of trial operation.

For the period of trial operation, the time of operation with any load shall be counted. Minor interruptions not exceeding four (4) hours at a time caused during the continuous operation shall not affect the total duration of trial operation.

However, if in the opinion of the, purchaser, the interruption is long, the operation shall be prolonged for the period of interruption. A trial report comprising of observations and recordings of various parameters to be measured in respect of the above trial operation shall be prepared by contractor. This report, besides recording the details of the observation during trial run shall also include the dates of starts and finish of the trial operation and shall be signed by the representative of both the parties.

The report shall have sheets, recording all the details of interruptions occurred adjustment made and any minor repairs done during the trial operation, based on the observation necessary modification/repairs to the plant shall be carried out by the contractor to the full satisfaction of the GWSSB, to enable the latter on to accord permission to carry out performance and guarantee tests on the plant.

33.0 PERFORMANCE AND GUARANTEE TEST

- 33.1 The final test as to the performance and guarantees shall be conducted at site by the GWSSB. The contractor shall make the equipment ready for such tests and assist the GWSSB in conducting such tests free of cost, such test shall be commenced after the successful completion of trial operation.
- 33.2 These trends shall be binding on both the parties of the contract to determine compliance of the equipment with the performance guarantee.
- 33.3 The available instrumentation and control equipment will be used during such tests and the GWSSB will calibrate, all such measuring equipment and devices as far as practicable. However, immeasurable parameters shall be taken into account in a reasonable manner by the GWSSB, for the requirement of these tests. The tests will be conducted for the specified duty and as near to the specified conditions as practicable. The GWSSB will apply proper correction in calculation to take into account condition, which should not correspond to the specified condition.
- 33.4 Any special equipment, tools tackles required for the successful completion of the performance and guarantee tests shall be provided by the contractor, free of cost.

33.5 The guaranteed performance figure of the equipment shall be provided by the contractor during these performance and guarantee cost should the results of these tests show any depressed from the guaranteed values, the contractor shall modify the equipment as required to enable them to meet the guarantees. In such case performance and guarantee tests shall be repeated one month, from the date of equipment is ready for re-tests and all cost for modification including labour materials and the cost of additional testing prove that the equipment meets the guarantee shall be borne by the contractor.

33.6 The specific tests to be conducted on equipment have been brought out in the technical specifications.

33.7 Performance

and guarantee tests shall make allowance for instrumentation error as may be decided by the GWSSB.

34.0 REGISTRATION AND STATUTORY INSPECTION

34.1 All registration and statutory inspection fees if any in respect of this work pursuant to this contract shall be to the account of the contractor. However, any registration statutory inspection fees lawfully payable under the provision of statutory laws and its amendments from time to time during erection in respect of the plant equipment ultimately to be owned by the owners shall be to account of the owner. Should any such inspection or registration need to be rearranged due to the fault of the contractor or his sub-contractor the additional fees for such inspection and/or registrations shall be borne by the contractor.

35.0 WORKS AND SAFETY REGULATION

35.1

The contractor will not if the GWSSB of his intention to bring on the site any equipment or any container with liquid or gaseous fuel or other substance which may create hazard. The GWSSB shall have the right to prescribe

the conditions for up-keep of such hazardous equipment. Before the contractor connects any electrical appliance to any plug or socket belonging to the other contractor or owners shall:

Satisfy the Engineer-in-charge of GWSSB that the appliance is in good working conditions.

(a) Inform the GWSSB of the maximum current rating voltage and phase power factor of the appliances.

(b) Obtain permission of the Board detailing the socket to which the appliances may be connected.

35.2 The GWSSB shall not grant permission to connect until it is satisfied that

(a) The appliance is in good condition and is fitted with suitable plug

(b) The appliance is fitted with a suitable cable having two earth conductors, one of which shall be an earthed metal sheet surrounding the cores.

35.3 No electrical cable in use by the contractor /
 GWSSB shall be disturbed without prior permission. No weight of any description will be placed on any such cable and no ladder or similar equipment will be attached to it, under which such equipment or container may be handled and used during the performance of the work and the contractor shall strictly adhere to such instruction. The GWSSB shall have the right to inspect any construction plant and to forbid its use if in its opinion it is unsafe. No claims due to such prohibitions shall be entertained by the GWSSB.

35.4 Where it is necessary to provide and / or store petroleum products, petroleum mixtures and explosives, the contractor shall be responsible for carrying out such provision and / or storage in petroleum
 Act, Explosives Act 1948 and petroleum inspector of Explosive of India. All such storages shall have prior approval also the GWSSB in case any statutory authority the contractor shall be responsible for obtaining the same.

36.0 ELECTRICAL SAFETY REGULATIONS

36.1 In no circumstances shall the contractor interfere with fuse and electrical equipment belonging to the GWSSB or other contractors.

36.2 No work shall be carried out on any live equipment. The equipment shall be made safe by the GWSSB and a permit to work be issued before work is carried out.

36.3 The contractor shall employ the necessary number of qualified full-time electricians to maintain temporary electrical installation.

MATERIALS AND WORKMANSHIP

1. Introduction

- 1.1. This part of the specification sets out the general standards of materials to be supplied and the workmanship required to be ensured by the contractor. All component parts of the Works shall, unless otherwise specified, comply with the provisions of this part or be subject to the approval of the Employer. Particular attention shall be paid to a neat, orderly and well-arranged installation carried out in a methodical competent manner.

2. Reference Specifications and Standards

- 2.1. Where reference is made in the Specification to a British Standard Specification (hereinafter abbreviated to 'B.S') issued by the British Standards Institution of 2, Park street, London W.I., or to an Indian Standard Specification (I.S.) issued by the Bureau of Indian Standards, (earlier known as Indian Standard Institution), ManakBhavan, 9 Bahadur shah Zafar Marg, New Delhi 110 002, or American Society for Testing and materials (ASTM) issued by ASTM 1916 Race Street, Philadelphia, P.A., 19103, U.S.A. or American National Standards Institute (ANSI) issued by ANSI 1430, Broadway, New York, N.Y., 10018, U.S.A. or Japanese Industrial Standards (JIS) issued by Japanese Standards Association, 4-1-24, Akasaka, Minato-Ku, Tokyo 107, Japan or to any other equivalent Standard it shall be to the latest revision of that Standard at the tender opening date.
- 2.2. The contractor may propose at no extra cost to the Employer, the use of any relevant authoritative internationally recognized Reference Standard.
- 2.3. All details, materials and equipment supplied and workmanship performed shall comply with the specified Standards. If bidder offers equipment to other Standards, the equipment / material should be equal or superior to those specified and full details of the difference shall be supplied.
- 2.4. In the event of conflict between this specification and the codes for equipment, provisions of this specification shall govern. Certain specifications issued by national or other widely recognised bodies are referred to in this specification. In referring to the Standard Specifications the following abbreviations are used:

IS	:	Indian Standard
ANSI	:	American National Standards Institute
API	:	American Petroleum Institute
ASME	:	American Society of Mechanical Engineers

ASTM	:	American Society of Testing and Materials
AWS	:	American Welding Society
AWWA	:	American Water Works Association
ISO	:	International Organisation for Standardisation
DIN	:	Deutsche Institute fur Normungs
BS	:	British Standard
IEC	:	International Electro technical Commission
IEE	:	Institution of Electrical Engineers
IEEE	:	Institute of Electrical and Electronic Engineers
NEMA	:	National Electrical Manufacturers Association
AGMA	:	American Gear Manufacturer's Association

3. Materials General

- 3.1. All materials incorporated in the works shall be the most suitable for the duty concerned and shall be new and of reputed make/approved quality, free from imperfections and selected for long life and minimum maintenance. Non-destructive tests, if called for in the Specification, shall be carried out. All submerged moving parts of the plant, or shafts and spindles or faces etc. in contact with them shall be of corrosion resistant materials. All parts in direct contact with various chemicals, shall be completely resistant to corrosion, or abrasion by these chemicals, and shall maintain their properties without aging due to the passages of time, exposure to light or any other cause.

4. Workmanship General

- 4.1. Workmanship and general finish shall be firstclass quality and in accordance with best workshop practice.
- 4.2. All similar items of the plant and their component parts shall be completely interchangeable. Spare parts shall be manufactured from the same materials as the originals and shall fit all similar items. Machining fits on renewable parts shall be accurate and to specified tolerances so that replacements can be readily installed. All equipment shall operate without excessive vibration and with minimum noise. All revolving parts shall be truly balanced both statically and dynamically so that when running at normal speeds at any load up to the maximum there shall be no vibration due to lack of balance.
- 4.3. All parts which can be worn or damaged by dust shall be totally enclosed in dust proof housings. All materials incorporated in the works shall be the most suitable for the duty concerned, free from imperfections and selected for long life and minimum maintenance.

All necessary accessories required for satisfactory and safe operation of the plant shall be supplied by the contractor unless it is specifically excluded from his scope. Suitable provision by means of eyebolts or other means are to be provided to facilitate handling of all items that are too heavy or bulky for lifting and carrying by two men.

- 4.4. If, after installation, the operation or use of the materials or equipment furnished by the contractor proves to be unsatisfactory. The Employer shall have the right to operate or use such materials or equipment until correction of defects, errors or omissions, by repair or by partial or complete replacement, can be made without interfering with the plant operations. Except for any warranty provided for elsewhere in this contract or unless otherwise agreed upon in advance, the period of such operation or use, pending correction of defects, will not exceed 1 year.

5. Welding

- 5.1. Welding shall comply with the latest revision of the BS 5135 Code.
- 5.2. Welders shall be qualified in accordance with the requirement of the appropriate section of BS 4871. The Engineer shall have the right to call for further qualification from time to time from any welder who in the opinion of the EIC does not produce weld in accordance with the qualification. Each welder shall be assigned a number and letter. Each welded end shall clearly be identified as to its welder marking the welder's code adjacent to the welds. A record chart shall be maintained for each welder showing the procedures, for which he has qualified, the date of such qualification, the type of defects produced and their frequency. The EIC shall disqualify the welder whose work require disproportionate quantum of repairs. All procedures where required shall be qualified as per BS EN 283-3.
- 5.3. Inspection and quality of surveillance shall not be limited to the examination of finished welds. The techniques employed shall be based on methods which are known to produce good results and which have been verified at Site by actual demonstration.
- 5.4. Haphazard striking of the electrodes for establishing an arc shall not be permitted. The arc shall be struck either on the joint or on a starting tag. The starting tag shall be of the same material or a material compatible with the base metal being welded. In case of any inadvertent strike on place other than the welding, the area affected shall be ground flushed and examined by liquid penetration method.
- 5.5. Generally, a stringer bead technique shall be used with a slight oscillation of necessary to avoid slag and to minimise the number of beads needed to fill exceed 3 times the wire diameter. Vertical welds shall be made in upward direction. For all pipes above 300 mm dia.,

welding shall be done whenever possible, by 2 welders working simultaneously along both sides of the pipe.

- 5.6. The root pass shall have less than 1.5 mm internal reinforcement. Defects like icicles, burn through and excessive “such back” etc. shall be cause for rejection of welds.
- 5.7. Final welds shall be suitable for appropriate fabrication of the non-destructive examination of the weld. If grinding is necessary, the weld shall be blended into the parent metal without gouging or thinning of the parent metal in any way. Uneven and excessive grinding may be a cause for rejection. Fillet weld shall preferably be convex and free from undercutting and overlap at the toe of weld. Convexity and concavity shall not exceed 1.5 mm. The leg lengths shall not exceed the specified size by more than 1.5 mm.
- 5.8. All attachments such as lugs, brackets and other non-pressure parts shall also be done by qualified welders in accordance with the design details and materials specifications. Temporary attachments shall be removed in a manner that will not damage the parent metal. Areas of temporary attachments shall be dressed smooth and examined by ultrasonic or liquid penetration methods.
- 5.9. All tack welds shall be made using qualified procedure and welders, the number of size of tack welds shall be kept as small as to consist of adequate strength and joint alignments. All tack welds shall be examined visually for defects and if found defective shall be completely removed. As welding proceeds, tack welds shall be either removed completely or shall be properly prepared by grinding or filling their starting ends so that they may be satisfactorily incorporated in the welds. Unacceptable defects shall be removed by grinding machine or chipping or gouging. Flame gouging may be permitted provided gouged surfaces are ground at least by 1.0 mm below the deepest indentation.
- 5.10. All weld repairs shall be carried out using the approved welding procedures and welders. Re welded areas shall be re-examined by the methods specified for the original welds and repair procedures shall be duly qualified by the EIC’s representative.

6. Pre heating and Post Heating Treatment

- 6.1. Pre heating and post heating treatment shall conform to the relevant application codes. Preheating not exceeding 121⁰ C for all carbon steel construction above 25 mm thickness would be mandatory. Such pre heating would be maintained during flame cutting, flame or arc gouging, welding and repairs and may be done by gas heating by gas torches/gas rings with neutral flame. The temperature shall be checked by temperature indicating crayons. However, such pre heating will not be necessary for welds less than 6 mm size. In large

diameter pipe fabricated out of plate materials, production control test plates in accordance with the BS 4870 Part 1 Table 6 to represent 30 % of the long seams and each welder's performance would be mandatory.

7. Electrodes

- 7.1. All electrodes shall be stored in their original sealed containers under dry conditions. Electrodes shall remain identified until consumed. All electrodes shall be dried before use. Drying ovens shall be provided in work areas for drying purposes. Electrodes withdrawn from oven shall be promptly used and excess unused electrodes shall be promptly returned to oven.

8. Examination/NDT/Radiography

- 8.1. The various stages of examination and types shall be as stipulated in the respective fabrication Codes. Radiographic examination shall be carried out as per provisions of BS 2600 or BS 2910. Ultrasonic tests where called for shall be carried out as per provisions of BS 3926, magnetic particle tests shall be carried out as per BS 6072. Liquid penetration tests shall be carried out as per BS 6443.

9. Stainless Steel Welding

- 9.1. All welding consumable such as electrodes, filler weirs, argon gas for shielding and purging shall be of high quality and the proposed brand shall be furnished for approval of the EIC. Weld deposits shall have similar or higher physical properties and similar chemical composition to the members joined.
- 9.2. All electrodes shall be purchased in sealed containers only and stored in their packing intact. The packets opened shall be consumed as early as possible. The electrodes removed from the containers shall be kept in holding ovens at temperatures recommended by electrode manufacturer. Special care shall be taken in avoiding mixing of electrodes in the oven. The electrodes and filling wires shall be free from rust, oil, grease, earth and other foreign matter.
- 9.3. Argon gas with purity 99.5 % shall be used for shielding and purging. The purity of gas shall be certified by the gas manufacturers.
- 9.4. Non-destructive examination of the welds shall be carried out to ensure quality of weld.
- 9.5. The electric current for welding shall be direct current, straight polarity (electrode negative). The welding current shall be kept minimum possible to ensure minimum heat affected zone

in the parent material. Other side of the weld joint shall be periodically flushed with argon gas.

10. Castings

- 10.1. Cast iron shall be of standard grey close-grained quality. The structure of the castings shall be homogeneous and free from non-metallic inclusions and other injurious defects. All surfaces of castings which are not machined shall be smooth and shall be carefully fettled to remove all foundry irregularities.
- 10.2. Minor defects in depth not exceeding 12.5 percent of total metal thickness and which will not ultimately affect the strength and serviceability of the casting may be repaired by approved welding techniques. The EIC shall be notified of large defects and no repair welding of such defects shall be carried out without prior approval of the EIC. If the removal of metal for repair should reduce the stress resisting cross section of the casting by more than 25 percent, or to such an extent that the computed stress in the remaining metal exceeds the allowable stress by more than 25 percent, then casting shall be rejected. Test coupons cast simultaneously with the main castings shall be identified to check physical, chemical analysis of casting. Major defects on casting are not acceptable. Castings repaired by welding for minor defects shall be stress relieved after such welding. Non-destructive tests as directed by the EIC will be required for any casting containing defects whose extent cannot otherwise be judged, or to determine where repair welds have been properly made.

11. Forging

- 11.1. All major stress bearing forging shall be made to standard specifications. Forging shall be subjected to magnetic particle testing or dye penetration test at the areas of fillets and change in section. The testing shall be conducted after rough machining (10 microns). Any defect which will not machine out during the final machining, will be gouged out fully, inspected by dye penetration or magnetic particle inspection to ensure that the defect is fully removed and repaired using an approved repair procedure. Any indication, which proves to penetrate deeper than 2.5 % of the finished thickness of the component, shall be reported to the EIC giving the details like location, length, width and depth. For the magnetic particle's inspection, the choice of wet or dry particles shall be at the Contractor's discretion.
- 11.2. All forging shall be demagnetised after test and shall be heat treated for the relief of residual stresses.

12. Design Life

- 12.1. The works as a whole shall be new, of sound workmanship, robustly designed for a long reliable operating life and shall be capable of 24 hours per day continuous operation for prolonged period in the climatic and working conditions prevailing at the Site, and with the minimum of maintenance. Particular attention shall be given to temperature changes, the stability of paint finish for high temperatures, the rating of engines, electrical machinery, thermal overload services, cooling systems and the choice of lubricants for possible high and prolonged operating temperatures. The contractor shall be called upon to demonstrate this for any component part either by service records, or evidence of similar equipment already installed elsewhere or relevant type tests. Routine maintenance and repair shall as far as possible not requires the services of highly skilled personnel.
- 12.2. The plant shall be designed to provide easy access to and replacement of component parts which are subject to wear, without the need to replace whole units. No parts in contact with water shall have a life from new to replacement or repair of less than five years.
- 12.3. Design features shall include the protection of plant against damage caused by vermin, dirt, dust and dampness and to reduce risk of fire. Plant shall operate without undue vibration, and parts shall be designed to withstand the maximum stresses under the most severe condition of normal service. Materials shall have a high resistance to change in their properties due to the passage of time, exposure to light, temperature and any other cause which may have a detrimental effect upon the performance or life of the Works.
- 12.4. Plant located outside lockable areas/building shall have additional features to prevent unauthorised operation.

13. Lubrication

- 13.1. A complete schedule of recommended oils and other lubricants shall be furnished by the contractor. The number of different types of lubricants shall be kept to a minimum. The schedule and the name of the supplier of the lubricants shall be submitted to the EIC.
- 13.2. Contractor shall indicate indigenously available equivalent lubricants with complete specification, to enable the Employer to arrange for regular supply.
- 13.3. Where lubrication is affected by means of grease, preference shall be given to a pressure system which does not require frequent adjustment or recharging. Frequent, for this purpose, means more than once in a month and grease systems having shorter periods between greasing should be avoided. Where necessary for accessibility grease nipples shall be placed at the end of the extension piping, and, when a number of such points can be grouped conveniently, the nipples shall be brought to a battery plate mounted in a convenient

position. All grease nipples shall be of the same size and type for every part of the plant. Arrangements shall be provided to prevent bearings being overfilled with either grease or oil.

- 13.4. Where more than one type of special grease is required a grease gun for each special type shall be supplied and permanently labelled.
- 13.5. Oil containers shall be supplied complete with oil level indicators of the sight glass type, or where this is not practicable, with dipsticks. The indicators shall show the level at all temperatures likely to be experienced in service. The levels shall be clearly visible in the sight glass type from the normal access floor to the particular item of Plant and they shall be easily dismantled for cleaning. All sight glasses shall be firmly held and enclosed in metal protection in such manner that they cannot be accidentally dislodged.
- 13.6. All lubrication systems shall be designed so as not to cause a fire or pollution hazard and particular care shall be taken to prevent leakage of lubricants and to avoid leaking lubricants coming into contact with any electrical equipment, heated surfaces or any other potential source of fire.

14. Name Plate

- 14.1. Each item of the plant shall have permanently attached to it in a conspicuous position, a nameplate and rating plate. Upon these shall be engraved or stamped, the manufacturer's name, type and serial number of plants, details of the loading and duty at which the item of plant has been designed to operate, and such diagrams as may be required by the EIC. All indicating and operating devices shall have securely attached to them or marked upon them designations as to their function and proper manner of use.
- 14.2. Name plates, rating plates and labels shall be of a non-flame propagating material, either non hygroscopic or transparent plastic with engraved lettering of a contrasting colour. Fixing shall be by means of non-corrosive screws, drive rivets or adhesives shall not be used.
- 14.3. Warning labels shall be provided where necessary to warn of dangerous circumstances or substances. Inscriptions or graphic symbols shall be black on a yellow background.
- 14.4. Instruction labels shall be provided where safety procedures such as wearing of protective clothing are essential to protect personnel from hazardous or potentially hazardous conditions. These labels shall have inscriptions or graphic symbols in white on a blue background.

15. Hardware, Nuts, Bolts, Studs and Washers

- 15.1. Nuts, bolts, studs and washers for incorporation in the plant shall conform to the requirements of the appropriate standard. Nuts and bolts shall be of the best quality of specified grade, machined on the shank and under the head and nut
- 15.2. Fitted bolts shall be a light driving fit in the reamed holes they occupy, shall have the screwed portion of such a diameter that it will not be damaged in driving and shall be marked in a conspicuous position to ensure correct assembly at site.
- 15.3. Washers, locking devices and anti-vibration arrangements shall be provided where necessary. Jointing hardware for the entire Plant shall be provided with sufficient spares to cater for site losses.
- 15.4. Where bolts pass through structural members taper washers shall be fitted, where necessary, to ensure that no bending stress is caused in the bolt. Where there is a risk of corrosion, bolts, nuts and studs shall be designed so that the maximum stress does not exceed half the yield stress of the material under any conditions. All bolts, nuts and washers which are subject to frequent adjustment or removal in the course of maintenance and repair shall be made of nickel bearing stainless steel.
- 15.5. The contractor shall supply all holding down, alignment and levelling bolts complete with anchorages, nuts, washers and packing required to attach the plant to its foundations, and all bed plates, frames and other structural parts necessary to spread the loads transmitted by the plant to concrete foundations without exceeding the design stresses.

16. Allowance for Wastage

- 16.1. The contractor shall supply reasonable excess quantities to cover wastage of those consumable which will be normally subject to waste during erection, commissioning and setting to Work.

17. Painting – General

- 17.1. The contractor shall be responsible for the cleaning, preparation for painting, and priming or otherwise protecting, as specified, all parts of the plant at the place of manufacture prior to packing.
- 17.2. Parts may be cleaned but surface defects may not be filled in before testing at the manufacturer's works. Parts subject to hydraulic test shall be tested before any surface treatment. After test, all surfaces shall be thoroughly cleaned and dried out if necessary, by washing with an approved de watering fluid prior to surface treatment. Except where the specification provides to the contrary all painting materials shall be applied in strict accordance with the paint manufacturer's instructions.

- 17.3. All protective coatings shall be suitable for use in warm humid climates. All primers, under coats and finishes shall be applied by brush or airless spray, except where otherwise specified. Consecutive coats shall be in distinct but appropriate shades. All paints shall be supplied from the store to the painters, ready for application, and addition of thinners or any other material shall be prohibited.

18. Painting at Place of Manufacture

- 18.1. Steel and cast-iron parts shall be sand blasted to near white cleaning before painting. Edges, sharp covers etc. shall be ground to a curve before sand blasting. A primer coat of a zinc rich epoxy resin-based coating with at least 75 microns dry film thickness is to be provided. In addition to the parts are to be provided with adequate number of coats of coal tar epoxy polyamine coating to a dry film thickness of 175 microns including primer coating.

19. Painting at Sites

- 19.1. Immediately on arrival at the site, all items of plant shall be examined for damage to the paint coat applied at the manufacturer's works, and any damaged portions shall be cleaned down to the bare metal, all rust removed, and the paint coat made good with similar paint.
- 19.2. After erection, such items which are not finish painted shall be done so and, items that have been finish painted at the manufacturer's works shall be touched up for any damaged paint work. For finish painting, two coats of synthetic enamel conforming to IS: 2932 shall be applied. Dry film thickness of each coat shall be at least 25 microns.
- 19.3. The dry paint film thickness shall be measured by Electrometer or other instruments approved by the GWSSB. In order to obtain the dry film thickness specified, the contractor shall ensure that the coverage rate given by the paint manufacturer will enable this thickness to be obtained. Strength of adhesion shall be measured with an adhesion tester and this value shall not be less than 10 kg/cm^2 . Painted fabricated steel work which is to be stored prior to erection shall be kept clear of the ground and shall be laid out or stacked in an orderly manner that will ensure that no water or dirt can accumulate on the surface. Suitable packing shall be laid between the stacked materials. Where cover is provided, it shall be ventilated.

20. Noise and Vibration

- 20.1. The Contractor shall provide a quiet installation. All items of plant and equipment shall be carefully chosen with a view to minimizing sound levels.
- 20.2. The Contractor shall provide and fix all material for the prevention of transmission of noise and vibration through the structure. Where appropriate all fans, A/C package unit,

compressors and other motif plant shall be mounted on resilient mountings. All rotating plant shall be statically and dynamically balanced.

21. Galvanising

21.1. Wherever galvanising has been specified the hot dip process shall be used. The galvanised coating shall be of uniform thickness. Weight of zinc coatings for various applications shall not be less than those indicated below:

- **Fabricated steel**

i	Thickness less than 2 mm but not less than 1.2 mm	340 Grams /Square mm
ii	Thickness 2 mm and above	460 Grams /Square mm

- **Fasteners**

i	Up to nominal size M10	270 Grams /Square mm
ii	Over M10	300 Grams /Square mm

21.2. Galvanising shall be carried out after all drilling, punching, cutting, bending and welding operations have been carried out. Burrs shall be removed before galvanising. Any Site modification of galvanised parts should be covered well by zinc rich primer and aluminium paint.

22. Support for Pipe work & Valves

All necessary supports, saddles, slings, fixing bolts & foundation bolts shall be supplied to support the pipe work. Valve and other equipment mounted in the pipe work shall be supported independent of the pipes to which they connect.

DETAILED & PARTICULAR TECHNICAL SPECIFICATIONS**MECHANICAL****ITEM -1 Operation & maintenance**

As per O&M manual volume

ITEM No -2 Man power

As per O&M manual volume

ITEM -3 Water Metres (Woltman type)

Design, Supply, Installation, Testing, Commissioning of Woltman type Bulk Water Meter, CI/ Brass/Bronze body material, totalizer made of copper can suitably anti corrosive metallic material, totaliser metallic shall have 5 mm thick glass cover suitable against antifraud attempts, Flange End process connection, IP 68 protection class, Wollman type Water Meter with removable mechanism, magnetic drive, dry dial, and be fitted with a low mass rotor which is parallel to the direction of water flow and exhibits dynamic thrust relief, water meters complete with T Type strainer, ISO 4064 2005 with valid CE mark mentioning notified body number along with MID/OIML/ISO certification from a recognized International laboratory.

80 mm Dia

Scope

Design, manufacture, supply, installation, testing, and commissioning of 80 mm dia Woltman type bulk water meter complete with T-type strainer, all accessories, and fittings, suitable for bulk water measurement in transmission/distribution systems.

Applicable Standards

The meter shall conform to the latest editions of:

- ISO 4064:2005 / ISO 4064 (latest) – Water meters
- IS 2373 – Water meters (for reference where applicable)
- Meter must be tested and certified by a recognized laboratory.

Size & Type

- Nominal Diameter: 80 mm
- Type: Woltman (Horizontal / Inferential type)
- Flow Direction: Axial (parallel to flow)
- End Connection: Flanged Ends

Metrological Characteristics

- Accuracy Class: Class B or better (as per ISO 4064 / R80/R100 preferred)
- Minimum Flow (Q1), Transitional Flow (Q2), Permanent Flow (Q3), Overload Flow (Q4): As per ISO standards
- Meter shall maintain accuracy over full flow range

Construction & Material**Body**

- Material: Cast Iron / Brass / Bronze (Epoxy coated internally & externally)
- Corrosion resistant and suitable for potable water

Measuring Mechanism

- Removable cartridge type mechanism
- Magnetic drive (no direct contact between wet & dry parts)
- Dry dial type register

Rotor

- Low mass rotor aligned parallel to flow
- Designed for dynamic thrust relief for reduced wear

Totalizer

- Material: Copper / Anti-corrosive metallic material
- Hermetically sealed
- 5 mm thick glass cover for anti-fraud protection
- Reading in kilolitres (KL)

Protection Class

- Minimum: IP 68
- Suitable for continuous submersion

Strainer

- T-Type Strainer to be supplied along with meter
- Body: CI

- Screen: Stainless Steel
- Suitable for same pressure rating as meter

Pressure & Temperature Rating

- Working Pressure: PN 16
- Test Pressure: As per ISO 4064
- Operating Temperature: Up to 60°C (or as required)

Design Features

- Flanged ends drilled as per IS 1538 / IS 6392
- Arrow marking for flow direction
- Vacuum sealed register
- Tamper-proof sealing arrangement
- Provision for AMR/AMI (optional, if required)

Installation

- Installed in horizontal position unless otherwise approved
- Straight length requirement:
 - Upstream: Minimum 5D
 - Downstream: Minimum 3D
- Proper alignment without strain
- With necessary gaskets, nuts, bolts

Testing & Certification

- Factory calibration certificate
- Hydrostatic and accuracy test reports
- MID / CE certification with notified body number
- OIML / ISO certification documents

Inspection

- Third-party inspection (if required)
- Visual, dimensional, and performance checks

Guarantee

- Minimum 12 months warranty from date of commissioning

Measurement

- Unit: Number (Nos.)
- Rate includes:
 - Supply
 - Transportation
 - Installation
 - Testing & Commissioning
 - All accessories including strainer

Approved Makes

- Honeywell (Elster)
- Itron
- Diehl Metering
- Sensus
- Kranti / Equivalent approved make

ITEM No -04 :Fishing Out of Stuck/ Fallen Pumping Machinery

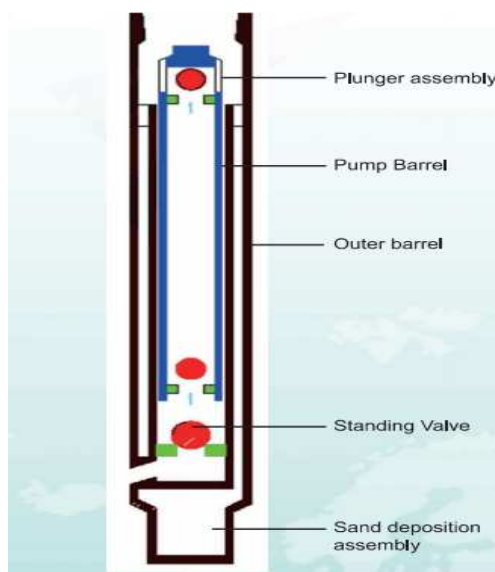
Labour charge for fishing out submersible pump set fallen in tube well of size 150 mm / 200 mm / 250 mm / 300 mm dia. including carting of required materials, fixtures for fishing to site of work including carting charges of the fished out submersible pump set and accessories to the respective departmental store including loading and unloading.

- If There is any Problem Of Pumping Machinery pipes / cable etc. stuck/Trapped /Fallen in bore hole then contractor have to fishing out submersible pump set fallen in tube well of size 150 mm / 200 mm / 250 /300 mm dia. including carting of required materials, fixtures for fishing to site of work including carting charges of the fished out submersible pump set and accessories to the respective departmental store including loading and unloading of pumping machinery by special technique with special tools / fixtures by agency by all means.

- During execution of this item, if recording camera required, agency must provide it during execution. No extra payment shall be made for items.
- Payment shall be made as per item executed based on job work as & when required.

ITEM-05 Charges for attending existing bore well And Bore hole cleaning.

- Contractor shall be responsible for Charges for attending existing bore well and taking necessary measurement & giving opinion for the depth & kind of filling materials and open about cleaning of bore hole for cleaning of with necessary tools & tacksels (without lifting & lowering pump) minimum charge within 50 km shall be paid Lumpsum.
- Payment will be made per Job.
- The work of Cleaning of bore hole by sand barrel system including removing foreign materials, sand, clay, pebbles etc. with necessary tools, plants and accessories; shall be performed by contractor in well condition and manner by all means.
- Due to ground water carries lots of foreign material along with water as sand, clay, Pebbles etc., after prolong use of deep, there may be reduction of discharge from tubewell. sand can really bring a lot harms on our equipment, pumping efficiency and operation time. Hence it is required to flush out such foreign matter from Tubewell. Sand barrel method is the most common application to remove foreign materials like sand, clamp, pebbles, etc with necessary tools, plants & accessories.
- Sand Barrel method uses Down Hole Plunger type valve as shown below;



Characteristics:

- With locking device at bottom, the barrel will not be extended due to the action of liquid column, and the clearance will not increase. So it's more suitable for deep wells;
- A valve blocking device is added to prevent the sand from falling back into barrel, resulting in sand stuck for plunger;
- The sand scraping assembly on the plunger can clean the sand on the inner wall of barrel, then the sand is discharged by liquid flow.
- All the Foreign materials like Sand, pebbles, clay etc. present in the Deep tubewell must be flushed out from the well until Sand free discharge and maximum discharge is obtained from tubewell.
- Agency must provide photos along with latitude, longitude along with bill documents.

ITEM-06Reflux Valve

Supplying, & erecting C.I swing, check type non-return(Reflux) Valve -ISI marked suitable for 80 mm dia nominal size.

Scope:Supplying & erecting C.I. swing check type Non-Return (Reflux) Valve, ISI marked, 80 mm nominal size, complete with fitting.

Standard: As per IS 5312 (Part 1).

Material:

- Body: Cast Iron (C.I.)
- Seat/Disc: Gunmetal / Brass (as per standard)

Type:

- Swing type, non-return valve
- Flanged ends

Installation:

- Fixed in pipeline with proper alignment
- With nuts, bolts, rubber gasket
- Ensure correct flow direction

Testing:

- Leakage test
- Smooth operation check

Measurement:

- Per No., including supply, erection & fittings

ITEM-07 MCCB

Providing and erecting Approved make Four pole moulded case circuit breaker having breaking capacity ICU of 35 KA. at 415 V. having Normal current rating 200A.with variable Thermal & magnetic release suitable to work on A.C.supply 50 c/s. with all internal connections, spreader tinned copper & complete erected in 16 G.M.S.housing including all supply of wiring, fittings

Scope:Providing & erecting 4 pole MCCB (200A) with 35 kA breaking capacity at 415V, complete with enclosure, wiring, and accessories.

Standard: As per IS/IEC 60947-2.

Rating:

- Current: 200 Amps
- 4 Pole
- Breaking Capacity (Icu): 35 kA
- Voltage: 415V AC, 50 Hz

Features:

- Adjustable thermal & magnetic release
- Suitable for AC supply

Construction:

- Mounted in 16 SWG MS enclosure
- With tinned copper spreaders/busbars
- Proper insulation & earthing

Installation:

- Complete internal wiring with lugs
- Proper tightening and connections
- Neat panel mounting

Testing:

- Functional test
- Trip operation check

Measurement:

- Per No., including supply, erection, wiring & fittings

ITEM-08 Filling of Existing Failed TW

Filling of Existing failed Tubewell or Abandoned bore hole of any size by sticky clay (with required materials)- for old failed tubewells

Scope: Filling of existing failed/abandoned tubewell or borehole (any size) using sticky clay, including all materials, labour, and complete closure.

Material:

Good quality impervious sticky clay free from stones and organic matter

Method:

- bore shall be cleaned before filling
- Filling done in layers with proper ramming/compaction
- Entire depth to be filled up to ground level
- Top properly sealed to prevent water percolation

Standard: As per CGWB / IS 2800 (relevant practices)

Safety:

- Ensure no collapse or hazard during filling
- Proper site barricading

Measurement:

Per RMT. (Each tubewell) including all materials, labour, and complete filling

ITEM-10 corrugated pipes (DWC)

Providing & laying approved make Double walled corrugated pipes (DWC) of polyethylene (conforming to IS 14930 II)with necessary connecting accessories of same material at required depth in existing trench for laying of cable below ground/road surface for enclosing cable (A)50 mm outer dia

Scope: Providing & laying Double Wall Corrugated (DWC) HDPE pipe of 50 mm outer dia for underground cable protection in trench/road crossing.

Material:

- HDPE DWC pipe (outer corrugated, inner smooth)
- With couplers/bends of same material

Laying:

- Laid at required depth in trench
- Proper alignment with necessary joints/accessories
- Suitable for underground/road crossing

Installation:

- Cable pulled smoothly without damage
- Ends sealed to prevent ingress of soil/water

Testing/Inspection:

- Visual check for joints & alignment
- Ensure no damage/cracks

Measurement:

- Running meter (Rmt) including supply, laying & accessories

ITEM-11 CABLE LUGS:

Solder less crimping type aluminium lugs conforming to IS suitable for cable of following size evenly crimped with high pressure tool & connected to switchgear terminals with brass/cadmium plated nut bolts in an approved manner. 16/25 sq.mm

Scope: SITC of aluminium solderless crimping type cable lugs for 16 & 25 sq.mm cables, complete with crimping and connection to switchgear.

Standard: As per IS 8309.

Material: Electrolytic grade aluminium, seamless barrel, flat palm with hole.

Crimping: Done using high-pressure (hydraulic) crimping tool Proper die matching lug size

Installation:

- Proper stripping and insertion of conductor
- Connected with brass/cadmium plated nuts & bolts
- Tight, secure and low resistance joint

Testing:

- Visual inspection
- Continuity check

Measurement:

- Per No., including supply, crimping, and fixing

ITEM-12 LED LIGHT FIXTURES:

SITC of Indoor wall mounting LED indoor fitting with LED s of wattage 0.2 kwatt to 0.5 watt assembled on single MCPCB with housing used as a heat sink shall be made of thick sheet steel confirming to IS :513/CRCA polyester powder coated and high U.V. & corrosion resistance with diffuser and/or Poly carbonate optics with company mark/name 120 to 300V, Power Factor more than 0.9, THD <10%,CCT 4000K to 6500K, Uniformity ration >0.7, Luminareefficancy> 85 Lumens/watt, LED driver efficiency >85% (Each fitting required LM-79 & LM-80 Certificates) Tube Light with integral/ nonintegral driver 22-24Watts, Surge - 2KV,IP-20, 4 feet Cat III

Scope of Work

This work includes Supply, Installation, Testing and Commissioning (SITC) of indoor LED tube light fittings (4 feet) complete with all accessories, wiring, mounting hardware, and connection to existing electrical system as per specifications and drawings.

2. Applicable Standards

The LED fitting shall conform to latest editions of:

- **IS 10322 (Part 5/Sec 1)** – Luminaire requirements
- **IS 16102 (Part 1 & 2)** – LED Lamps performance

Type of Luminaire

- **Type: LED Tube Light (Batten Type)**
- **Mounting: Wall / Surface Mounted (Indoor)**
- **Length: 4 Feet (Approx. 1200 mm)**
- **Application: Indoor lighting (offices, pump houses, control rooms)**

Electrical Characteristics

Parameter	Requirement
Wattage	22–24 Watts
Operating Voltage	120V to 300V AC
Frequency	50 Hz
Power Factor	≥ 0.90
Total Harmonic Distortion (THD) < 10%	

Parameter	Requirement
Surge Protection	2 kV
Insulation Class	Class I / II

LED & Driver Specifications

LED Module

- High efficiency LEDs mounted on **single MCPCB**
- Proper thermal management ensured
- Long life: **≥ 50,000 burning hours**

Driver

- Type: **Integral or Non-integral**

Constructional Details

Housing:

- Made of CRCA sheet steel conforming to IS 513
- Polyester powder coated
- High UV and corrosion resistance

Heat Sink:

- Housing itself acts as heat dissipation body

Diffuser/Optics:

- Polycarbonate diffuser or optics
- UV stabilized, glare-free output

Finish:

- Smooth, aesthetic, and durable

Ingress Protection

- **IP Rating: IP20 (Indoor application)**

Marking

Each luminaire shall have:

- Manufacturer's name / brand
- Wattage and voltage rating
- lumen output
- IS standard marking

Installation

- Mounted on wall/ceiling using suitable clamps/brackets
- Connection with PVC insulated copper wire
- Proper earthing of metallic body
- Neat and secure wiring
- Testing after installation

Measurement & Payment

- Unit: **Each (Per Fitting)**
- Rate includes:
 - Supply of complete fitting
 - Installation
 - Wiring and accessories
 - Testing & commissioning

Preferred Makes

- **Philips / Wipro / Havells / Crompton / Bajaj / Syska / Panasonic or equivalent approved make**

Notes

- Driver shall be suitable for **wide voltage fluctuation (120–300V)**
- Fitting shall be **flicker-free**
- Minimum maintenance required
- Suitable for **continuous operation in indoor conditions**

ITEM-13 Earthing for panel

Supplying & erecting funnel type earthing having earth plate of following size buried in specifically prepared earth pit 3 mtr. below ground with 40 kg. charcoal and salt with alternate layers of charcoal & salt, 20mm.dia. G.I. pipe with Funnel with a wire mesh for watering & bricks masonry block, C.I. Cover complete as per para 7.3 of IS 3043 with necessary length of double Galvanised Iron /copper earth wire No 6 SWG bolted with lug to the plate and covered in 12 mm dia. G.I. pipe 2.5 mtr long complete connected to the nearest switch gear with end socket as per direction & duly tested by earth tester confirming to IS (As per drawing) with following specification. (C) with 30 X 30 X 0.35 cms. CI earth plate.

Scope of Work

The work includes design, supply, installation, testing, and commissioning of plate type earthing system (funnel type) using C.I. earth plate (30 cm × 30 cm × 3.5 mm) for effective grounding of electrical panels.

Applicable Standards

The complete earthing system shall conform to:IS 3043 – Code of Practice for Earthing

Type of Earthing

- Type: **Plate Earthing (Funnel Type)**
- Electrode Material: **Cast Iron (C.I.) Plate**
- Application: **Electrical panel earthing**

Earth Electrode

- Material: **Cast Iron (C.I.)**
- Size: **300 mm × 300 mm × 3.5 mm thickness**
- Plate shall be free from cracks, blow holes, and defects
- Provided with **holes for bolting earth conductor with lug**

Earth Pit Construction**Excavation**

- Pit depth: **Minimum 3.0 meters below ground level**
- Pit size: As required to accommodate plate and filling

Installation

- Plate shall be placed **vertically** in the pit

Backfilling Material

- Around the plate, provide **alternate layers** of:
 - **Charcoal (total approx. 40 kg)**
 - **Salt (sodium chloride)**
- Layer thickness: Approx. **150 mm each**
- Purpose:
 - Reduce earth resistance
 - Improve moisture retention

Watering Arrangement (Funnel Type)

- 20 mm dia GI pipe provided from ground level to plate

Top fitted with:

- Funnel
- Wire mesh to prevent debris entry
- Used for periodic watering of earth pit

Masonry Chamber

Construct brick masonry chamber around top of pipe

Size: Approx. 300 mm × 300 mm × 300 mm

Plastering: Cement mortar (1:4)

Cover:

Heavy duty C.I. cover with frame

Removable for maintenance

Installation Requirements

- All joints shall be **mechanically strong and electrically continuous**
- Joints shall be protected against corrosion
- Earthing conductor shall be laid in **shortest practical path**
- Proper identification (earthing marking) to be provided

Inspection & Acceptance

- Visual inspection of:
 - Plate size and material
 - Layering of charcoal and salt
 - Pipe and funnel arrangement
- Verification of:
 - Proper connection to panel
 - Earth resistance value

Measurement & Payment

- Unit: **Per Set (Each complete earthing system)**
- Rate includes:
 - Excavation
 - Supply of all materials
 - Installation
 - Backfilling
 - Masonry chamber
 - Testing & commissioning

Notes

- Water shall be poured periodically to maintain low resistance
- Earthing pit location shall be away from foundation and dry zones
- Multiple earthing may be interconnected for better performance

ITEM-14 Analog type Voltmeter.**Scope of Supply**

The specification covers design, manufacture, testing, supply, and delivery of panel-mounted analog type voltmeters suitable for measurement of AC/DC voltage in electrical systems used in water supply, pumping stations, and allied installations.

Applicable Standards

The voltmeter shall conform to the latest editions of the following IS standards:

Type & Principle

- Type: **Analog, direct reading**
- Principle:
 - **Moving Iron (MI)** type for AC measurement
 - **Permanent Magnet Moving Coil (PMMC)** type for DC measurement
- Mounting: **Flush mounting (panel type)**

Electrical Characteristics

- Parameter Requirement
- Rated Voltage Range: As specified (e.g., 0–300V AC or DC)
- Frequency (for AC): 50 Hz \pm 5%
- Accuracy Class: Class 1.5 (or better as specified)
- Overload Capacity: 120% of rated voltage for 2 hours without damage
- Power Consumption: Low consumption type

Constructional Requirements

- Meter shall be **robust, dust-proof, and suitable for tropical conditions**
- Case: **Non-corrosive, flame-retardant plastic or metal enclosure**
- Front Cover: **Clear, shatterproof glass/acrylic**
- Dial:
 - Clearly marked scale with anti-glare finish
 - Black markings on white background
 - Uniform scale distribution
- Pointer:
 - Knife-edge type for precise reading
 - Anti-parallax mirror scale preferred
- Terminal:
 - Suitable for **copper conductor connections**
 - Clearly marked polarity (for DC meters)

Size & Mounting

- Standard sizes:
 - **96 mm × 96 mm** (preferred)
 - 72 mm × 72 mm (if specified)
- Mounting: **Flush panel mounting with clamps**
- Depth: Suitable for standard LT panels

Marking

Each voltmeter shall be clearly marked with:

- Manufacturer's name / trademark
- Type and model
- Rated voltage
- Accuracy class
- Serial number
- IS standard marking

Installation & Commissioning

- Shall be installed on control panel
- Proper tightening of terminals
- Ensure correct polarity (for DC)
- Functional check after installation

Measurement & Payment

- Unit: **Number (Nos.)**
- Payment includes:
 - Supply
 - Transportation
 - Testing
 - Installation & commissioning

Preferred Make

AE / Rishabh / Motwane / HPL / L&T / Schneider (or equivalent approved make)

ITEM-15 Analog type Ampreremeter.

Scope of Supply

This specification covers design, manufacture, testing, supply, and delivery of **panel-mounted analog type ammeters** for measurement of AC/DC current in LT panels, pumping machinery, and electrical installations.

Applicable Standards

The ammeter shall conform to latest editions of:

- **IS 1248 (Part 1 to 5)** – Direct Acting Indicating Analogue Electrical Measuring Instruments

Type & Principle

- Type: **Analog indicating type**
- Principle:
 - **Moving Iron (MI)** – for AC measurement
 - **PMMC (with shunt)** – for DC measurement
- Mounting: **Flush panel mounting**

Electrical Characteristics

Parameter	Requirement
Current Range	As specified (e.g., 0–100A)
CT Secondary	5A (standard) for CT-operated ammeters
Frequency (AC)	50 Hz \pm 5%
Accuracy Class	Class 1.5 or better
Overload Capacity	120% of rated current for 2 hours
Continuous Rating	100% rated current
Power Consumption	Low consumption type

CT Operated Ammeter (For Currents > 30A)

- Ammeter shall be used with **Current Transformer (CT)**
- Secondary current: **5A**

- Scale shall be calibrated to indicate **primary current**
 - Example: 100/5A CT → Ammeter scale: 0–100A
- CT ratio must be clearly mentioned on dial

Constructional Requirements

- Enclosure:
 - Non-corrosive, dust-proof, and rugged
 - Flame-retardant plastic or metal case
- Front:
 - Transparent, shatterproof glass/acrylic
- Dial:
 - White background with black markings
 - Uniform, clear scale
 - Anti-parallax mirror preferred
- Pointer:
 - Knife-edge type
 - Balanced and vibration-resistant
- Terminals:
 - Brass terminals with proper insulation
 - Suitable for copper conductors

Size & Mounting

- Standard sizes:
 - **96 mm × 96 mm (preferred)**
 - 72 mm × 72 mm (optional)
- Mounting: **Flush mounting with clamps**
- Suitable for standard LT pane

Calibration & Accuracy

- Factory calibrated

- Accuracy shall be **Class 1.5**
- Calibration certificate required
- Linear scale with easy readability

Marking Each ammeter shall have:

- Manufacturer's name / trademark
- Model/type
- Current range
- CT ratio (if applicable)
- Accuracy class
- IS marking

Installation & Commissioning

- Proper connection with CT secondary (for CT-operated meters)
- **IMPORTANT:** CT secondary must never be open-circuited
- Tighten all terminals properly
- Check polarity and phase
- Functional testing after installation

Measurement & Payment

- Unit: **Number (Nos.)**
- Payment includes:
 - Supply
 - Transportation
 - Installation
 - Testing & commissioning

Preferred Makes

AE / Rishabh / Motwane / HPL / L&T / Schneider or equivalent approved make

Sign of Contractor

Executive Engineer,
P.H.Mechanical Division-Bhuj.

APPROVED VENDOR LISTS**(Mechanical, Electrical, Instrumentation & Civil Items)**

The approved lists of vendors for Mechanical/Electrical/Instrumentation/Civil equipment and accessories to be supplied under this contract/bid is available on GWSSB's official website.

For pumping machinery i. e. HSCF Type Pump Set and Mono submersible along with its Prime Mover i. e. LV Induction Motors, where total working HP per pumping station exceeds 350 H.P. Pumps and Motors & All other associated and relevant Electro Mechanical Equipent/Items will have to be supplied from manufacturers (i.e. vendors) who are registered in "A" Group category as per Approved & Prevailing Vendor List.

The lists of approved vendors as prevailing on the date of submission of the BID will hold true. However subsequent addition/deletion in above vendors' lists by the competent authority of GWSSB shall also be applicable at the time of approval of QAPs. However, decision of the competent authority of GWSSB shall be final & binding in this regard.

Contractor

Executive Engineer (Mech)