

TECHNICAL SPECIFICATION

NAME OF WORK :- Operation, Maintenance and Repairing of Tubewell & Sump Pumping Machinery and Pipeline Network of Various H/W Under Khombhadi Complex RWSS for 12 Month Under M & R Programme-2026-27 (2nd Attempt)

PART – A :- SECTION – A

Civil Part A-1

Item No. 1 :- Operation & Maintenance of Pipeline network including providing, supplying and fixing necessary specials (CID joints, bends, couplers, tail piece, T etc.) suitable to various dia. of PVC pipes, HDPE pipes and suitable special etc. Complete including leakage repairing . The routine inspection, cleaning, flushing, leak detection, and repairs; preventive maintenance of valves and appurtenances; cleaning of valve chambers, tools, safety equipment, and supply of necessary consumables/spares, complete
For Non- Metallic Pipeline
Khombhadi Complex Existing Pipeline Network
Khombhadi Complex New Pipeline Network

1. Scope of Work

The work shall include **operation, routine maintenance, preventive maintenance, and repair** of non-metallic pipeline networks such as **PVC, HDPE pipelines** of various diameters, including all associated fittings, valves, and appurtenances.

The contractor shall ensure **continuous and efficient water supply** through the pipeline system with minimum losses and leakages.

2. Materials & Specials

The work includes **providing, supplying, and fixing** all necessary specials such as:

- CI / DI / PVC compatible joints (CID joints)
- Bends (all degrees)
- Couplers / repair couplers
- Tail pieces
- Tees (T-joints)
- Reducers
- End caps
- Flanges (where required)

All materials shall:

- Conform to relevant **IS standards**

- Be compatible with **PVC / HDPE pipelines**
 - Be approved by the Engineer-in-Charge before use
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3. Routine Operation & Maintenance

The contractor shall carry out:

- Regular **patrolling and inspection** of pipeline network
 - Monitoring of **pressure and flow conditions**
 - Ensuring **equitable water distribution**
 - Operation of valves as per requirement
 - Maintaining logbooks for operation activities
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4. Leak Detection & Repair

- Identification of visible and hidden leakages
- Use of suitable methods for **leak detection**
- Immediate repair of:
 - Pipe bursts
 - Joint leakages
 - Fitting failures
- Replacement of damaged pipe sections if required

All repairs shall be carried out with **minimum interruption** to water supply.

5. Cleaning & Flushing

- Periodic **flushing of pipelines** to remove sediments
 - Cleaning of dead ends and low-velocity zones
 - Maintaining water quality standards
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6. Preventive Maintenance

- Regular inspection and maintenance of:
 - Valves (sluice valves, air valves, scour valves)
 - Chambers and appurtenances
 - Lubrication, tightening, and replacement of worn parts
 - Ensuring all valves are **fully operational**
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7. Valve Chamber Maintenance

- Cleaning and dewatering of chambers
- Repair of chamber structures if required
- Ensuring accessibility and proper cover placement

8. Tools, Plants & Safety

The contractor shall provide:

- Necessary tools and equipment:
 - Pipe cutting tools
 - Welding / jointing machines (for HDPE)
 - Leak detection devices
 - Safety equipment:
 - Helmets, gloves, gumboots
 - Gas detectors (if required)
 - Barricading materials
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9. Consumables & Spares

All consumables shall be included in the scope:

- Rubber rings / gaskets
- Nuts, bolts, washers
- Solvent cement (for PVC)
- Lubricants
- HDPE jointing materials

No extra payment shall be made for these items.

10. Work Execution Conditions

- Work shall be executed **as per direction of Engineer-in-Charge**
 - Minimum disruption to public and traffic
 - Proper **barricading and signage** during repair work
 - Restoration of road surface after excavation
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11. Measurement

- The work shall generally be measured on:
 - **Per km per month basis** OR
 - As per tender item description

No separate measurement shall be made for:

- Leak repairs
 - Specials used
 - Tools and consumables
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12. Payment

- Payment shall be made on **monthly basis** for satisfactory O&M
- Rate includes:
 - Labour
 - Materials
 - Tools & plants
 - Transportation
 - All taxes, duties, royalties

No extra payment shall be made for:

- Emergency repairs
- Night work
- Any incidental charges

13. Performance Requirements

- Maintain **minimum leakage losses**
- Ensure **24x7 readiness for emergency repairs**
- Response time:
 - Minor leakage: within 6 hours
 - Major burst: within 2–4 hours

14. Records & Reporting

Contractor shall maintain:

- Daily logbook
- Leakage register
- Maintenance records
- Material consumption register

The work shall be carried out to the satisfaction of engineer-in-charge.

The payment should be made for completed item as per Schedule-B (BAQ)

Item No. 2 :- Operation & Maintenance of Pipeline network including providing, supplying and fixing necessary specials (CID joints, bends, couplers, tail piece, T etc.) suitable to various dia of D.I. pipes and suitable special etc. Complete including leakage repairing. The routine inspection, cleaning, flushing, leak detection, and repairs; preventive maintenance of valves and appurtenances; cleaning of valve chambers, tools, safety equipment, and supply of necessary consumables/spares, complete
For Metallic Pipeline
Khombhadi Complex Existing Pipeline Network

1. Scope of Work

The work shall include **operation, routine maintenance, preventive maintenance, leakage detection, and repair of metallic pipeline network (Ductile Iron – D.I. pipelines)** of various diameters including all fittings, valves, and appurtenances.

The contractor shall ensure **efficient, continuous, and leak-proof water supply system** as per directions of the Engineer-in-Charge.

2. Materials & Specials

The contractor shall provide, supply, and fix all required specials including:

- DI / CI compatible joints (CID joints, push-on joints, mechanical joints)
- Bends (11.25°, 22.5°, 45°, 90°)
- Tees (Equal / Unequal)
- Reducers
- Couplers / Repair clamps
- Tail pieces
- Flanged joints and collars
- End caps / blank flanges

All materials shall:

- Conform to relevant **IS standards (IS 8329, IS 9523, IS 5382 etc.)**
 - Be **ISI marked** and approved by Engineer-in-Charge
 - Be suitable for required **pressure rating (PN class)**
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3. Routine Operation & Inspection

The contractor shall carry out:

- Regular **patrolling and inspection** of entire pipeline network
 - Monitoring of **pressure, discharge, and flow**
 - Operation of sluice valves, air valves, scour valves
 - Ensuring **equitable water distribution**
 - Maintaining daily operation logs
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4. Leak Detection & Repair

- Detection of **visible and hidden leakages**
- Immediate repair of:
 - Pipe bursts
 - Joint leakages
 - Cracks and corrosion damages
- Replacement of damaged pipeline portions where required
- Use of:
 - DI repair clamps
 - Mechanical couplers
 - Rubber gaskets and fasteners

All works shall be completed with **minimum shutdown period**.

5. Cleaning & Flushing

- Periodic **flushing of pipelines** to remove sediments and deposits
 - Cleaning of dead ends and low-pressure zones
 - Maintaining water quality as per standards
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6. Preventive Maintenance

- Routine checking and maintenance of:
 - Sluice valves
 - Air valves
 - Scour valves
 - Lubrication, tightening of bolts and glands
 - Replacing worn-out rubber rings, packing materials
 - Ensuring all appurtenances are **fully functional**
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7. Valve Chamber Maintenance

- Cleaning, dewatering, and upkeep of valve chambers
 - Removal of silt, debris, and stagnant water
 - Repair of chamber structure (minor)
 - Ensuring proper covers and accessibility
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8. Corrosion Protection

- Monitoring and maintenance of external protection of DI pipes
 - Repair of damaged coatings (bituminous / epoxy)
 - Application of anti-corrosive coatings where required
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9. Tools, Plants & Safety

Contractor shall provide:

Tools & Equipment

- Pipe cutting tools
- Lifting equipment
- De-watering pumps
- Leak detection instruments
- Spanners, torque tools

Safety Equipment

- Helmets, gloves, safety shoes
- Reflective jackets

- Barricading materials
 - Gas detectors (if required)
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10. Consumables & Spares

The contractor shall supply all consumables including:

- Rubber gaskets / sealing rings
- Nuts, bolts, washers
- Jointing materials
- Lubricants, grease
- Anti-corrosive compounds

No separate payment shall be made for consumables.

11. Execution Conditions

- Work shall be executed as per **Engineer-in-Charge instructions**
 - Proper **traffic management and barricading** during repairs
 - Minimum inconvenience to public
 - Restoration of road surface after excavation
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12. Measurement

- Measurement shall be on:
 - **Per km per month basis** OR as per tender provision

No separate measurement shall be made for:

- Leak repairs
 - Specials and fittings
 - Consumables, tools, and equipment
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13. Payment

- Payment shall be made on **monthly basis**
- Rate includes:
 - Labour charges
 - Cost of all materials and specials
 - Tools & plants
 - Transport, loading/unloading
 - Taxes, duties, royalties

No extra payment for:

- Emergency work
- Night work
- Any incidental expenses

14. Performance Requirements

- Maintain **minimum water losses**
 - Ensure **quick response time**:
 - Minor leakage: within 6 hours
 - Major burst: within 2–4 hours
 - Maintain uninterrupted supply as far as possible
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15. Records & Reporting

Contractor shall maintain:

- Daily logbook
- Leakage and repair register
- Valve operation register
- Material consumption records
- Monthly performance report

The work shall be carried out to the satisfaction of engineer-in-charge.

The payment should be made for completed item as per Schedule-B (BAQ)

Item No. 3 :- Providing Man Power as shown in "Annexure-1" for Maintaining Pipeline network of Nakhatrana Taluka of various Tube well Site and Head Work Site under Various Reg. water supply scheme
Khombhadi Complex Existing Pipeline Network (Lineman Cum Valve man)
Pipe Fitter (0.5 YoE) 1 per 50 km (3 No.)
Helpers For Fitter 2 per 50 km (6 No.)
Khombhadi Complex New Pipeline Network (Lineman Cum Valve man)
Pipe Fitter (0.5 YoE) 1 per 50 km (2 No.)
Helpers For Fitter 2 per 50 km (4 No.)
Khombhadi Complex
Asst. Maintenance Engineer (1 YoE)

Scope of Work

The agency shall provide skilled and semi-skilled manpower for operation, maintenance, repair and smooth functioning of existing and new pipeline networks, tube well sites, pumping machinery, valve operation and head work sites under various Regional Water Supply Schemes of Nakhatrana Complex.

The manpower shall be deployed as per “Annexure-1” and as directed by Engineer-in-Charge.

A. Manpower Requirement

1. Khombhadi Complex Existing Pipeline Network

(Lineman cum Valveman)

Sr. No.	Designation	Qualification / Experience	Quantity
1	Pipe Fitter	Minimum 0.5 Year Experience in pipeline maintenance work	3 Nos.
2	Helper for Fitter	Skilled helper for assisting fitter work	6 Nos.

Deployment Criteria:

- One Pipe Fitter per 50 km pipeline length.
 - Two Helpers per 50 km pipeline length.
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2. Khombhadi Complex New Pipeline Network

(Lineman cum Valveman)

Sr. No.	Designation	Qualification / Experience	Quantity
1	Pipe Fitter	Minimum 0.5 Year Experience in pipeline maintenance work	2 Nos.
2	Helper for Fitter	Skilled helper for assisting fitter work	4 Nos.

Deployment Criteria:

- One Pipe Fitter per 50 km pipeline length.
 - Two Helpers per 50 km pipeline length.
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3. Nakhatrana Complex Head Works / Tube Well Site

Sr. No.	Designation	Qualification / Experience	Quantity
1	Assistant Maintenance Engineer	Diploma / Degree in Mechanical or Civil Engineering with minimum 1 Year Experience in water supply O&M work	1 No.

B. Duties and Responsibilities

Pipe Fitter

- Attending leakage and burst repair work.
- Operation and maintenance of valves, sluice valves and air valves.
- Jointing, dismantling and repairing pipeline accessories.
- Maintenance of distribution and transmission pipeline network.
- Coordination during shutdown and emergency repair works.
- Maintaining daily maintenance records.

Helper for Fitter

- Assisting fitter during repair and maintenance activities.
- Excavation, refilling and cleaning work related to pipeline maintenance.
- Handling tools, materials and fittings.
- Assisting in valve operation and emergency breakdown works.

Assistant Maintenance Engineer

- Manage and carry out Operation & Maintenance (O&M) works
- Supervision of pipeline maintenance activities.
- Preparation of daily work reports and manpower attendance.
- Coordination with departmental officers.
- Monitoring water supply operations and breakdown maintenance.
- Maintaining inventory and ensuring timely repairs.
- Ensuring safety practices during maintenance works.
- To carry out daily software/data entry work in ERP, Jansampark App and any other existing or future software/application introduced by the department or Government from time to time for operation, maintenance, monitoring and reporting purposes.
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C. Working

- Manpower shall remain available during emergency breakdowns, shutdowns and special maintenance works.
 - Weekly off shall be provided as per Labour Laws.
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D. Tools and Safety

The contractor shall provide necessary:

- Hand tools
- Spanners and pipe tools
- Safety shoes
- Hand gloves
- Reflective jackets
- Helmets
- Torch lights and other safety equipment

No extra payment shall be made for the above items.

E. Wage Payment Clause

The contractor shall pay wages to all manpower as per latest prevailing Minimum Wages Act notified by Government of Gujarat / Labour Commissioner from time to time.

Any revision in minimum wages during contract period shall be binding on the contractor and payment to labour shall be made accordingly without any violation of Labour Laws.

The rates quoted by contractor shall be deemed to include:

- Minimum wages
- EPF contribution
- ESIC contribution
- Bonus
- Insurance
- Uniform and safety equipment
- Administrative charges
- All statutory liabilities

No separate payment shall be made by the department for increase in minimum wages unless specifically provided in tender conditions.

F. Measurement

- Measured as:
 - **Number of manpower per month**
- No separate payment for:
 - Overtime
 - Emergency deployment

G. Payment

- Payment shall be made **per manpower per month basis**
- Inclusive of all costs and statutory charges

The work shall be carried out to the satisfaction of engineer-in-charge.

The payment should be made for completed item as per Schedule-B (BAQ)

PART – C :- SECTION – C

Civil Part C-1

Item No. 1 :- Providing and supplying in standard length ISI mark rigid unplasticized PVC pipes suitable for potable water with ring fit joint including cost of rings, as per IS specification no. 4985/1988 including all local and central taxes, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to the departmental stores and including cost of jointing material etc. complete.

Note:

- 1. One coupler / ring shall be provided with each full length pipe cost of which is included in rates below.**
- 2. 3% (Three) Discounted rate to be considered for Coupler jointed pipe**
- 3. Rate for PVC Resin as Rs. 91739/MT (Price Without GST)**

Khombhadi Complex Existing Pipeline Network

90 mm PVC 6 Kg/cm²

110 mm PVC 6 Kg/cm²

140 mm PVC 6 Kg/cm²

160 mm PVC 6 Kg/cm²

Khombhadi Complex New Pipeline Network

90 mm PVC 6 Kg/cm²

110 mm PVC 6 Kg/cm²

140 mm PVC 6 Kg/cm²

160 mm PVC 6 Kg/cm²

200 mm PVC 6 Kg/cm²

STANDARDS :-

- The UPVC Pipes to be manufactured, supplied and delivered under the scope of this contract shall be manufactured in accordance and confirming to IS:4985-2000 or its latest revision or amendments or other authoritative standard that ensure at least a substantially equal quality to the IS:4985-2000 or its latest revision or amendments

Electrometric sealing ring shall be as per specification of IS – 5382-1985, and ISO: 4633-1996 or it shall be EPDM rubber ring. The dimensions, material compositions, tests etc. shall be as per IS: 4985-2000 or with its latest revision or amendments.

- The minimum wall thickness weight shall be as per Appendix I of the tender.
- The color of pipes shall be as per IS 4985-2000
- Bureau of Indian Specifications (BIS) / Indian Standard (IS) shall mean the Latest version issued by BIS.

The material from which the pipes are made shall consist substantially of unplasticized poly vinyl chloride conforming to IS: 10151, to which may be added only those additives that are absolutely needed to facilitate the manufacture of the polymer, and the production of sound, durable pipes of good surface, finish, mechanical strength and opacity.

The bulk density of the UPVC compound shall be 0.50 to 0.53 and the density of UPVC pipe shall be 1.40 to 1.46 g/cm³.

The additional of the manufactures own rework material shall comply to clause 4.2 of IS: 4985.

PVC resin of suspension grade K-66/K-67 shall be used for extrusion of UPVC pipe. In line with BIS 4985-2000 the tolerance on outside diameter of the pipe shall be as under:

- “The pipes shall be transported to the store by flat floored trucks in pre packed wooden crate. The height of crate should not be exceeding more than 2 meters. The both ends of packaging unit (crate) shall be covered with plastic sheet to ensure adequate protection during transport. At the time of packing and stacking of pipes, the sockets shall be alternated within the pipe of pipes and shall project sufficiently for the pipes to be

correctly supported along their whole length. The pipes shall rest uniformly on the vehicle bed over their whole length during transport to avoid sagging or deformation.

- The packing material like wooden crate, plastic sheet etc. shall be the property of tendered and he is permitted to reuse the packing material for transporting next batch of pipes”.
- The pressure rating of pipes shall be in accordance with IS 4985 with a maximum continuous working pressure at 27⁰ C. of 6 & 10 kg/cm². This working pressure shall be downgraded for ambient underground soil temperature of 45⁰ C. as per the figure given in IS 4985 for design purposes.
- The pipes when subjected to internal hydrostatic pressure in accordance with IS: 12235-1986 (part – 8) shall not burst during the prescribed test duration. The temperature, duration and test and induced internal stress shall conform to the parameters given below:

Sr. No.	Test	Temp. (°C)	Min. duration (h)	Induced Stress (Mpa)	Requirements
1	Type test	60	1000	10	No failure
2	Acceptance Test	27	1	36	No failure

The integral socket of the pipe shall be tested for internal hydrostatic pressure in accordance with ISO: 3603 and ISO 1167.

The UPVC pipe shall not contain vinyl chloride monomer (VCM) exceeding 1 ppm when determined by means of gas phase chromatography using the “headspace” method according to IS: 10151.

The wall of the socket and the wall of the plain pipe shall not transmit more than 0.2% of visible light falling on them when tested in accordance with IS:12235 (part -3).

The pipes shall be supplied in straight length of 6 mtr with tolerance of +20mm and - 0mm. The effective length of socket pipe shall be considered as shown in figure 2 of IS 4985.

All plastic and non-plastic material for components of the UPVC piping system e.g. Electrometric sealing ring, lubricants, when in permanent or in temporary contact with water which is intended for human consumption, shall not adversely affect the quality of the drinking water.

Concentrations of chemicals, biological agents or other substance leached from pipe materials in contact with drinking water and the values of the relevant physical parameters, shall not exceed the maximum values recommended by IS: 10500.

The pipe material shall be in accordance with IS 4985, clause 6.3.

The quality control system and sampling model shall be as under:

Quality Control System and Sampling Model				
Order of Tests to be conducted	By Manufacturer	By Third Party Inspection / PMC representative	Codes/Standards to be followed	Remark
Raw Material 1) Resin K-valve Particle size dis. Bulk density 2) PVC compou nd density	Laboratory test certificates from the original manufacturer of resin and confirmation of the same by the pipe manufacturer in their laboratory. Both test certificates have to be presented during inspection	Verification of test certificates and witness of sample test at pipe manufacture's laboratory at discretion	IS: 4669	For every batch of PVC resin used prior to formulation of compound
Process Check Degree of fusion of extruded UPVC pipe by Acetone immersion test.	Minimum one specimen per extrusion condition or molding condition per day	May witness test during inspection	ASTM D 2152	Test shall be conducted on samples from each machine
On line Check Quality Outside diameter Wall thickness Length of pipe surface finish Socket dimensions	Each & every pipe shall be checked by the manufacturer during extrusion of pipe	Sample testing shall be done for acceptance of the lot as per sampling procedure given Appendix – A, Table -5 of IS 4985	IS: 4985 ISO: 2045 Specification	Wall thickness shall also be checked by cutting the pipe at any place by the inspector
Finished product check. Reversion test Stress relief test	Min. 2 samples per machine per shift shall be tested	Sample testing shall be done as per IS 4985, Table 6&7	IS: 4985 IS: 12235 Part 5&6	Test records shall be submitted to PMC on request
Drop impact	Min. 1 samples per	Sample testing	IS: 4985	Whenever the

Quality Control System and Sampling Model				
Order of Tests to be conducted	By Manufacturer	By Third Party Inspection / PMC representative	Codes/Standards to be followed	Remark
test Internal Hydrostatic pressure test. Pressure test for integral joint	machine per shift	shall be done as per IS 4985, Table-8	IS: 12235 Part 8&9 ISO 3603 ISO 1167	pipe is cut for hydrostatic test, the inspector will also verify the pipe thickness
Capacity Effect on water	Min. one sample for every change in compound formulation	One sample per 100 km of length of supply at the discretion of inspector	IS: 4985 IS: 12235 Part 3,4&10	Test records shall be submitted to PMC on request
Long term hydrostatic test	Min. 3 samples of different diameter from the regular production lot.	May witness test during inspection	IS: 4985 IS: 12235	Test records shall be submitted to PMC on request
Density	Min. one sample per machine per shift	Min 5 samples per lot	IS: 8543 part 1/ sec 2	Reconfirmation may be done at store by checking the samples at the approved laboratory
Ash content	Min. one sample per machine per shift	Min 5 samples per lot	MTNL Standard/ ISO: 3451-5	Reconfirmation may be done at store by checking the samples at the approved laboratory
Vicat softening temp.	Min. one sample per machine per shift	Min. one sample per lot.	ISO : 2507	

Temperature variations :-

All the pipes to be manufactured, supplied and delivered shall be subjected to weather conditions like sun, dust, rain, and wind as available in State of Gujarat. They shall be also subjected to carry and convey drinking water under variable temperature conditions ranging from 4 C⁰ to 45 C⁰.

MARKING :-

The methods of marking all the pipes to be delivered under scope of contract shall that all the information will remain legible even after transportation, storage in open space etc. In general the legible and indelible marking upon the goods shall indicate the followings;

- i) Certification mark on each pipe.
- ii) Manufacturers brand name and/or trademark.
- iii) Purchasers mark as “ GWSSB ” is inscribed.
- iv) The outside diameter and pressure rating.
- v) Batch number or lot number.
- vi) Inspector’s mark on each pipe

Any other important matter that the manufacturer or purchaser deems fit to be inscribed.

Elastomeric Sealing Ring :-

This Sealing Ring Shall Be Sturine Butadin In Red Color As Specified In Is. The Lubricant Applied For Jointing Of Elastomeric Rubber Ring Shall Be Of Good Quality And Comply The Following Specifications:

- a) Must have paste like consistency and be ready for use, preferably soap jelly.
- b) Has to adhere wet and dry surfaces of UPVC pipes and rubber ring.
- c) Must be non-toxic.
- d) Must be water-soluble.
- e) Must non-affecting physic-chemical and organoleptic properties of drinking water carried ion the pipe.
- f) Must not have an objectionable odor.
- g) Must not harmful to the skin.

Elastomeric sealing ring shall be in accordance with one of the types (Type - 1 to Type – 6) as per ISS 5382. These sealing rings shall be EPDM rubber ring. The sealing ring shall be with ISI mark.

In case of imported EPDM Ring, such rings shall conform to relevant International Standards or the Standards of country of origin, which are equivalent or higher than the Bureau of Indian Standard Specifications. In case of manufacturers who have applied for getting a BIS certification mark, it would be mandatory for such bidders to produce the BIS certification

license on or before the date of opening of the price bids. An undertaking in this regard shall have to be provided along with the technical bid.

The rubber sealing rings shall be vulcanized from Ethylene Propylene (EPDM) with strengths as per table 2 of IS 5382-1985.

type test :-

- a) Type test capacity, test for effect on water, test for resistance to Sulfuric Acid, internal Hydrostatic pressure test for 1000 Hrs. shall be carried out at least once at any time during the contract. Or shall be taken at least once during every six months irrespective of the ordered quantity.
- b) The said type test shall be taken by the “GWSSB” representative or third party inspection agency at the in-house laboratory of the manufacturer.

color of pipes :-

- The color of the pipes shall be as per IS 4985-2000.
- The pipes shall bear ISI mark confirming to IS: 4985-2000 or its latest amendment/revision if any.

test for pvc resin & pipe :-

Test for PVC Resin

It shall be sufficient to show the certificate of chemical test (in accordance with IS 4669) to the inspecting authority to confirm the 'K' value to be 64 to 67 as per clause No. 6.1.2. of IS 4985-2000

Tests for PVC Pipes as per IS: 4985-2000

A) Density

These tests shall be carried out by the inspection agency as per the IS:4985-2000 OR its latest revision OR amendments. The value shall be between 1.40 and 1.46 as per the ISS clause No. 10.6

B) Sulphate Ash Content

When tested as per Annex B, of IS 4985-2000, the sulphate ash content in the pipe shall not exceed 11 percent.

C) Reversion Test

When tested by the immersion method a length of pipe 200 +/- 20 mm long shall not alter in length by more than 5 %. In case of socket end pipes this test shall be carried out on the plain portion of the pipe taken at least 100 mm away from the root of the socket.

D) Vicat softening temperature

When tested by the method prescribed in IS 6307, the Vicat softening temperature of the specimen shall not be less than 80 degree Celsius.

E) Resistance to external bows

When tested by method, the pipe shall have a true impact rate of not more than 10 %.In case of socket ended pipes this test shall be carried out on the plain portion of the pipe taken at least 100 mm away from the root of the socket.

F) Opacity

The wall of the plain pipe shall not transmit more than 0.2 % of the visible light falling on it when tested in accordance with IS 12235 Part-3

G) Effect on water

The pipe shall not have any detrimental effect on the composition of water flowing through them. When tested by the method described in IS 12235 part 4, toxic substances extracted from the internal wall of pipe shall not exceed the following concentrations in the solution.

H) Dimensions of pipe as per IS: 4985: 2000

Tolerance as per IS: 4985: 2000

Quality Assurance

The manufacturer shall have a laid down Quality Assurance Plan for the manufacture of the products offered which shall be submitted along with the tenders. weight and minimum wall thickness of unplasticized ring fit type PVC pipes are as per IS 4985-2000.

Inspection:

Inspection of pipe will be carried out at factory site by inspecting agency to be fixed and authorised by GWSSB. The inspecting agency will inspect the material as per the specification and on satisfying itself will mark the inspecting mark on all pipe and issued inspection note to the supplier and concerned consignee.

The bidder shall have to arrange for random testing of pipes brought on site, in CIPET/GIRDA in the presence of GWSSB's representative and on satisfactorily report from the CIPET/GIRDA the payment of pipes will be made. Testing charges shall be borne by Agency.

Pipes supplied must be purchased from the latest vendors approved by GWSSB at the time of purchase of pipes.

The condition will be operative from the date of work order. No escalation shall be granted beyond stipulated time. However, in case of work carried after original time limit, only decrease in prices shall be adjusted.

A) PRICE VARIATION FOR UPVC PIPES :-

Clause 59 Will Be Applicable.

i. The price variation will be based on Prime Grade 67 GER 01 (Formerly known as A Grade 67 GER 092) announced by IPCL from time to time.

ii.	The rate of PVC resin as on New GWSSB SOR declared by IPCL is as under :
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New GWSSB SOR :- Rs. 91739/- per MT (Price Without GST)

In the event of any variation, prices will be calculated as:

$$P = 0.90 (A -$$

B) X C

Where :-

P	:	Price Variation per tonne
A	:	Current Price of PVC resin per tonne fixed by IPCL on the date of inspection of pipe offered.
B	:	Price of PVC resin per tonne i.e on New GWSSB SOR: Rs. 91,739/- per MT (Price Without GST)
C	:	Weight of pipe (In this case value of C = 1 Tonne)

The work shall be carried out to the satisfaction of engineer-in-charge.

The payment should be made for completed item as per Schedule-B (BAQ)

Item No. 2 :- Providing and supplying C. I. Temper proof Air valves with SS 304 Float gun metal- nozzle of approved make & quality of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete. Without Isolating Sluice Valve PN 1.0

a) Temper proof Air valves 50 mm dia In PVC 90 mm to 200 mm Dia

Khombhadi Complex Existing Pipeline Network

Khombhadi Complex New Pipeline Network

b) Temper proof Air valves 50 mm dia In DI 100 mm to 200 mm Dia

Khombhadi Complex Existing Pipeline Network

c) Temper proof Air valves 80 mm dia DI 250 mm to 300 mm Dia

Khombhadi Complex Existing Pipeline Network

1. Scope of Work

The work shall include **providing, supplying, transporting, and stacking of Cast Iron (C.I.) tamper-proof air valves with SS 304 float and gun metal nozzle, suitable for PVC pipeline of 90 mm to 200 mm diameter, complete in all respects.**

The item includes all costs such as **taxes, insurance, freight, loading, unloading, conveyance to departmental stores, stacking, etc.**

2. Type & Size of Air Valve

- Type: **Tamper-proof single / double orifice air valve**
- Nominal Diameter: **50 mm**
- Pressure Rating: **PN 1.0 (10 kg/cm²)**
- Application: For **PVC pipeline (90 mm to 200 mm dia)**

3. Materials Specification

3.1 Body & Cover

- Material: **Cast Iron (CI)**
- Conforming to **IS 210 (Grade FG 200 or higher)**
- Robust construction suitable for buried and chamber conditions

3.2 Float

- Material: **Stainless Steel (SS 304)**
- Seamless, corrosion-resistant
- Designed for smooth operation and long life

3.3 Nozzle & Internal Parts

- Material: **Gun Metal (GM)**
- Conforming to **IS 318**
- Precisely machined for airtight sealing

3.4 Fasteners

- Nuts, bolts, washers: **GI / SS**
- Corrosion-resistant and suitable for water supply applications

3.5 Tamper-Proof Arrangement

- Valve shall be provided with:
 - **Tamper-proof cap / locking arrangement**
 - Protection against unauthorized operation
 - Suitable for public water supply systems

4. Design & Construction

- Valve shall be designed for:
 - **Automatic release of entrapped air**
 - **Admittance of air during vacuum conditions**

- Suitable for continuous operation under field conditions
- Leak-proof and pressure-tight construction

5. Coating & Protection

- Internal & external surfaces shall be:
 - Coated with **bituminous / epoxy coating**
- Coating shall be:
 - Uniform
 - Anti-corrosive
 - Suitable for potable water use

6. Inspection & Testing

- Each valve shall be tested for:
 - **Hydrostatic pressure test**
 - Leakage test
- Test certificates shall be submitted if required
- Inspection shall be carried out as per Engineer-in-Charge instructions

7. Transportation & Handling

- Safe transportation to:
 - Departmental store / site
- Proper loading, unloading, and stacking
- Protection from damage during transit

8. Measurement

- Measurement shall be in **Number (Nos.)** of air valves supplied
- No separate measurement for:
 - Transportation
 - Taxes, duties
 - Handling charges

9. Payment

- Payment shall be made per **Number of valves supplied**
- Rate includes:
 - Cost of valve
 - All materials and components
 - Transportation, insurance, freight
 - Loading, unloading, stacking
 - All taxes and incidental charges

10. Applicable Standards

- IS 14845 – Air Valves for Water Supply
- IS 210 – Cast Iron
- IS 318 – Gun Metal

- IS 2062 / SS 304 – Stainless Steel
- Relevant GWSSB / CPWD specifications

11. Performance Requirements

- Smooth and reliable operation
- No leakage under working pressure
- Effective air release and vacuum relief
- Long service life with minimal maintenance

The work shall be carried out to the satisfaction of engineer-in-charge.

The payment should be made for completed item as per Schedule-B (BAQ)

Item No. 3 :- Erection of air valve riser by installing new G.I. pipe of 3 mm thick and 3.2 mt length with necessary fittings such as flange of appropriate size, nut bolts and embedded the pipe in RCC M;15 with offset of 10 cm around pipe with necessary steel etc complete

a) Temper proof Air valves 50 mm dia In PVC 90 mm to 200 mm Dia

Khombhadi Complex Existing Pipeline Network

Khombhadi Complex New Pipeline Network

b) Temper proof Air valves 50 mm dia In DI 100 mm to 200 mm Dia

Khombhadi Complex Existing Pipeline Network

c) Temper proof Air valves 80 mm dia DI 250 mm to 300 mm Dia

Khombhadi Complex Existing Pipeline Network

1. Scope of Work

The work shall include **providing, supplying, fabricating, erecting, and commissioning of air valve riser arrangement using G.I. pipe**, including fixing of flanges, nuts & bolts, and embedding the riser in RCC pedestal, complete in all respects as per direction of the Engineer-in-Charge.

2. Materials

2.1 G.I. Pipe

- Material: **Galvanized Iron (G.I.) Pipe**
- Thickness: **3 mm (minimum)**
- Length: **3.20 meters**
- Conforming to **IS 1239 (Medium / Heavy Class)** or equivalent
- Pipe shall be:
 - Straight, smooth, and free from defects

- Properly galvanized (hot dip)
-

2.2 Flanges

- Suitable **M.S. / G.I. flanges** of required diameter
 - Conforming to **IS 6392 / IS 1538**
 - Properly machined and drilled
-

2.3 Fasteners

- Nuts, bolts, washers:
 - **G.I. / High tensile steel**
 - Corrosion resistant
-

2.4 Concrete

- Grade: **M15 (1:2:4 nominal mix)**
 - Providing **minimum 10 cm offset** around pipe
 - Including necessary **reinforcement steel** (as required for stability)
-

2.5 Jointing Materials

- Rubber gaskets / insertion sheet
 - PTFE tape / sealing compound
 - Suitable packing for leak-proof joints
-

3. Fabrication

- Pipe cutting, threading / welding (if required) shall be:
 - Done as per standard engineering practice
 - Flanges shall be:
 - Properly aligned and securely fixed
 - All joints shall be:
 - Leak-proof and properly tightened
-

4. Installation / Erection

4.1 Riser Installation

- G.I. pipe riser shall be:
 - Installed vertically up to **3.20 m height**
- Connected to pipeline using:
 - Tee / saddle / ferrule arrangement (as applicable)

4.2 Concrete Embedding

- Riser pipe shall be embedded in:
 - **RCC M15 concrete block**
 - Minimum **10 cm thick offset** all around pipe
 - Proper compaction and curing shall be ensured
-

4.3 Fixing of Air Valve

- Air valve shall be:
 - Fixed at top of riser using flange connection
 - Proper gasket shall be provided to ensure:
 - Leak-proof joint
-

5. Coating & Protection

- Exposed portion shall be:
 - Painted with **one coat primer + two coats enamel paint**
 - Underground portion shall be:
 - Protected with **bituminous coating**
-

6. Workmanship

- Riser shall be:
 - Perfectly vertical and aligned
 - Firmly fixed without tilting
 - All joints shall be:
 - Tight and leak-proof
 - Finishing shall be neat and durable
-

7. Testing

- After installation:
 - Check joints for leakage
 - Ensure proper functioning of air valve
 - Any defects shall be rectified by contractor
-

8. Safety

- Contractor shall provide:
 - PPE (helmets, gloves, safety shoes)
- Proper barricading during execution
- Safe handling of materials

9. Measurement

- Measurement shall be in **Number (Nos.) of completed riser units**
- Each unit includes:
 - G.I. pipe
 - Flanges and fittings
 - Concrete work
 - Complete erection

No separate measurement shall be made for:

- Excavation
- Concrete and steel
- Painting
- Fasteners

10. Payment

- Payment shall be made per **completed unit (Nos.)**
- Rate includes:
 - Cost of G.I. pipe
 - Flanges, nuts, bolts
 - RCC work and reinforcement
 - Labour, fabrication, erection
 - Painting and protection
 - Transportation, taxes, and all incidental charges

11. Applicable Standards

- IS 1239 – G.I. Pipes
- IS 6392 / IS 1538 – Flanges
- IS 456 – Concrete
- Relevant GWSSB / CPWD Specifications

12. Performance Requirements

- Strong and stable riser
- Leak-proof connections
- Corrosion resistance
- Proper support for air valve system

The work shall be carried out to the satisfaction of engineer-in-charge.

The payment should be made for completed item as per Schedule-B (BAQ)

NOTE :- Government of India has Circulated a New Circular for application of GST applicable from date-01.07.2017. These Rules under GST Will be applicable to this work. Also any other conditions/Rules shall be declared by govt. Will also be included and applicable to Work

Dy. Executive Engineer
P. H. Mech. Sub Division
Bhuj - Kachchh

Executive Engineer
P. H. Works Division
Nakhatrana

Signature of Contractor

Technical Specification Electro-Mechanical

Part A-2

Technical Specification Electro-Mechanical Components O&M (Part-A 2)

Part A-2 The work includes Maintenance and repairing of submersible pump sets and control panel boards of at Bhujiya Hill, Tal:Bhuj on contract basis. The works includes removing submersible pump sets, all repairing including rewinding, lifting, lowering, providing & utilizing necessary lubricants, tool kit and all other running consumables as well as routine & emergency break down maintenance repairing of control panel boards including replacement of spare parts if any and also petty maintenance of replacement and repair of cut outs, main switch, volt meter, ampere meter, earthing wiring and single phase wiring inside and outside of pump house cabin, repairing fuse wires internal wiring etc with the help of qualified person employed by the contractor in case of failure during contract period.

All workers deployed for removing, lowering or repairing of Submersible pump sets, control panel boards and other pipeline works shall be insured for any type of casualty.

Repairing of Submersible pump sets including removing and lowering and other miscellaneous works:-

- The work including the removal of Submersible pump set from the tube well/ sump in case failure.
- The Contractor has to immediately repair the machinery after the failure detected or communicated by department in person, Telephone or in writing.
- The nature of failure may be any, failure of motor, cable fault or decrease in discharge of the pump or any other cause.
- O&M also includes rewinding of motor. No extra payment shall be made to contractor.
- Every care shall be taken by the contractor while removing the motor so that no harm is made to the tube well, submersible pump set or any other asset of GWSSB.
- Any loss if made shall be rectified by the contractor.
- The machinery shall be got repaired from the skilled and experienced person with the use of standard make parts and winding wires etc. The HP and capacity and discharging capacity including head shall not be altered while repairing.
- The department shall provide all the machinery in working condition on the commencement of the work. Even portion of tube well site shall be handed over on the date of work order if the machinery is in working condition.
- Contractor has to taken over charge of all P.Mc and accessories as it is on site situation.
- Handing over note shall be prepared and signed by The contractor and department during handing over process.
- The work shall include lowering of submersible pump set & Horizontal Sub. Pump Set and all the material required for lowering such as tape roll rubber packing nut bolts shall be provided by the contractor and all the minor alteration in the column pipe etc shall be done by the contractor.
- Every care must be made in lowering the submersible pump set so that tube well machinery and any other asset of GWSSB are not damaged.
- Contractor shall be responsible if any submersible motor falls in tube well while lifting, lowering, and running of idle condition.

- The submersible pump set if fallen shall be removed by the contractor at its own cost if contractor fails it will be carried out by department at risk and cost of contractor.
- Contractor shall obtain written permission from section officer Engineer in charge before taking machinery from site to his workshop. **Job card** of Each Repair shall be maintained and got checked by section officer engineer in charge. Also site register at individual tube well/head works be provided for daily pumping record with power consumption record to be maintained by agency duly signed by concern Deputy Engineer with certificate of contained pages
- Joint site visit shall be arranged weekly by contractor of his Representative with DEE or His Representative.
- A meeting shall be convened monthly with contractor DEE/ Section officer regarding smooth maintenance & repairing of pumping machineries. Before lowering of pumping machinery in the T.W. Pumping machinery shall be checked by site in charge / work assistant & entered in log book also details of removed pumping machinery shall be entered in log book before giving for repairing. Each operation shall be entered in log book date wise with initials.
- Repairing of control panel complete including routing inspection for proper working and replacement of the parts. The work includes repairing of the control panels including replacement of the parts of the control panel. The contractor shall not alter the type of the panel. Make of spares.
- The Control panel shall be got repaired by skilled and experienced person with the use of standard make spare parts. The HP capacity of control panel shall not be altered after repairing.
- The department shall provide all the control panels in working condition and detail handing over report of each panel shall be prepared and signed by contractor and department on the date of commencement of the contract.
- **The record of movement of Horizontal Sub. Pump Set & Submersible Pump set shall be maintained by the contractor** and communicated to the department on the same day of any transaction i.e. removing motor, lowering motor, transportation of motor from tube well site to workshop, transportation of motor from work shop to tube well site.
- At the end of contract all the machinery and control panel including stand by shall be in working condition.
- In case of failure of tube well or the tube well not required to be run by the department, the contractor shall be not be paid for that tube well for the period of not running of the tube well due to failure of bore or any other reason.
- GWSSB reserves the right to idle any number of tube wells with the prior notice of one week as it may not be needed to run all the tube wells due to fluctuation in requirement of water. The contractor shall not be paid for such idle tube wells.
- In case of any dispute regarding period of running of tube wells, **Executive Engineer, Public Health mech Division, Bhuj** shall be final authority to decide the matter.
- All necessary material such as fuse wire, repairing or replacing of cut outs, main switches shall be provided by the contractor at its own cost.
- In case of any headworks with a HT electrical connection, Power factor must not be less than 0.9 in any case. Power factor penalty must be deducted from next bill of the contractor plus penalty as per DTP terms and conditions.

- Agency must follow all the general and special terms and conditions of contract as described in the tender documents.

-: Operation Of The Facilities

The employer appoints the contractor to perform and undertake the O & M services and all other Obligation set out and in accordance with these conditions during the O & M period. The contractor .accepts the appointment and acknowledges a duty to perform such obligations

- The contractor shall be in complete charge of and have custody and control over and responsibility for the facilities, and the contractor shall perform or cause to be performed on behalf of the employer all O & M services for the facilities and shall supply or cause to be .supplied all materials required therefore in accordance with the O & M standard
- The contractor shall also acknowledge that the employer and employer's personnel and other contractors may be carrying out work at the facilities and shall endeavor to fully cooperate and work in a manner so as not to cause any obstruction or hinderance to them. The contractor is an independent contractor and not an agent, employee and nothing in these conditions or the O & M contract shall be deemed to create a joint venture between the employer and the contractor

-: Responsibility of the contractor

The contractor shall be solely and ex...-: clusively responsible for

- Obtaining all necessary permits and consents required by applicable laws or any .government authority for the contractor to carry out the O & M service
- Theprocurementof all goods and services necessary to ensure compliance with its .obligations under these conditions
- .Making available suitably qualified and trained personnel to perform the O & M services
- perform the O & M services in accordance with the O & M manuals and maintain the facilities in good repair and condition and ensure that the facilities are well and suitaby maintained at all times in accordance with good operating practices and in accordance with .these conditions

- procuring and administering all chemicals and other consumables, tools, equipment, spare parts and other materials (which shall be of good quality and unused) necessary for the .operation and maintenance of the facilities
- Arranging for the testing and recalibration of all scales, meters, gauges, and other measuring devices at the Facilities on an manual basis unless otherwise stated in the O & .M contract as instructed by engineer-in-charge
- .For providing any and all relevant information required by the employer

Duty Of Care By The Operator & Performance Standards

Duty of Care

- The contractor shall manage, operate and maintain the facilities in accordance with good perating practices and in accordance with the O & M standard so that the facilities are capable of meeting the outputs and specifications set out in the contract.
- The contractor shall take full responsibility for the care of the facility from the date of issue of the Taking Over Certificate, till the end of the O & M Period.
- If any loss or damage happens to the facility, during the O & M Period due to any breach by the contractor of any of his obligations under these conditions including any willful misconduct, negligence and non conformity with good operating practices than the contractor shall, at his own cost, rectify such loss or damage so that the Facility conforms in every respect with the provisions of these conditions.
- The Employer shall be liable only in case of any damage caused due to any Employer's risk.

Obligations And Responsibilities Of The Employer

- The Employer shall employ the contractor to provide the O & M services and shall issue the work order, hand over the custody of the facilities to the contractor for its use during the O & M period.
- Pay the contractor all sums required to be paid in accordance with the terms of these conditions.
- Notwithstanding anything else herein contained the Employer may set off any sums owed by the contractor under the contract for monies owed to the contractor by the Employer under these conditions or as a debt due from the contractor.
- No advance payment or down payment shall be made.

Representations And Warranties Of The Contractor

The Contractor hereby represents for the benefit of the Employer as follows:

Performance of O & M Services

- That the contractor has the required skills and capability to perform, and shall diligently perform, the O & M services in a high quality, timely and professional manner utilising sound engineering principles and project management procedures in accordance with good industry practices;
- The contractor shall perform its obligations hereunder in accordance with the requirements of these conditions and shall meet the performance guarantee.
- It shall not use any spare parts or material that are not new and which shall be of a quality that is in accordance with good industry practices.
- Contractor shall obtain certificate in prescribed Performa regarding days of satisfactory running of each tube well from concern site in charge of his representative.

- Any material inspected related to tube well unserviceable such as cables, column pipes etc will be arranged/provided by department.
- The rate shall be paid per Pumping machinery per month.
- In case of failure agency shall provide estimate of work done to concern department.
- The old/scrap material shall be sent to departmental store as per instructions of EIC. No extra transportation charge shall be provided by GWSSB to agency. Agency has to manage transport vehicles above work.
- Contractor shall obtain certificate in prescribed Performa regarding days of satisfactory running of each tube well from concern site in charge of his representative.
- Any material inspected related to tube well unserviceable such as cables, column pipes etc will be arranged/provided by department.
- The rate shall be paid per Pumping machinery per month.
- In case of failure agency shall provide estimate of work done to concern department.
- Agency/ Contractor required to submit all the document as per instructions of EIC in a required performa.

પંપિંગ મશીનરી માટે સંચાલન, નિભાવણી, અને મરામત કામ માટેની શરતો :-

- ૧). ઠેકેદારશ્રી દ્વારા આ કામ માટેનાં ભાવ, યોજનાના સઘળા કામો અને ગામોને સ્વયં સ્થળ મુલાકાત લઈ, સંપૂર્ણ વિગતોથી વાકેફ થઈ ભરવાના રહેશે. ઉક્ત યોજના મા ખાતા દ્વારા નવી પંપિંગ મશીનરી, પેનલ બોર્ડ, કેબલ, કટ આઉટ બોર્ડ વગેરે આપવામાં આવશે નહીં. હયાત પંપિંગ મશીનરી જે હાલત મા મળે તે હાલત મા સ્વિકારી ચાલુ કરી બે વર્ષ માટે પાણી ઉત્પાદન કરી વિતરણ કરવાનું રહેશે.
- ૨). ભરેલ ભાવ પૈકી કોઈપણ ભાવો કોઈપણ કારણ આપ્યા સિવાય, મંજૂર કે નામંજૂર કરવાના હક્કો કાર્યપાલક ઇજનેરશ્રીને આબાધિત રહેશે.
- ૩). સંજોગોવસાત જો યોજનાની મરામત અને નિભાવણી બંધ કરવાની થાય અથવા તેના માળખામાં ફેરફાર થાય તો મંજૂર કરેલા માસિક ભાવોમાં અધિક્ષક ઇજનેરશ્રી સાથે વાટાઘાટો કરી ફેરફાર કરવાનો રહેશે અથવા રદ કરવાનો રહેશે. અને તે અંગેનો અધિક્ષક ઇજનેરશ્રીનો નિર્ણય ઠેકેદારશ્રીને બંધનકર્તા રહેશે.
- ૪). કોઈપણ સંજોગોમાં, કોઈપણ કારણસર, કરારનાં સમયગાળા દરમિયાન, આ ખાતાની જાણ બહાર ઠેકેદાર પાણી યોજનાનું સંચાલન બંધ કરી શકશે નહીં. અન્યથા આમ કરવાથી લાભાર્થીઓને જે મુશ્કેલી ઉભી થશે તેની સઘળી જવાબદારી ઠેકેદારશ્રીની રહેશે. અને તે બાબતે તમામ પ્રકારનાં પગલા ઠેકેદારશ્રી પર ખાતાનાં હિતમાં લેવામાં આવશે.
- ૫). મંજૂર કાયદાનો અમલ ઠેકેદારશ્રીએ કરવાનો રહેશે. જો તેની યોગ્ય અમલવારીમાં કોઈ પણ જાતની ક્ષતિ કે ચૂક જણાશે તો તેની સઘળી જવાબદારી ઠેકેદારશ્રીની રહેશે.
- ૬) ઇજારદાર દ્વારા રોકવામાં આવેલ સ્ટાફનાં ડ્યુટી લીસ્ટ મુજબ મોબાઇલ નંબર, નિયત ફોર્મેટ ના આઇ-કાર્ડ (આ સાથે સામેલ ફોર્મેટ મુજબ), આધારકાર્ડ નકલ ના.કા.ઇ.શ્રીની કચેરીએ રજૂ કરવાની રહેશે. જો

કોઇ પણ મોબાઇલ નંબરમાં ફેરફાર થયે તેની તુરંત જાણ ના.કા.ઇ.શ્રીને કરવાની રહેશે. જેથી આકાસ્મિક સમય સંજોગે જરૂરી પગલા લઇ શકાય.

૭). ઇજારદારે યોજનાનાં હેડ વર્ક્સ કે સબ હેડવર્ક્સ ખાતે આવેલ હયાત બાગ બગીચાની જાળવણી કરવાની રહેશે. તથા હવાલા ઇજનેરની સુચના મુજબ સમયાંતરે વૃક્ષારોપણ કરી તેની જાળવણી કરવાની રહેશે. વૃક્ષારોપણ માટેનાં છોડ કે રોપા ખાતાકીય રીતે પુરા પાડવામાં આવશે (લાગુ પડતુ નથી).

૮). ઠેકેદારશ્રી તરફથી રોકવામાં આવેલ માણસોને ખાતા દ્વારા નક્કી થયા મુજબનો ગણવેશ સ્વખર્ચે આપવાનો રહેશે. (લાગુ પડતુ નથી).

૯). ઠેકેદારશ્રી તરફથી રોકવામાં આવેલ માણસો માટે ઠેકેદારશ્રી દ્વારા લગત ના.કા.ઇ.શ્રીની સહી વાળા ઓઇડેન્ટી કાર્ડ સ્વખર્ચે મેળવીને નિયમીત ઉપયોગમાં લેવાના રહેશે.

૧૦). ઠેકેદારશ્રી દ્વારા કચેરી ખાતે તથા હેડવર્ક્સ તેમજ સબ હેડવર્ક્સ ખાતે ફરીયાદ રજીસ્ટર રાખવાનું તથા

નિભાવવાનું રહેશે.

૧૧). કાર્યપાલક ઇજનેરશ્રીનાં લેખિત મંજૂરી સિવાય કોઇપણ ભાગ કે આ કામ પેટામાં ઇજારા તરીકે આપી શકાશે નહીં.

૧૨). કામનાં આરંભથી કે તેના અંત સુધી કામ ઇજારદારશ્રીની સીધી દેખરેખ નીચે રહેશે અને આગથી અથવા બીજા કોઇપણ કારણથી કામોને થયેલ નુકશાન બાબતે ઇજારદાર જવાબદાર રહેશે. આગથી અથવા બીજા કોઇ કારણથી થયેલ નુકશાન તેમને પોતાના ખર્ચે દુરસ્ત કરી આપવાનું રહેશે. તે દરમિયાન માણસોને ઇજાઓ થઇ હોય તો તે અંગેનાં દાવાઓની તેમજ અગર તેના નીચેનાં માણસોની ગેરવર્તુણક, બીન કાળજી અગર બીજી કોઇ અન્ય ભુલથી મિલકતને નુકશાન થયું હોય તે ઇજારદારનાં શીરે રહેશે. આ બાબતે કાર્યપાલક ઇજનેરશ્રીનો નિર્ણય આખરી રહેશે.

૧૩). ઇજારદારે કામ પર રોકેલ તાંત્રિક તેમજ બિન તાંત્રિક કર્મચારીઓને સામાન્ય ઇજા થાય તેવા સંજોગોમાં તાત્કાલિક સારવાર મળે તે હિસાબે ફર્સ્ટ એઇડનાં સાધનો પોતે વસાવવાનાં રહેશે. તથા સ્ટાફ તેમજ તમામ મશીનરીઓને વિમા રક્ષણ પૂરું પાડવાનું રહેશે.

૧૪). ઇજારદારે તાંત્રિક તેમજ બિન તાંત્રિક કર્મચારીઓ યોજના ચલાવવા માટે રાખેલ હોય તેમને ઇજારાના સમય દરમિયાન કોઇપણ પ્રકારની શારીરિક કે અન્ય વગેરે નુકશાની કે ઇજાના પ્રસંગે જરૂરી વળતર ચુકવવાનું થાય તેની સંપૂર્ણ જવાબદારી ઇજારદારની રહેશે. આ માટેનો વિમો ઇજારદારશ્રીએ સ્વખર્ચે ઉતારી પહોંચ લગત પેટા વિભાગીય કચેરીએ રજુ કરવાની રહેશે.

૧૫). ઇજારાના સમય દરમ્યાન ઇજારદારે આપવાનો થતો માલસામાન કે અન્ય ચીજ વસ્તુ જ્યાં ઉપલબ્ધ હશે તેવા નજીકનાં ખાતાકીય સ્ટોર પરથી પહોંચ લઈને આપવામાં આવશે. જેને સાઈટ પર લઈ જવાનો ખર્ચ ઇજારદારે ભોગવવાનો રહેશે.

૧૬). ઇજારાનાં અંતે યોજના ચલાવવા સંબંધી ખાતાના નિયત રજીસ્ટરો કે જે ઇજારદારે રાખવાનાં તથા નિયમીત નિભાવવાનાં રહેતા હોય તેવા રજીસ્ટરો અને અન્ય સાહિત્ય ખાતાને સોંપી દેવાનું રહેશે.

૧૭). સરકારશ્રીના કે બોર્ડનાં યોજના ચલાવવા સંબંધી પ્રવર્તમાન કે ભવિષ્યના દરેક નિયમો આ કામના ઇજારદારને બંધનકર્તા રહેશે. અને કોઇપણ કારણોસર ઇજારાનાં સમય દરમ્યાન અધવચ્ચે યોજના બંધ કરવાની થાય તો તે સમયથી આ ઇજારો આપોઆપ સમાપ્ત થયેલ ગણાશે.

૧૮). ઇજારાના સમય દરમ્યાન કોઇપણ પ્રકારનાં મતભેદનાં પ્રશ્ને કાર્યપાલક ઇજનેરશ્રીનો નિર્ણય આખરી અને બંધનકર્તા રહેશે.

પંપીંગ મશીનરી માટે સંચાલન, નિભાવણી, અને મરામત કામ માટેની શરતો:

૧). આ યોજના હેઠળ આવરી લેવામાં આવેલ દરેક મશીનરીની ટુંકી વિગતો સામેલ છે. તે દરેક મશીનરી ચલાવવાની, જાળવવાની, તથા મરામત કામ ઇજારદારે કરવાના રહેશે.

૨). પંપીંગ મશીનરી દ્વારા યોજનાના સોર્સ, ટ્યુબવેલ, કે કુવા અથવા બન્ને (ટ્યુબવેલ તથા કુવા) માંથી પાણી પંપ કરી મુખ્ય ટાંકો ભરી યોજનામાં આવરી લીધેલ ગામો સુધી પાણી પુરવઠો ગામની હાલની વસ્તી મુજબ માથાદીઠ ઓછામાં ઓછું ૧૦૦ લીટર મુજબ પાણી મળે તેટલું પાણી પંપ કરવાનું રહેશે.

૩). યોજનામાં આવરી લેવામાં આવેલ બધા ગામોને ઉપરોક્ત ધોરણે વસ્તીનાં પ્રમાણસર પાણી પુરૂ પડે તેટલું પાણી દરરોજ પંપીંગ કરવાનું રહેશે. અનુકુળતા મુજબ પંપીંગ સમયમાં ફેરફાર થવાનો હક્ક બોર્ડનાં સક્ષમ અધિકારીશ્રી દ્વારા આબાધિત રહેશે.

૪). બધા ગામોને મળીને કુલ હાલની વસ્તીનાં માથાદીઠ ૧૦૦ લીટર પાણી પુરૂ પડે તેટલું પંપીંગ કરવાનું રહેશે. સંજોગોવસાત ટ્યુબવેલ અથવા કુવામાં પાણીની ઓછી આવકનાં કારણે આખા દિવસનાં પ્રયત્નો છતાં પાણી નિયત જથ્થામાં આપી શકાય નહીં તો તે માટે ઇજારદાર જવાબદાર રહેશે નહીં.

૫). દરરોજનાં પાણી પંપીંગની વિગત તથા જથ્થાની વિગતો, પંપીંગ કલાક સહિત દર અઠવાડીયે નાયબ કાર્યપાલક ઇજનેરશ્રીની કચેરીને નિયમીત મોકલવાની રહેશે.

૬). ડીઝલ ઓઇલ એન્જીન, ઇલેક્ટ્રીક મોટર પંપને અનુકુળતા મુજબ સમયસર ચલાવવા માટે તેમજ રીપેરીંગનાં કિસ્સામાં રીપેરીંગ માટે જોઇતા મજૂરો/મીકેનીક્સ વિગેરેની વ્યવસ્થા ઇજારદારે પોતાના ખર્ચે અને જોખમે કરવાની રહેશે.

૭). ઇલેક્ટ્રીક મીટર વપરાશ અંગેનું બીલ વિદ્યુત બોર્ડનાં નિતિ-નિયમોનુંશાર સ્મૃતિવન સોસાયટી હસ્તકના સક્ષમ અધિકારીશ્રી દ્વારા ભરપાઇ કરવામાં આવશે. આમ પાણી પુરવઠો આપવા બાબતે વિજળીનો

જે કાંઈ વપરાશ થશે તે માટે બોર્ડ જવાબદાર રહેશે અને તે રકમ ભરવાની રહેશે નહીં. પરંતું ઇલેક્ટ્રીક મોટર પંપ તથા તેને લગતી બધીજ એસેસરીઝની સંપૂર્ણ જાળવણી ઇજારદારે કરવાની રહેશે. વિજળી વપરાશનું બીલ સમયસર ભરવા માટે બીલ આવ્યે કે તુરંત ઇજારદારે બોર્ડની કચેરીમાં રજુ કરવાનું રહેશે. જો બીલ મોડું રજુ થયેથી ભરવાની થતા વિલંબીત ચાર્જ ઇજારદારે ભોગવાના રહેશે. એનર્જી મીટરમાં ખરાબો/ખોટીપો થયેથી ઇજારદારશ્રીએ તુરંત જીઇબીની કચેરીમાં નિયત રકમ ભરીને રીપરીંગ કરાવવાનું અથવા બદલાવવાનું રહેશે. ગુજરાત વિદ્યુત બોર્ડની જરૂરી ફી ઠેકેદારશ્રીને બોર્ડ દ્વારા પુનઃ ચુકવણું કરવાનું રહેશે.

૮). બોર્ડનાં સક્ષમ અધિકારીશ્રીની સૂચના મુજબ ડીઝલ, ઓઇલ વપરાશ તથા ઇલેક્ટ્રીક મોટર વપરાશ અને યુનિટ વપરાશ માટે નિયત ફોર્મમાં ઠેકેદારશ્રીએ સ્વખર્ચે રજીસ્ટરો રાખવા અને નિયમિત જાળવણી તથા દરરોજ જરૂરી તમામ નોંધો ઇજારદારશ્રીએ કરવાની રહેશે. અને નિચે સહી કરનાર અધિકારીશ્રી કે તેના પ્રતિનિધી મુલાકાત દરમિયાન આવા રજીસ્ટરો તપાસવા માંગે ત્યારે ઇજારદારે રજુ કરવાના તથા સુચના પ્રમાણે જાળવવાનાં રહેશે.

૯). મશીનરી કે પંપમાં ખરાબી કે ભાંગકુટ થાય તો તે દુરસ્ત કરવા માટે જોઇતાં મજદુર ઠેકેદારે પોતાના ખર્ચે અને જોખમે રાખવાનાં રહેશે. તેમજ આ માટે જોઇતો પરચુરણ માલ સામાન જેવા કે રબ્બર પેકીંગ, ચાપડા, નટ, બોલ્ટ તેમજ સોલ્યુશન વગેરે ઇજારદારે પોતાના ખર્ચે લાવવાના રહેશે.

૧૦). આ યોજનાના કુવામાં કે બોરમાં, યોજનામાં આવરી લેવાયેલ ગામની પાણીની જરૂરીયાત કરતાં અપુરતું પાણી જણાય ત્યારે અગાઉથી બોર્ડની કચેરીને જાણ કરવી કે જેથી કરીને આ કચેરી આ માટે સમયસર જરૂરી પગલા લઇ શકે.

૧૧). અનિવાર્ય સંજોગો સિવાય દરેક ગામોએ આવેલ ટાંકાઓમાં જરૂરીયાત મુજબનો સંગ્રહ કરી શકાય તેટલું પાણી પંપીંગ કરવાનું રહેશે. આ માટે દિવસ કે રાત્રી દરમિયાન જ્યારે પણ વિજળી ઉપલબ્ધ હોય તે સમયે જરૂરીયાત મુજબનું પંપીંગ કરવાનું રહેશે. પંપીંગ માટે રાત્રી સમયનો મહત્તમ ઉપયોગ કરવાનો રહેશે. સતત ચોવીસ કલાક દરમિયાન વિજળી બંધ રહે તો તેની જાણ ઇજારદારે જી.ઇ.બી.ની કચેરીમાં કરી વિજળી ચાલુ કરાવવાનાં પ્રયત્નો તાત્કાલિક અસરથી હાથ ધરવાના રહેશે. આ બાબતની જાણ ખાતાની કચેરીને વિજળી બંધ હોવાના કારણો સાથે કરવાની રહેશે. જેથી ખાતા દ્વારા પણ પ્રયત્નો હાથ ધરી શકાશે.

૧૨). યોજનાની તમામ મશીનરીની દેખરેખ ઇજારદારે રાખવાની રહેશે. દરેક મશીનરી, પંપહાઉસ આસપાસ સ્વચ્છ તેમજ સુઘડતા રાખવાની જવાબદારી ઇજારદારની રહેશે.

૧૩). પાતાળકુંવા પર બેસાડવામાં આવેલ સબમર્શીબલ પંપીંગ મશીનરી ચલાવવા માટે ઇજારદારે પોતાના ખર્ચે કુશળ અને તાલીમ પામેલ ઓપરેટરો રાખવાનાં રહેશે. અને રાખેલ ઓપરેટરોની શૈક્ષણિક લાયકાત અનુભવ વિગેરેનાં પ્રમાણપત્રોની નકલો ખાતાની કચેરીને ઇજારદારે આપવાની રહેશે.

૧૪). વિજ વપરાશ સબમર્શીબલ પંપના હોર્સ-પાવરને અનુલક્ષી ધારા ધોરણથી વધારે માલુમ પડ્યેથી ઇજારદારે ખાતાને તુર્તજ જાણ કરવાની રહેશે.

૧૫). પાતાળકુંવામાંથી પાણી ઉંડુ જવાના પ્રસંગે મશીનરી માટે વપરાશનાં પાઇપો, કેબલ, ખાતા દ્વારા વિના મુલ્યે આપવામાં આવશે અને જો મશીનરીની ક્ષમતાથી વધારે ઉંડાઇએ પાણી ઉંડુ જવાના પ્રસંગે ખાતા તરફથી બીજી યોગ્ય ક્ષમતાની મશીનરી આપવામાં આવશે. આ માટે ઇજારદારે તાત્કાલિક જાણ કરવાની રહેશે. જેથી ખાતા દ્વારા તાત્કાલિક વ્યવસ્થા થઇ શકે જે માટે મશીનરી કે પાઇપો ઉતારવા ઇજારદારે પોતાના ખર્ચે સાધનો, મજૂરો, વિગેરે વ્યવસ્થા કરવાની રહેશે. આવા કામમાં પણ બે દિવસથી વધારે વિલંબ નિવારવા ઇજારદારે કાળજી લેવાની રહેશે. અન્યથા બેવડા દરથી વસુલાત કરવામાં આવશે.

૧૬). મશીનરી બોરમાં પડી જવાના પ્રસંગે ઇજારદારે પોતાના ખર્ચે અને જોખમે મશીનરી દિવસ બે માં બહાર કાઢી આપવાની રહેશે. અન્યથા પડી જવા પામેલ મશીનરીની ક્ષમતાની મશીનરી ઇજારદારે પોતાના ખર્ચે લાવીને પાણી ચાલુ કરવાનું રહેશે. અને બોરમાં પડી જવા પામેલ મશીનરી કાઢવામાં ઇજારદાર નિષ્ફળ જશે તો ઇજારાનો સમય પુરો થયેલ ઇજારદારે પોતાની લાવેલ ફીટ કરેલ મશીનરી ખાતાની માલિકીની ગણાશે. જો આવા પ્રસંગે અન્ય મશીનરી લાવવાનો ઇન્કાર કરશે તો ખાતાને થયેલ નુકશાન ઇજારદાર પાસેથી વસુલ કરવામાં આવશે તેમજ અન્ય નિયમ મુજબની કાર્યવાહી ઇજારદાર સામે હાથ ધરવામાં આવશે.

૧૭). અછત સમય દરમિયાન, રણ વિસ્તાર માટે કે મીલીટરી માટે કે ખાતાની અન્ય જરૂરીયાત માટે ટેન્કર ભરવાનાં થશે ત્યારે ખાતાની પરવાનગી મેળવી ઇજારદારે વિના મુલ્યે ભરી આપવાનાં રહેશે.

૧૮). જરૂર જણાયે ઠેકેદારશ્રીએ ૨૪ કલાક પંપીંગની વ્યવસ્થા કરવાની રહેશે. તથા કુવા-બોરમાં પાણીનાં લેવલનાં ડ્રો ડાઉનની વિગતો સમયસર ખાતાને કરવાની રહેશે.

૧૯). બોર કુવાની મશીનરીનાં ઇનલેટ, આઉટલેટ કે કોલમ પાઇપો કાઢતી-ઉતારતી-ફીટ કરતી વખતે ઇજારદારે બરાબર ચકાસવાની રહેશે. અને તેનાં આંટા વિગેરે ખરાબ થઇ ગયા હોય કે પાઇપો સડી ગયા હોય તો ખાતા પાસેથી મેળવી ફીટ કરવાનાં રહેશે. કપ્લીન નવી નાખવાની જરૂર જણાય તો ઠેકેદારે સ્વખર્ચે નવી નાખવાની રહેશે. પાઇપોનાં આંટા ખરાબ થઇ ગયા હોય તો ઠેકેદારશ્રીએ સ્વખર્ચે નવા કઢાવવાના રહેશે.

૨૦). ઠેકેદારે સરકારશ્રીનાં વખતો વખતના નિયત દરે કામ પર રોકવામાં આવેલ માણસોને તેમના કામની કક્ષા પ્રમાણે લેબર કલમ મુજબ પગાર, ભથ્થા વગેરેનું ચુકવણું કરવાનું રહેશે. તેમજ વખતો-વખત લેબર કમિશનર દ્વારા બહાર પાડવામાં આવેલ પરીપત્ર મુજબ અમલ કરવાનું રહેશે. જો ભવિષ્યમાં ઓછા ચુકવણા માટે કોઇ કોર્ટ કેસ કે વહીવટી પ્રશ્નો ઉભા થશે તો તે અંગેની જવાબદારી ઠેકેદારશ્રીની રહેશે.

૨૧). આ કામ માટે કોઇપણ પ્રકારનાં પરીક્ષણની જરૂરીયાત ઉભી થશે ત્યારે ખાતાની સૂચના મુજબ યાંત્રિક ભાગોનાં ચાલુ સામાન્ય પરીક્ષણની કામગીરી ખાતાની સૂચના મુજબ કરવાની રહેશે. અને તે માટે કોઇ વધારાનું ચુકવણું કરવામાં આવશે નહીં.

૨૨). પંપીંગ મશીનરીનાં સતત સંચાલન માટે ઠેકેદારશ્રીએ નીચે મુજબની તકેદારી રાખવાની રહેશે.

૨૨.૧). કરવાની થતી કામગીરીનું નિરિક્ષણ ઠેકેદારે પોતે રાખવાનું રહેશે. અથવા આ પ્રકારનાં કામનાં અનુભવી આઇ.ટી.આઇ. ઇલેક્ટ્રીશીયનના કોર્સ કરેલ પ્રતિનિધિને રોકીને કામગીરી કરવાની રહેશે. તેને યાંત્રિક મશીનરીનાં સંચાલન તથા તેના ઇન્સ્ટોલેશનની સારી રીતે સંચાલન થાય તે માટે તથા તેની સામાન્ય મરામત માટે દિવસમાં એક વખત સ્થળ મુલાકાત લેવાની રહેશે. જરૂરીયાતને ધ્યાને રાખીને યાંત્રિક યંત્રોની સંચાલન માટે વ્યવસ્થિત આયોજન કરવાનું રહેશે અને તેની ઉપર જરૂરી કર્મચારીઓ મુકવાના રહેશે.

૨૨.૨) કામ શરૂ કરતા પહેલા અને સંચાલન અંગે યાંત્રિક ઉપકરણો હાથ પર લેવા અને સ્થળ પર કામગીરી શરૂ કરતા પહેલા, તેઓએ માણસો નિયત થયા મુજબના પ્રમાણપત્રો અને અનુભવ ધરાવે છે તે અંગેની ખરાઇ, કામનાં હવાલો ધરાવનાર અધિકારીશ્રી પાસે કરાવવાની રહેશે અને મજૂરી માટે અસલ પ્રમાણપત્રો બે ઝેરોક્ષ કોપી સાથે રજૂ કરવાના રહેશે. અસલ પ્રમાણપત્રો તરત જ પરત કરવામાં આવશે.

૨૨.૩) યોજનાના સંચાલનની જવાબદારી ઠેકેદારશ્રીને સોંપ્યા બાદ ઠેકેદારશ્રી દ્વારા રોકેલ કર્મચારીની કામગીરી બરાબર નહીં માલુમ પડે તો તેને બદલવા ઠેકેદારને જણાવવામાં આવશે.

૨૨.૪). આઇડેન્ટીટી કાર્ડ:- ઉપર જણાવ્યા મુજબ જે વ્યક્તિને સંચાલનની કામગીરી સંભાળવાની થાય તે વ્યક્તિના ઓળખપત્ર, પાસપોર્ટ સાઇઝનાં ફોટા સાથે તેની પોતાની સહી અને હવાલે ધરાવનાર ઇજનેરની સહી સાથેનાં બે નકલમાં રજૂ કરવાનાં રહેશે. તે પૈકી એક નકલ જેનું ઓળખપત્ર ફોટો હશે તેને આપવામાં આવશે જ્યારે બીજી નકલ ખાતા પાસે રહેશે. આ પ્રકારનાં ઓળખપત્ર નહીં ધરાવનાર આસામીને સંચાલનની કામગીરી કરવા દેવામાં આવશે નહીં જેની નોંધ લેવી.

૨૨.૪.૧). ખાતા દ્વારા નક્કી કરવામાં આવે તે મુજબનાં ગણવેશમાં કર્મચારીઓએ ફરજ પર આવવાનું રહેશે. ઠેકેદારે રોકેલ તમામ કર્મચારીને જરૂરી ગણવેશ, સુરક્ષાત્મક બૂટ, હાથ મોજા, સાધનો સ્વખર્ચે પુરા પાડવાનાં રહેશે. પંપીંગ સ્ટેશનમાં ઇન્સ્યુલેટેડ ટૂલ્સ એજન્સીએ રાખવાના રહેશે.

૨૨.૫). સંચાલન દરમિયાન સંચાલકની ગેરહાજરી અંગે વળતર વસુલાત કરવા બાબત.

૨૨.૫.૧). આ કામગીરી માટે રોકવામાં આવેલ સંચાલક કોઇપણ સંજોગોમાં પંપીંગ સેટ ચાલુ હાલતમાં છોડીને દુર જઇ શકશે નહીં. પંપ હાઉસ કે પંપ ઉપર સતત હાજર રહેશે.

૨૨.૫.૩). પાતાળકુવો અથવા સંપમાં એકધારી પાણીની સપાટી જળવાઇ રહે તે માટે સંચાલક (ઓપરેટર) વાલ્વ તથા તેને લગત ઉપકરણોને જરૂરીયાત પ્રમાણે ઓપરેટ કરવાનાં રહેશે તેથી પંપનું સંચાલન સતત ચાલુ રહે. અને કોઇપણ સંજોગોમાં પાણી વગર પંપ ચાલુ રહે નહીં તેવી તેની તકેદારી રાખશો. અને ઓપરેટરની બેદરકારીને કારણે પંપસેટને કોઇપણ પ્રકારની નુકશાની થશે તો તેનું સમારકામ ઠેકેદારશ્રીનાં ખર્ચે અને જોખમે કરાવવામાં આવશે.

૨૨.૫.૪). જો ખામીયુક્ત સંચાલનને કારણે અથવા સામાન્ય જાળવણીને કારણે પંપીંગ મશીનરી અથવા ઉપકરણોને નુકશાન થશે તો તેનું સમારકામ ઠેકેદારના ખર્ચે કરાવવાનું રહેશે. આ કામનાં પરીક્ષેત્રમાં મશીનરીનાં સંચાલન ઉપરાંત જરૂરીયાત પ્રમાણે વાલ્વનું સંચાલન કરવાનો પણ સમાવેશ થાય છે.

૨૨.૫.૫).ખાતા દ્વારા નક્કી કરવામાં આવેલ કુશળ/અર્ધ કુશળ/બીન કુશળ/કેમીસ્ટ માણસો જો ફરજ પર ગેરહાજર રહેશે, તો નિયમોનુસાર મુજબ કપાત કરવામાં આવશે.

૨૩). પંપ હાઉસ તથા તેની આજુબાજુનો વિસ્તાર સ્વચ્છ રાખવાની જવાબદારી ઠેકેદારશ્રીની રહેશે.

૨૪). ઠેકેદારશ્રીએ સંચાલન માટે રોકવાના થતા સંચાલકો માટેનું ડ્યુટી લીસ્ટ તેના અમલ પહેલા હવાલો ધરાવનાર ઇજનેર પાસેથી મંજૂરી મેળવવાની રહેશે. આ ડ્યુટી લીસ્ટ ઠેકેદારે ત્રણ નકલમાં રજૂ કરવાની રહેશે. જે પૈકી એક નકલ ફરજ પરના પંપીંગ સ્ટેશન ઉપર જાહેરમાં વાંચી શકાય તે રીતે રાખવાની રહેશે. જો આ નક્કી કરેલ ડ્યુટી લીસ્ટમાં કોઈ ફેરફાર કરવાનો થાય તો ઠેકેદારે હવાલો ધરાવનાર ઇજનેરની અનુમતીથી થઈ શકશે. હવાલા ઇજનેરની સુચનાથી સંચાલકોને એક પંપીંગ સ્ટેશનથી બીજા પંપીંગ સ્ટેશન ઉપર લેખીત સુચના આપવામાં આવે ત્યારબાદ બલદવાના રહેશે. આ અંગે કોઈપણ પ્રકારનો વિવાદ ચાલશે નહીં.

૨૫). ઠેકેદારશ્રી દ્વારા નિયત નમુના મુજબની પ્રીન્ટ કરેલ લોગબુક પંપીંગ સ્ટેશનનાં સંચાલકને દરરોજનાં પંપીંગની નોંધ માટે આપવાની રહેશે. અને તેમાં સંચાલકોએ જરૂરી નોંધ કરવાની રહેશે. જેની રોજરોજની એક નકલ હવાલો ધરાવનાર ઇજનેરને અથવા તેના પ્રતિનિધિને આપવાની રહેશે.

૨૬). હવોલો ધરાવતા ઇજનેર પંપીંગ સ્ટેશન તથા ઇન્સ્ટોલેશન સંચાલન અર્થે ઠેકેદારને ઇન્સ્ટોલેશનની દરેક વિગતોની લેખીત માહિતી સાથે હવાલો આપશે. જ્યારે ઠેકેદારની કામગીરી પૂર્ણ થશે ત્યારે તે જ રીતે ઠેકેદારશ્રીએ પંપીંગ સ્ટેશન તથા ઇન્સ્ટોલેશનનો હવાલો જે તે સ્થિતિમાં ઠેકેદારને સોંપેલ તે પ્રમાણેની સ્થિતિમાં હવાલાના ઇજનેરને પરત કરવાનો રહેશે. જો તેમ કરવામાં ઠેકેદારશ્રી નિષ્ફળ જશે તો પંચ રૂબરૂ હવાલો લેવામાં આવશે. અને ક્ષતિ જણાશે તો તેનું ઠેકેદારનાં ખર્ચે કોઈપણ પ્રકારની આગોતરા જાણ કર્યા વગર સમારકામ કરાવવામાં આવશે. અને તે માટે થનાર ખર્ચની બાબતે કોઈપણ વિવાદ ચલાવી લેવામાં આવશે નહીં.

૨૭.) હાલમાં ઉપયોગમાં લેવાતી પંપીંગ મશીનરી, પેનલ બોર્ડની વિગત પરિશિષ્ટ -૩ માં સામેલ છે. કોન્ટ્રાક્ટ સમય પૂર્ણ થયે બધી જ મશીનરી ચાલુ હાલતમાં પરત કરવાની રહેશે. જો કોઈ મશીનરી, પેનલ બોર્ડ બંધ હાલતમાં હશે તો જે તે સમય ના યાંત્રીક વિભાગના એસ.ઓ. આર. મુજબ નાણાની કપાત કરવામાં આવશે.

જો કોઈ બોર, હેડ વર્ક્સ, યુનીટ માટે એક થી વધુ પંપીંગ મશીનરી, પેનલ બોર્ડ આપવામાં આવેલ હોય, તો તમામ મશીનરી, પેનલ બોર્ડ ચાલુ હાલત માં રાખવાના રહેશે. માસના અંતે દરેક પંપીંગ મશીનરી ચલાવવાનો સમય લગભગ સરખો હોવો જોઈએ.

૨૮). યોજનાના દરેક હેડ વર્ક્સ/ સબ હેડ વર્ક્સ પર મળેલ તથા હેડ વર્ક્સ/ સબ હેડ વર્ક્સ પરથી પંપીંગ થયેલ પાણીના જથ્થાની વિગત એજન્સીએ એસ.એમ.એસ, / ઈન્ટરનેટ મારફતે ના.કા.ઈ/કા.ઈ. ની સુચના મુજબ આપવાની રહેશે.

૨૯). સંચાલન અંગેનાં સુચનો:

ઠેકેદારે ખાત્રી આપવાની રહેશે કે તેમના દ્વારા રોકવામાં આવેલ ઓપરેટર નીચે જણાવેલ વિગતે પંપ સેટ ચલાવવા અંગેની જાણકારી ધરાવે છે.

એ). પંપ ચાલુ કર્યા પહેલા:

ઓપરેટર દ્વારા પંપ ચાલુ કરતા પહેલા નીચે દર્શાવેલ બાબત અંગે ચકાસણી કરવાની રહેશે.

૧). પેનલ બોર્ડનાં વોલ્ટ મીટરમાં વોલ્ટેઝ ૩૮૦ થી ૪૪૦ વોલ્ટ છે.

૨). પંપ અને મોટરનાં લુબ્રીકેશન

૩). પંપ અને મોટરની શાફ્ટ હાથ વડે ફેરવી પંપ જામ નથી અને યુનિટ મુક્ત રીતે ફરે છે તે ચકાસી લેવું.

૪). ઍલ્ડનું લીકેજ ચકાસવું.

૫). સક્શન વાલ્વ ખોલવો.

૬). પંપનું પ્રાઇમીંગ કરવું અને હવાનો ભાગ દુર કરવો.

૭). સ્ટાર્ટર દબાવી મશીનરી ચાલુ કરવી.

બી). ચાલુ પંપ દરમિયાન પંપ ઓપરેટરે નીચેની જણાવેલ કાળજી લેવાની રહેશે.

૧). ડીલીવરી વાલ્વ ધીમેથી ખોલવો.

૨). પેનલ બોર્ડનાં વોલ્ટ મીટર અને એ મીટર ચકાસીને ખાત્રી કરી લેવી કે પંપ ઓવરલોડમાં ફરતો નથી.

૩). ડીલીવરી હેડ પ્રેસર ગેજ મુકવું અને સતત પાણીનો જથ્થો નિયમિત થાય તે માટે વાલ્વ થ્રોટલ કરવો.

૪). ચાલુ મશીનરીમાંથી કોઇ પણ પ્રકારનો અવાજ જેવો કે બેરીંગ નોક થવી અથવા કોઇપણ ભાગનાં પીશાવા જેવો અવાજ વિગેરે બાબતે સતત દેખરેખ રાખવી.

૫). મોટર તથા મોટર બેરીંગને કેટલીક વાર યોગ્ય સમયે સ્પર્શ કરી ગરમ થયેલ નથી તેની ખાત્રી કરી લેવી.

૬). સક્શન અને ડીલીવરી હેડ પ્રેસર ગેજ ચકાસી તે સાચી નોંધ કરે છે તેની ખાત્રી કરવી.

સી). પંપ બંધ કરતી વખતે ઓપરેટરે નીચેની બાબતે કાળજી લેવી.

૧). લોડ ક્રમે ક્રમે બંધ કરવો. એકદમ બંધ કરી દેવો નહીં.

૨). જ્યારે જ્યારે લોડ દુર કરવામાં આવે ત્યારે મશીનરી તુરંત જ બંધ કરવી નહીં. પરંતુ બંધ કર્યા પહેલા થોડી વાર ચાલવા દેવી.

ડી). પંપ ચાલુ થયા પછી બંધ થાય તેવા સંજોગોમાં ઓપરેટરે નીચે જણાવેલ કારણો પૈકી અવલોકન કરી ક્યાં કારણસર આવું બને છે. તેની જાણકારી થવી જોઈએ.

૧). પંપ અને સક્શન લાઇન પાણીથી ભરેલ ન હોય

૨). સ્ટ્રીંગ બોક્સમાંથી હવાનું લીકેઝ

૩). સક્શન લાઇનમાંથી હવાના લીકેઝ અથવા હવાના પોકેટ

૪). વધુ પડતી સક્શન લીફ્ટ

ઇ). પંપ માંથી તુટક તુટક પાણી આવે તેવા સંજોગોમાં ઓપરેટરે તાત્કાલીક નીચે જણાવેલ કારણો અંગે અવલોકન કરી અને શા કારણથી આવુ બને છે તેજુ જાણકારી મેળવી લેવાની રહેશે.

૧). સ્પીડ ઘણીજ ધીમી હોય.

૨). કુટ વાલ્વ ઘણો નાનો હોય અથવા અંશતઃ અડચણવાળો હોય.

૩). પાણી સાથે હવા હોવાથી.

૪). પંપ અને સક્શન લાઇન પાણીથી પુરતા ભરેલા ન હોય.

૫). વધુ પડતી સક્શન લીફ્ટ.

ઉપર જણાવેલ વિગતો બાબત જે ક્ષતિ દેખાય તે બાબતો નોટીશ બોર્ડ ઉપર લખવાની રહેશે. સામાન્ય વધારાની બાબતો જેવી કે લ્યુબ્રીકેન્ટ ઝલાન્ડ પેકીંગ કોટન વેસ્ટ અને મરામત માટેનાં જરૂરી યંત્રો સાધનો સ્વખર્ચે ઠેકેદારે લાવવાના રહેશે. માપક યંત્રો સાધનો જેવા કે વોલ્ટ મીટર, એમીટર, રીલે વોટર મીટર, પ્રેસર ગેજ, વેક્યુમ ગેજ વગેરેની માસીક ચકાસણી ઠેકેદારે પોતાના પ્રતિનિધિ પાસે કરાવવાની રહેશે અને આ રીતે સમયાંતરે ચકાસણી અને મરામત અંગેની નોંધ નોંધપોથીમાં કરી ખાતાના પ્રતિનિધિ પાસેથી પ્રતિ હસ્તાક્ષર મેળવવાના રહેશે. તથા પંપીંગ સ્ટેશન પર રાખવાની થશે અને જ્યારે પણ નિરિક્ષક અધિકારી મુલાકાત લે ત્યારે તે રજુ કરવાની રહેશે. એજન્સીની જવાબદારી પંપીંગ સ્ટેશનના સમગ્ર સંચાલન તથા પાણી આપવાની વ્યવસ્થા કરારખતમાં દર્શાવેલ સમય માટે રહેશે.

વીજ પુરવઠો નિષ્ફળ જાય તો ઠેકેદારનાં સંચાલકે હવાલાના ઇજનેર અથવા તેના પ્રતિનિધિને ટેલીફોનથી તુરંતજ જાણ કરવાની રહેશે. અને ગુજરાત વિદ્યુત બોર્ડનાં સંલગ્ન વ્યક્તિને આ અંગે તુરંત જ ટેલીફોનથી પણ ફરીયાદ નોંધાવવાની રહેશે. કોઇપણ અનઅધિકૃત વ્યક્તિને પંપીંગ સ્ટેશન પર દાખલ થવા દેવામાં આવશે નહીં.

પંપ સેટનાં સંચાલન અને દિવાબત્તી માટેનો પાવર ખાતા તરફથી વિના મુલ્યે પુરો પાડવામાં આવશે. પંપીંગ સ્ટેશન તથા તેમાં આવેલા સાધનો તથા યંત્ર સામગ્રીની સર્વે સલામતીની જવાબદારી ઠેકેદારની રહેશે. ઠેકેદારનાં હવાલા દરમિયાન પંપીંગ સ્ટેશન તથા યંત્ર સાધન સામગ્રીની કોઈ પ્રકારની ચોરી અથવા અકસ્માત થશે તો તેની જવાબદારી ઠેકેદારની પોતાની રહેશે. અને ખાતા તરફથી કોઈપણ પ્રકારનું વળતર ચુકવવામાં આવશે નહીં. ઠેકેદારનાં હવાલા દરમિયાન પંપસેટ, પંપીંગ સ્ટેશન અથવા અન્ય કોઈ સાધનોને કોઈપણ પ્રકારની ક્ષતિ પહોંચશે તો તેને યથાવત સ્થિતિમાં લાવવાની જવાબદારી ઠેકેદારની રહેશે. અને તે માટે વધારાની રકમનું ચુકવણું કરવામાં આવશે નહીં.

આ સાથેનાં પરિશિષ્ટમાં યંત્ર સાધન સામગ્રી બેસાડેલ છે તેની વિગતો આપવામાં આવેલ છે. જેનાથી ઠેકેદારે પોતે વાકેફ થવાનું રહેશે. અને તેનું સારસંભાળ અને સંચાલન ઠેકેદારે કરવાનું રહેશે.

કામગીરીના કરારખતના સમયગાળા દરમિયાન (૦૮ માસ) જે તે સોંપવામાં આવેલ પાતાળકુવાની સાફ સફાઈ/વાલ કરવાની કામગીરી જરૂર જણાય તો તે ઇજારદારશ્રી દ્વારા સ્વખર્ચે કરાવવાની રહેશે. આ માટે અન્ય કોઈ વધારાની રકમનું ચુકવણું કરવામાં આવશે નહીં

કામગીરીના કરારખતના સમયગાળા દરમિયાન (૦૮ માસ) ઇજારદારશ્રી દ્વારા જણાવ્યા મુજબના જરૂરી મેન પાવર રાખવાના રહેશે. આ બાબતે નિષ્ફળ રહેવા પામે તો તે કામગીરી માટેની રકમ ઇજારદારશ્રીના બીલમાંથી કપાત કરવાની રહેશે.

કામનો ચાર્જ સંભાળતી વખતે પાતાળકુવા, સંપ તેમજ તમામ પ્રકારની પંપીંગ મશીનરીઓ તેમજ પેનલ બોર્ડ અને અન્ય વિજ ઉપકરણો જે હાલતમાં હશે તે હાલતમાં સંભાળી લેવાના રહેશે તેમજ તેને વર્કીંગ કન્ડીશનમાં લાવી ૦૮ માસ સુધી ચલાવવાના રહેશે. વર્કીંગ કન્ડીશનમાં લાવવા માટે કોઈ પણ જાતનું ચુકવણું ખાતા તરફથી કરવામાં આવશે નહીં. તેમજ આ કામ પુર્ણ થયે ખાતાને ચાર્જ પરત સોંપણી વખતે તમામ મશીનરીઓ ચાલુ હાલતમાં આપવાની રહેશે.

કામગીરીના કરારખતના સમયગાળા દરમિયાન (૨૪ માસ) ઇજારદારશ્રી દ્વારા જણાવ્યા મુજબના જરૂરી મેન પાવર રાખવાના રહેશે તેમજ જણાવેલ ગામ/પરાંને જોડતી પાઇપલાઇનની મ. અને નિ. તેમજ સમગ્ર સંચાલન કરવાનું રહેશે તથા જે તે ગામ/પરાંને નિયમિત પુરતાં પ્રમાણમાં પાણી પુરવઠો આપવાનો રહેશે. આ બાબતે નિષ્ફળ રહેવા પામે તો તે કામગીરી માટેની રકમ ઇજારદારશ્રીના બીલમાંથી કપાત કરવાની ફરજ થશે. કામનો ચાર્જ સંભાળતી વખતે સંપ તેમજ તમામ પ્રકારની પંપીંગ મશીનરીઓ તેમજ પેનલ બોર્ડ અને અન્ય વિજ ઉપકરણો જે હાલતમાં હશે તે હાલતમાં સંભાળી લેવાના રહેશે તેમજ તેને વર્કીંગ કન્ડીશનમાં લાવી ૧૨ માસ સુધી ચલાવવાના રહેશે. વર્કીંગ કન્ડીશનમાં લાવવા માટે કોઈ પણ જાતનું ચુકવણું ખાતા તરફથી કરવામાં આવશે નહીં. તેમજ આ કામ પુર્ણ થયે ખાતાને ચાર્જ પરત સોંપણી વખતે તમામ મશીનરીઓ ચાલુ હાલતમાં આપવાની રહેશે.

૩૦) શીડ્યુબ-બી ના પાર્ટ-સી મા લેવામાં આવેલ આઇટમો એ જ્યારે જરૂર જણાય તે કિસસામાં સલગ્ન એજન્સીયર ઇન ચાર્જ દ્વારા આપવામાં આવેલ સુચના મુજબ તેમજ ટેકનીકલ સ્પેશિફિકેશન મુજબ એજન્સી

દ્વારા પુરા પાડવાના રહેશે. સદર આઇટમો નું ચુકવણું જે આઇટમો એજંસી દ્વારા સપ્લાય કરેલ હોય તેનું કરવામાં આવશે. પાર્ટ-સી માં લેવામાં આવેલ તમામ આઇટમો માટે એજંસી દાવો પ્રસ્થાપીત કરી શકે નહીં. તેમજ ચુકવણું થયેથી સદર આઇટમો ખાતા હસ્તક રહેશે. એજંસી આ બાબતે કોઇ પણ હક કે દાવો પ્રસ્થાપીત કરી શકે નહીં. જે સ્થાને નવીન આઇટમો લગાવવામાં આવે છે. તેના ઉતારવા કે ઇંસ્ટોલ કરવા માટે એજંસીને અલગથી કોઈ ચુકવણું કરવા પાત્ર થતું નથી. સદર સાઇટો પર જુનું પડેલ મટીરીયલ એજંસીનીયર ઇન ચાર્જ ની સુચના મુજબ એજંસી દ્વારા ટ્રાન્સપોર્ટેશન કરાવી ખાતાકીય સ્ટોરમાં જમા કરવાનું રહેશે. આ અંગે એજંસીને અલગથી કોઈ ચુકવણું કરવામાં આવશે નહીં.

૩૧) મરામત નિભાવણી દરમિયાન કોઈ પાઈપ લાઈનના એરવાલ રાઈઝર પડી ગયેલ હોય અથવા રાઈઝર પાઈપ સડી ગયેલ હોય તો નવિન એરવાલ્વ ઉભો કરવાની કામગીરી કરવની રહેશે જે એજંસીને કોઈ અલગથી ચુકવણું કરવામાં આવશે નહિ.

૩૨) એજંસી હસ્તકની પાઈપ લાઈન માં કોઈ ગેરકાયદેસર કનેક્શન ન થાય તેનું ખાસ ધ્યાન રાખવાનું રહેશે, જો કોઈ ગેરકાયદેસર કનેક્શન માલુમ પડે તો તેની કાયદેસરની કાર્યવાહિ એજંસી દ્વારા કરવાની રહેશે .

૩૩) ઈ.આર.પી. સોફ્ટવેર તેમજ બોર્ડના અન્ય કોઈ સોફ્ટવેરમાં ઈજારદારશ્રી દ્વારા ટેન્ડરમાં સમાવિષ્ટ કામગીરીને લગત જરૂરી ટેનિક એન્ટ્રી નિયત સમયમાં દરરોજ ફરજિયાત કરવાની રહેશે. જે જરૂરી ટેનિક એન્ટ્રી બાબતે ભવિષ્યમાં કામગીરીના ચુકવણાં બાબતે પ્રશ્ન ઉપસ્થિત થાય તો તે બાબતે ઈજારદારશ્રીની અંગત જવાબદારી રહેશે. તેમજ નિયમિત પણે એન્ટ્રી ન થયાના કિસ્સામાં ટેન્ડરના નિયમોનુસાર પેનલ્ટી કપાત લેવામાં આવશે.

૩૪) એજંસી ને સદર ટેન્ડર માં સમાવિષ્ટ કામગીરીની વિગત નાયબ કાર્યપાલક ઈજનેરશ્રી જા. આ. યાંત્રિક પેટા વિભાગ-ભુજ દ્વારા સોંપવામાં આવેલ હેન્ડ ઓવર ચાર્જ પેપર માં જણાવ્યા મુજબ ઘાટકો જેમકે પમ્પીંગ મશીનરી, પેનલ, કેબલો તેમજ તમામ એસેસરીઝ વગેરે જે હાલત માં છે તે હાલાતમાં લઈ તેમાં કરવાની થતી કામગીરી જેવી કે લિકેજ ,ડેમેજ એરવાલ ,સ્લુઝ વાલ, તેમજ બંધ પડેલ પમ્પીંગ મશીનરી વગેરેને મરામત એજંસીના સ્વખર્ચે કરી આપવાની રહેશે.

૩૫) મરામત-નિભાવણી હેઠળના તમામ ટ્યુબવેલ ના સંચાલન, મરામત-નિભાવણીના સમયગાળા દરમિયાન ખાતા દ્વારા નવીન બોરનું શારકામ થયેથી તેમજ સલઝન ના.કા.ઇ./કા.ઇ.શ્રી ની સુચનાથી નવીન બનેલ બોર એજંસી દ્વારા સંભાળી લેવાની રહેશે તેમજ જુની બોરની મશીનરી તેમજ સલઝન એસેસરીઝ સલઝન ના.કા.ઇ./કા.ઇ.શ્રી ની સુચના મુજબ નવીન બોરમાં ઉતારવાની રહેશે અથવા સ્ટોરમાં સુચના મુજબ ખાતાકીય સ્ટોરમાં જમા કરાવવાની રહેશે. જો નવીન મશીનરી ઉતારવાની થાય તો ખાતાકીય સ્ટોરમાંથી મેળવી નવીન શારેલ પા.કુ. માં ઉતારવાની રહેશે. આ અંગે એજંસી દ્વારા કોઇપણ અલગથી ચુકવણું કરવાનું રહેશે નહિ.

કા.ઇ.શ્રી (બાં)

નખત્રાણ

કોટ્રાક્ટર

કા.ઇ.શ્રી (યાં)

ભુજ

Technical Specification Electro-Mechanical

Part C-2

Item No: 1 & Item No:-2 Cubical Control Panel (ATS) & DOL/ Star-Delta Panel

Auto transformer starter suitable for local & remote pump control application consisting of Auto Transformer (vacuum impregnated, air cooled having three (3) tapings at 50%, 65% and 80%), incomer MCCB / MCB, overload relay and contactors as per Type II coordination including digital MFM with RS 485 communication port, analogue type ammeter with selector switch, run hour meter, required protective relays & control accessories.

Supply of fully automatic air break type panel up to 7.5 H.P. D.O.L. Star Delta from 8 -20 H.P. above 20 H.P. auto transformer Control Panels for Submersible Pumps suitable for operation on 415 (+ 10% -15%) Voltage, 3 Phase, $50 \pm 3\%$ Hz A.C. Supply, Control Panels shall be comprising of MCB/MCCB, Overload relays, Contactors and Accessories. The details of equipment / accessories for each type of panels are given in enclosed data sheet.

1) ENCLOSURES:

The control panel shall be dust and vermin proof as per IP-41 and fabricated out of minimum 1.5 mm CR sheets for all Panels. Control Panel shall be wall-mounting type for DOL / Star Delta and for ATS wall mounting-cum-pedestal type. All items inside the panel shall be mounted on steel base plate. All metal parts shall be thoroughly cleaned, degreased and made free from rust. Control panels shall be powder coated. The color shade of panel shall be RAL 7032 for entire panel and component mounting plate should be Orange only. Size of the enclosure should be as mentioned in the drawing attached.

All bolts, nuts, screws, washers shall be Galvanized Zinc / Cadmium plated and passivity, and full protection from dust rubber lining should be provided. There shall be cable entry for suitable size at the bottom of the control panel for outgoing cable to submersible motor. There should be one suitable entry on bottom of Control Panel for incoming cable. Layout on the door will be as per drawing (attached). For Closing the Door Two Half Turn Door Locks (Top and Bottom) operated by a Screw Driver type key should be provided. One Key is provided by the supplier with each Control Panel.

The cable entries for incoming and outgoing cable shall be provided with rubber grommets, at bottom of panel.

2) WIRING AND TERMINALS:

Power Supply to Control Panel and Internal Control Panel wiring shall be done with P.V.C. insulated copper conductor / Strip having 660/1100 V grade insulation Control wiring shall be done with 1.0 mm² copper conductors and shall be terminated with adequately sized compression type lugs for connections to the equipment terminals and the terminal strips. Each wire shall be identified at both ends by PVC ferrules. Not more than 2 wires to be terminated at one terminal and proper type and size at terminals should be used keeping in view the components for which they are used, so, that sufficient surface contact can be achieved. Screws and Bolts should be used as per corresponding size and hole. That should be done to the satisfaction of inspection authority. Incoming and outgoing connections to be made at terminals only Clip on type terminals shall be used for wiring up to 10mm² and for conductors larger than 10 mm² bolt type terminals shall be provided. Terminal may also be permissible on epoxy insulator with copper strip and

Hardware of proper size. The size of incoming cable should be provided as per table-I here under:

TABLE - I

Sr No	Type of Control Panel	Size of incoming Conductor Terminal	Terminal strip for outgoing Conductor		
1	D.O.L. Up to 3 H.P.PANEL	1 x 3 x 2.5 sq.mm	1 No.	-	2.5 sq.mm
2	D.O.L. Up to 5 H.P.PANEL	1 x 3 x 2.5 sq.mm	1 No.	-	2.5 sq.mm
3	D.O.L. Up to 7.5 H.P.PANEL	1 x 3 x 4.0 sq.mm	1 No.	-	4.0 sq.mm
4	S.D. 8 to 10 H.P.PANEL	1 x 3 x 6.0 sq.mm	2 Nos.	-	4.0 sq.mm
5	S.D. 11 to 15 H.P.PANEL	1 x 3 x 6.0 sq.mm	2 Nos.	-	4.0 sq.mm
6	S.D. 16 to 20 H.P.PANEL	1 x 3 x 10.0 sq.mm	2 Nos.	-	6.0 sq.mm
7	ATS 21 to 30 H.P.PANEL	1 x 3 x 16.0 sq.mm	1 No.	-	16.0 sq.mm
8	ATS 31 to 35 H.P.PANEL	1 x 3 x 16.0 sq.mm	1 No.	-	16.0 sq.mm
9	ATS 36 to 45 H.P.PANEL	1 x 3 x 25.0 sq.mm	1 No.	-	25.0 sq.mm
10	ATS 46 to 50 H.P.PANEL	1 x 3 x 25.0 sq.mm	1 No.	-	25.0 sq.mm
11	ATS 51 to 60 H.P.PANEL	1 x 3 x 35.0 sq.mm	1 No.	-	35.0 sq.mm
12	ATS 61 to 70 H.P.PANEL	1 x 3 x 35.0 sq.mm	1 No.	-	35.0 sq.mm
13	ATS 71 to 80 H.P.PANEL	2 x 3 x 25.0 sq.mm	1 No.	-	50.0 sq.mm
14	ATS 81 to 90 H.P.PANEL	2 x 3 x 25.0 sq.mm	1 No.	-	50.0 sq.mm
15	ATS 91 to 100 H.P.PANEL	2 x 3 x 25.0 sq.mm	1 No.	-	70.0 sq.mm
16	ATS 101 to 110 H.P.PANEL	2 x 3 x 35.0 sq.mm	1 No.	-	70.0 sq.mm
17	ATS 111 to 120 H.P.PANEL	2 x 3 x 35.0 sq.mm	1 No.	-	70.0 sq.mm
18	ATS 121 to 130 H.P.PANEL	3 x 3 x 35.0 sq.mm	1 No.	-	95.0 sq.mm
19	ATS 131 to 140 H.P.PANEL	3 x 3 x 35.0 sq.mm	1 No.	-	95.0 sq.mm
20	ATS 141 to 150 H.P.PANEL	3 x 3 x 35.0 sq.mm	1 No.	-	95.0 sq.mm
21	ATS 151 to 160 H.P.PANEL	3 x 3 x 35.0 sq.mm	1 No.	-	Above 95 sq.mm.

3) EARTHING :

Provision shall be provided for connecting the earth. All non-current carrying metallic parts of the equipment shall be earthed Two “L” shaped earth bus of aluminum (19 mm x 3 mm) will be connected between base plate and the body of the panel. Also necessary provision of earthing on door shall be made to connect main Earthing.

4) NAME PLATE :

Labels shall be provided for each equipment mounted on the panel and all labels shall be engraved in Gujarati Language on 3 ply-laminated sheets or anodized aluminum. These shall be fastened to the panels by screws and not by Adhesive. All mounted equipment shall have identification with paint inside the panels. Instruction for operation of panel shall be engraved in Gujarati language on 3 ply laminate sheet or anodized aluminum. These should be fastened to the front side of panel door by screws and not by Adhesive.

5) ACCESSIBILITY :

Checking and removal of components shall be possible without disturbing adjacent equipment. All auxiliary equipment's shall be easily accessible incoming supply terminals shall be shrouded with plastic covers to prevent accidental contact.

6) INCOMING:

MCCB for ATS and MCB for DOL / Star

Delta MCCB:

- 1) Fixed thermal magnetic type.
- 2) Breaking capacity (ICU) should be minimum 10 KA up to 200 A and Minimum 35KA for 225 A and above (ICU = 50% of Ics).
- 3) All Accessories should be field fit table type.
- 4) Rated Insulation voltage should be minimum 600 V.
- 5) Certified pollution degree for environment for MCCB should be as per IEC-60947 MCB:

- 1) Should be suitable for Isolation function as specified in IEC 60898 / IS: 8828.
- 2) Should have IP-20 protection with positive contact indication.
- 3) Should be of "C" type tripping class suitable for motor application.
- 4) Energy limitation class should be III.
- 5) Average suitable life should greater than 20,000 for 32 A and 10,000 for more than 32 A rating.
- 6) Breaking capacity should be minimum 10KA.

7) **MCCB / MCB**

MCCB / MCB for main circuit should be TP and Neutral should be separate. It should be mounted in side the panel on base plate and the operating trigger shall be front of the panel in such a way that only trigger is seen fitted in a Hooper type box as shown in drawings. A separate MCCB / MCB for capacitors should be mounted as suitable place inside the enclosure. The current rating shall be as per Table - II.

TABLE – II

Sr. No.	Type of Control Panel Board	FOR MAIN CIRCUIT	FOR CAPACITOR		Range of CT
		Capacity of MCB / MCCB	Capacity of MCB / MCCB (TP 10 KA)	Capacitor KVA _r	
1	D.O.L. Up to 3 H.P. Panel	16 AMP MCB	-	0	10/5 AMP
2	D.O.L. Up to 5 H.P. Panel	20 AMP MCB	-	0	15/5 AMP
3	D.O.L. Up to 7.5 H.P. Panel	25 AMP MCB	6 AMP MCB	3	20/5 AMP
4	S.D. 8 to 10 H.P. Panel	32 AMP MCB	6 AMP MCB	3	30/5 AMP
5	S.D. 11 to 15 H.P. Panel	50 AMP MCB	10 AMP MCB	4	50/5 AMP
6	S.D. 16 to 20 H.P. Panel	63 AMP MCB	10 AMP MCB	5	60/5 AMP
7	ATS 21 to 30 H.P. Panel	75/80 AMP MCCB	16 AMP MCB	7	75/5 AMP
8	ATS 31 to 35 H.P. Panel	100 AMP MCCB	16 AMP MCB	8	100/5 AMP
9	ATS 36 to 45 H.P. Panel	125 AMP MCCB	20 AMP MCB	10	100/5 AMP
10	ATS 46 to 50 H.P. Panel	150/160 AMP	25 AMP	11	150/5 AMP

		MCCB	MCB		
11	ATS 51 to 60 H.P. Panel	200 AMP MCCB	32 AMP MCB	13	150/5 AMP
12	ATS 61 to 70 H.P. Panel	200 AMP MCCB	32 AMP MCB	15	200/5 AMP
13	ATS 71 to 80 H.P. Panel	225/250 AMP MCCB	40 AMP MCB	17	250/5 AMP

14	ATS 81 to 90 H.P. Panel	300/320 AMP MCCB	40 AMP MCB	19	250/5 AMP
15	ATS 91 to 100 H.P. Panel	300/320 AMP MCCB	50 AMP MCB	21	300/5 AMP
16	ATS 101 to 110 H.P. Panel	300/320 AMP MCCB	50 AMP MCB	23	300/5 AMP
17	ATS 111 to 120 H.P. Panel	400 AMP MCCB	50 AMP MCB	25	400/5 AMP
18	ATS 121 to 130 H.P. Panel	400 AMP MCCB	63 AMP MCB	27	400/5 AMP
19	ATS 131 to 140 H.P. Panel	400 AMP MCCB	63 AMP MCB	29	400/5 AMP
20	ATS 141 to 150 H.P. Panel	400 AMP MCCB	63 AMP MCB	31	500/5 AMP
21	ATS 151 to 160 H.P. Panel	500 AMP MCCB	63 AMP MCB	33	500/5 AMP

8) CONTACTORS:

The contactors shall be air break type having AC-3 duty rating. The contactor shall be suitable for operation on 415+10%-15% voltage Current as per Table-III All contactors should be suitable to perform at ambient temperature - 20° C to 45° C. The insulation class of coil is B or higher. Minimum life of operating cycle as under in million

- 1) Mechanical - a) 15 up to 32 A, b) 10-33 A to 80 A and c) 5-81 A to 400 A
- 2) Electrical - a) 1 up to 70 A, b) 0.75 - 71 A to 150 A and c) 0.5-151 A to 400A

9) OVERLOAD RELAYS: (IN CASE OF DOL / STAR DELTA / ATS)

Overload relays shall be three element positive acting ambient temperature compressed type with in built single phasing prevention mechanism and adjustable setting range to ensure protection against overload and single phasing. Bimetal relays shall be manually and auto reset type. Should have 1 No + 1 NC or 1C/O potential free auxiliary contact. Ratings shall be as per Table-III. Overload relays should be same make as per contactor as far as possible.

TABLE – III
CONTACTORS & MCCB / OVERLOAD RELAYS

Sr. No.	Type of Control Panel board	Rating			
		Main Contactor	Delta/ Step Contactor	Star Contactor	Relay Range in Amp (Approx.)
1	2	3	4	5	6
1	D.O.L. Up to 3 H.P.PANEL	16	-	-	3-5
2	D.O.L. Up to 5 H.P.PANEL	16	-	-	6-10

3	D.O.L. Up to 7.5 H.P.PANEL	22/25	-	-	10-16
4	S.D. 8 to 10 H.P.PANEL	16	16	16	6-10
5	S.D. 11 to 15 H.P.PANEL	22/25	22/25	22/25	10-16
6	S.D. 16 to 20 H.P.PANEL	30/32	30/32	30/32	13-21
7	ATS 21 to 30 H.P.PANEL	63/70	30/32	22/25	30-50
8	ATS 31 to 35 H.P.PANEL	63/70	38/40	30/32	45-70
9	ATS 36 to 45 H.P.PANEL	80/110	38/40	30/32	55-90
10	ATS 46 to 50 H.P.PANEL	95/110	63/70	38/40	60-100
11	ATS 51 to 60 H.P.PANEL	120/130	63/70	38/40	60-100
12	ATS 61 to 70 H.P.PANEL	160/200	63/70	38/40	80-120
13	ATS 71 to 80 H.P.PANEL	160/200	95/100	50	90-150
14	ATS 81 to 90 H.P.PANEL	200	95/100	50	135-225
15	ATS 91 to 100 H.P.PANEL	200	120/125	50	135-225
16	ATS 101 to 110 H.P.PANEL	225	120/125	65/70	135-225
17	ATS 111 to 120 H.P.PANEL	250	140	65/70	135-225
18	ATS 121 to 130 H.P.PANEL	300	150	80/100	135-225
19	ATS 131 to 140 H.P.PANEL	300	150	95/100	180-300
20	ATS 141 to 150 H.P.PANEL	300	160/170	110	180-300
21	ATS 151 to 160 H.P.PANEL	400	160/170	120/125	180-300

Note:

Overload relay should be provided considering

For D.O.L.:- 1.6 times of maximum H.P.

For Star Delta. : - 0.96 times of Maximum H.P.

For ATS up to 80 H.P.:- 1.5 times of Maximum H.P.

For ATS above 80 H.P.:- 1.4 times of Maximum H.P.

It should be within calculation range having margin at upper side for future. It should be manually or auto reset type.

Temperature compensation -20 to +55 Degree C

10) CONTROL SUPPLY:

415 (+10% - 15%) Voltage, 3 Phases, 50 + 3% Hz A.C. Supply

Door push button should be provided for control circuit. Such a way motor supply should be cut off when door was opened.

415 / 230 V Transformer shall be provided for Supply to MFM.

11) AUTO TRANSFORMER:

Auto transformers shall be air cooled type having 3 tapping of 60%, 70% and 80%. The same should be wound with copper wire. The size of the wire should be determined as per the H.P. of the motor. Stampings of reputed make and winding wire with 'E' Class insulation should be used. This should also be suitable for 6 starts per hour. Maximum temperature rise should not be more than 115⁰ C as per ISS Kordnoffer Circuits as per ISS should be adopted in ATS Panel. ATS shall be provided with Thermal Overheat Protector (TOP) in each coil of Transformer in such a way to cut the supply of control circuit to save the Transformer from overheating. Thermal Overheat Protector (TOP) rating shall be 90⁰ Centigrade. But add 10% tolerance i.e. 100⁰ Centigrade +/- 10% shall be an Acrylic / Hylem sheet over the transformer. Also to absorb humming Rubber sheet shall be provided below Auto Transformer.

11) ATS

- i) Auto transformer shall be vacuum impregnated.
- ii) Testing of transformers should withstand full load starting current ($6 \times 1.5 \times \text{H.P.} \times \text{Tapping}^2$) for six starts per hour. Each kick of 15 seconds duration as per relevant IS.
- iii) (%) Percentage regulation of voltage should be within 10%.
- iv) Excitation current at no load at rated voltage should be less than 10% of rated current
- v) Lamination should be preferably CRGO (Cold Rolled Grain Oriented) alternative CRNGO.

12) CONTROL FUSES:

Re-wire able Control Fuse shall be provided for DOL, Star Delta, and ATS Panels 16A 415 Volts. 3 Nos

13) TIMER:

Star Delta - Electronic Star Delta change over time 0 to 30 Sec. ATS -Thermal / Electro - pneumatics / Electronic timer for change over in start to run should be provided. Control wiring may be change as per type of timer and contactors.

14) MULTIFUNCTION METER:

Digital type CT Operated Multifunction meter, 3 lines display i.e. showing any three parameters at a time, of class 1% accuracy shall be provided showing A, V, Hz, Pf, KW, KWH etc. Range of Three no s CT shall be as per Table-II.

15) INDICATING LAMPS:

Light Emitting Diode red color lamp should be used at 230 V and size of lamp holder should be 22.5 mm.

For DOL / STAR DELTA	For ATS
ON	OFF
Over load Trip	Start
SPP	Run
	Over load Trip
	SPP

16) PUSH BUTTONS (22.5 MM DIA)

Push button colors shall be as follows:

Stop	Red
Start	Green
Timer Falls (ATS)	Yellow
Overload Reset (ATS)	Black

17) SINGLE PHASING PREVENTOR:

Single phasing preventer with auto switch should be operating on negative phasing sequence components principals and voltage sensing type only. It should be operate satisfactory from 320 / 480 V. Cut off Voltage should be 320 V and 480 V. Timing range of delay start 0 to 45 Sec. Toggle switch for Auto-SPP-By pass should provided on the front of the unit. There must be an indication when 3 phases are balanced. When one fuse blows, indication light would go off. The wiring diagrams of SPP should be provided on the unit (SPP).

18) INCOMING CABLE:

The length of cable for panels shall be provided with 3 meters suitable size (as per table-

I) Flat PVC Copper Submersible Cable of 660/1100 V Grade duly crimped with lugs of both ends. And an additional wire of 2.5 Sq.mm (Black) Single Core shall be provided with 3-phase incoming cable from neutral point to GEB supply. The cable shall be IS Marked and GWSSB Approved vendor.

19) CAPACITOR:

APP 415/440 Volts A.C. GEB approved capacitor with GEB test report should be provided with necessary connections. GEB Test Certificate shall have to provide in duplicate in each respective panel. Capacitor should be inside or outside the panel. Capacity of Capacitor shall be as tabulated as per Table-II. (Different unit of Capacitor is acceptable but total KVAR should be same as per Table-II).

20) TEST AND INSPECTION:

- 1) Tests shall be carried out at manufacturer's works under his care and expenses.
- 2) Following tests as per applicable standard code shall be conducted during inspection.

- a) H.V. I.R. All panels - 2.0 KV for power test Circuit for 1 Min.
- 1.0 KV FOR CONTROL CIRCUIT
 - b) Meager All panels test as per relevant IS
 - c) Functional test (All panels)
 - d) Temperature rise test for autotransformer only one from each category out of lot of any number of panels offered for inspection.
- 3) The test report of the concern equipments / components from the concern vendor will have to be provided to inspecting agency vendor of the equipment.

21) EQUIPMENT MAKES:

Unless approved in writing equipment/components of following make approved by CPRI / EARDA Tested shall only be acceptable.

MCB / MCCB	L & T SIEMENS, ELCON, STANDARD, C & S, GE, HAVELLS, SCHNEIDER, HPL, INDO-ASIAN, BCH and GWSSB Approved Vendors Make.
Contactors	L&T, SIEMENS, YULE, JSL, C&S, GE, BCH, SCHNEIDER, HAVELLS, PECO, INDO-ASIAN and GWSSB Approved Vendors Make.
Overload Relays	L&T, SIEMENS, SCHNEIDER, GE, YULE, JSL, C&S, BCH, HAVELLS, T/M, GS, PECO, INDO-ASIAN and GWSSB Approved Vendors Make.
Timers	L&T, JSL, ELLICO, C&S, BCH, GELCO, INDO-ASIAN and GWSSB Approved Vendors Make.
Push Buttons (22.5 mm)	L&T, SIEMENS, TEKNIC, VAISHNO, C&S, MATHURA and GWSSB Approved Vendors Make.
CT Coil	Approved by CPRI / ERDA Tested
Door Push Button	REPUTED and GWSSB Approved Vendors Make.
Digital Meters	AE, IMP, MECO, RISHABH (L&T), TRINITY, EL-MESURE, HPL, INDOTECH, NIPPEN, SELEC, GELCO, ELLICO and GWSSB Approved Vendors Make.
Terminals	TOSHA, ELMEX, TECHNOPLAST, PI, CONNECT WELL, AIRON, VIRAL and GWSSB Approved Vendors Make.
Single Phase Preventer (Auto Switch)	MINILEC, GELCO, ELLICO, AMBILIN OR Any other make approved by CPRI / ERDA Tested as per GWSSB Specification for each Rating and GWSSB Approved Vendors Make.
Incoming Cable	GWSSB Approved with IS Marked.
Indicating Lamps (LED)	AIRON, ESSEN, IEC, B.C.H., VAISHNO, CONCORD, TEKNIC, ELCOM, MATHURA and GWSSB Approved Vendors Make.
Rewire able Fuse	WILLY, KEW, SUPER, PEW and GWSSB Approved Vendors Make.
Auto Transformer	SUN, ELEMICA, SUECO, ELTECH OR Any other make approved by CPRI/ERDA Tested as per GWSSB Specification for each Rating and GWSSB Approved Vendors Make.

Capacitor	G.E.B. Approved make and GWSSB Approved Vendors Make.
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22) I.S. SPECIFICATIONS:

Control Panel and equipment shall conform to following OR relevant I.S. specifications.

a)	IS : 13947 / Part-I	General requirement of switchgear and control gear voltage not exceeding 1000 Volts.
	IS : 13947 Part-II	Degree of protection provided for switchboard.
	IS : 13947 Part-IV	Contractor AC Voltage not exceeding 1000 Volts.
	IS : 13947 (Part- I & IV)	Motor starter for voltage not exceeding 1000 Volts.
b)	IS : 2705	Specifications for Current Transformer.
c)	IS : 5124-1964	Code of practice for installation and maintenance of induction motor starter AC voltage not to exceeding 1000 Volts.
d)		Multi function meter.

23) Suppliers shall have to supply the Control Panel Boards as per the Approved Wiring Diagrams.

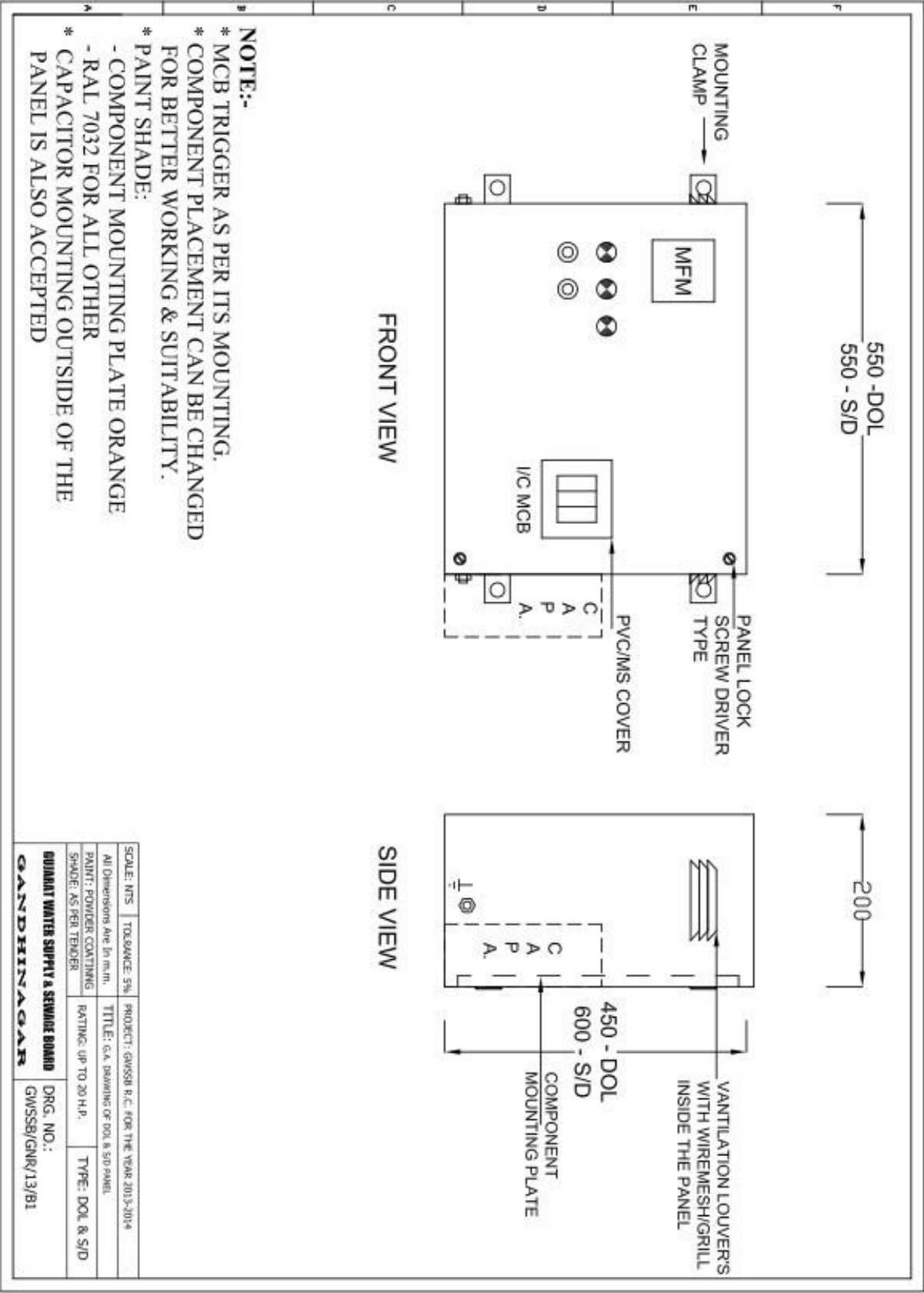
24) The Monogram of “GWSSB” should be screen printed on the panel.

DATA SHEET FOR D.O.L. / STAR DELTA & ATS CONTROL PANEL

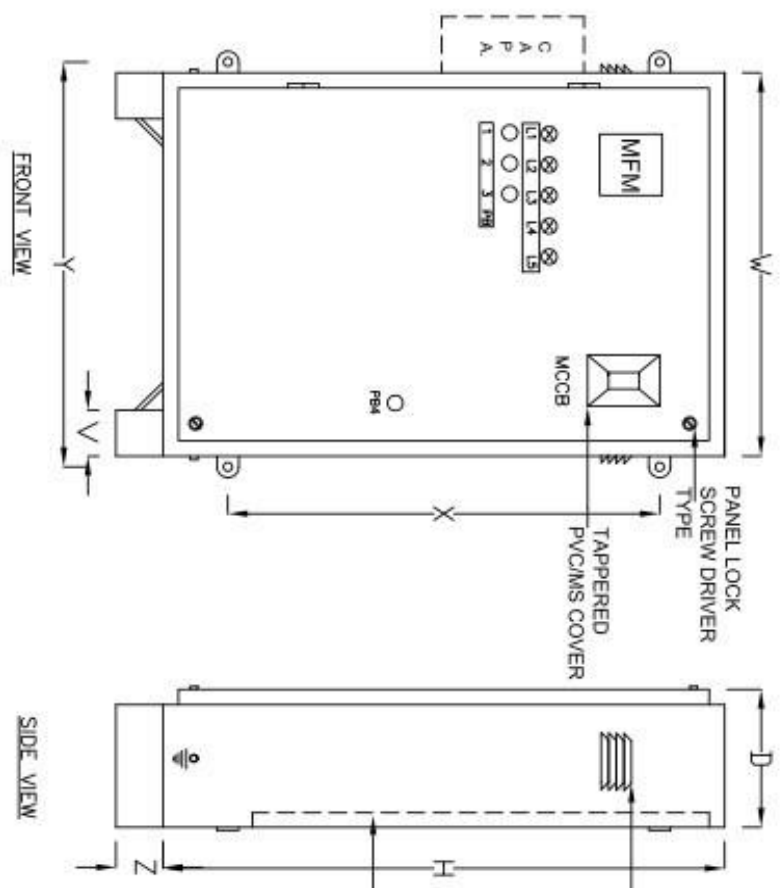
Sr No	Description	D.O.L. Qty.	S.D. Qty.	A.T.S. Qty.
1	MCB (For Motor)	1	1	
	MCCB			1
2	Contactor	1	3	3
3	Overload Relay	1	1	1
4	Push Buttons			
	Motor Start	1	1	1
	Motor Stop	1	1	1
	Timer Bypass			1
	Overload Relay Reset			1
5	Indicating Lamps			
	Motor on	1	1	1
	Motor Run			1
	Motor Off			1
	Overload Trip	1	1	1
	SPP	1	1	1
6	Digital Multi Function Meter	1	1	1

7	CT for Multi Function Meter	3	3	3
8	Single phasing Preventer (Auto Switch)	1	1	1
9	Capacitor	1	1	1
10	MCB / MCCB for Capacitor	1	1	1
11	Timer		1	1
12	Control Fuse	3	3	3
13	Auto Transformer			1

NOTE: The use of contactors and overload relays in the Control Panel shall be of one make as far as possible.



SCALE: MTS	TOLERANCE: 5%	PROJECT: GWSSB R.C. FOR THE YEAR 2013-2014
All Dimensions Are In mm.		
PAINT: POWDER COATING	TITLE: S.A. DRAWING OF DOL & S/D PANEL	
SPACE: AS PER TENDER	RATING: UP TO 20 H.P.	TYPE: DOL & S/D
QUANT WATER SUPPLY & SEWAGE BOARD		DRG. NO.:
GANDHINAGAR		GWSSB/GNR/13/B1



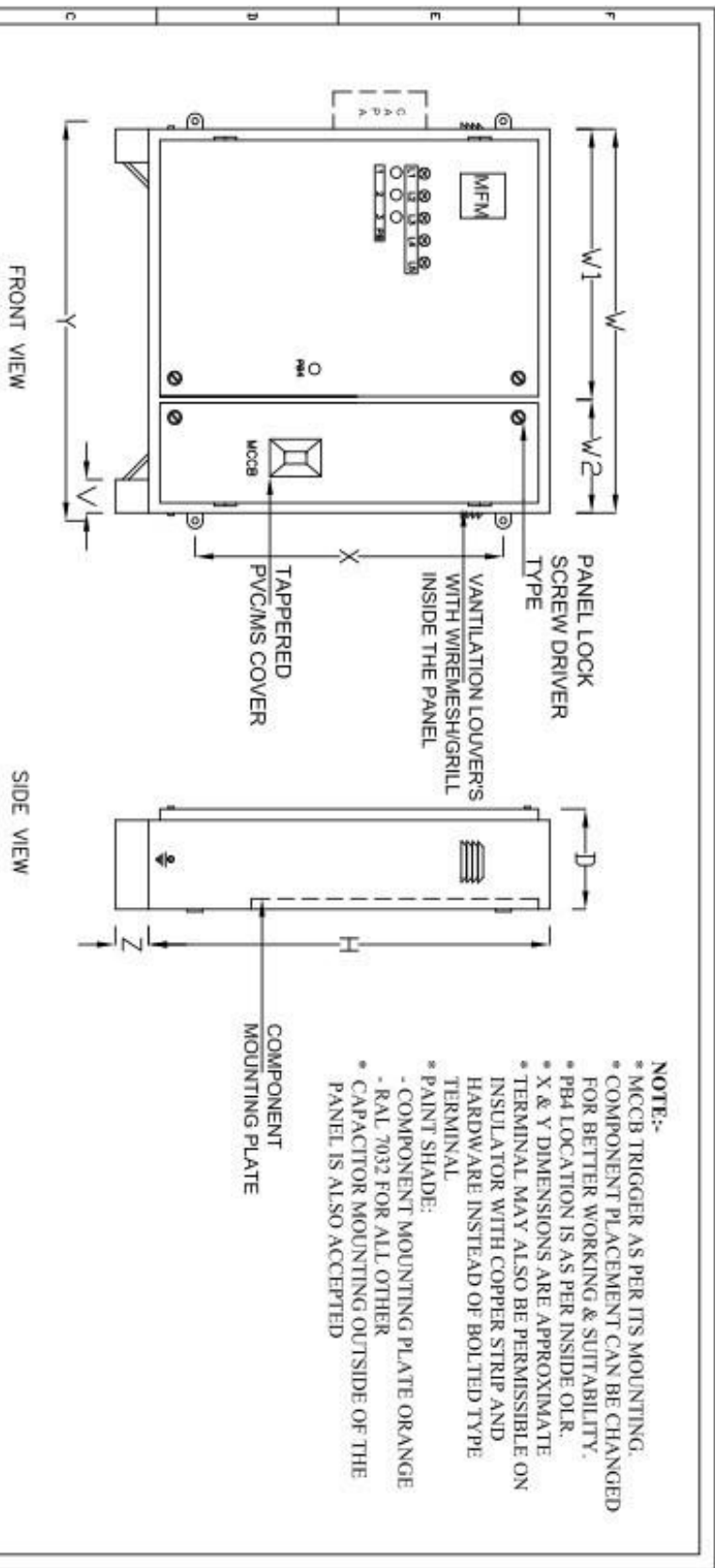
VENTILATION LOUVER'S
WITH WIREMESH/GRILL
INSIDE THE PANEL.

NOTE:-

- * MCCB TRIGGER AS PER ITS MOUNTING.
- * COMPONENT PLACEMENT CAN BE CHANGED FOR BETTER WORKING & SUITABILITY.
- * PBA LOCATION IS AS PER INSIDE OLR.
- * X & Y DIMENSIONS ARE APPROXIMATE
- * TERMINAL MAY ALSO BE PERMISSIBLE ON INSULATOR WITH COPPER STRIP AND HARDWARE INSTEAD OF BOLTED TYPE TERMINAL.
- * PAINT SHADE:-
- COMPONENT MOUNTING PLATE ORANGE
- RAL 7032 FOR ALL OTHER
- * CAPACITOR MOUNTING OUTSIDE OF THE PANEL IS ALSO ACCEPTED

AUTO-RANSFORMER			
HP	21-35	36-50	51-70
H	900	1000	1125
W	700	750	850
D	300	300	350
X	700	800	900
Y	750	800	900
Z	150	150	150
V	100	100	100

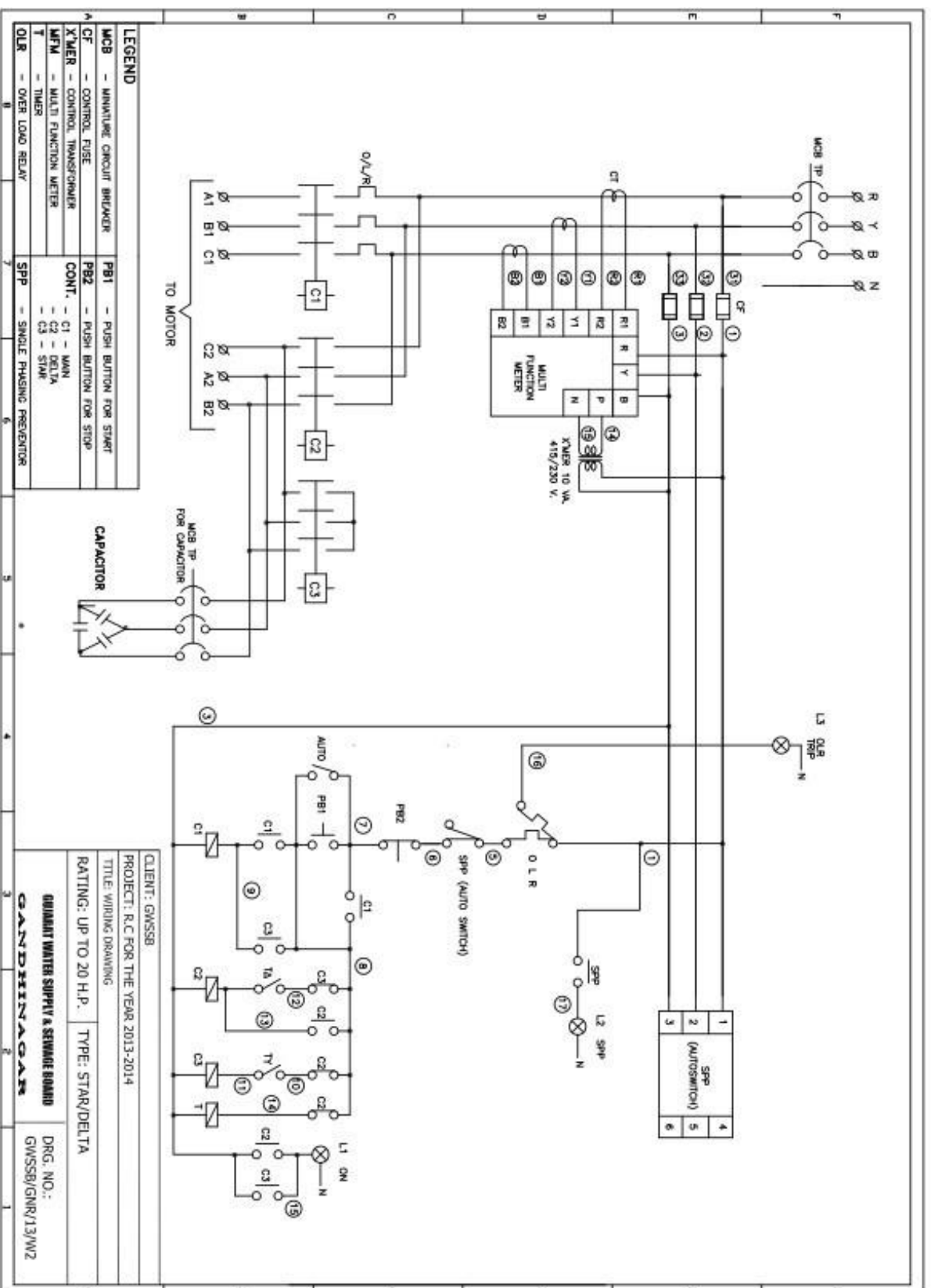
SCALE: MTS	TOLERANCE: 5%	PROJECT: GWSSB R.C. FOR THE YEAR 2013-2014
All Dimensions Are In m.m.	TITLE: G.A. DRAWING OF ATS PANEL	
PAINT: POWDER COATING	RATING: 21 to 70 H.P.	TYPE: ATS
SPACE: AS PER TENDER		
QUANTANT WATER SUPPLY & SEWAGE BOARD		DRG. NO.:
GANDHINAGAR		GWSSB/GNR/13/R2

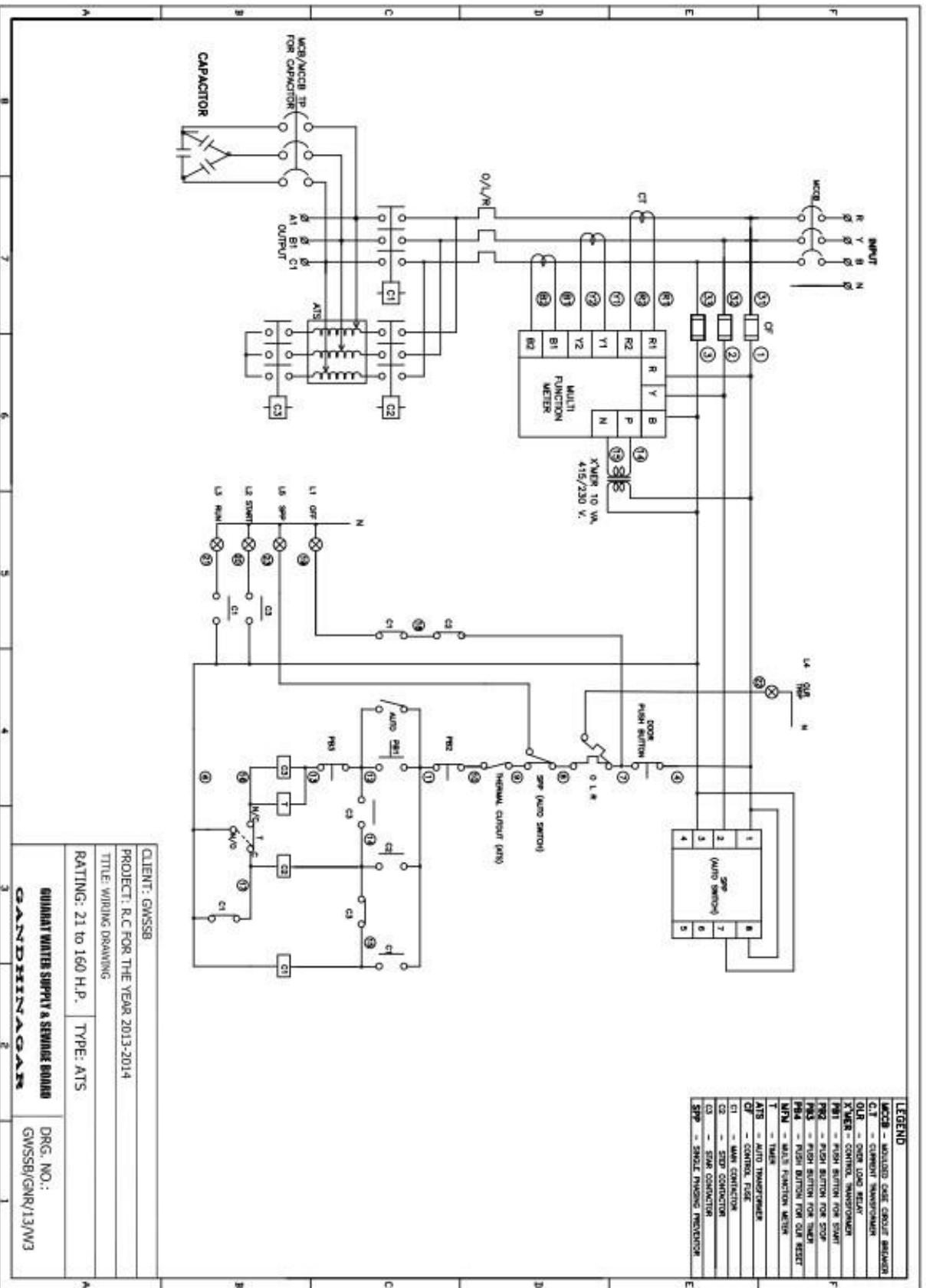


- NOTE:-**
- * MCCB TRIGGER AS PER ITS MOUNTING.
 - * COMPONENT PLACEMENT CAN BE CHANGED FOR BETTER WORKING & SUITABILITY.
 - * PB4 LOCATION IS AS PER INSIDE OLR.
 - * X & Y DIMENSIONS ARE APPROXIMATE
 - * TERMINAL MAY ALSO BE PERMISSIBLE ON INSULATOR WITH COPPER STRIP AND HARDWARE INSTEAD OF BOLTED TYPE TERMINAL
 - * PAINT SHADE:
 - COMPONENT MOUNTING PLATE ORANGE
 - RAL 7032 FOR ALL OTHER
 - * CAPACITOR MOUNTING OUTSIDE OF THE PANEL IS ALSO ACCEPTED

AUTO TRANSFORMER				
HP	71 TO 80	81 TO 120	121 TO 150	151 TO 160
H	1000	1125	1250	1400
W	1100	1250	1350	1550
W1	750	800	900	1100
W2	350	450	450	450
D	350	350	400	400
X	800	925	1050	1200
Y	1150	1300	1400	1600
Z	150	150	150	150
V	100	100	100	100

SCALE: NTS	TOLERANCE: 5%	PROJECT: GWSSB R.C. FOR THE YEAR 2013-2014
All Dimensions Are In m.m.		
DRAWN: POUNDER COATING	TITLE: G.A. DRAWING OF ATS PANEL	
SHADE: AS PER TENDER	RATING: 71 to 160 H.P.	TYPE: ATS
QUANTUM WATER SUPPLY & SEWAGE BOARD		DRG. NO.:
GANDHIRNAGAR		GWSSB/GNR/13/83





LEGEND

MCCB	- MOLDED CASE CIRCUIT BREAKER
C.T	- CURRENT TRANSFORMER
OLR	- OVER LOAD RELAY
X-MEN	- CONTROL TRANSFORMER
PS1	- PUSH BUTTON FOR START
PS2	- PUSH BUTTON FOR STOP
PS4	- PUSH BUTTON FOR THERM
WUN	- WATTS FUNCTION METER
T	- THERM
ATS	- AUTO TRANSFORMER
CT	- CONTROL FUSE
CI	- MAIN CONNECTION
CS	- STOP CONNECTION
STP	- SMALL THROU INTERLOCK

CLIENT: GWSSB	
PROJECT: R.C FOR THE YEAR 2013-2014	
TITLE: WIRING DRAWING	
RATING: 21 to 160 H.P.	TYPE: ATS
DRG. NO.: GWSSB/GNR/13/W/3	

GANDHINAGAR

ITEM No:-03 Horizontal Mono Submersible Pump Set:

Monoset sub. pump 3 phase 400/440 volt, 50 c/s. A.C. Supply & 2900 RPM , following IS 14220 MOC : Casing: CI-FG260, Impeller : Bronze & Shaft : SS:410

The horizontal mono submersible pump set shall be as per IS: 14220 / 1994 with latest amendments. The standard specifies the technical requirement for three phase mono submersible pump sets commonly used in sump for handling clear cold water for application in water supply etc. The duty point of the set should be located at the optimum efficiency point of the pump rating curves, there should not be steep fall in efficiency in the operating range. The pump with single stage RPM of shall be 2900 operating on $415 \pm 10\%$ volts, 3 phase and 50 Hz frequency.

Minimum motor horsepower rating, cable size, starting system delivery size shall be as specified in the data sheet.

Features of construction shall be as follows.

Pump:

The pump casing should be free from blow holes, sludge inclusion other detrimental defects. Casing should be provided with renewable wearing rings excepting radial flow pump set. Casing should be provided with wearing rings. Casing should be hydraulically tested up to 1.5 times shut off pressure. Shut off head shall be at least 120 % of rated head.

Impeller:

Impeller should be of closed type, ensuring required performance free of capitations. The material of impeller will be as per MOC shown in data sheet.

Shaft:

The pump and motor shall be unbuilt on the common shaft. Below the impeller shaft assembly, shaft protection sleeve shall be provided. It shall have surface finishing of 0.75 Microns. The material of shaft shall be as per Annexure - III.

Motor:

The submersible motor shall be confirmed to IS: 9283 / 1994 with latest revision. It should be totally enclosed squirrel cage induction type water cooled water lubricated sealed against entry from outside water.

The windings shall be of wet type. The thrust bearing should be of wet type water lubricated designed to take all untoward load at most unfavorable running conditions. Front rear bearing housing thrust bearing housing should preferably be fixed separate replaceable bolts / studs (not threaded connections) to the starter to facilitate easy dismantling. Full proof sealing arrangement by s guard shall be preferred in the motor inlet body to prevent open well water impurities like s, silt from entering the motor bearing stator motor should be impregnated with a superior varnish class B thermal insulation properties by vacuum pressure or epoxy paints on stator cold rolled stamping used rotor shall be painted with Polyurethane paint and backed properly under controlled temperature condition not by manual or gravity

flow to remove air pocket so that these are thoroughly filled up by varnish. The motor rotor should be preferably lead shot blasted. Subsequently rotor body should be baked repeatedly under controlled conditions to ensure long life of paint hard finish to the surface to avoid corrosion before power coating.

The material for construction of rotor shaft shall be as specified in data sheet provided with sleeves having materials as per detailed material of construction in the bearing portion. The windings should be accessible to facilitate checking locating any faults without disturbing all the coils and also to enable replacement of any defective coils. It should be possible to rewind the Stator with readymade protested coils to save time during the repair. Kelvin Bridge / digital resistance meter shall be treated preferable for measurement of hot cold resistance of winding for evaluated temperature rise. Full proof arrangement should be made for stopping the rotating of shifting of stampings inside the stator body due to operation of pump sets. Earth leakage current should not be more than 50 Milli amperes at rated voltage.

The HP rating of motor shall be decided on minimum power margin over above the power required on duty point shall be 25 % bidder has to supply motor of minimum HP rating considering 25 % reserve power margin.

Starting method shall be direct online.

Cable:

The motor shall be provided with three core flat PVC waterproof flexible copper submersible cable in single length (approx. 15 meters) of suitable size as per actual requirement. The cross-sectional areas should be sufficient so as not to cause voltage drop of more than 2.5% of nominal voltage i.e., 10 volts at 400 volts throughout the length of the cable size of the Following points shall be applicable for the manufacture of the pump set:

- (1) Casing individually tested to hydraulic test pressure 1.5 times of shut off pressure.
- (2) All rotating parts should be individually balanced on machine for rated RPM according to the relevant IS (vibrations of the assembly during the testing shall not exceed 80-micron peak to peak). Impeller closed type.
- (3) Motor Wet type
- (4) Brass / Carbon steel drain plug provided.
- (5) Compensating device provided.
- (6) The stator varnished by vacuum pressure method or EPOXY painted (if cold rolled stamping used).
- (7) Rotor varnished by vacuum pressure method or Epoxy Paint methane paint duty properly backed.
- (8) Rotor painted baked under controlled condition or powder coated.
- (9) Winding easily assembled.
- (10) Winding subjected to 1.5 KV for 30 seconds.
- (11) Matching grooves for stopping rotation shifting.
- (12) SS / Brass suction strainer preferred.
- (13) Stud nuts shall be of alloy steel nut shall be lock Nut.
- (14) The Stator end ring shall be of bronze metal or MS.
- (15) The stator is rewind able with readymade protested coils in each type of motor offered.
- (16) Cable confirming to IS: 694.

Testing performance as per IS: 14220 with latest revision:

Pump shall be tested as per IS: 14220 motors shall be tested as per IS: 9283 at manufacturers works. Bidder shall have to give internal test report.

Materials of Construction

Sr. No.	Description	Material (s)
1	Shaft sleeve when used	Grade X04 Cr. 12, X12 Cr 12 or X 20 Cr 13 Conforming to IS: 1570 (part 5) 1985
2	Motor bearing housing base	Grade FG 200 of IS: 210/1993
3	Pump and Motor Shaft (Common)	Grade X04 Cr 12, X12 Cr 12 or X20 Cr 13 Conforming to IS: 1570 (Part-5) 1985 or Grade 40C8 or 45C8 Conforming to IS: 1570 (Part-2/ Sec.1) 1979
4	Bearing Bush	Leaded tin bronze Grade LTB3, LTB4 or LTB5 of IS: 318 / 1981 or resin bonded carbon or PTFE bonded carbon
5	Rotor	Electrical sheet steel electro grade copper rods conforming to IS: 613 / 1984 or Aluminum dia cast rotor conforming to IS: 617 / 1984
6	Stator Core	Electrical sheet steel PVC insulated winding wire/polymer insulated winding wires or with any suitable plastic covered wires conforming to IS: 8783 /1978
7	Winding Wire	i) For motors other than water filled motor: Enameled copper conductor conforming to IS: 4800 (Part-7) 1970 ii) For water filled motors: (a) Enameled copper conductor to IS: 4800 (Part-7) /1970or. (b) PVC insulated winding wire conforming to IS :8783 / 1978or. (c) With polymer insulated such that the test on insulated resistance satisfied
8	Breather diaphragm	Nitrile rubber
9	Cable	PVC insulated PVC sheathed 3 core flat type conforming to IS: 694/1990 or PVC insulated. polymer sheathed 3 core flat type (approx. 15 meters)
10	Cable GI	Nitrile rubber

11	Thrust Bearing face combinations	Bronze- ferrous asbestos, Brass - Ferro tests, Carbon- Stainless steel, Bronze suitable elastomer or any other suitable combinations
12	Water drain plug	Bronze / Brass / Stainless steel / Suitable Plastic
13	Impeller	High tensile brass conforming to IS: 304 /1981or. leaded tin Bronze LTB 2 of IS: 31 8/ 1981
14	Casing	Cast iron Grade FG 200 of IS: 210 / 1993, Allow. steel casing conforming to IS: 3444/1987
15	S Guard	Bronze Or S.S.

DATA SHEET FOR HORIZONTAL MONO SUBMERSIBLE PUMP SET			
Name of RWSS:			
Name of Pumping Station:			
Sr. No.	Particulars	Departmental Requirement	Bidders' Data
1	Capacity	As per price bid	
2	Head	As per site Survey by contractor	
3	Type of pump	Horizontal mono submersible	
4	Minimum submergence required in meter	Manufacturers' Standard	
5	Make	As per Approved List	
5	Motor Details		
5.1	Type of motor	Submersible	
5.2	Rated Voltage	415 Volts	
5.3	No. of phases frequency	3 Phase, 50 Hz	
5.4	Method of Starting	Up to 7.5 HP DOL, 7.6 HP to 20 HP Star Delta, 21 to 100 HP ATS, above 100 HP Soft Starter	
5.5	Class of insulation	"F" Class	
5.6	Fill of motor	Water	
5.7	Ambient reference temperature	45 ⁰	
5.8	Motor HP rating	Manufacturers' Standard	
5.9	Synchronous motor speed	2900 RPM or as per standard	
5.10	Motor input at duty point	Pl. furnish detail	
5.11	Reserve power of motor	As per CPHEEO Manual	
6	Cable	PVC flat submersible copper	
6.1	Size	Pl. furnish detail	
6.2	Maximum current carrying capacity of Cable	Pl. furnish detail	
7	Overall efficiency of pump set		
7.1	at Full Load	Pl. furnish detail	
7.2	at duty Point	Pl. furnish detail	

8	Materials of construction		
8.1	Confirm materials of construction for various pump and motor parts with accessories as per detailed technical specifications	Yes / No	
8.2	State any variation in any of above explicitly	* To be stated by the pump manufacturer / agency	
9.0	Required accessories		
4.2	Delivery Pipe	Required	
4.4	Direct online starter panel	Required	
4.6	Cable required for pump motor	Required	
4.7	Suction Strainer	Required	

- The material for construction of rotor shaft shall be as specified in data sheet provided with sleeves having materials as per detailed material of construction in the bearing portion. The windings should be accessible to facilitate checking locating any faults without disturbing all the coils and also to enable replacement of any defective coils. It should be possible to rewind the Stator with readymade protested coils to save time during the repair. Kelvin Bridge / digital resistance meter shall be treated preferable for measurement of hot cold resistance of winding for evaluated temperature rise. Full proof arrangement should be made for stopping the rotating of shifting of stampings inside the stator body due to operation of pump sets. Earth leakage current should not be more than 50 milli amperes at rated voltage.
- The HP rating of motor shall be decided on minimum power margin over above the power required on duty point shall be 25 % bidder has to supply motor of minimum HP rating considering 25 % reserve power margin.
- Starting method Up to 7.5 HP. D.O.L. Starter, 8 to 20 HP Star Delta 21 HP and above Auto transformer starter type.

Note:

1. Manufacturer / supplier shall submit separate data sheets for each duty.
Bidder shall refer electrical specifications for motor requirement shall offer accordingly.

L.T. MOTORS (PRIME MOVER)

1. GENERAL

- The specification covers the design, manufacture, testing at manufactures works, supply, delivery, storage at site; erection, testing commissioning of Squirrel cage induction motors complete with instrumentation controls safety devices, equipment, lubricating system oil.
- The scope of supply shall include spares for 5 years of operation of the pumping station, special tools testing devices, all parts accessories etc. which are essential for construction, operation maintenance of all the motors even though these are nor individually or specifically stated or enumerated.
- Corresponding components of all the motors associated equipment spares shall be of the same material, dimensions finish shall be interchangeable.
- The motor shall perfectly match in respect of speed, runaway speed, moment of inertia overload capacities, couplings any other requirement with that of pump.

2. STANDARDS

Sr. No.	Standard	Description
1	IS 325	Squirrel cage induction motors
2	IS 12615	Energy efficient induction motors- three phase squirrel cage
3	IS 4691	Type of enclosures
4	IS 900	Code of practice for installation maintenance of induction motors
5	IS 6362	Method of cooling
6	IS 4029	Testing of induction motors
7	IS 2223	Dimensions of flange mounted as induction motors
8	IS 2253	Designations for types of construction mounting Arrangements of rotating electrical machines.
9	IS 2254	Designations of vertical shaft motors for pumps
10	IS:4722	Rotating electrical machines
11	IS: 4728:1975	Terminal marking direction of rotation for rotating electrical Machinery.
12	IS: 6362:1995	Designation of methods of cooling for rotating electrical Machines.
13	IS: 7816:1975	Guide for testing insulation resistance of rotating machines.
14	IS: 12065:1987	Permissible limits of noise level for rotating electrical machines.
15	IS: 12075:1987	Mechanical vibrations of rotating electrical machines
16	IS: 4889:1968	Method of determination of efficiency of rotating electrical Machines.
17	IS: 12802:1989	Temperature rise measurement of rotating electrical machines.
18	IS: 12824:1989	Types of duty classes of rating for rotating electrical machines

3. TECHNICAL PARAMETERS

Sr. No.	Description	Technical Parameter
1	Motor Rating	As per the requirement of Pump.
2	Type of motors	3 Phase Induction Motor, TEFC
3	Quantity	
4	Motor duty	Continuous, S1
5	Application Standard	IS 325
6	Motor Energy efficiency class	EFF2 as per IS- 12615 (94%)
7	Design Temperature	50 Deg C amb.
8	Rated Speed	Contractor to specify
9	Supply voltage and frequency Conditions Voltage: Frequency: Combined V and F Variation	415 V \pm 10% 50 Hz \pm 5% \pm 10%
10	Insulation class	Class F temperature rise as per class B
11	Starting Method	Star Delta up to 50 kW Soft Starter for Above 50 kW
12	Cable termination details	Al conductor, XLPE / PVC insulated, armored. 0.433 kV grade cable
13	Cable termination box protection	Class IP 55
14	Space heater	230 V
10	Bearing temperature sensing	Required
15	Winding temp. sensing	6 Nos. required for each motor
16	Minimum Efficiency	As per Manufacture

4. DESIGN CRITERIA

4.1 Rating and Temperature rise

- All motors shall be of continuous rated type.
- The motors shall be designed for maximum ambient temperature of 50°C; with the temperature rise of the stator winding by resistance method over the ambient air temperature no exceeding 70°C for both class B class F insulation.
- In case of continuous operation at extreme supply voltage variation limits, the temperature rise limits as specified above shall not exceed by more than 10°C for motors of output up to including 200KW. \pm 10%
- Each motor shall be assigned a maximum continuous rating (MCR) corresponding to this temperature rise.
- Wherever the basis for motors ratings is not specified in the corresponding mechanical

specification sections, maximum continuous motor ratings shall be at least 50% above the maximum load demand of the driven equipment under entire operating range as specified elsewhere including voltage frequency variation.

- f) The rated supply voltage, voltage and frequency variations in the supply are mentioned elsewhere. Motors shall be capable of delivering its maximum continuous rating with supply variations. The motor can start satisfactorily under extreme conditions.
- g) All motors shall be so designed that the maximum inrush currents, locked rotor pull out torques developed by them at highest voltage frequency limits do not endanger the motor the driven equipment.
- i) Induction motors shall be designed to be capable of withstand the voltage torque stresses developed due to the difference between the motor residual voltage incoming supply voltages equal to 150% of the rated motor voltage during changeover of buses.
- J) The voltages at all motors during start up shall be maintained at a value which ensures that there is sufficient accelerating torque developed by the motor to give a safe run up time.
- k) The maximum system transient impedance shall be used in calculating voltage drops relating to motor starting, restarting re-acceleration requirements.
- l) During starting or re-acceleration of a motor, either individually or in a group, the voltage dip at the motor terminals shall not vary more than 15% from rated voltage when started direct online under the worst operating scenario i.e. largest motor started with minimum number of power sources minimum fault level.

5. TORQUE REQUIREMENTS

- a) The accelerating torque at any speed with the lowest starting voltage shall be at least 10% of rated full load torque of the motor.
- b) The pull-out torque at rated voltage shall not be less than 205% of the full load torque.

6. NO. OF STARTS

Continuous duty motors shall be suitable for two starts in succession three equally spread starts in an hour under the specified conditions of load, torque inertia, with the motor initially at its normal running temperature.

7. STARTING CURRENT

The ratio of starting Current/rated current (MCR corresponding to the specified temperature rises) shall not exceed 6. In case of DOL starter. But with soft starter it shall be between 2 to 3 times.

8. STARTING TIME

- a. For motors with stating time up to 20 seconds at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 2.5 seconds more than stating time.
- b. For motors with starting time more than 20 seconds but not exceeding 45 seconds at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 5 seconds more than the starting time.

- c. For motors with starting time more than 45 seconds at minimum permissible starting voltage, the locked rotor withstand time under hot conditions at highest voltage limit shall be more than the starting time by at least 10% of the starting time.

9. CONTROL

All the motors shall be suitable for control through circuit breaker / MCCB as specified.

10. ENCLOSURE METHOD OF COOLING

The motors shall be totally enclosed closed Fan Cooled, (TEFC).

11. VIBRATION LEVEL and NOISELEVEL

The vibrations as measured at motor bearings shall be within the limits specified in IS: 12075/ BS: 4999 Part -142. The motor shall also be capable of withstanding the vibration produced by the driven equipment. The Noise levels shall comply with IS: 12065.

12. CONSTRUCTIONAL FEATURES

- a) Motor its components (such as stator, rotors, end shields, terminal boxes, and bearings heat exchangers) shall be designed to be readily interchangeable as integral units for the same design rating.
- b) All nonmetallic components used shall be resistant to flame propagation.
- c) All enclosures shall be designed to provide effective sealing between the primary secondary air circuits. All totally enclosed types of motors shall have suitable means of breathing drainage to prevent accumulation of condensation. Drain holes diameter shall not exceed 6mm.
- d) The cooling fans shall be capable of being connected for rotation in either direction or due care for cooling etc., especially where identical motors are to be provided for opposite direction of rotation, such as for a pair of conveyors without replacing or removal of fans or any other parts.
- e) Motors shall preferably be capable of being connected for rotation in either direction with due care for cooling etc., specially where identical motors are to be provided for opposite direction of rotation, such as for a pair of conveyors without replacing or removal of fans or any other parts.
- f) All heavy parts of the motors shall be provided with necessary arrangement: such as lifting lugs/eye bolts for lifting or handling during erection or overhaul.
- g) All motor rotors shall be dynamically balanced. Rotors shall be so designed as to keep the combined critical speeds with the driven equipment away from the running speed by at least 20%.
- h) Space heaters or internal electric heaters shall be provided on motors rated above 30 KW to maintain the windings in a dry condition during periods of still. The heaters shall be suitable for use on 240 volts, 50Hz AC Supply.
Space heater shall remain ON when motor is in operation.

j) Temperature Detectors

At least six nos. of simplex or duplex platinum resistance type embedded temperature detectors, evenly distributed around the stator, and shall be provided for all HT motors. These shall be located at locations where high temperatures are expected during operation. Resistance of the temperature detector at 0°C shall be one hundred (100) ohms. Temperature detector lead insulation class shall be the same as stator winding insulation class. Detector leads, external to the slot shall be provided with a protective covering. These RTDS shall be wired to PLC controls for monitoring temperature rise.

13. WINDING INSULATION

- a) Winding insulation shall be of class B or better for LT AC motors. It shall be of proven high-quality reliability.
- b) All windings insulation shall be non-hygroscopic, oil-resistant resistant to flame propagation. All windings shall be impregnated suitably processed to effectively seal them to prevent deterioration from adverse environmental conditions at site.
- c) All winding overhangs leads shall be adequately supported, braced blocked.
- d) Cage windings for all joints shall be designed to give an adequate safety factor on the fatigue due to thermal mechanical stresses, considering the specified starting running conditions. All electrical joints connections shall be of brazed or welded construction.

14. BEARINGS

- a) Bearings shall be of roller type, except where motor speed shaft loading dictates otherwise. Vertical motors shall normally have rolled type guide thrust bearings. The latter may however be of Kingsbury tilting pad type where heavy axial loads are to be supported.
- b) Temperature of lubricating oil as it leaves the bearing shall be not exceeding 71-degree C.
- c) Bearing shall comply with the relevant Indian or International Standards. The bearings housing shall be correctly packed with lithium-based grease at the time of assembly. Construction shall be such that the bearings can be dismantled without risk of damage.

15. TERMINAL BOXES ASSOCIATED FITTINGS

- a) The cable boxes terminations shall be designed to enable easy disconnection replacement of cables. Leads from terminals to the windings shall be adequately sized braced to withstand the heating forces produced by maximum fault current.
- b) Terminals shall be suitable for receiving aluminum conductor XLPE/PVC insulated cables. Motor shall be supplied with compression type tinned brass cable gland crimping type tinned copper lugs for the termination of cable. The termination lugs shall conform to DIN46329.
- c) Clearance between the lugs/bare live parts of different phases between lugs/bare live parts earth shall be as per relevant standard. The terminal boxes shall be capable of withstanding a system fault level. A suitable provision of releasing the pressure developed during faults shall be made. Terminal boxes shall be suitable for top bottom entry of cables.
- d) LT motor terminal box shall be capable of being turned through 360° in step of 90-degree C.

16. EARTHING TERMINALS

Two independent earthing points shall be provided in accordance with IS: 3043, on opposite sides of the motor for bolted connection.

17. RATING PLATE

In addition to the requirements as called for in relevant IS, the rating plating plate shall indicate the following:

- a) Maximum continuous rating in KW corresponding temperature rise, as applicable for cooling medium temperature as specified.
- b) Bearing identification numbers (in case of ball / roller bearing recommended lubricant.)

18. PAINT and FINISH

- a) All external parts shall be finished painted to produce a neat durable surface which would prevent rusting corrosion. The equipment shall be thoroughly decreased, sharp edges scales removed treated with one coat of primer two coats of enamel paint shade no 631 as per IS:5 for indoor motors shade no. 632 as per IS: 5 for outdoor motors. Motor fans shall also be painted to withstand corrosion.
- b) All fasteners used in the construction of the equipment shall be either of corrosion resistant material or heavy cadmium plate. Current carrying fasteners shall be either stainless steel or high tensile brass or copper.

19. PRE-COMMISSIONING TEST OF PUMP and MOTOR:

- The test shall be carried out as per IS: 9137 code of acceptance test of pump Class C, in general as started below in particular.
 - The purpose of the field test is not to ensure whether pump performance as regards parameter i.e., H, Q and power etc. is within acceptance limit as per IS: 9137. The purpose is to ensure that the pump performance is generally acceptable or otherwise.
Final acceptance shall be as per the following criteria.
- i) As regards H/Q characteristic for acceptance it shall be checked whether motor is not getting overloaded within the specified head range.
 - ii) Flow measurement shall be taken by the flow meter provided by contractor.
 - iii) The head shall be measured with calibrated pressure gauge of accuracy 1% or better. At least 3 pressure gauges shall be calibrated from two different institutions with prior approval of the Engineer in charge. The calibration shall be pointed to point not merely for percentage error. The gauge shall be fitted at a suitable place from the discharge nozzle. It may be noted that pressure gauge shall be installed at least 2 times diameter away from discharge nozzle delivery valve be placed at least four times diameter away from discharge nozzle. Such conditions shall be simulated at site condition no allowance for this deficiency shall be considered. The decision of Engineer in Charge shall be final.
 - iv) The input power to the motor shall be measured by 2 wattmeter method. The watt meters shall be of Laboratory grade having accuracy of min. 0.5% these should be digital type.
 - v) The speed shall be measured by a non-contact tachometer with digital display calibrated. The

field test shall be taken with entire head range in such a manner that it would cover at least 6 points (i.e., duty point, 2 above duty points, 2 below duty point shut off). The guarantee for head discharge shall be deemed to be fulfilled as per clause.

The field performance test at the site is essential as above (i) to (v) the manufacturer shall also be asked to attend the same.

20. PRE COMMISSIONING CHECKS and TEST OF HTMOTOR:

1. Check IR and PI value. If required improve IR and PI by drying out to obtain the required insulation resistance values. Approval of the drying methods shall be obtained from the Owner before applying heat.
2. Align the motor with the pump.
3. Check cable connection at motor phase, neutral side and Circuit breaker side space heater connection.
4. Check motor earthing at two places to measure earth resistance.
5. Set winding and air temperature gauges for alarm and trip set value are as per OEM recommendation and simulate the values.
6. Carry out DC simulation test of the breaker. See that breaker trips by operating all relays one by one.
7. Test motor protection relay by secondary injection relay test set and see that settings are done as per recommendation.
8. Switch on DC supply at motor beaker keeping breaker in racked out position. See that space heater becomes "on". Measure current taken by the space heater circuit. And note down for future reference.
9. Run the motor in decoupled condition, check direction of rotation, it should be as required for the pump. Note down no load current in decoupled, vibration on motor bearings in decoupled condition.
10. Stop motor, Coupled motor with Pump. Give start kick and check direction of rotation.
11. Run pump motor set with discharge valve in closed position. Observe and note down no load current in coupled condition, vibration at all the bearings for future reference.
12. Run motor on load opening pump discharge valve note down no load current in coupled condition, vibration at all the bearings for future reference.
13. Each Pump- motor set is to run separately continuously for 72 hours at full load temperature of various parts including winding, bearing etc. are to be observed. Measurement of discharge at rated head is to be measured.

21. PRE-COMMISSIONING CHECKS and TEST OF LTMOTOR:

1. Check IR and PI value. If required improve IR and PI by drying out to obtain the required insulation resistance values. Approval of the drying methods shall be obtained from the Owner before applying heat.
2. Align the motor with the pump.
3. Check cable connection at motor phase, neutral side and Circuit breaker side space heater connection.
4. Check motor earthing at two places to measure earth resistance.
5. Set winding and air temperature gauges for alarm and trip set value are as per OEM

recommendation and simulate the values.

6. Carry out DC simulation test of the breaker. See that breaker trips by operating all relays one by one.
7. Test motor protection relay by secondary injection relay test set and see that settings are done as per recommendation.
8. Switch on DC supply at motor beaker keeping breaker in racked out position. See that space heater becomes “on”. Measure current taken by the space Heater circuit. And note down for future reference.
9. Run the motor in decoupled condition, check direction of rotation, it should be as required for the pump. Note down no load current in decoupled, vibration on motor bearings in decoupled condition.
10. Stop motor, Coupled motor with Pump. Give start kick and check direction of rotation.
11. Run pump motor set with discharge valve in closed position. Observe and note down no load current in coupled condition, vibration at all the bearings for future reference.
12. Run motor on load opening pump discharge valve note down no load current in coupled condition, vibration at all the bearings for future reference.
13. Each Pump- motor set is to run separately continuously for 72 hours at full load temperature of various parts including winding, bearing etc. are to be observed. Measurement of discharge at rated head is to be measured.

ITEM No:-04 THREE PHASE SUBMERSIBLE PUMPS SETS

The pump set should be of sturdy construction to facilitate manual loading and unloading requirements. It should be repairable in workshop with minimum cost and shall have fast wearing parts of replaceable. Feature and easy rewind-ability of electric motors and of economy in repairs are over riding consideration after meeting the basic Hydraulic, Electrical and Mechanical performance needs. Pumps shall confirm to IS:8034 and motors shall confirm to IS:9283 (Latest revision & amendment).

The duty point of the pump set shall be located at the optimum efficiency point of the pump rating curves and there should not be steep fall in efficiency in the operating range as specified in Annexure-VIII. The verification of the pump sets performance will be as per relevant latest IS at rated voltage. The pump with lesser number of stages will be preferred. R.P.M. of pump set shall be 2900 at 50 Hz.

The Company shall offer the Efficiency within (-) 5 digit at Pump Operating Head Range at +10% to -25% (i.e. if the company offers 50% Efficiency at Duty Point, in that case 45% Efficiency is maintained at Pump Head Operating Range +10% to -25%). Three Phases - 50Hz, 415 (+ 10% - 15%) Volts, 2900 RPM Motor:

Minimum Motor Horse Power Rating, Cable Size, Starting System, Minimum Overall Efficiency and Delivery Size shall be as per ANNEXURE attached. In case, if the motor rating exceeds the minimum ratings given in the ANNEXURE, than the starting methods shall be as applicable shall have to be given accordingly.

The GWSSB reserves the right to ask the tendering firm to give test check of the product at tender consideration stage itself.

1. PUMP :

The pump shall confirm to IS:8034. Bowls should be free from Blow Holes, Slage inclusion and other detrimental defects.

Bowls shall be provided with renewable wearing rings except in radial flow pump set.

Bowls provided with wearing rings should be suitable for lubricating by water and shall be of superior quality. The fitment of wearing rings with interface fir OR locking compounds is to be done.

Stage casing / Stage Bowl shall be hydraulically tested upto 1.5 times Shut-Off Pressure or maximum upto 25 kg/cm² which ever is higher.

1.1 IMPELLER :

Impeller shall be of closed type (Not fabricated), ensuring required performance and free of cavitations. The material of impeller will be as per ANNEXURE.

1.2 SHAFT :

The pump shaft will be guided by bush bearings provided in bowl wherever required. Below the impeller shaft assembly. Shaft protection sleeve shall be provided. The material of shaft shall be as per ANNEXURE.

1.3 SUCTION CASING WITH STRAINER:

The material of suction casing should be as per ANNEXURE. Opening of the Suction casing should be of proper size and shape to minimize, eddy current. In order to check entry of foreign materials strainer/Screen shall be of minimum thickness for SS-0.

1.3.1 Entrance velocity of water in the pump should not be more than 3.6 mt/sec.

1.4 BEARING SLEEVE:

The material for this will be as per ANNEXURE - VII.

1.5NON RETURN VALVE :

Non return valve will be provided with the pump discharge casing. NRV design shall be for instant closing of the NRV. No back pressure should develop which may adversely affect the pump set. It should have K-factor within the limits of IS:10805 NRV losses shall not be higher than 0.8 meter at rated flow.

Separate test for K-Factor is not required. However, internal test reports of NRV are to be reviewed.

2. MOTOR :

The motor shall conform to IS:9283. It should be designed for 415 + 10% and – 15% volts, 3 phase, 50 cycles. It should be totally enclosed squirrel cage induction type water cooled and water lubricated sealed against entry from outside water.

The windings shall be of wet type. The thrust bearings should be of Wet type water lubricated and provided with metal tilting thrust pads, designed to take all untoward load at most unfavorable running conditions. Winding Wires shall have to be utilised as per latest IS:9283.

The ball used in the thrust Assembly should be as per ANNEXURE - VII. Upper and lower bearing housings and thrust bearing housing should preferably be fixed separate replaceable bolts/studs and (not threaded connections) to the stator to facilitate easy dismantling. Inspection Agency will open the motor base and check the thrust bearing & tilting pad type and mark the identification & the word GWSSB with hard punch or with indelible ink. If the fiber thrust bearing is provided then it shall be marked with indelible ink.

Full proof sealing arrangement by sand guard shall be provided in the Motor inlet body to prevent tubewell water impurities like sand, silt from entering the Motor bearing Stator and Rotor should be impregnated with a superior varnish Class-B thermal insulation properties by vacuum pressure or epoxy paints on stator when cold rolled stamping used and rotor shall be painted with Polyurethane paint & backed for at least ½ hour under controlled temperature condition and not by manual or gravity flow to remove air pocket so that these are thoroughly filled up by varnish. Motor rotor should be preferably lead-shot blasted. Subsequently, rotor body should be baked repeatedly under controlled conditions to ensure long life of paint and hard finish to the surface to avoid corrosion before powder coating. The rotor shaft shall be as per ANNEXURE - VII and provided with sleeves having

materials as per ANNEXURE in the bearing portion. The windings should be accessible to facilitate checking and locating any faults without disturbing all the coils and also to enable replacement of any defective coils. It should be possible to rewind the Stator with ready made pre-tested coils in order to save time during the repair. Kelvin bridge/digital resistance meter shall be treated preferable for measurement of hot and cold resistance of winding for evaluated temperature rise. Any deviation above should be indicated clearly. Full proof arrangement should be made for stopping the rotating of shifting of stampings inside the stator body due to operation of pump sets..

2.1 The quoted H.P. of motor should meet both the following conditions;

2.1.1 The motor rating shall be Highest of (1) 115% of the maximum pump input over entire range or (2) as mentioned in Annexure-VI i.e. whichever is higher.

2.1.2 The motor should not get overloaded in the range of + 10% & (-) 25% of the specified pump head. The meaning of overload will be as per IS:8034.

The HP rating of motor shall be selected from the following rating 3, 4, 5, 6, 7.5, 10, 12.5, 15, 17.5, 20, 22.5, 25, 27.5, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 100, 110, 125, 135, 150, 160.

- 2.2 All rotating parts should be individually balanced on machine for minimum 700 RPM (and vibrations of the assembly during the testing shall not exceed to 80 micron peak to peak)
- 2.3 Compensating device provided.
- 2.4 Rotor painted and baked under controlled condition or powder coated.
- 2.5 Winding easily assemble.
- 2.6 Winding subjected to 1.5 KV after 24 hours.
- 2.7 Matching grooves for stopping stamping from rotation and shifting.
- 2.8 Stamping treated chemically to recover unwanted substance and impurities.
- 2.9 Rotor lead / sand / steel shot blasted.
- 2.10 The Maximum outside diameter of pump & motor with Cable and glands shall be 280 mm, 196 mm and 146 mm respectively for 300 mm, 200 mm and 150 mm tubewell where as the minimum outside dia of Pump & Motor shall be suitable to the respective dia of the tube well so that the same can be easily lowered in to or removed from the relevant tube wells. This means that pump & Motor of 146 mm dia shall be offered for 150 mm dia tubewell only and not for 200/300 mm dia tubewell. Similarly pump & Motor of 196 mm dia shall be offered for 200 mm dia tubewell only and not for 300 mm dia tubewell and pump & motor of 280 mm dia shall be offer for 300mm dia tubewell only. Also dia of pump & motor shall be the same in any case mentioned above. In no case mismatching will be entertained. In case of such mismatching the offer shall liable for rejection.
- 2.11 Stator is rewindable with readymade pretested coils in each type of motor offered.
- 2.13 Vendors to submit cross sectional drawing of Pump motor and non return valve with clear indication of material specification for the major components covered under specification.

3. METHOD OF STARTING:

Starting method Up to 7.5 HP. D.O.L. Starter, 8 to 20 HP Star Delta and 21 HP & above Auto transformer starter type.

4. CABLE :

Motor shall be provided with Three core Flat PVC Copper water proof and Flexible Cable of 5 mt. length and suitable size. The cross sectional areas should be Sufficient so as not to cause voltage drop of more than 2.5% of nominal voltage i.e. 10 volts at 400 volts throughout the length of the cable. Cable should be provided with ISI Mark (IS: 694) Manufactured by GWSSB Approved Venders.

5 TESTING:

5.1 SAMPLING

The sampling and criteria of conformity for hydraulic performance shall be as per IS:10572 except for lot size up to 25. the sampling for lot size up to 25 shall be given below

Lot Size	Sample Size
Up to 7	1
8 to 15	2
16 to 25	3

- 5.2 Pumps shall have to be tested as per IS:8034 / IS:11346 and motor will be tested as per IS:9283 at manufacturers works with NRV fitted.
- 5.3 Suppliers have to give Inspection call with internal test report of motor as per IS 9283 & pump set as per IS 8034 in Specimen Sheet shown in IS:11346.
- 5.4 All the instruments are used during pump performance testing and motor routine testing are calibrated from NABL Accreditation Approved laboratory, with its required range and traceability.
- 5.5 The manufacturer shall have to provide all material test certificate for Chemical properties & mechanical, carried out at NABL Accredited Approved Laboratory for each lot of supply order, Except rubber items & three core Flat copper cable.
- 5.6 The leakage current of submersible pump set shall not exceed 50 milli Ampere at rated voltage.
- 5.7 For motor having journal bearings, the surface of the rotor shaft or that of the sleeve when provided at the bearing portion, shall have a surface roughness not higher than 0.75 microns Ra & Thrust plate lapping is done on machine and the limit is 0.3 Micron Ra.
- 5.8 Motor Routine Test for each H.P. range of each lot shall be carried out As per IS 9283
- 5.9 Rejection of any kind during inspection will be viewed seriously. Cumulative three rejections irrespective of any category may be considered as substandard product of the firm and GWSSB will reserve right to stop giving further order under the contract.

6 STRIP TEST :

The inspecting agency shall dismantle the pump set precisely to carry out the strip test which shall also include through review of the material used with reference to the relevant tests

7 TYPE TEST :

The type test certificate for electrical performance on submersible motor shall be as per IS 9283 with latest amendment from NABL Accreditation Approved Laboratory for each H.P. range.

Further at the time of inspection against supply order under this rate contract, the inspecting agency shall review the type test of each H.P. rating motor.

8. ROUTINE INSPECTION:

Motor Routine Test for each H.P. range of each lot shall be carried out As per IS 9283.

Routine inspection as per pump test record sheet at the time of supply will be carried out by the TPI.

If test result / performance are not satisfactory, during testing, randomly selected pumps of any category of any order shall be tested at NABL Accredited Laboratory and necessary action will be taken accordingly at the discretion of GWSSB, which will be binding to the contractor (Manufacturer).

Pumpset testing charge for routine inspection will be borne by GWSSB if results are as per tender agreement otherwise it shall have to be borne by the contractor (Manufacturer).

If the pumpset which has failed in field, one of the pumpset of that order may be selected for testing. If that pumpset also fails in NABL accreditation Laboratory without unreliable reason of its working environment, then it is liable for

- (1) Forfeiture of Security Deposit of the manufacturer.
- (2) Termination of the contract from department.
- (3) Disciplinary action will be taken by GWSSB. The manufacturer will be black listed / banned / debarred up to three years.

9. MARKING :

The methods of marking all the pumps to be delivered under scope of contract shall ensure that all the information will remain legible even after transportation, storage in open space etc. In general the legible and marking upon the goods shall indicate the followings :

- 1) Manufacturer's Brand Name and/or Trade Mark / Model Embossed / Engraved.
- 2) Any other important matter that the manufacturer deemed fit to be inscribed.
- 3) BEE Logo is preferable. Manufacturer can give BEE logo voluntarily.

1	Name of the manufacturer	
2	Category No.	
3	Model	
4	Sr. No.	
5	Number of Stage	Nos.
6	Bore Size	mm
7	Head at Nominal Duty Point.	Meter
8	Discharge at Nominal Duty Point.	LPM
9	Overall Efficiency	%
10	Motor Rating KW/HP	KW/HP
11	Rated Speed	RPM
12	Maximum Current	Ampere
13	Rated Voltage (V) with Variation	Volt
14	Rated Frequency (Hz)	Hz
15	Connection	
16	Type of Duty (Whether Continuous or Not)	
17	Delivery Size (NRV)	mm
18	Head Range for Non Overloading Requirement.	To Meters.
19	Year of Manufacture	

10. PACKING:

Pump & Motor shall be packed in a suitable wooden / corrugated box acceptable to buyer.

ANNEXURE

Cat. No.	Dish in LPM	Head in Mtrs.	Mini. HP	Cable Size	Method of Starting	Delivery Size (NRV) in mm dia	Minimum Overall Efficiency	Nominal Diameter of Tubewell mm
1	2	3	4	5	6	7	8	9
1.0	90	60	3.00	1.5	DOL	50.00	37.59	150
1.1	90	90	5.00	1.5	DOL	50.00	38.15	150
1.2	90	120	6.00	2.5	DOL	50.00	39.27	150
1.3	90	150	7.50	4.0	DOL	50.00	40.95	150
1.4	90	180	10.00	4.0	SD	50.00	40.70	150
2.0	135	60	4.00	1.5	DOL	50.00	39.06	150
2.1	135	90	6.00	2.5	DOL	50.00	40.81	150
2.2	135	120	7.50	2.5	DOL	50.00	42.56	150
2.3	135	150	10.00	4.0	SD	50.00	43.14	150
2.4	135	180	12.50	4.0	SD	50.00	43.73	150
2.5	135	210	15.00	6.0	SD	50.00	44.31	150
2.6	135	240	17.50	6.0	SD	50.00	44.89	150
2.7	135	255	17.50	6.0	SD	50.00	44.89	150
3.0	180	72	6.00	1.5	DOL	50.00	42.35	150
3.1	180	108	10.00	2.5	SD	50.00	44.77	150
3.2	180	144	12.50	4.0	SD	50.00	45.38	150
3.3	180	163	12.50	4.0	SD	50.00	45.38	150
3.4	180	180	12.50	6.0	SD	50.00	45.38	150
3.5	180	215	15.00	6.0	SD	50.00	45.98	150
3.6	180	255	20.00	6.0	SD	50.00	47.19	150
3.7	180	275	22.50	10.0	ATS	50.00	47.19	150
3.8	180	295	25.00	16.0	ATS	50.00	48.05	150
4.0	240	72	7.50	1.5	DOL	50.00	46.57	150
4.1	240	108	10.00	2.5	SD	50.00	46.40	150
4.2	240	144	15.00	4.0	SD	50.00	48.49	150
4.3	240	170	17.50	6.0	SD	50.00	49.13	150
4.4	240	190	20.00	10.0	SD	50.00	48.91	150
4.5	240	210	20.00	10.0	SD	50.00	49.76	150
4.6	240	230	25.00	10.0	ATS	50.00	49.76	150
4.7	240	250	25.00	10.0	ATS	50.00	49.76	150
4.8	240	270	27.50	16.0	ATS	50.00	48.91	150

5.0	320	55	7.50	2.5	DOL	50.00	46.81	150
5.1	320	92	12.50	2.5	SD	50.00	48.09	150
5.2	320	130	17.50	4.0	SD	50.00	49.38	150
5.3	320	150	20.00	10.0	SD	50.00	50.02	150
6.0	400	60	10.00	1.5	SD	80.00	49.95	150
6.1	400	90	15.00	4.0	SD	80.00	51.30	150
6.2	400	120	20.00	4.0	SD	80.00	52.65	150
6.3	400	150	22.50	16.0	ATS	80.00	52.65	150
7.0	510	52	12.50	2.5	SD	80.00	51.30	200
7.1	510	87	20.00	4.0	SD	80.00	53.33	200
7.2	510	123	25.00	10.0	ATS	80.00	54.00	200
7.3	510	141	30.00	16.0	ATS	80.00	54.00	200
7.4	510	159	35.00	25.0	ATS	80.00	54.00	200
7.5	510	175	40.00	25.0	ATS	80.00	54.00	200
8.0	800	72	25.00	10.0	ATS	80.00	56.32	200
8.1	800	108	35.00	16.0	ATS	80.00	57.02	200
8.2	800	144	45.00	25.0	ATS	80.00	57.73	200
8.3	800	162	50.00	25.0	ATS	80.00	57.73	200
8.4	800	180	55.00	35.0	ATS	80.00	57.73	200
8.5	800	198	60.00	35.0	ATS	80.00	57.73	200
9.0	1200	63	27.50	10.0	ATS	100.00	59.40	200
9.1	1200	105	45.00	25.0	ATS	100.00	59.53	200
9.2	1200	126	55.00	25.0	ATS	100.00	59.53	200
9.3	1200	147	65.00	35.0	ATS	100.00	60.26	200
9.4	1200	167	75.00	35.0	ATS	100.00	60.26	200
10.0	600	50	12.50	2.5	SD	80.00	53.01	200
10.1	600	83	17.50	4.0	SD	80.00	53.53	200
10.2	600	116	25.00	10.0	ATS	80.00	54.90	200
10.3	600	132	30.00	10.0	ATS	80.00	54.90	200
10.4	600	149	35.00	16.0	ATS	80.00	55.24	200
10.5	600	165	40.00	25.0	ATS	80.00	55.24	200
10.6	600	180	45.00	25.0	ATS	80.00	55.92	200
SP-1.0	1700	52	30.00	16.0	ATS	125.00	61.20	200
SP-2.0	1700	86	50.00	25.0	ATS	125.00	61.34	200
SP-3.0	2000	50	35.00	16.0	ATS	150.00	61.48	300
SP-4.0	2000	74	50.00	25.0	ATS	150.00	62.24	300

SP-5.0	2900	45	45.00	25.0	ATS	150.00	63.14	300
SP-6.0	2900	68	65.00	35.0	ATS	150.00	63.91	300
LD-2.0	420	72	12.50	2.5	SD	80.00	50.24	200
LD-2.1	420	108	20.00	4.0	SD	80.00	52.20	200
LD-2.2	420	144	27.50	16.0	ATS	80.00	52.20	200
LD-2.3	420	180	35.00	25.0	ATS	80.00	52.57	200
LD-2.4	420	216	40.00	25.0	ATS	80.00	52.20	200
LD-2.5	420	252	40.00	25.0	ATS	80.00	52.20	200

ANNEXURE

N o	Particulars	Material
	<u>FOR PUMP</u>	
1	Shaft sleeve	Bronze Grade LTB 4 as per IS:318
2	Casing Wearing Ring	Nitrile rubber
3	Bush	Bronze Grade LTB 4 as per IS:318
4	Discharge Casing	Cast iron grade FG 260 as per IS:210
5	Non return valve housing	Cast iron grade FG 260 as per IS:210
6	Impeller (Not Fabricated)	Stainless steel grade X 12 Cr 12 as per IS 6603
7	Pump Bowl	Cast iron grade FG 260 as per IS:210
8	Pump Shaft	Stainless steel grade X 12 Cr 12 as per IS 6603
9	Suction Casing	Cast iron grade FG 260 as per IS:210
10	Studs	SS 410
11	Bowl Supporting Clamp	SS 410
B	<u>FOR MOTOR</u>	
1	Bearing Housing and base	Cast iron grade FG 260 as per IS:210
2	Motor Shaft	Stainless steel grade X 12 Cr 12 as per IS 6603
3	Bearing bush	Bronze Grade LTB 4 as per IS:318
4	Rotor	
	a) Lamination	Silicon steel cold Rolled M-45 not more than 0.5mm thick as per IS:648
	b) Conductor core	Electro grade copper as per IS: 613
5	Stator	
	a) Lamination	Silicon steel cold Rolled M-45 not more than 0.5mm thick as per IS:648
	b) Winding wire	
	1) Conductor	Electro grade copper as per IS: 613
	2) Insulation	Polywrap copper conductor as per IS : 8783
6	Breather Diaphragm	Nitrile rubber
7	Thrust Bearing	Thrust Plate C.I. Base with Carbon Plate.
	a) Steel Ball (If provided)	SS Chrome steel 410
8	Cable Gland	Nitrile rubber
9	Cable	Three core Flat PVC Copper Flexible Cable (IS: 694/2010) class 5
10	Stator casing	Stainless steel GR 20 Cr 13 as per IS 1570 (part-5)
11	Sand Guard	Bronze Grade LTB 4 as per IS:318
12	Coupling Sleeve	Stainless steel grade X 12 Cr 12 as per IS 6603
13	Strainer	Stainless steel grade X 12 Cr 12 as per IS 6603
14	Water filling plug	Bronze Grade LTB 2 as per IS:318

ANNEXURE*Quoted Efficiency at Head Rang at +10 to -25 of Three Phase Submersible Pumps*

Cat. No.	Design Parameter		Min. H.P.	Minimum Overall Eff. % at Duty Point	+10 % Head	-25 % Head	Minimum Overall Eff. % at Duty Point	Efficiency at +10 % Head	Efficiency at -25 % Head
	Disch. in LPM	Head in Mtrs							
1	2	3	4	5	6	7	8	9	10
1.0	90	60	3.0	37.59	66.00	45.00			
1.1	90	90	5.0	38.15	99.00	67.50			
1.2	90	120	6.0	39.27	132.00	90.00			
1.3	90	150	7.50	40.25	165.00	112.50			
1.4	90	180	10.0	40.70	198.00	135.00			
2.0	135	60	4.0	39.06	66.00	45.00			
2.1	135	90	6.0	40.81	99.00	67.50			
2.2	135	120	7.50	42.56	132.00	90.00			
2.3	135	150	10.0	43.14	165.00	112.50			
2.4	135	180	12.50	43.73	198.00	135.00			
2.5	135	210	15.0	44.31	231.00	157.50			
2.6	135	240	17.50	44.89	264.00	180.00			
2.7	135	255	17.50	44.89	280.50	191.25			
3.0	180	72	6.0	42.35	79.20	54.00			
3.1	180	108	10.0	44.77	118.80	81.00			
3.2	180	144	12.50	45.38	158.40	108.00			
3.3	180	163	12.50	45.38	179.30	122.25			
3.4	180	180	12.50	45.38	198.00	135.00			
3.5	180	215	15.0	45.98	236.50	161.25			
3.6	180	255	20.0	47.19	280.50	191.25			
3.7	180	275	22.50	47.19	302.50	206.25			
3.8	180	295	25.0	48.05	324.50	221.25			
4.0	240	72	7.50	46.57	79.20	54.00			
4.1	240	108	10.0	46.40	118.80	81.00			
4.2	240	144	15.0	48.49	158.40	108.00			
4.3	240	170	17.50	49.13	187.00	127.50			
4.4	240	190	20.0	48.91	209.00	142.50			
4.5	240	210	20.0	49.76	231.00	157.50			
4.6	240	230	25.0	49.76	253.00	172.50			

4.7	240	250	25.0	49.76	275.00	187.50			
4.8	240	270	27.50	48.91	297.00	202.50			
5.0	320	55	7.50	46.81	60.50	41.25			
5.1	320	92	12.50	48.09	101.20	69.00			
5.2	320	130	17.50	49.38	143.00	97.50			
5.3	320	150	20.0	50.02	165.00	112.50			
6.0	400	60	10.0	49.95	66.00	45.00			
6.1	400	90	15.0	51.30	99.00	67.50			
6.2	400	120	20.0	52.65	132.00	90.00			
6.3	400	150	22.50	52.65	165.00	112.50			
7.0	510	52	12.50	51.30	57.20	39.00			
7.1	510	87	20.0	53.33	95.70	65.25			
7.2	510	123	25.0	54.00	135.30	92.25			
7.3	510	141	30.0	54.00	155.10	105.75			
7.4	510	159	35.0	54.00	174.90	119.25			

Cat. No.	Design Parameter		Min. H.P	Minimum Overall Eff. % at Duty Point	+10 % Head	-25 % Head	Minimum Overall Eff. % at Duty Point	Efficiency at +10 % Head	Efficiency at -25 % Head
	Disch. in LPM	Head in Mtrs							
1	2	3	4	5	6	7	8	9	10
7.5	510	175	40.0	54.00	192.50	131.25			
8.0	800	72	25.0	56.32	79.20	54.00			
8.1	800	108	35.0	57.02	118.80	81.00			
8.2	800	144	45.0	57.73	158.40	108.00			
8.3	800	162	50.0	57.73	178.20	121.50			
8.4	800	180	55.0	57.73	198.00	135.00			
8.5	800	198	60.0	57.73	217.80	148.50			
9.0	1200	63	27.50	59.40	69.30	47.25			
9.1	1200	105	45.0	59.53	115.50	78.75			
9.2	1200	126	55.0	59.53	138.60	94.50			
9.3	1200	147	65.0	60.26	161.70	110.25			
9.4	1200	167	75.0	60.26	183.70	125.25			
10.0	600	50	12.50	53.01	55.00	37.50			
10.1	600	83	17.50	53.53	91.30	62.25			
10.2	600	116	25.0	54.90	127.60	87.00			
10.3	600	132	30.0	54.90	145.20	99.00			
10.4	600	149	35.0	55.24	163.90	111.75			
10.5	600	165	40.0	55.24	181.50	123.75			
10.6	600	180	45.0	55.92	198.00	135.00			
SP-1.0	1700	52	30.0	61.20	57.20	39.00			
SP-2.0	1700	86	50.0	61.34	94.60	64.50			
SP-3.0	2000	50	35.0	61.48	55.00	37.50			
SP-4.0	2000	74	50.0	62.24	81.40	55.50			
SP-5.0	2900	45	45.0	63.14	49.50	33.75			
SP-6.0	2900	68	65.0	63.91	74.80	51.00			
LD-2.0	420	72	12.50	50.24	79.20	54.00			
LD-2.1	420	108	20.0	52.20	118.80	81.00			
LD-2.2	420	144	27.50	52.20	158.40	108.00			
LD-2.3	420	180	35.0	52.57	198.00	135.00			
LD-2.4	420	216	40.0	52.20	237.60	162.00			
LD-2.5	420	252	40.0	52.20	277.20	189.00			

ANNEXURE

Data sheet for pump, motor, cable etc, details to be filled in for individual category.

	Category No. (As per Annexure-I)	
I)	PUMP DETAILS.	Bidder's Reply
1	Discharge (LPM)	
2	Head(Meter)	
3	Type of pump	
4	Maximum outside diameter of pump set including cable thickness in mm	
5	No. of stage	
6	Pump efficiency at duty point _____%	
7	NRV size in mm	
8	Pump input at duty point (KW)	
9	Minimum submergence required in mtr.	
10	Rated speed (Rpm)	
11	Characteristic curves should cover completed range of operation i.e. minimum operation head to shut off head.	
II)	MOTOR DETAILS :	
1	Reference Indian standard (i.e.IS : 9283)	
2	Type of duty (Countinuous duty, Type S1)	
3	Frequency	
4	Number of phases	
5	Rated output,in Kw/H.P	
6	Rated voltage and winding connections	
7	Current ,approximate ,at rated output in "A"	
8	Speed in at rated output in Rpm	
9	Nominal efficiency,in perecent	
10	Category of motor	
11	Maximum outside diameter of motor including cable thickness in mm	
12	Method of starting (Star Delta/ ATS/ DOL)	
13	Starting torque as percentage of full load torque	
14	Reserve power of motor (Minimum 15% more than duty point condition.)	
15	Size of cable	
III)	Overall efficiency of Pump set at Duty point _____%	
IV)	Performance curves of pump and motors are required as	
	i) Discharge V/s Head	
	ii) Discharge V/s Power input KW)	
	iii) Discharge V/s overall efficiency of pump set	

	iv) Submersible motor characteristic curves as under;	
	(a) Load V/s power factor	
	(b) Load V/s RPM	
	(c) Load V/s efficiency	
	(d) Load V/s Current	
V)	Cross section drawing for both pump and motor showing clearance at bearings wearing run out and material specification for major components.	

Note :

The Bid for particular category will be considered as non responsive if offer dose not match the specified minimum parameter as mention in Annexure-VI.

Sign of Contractor

**E.E.(Works Division)
Nakhatrana**

**E.E. (Mech Dn)
Bhuj**