



BHARAT HEAVY ELECTRICALS LIMITED
(A GOVT OF INDIA UNDERTAKING)

Water Systems Group- WEG & WS
Boiler Auxiliary Plant (BAP), Ranipet

TECHNICAL SPECIFICATION FOR SLURRY PUMPS

SPECIFICATION NUMBER : ROS: 9068:03
BUYER (EPC) : BHEL, BAP Ranipet
APPLICATION : FLUE GAS DESULPHURIZATION SYSTEM

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1.0 INTENT OF SPECIFICATION

This specification covers the minimum requirements for the complete design, material, manufacturing, shop inspection, testing at the manufacturer's works, supervision of erection & commissioning and performance guarantee testing for the Flue Gas Desulphurization plant. For project specific technical parameters, refer to **Annexure-A**. The following points may be noted:

- a. Bidder shall assume full responsibility for the entire equipment assembly and shall comply to the requirements of this specification and referred specifications/attachments to enquiry/order.
- b. In case, deviations are considered essential by the Bidder (after exhausting all possible efforts), the same shall be separately listed in the Bidder's proposal under separate section, titled as "List of Deviations/Exceptions to the Enquiry Document (**Annexure- II**)".
- c. Any deviation, not listed in Annexure - II, though reflected in any other part of the offer, shall not be considered.
- d. BHEL discretion is final in acceptance / rejection of exceptions / deviations listed by Bidders' proposal in Annexure – II. Only written approval by BHEL is valid means of acceptance of deviation / exception.
- e. Compliance to this specification shall not relieve the Bidder of the responsibility of furnishing equipment and accessories/auxiliaries of proper design, materials and workmanship to meet the specified start up and operating conditions.
- f. In case, the Bidder considers requirement of additional instrumentation, controls, safety devices and any other accessories/auxiliaries essential for safe and satisfactory operation of the equipment, the same shall be recommended along with reasons in a separate section and include the same in scope of supply.
- g. All accessories, items of work, though not indicated but required to make the system complete for its safe, efficient, reliable and trouble free operation and maintenance shall also be in supplier's scope unless specifically excluded.

2.0 APPLICABLE CODES & REGULATIONS

The design and materials shall conform to the requirements of applicable codes and regulations of the latest edition. The design, manufacture, installation and testing of the pump shall follow the latest applicable Indian/International (ASME/EN/Japanese) Standards. In general, pumps shall conform to latest edition of the following standards:

- IS:1520: Horizontal centrifugal pumps for clear cold fresh water
- IS:5120: Technical requirements of roto dynamic special purpose pumps
- API:610: Centrifugal pumps for general refinery service
- IS:5639: Pumps handling chemicals & corrosion liquids
- IS:5659: Pumps for process water
- HIS: Hydraulic Institute Standards USA

3.0 PROVENNESS CRITERIA:

Bidders shall meet the Qualification Requirement (QR) for Slurry Pumps as per **Annexure-B** and **submit the Annexure to qualification requirement (Attachment-3K)**. Necessary documentary evidences shall be submitted along with the bid. **Offers of Bidders not meeting Qualification Criteria shall not be considered for evaluation.**



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4.0 MATERIAL OF CONSTRUCTION

	Material of construction	Horizontal Centrifugal Pumps	Vertical Sump Pumps
i.	Casing	1. Ductile Iron (65-45-12, ASTM A536) with replaceable rubber liner- 14000hrs to be guaranteed. OR 2. Ductile Iron with Hi Chrome liner - 14000hrs to be guaranteed. OR 3. In case of Hi chrome casing pump the Guaranteed wear life of casing shall not be less than 24000 hrs.	1. Ductile Iron (65-45-12, ASTM A536) with replaceable rubber liner- 14000hrs to be guaranteed. OR 2. Ductile Iron with Hi Chrome liner - 14000hrs to be guaranteed. OR 3. In case of Hi chrome casing pump the Guaranteed wear life of casing shall not be less than 24000 hrs.
ii.	Impeller	Hi Chrome or superior material with 14000 hrs guarantee.	Hi Chrome or superior material with 14000 hrs guarantee.
iii.	Solid Shaft	Duplex SS 2205 /EN8D /EN9	Duplex SS 2205 / CS+Rubber Lined
iv.	Shaft sleeve at mechanical seal	CD4MCU ASTM A 743/ Duplex 2205	CD4MCU ASTM A 743/ Duplex 2205
v.	Base Plate	Carbon steel with Epoxy Coating	Carbon steel with Epoxy Coating

Note: The material and thickness of the liners shall ensure a minimum service life of 2 years before replacement

5.0 SCOPE OF SUPPLY

Scope for the bidders shall include Design, Supply and Supervision of Erection & Commissioning.

Design: Includes basic engineering, detail engineering, preparation and submission of engineering drawings/calculations/datasheets/quality assurance documents/field quality plans, storage instructions, commissioning procedures, operation & maintenance manuals, performance guarantee test procedures and assisting BHEL in obtaining time bound approval from CUSTOMER.

Supply: Includes manufacturing/fabrication, shop floor testing, stage inspections, final inspections, painting & packing.

Supervision of Erection & commissioning: Includes supervision of erection & commissioning, supervision of trial operation, training of customer's O&M Personnel.

The scope of supply for Slurry pump shall include but not limited to the following:

Sl. No	Scope
1.	Slurry pump complete with
	i. Casing
	ii. Rotor and Shaft assembly
	iii. Drive motor as per specification
	iv. Coupling or Pulley & V-belt (As applicable)
	v. Common base frame for pump & motor and shock pads
	vi. Single/ Double Mechanical seal as applicable with applicable Quenching/ Flushing plan
	vii. Flushing and drain system Provision to be provided in mechanical seal in case of with flushing mechanical seal
	viii. Coupling guards with bolts or V-belt guard (As applicable)



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Sl. No	Scope
	ix. Discharge pressure guage(to be supplied as loose)
	x. Temporary Strainers required for commissioning
	xi. Expansion joints (Bellows) at suction and Discharge
	xii. Casing drain terminated at battery limit with flange(if applicable)
	xiii. Cooling water piping for Bearing cooling(as applicable)
	xiv. Lubrication system (as applicable)
	xv. Foundation bolts for supplied items
	xvi. Pedestal for Pump
	xvii. Drip tray for drainage collection from pump (if applicable). However bidder to provide the same in case end customer requests for the same.
	xviii. Lantern Ring (if applicable)
	xix. Mechanical Running and Performance test at shop
	xx. Painting and Rust Prevention during shipment and construction
	xxi. Supervision of Erection & commissioning at site
	xxii. Special tools & tackles as applicable
	xxiii. Accessory (Internal) Piping within the skid(if applicable)
	xxiv. First fill of consumables like lubricants, etc.,
	xxv. Start-up & Commissioning & Mandatory spares
	xxvi. Seaworthy Packing & Forwarding (for import supplies) to Project Site office
	xxvii. Installation, operation and maintenance manuals
	xxviii. In case pumps of series pumps, common individual base frame to be provided by vendor with interconnecting piping (MOC: MSRL/ any other material suitable for handling slurry application), interconnecting expansion joints, interconnecting fasteners.
	xxix. Any other items required for completeness of the equipment except the items covered in the exclusions.

6.0	DESIGN & CONSTRUCTION
6.1	DESIGN REQUIREMENTS
1.	The pump shall be single stage centrifugal type capable of delivering the rated flow at rated head with margins as specified below.
2.	All slurry pumps for a particular service shall be identical and interchangeable. The composition of Limestone slurry is provided in the Annexure for reference. Bidder shall consider the Slurry pumps accordingly with reference to construction and speed as follows. Tip speed of impeller :(a) for rubber lined pumps should not exceed 25m/sec, (b) for other pumps should not exceed 30m/sec- vendor to furnish. However, if the discharge head exceeds 6.0 bar bidder may consider higher tip speed subject to BHEL approval. The slurry velocity shall be in the range of 1.2 m/s to 2.3 m/s to prevent bed of solids in the pipe. Notwithstanding the above parameters, it shall be the bidders endeavor and responsibility to ensure that there shall be no settling of solids in the pipelines. Necessary calculations shall be submitted to BHEL for review.
3.	All the pump wear parts in contact with the slurry shall be provided with replaceable rubber/elastomer liners suitable for the fluid handled. The bidder can also offer a hi-chrome alloy line pump if the bidder



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	has previous experience of the same for similar applications.											
4.	The pump shall be provided with seals of proven type and shall be designed for minimization of seal water consumption. The shaft shall be supported on heavy duty ball/roller bearings(FAG/SKF/TIMKEN/ or equivalent subjected to BHEL approval)											
5.	The Pump shall be capable of developing the required total head at rated capacity for continuous operation. Also the pumps shall be capable of being operated to give satisfactory performance at any point on the HQ characteristics curve. The operating range of the pump shall be 40% to 120% of the duty point / as per relevant Standards unless otherwise mentioned elsewhere. The maximum efficiency of pump shall be at BEP. The maximum efficiency of pump shall preferably be within ± 10% of the rated design flow as indicated in data sheets.											
6.	The total head capacity curve shall be continuously rising from the operating point towards shut-off without any zone of instability and with a minimum shut-off head of about 15% more than the design head.											
7.	Pumps of a particular category shall be identical and shall be suitable for parallel operation with equal load division. The head Vs capacity and BHP Vs capacity characteristics should match to ensure even load sharing and trouble free operation throughout the range. Components of identical pumps shall be interchangeable.											
8.	<table><tr><td>Speed</td><td>Antifriction Bearing</td><td>Sleeve Bearing</td></tr><tr><td>1500 rpm and below</td><td>75.0 micron</td><td>75.0 micron</td></tr><tr><td>3000 rpm</td><td>50.0 micron</td><td>65.0 micron</td></tr></table>			Speed	Antifriction Bearing	Sleeve Bearing	1500 rpm and below	75.0 micron	75.0 micron	3000 rpm	50.0 micron	65.0 micron
Speed	Antifriction Bearing	Sleeve Bearing										
1500 rpm and below	75.0 micron	75.0 micron										
3000 rpm	50.0 micron	65.0 micron										
9.	The pumps shall be capable of starting with discharge valve fully open and close condition. Motors shall be selected to suit to the above requirements. Continuous Motor rating (at 50 deg.C ambient) shall be at least ten percent (10%) above the maximum load demand of the pump in the entire operating range to take care of the system frequency variation and no case less than the maximum power Requirement at any condition of the entire characteristic curve of the pump.											
10.	The kW rating of the drive unit shall be based on continuously driving the connected equipment for the conditions specified. However, in cases where parallel operation of the pumps are specified, the actual motor rating is to be selected by the Bidder considering overloading of the pumps in the event of tripping of operating pump(s).											
11.	Pumps shall be so designed that pump impellers and other accessories of the pumps are not damaged due to flow reversal.											
12.	The Contractor under this specification shall assume full responsibility in the operation of pump and motor as a unit.											
13.	The pumps shall be designed as impeller centrifugal pump. The pumps shall be wear-resistant, be equipped with flushing devices/provision to prevent sedimentation and shall be designed and installed in a manner to allow easy replacements, repair and maintenance.											
14.	Impellers shall be single piece casting. Fabricated impellers shall not be accepted.											
15.	The slurry pumps shall be equipped with oil level indication (if applicable), coupling guard/V-belt guard & equipment for collecting leakage, made of corrosion resistant material.											
16.	Pumps must be carefully set to ensure that the net positive suction head available under all operating conditions will be adequate. The NPSH Values are to be referred to the least favorable operating conditions- lowest atmospheric pressure, lowest level of water on the suction side of the pump and highest temperature of the pumped fluid. An adequate safety margin of normally greater than 1m to the max NPSH required shall be provided.											



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17.	All pumps shall be fitted with pressure gauges on discharge end. (To be supplied loose)
18.	Venting valve shall be fitted to all pumps at suitable points on the pump casing unless the pump is self-venting due to the arrangement of the suction and discharge nozzles. Drainage facilities shall be provided on the pump casing or adjacent pipe work to facilitate the dismantling of pumps. (If Applicable)
19.	Pumps shall have stable head-capacity characteristics curve from run-off to shut-off.
20.	Selection of Duty point should preferably be at BEP (Best Efficiency Point). It should be noted that head variation is due to level variation in tank. Pump has to run in the system without compromising it's NPSH requirement at lowest water level in tank. Hence, when tanks are filled-up and at normal water level, pump will operate at the right of BEP. Pump's operating zone shall be considered accordingly.
21.	External flushing is required to remove the accumulated particles and all related information shall be mentioned in data sheet.
22.	Pump should have adjustment provision of axial clearance between casing and impeller for maintenance of performance at best efficiency in the event of wear between impeller and casing.
23.	Each pump will have a coupling of adequate size, designed for full load and capable of supporting start-up an overload moment. Each half of the coupling will be factory mounted and locked to its shaft. The coupling must be able to accept the adjustment of the impeller. Bidder can also quote pumps with V-belt & Pulley arrangement.
24.	The Antifriction bearing of the pumps shall be designed for minimum useful life (L-10) of 20,000 hours of continuous operation (Under the design condition). The thrust bearing will have dimensions for a minimum of 175 % of the required load.
25.	The pumps shall have mechanical seals of cartridge type with self-lubrication sliding ring cartridges. The static part will be mounted on the seal plate with circumferential ring (O-ring) or another flexible sealing ring. Built in seal design will not be accepted.
26.	The sealing areas shall be designed in such a way so that solids do not precipitate, affect the cooling, or affect adjustment and mechanical functioning of the seals. Seals requiring jet cleaning shall be avoided. Bidder to furnish the water requirement for Plan 32 & 62 so that BHEL can arrange the same suitably.
27.	Pump induced vibration due to flow pulsations shall be avoided through suitable design.
28.	Each rotating equipment shall be first statically balanced and then dynamically balanced according to ISO 1940 (As applicable.).Moreover Bidder to ensure balancing of the impellers after mounting on the shaft as per relevant balancing standards. In case during operation deflection in the shaft or any other operation issues occur, the same needs to be rectified by the bidder without any price implication to BHEL.
6.2	CONSTRUCTIONAL FEATURES
A)	CASING
a.	Pumps shall be of Radial Split Casing (if twin casing pump), Over-hang, End Suction Type Back Pull-out design, Vertical Discharge type for Horizontal Centrifugal Pump.
b.	The casing shall be designed to withstand the maximum shut-off pressure developed by the pump at the pumping temperature.
c.	Pump casing shall be provided with a vent connection and piping with fittings & valves. Casing drain as



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	required shall be provided complete with drain valves, piping and plugs (As Applicable).
d.	Pump casing to be provided with a connection for discharge pressure gauge as standard feature. (Pressure Gauge shall be supplied loose) It shall be structurally sound to provide housing for the pump assembly and shall be designed hydraulically to minimum radial load at part load operation.
e.	For single casing pumps, bidder to confirm that in case casing wears out by 50% during operation, pump allowable maximum pressure will not reduce. This shall be confirmed strictly for equipment and plant safety. A basis of calculation proving the same shall be submitted for review.
f.	Lifting provision of pump as a whole and individual casing half should be provided.
g.	Renewable wear rings shall be provided at points of running clearance and shall be made from appropriate materials indicated in the referred standards.
B)	IMPELLER
a.	Impeller shall be semi-closed, closed or open type and designed in conformance with the detailed analysis of the liquid being handled. The impeller shall be secured to the shaft, and shall be retained against circumferential movement by keying, pinning or lock rings. On pumps with overhung shaft, impellers shall be secured to the shaft by a lockout or cap screw which tightness in the direction of normal rotation. Bidder may also propose threaded connection between impeller and shaft. Bidder shall provide evidence of zero contact between the slurry being processed and the Threaded region.
b.	Tipspeed of impeller: Please refer Clause 6.1(2)
c.	Miller number for the material should be justified for that pumping medium as per ASTM G75-95 as well as the corrosion effect of pumping medium
d.	Impeller as rotating assembly along with all elements should meet balancing standard of ISO 1940 Gr 6.3
e.	Maximum size impellers for the pump body shall not be quoted for. By installation of a new impeller a head increase of 5% minimum shall be possible. Maximum size impeller to be quoted or as appropriate technically by the bidder. In case there is variation required in the system then same can be done thru by changing the pump RPM with change in pulley ratio.
C)	IMPELLER/CASING WEARING RINGS
a.	Replaceable type wearing rings shall be provided at suitable locations of pumps. Suitable method of locking the wearing ring shall be used. Wearing rings shall be provided in pump casing and/or impeller as per manufacturer's standard practice.
D)	SHAFT
b.	The shaft shall be ground and polished to final dimensions and shall be adequately sized to withstand all stresses from rotor weight, hydraulic loads, vibration and torques coming in during operation.
c.	All Pump shafts shall be of ample size to transmit the maximum possible output from the prime mover.
d.	The pump shaft and coupling are to be so dimensioned that the maximum permissible torque of the shaft is higher than the maximum transmissible torque of the coupling and gear.
e.	Pumps shall operate smoothly throughout the speed range up to their operating speeds. The first coupled critical speed must be at least 20% higher than the maximum operating speed. The determination of the shaft diameter and the distance between two consecutive bearings must include a sufficiently large safety margin to satisfy this condition.



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f.	Shafts shall be conservatively designed to transmit maximum power required and to assure rigidity. Shafts shall be machined and ground to close tolerances and shall be tapered to permit easy removal of the seals and bearings.
g.	Shaft shall run in high precision heavy duty roller bearings. Lubrication system provided shall be such that visual checking of lubricant level is possible
h.	No parts of the shaft should come in contact with the liquid medium for horizontal centrifugal pump.
i.	Shaft should have a keyed joint at impeller hub or thread connection between impeller and shaft is acceptable however in no circumstances Slurry shall come in contact with the threaded part.
E)	SHAFT SLEEVES
a.	Renewable type fine finished shaft sleeves shall be provided at mechanical seals. Shaft sleeves shall be fastened to the shaft to prevent any leakage or loosening. Shaft and shaft sleeve assembly should ensure concentric rotation.
F)	BEARINGS
a.	Heavy duty bearings, adequately designed for the type of service specified in the enclosed pump data sheet and for long, trouble free operation shall be furnished. Proper lubricating arrangement for the bearings shall be provided. The design shall be such that the bearing lubricating element does not contaminate the liquid pumped. Where there is a possibility of liquid entering the bearings suitable arrangement in the form of deflectors or any other suitable arrangement must be provided ahead of bearings assembly. Bearings shall be easily accessible without disturbing the pump assembly. A drain plug shall be provided at the bottom of each bearings housing.
b.	The bearings may be ball, roller or sleeve bearing. If sleeve bearings are used these shall be machined for close running fit. The bearings shall be designed to take the necessary radial load as well as the net axial thrust. Bearings shall be lubricated properly and sized for an operating life of 20,000 hours on the basis of maximum load. Oil level indication shall be provided.
c.	Bearing housings on horizontal shaft pumps shall be designed to enable the bearings to be replaced without removing the pump or motor from its mounting. Bearing housings on horizontal shaft pumps shall be effectively protected against the ingress of water, pumped fluid and dust by suitable nonferrous deflectors.
d.	If bearing housing requires cooling water, volume and pressure of cooling water is to be indicated in Technical Data Sheet.
e.	Lubricating oil will be the responsibility of pump manufacturer. Hence, manufacturer has to make arrangement of first fill of oil at installation, and at commissioning stage. Quantity of oil and its grade is to be indicated in Drawing and Operation Manual.
G)	MECHANICAL SEALS
a.	Mechanical seals shall be of single/double type with either sliding gasket or bellows between the axially moving face and shaft sleeves or any other suitable type. The sealing faces should be highly lapped surfaces of materials known for their low frictional coefficient and resistance to corrosion against the liquid being pumped.
b.	The pump supplier shall coordinate with the seal maker in establishing the seal chamber of circulation rate for maintaining a stable film at the seal face. The seal piping system shall form an integral part of the pump assembly. For the seals under vacuum service, the seal design must ensure sealing against atmospheric pressure even when the pumps are not operating. Necessary provision for seal water supply along with complete piping fittings and valves as required shall form integral part of pump supply.



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c.	The Mechanical Seals shall be so arranged that repacking or fitting of replacement seals can be carried out with the minimum of disruption to plant operation.
d.	Design the mechanical seals chamber to have sufficient room to lubricate and get seal face cool with its own slurry.
e.	Provide requirements for periodical flushing to rinse the seal face for leaked slurry.
f.	Pump shall be supplied with mechanical seal. All mechanical seals, regardless of type or arrangement, shall be of the cartridge design. Hook sleeve cartridge should not be used.
g.	Requirement of flushing water, its quantity, and pressure to be indicated in data sheet.
h.	Zero leakage is the intension of this specification. However, quantity of leakage, if it is unavoidable, pump should have a provision of collecting of any drip leakage and flushing the same to nearby pit is to be providing without corroding the base plate of pump.
i.	Mechanical seals shall be fitted and installed in the pump before shipment and shall be clean. Mechanical seals shall be plugged with screw for shipping.
j.	For Flushless Mechanical Seal suitable lubrication system should be considered such as Synthetic lubrication Device (SLD) or any other Flushless Mechanism catering to the lubrication of Mechanical Seal. Bidder to ensure seal life of 20000 hours is met & accordingly lubrication arrangements should be considered for each pump to meet the seal life. Bidder to furnish the shelf life of the SLD for lubrication of the mechanical seal. The supply of SLD devices will be separate & will be subjected to the clearance of BHEL.
k.	Seal life shall be guaranteed for 20000 hrs. In the event seals fail before guarantee period, the bidder shall replace the same without any cost implication. Make of Mechanical Seals: Eagle Burgmann/ Flowserve/ John crane only. No other make is acceptable.
l.	In case of Flushing / Quenching recommended by the bidder for the mechanical seal , applicable flushing /quenching plans integrated piping along with their respective instruments, fittings will be in the scope of the bidder. The Flushing / Quenching plans should meet the respective API Standards. Bidder also Confirm the quantity of water requirement for such arrangement so that BHEL can arrange the same suitably.
H)	COUPLING (if applicable)
a.	The pump and motor shafts shall be connected with an adequately sized flexible coupling of proven design with a spacer to facilitate dismantling of the pump without disturbing the motor. Necessary coupling guards shall also be provided.
b.	Coupling halves shall be machine matched to ensure accurate alignment. Couplings and gears must have a rated capacity of at least 120% of the maximum potential power transmission requirement.
c.	Coupling shall be of flexible type made of cast steel. The Bidder shall furnish both halves of the coupling. Both the Coupling halves shall be bored and keyed to fit shafts of the gearbox and the motor by bidder.
d.	All rotating parts such as coupling shall be covered with suitable protective guards. Guards shall be easily removable type. If weight of the coupling is heavy (>40 kgs), provision of tapped hole should be incorporated in right place of hub to handle the same effortlessly.
I)	BASE PLATE
a.	A common base plate mounting both for the pump and motor shall be furnished. The base plate shall be fabricated steel and of rigid construction, suitably ribbed and reinforced. Base plate and pump supports shall be so constructed and the piping unit so mounted as to minimize misalignment caused by



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	mechanical forces such as normal piping strain, internal differential thermal expansion and hydraulic piping thrust. Suitable drain troughs and drip lip shall be provided. The HT motors are in BHEL's scope. However, bidder should design the base frame in order to accommodate both the HT motor & pump on the same base frame. (HT motor overall dimensions & weight will be provided by BHEL after placement of PO).
b.	Suitable holes shall be provided for grouting and these shall be so located that the base plate can be grouted in place without disturbing the pump and motor.
c.	Base plate must have provision of aligning driver and driven shaft in both directions of base plate so that shafts can be aligned. Similarly, provision must be provided for alignment of shaft in vertical plane.
d.	Pump manufacturer is to supply base plate along with Foundation bolt & Nut, "Taper wedge (if applicable)" and the necessary fastener for Pump and Motor with Base plate.
e.	Base plate must be provided with a trough, material of which must be compatible of pumping liquid. Leaked liquid, collected in trough, can be systematically routed at designated point
f.	Base plate must be stress-relieved for any residual welding stress and certificate to that effect is to be submitted as per inspection requirement.
J)	ASSEMBLY AND DISMANTLING
i.	Assembly and dismantling of each pump with drive motor shall be possible without disturbing the grouting base plate or alignment.
K)	ADDITIONAL REQUIREMENT FOR VERTICAL SUMP PUMP
	The pumps shall be designed for continuous operation. The pump shall be single stage centrifugal type with semi open or open impeller . The pump impeller shall be cantilever type and shall not be supported below the base plate for easy withdrawal.
	The pump shall deliver the rated flow at rated head with margins as specified in the respective clauses. The pump shall be capable of pumping of slurry with solid concentration upto 30 wt% & particle lumps of 6-7mm.
	The material chosen for the pump components shall be suitable for the fluid handled and shall be proven in similar application.
	The pumps shall not be supported below the base plate level for easy withdrawal without entering the sump.
	The sump depth is around 4-5 m. The detailed drawing of the sump will be provided during post ordering stage to the successful bidder. Bidder shall take care of the inlet level of the sump and accordingly take care of the design requirement during detailed engineering.
M)	ACCESSORIES:
1.	Suction Strainers
i.	Temporary conical strainer to be provided so as to avoid entry of any troublesome particle into the pump at the time of commissioning/starting up. Note: Pipe sizes / Flange sizes will be informed during detail engineering with respect to strainer size & its mounting holes.

6.3 Motor

Please refer to the motor specification attached TECI: LT MOTOR: REV 04(**Annexure-F**). The motor make is subject to end customer approval. The motor painting schedule is subject to customer approval.



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Note: 1) All HT Motors are in BHEL Scope.

2) HT Motor Range: Above 200kW.

3) For HT motor pumps, provision for Vibration sensor and Key Phase Marker Sensor should be provided.

a) Vibration Sensor: 4 provisions on the pump. Thread size of M6x1 (M6x1 threaded provision 12mm deep) for each vibration sensor.

b) Key Phase Marker Sensor: 1 Provision. Notch (of size 30mmL x 15mmW x 3mmD) for phase marker probes are to be provided.

7.0 GENERAL REQUIREMENTS:

S. No.	Description
1.	Metric unit shall be used in the drawings and in the any displays on the equipments. Special attention should be taken that the unit of pressure shall be in dual scales of kPa and kg/cm ² G. For instance the pressure gauges should have dual unit's indication.
2.	Descriptions in the drawings, in the documents, and in the displays shall be in English
3.	All rotating parts such as coupling shall be covered with suitable protective guards. Guards shall be easily removable type.
4.	The equipment shall be designed to withstand the corrosive and moist environment in which these are proposed to operate.
5.	Noise level produced by any rotating equipment individually or collectively shall not exceed 85 dBA measured at a distance of 1.0 meter horizontally from the source in any direction and 1.5m above operating floor. Predicted sound pressure levels for the pump drive assemblies shall be submitted as part of the proposal data.
6.	The overall vibration level shall be as per ISO 10816 /HIS 9.6.4.11 for casing vibrations.
7.	Suitable drain connections shall be provided (as applicable).
8.	The equipment shall be suitable for stable operation continuously.
9.	Limit of connection: The buyer (BHEL) has an intention to minimize interface for utilities as much as possible. The bidder shall consider this requirement in the planning stage of layout for the equipment. The bidder shall provide the header piping for utilities and branch piping to each nozzle. Terminal points for all utilities shall be located at skid edge. The bidder shall specify all terminal points with tie-in number in the P&ID and submit it in the proposal to confirm the scope of supply.
10.	Corrosion allowance: Corrosion allowance for entire equipment shall be in accordance with latest applicable Indian / International standard.
11.	Flanges shall be in accordance with ANSI B16.5 Class 150, However if Vendor Proposes any other drilling standard, prior approval from BHEL to be taken & Vendor to provide one no. extra pipe fittings such as expansion bellow, concentric reducer/expander with SS316 fasteners for each pump.
12.	Name plate: All equipment shall be provided with nameplates indicating the item number and service name. Name plates shall be of 304 Stainless steel plate and placed at a readily visible location. Nameplate of main equipment shall have enough information, which will be confirmed during engineering phase. Stainless steel nameplates for all instruments and valves shall be provided.
13.	Rotation arrows shall be cast in or attached with stainless steel plate on each item of rotation equipment at a readily visible location.



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14.	Unless otherwise specified, all equipment items where the weight exceeds 15 kg shall be provided with suitable lifting lugs, ears or ring bolts or tapped holes for lifting rings. Minimum shock factor for lifting lugs shall be minimum 2.0. The position of lifting lugs and reference dimension shall be shown on GA and/or outline drawings. NDT shall be conducted for lifting lugs. When any spreader bars are required for lifting and laydown, the bidder shall provide spreader bar with equipment.
15.	Skid Mount/Transportation: Equipment shall be fabricated as skid mount design as much as practical to minimize erection at the site.
16.	Two pieces of stainless steel earth lugs shall be provided with equipment diagonally. The position of earth lugs shall be shown on each GA and/or outline drawing.
17.	Provide double nuts for anchor bolts
18.	Bidder shall provide allowable vibration level on foundation in foundation drawings and/or general arrangement drawings.
19.	If the driver/driven equipment train is in the resonance condition or any vibration problems occur, the bidder shall solve the problems in a timely manner.
20.	Bidder shall provide the mating flanges with the necessary gaskets. Gasket Material shall be of EPDM/Neoprene Rubber or any other material suited for slurry application.
21.	All the surfaces of the carbon steel should be rust prevented before shipment for the period of at least 12 months for storage and construction.
22.	Bidder to provide capacity of crane or hoist required for material handling and the details of heaviest component to be handled.
23.	The list of all Bought out items with makes and country of origin to be mentioned along with offer to be submitted.
24.	Quality Plan to be submitted along with the offer.
25.	Minor Chipping i.e. up to 50 mm thk, micro leveling and providing shim plates for erection of equipment / item at site shall be in the scope of bidder.
26.	All the fasteners which are in contact with slurry should be of High chrome/ Duplex material only .All other fasteners should be minimum of SS316.
8.0	PACKING AND FORWARDING
1.	Proper packing to be ensured. Indigenous Supply: Pump & sub system assembly shall be wrapped in polythene bags & packed in a strong rigid wooden crate. Rain water should not enter into the pump internals during storage in the outer yard of power plant. Imported Supply: All imported supply should be packed as per Sea worthy packing specification no. PE-TS-888-100-A001 (Annexure-H) .Liberal packing materials and struts shall be provided to arrest rolling and to protect from transit damages.
2.	Equipment and process materials shall be packed and semi-knocked down, to the extent possible, to facilitate handling and storage and to protect bearings and other machine surfaces from oxidation. Each container, box, crate or bundle shall be reinforced with steel strapping in such a manner that breaking of one strap will not cause complete failure of packaging. The packing shall be of best standard to



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	withstand rough handling and to provide suitable protection from tropical weather while in transit and while awaiting erection at the site.
3.	Equipment and materials in wooden cases or crates shall be properly cushioned to withstand the abuse of handling, transportation and storage. Packing shall include preservatives suitable to tropical conditions. All machine surfaces and bearings shall be coated with oxidation preventive compounds. All parts subject to damage when in contact with water shall be coated with suitable grease and wrapped in heavy asphalt or tar impregnated paper.
4.	Crates and packing material used for shipping will become the property of owner (CUSTOMER).
5.	Packaging or shipping units shall be designed within the limitations of the unloading facilities of the receiving ports and the ship will be used. It shall be the bidder's responsibility to investigate these limitations and to provide suitable packaging and shipping to permit transportation to site.
6.	Packing (tare) shall be part of the equipment cost and shall not be subject to return. The packing should ensure integrity and cohesiveness of each delivery batch of equipment during transportation. In case of equipment assemblies and unit's delivery in the packing of glass, plastics or paper the specification of packing with the material and weight characteristics are to be indicated.
7.	Each package should have the following inscriptions and signs stenciled with an indelible ink legibly and clearly: a. Destination b. Package Number c. Gross and Net Weight d. Dimensions e. Lifting places f. Handling marks and the following delivery marking
8.	Each package or shipping units shall be clearly marked or stenciled on at least two sides with project details as per enquiry. In addition, each package or shipping unit shall have the symbol painted in red on at least two sides of the package, covering one fourth of the area of the side.
9.	Each part of the equipment which is to be shipped as a separate piece or smaller parts packed within the same case shall be legibly marked to show the unit of which it is part, and match marked to show its relative position in the unit, to facilitate assembly in the field. Unit marks and match marks shall be made with steel stamps and with paint.
10.	Each case shall contain a packing list showing the detailed contents of the package. When any technical documents are supplied together with the shipment of materials no single package shall contain more than one set of such documents. Shipping papers shall clearly indicate in which packages the technical documents are contained.
11.	The case number shall be written in the form of a fraction, the numerator of which is the serial number of the case and the denominator the total number of case in which a complete unit of equipment is packed.
12.	Wherever necessary besides usual inscriptions the cases shall bear special indication such as "Top", "Do not turn over", "Care", "Keep Dry" etc. as well as indication of the center of gravity (with red vertical lines) and places for attaching slings (with chain marks)
13.	Marking for Safe handling: To ensure safe handling, packing case shall be marked to show the



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	following: a. Upright position b. Sling position and center of Gravity position c. Storage category d. Fragile components (to be marked properly with a clear warning for safe handling)
14.	Each crate or package is to contain a packing list in a waterproof envelope. All items are to be clearly marked for easy identification against the packing List. All cases, packages etc. are to be clearly marked on the outside to indicate the total weight where the weight is bearing and the correct position of the slings are to bear an identification mark relating them to the appropriate shipping documents. All stencil marks on the outside of cases are either to be made in waterproof material or protected by shellac or varnish to prevent obliteration in transit.
15.	The packing slip shall contain the following information: - Customer name, Name of the equipment, Purchase Order number with Date, Address of the delivery site, Name and Address of the Sender, Serial Number of pump & accessories, BHEL item Code, Gross Weight and Net weight of Supplied items.
16.	Prior to transport from manufacturer's work to destination, components of the unit shall be completely cleaned to remove any foreign particles. Flange faces and other machined surfaces shall be protected by an easily removable rust preventive coating followed by suitable wrapping.
17.	All necessary painting, corrosion protection & preservation measures shall be taken as specified in painting schedule. Supplier shall consider the coastal environment zone which is defined as "very severe" during final finishing/shipping.
18.	Successful bidder shall furnish the detail packing /shipment box details with information like packing box size, type of packing, weight of each consignment, sequence no. of dispatch, no. of consignment for each deliverable item against each billing break up units/ billable blocks. Without these details the BBU shall not be approved during detail engineering. Also, complete billing break-up with above mentioned details shall be submitted within 10days of LOI.
19.	All items/equipment shall be dispatched in properly packed condition (i.e. no item shall be dispatched in loose condition such that it becomes difficult to store/identify its location at site at a later stage).
20.	Cases which cannot be marked as above shall have metal tags with the necessary markings on them. The metal tags shall be securely attached to the packages with strong steel binding wire. Each piece, Skid, Case or package shipped separately shall be labelled or tagged properly. Note: Vendor to Provide photos of Packing boxes along with Packing box dimensions before dispatch.
9.0	SUPERVISION OF ERECTION, TESTING AND COMMISSIONING
1.	The erection of Slurry Pumps will be done by owner as per Erection Manual and check List. However, the bidder shall make visits for the supervision of erection, pre-commissioning & post- commissioning check-up, start-up, testing and trial runs of all the items covered under the scope of supply.
2.	Total number of visits shall be 6 and number of days per visit shall be 5 working days. Total number of working days= 6 x 5 = 30 days. Travel duration shall be additional.
3.	TA/DA, boarding and lodging shall be borne by the bidder and shall be inclusive in supply portion.
4.	Per day Charges for supervision shall be quoted by the bidder.



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5.	Price comparison for evaluating the lowest bid will be considered all main supply, supervision of E&C charges and mandatory spares price all together.
10.0	EXCLUSIONS
	The following work associated with the slurry pump will be by BHEL: a. Civil foundations b. Walkways, platforms and ladders c. Element handling hoists
11.0	INSPECTION AND TESTING
A)	Minimum Testing requirements to be considered are as below: The typical quality plan is enclosed with this specification(ANNEXURE-G).
1.	Bidder shall submit the quality plan during the Post ordering stage subject to BHEL / end customer approval.
2.	For surfaces with rubber lining, degree of cleaning shall be visually checked before the application of the coating. There must be no area with oxidation, dirt or partially or generalized corrosion defects.
3.	Test certificates shall be issued for each lot of raw material used in the coating, corresponding to specific weight and traction resistance.
4.	For surfaces with rubber lining, adherence test shall be conducted on production samples. Adherence test shall be conducted on the actual surface through hammering. In order to verify the absence of air packets (or) surface without adherence.
5.	For surfaces with rubber lining, Coating thickness shall be checked at 100%. A High voltage porosity test will be conducted on 100 % of the coated surface.
B)	General Inspection requirements to be considered are as below:
1.	Bidder shall furnish written copies of shop production, fabrication and quality test procedures and drawings to be used for review by BHEL / CUSTOMER prior to manufacture. Inspection of above mentioned tests by BHEL/ CUSTOMER representative at bidder's works is envisaged.
2.	The Bidder shall furnish performance test procedure along with standard. The test procedure will be reviewed and approved by the BHEL/CUSTOMER.
3.	Slurry Pumps will be inspected at the Bidder's works before dispatch or where the test facilities are available.
4.	The Bidder shall conduct performance test for the remaining pumps and submit the reports.
5.	A dynamic balancing certificates stating that the rotating assembly has been balanced dynamically shall be sent to CUSTOMER/ BHEL within one (1) week of the successful completion of balancing.
6.	Acceptance tolerance of actual versus guaranteed performance for capacity, head, efficiency and power absorbed shall be as per applicable standard.
7.	Vibration levels shall be measured during shop running/performance tests.



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8.	Contract shaft seals shall be used during shop tests, unless the seal design is unsuitable for the shop-test condition.
9.	Slurry pumps shall not be released for shipment, until shop tests data and performance tests curves have been approved by Owner.
10.	Bidder should furnish performance guarantee as per applicable standard guarantee for the design, manufacture, material and safe operation of the equipments.
11.	BHEL shall witness the test at Bidder's works and a notice of minimum three (3) weeks shall be given for attending the inspection.
12.	Bidder to arrange all calibrated gauges, Instruments during inspection.
13.	Mechanical running and the performance test shall be carried out at factory. Bidder to arrange Motor of same / higher rating for the shop test and inspection.
14.	The performance test may be carried out using water at shop and shall be converted to the design condition.
12.0	PAINTING – As per enclosed document Annexure-E
13.0	SPARES,TOOLS & TACKLES
13.1	START UP & COMMISSIONING SPARES
	Start-up & Commissioning Spares shall be part of the main supply of the Slurry pumps. Start-up & commissioning spares are those spares which may be required during the start- up and commissioning of the equipment/system. All spares required for successful operation till commissioning of pump shall come under this category. Bidder shall provide an adequate stock of such start up and commissioning spares to be brought by him to the site for the equipment erection and commissioning. The spares must be available at site before the equipments are energized.
13.2	MANDATORY SPARES
	The mandatory spares list is provided in the enclosed Annexure-D. The Mandatory spares price will be considered for bid evaluation. Mandatory spare parts items shall be handed over separately and shall not be mixed with the supply of the main equipment parts. Spares shall be sent in pre-decided lots in containers/secure boxes. All boxes/containers are to be distinctly marked in red color with boldly written “S” mark on each face of the containers. Spares shall not be dispatched before dispatch of corresponding main equipment’s. Each item shall be labelled in English and be packed against damage and sealed to prevent deterioration from corrosion. All spares supplied under this contract shall be strictly inter-changeable with the parts for which they are intended for replacements. All the Initial spares shall be manufactures along with the main equipment components as a continuous operation as per same specification and quality plan.
13.3	SPECIAL TOOLS & TACKLES:
	Any special tools & tackles required for the entire equipment to disassemble, assemble or maintain the units, they shall be included in the quotation and furnished as part of the initial supply of the machine. List of special tools & tackles shall be decided by bidder as per his proven practice. When special tools are provided, they shall be packaged in separate, boxes with lugs and marked as “Special Tools for (tag / item number).” Each tool shall be stamped or tagged to indicate its intended usage. Levers and eye bolts for the removal of parts to be serviced shall be submitted with special tools.
14.0	PERFORMANCE GUARANTEE



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	All performance tests for Slurry pumps shall be carried out in accordance with any latest international codes/standards. 1) Bidder shall furnish Performance guarantee for the design, manufacture, material, safe and trouble-free operation of the Slurry pump and its accessories 2) Bidder shall guarantee and demonstrate the rated capacity of the pump at the rated head. 3) Noise level ≤ 85 dB (A) at 1m horizontal distance from equipment/enclosures and 1.5m above operating floor is to be guaranteed. 4) Vibration levels measured on the non-rotating parts shall not exceed the zone limit "B" as defined in ISO 10816 at steady conditions and shall not exceed the zone limit "C" as defined in ISO 10816 at transient conditions. 5) Acceptance tests to be carried out as per the procedure defined by the bidder which shall be submitted for BHEL/ CUSTOMER approval. 6) In the event that the performance test is unsuccessful, bidder shall take necessary remedial action at his cost and the performance test shall be repeated.
15.0	BID EVALUATION CRITERIA FOR POWER CONSUMPTION:
1.	POWER GUARANTEE Bidder to specify the guaranteed power consumption at motor input terminal per Pump operating at the duty point in the offer.
2.	BID EVALUATION CRITERIA FOR POWER CONSUMPTION: Refer Annexure C
16.0	LIQUIDATED DAMAGES FOR POWER CONSUMPTION
	Refer Annexure C
17.0	WARRANTY
1.	The warranty period shall begin on the date of taking over by CUSTOMER or date of issuance of the provisional acceptance certificate for the unit (whichever occurs first) and shall end after twenty-four (24) months. Provided that the successful bidder shall extend the provisions of this warranty to cover all repaired and replacement parts furnished under the warranty obligations hereunder, subject to the warranty period for the same being for a period of 24 months from the date on which replacement or renewal work is completed.
2.	In case of failure of the equipment to meet the guarantee, CUSTOMER/BHEL reserves the right to reject the equipment. However, CUSTOMER/BHEL reserves the right to use the equipment until new equipment supplied by bidder meets the guaranteed requirement.
18.0	FIRST FILL OF CONSUMABLES:
1.	Bidder's scope shall also include supply and filling of all chemicals, reagents, resins, lubricants, grease, filters and consumable items for operation up to commissioning including top up requirements. All lubricants proposed for the plant operation shall be suitable for all operating and environmental conditions that will be met on site consistent with good maintenance procedures as instructed in the maintenance manuals.



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2.	Detailed specifications for the lubricating oil, grease, gases, servo fluids, control fluids, chemicals including items qualities and quantities required per month of the plant operation for the CUSTOMER/BHEL's approval herein shall be furnished within 2 months of placement of Order. On completion of erection complete list of bearings/equipment giving their location and identification marks shall be furnished to BHEL along with lubrication requirements. All types of chemicals, consumables, lubricants and grease shall be readily obtainable locally and the number of different types shall be kept to a minimum. For each type and grade of lubricant recommended, bidder shall list at least three equivalent lubricants manufactured by alternative companies.
19.0	TRAINING
	Successful bidder shall provide comprehensive training for CUSTOMER/BHEL Engineering, O&M, Erection & Commissioning staffs at site covering all aspects of the Slurry pumps - Operation & Maintenance, Troubleshooting etc. (for minimum 2 days).
20.0	CONFLICT
	Bidder's equipment shall be designed for and shall meet the service, performance and minimum level of quality requirements specified. Bidder shall be solely responsible for advising CUSTOMER in writing of any conflicts between the specifications and Bidder's design, including performance and levels of quality. Bidder agrees that its obligations, liabilities and warranties shall not be diminished or extinguished due to its meeting the requirements of the Specification.
21.0	DOCUMENTATION
A	DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER
	The Bidder shall submit all documents, drawings, diagrams and all such information, which are necessary to fully understand the offer for techno – commercial evaluation. The documents mentioned as to be submitted along with the offer are required for proper evaluation purpose and vendors are requested to comply with above in all respect.
B	DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT
	The Successful bidder shall submit all documents, mentioned as to be submitted after award of contract, for review, approval. Drawings that are reviewed by the CUSTOMER/ BHEL will be returned to bidder with a transmittal letter with any comments and / or questions marked on the drawings or noted in the letter. All comments and questions must be resolved before a resubmission of drawings / documents. If the design has not developed enough to resolve some of the comments or questions, bidder shall place a "hold" on those items or areas of design. CUSTOMER/ BHEL reserves the right to return drawings unprocessed to bidder if there exists any evidence that bidder has not acknowledged all comments and questions. All necessary GA drawings, sections, sub-assembly drawings, specifications of main and sub components and necessary set of operation & maintenance manual as asked by CUSTOMER must be furnished by bidder in soft and hard copy forms. For all documents softcopy format shall be searchable pdf, however in addition all drawings, diagrams like P&IDS shall be supplied in ACAD or other editable format and all lists in Excel format. Further break up of technical documents will be discussed during finalization of the purchase contract. Unless agreed otherwise, ten (10) hard copies and five (05) sets of electronic copies of all documents are



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	to be submitted in the English language. Electronic Copies shall be submitted in primary original data format (e.g. DOC, XLS, DWG) as well as in a printable non-proprietary document format (e.g. PDF). Especially P&IDs shall be submitted as DWG files and PDF files. Bidder to ensure submission of hard copies as per CUSTOMER requirement for all engineering drg/doc and for all subsequent revisions along with a soft copy through email to concerned project team. However all the engineering related information shall be furnished in soft form to BHEL.

I. DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER:

Sl. No.	Description	Require For Part	Purpose
1.	Annexure to qualification requirements : Attachment -3K	I	Qualification Requirement (QR)
2.	Reference plant details of similar or higher capacity Slurry Pumps supplied (ANNEXURE-I)	I	QR
3.	Seal & Sign of bidder on all pages of specification	I	Technical Evaluation of Bid(TEB)
4.	Deviation List (if any)	I	TEB
5.	Slurry Pump & Motor Sizing Calculation	I	TEB
6.	GA drawing all offered pumps with foundation details	I	TEB
7.	Filled Data Sheets of Slurry Pumps & All accessories	I	TEB
8.	Performance curves i. Flow v/s Head ii. Flow v/s NPSH iii. Flow v/s Efficiency iv. Flow v/s Power Consumption v. Torque v/s Speed curve for motor selection	I	TEB
9.	Required Electric power & other Utility List	I	TEB
10.	Make of all bought out items & sub vendor list	I	TEB
11.	Quality Plan	I	TEB
12.	List of Start-up & Commissioning Spares	I	TEB
13.	List of Special Tools	I	TEB
14.	Delivery Schedule	I	TEB
15.	Catalogue	I	TEB

II. DOCUMENTS TO BE SUBMITTED AFTER CONTRACT:

Sl. No.	Description	Handing over of Documents after Contract (in weeks)	Purpose
1.	Utility Consumption & Lubricating Oil List	2	Customer Approval
2.	Foundation Drawing, Anchor Bolts, static & dynamic details	2	Customer Approval



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Sl. No.	Description	Handing over of Documents after Contract (in weeks)	Purpose
3.	GA drawing including cross sectional view of Slurry Pumps & Accessories with bill of material (in PDF & AutoCAD format)	2	Customer Approval
4.	GA drawings for Pumps in series arrangement with interconnecting piping & expansion joints drawings	2	Customer Approval
5.	P&ID drawing of Slurry Pumps & Lube Oil System in PDF & AUTOCAD format	3	Customer Approval
6.	GA drawings of mechanical seal and coupling for offered slurry pumps	3	Customer Approval
7.	Filled Data Sheets of Slurry Pumps & All accessories	3	Customer Approval
8.	Quality Plan with Inspection & Performance Test Procedure at site	3	Customer Approval
9.	Pump & Motor Sizing Calculation	4	Customer Approval
10.	Performance curves i. Flow v/s Total Pressure ii. Flow v/s Efficiency iii. Flow v/s Power consumption iv. Torque v/s Speed curve for motor selection	4	Customer Approval
11.	Motor Rating in KW	4	Customer Approval
12.	Sub vendors List	4	Customer Approval
13.	Manufacturing Schedule	4	Customer Approval
14.	Approximate weight of each skid	5	To arrange lifting
15.	List of Special Tools	8	E&C
16.	List of Start-up & Commissioning Spares	9	E&C
17.	Required Electric power	10	E&C
18.	Pre- Commissioning Check List	10	E&C
19.	Installation & assembly procedure	10	E&C
20.	Erection & Commissioning Schedule	10	E&C
21.	Recommended Repair Procedure	10	E&C
22.	Operation and Maintenance Manual (10 hardcopies and 5 electronic copies in English)	10	E&C
23.	Electrical Load List with Single Line Diagram	10	BHEL Review
24.	Control Logic of Slurry Pumps	10	BHEL Review
25.	Catalogue	10	BHEL Review
26.	Proforma Packing List	12	Dispatch

22.0 LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED:

The following type test reports shall be submitted for each type and rating of LT motor of above 50 KW only

1. Measurement of resistance of windings of stator and wound rotor.



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2. No load test at rated voltage to determine input current power and speed
3. Open circuit voltage ratio of wound rotor motors (in case of Slip ring motors)
4. Full load test to determine efficiency power factor and slip.
5. Temperature rise test.
6. Momentary excess torque test.
7. High voltage test.
8. Test for vibration severity of motor.
9. Test for noise levels of motor:
 - Noise level for all the motors shall be limited to 85dB (A) except for BFP motor for which the maximum limit shall be 90 dB(A). Vibration shall be limited within the limits prescribed in IS/IEC 60034-14. Motors shall withstand vibrations produced by driven equipment. Motor bearing housings shall have flat surfaces, in both X and Y directions, suitable for mounting 80mmX80mm vibration pads (If applicable), if not Bidder to ensure & Vibration shall be within the limit prescribed in IS/IEC 60034-14 & HIS Standard. If Vibration limits exceeds Bidder to provide required support to rectify the issue with no cost implication to BHEL.
10. Test for degree of protection
11. Over speed test.
12. Type test reports for motors located in fuel oil area having flame proof enclosures as per IS 2148 / IEC 60079-1
 - All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.
 - The type test reports once approved for any projects shall be treated as reference. For subsequent projects of CUSTOMER, an endorsement sheet will be furnished by the manufacturer confirming similarity and “No design Change”. Minor changes if any shall be highlighted on the endorsement sheet.



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ANNEXURE I : REFERENCE LIST FOR SLURRY PUMPS

Sl. No.	Project Name , Customer & Plant capacity	Coal fired Yes/No	Wet Limestone Based FGD Yes/No	Type of Slurry Pump	Model	Capacity	Head in meter of slurry column	Speed	Year of Commissioning	Qty
						m ³ /hr.	meter	rpm		



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ANNEXURE II : LIST OF DEVIATIONS/EXCEPTIONS TO THE ENQUIRY DOCUMENT

Enquiry No : _____; Project : _____

SI No	Clause No	Page No	Description of Deviation



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ANNEXURE-III: SCHEDULE OF GUARANTEES

SL NO	DESCRIPTION	Limestone slurry feed pump	Gypsum bleed pump	Primary hydro cyclone feed tank pump	Filtrate water tank pump	Secondary hydro cyclone feed tank pump	Waste water tank pump	Auxiliary absorbent tank pump	Emergency transfer pump	Absorber area drain sump pump	Gypsum area drain sump pump	Limestone area drain sump pump
1	Rated Capacity of the Pump. (m ³ /hr)											
2	Total Head at design capacity. (m)											
3	Guaranteed power consumption at Motor input Terminal at rated Head & capacity. (kw)											



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4	Noise level at a distance of 1.0 meter from the equipment at site and 1.5m above operating floor. dB(A)											
5	Maximum vibration (peak to peak amplitude at site). (Microns)											
6	Equipment Availability. (%)											
7	Pump Efficiency (%)											
8	Life of the Pump wear parts including Casing liners bearing etc. (Hours)											

Note : Bidder to provide the details for the applicable pumps.

Signature of the Bidder.....

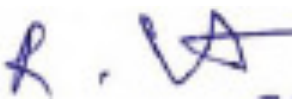
Name.....

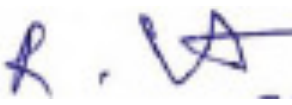
Details of BOI's/ Sub Systems with respect to Main Items

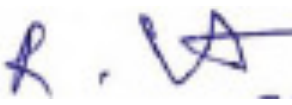
Sl No.	Item/ Sub system Name	Quantity	Supplier Name	Place of Manufacturing
OEM (ORIGINAL EQUIPMENT MANUFACTURER) SEAL AND SIGN.				

 Ranipet		MANUFACTURER'S NAME AND ADDRESS Customer Approved Source		MANUFACTURING QUALITY PLAN										
				ITEM: SLURRY PUMP					PROJECT: AS PER PO					
				SYSTEM: FGD APPLICATION					BHEL WO : AS PER INTERNAL W/O					
				QP NO.		FGS:SLP:723, REV:00		DATE: 08.01.2021		MAIN CONTRACTOR		M/S BHEL, RANIPET		
						PAGE NO:		Page 1 of 5						
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N				D*	M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10.			11.

1.0 RAW MATERIALS														
1.1	Volute Casing, Casing Cover	Chemical & Mechanical Properties	Major	Chemical & Mechanical Properties, Hardness check	1 Sample / Heat	NTPC Approved GA Drawing / Data Sheet/ Specification		MTC	√	P	V	V		
1.2	Impeller, Wear Plate.	Chemical & Mechanical Properties	Major	Chemical & Mechanical Properties, Hardness check	1 Sample / Heat	Drawing & Specification		MTC	√	P	V	V		
1.3	Volute Casing	Surface Defects	Major	DPT on machined surface	100%	ISO4987	ISO 4987, Level 2	DPT Report	√	P	V	V		
1.4	Cover Plate & Frame Plate	Soundness	Major	RT *	20 %	ASME Sec V, ASTM - E446 Level - 5		Test Report	√	P	V	V	*For Gypsum Bleed Pumps	
1.5	Shaft	Chemical Composition	Major	Chemical composition	1 Sample /Heat	Drawing/Specification		Test Report	√	P	V	V		
		Mechanical Properties		Mechanical Tests, Heat treatment if applicable		Drawing/Specification		Test Report	√	P	V	V	HT Chart Review.	

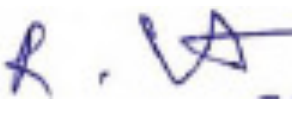
Manufacturer Sign & Seal	Legend: * Record, identified with "tick" (√) under column 'D' shall be submitted to customer as a QA documentation package. M: Manufacturer / Sub supplier, C: Main Contractor/BHEL/BHEL AIA. N: NTPC P: Perform: witness, V: review of records, MA: Major and MI: Minor, DPT: Dye Penetrant Test, UT: Ultrasonic Testing TC: Test Certificate, IR: inspection report, MTC: Material Test Certificate. COC: Certificate of conformance.	 Rakesh Kr Madhu (Dy Mgr / QA)	 K Renjith (Mgr / QA)	 R Arunachalam (DGM/QA)
		Prepared by	Reviewed by	Approved by

 Ranipet		MANUFACTURER'S NAME AND ADDRESS Customer Approved Source		MANUFACTURING QUALITY PLAN											
				ITEM: SLURRY PUMP						PROJECT: AS PER PO					
				SYSTEM: FGD APPLICATION						BHEL WO : AS PER INTERNAL W/O					
				QP NO.		FGS:SLP:723, REV:00		DATE: 08.01.2021		MAIN CONTRACTOR			M/S BHEL, RANIPET		
								PAGE NO:			Page 2 of 5				
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS	
					M	C/N						M	C		N
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10.			11.	
		Hardness Test		Mechanical Hardness	100%		Drawing/Specification		Test Report	√	P	V	V		
		Internal Soundness		UT	100%		ASTM A 388	ASTM A 788	UT Report	√	P	V	V		
		Surface & Sub Surface Defects		MT-on m/c Surface	100%		ASTM E709	ASTM A 788	MT Report	√	P	V	V		MT-Magnetic Particle Test
1.6	Impeller	Surface & Sub Surface Defects	Major	DPT	Accessible Areas		ISO4987	ISO 4987, Level 2	DPT Report	√	P	V	V		
2.0 IN PROCESS INSPECTION															
2.1	Impeller/Volute Casing/ Wear Plate / Casing Cover/ Shaft After Machining	Surface Condition/ Defects/ Measurement	Major	Visual and Measurement	100%		Drawing		IR (Protocol)		P	-	-		
2.2	Couplings	Verification of TC	Major	Review of TC	100%		Technical Specification / Drawing		COC/TC	√	P	V	-		
2.3	Rotating Parts	Balancing	Major	Static & Dynamic Balancing	100%		ISO 1940	ISO 1940, grade 2.5 or lower	Balancing Report	√	P	V	V		
2.4	Volute Casing	Soundness	Major	Static	100	20%	See	No Leakage	Test	√	P	W		Test	
Manufacturer Sign & Seal		Legend: * Record, identified with "tick" (√) under column 'D' shall be submitted to customer as a QA documentation package. M: Manufacturer / Sub supplier, C: Main Contractor/BHEL/BHEL AIA. N: NTPC P: Perform: witness, V: review of records, MA: Major and MI: Minor, DPT: Dye Penetrant Test, UT: Ultrasonic Testing TC: Test Certificate, IR: inspection report, MTC: Material Test Certificate. COC: Certificate of conformance.													
								Rakesh Kr Madhu (Dy Mgr / QA)		K Renjith (Mgr / QA)		R Arunachalam (DGM/QA)			
								Prepared by		Reviewed by		Approved by			

 Ranipet		MANUFACTURER'S NAME AND ADDRESS Customer Approved Source		MANUFACTURING QUALITY PLAN									
				ITEM: SLURRY PUMP					PROJECT: AS PER PO				
				SYSTEM: FGD APPLICATION					BHEL WO : AS PER INTERNAL W/O				
				QP NO.		FGS:SLP:723, REV:00		DATE: 08.01.2021		MAIN CONTRACTOR		M/S BHEL, RANIPET	
						PAGE NO:		Page 3 of 5					
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK M C/N		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY M C N		REMARKS
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10.		11.
				Pressure Testing of Casing	%	/10 % of each type	Remarks Column		Report			W	Pressure at 2x rated head or 1.5x shut of head whichever is higher for 30min.
3.0 FINAL INSPECTION													
3.1	Complete Pump Assembly	Completeness	Major	Visual & Dimensional	100 %	*	Approved GA Drawing	IR	√	P	W	W	
		Measurement-Flow vs Head(Complete operating range), Power, Efficiency	Major	Performance testing of pump	100 %	*	Approved Drawing /Data Sheet	Performance Test Report	√	P	W	W	*BHEL to witness 20% of each type of Pump and NTPC-one Pump per type.
		Vibration Velocity RMS [MM/S] Bearing Temperature Noise Level RMS[MM/S]		Measurement	100 %	*	Approved Drawing. Approved Data Sheet	Performance Test Report	√	P	W	W	
		NPSH Test	Major	Measurement	1 Pump / each type		Design Standard of Pump	NPSH Test	√	P	W	W	
Manufacturer Sign & Seal		Legend: * Record, identified with "tick" (√) under column 'D' shall be submitted to customer as a QA documentation package. M: Manufacturer / Sub supplier, C: Main Contractor/BHEL/BHEL AIA. N: NTPC P: Perform: witness, V: review of records, MA: Major and MI: Minor, DPT: Dye Penetrant Test, UT: Ultrasonic Testing TC: Test Certificate, IR: inspection report, MTC: Material Test Certificate. COC: Certificate of conformance.					 Rakesh Kr Madhu (Dy Mgr / QA)		 K Renjith (Mgr / QA)		 R Arunachalam (DGM/QA)		
													Prepared by

 Ranipet		MANUFACTURER'S NAME AND ADDRESS Customer Approved Source		MANUFACTURING QUALITY PLAN										
				ITEM: SLURRY PUMP					PROJECT: AS PER PO					
				SYSTEM: FGD APPLICATION					BHEL WO : AS PER INTERNAL W/O					
				QP NO.		FGS:SLP:723, REV:00		DATE: 08.01.2021		MAIN CONTRACTOR		M/S BHEL, RANIPET		
						PAGE NO:		Page 4 of 5						
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N				D*	M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10.			11.
					/ design				Report					
3.2	Complete Pump Assembly	Leak test	Major	Leakage testing	100%		Mfg. Drawing, Approved Data Sheet	No Leakage	Report	√	P	W	W	
3.3		Strip Down Test (Not Required If Performance Test is Fine.)	Major	Visual	100%		Mfg. Drawing, Approved Data Sheet		Report	√	P	W	W	Only Required in case of Abnormal Sound
3.4	Painting	Dry Film Thickness/Paint shade	Major	Visual & Measurement	100%		NTPC Approved Painting Schedule		IR(Protocol)	√	P	V	V	
3.5	Packing	Preservation	Major	Visual & Measurement	100%		Technical Spec/ BHEL approved Packing Procedure/Drawing		COC	√	P	V	-	
4.0	DOCUMENTATION													
4.1	Check of Quality Assurance Documentation	Compliance to MQP	Major	Check of Complement s	100%		Manufacturing Quality Plan		Protocol	√	V	V	V	

NOTE: 1. (\$) – 10 % of each type for NTPC (Customer).

Manufacturer Sign & Seal	Legend: * Record, identified with "tick" (√) under column 'D' shall be submitted to customer as a QA documentation package. M: Manufacturer / Sub supplier, C: Main Contractor/BHEL/BHEL AIA. N: NTPC P: Perform: witness, V: review of records, MA: Major and MI: Minor, DPT: Dye Penetrant Test, UT: Ultrasonic Testing TC: Test Certificate, IR: inspection report, MTC: Material Test Certificate. COC: Certificate of conformance.			
		Rakesh Kr Madhu (Dy Mgr / QA)	K Renjith (Mgr / QA)	R Arunachalam (DGM/QA)
		Prepared by	Reviewed by	Approved by

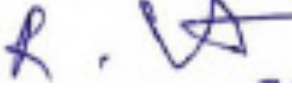
 Ranipet		MANUFACTURER'S NAME AND ADDRESS Customer Approved Source		MANUFACTURING QUALITY PLAN								
				ITEM: SLURRY PUMP				PROJECT: AS PER PO				
				SYSTEM: FGD APPLICATION				BHEL WO : AS PER INTERNAL W/O				
				QP NO.		FGS:SLP:723, REV:00		DATE: 08.01.2021		MAIN CONTRACTOR		M/S BHEL, RANIPET
						PAGE NO:		Page 5 of 5				
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY	REMARKS
					M	C/N					M C N	
1.	2.	3.	4.	5.	6.	7.	8.	9.	D*	** 10.	11.	

- All other items, which are not cover under this QP, shall be manufactured inspected as per OEM (Original equipment Manufacturer)/BHEL standard practice and relevant standard. Relevant TC/COC will be submitted for the same.
- This QP is applicable for Mandatory Spare supply also.
- Separate MQP to be submitted for Electric Motor.

SI No	Types of Pumps	Quantity	No of Pumps as Per Approved Datasheet / GA Drawing
01.	Limestone slurry feed Pump	06	
02.	Gypsum bleed Pump	06	
03.	Primary hydro cyclone feed tank Pump	02	
04.	Filtrate water tank Pump	02	
05.	Secondary hydrocyclone feed tank	02	
06.	Waste water tank Pump	04	
07.	Auxiliary absorbent tank Pump	02	
08.	Emergency transfer Pump	03	
09.	Absorber area drain sump Pump	06	
10.	Gypsum area drain sump Pump	02	
11.	Limestone area drain sump Pump	02	

Record of revision

Rev no	Date	Description
00	08.01.2021	Original Issue – First submission.

Manufacturer Sign & Seal	Legend: * Record, identified with "tick" (√) under column 'D' shall be submitted to customer as a QA documentation package. M : Manufacturer / Sub supplier, C : Main Contractor/BHEL/BHEL AIA. N : NTPC P : Perform: witness, V : review of records, MA : Major and MI : Minor, DPT : Dye Penetrant Test, UT : Ultrasonic Testing TC : Test Certificate, IR : inspection report, MTC : Material Test Certificate. COC : Certificate of conformance.			
		Rakesh Kr Madhu (Dy Mgr / QA)	K Renjith (Mgr / QA)	R Arunachalam (DGM/QA)
		Prepared by	Reviewed by	Approved by

BHEL BAP/ RANIPET / TAMIL NADU INDIA		OEM SUPPLIER To be filled by OEM Supplier		MANUFACTURING QUALITY PLAN FOR LT MOTOR (Up to TO 200KW) - FGD Application					MQP:E:LTM:BONGAIGAON :FGD:SLURRY PUMP:001			
		LT MOTOR Manufacture To be filled by OEM Supplier							REV:NO:00			
		DATE: 13.02.2021										
		Page :										
S1.No.	COMPONENT/ASSEMBLY/OPERATION/TESTS	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTITY OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE STANDARD	FORMAT OF REC	D	AGENCY		REMARKS
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	
INCOMING INSPECTIONS:												
1.1	Enamelled round copper conductor(Dual coated)MM	1.Overall diameter	Major	Mechanical	1 sample/lot	IS 13730 1993 Part 13 / IEC 60317-0-1-2008 (As applicable)	IEC 60317-0-1 2008	Plant format		P	V	EC gr purity: -99.6%
		2.Bare conductor diameter	Major	Mechanical	1 sample/lot	BHEL / NTPC Spec & Apprd Datasheet	BHEL / NTPC Spec & Apprd Datasheet	Plant format		P	V	
		3.BDV test	Major	Electrical	1 sample/lot	--do--	--do--	Plant format		P	V	
		4.Elongation	Major	Mechanical	1 sample/lot	--do--	--do--	Plant format		P	V	
		5.Continuity (insulation)	Major	Electrical	1 sample/lot	--do--	--do--	Insp report/ Supplier TC		P	V	
		6.Tan Delta (If applicable)	Major	Electrical	1 sample/lot	--do--	--do--	Insp report/ Supplier TC		P	V	
1.2	Aluminum Ingots	1.Chemical composition	Major	Chemical	1 sample/lot	--do--	--do--	Supplier Tc		P	V	
1.3	FAN	1.Diameter (ID&OD)	Major	Mechanical	1 sample/lot	--do--	--do--	Inspection Report		P	V	
1.4	Bearings (SKF OR FAG)	1.Type & Make	Major	Visual	100%	--do--	--do--	Inspection Record		P	V	
		2.Dimensions - ID,OD&width	Major	Mechanical	1 sample/lot	--do--	--do--	Inspection Record		P	V	
1.5	Terminal Block	1.Dimensions	Major	Mechanical	Plant std.	--do--	--do--	Inspection Report		P	V	
		2.Proof voltage test	Major	Electrical	Plant std.	--do--	--do--	Inspection Report		P	V	

BHEL BAP/ RANIPET / TAMIL NADU INDIA		OEM SUPPLIER To be filled by OEM Supplier		MANUFACTURING QUALITY PLAN FOR LT MOTOR (Up to TO 200KW) - FGD Application					MQP:E:LTM:BONGAIGAON :FGD:SLURRY PUMP:001			
		LT MOTOR Manufacture							REV:NO:00			
		To be filled by OEM Supplier							DATE: 13.02.2021			
		Page :										
S1.No.	COMPONENT/ASSEMBLY/OPERATION/TESTS	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE STANDARD	FORMAT OF REC	D	AGENCY		REMARKS
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	
INPROCESS INSPCTIONS:												
2.1	Stator core	1.Core length dia	Major	Mechanical	100%	--do--	--do--	Inspection Record		P	V	
		2.Core locking	Major	Visual	100%	--do--	--do--	Inspection Record		P	V	
		3.Rigidity of core	Major	Mechanical	100%	--do--	--do--	Inspection Record		P	V	
2.2	Die cast rotor	1.Core length	Major	Mechanical	100%	--do--	--do--	Inspection Record		P	V	
		2.Blow holes	Major	Mechanical	100%	--do--	--do--	Inspection Record		P	V	
2.3	Wound stator (if applicable)	1.Resistance	Major	Electrical	100%	--do--	--do--	Inspection Record		P	V	
		2.H.V.Test	Major	Electrical	100%	--do--	--do--	Inspection Record		P	V	
		3.Insulation resistance	Major	Electrical	100%	--do--	--do--	Inspection Record		P	V	
2.4	Final Assembly	1.Completeness	Major	Visual	100%	--do--	--do--	Inspection Record		P	V	
		2.Runout in case of flanged motors	Major	Mechanical	100%	--do--	--do--	Inspection Record		P	V	
		3.Mounting dimensions	Major	Mechanical	100%	--do--	--do--	Inspection Record		P	V	

BHEL BAP/ RANIPET / TAMIL NADU INDIA		OEM SUPPLIER To be filled by OEM Supplier		MANUFACTURING QUALITY PLAN FOR LT MOTOR (Up to TO 200KW) - FGD Application					MQP:E:LTM:BONGAIGAON :FGD:SLURRY PUMP:001			
		LT MOTOR Manufacture							REV:NO:00			
		To be filled by OEM Supplier							DATE: 13.02.2021			
		Page :										
S1.No.	COMPONENT/ASSEMBLY/OPERATION/TESTS	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE STANDARD	FORMAT OF REC	D	M	BHEL/BHEL AIA	REMARKS
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	
FINAL INSPECTION AND TESTING:												
3.1	Routine Test	1.Resistance Measurement on winding & space heater	Major	Electrical	100%	BHEL / NTPC Spec, GA Drawing & Apprd Datasheet and IS/IEC 60034 (As applicable)	BHEL / NTPC Spec, GA Drawing & Apprd Datasheet and IS/IEC 60034 (As applicable)	Inspection Record		P	W	
		2.HV Test	Major	Electrical	100%	--do--	--do--	Inspection Record		P	W	
		3.Phase sequence & direction of rotation	Major	Electrical	100%	--do--	--do--	Inspection Record		P	W	
		4.No load run test	Major	Electrical	100%	--do--	--do--	Inspection Record		P	W	
		5.Vibration test	Major	Mechanical	100%	--do--	--do--	Inspection Record		P	W	
		6.Name plate recheck	Major	Visual	100%	--do--	--do--	Inspection Record		P	W	
		7.Paint shade thickness & adhesion	Major	Visual & Measurement	100%	--do--	--do--	Inspection Record		P	W	
		8.Mountings & Overall dimensions	Major	Mechanical	100%	--do--	-do-	Inspection Record		P	W	

BHEL BAP/ RANIPET / TAMIL NADU INDIA		OEM SUPPLIER To be filled by OEM Supplier		MANUFACTURING QUALITY PLAN FOR LT MOTOR (Up to TO 200KW) - FGD Application					MQP:E:LTM:BONGAIGAON :FGD:SLURRY PUMP:001 REV:NO:00 DATE: 13.02.2021 Page :			
		LT MOTOR Manufacture										
		To be filled by OEM Supplier										
S1.No.	COMPONENT/ASSEMBLY/OPERATION/TESTS	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE STANDARD	FORMAT OF REC	D	AGENCY		REMARKS
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	
3.2 TYPE TESTS ###												
3.3	Preservation and Packing	1.Completeness	Major	Review	100%	--do--	--do--	Inspection Record		P	V	
		2.Motors covered with polythene sheets	Major	Visual	100%	--do--	--do--	Inspection Record		P	V	
		3.Packing	Major	Visual	100%	--do--	--do--	Inspection Record		P	V	
### TYPE TEST REQUIREMENTS FOR LT MOTOR INCLUDING DEGREE OF PROTECTION TEST REPORT (IP 55) BHEL/BHEL AIA (Authorised Inspection Agency) shall review the Identical design type test report during including degree of Protection Test report (IP 55) for acceptance in line with BHEL/Ultimate Customer - NTPC approved Data sheet/Drg/Spec for LT Motor rating up to 50KW and BHEL/Ultimate Customer NTPC approved type test report for LT Motor rating more than 50KW and up to 200KW. If not available for Similar / Identical Design of any of the LT Motor motor, then OEM / LT Motor Manufacture shall conduct all these type tests at Third party lab / Government Approved Lab / Own lab in presence of BHEL/BHEL AIA / without any cost implication to BHEL/Ultimate Customer - NTPC within reasonable time.												
1. Measurement of Resistance of Stator 2. No Load test at Rated Voltage 3,. Pull out test 4.Temperature Rise Test 5.Momentary Exceeds Torque Torque Test 6.High Voltage Test 7.Test for Vibration Severity 8.Test for Noise Level Measurement 9. Over Speed Test 10. Degree of Protection TC (IP 55)												
LEGEND: OEM = Orginal Equipement Supplier M = LT Motor Manufacture - BHEL AIA = BHEL AUTHORISED INSPECTION AGENCY GA Drawing : General Arrangment Drawing NTPC - NATIONAL THERMAL POWER CORPORATION (Ultimate Customer) OEM SUPPLIER : (To be Filled up by OEM Supplier) LT MOTOR Manufacture : (To be Filled up by OEM Supplier)												

Annexure-I

CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTORS(IE3) Up to 200KW

(For INDIGENOUS OEM VENDOR ONLY)

PROJECT: NTPC Bongaigaon 3 x 250MW (BHEL W.O no: G305, G306 and G307) NTPC CONTRACT NO: CS-4610-101-2-FC-COA-5066-AMDT-04 for Bongaigaon FGD 3 x 250 MW PACKAGE: FGD PACKAGE MAIN CONTRACTOR: BHEL - RANIPET SUB CONTRACTOR (OEM) & ADDRESS: (To be filled by OEM VENDOR)		CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTORS(IE3) - Up to 200KW NTPC Bongaigaon 3 x 250MW (BHEL W.O no: G305, G306 and G307)	DOC.NO: BAP/QR/G305, G306 & G307/Bongaigaon/LTM/Slurry Pumps: 001 Rev NO.: 00 PAGE : Page 1 of 6 DATE: 13.02.2021	##Enquiry No: ## OEM Supplier Name & Address: ##Offer reference: ##Date: Contact Official Name: Mobile no: Email id:
Sl. NO.	DESCRIPTION	BHEL and Ultimate Customer - NTPC (National Thermal Power Corporation), India Quality Requirements		##Specific confirmations by the vendor

ITEM: LT Motors(IE3) Up to 200KW

01	Type Test Requirements	A. Vendor shall submit the type test reports of all the type tests as listed in SL NO: 01 (D) below and carried out within 10 years from the date of ultimate customer NTPC COA Amendment 04 dt 11.11.2019. These reports should be for the test conducted on the identical/similar LT Motors to those proposed to be supplied under this enquiry and test (s) either should have been conducted at an independent laboratory (or) should have been witnessed by BHEL AIA (BHEL Appointed Inspection Agency) / BHEL (or) Ultimate client NTPC at respective LT Motor Manufacture of OEM vendor.	
		B. However, if vendor is not able to submit the similar / identical type test report as per above condition (or) in the case of type test reports are not found to be meeting the specification requirement, the vendor shall conduct all the tests at no additional cost to BHEL either at third party lab (or) own lab in the presence of BHEL AIA (BHEL Appointed Inspection Agency) / BHEL /Ultimate client NTPC and submit the reports for review & approval.	
		C. Type Test reports review and approval by BHEL AIA (BHEL Appointed Inspection Agency) / BHEL / Ultimate client NTPC is must in line with NTPC approved data sheet / BOM/GA Drawing etc.	
		D. The following Type test reports to be submitted covering the following for above 50KW LT Motor as per relevant BIS (Bureau of Indian Standard) - BIS 325 / IEC 60034 etc i. Measuring of resistance of winding of stator and wound rotor (if applicable) ii. No load test at rated voltage to determine input current, power and speed. iii. Open circuit voltage ratio of wound rotor motor (in case slip ring motors) iv. Full load test to determine efficiency power factor and slip v. Temperature rise test. vi. Momentary excess load test vii. High voltage test viii. Test for vibration severity of motor ix. Test of noise levels of motor (Noise level for all the motors shall be limited to 85dB(A) except for BFP motor for which the maximum limit shall be 90dB(A).) x. Over speed test xi. Degree of Protection Tests (Minimum Ingress Protection - IP 55). xii. Type test reports for motors located in fuel oil area having flame proof enclosures as per BIS 2148/ IEC 60079-1	

Annexure-I

CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTORS(IE3) Up to 200KW

(For INDIGENOUS OEM VENDOR ONLY)

PROJECT: NTPC Bongaigaon 3 x 250MW (BHEL W.O no: G305, G306 and G307) NTPC CONTRACT NO: CS-4610-101-2-FC-COA-5066-AMDT-04 for Bongaigaon FGD 3 x 250 MW PACKAGE: FGD PACKAGE MAIN CONTRACTOR: BHEL - RANIPET SUB CONTRACTOR (OEM) & ADDRESS: (To be filled by OEM VENDOR)	CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTORS(IE3) - Up to 200KW NTPC Bongaigaon 3 x 250MW (BHEL W.O no: G305, G306 and G307)	DOC.NO: BAP/QR/G305, G306 & G307/Bongaigaon/LTM/Slurry Pumps: 001 Rev NO.: 00 PAGE : Page 2 of 6 DATE: 13.02.2021	##Enquiry No: ## OEM Supplier Name & Address: ##Offer reference: ##Date: Contact Official Name: Mobile no: Email id:	
Sl. NO.	DESCRIPTION	BHEL and Ultimate Customer - NTPC (National Thermal Power Corporation), India Quality Requirements		##Specific confirmations by the vendor
<u>ITEM: LT Motors(IE3) Up to 200KW</u>				
01	Type Test RequirementContd	E. The TCs / Type Test reports shall also be given as PDF file with index sheet & page control through Email & Soft Copy (File size to less than 9MB).		
02	Quality Plan Requirement	1. RQP or MQP is applicable for these LT Motor. 2. RQP/MQP (Manufacturing Quality Plan) is applicable for these LT Motors and accordingly Actual LT Motor Manufacture and OEM shall submit the RQP/MQP in ultimate customer – NTPC format. 3. If any of LT Motor manufacture is having, ultimate customer NTPC approved MQP (Manufacturing Quality Plan) / RQP (Reference Quality Plan) and having validity, the same is applicable for these LT Motor for inspection subject to obtaining ultimate customer NTPC formal approval in the event of an order through endorsement sheet approval route as in sl no: 4 below 4. Accordingly, LT Motor Manufacture & OEM supplier shall submit the filled up Endorsement sheet (copy attached) with ultimate customer approved MQP/RQP with signature & seal in the event of a Purchase Order from BHEL. 5. If LT Motor Manufacture / OEM vendor does not have MQP/RQP, they should submit a fresh MQP to BHEL/NTPC (in NTPC format) for review & approval. (copy attached).		

Annexure-I

CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTORS(IE3) Up to 200KW

(For INDIGENOUS OEM VENDOR ONLY)

PROJECT: NTPC Bongaigaon 3 x 250MW (BHEL W.O no: G305, G306 and G307)		CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTORS(IE3) - Up to 200KW		DOC.NO: BAP/QR/G305, G306 & G307/Bongaigaon/LTM/Slurry Pumps: 001 Rev NO.: 00 PAGE : Page 3 of 6 DATE: 13.02.2021	##Enquiry No: ## OEM Supplier Name & Address: ##Offer reference: ##Date: Contact Official Name: Mobile no: Email id:
NTPC CONTRACT NO: CS-4610-101-2-FC-COA-5066-AMDT-04 for Bongaigaon FGD 3 x 250 MW		NTPC Bongaigaon 3 x 250MW (BHEL W.O no: G305, G306 and G307)			
PACKAGE: FGD PACKAGE MAIN CONTRACTOR: BHEL - RANIPET SUB CONTRACTOR (OEM) & ADDRESS: (To be filled by OEM VENDOR)					
Sl. NO.	DESCRIPTION	BHEL and Ultimate Customer - NTPC (National Thermal Power Corporation),, India Quality Requirements			##Specific confirmations by the vendor
<u>ITEM: LT Motors(IE3) Up to 200KW</u>					
03	BHEL / Ultimate Customer – NTPC approved vendors	LT Motors are to be procured only from following Ultimate Customer - NTPC approved vendors and no deviation on this specific requirement is acceptable. ➤ KEC / Bengaluru (Up to 200KW) & Hubli (Up to 90KW) ➤ CGL/Ahemednagar (Up to 200KW) ➤ SIEMENS/Mumbai (Up to 200KW) ➤ ABB/Faridabad (Up to 55KW) and Bengaluru (Up to 200KW) ➤ BBL/Mumbai (Up to 200KW) ➤ NGEF/ Bengaluru (Up to 15KW) ➤ Marathon / Kolkatta (Up to 200KW) ➤ Jyothi / Vadodara (Up to 200KW) ➤ Laximi Hydraulics Private Limited (LHPL) / Solapur (Up to 200KW)			
04	Inspection Methodology to be adopted at Actual LT Motor Manufacture works by OEM vendor	<u>LT Motors up to 30KW – Inspection Categorization: III</u> All Routine tests on LT Motors are to be ensured by OEM Vendor & same are to be inspected & witnessed by OEM Vendor / BHEL / BHEL AIA (BHEL authorized inspection Agency) at LT Motor manufacture works as per approved MQP & approved data sheet / drg / spec/ as per relevant BIS (Bureau of Indian Standard) - BIS 325 / IEC 60034 etc and all the Routine Test Reports with Inspection report (IR) to be submitted for BHEL/Ultimate Customer – NTPC for review and to obtain inspection and dispatch clearance .			
		<u>LT Motors (30KW to 50KW) – Inspection Categorization: II</u> All Routine Tests on LT Motors are to be ensured by OEM vendor & witnessed by BHEL/BHEL AIA (BHEL authorized inspection Agency) at LT Motor manufacture works including review of Type Test Reports and Degree of Protection Test Reports (IP 55) as per approved MQP & approved data sheet/drg/spec / as per relevant BIS (Bureau of Indian Standard) - BIS 325 / IEC 60034 etc and all the Routine Test Reports with Inspection report (IR) to be submitted for BHEL/Ultimate Customer – NTPC for review and to obtain inspection and dispatch clearance .			

Annexure-I

CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTORS(IE3) Up to 200KW

(For INDIGENOUS OEM VENDOR ONLY)

PROJECT: NTPC Bongaigaon 3 x 250MW (BHEL W.O no: G305, G306 and G307) NTPC CONTRACT NO: CS-4610-101-2-FC-COA-5066-AMDT-04 for Bongaigaon FGD 3 x 250 MW PACKAGE: FGD PACKAGE MAIN CONTRACTOR: BHEL - RANIPET SUB CONTRACTOR (OEM) & ADDRESS: (To be filled by OEM VENDOR)	CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTORS(IE3) - Up to 200KW NTPC Bongaigaon 3 x 250MW (BHEL W.O no: G305, G306 and G307)	DOC.NO: BAP/QR/G305, G306 & G307/Bongaigaon/LTM/ Slurry Pumps: 001 Rev NO.: 00 PAGE : Page 4 of 6 DATE: 13.02.2021	##Enquiry No: ## OEM Supplier Name & Address: ##Offer reference: ##Date: Contact Official Name: Mobile no: Email id:
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Sl. NO.	DESCRIPTION	BHEL and Ultimate Customer - NTPC (National Thermal Power Corporation), India Quality Requirements	##Specific confirmations by the vendor
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ITEM: LT Motors(IE3) Up to 200KW

04	Inspection Methodology to be adopted at Actual LT Motor Manufacture works by OEM vendor..... Contd	<u>Above 50KW and up to 200KW – Inspection Categorization: I</u> All Routine & Type Tests if any on LT Motors are to be ensured by OEM Vendor and same shall be offered to BHEL/ BHEL AIA (BHEL authorized inspection Agency) / Ultimate Customer-NTPC for inspection & witnessing including review of Degree of Protection Test Reports as per approved MQP /RQP with endorsement sheet / approved data sheet / drg / spec / as per relevant BIS (Bureau of Indian Standard) - BIS 325 / IEC 60034 etc and all the Routine Test Reports , Type test Reports including Degree of protection test report with Inspection report (IR) to be submitted for BHEL/Ultimate Customer – NTPC for review and to obtain inspection and dispatch clearance . BHEL/ BHEL AIA (BHEL authorized inspection Agency)) / Ultimate Customer-NTPC to witness / perform inspection at LT Motor Supplier works and submit all the inspection documents and routine & Type test reports including Degree of Protection Test Reports (IP 55) as per approved MQP & approved data sheet / drg / spec / as per relevant BIS (Bureau of Indian Standard) - BIS 325 / IEC 60034 etc. No material shall be dispatched without BHEL / BHEL AIA and Ultimate Customer – NTPC Inspection and dispatch clearance.	
05	Painting Requirements	Painting requirement like paint shade and painting thickness including no of coats if any are to be ensured by the OEM vendor for these LT Motors as per BHEL/ Ultimate Customer -NTPC approved data sheet/drg/spec (As applicable).	
06	Packing	Packing shall be as per Specification / Drg. / Data sheet including sea worthy packing if any to avoid any transit & handling damages .	
07	For Inspection call	Inspection call by OEM Vendor for LT Motor inspection at Actual LT Motor Manufacture works to be raised for BHEL/BHEL AIA inspection / Ultimate Customer – NTPC including for type test witnessing if any to be ensured / addressed to Mr R Kesavan., DGM (QC-Proc)., Mobile no: +91 9443006303., Email id: kesavan@bhel.in and Mr Zeeshan Ali., Sr. Engineer (QC-Proc)., Mobile no: +91 9443149691 ., Email id: zeeshan@bhel.in including for inspection related activities for immediate response / resolution.	
08	Document Package / Dossier	Specific confirmation for Document Package in the event of an order (3 hard copies + soft copies in Pdf file) is to be given containing the following with proper linkages (.)	

Annexure-I

CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTORS(IE3) Up to 200KW

(For INDIGENOUS OEM VENDOR ONLY)

PROJECT: NTPC Bongaigaon 3 x 250MW (BHEL W.O no: G305, G306 and G307) NTPC CONTRACT NO: CS-4610-101-2-FC-COA-5066-AMDT-04 for Bongaigaon FGD 3 x 250 MW PACKAGE: FGD PACKAGE MAIN CONTRACTOR: BHEL - RANIPET SUB CONTRACTOR (OEM) & ADDRESS: (To be filled by OEM VENDOR)	CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTORS(IE3) - Up to 200KW NTPC Bongaigaon 3 x 250MW (BHEL W.O no: G305, G306 and G307)	DOC.NO: BAP/QR/G305, G306 & G307/Bongaigaon/LTM/ Slurry Pumps: 001 Rev NO.: 00 PAGE : Page 5 of 6 DATE: 13.02.2021	##Enquiry No: ## OEM Supplier Name & Address: ##Offer reference: ##Date: Contact Official Name: Mobile no: Email id:	
Sl. NO.	DESCRIPTION	BHEL and Ultimate Customer - NTPC (National Thermal Power Corporation), India Quality Requirements		##Specific confirmations by the vendor
<u>ITEM: LT Motors(IE3) Up to 200KW</u>				
08	Document Package / Dossier...contd	(i) Index Sheet (ii) MQP/RQP/Endorsement sheet (iii) TCs identified by BHEL/NTPC for record for “CHP” (Customer Hold Point) Verification & Witness “W” portion as given in MQP / RQP / MQP (as applicable). (iv) Final Inspection Report + TC (v) BHEL AIA (BHEL Appointed Inspection Agency) / BHEL report + TC (vi) Ultimate customer NTPC (National Thermal Power Corporation) CHP (Customer Hold Point) / MDCC (Material Dispatch Clearance Certificate) (vii) Type test reports conducted/submitted with approval with approved data sheet and BOM with actual make used with Customer approved drgs.		
09	Important notes	<u>Inspection Categorization: I</u> Inspection by BHEL/BHEL AIA and also by Ultimate Customer – NTPC based on MQP/RQP approved and as in sl no:04 <u>Inspection Categorization: II</u> Inspection by Main contractor (BHEL) / BHEL AIA based on Ultimate Customer – NTPC approved MQP/RQP & based on inspection as in sl no:04 <u>Inspection Categorization: III</u> COC by Main contractor (BHEL) to Ultimate Customer – NTPC based on inspection as in sl no:04.		
		Any cost implication for conducting checks / tests including for witnessing of any of the tests at Actual LT Motor Manufacture Works by BHEL / BHEL AIA / Ultimate Customer – NTPC is in the scope of OEM Supplier only and no extra cost if any will be admissible in the event of an order and also during execution of the contract.		

Annexure-I

CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTORS(IE3) Up to 200KW

(For INDIGENOUS OEM VENDOR ONLY)

PROJECT: NTPC Bongaigaon 3 x 250MW (BHEL W.O no: G305, G306 and G307) NTPC CONTRACT NO: CS-4610-101-2-FC-COA-5066-AMDT-04 for Bongaigaon FGD 3 x 250 MW PACKAGE: FGD PACKAGE MAIN CONTRACTOR: BHEL - RANIPET SUB CONTRACTOR (OEM) & ADDRESS: (To be filled by OEM VENDOR)		CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTORS(IE3) - Up to 200KW NTPC Bongaigaon 3 x 250MW (BHEL W.O no: G305, G306 and G307)	DOC.NO: BAP/QR/G305, G306 & G307/Bongaigaon/LTM/Slurry Pumps: 001 Rev NO.: 00 PAGE : Page 6 of 6 DATE: 13.02.2021	##Enquiry No: ## OEM Supplier Name & Address: ##Offer reference: ##Date: Contact Official Name: Mobile no: Email id:
Sl. NO.	DESCRIPTION	BHEL and Ultimate Customer - NTPC (National Thermal Power Corporation), India Quality Requirements		##Specific confirmations by the vendor

ITEM: LT Motors(IE3) Up to 200KW

10	Motor details Vendor shall furnish following Motor details for the Pumps applicable for this enquiry. NTPC Bongaigaon 3 x 250 MW – FGD Project:-			
	S. No	Pump	LT Motor	
			Rating (in kW)	Quantity
				Proposed Make
	1	Limestone Slurry Feed Pump		
	2	Gypsum Bleed Pump		
	3	Primary Hydrocyclone Feed Tank Pump		
	4	Filtrate Water Tank Pump		
	5	Secondary Hydrocyclone Feed Tank Pump		
	6	Waste Water Tank Pump		
	7	Auxiliary Absorbent Tank Pump		
	8	Absorber Area Drain Sump Pump		
	9	Gypsum Area Drain Sump Pump		
	10	Limestone Area Drain Sump Pump		
	11	Other LT motors involved in the system (if any)		

OEM Supplier signature with seal

Necessarily to be filled up & submitted by the OEM vendor at the time of offer itself otherwise the offer may not be considered w.r.t Quality Requirements against LT Motors being BHEL/ ultimate customer – NTPC (National Thermal Power Corporation Limited) specific requirements.

ENDORSEMENT SHEET FOR QP
REFERENCE / STANDARD / FIELD QUALITY PLAN (RQP / SQP/RFQP/SFQP)

TO BE FILLED IN BY SUPPLIER AT TIME OF SUBMISSION			To be filled in by NTPC
PROJECT NAME	NTPC Bongaigaon 3 x 250 MW FGD Project (BHEL W.O no: G305, G306 and G307)		<u>2REVIEW & ENDORSEMENT BY NTPC</u> PROJECT SPECIFIC QP NUMBER ALLOTTED QP NO: REV. NO.: 00 DT :
CONTRACT NO.:	CS-4610-101-2-FC-COA-5066-AMDT-04 for Bongaigaon FGD (3 x 250MW)		
MAIN SUPPLIER	M/S.BHEL, RANIPET , TAMIL NADU., INDIA		
MANUFACTURER WORKS & ADDRESS	(TO BE FILLED BY OEM / LT MOTOR SUPPLIER)		
ITEM /EQUIPMENT / SYSTEM/ SUB-SYSTEM DETAILS i.e. MODEL TYPE/SIZE/RATING etc.	LT MOTOR(IE3) – SLURRY PUMPS FOR FGD APPLICATION		
APPROVED QP NO.: RQP/SQP/RFQP/SFQP	(TO BE FILLED BY OEM / LT MOTOR SUPPLIER)		
<i>Confirmation by Main Supplier (TICK WHICHEVER APPLICABLE)</i>			<i>(TICK APPLICABLE)</i>
I. That the item/ component is identical to that considered for SQP approval. ☒			The MQP/RQP/SQP is endorsed for this project without any change The SQP is endorsed for this project with changes as indicated.
II. That there are minor changes in the item/ component with respect to that considered for MQP/RQP/SQP approval, however the same do not affect the contents of MQP/RQP/SQP			
III. That there are minor changes in the item/ component with respect to that considered for MQP/RQP/SQP approval, however the same affect the MQP/RQP/SQP slightly, as indicated below / in attached sheet.			
			<u>DISTRIBUTION OF ENDORSEMENT OF</u> A) MQP/RQP/SQP: 1. MAIN SUPPLIER (WITH A COPY OF MQP/RQP/SQP) 2. MANUFACTURER 3. RIO 4. CQA-SPL 5. CQA-O/C B) RFQP/SFQP: 1. MAIN SUPPLIER (with a copy of MQP/RQP/SQP) 2. MANUFACTURER 3. NTPC FQA (with a copy of MQP/RQP/SQP) 4. NTPC Erection (with a copy of MQP/RQP/SQP) 5. CQA-SPL 6. CQA-O/C
SIGN.: (Main Supplier) DATE:	(TO BE FILLED BY OEM / LT MOTOR SUPPLIER)		NTPC (Reviewed /Approved by/ Date & Seal)
	SIGN.: (Manufacturer) DATE:		

Venkateswarlu M

From: RAMNANDHA M <ramnandha@bhel.in>
Sent: Saturday, February 13, 2021 7:01 PM
To: Mandadi Venkateswarlu(Manager/MM-FGD/BAP)
Cc: K C Gandhi Parimalam(Dy GM/QA-ELEC/BAP); K Renjith(Manager/QC- NDTL/BAP); Rakesh Kumar Madhu(Dy Manager/QA_MECH/BAP); Abhinav Kumar(Dy Manager/WS(CON)/BAP); N S Prabhakaran(Dy. Engineer/QC-SD & ADMN/BAP)
Subject: CQR and Quality Requirements for LT Motors (Up to 200KW) for Slurry Pumps-NTPC Bongaigaon (3 x 250 MW) FGD Project- Indent no: RFW01100, RFW01101, RFW01102 (BHEL W.O No: G305 to G307)
Attachments: RE: Supply of Slurry pumps for Bongaigaon FGD project-Reg (946 KB); RE: Supply of Slurry pumps for Bongaigaon FGD project-Reg (14.1 MB); Bongaigaon FGD Package _Slurry Pumps_LT MOTORS up to 200KW_Indegenious V....pdf; Endorsement Sheet for Bongaigaon_LT Motor_FGD_Slurry_Pumps_NTPC.doc; NTPC MQP FORMAT Bongaigaon FGD_Slurry Pumps.pdf; Bongaigaon FGD Package _Slurry Pumps_LT MOTORS up to 200KW_Foreign Vendor.pdf; Copy of Indicative MQP for Bongaigaon Slurry Pumps_LT Motor Up to 200KW- Inf purpose only.pdf

Dear Sr.,

Sub: Procurement of Slurry Pumps for NTPC Bongaigaon (3 x 250 MW) FGD Project

Ref:- 1. Indent no: RFW01100, RFW01101, RFW01102 for NTPC Bongaigaon (3 x 250 MW) FGD Project - BHEL W.O No: G305 to G307

2. Mail from MM dt 12.02.2021, 13.02.2021 (copy attached)

3. Mail from QA- Mechanical to MM dt 13.02.2021 (copy attached)

Further to the above, following are the Quality Requirements for the supply of LT Motors being used in Slurry Pumps meant for NTPC Bongaigaon (3 x 250 MW) FGD Project.

Specific confirmation / documents shall be obtained from all the OEM vendors.

I. W.r.t INDIGENOUS OEM VENDORS ONLY

Sl no	Description & Quality Requirements	Specific confirmation by the vendor (Confirmed/ Not Confirmed)
01	OEM vendor shall meet all the requirements as in Annexure-I and also OEM Vendor shall endorse (Signature and Stamp in all the pages) in attached CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTORS(IE3) Up to 200KW used in Slurry Pumps for FGD application (DOC.NO: BAP/ QR/ G305, G306 & G307/ Bongaigaon/ LTM/ Slurry Pumps: 001 Rev No. 00 dt 13.02.2021) and send us the same to follow / ensure all the requirements in the event of an order.	
02	OEM vendor shall ensure Credentials of design and Manufacturing capabilities w.r.t. LT Motors by their LT Motor manufacture.	

03	OEM Supplier shall submit other details like that they are already approved vendor by Ultimate Customer – NTPC (National Thermal Power Corporation Limited) specifically for proposed supply of LT Motor against BHEL/ Ranipet. The details of PO already executed preferably through various other BHEL units for any NTPC projects with CHP/ MDCC including technical catalogue, PO received so far for similar supply of LT Motors may also be submitted.	
04	Accordingly OEM vendor shall be suitably informed that If Ultimate Customer – NTPC (National Thermal Power Corporation Limited) vendor approvals is not there / not available, then their offer will not be considered for further processing / ordering for the supply of LT Motors to take care of overall equipment/system requirements.	
05	No material shall be dispatched without BHEL/ Ultimate Customer – NTPC (National Thermal Power Corporation Limited) inspection - CHP/ MDCC clearances.	

II.W.r.t FOREIGN (OUTSIDE INDIA) OEM VENDORS ONLY

Sl no	Description & Quality Requirements	Specific confirmation from vendor (Confirmed)
01	OEM vendor shall meet all the requirements as in Annexure-I and also OEM Vendor shall endorse (Signature and Stamp in all the pages) in attached CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTORS(IE3) Up to 200KW used in Absorbers for FGD application (DOC.NO: BAP/ QR/ G305, G306 & G307/ Bongaigaon/ LTM/ Slurry Pumps: 002 Rev No. 00 dt 13.02.2021) and send us the same to follow / ensure all the requirements in the event of an order.	
02	OEM vendor shall ensure Credentials of design and Manufacturing capabilities w.r.t. LT Motors by their LT Motor manufacture.	
03	OEM Supplier shall submit other details like that they are already approved vendor by Ultimate Customer – NTPC (National Thermal Power Corporation Limited) specifically for proposed supply of LT Motor against BHEL/ Ranipet. The details of PO already executed preferably through various other BHEL units for any NTPC projects with CHP/ MDCC including technical catalogue, PO received so far for similar supply of LT Motors may also be submitted.	
04	Accordingly OEM vendor shall be suitably informed that If Ultimate Customer – NTPC (National Thermal Power Corporation Limited) vendor approvals is not there / not available, then their offer will not be considered for further processing / ordering for the supply of LT Motors to take care of overall equipment/system requirements.	
05	No material shall be dispatched without BHEL/ Ultimate Customer – NTPC (National Thermal Power Corporation Limited) inspection - CHP/ MDCC clearances.	

Subject to the above specific confirmation from all the OEM vendors and also for Engg (both Electrical and Mechanical) requirements including Quality Requirements furnished by QA-Mechanical vide mail dt 13.02.2021 (copy attached), OEM Vendors offers will be acceptable w.r.t Quality Requirements.

Purchase shall ensure all the above Quality requirements while releasing the PO on successful bidder on specific confirmation from all the OEM vendors on the above .

Important Note:

Engg shall ensure customer approved LT Motor data sheet/ drg/ spec (As applicable) to obtain CHP/ MDCC from NTPC.

Regards
Ramnandha M
Engineer-QA-Electrical and C&I
BAP Ranipet
BHEL
Ph: 9952555203/04172-283126

OEM SUPPLIER WITH OEM MFR.'s LOGO (TO BE FILLED BY OEM SUPPLIER)	LT MOTOR MANUFACTURER'S NAME AND ADDRESS (TO BE FILLED BY OEM / LT MOTOR MANUFACTURE)	MANUFACTURING QUALITY PLAN				PROJECT: NTPC Bongaigaon 3 x 250MW (BHEL W.O no: G305, G306 and G307) FGD PACKAGE					
		ITEM: LT MOTOR(IE3) UP TO 200KW FOR FGD APPLICATION		QP NO.: SLURRY PUMPS: LT MOTOR:001 REV.NO.: 00 DATE: PAGE: OF....		NTPC CONTRACT NO: CS-4610-101-2-FC-COA-5066-AMDT-04 for Bongaigaon FGD (3 x 250 MW)					
		SUB-SYSTEM: FGD - SLURRY PUMPS		MAIN CONTRACTOR: BHEL - RANIPET SUB CONTRACTOR (OEM) & ADDRESS: (TO BE FILLED BY OEM SUPPLIER)							

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C / N					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10.			11.

		LEGEND: * RECORDS, IDENTIFIED WITH “TICK” (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: OEM MANUFACTURER/LT MOTOR SUB-SUPPLIER C: MAIN SUPPLIER – BHEL/BHEL AIA , N: NTPC P: PERFORM W: WITNESS AND V: VERIFICATION. AS APPROPRIATE, CHP: NTPC SHALL IDENTIFIED IN COLUM “N” AS ‘W”		DOC. NO.: _____ REV..... CAT.....		
OEM MANUFACTURER/ LT MOTOR SUPPLIER	MAIN (BHEL) SUPPLIER		FOR NTPC USE			
SIGNATURE				REVIEWED BY	APPROVED BY	APPROVAL SEAL

Bharat Heavy Electricals Limited

Ranipet-632406, India.

Quality Assurance(Mech)

To,

Shri. V Raghupathy, SM/Purchase
Kind Attn: Shri M Venkateswarlu, Mgr/Purchase

BAP: QA-Mech: FGD: SLP : 146
Dt. 13-02-2021

Item Name	Indent No	Indent Dt.	PGMA	Technical Specification
SLURRY PUMPS	RFW01100	03.02.2021	FW701	ROS:9068, Rev:03, Dt:28.01.2021
	RFW01101	03.02.2021	FW997	

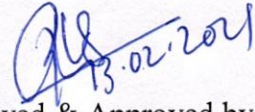
Project: BONGAIGAON (3X250 MW) _ W/O: G305-G307

"Customer/NTPC has informed that in case the item is covered under Sub-QR list, the proposed vendors for the same shall be accepted by QA after acceptance of vendor by NTPC Engg."

1. Since Slurry Pump appears under Sub-QR item, Sub-QR approved vendor by NTPC Engg. acceptable to Quality also.
2. Inspection and testing shall be done as per approved Quality plan, Quality plan to be approved by Customer/ NTPC after review of BHEL.
3. Painting shall be as per Customer approved Painting schedule.
4. Arrange MQP from sub QR Cleared vendor for taking up with Customer for their review and approval. Find herewith-attached typical MQP (QP NO.FGS:723/00, DT: 08.01.2021). This MQP involves minimum check only and actual Quantum of Check/Stage may differ based on Project/Customer requirement and their approved MQP.
5. Already NTPC approved latest MQP for similar application if available specific to Vendor may be shared for obtaining faster approval from Customer/Customer Consultant.
6. All the Pumps shall be inspected at supplier works as per approved QP/Approved Drawing/Approved datasheet and Specification.
7. Packing of items shall be as per BHEL Engg Approved Packing Drawing/Packing Specifications.
8. BHEL Authorized representatives shall have the right to witness the necessary inspection and testing of goods mentioned in the PO. The supplier shall inform BHEL in advance about the readiness of the goods for inspection and testing. Inspection / Inspection wavier / approval by BHEL does not absolve Supplier's responsibility for conformity of the specification as per the terms of PO. Material Test Certificates shall be submitted to BHEL.
9. Annexure 'Q' and BOI's Details shall be part of enquiry File and shall be filled by Supplier with their duly sign and seal.
10. **Vendor Quality Plan shall contain following Inspection Notes:**
 - a. Latest version of standards & Specification shall be applied.
 - b. Materials shall be procured in compliance to Functional Technical specification.
 - c. Gauges and measuring instruments with valid calibration only shall be used.
 - d. Inspection / Inspection wavier / approval by BHEL does not absolve Supplier's responsibility for conformity of the specification as per the terms of PO.
 - e. BHEL /BHEL Authorized representatives shall have the right to witness the necessary inspection and testing of goods mentioned in the PO.
 - f. In case of Vendor Drawing & Datasheet, it needs approval by BHEL Engineering.
 - g. This QP shall be read along with relevant PO, BHEL Specification / Approved Drawing / Datasheet.


Prepared by.

Rakesh Kr Madhu (Dy.Mgr/QA)


Reviewed & Approved by.
K Renjith(Mgr/QA)