1X800 MW NORTH CHENNAI STG III (FGD PKG)

TECHNICAL SPECIFICATION
FOR
MISC. PUMPS (HORIZONTAL)

SPECIFICATION No. **PE-TS-485-100-W001**

REV NO. 00

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, INDIA

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PROJECT INFORMATION

SL.NO	DESCRIPTION	DETAILS
1	**METEOROLOGICAL DATA**	
1.1	MAXIMUM TEMPERATURE	45 Deg C
1.2	MINIMUM TEMPERATURE	15 Deg C
1.3	MAXIMUM RELATIVE HUMIDITY	90%
1.4	MINIMUM RELATIVE HUMIDITY	36%
1.5	AVERAGE ANNUAL RAINFALL	1600 mm
1.6	SEISMIC ZONE (AS PER IS 1893)	Zone: III as defined in IS:1893-2002
1.7	HEIGHT ABOVE MSL	(+) 10.0 Meter above Mean Sea Level
1.8	BASIC WIND SPEED (AS PER IS 875)	11.8 kmph (Avg), 50 m/s (max)
2	**ELECTRICAL DATA**	
2.1	AMBIENT TEMPERATURE FOR DESIGN OF ELECTRICAL EQUIPMENT	50 Deg C at relative humidity of 95%
2.2	RATED FREQUENCY	50 Hz
2.3	FREQUENCY VARIATION	(+)3 to (-)5 %
2.4	AC VOLTAGE	415 V
2.5	AC VOLTAGE VARIATION	+/-10 %
2.6	FAULT LEVEL (KA/SEC)	50 KA for 1 second

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	GENERAL TECHNICAL REQUIREMENT
1	The bidder to choose a standard proven model from the range of pumps manufactured.
2	The equipment shall comply with all applicable safety codes and statutory regulations of India where the equipment is to be installed.
3	The design, manufacture and testing of the Pumps complete with all accessories, shall generally conform to the latest editions of the appropriate standards.
4	Latest codes and standards shall be applicable as on date of bid submission.
5	In the event of any conflict between the requirements of two clauses of this specification, documents or requirements of different codes and standards specified, stringent requirement as per the interpretation of the owner shall apply.
6	Drawing / documents to be submitted by bidder shall be as per "Documentation Requirement" given in this specification.
7	Bidder to note that drawing/document submission shall be through web based Document Management System. Bidder shall be provided access to the DMS for drg/doc approval and adequate training for the same. Bidder to ensure proper net connectivity at their end.
8	The first revision drawings/ documents submitted by vendor shall be complete in all respects. Any incomplete drawing submitted shall be treated as non-submission with delays attributable to vendor’s account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL / Customer’s place as per the requirement for across the table submissions/ discussions/ finalizations of drawings.
9	The details of the Pumps with the quantity, design parameters, accessories etc. to be supplied shall be as per Data Sheet enclosed in this specification.
10	Pumps with Mechanical seal required as given in TECHNICAL DATA - PART - A shall be supplied with gland packing arrangement initially to site and gland packing arrangement shall be replaced by vendor with mechanical seal arrangement at site after commissioning of the pumps with gland packing. Loose Mechanical seal shall be dispatched along with main supply. Shaft sleeve and/or any other item required for satisfactory operation of Mechanical seal after replacement at site shall be provided by the pump supplier without any cost implication to BHEL.
11	Any accessory/component which is not specifically mentioned but required for proper performance and safe operation of pumps and drives to be provided without any cost implication to BHEL.

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12	**SITE SERVICES:** (i) Pumps with Mechanical seal shall be supplied with gland packing arrangement initially to site and gland packing arrangement shall be replaced by vendor with mechanical seal arrangement at site after commissioning of the pumps with gland packing. Loose Mechanical seal shall be dispatched along with main supply. Shaft sleeve and any other item required for satisfactory operation of Mechanical seal after replacement at site shall be provided by the pump supplier without any cost implication to BHEL. (ii) The pumps erected by BHEL/Customer shall be checked by the bidder for correctness of their installation, alignment, etc. at site prior to their commissioning. Signed Checklist for installation after completion of the activity to be submitted as per format given with specification. (iii) Performance test of Pumps at Site shall be applicable for Pumps as mentioned in TECHNICAL DATA PART-A and ANNEXURE FOR PERFORMANCE GUARANTEE AND TESTING.	
13	The pumps shall be capable of running over the entire range of NPSH conditions required without any noise, vibration or cavitations.	
14	Pump(s) shall preferably be designed to have the best efficiency at flow within ± 10% of the specified duty point flow. The pumps shall be suitable for continuous operation at any point within the “Range of Operation” as stipulted in TECHNICAL DATA - PART - A.	
15	The pumps shall be capable of starting with discharge valve fully open and close condition.	
16	Pump Casing shall be provided with a connection for suction and discharge pressure Gauge as standard feature.	
17	Shaft size selected must take into consideration the critical speed as specified in API-610. The critical speed shall be at least 30% higher than the rated speed.	
18	The Impeller assembly shall be dynamically balanced and designed with critical speed substantially above the operating speed.	
19	Pumps of a particular category shall be identical and shall be suitable for parallel operation with equal load division. The head vs. capacity, the BHP vs. capacity characteristics etc. shall be identical to ensure equal load sharing and trouble-free operation of any pump when the other pump(s) working in parallel with it trip.	
20	Components of identical pumps shall be interchangeable.	
21	Pump Suction/Discharge nozzles are capable of withstanding external reactions not less than those specified in API-610.	
22	Replaceable type wearing rings (as applicable) shall be furnished to prevent damage to impeller and casing.	
23	Renewable type fine finished shaft sleeves shall be provided at the stuffing boxes/ mechanical seals.	

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24	Length of the shaft sleeves shall be extended beyond the other faces of gland packing or seal end plate so as to distinguish between the leakage past Shaft and shaft sleeve and that past the seals/glands.	
25	Shaft sleeves to be properly fastened to the shaft to prevent any leakage or loosening. Shaft sleeve assembly should ensure concentric rotation.	
26	In case, shaft sleeve is threaded, a water slinger to be provided on the Pump Shaft to avoid ingress of leaked water (if any due to failure of sealing arrangement for shaft sleeve) to Bearing.	
27	In case of axial split casing Multistage pumps, minimum factor of safety of '2' times shall be considered for bearing capacity selection and pump design.	
28	Bearings to be easily accessible without disturbing the pump assembly.	
29	A drain to be provided at the bottom of each bearing housing.	
30	Heavy-duty ball/roller bearing to be provided to take care of the radial loads.	
31	Adequate Hydraulic pressure balancing device or Thrust Bearing to be provided to take care of the axial loads.	
32	Provision on Bearing for mounting temperature measuring instruments to be provided.	
33	Stuffing box to be designed for replacement of packing without removing any part other than the gland.	
34	If water handled (based upon the water quality given with Specification) by pump is dirty/ not suitable for lubrication/ cooling, the bidder shall provide requisite strainer/ filters, tanks, motorized valves, etc. after the tap off for the required service, the arrangement provided shall be subject to BHEL/Customer approval.	
35	The materials of construction for various components specified are the minimum requirements. Equivalent or Superior materials suitable for fluid handled is also acceptable subject to Customer/BHEL approval. Materials of construction for other components not specified shall be similarly selected by the bidder for the intended duty and subject to Customer/BHEL approval.	
36	Wherever Staineless (SS) material is coming in contact with non SS material, suitable isolation (rubber etc.) shall be provided to avoid galvanic corrosion.	

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37	**Instructions for HT/LT Motors supplied by BHEL as free issue (with scope mentioned in TECHNICAL DATA - PART - A):** (i) All HT /LT motors which are not in bidder's scope of supply: only bare motors, shall be supplied as free issue by BHEL, based on ratings and TS (Torque - Speed) curve selected and furnished by the bidders along with their un-priced bid. The responsibility for satisfactory operation for combined performance of pumps & motors shall rest with the bidder only as if, the drive motors also have been supplied by the bidder. (ii) Couplings, base plate, foundation bolts, any other fittings, etc. as required shall be supplied by the bidders only. BHEL shall supply one number of each type of drive motors (where drive motor is not in bidder's scope of supply) for shop testing of pumps with job motors to Bidder's Works/Shop. Bidder shall dispatch this Job Motor to Project Site along with the Pumps at their cost. All other motors shall be dispatched by BHEL directly to project sites.	
38	**Instructions for Mandatory Spare:** (i) One(1) set consists of quantity required for complete replacement for one(1) Pump of each type/size.Also the 'set' would include all components/hardware required to replace the item. (ii) Wherever quantity has been specified as percentage (%), it shall mean percentage (%) of the total population of the item in the station (project), unless specified otherwise and the fraction will be rounded off to the next higher whole number. (iii) Wherever the quantities have been indicated for each type, size, thickness, material, radius, range etc. these shall cover all the items supplied and installed and the break up for these shall be furnished in the bid. (iv) In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities in line with the approach followed as above. (v) Each spare shall be clearly marked and labeled on the outside of the packing with its description. When more than one spare part is packed in single case, a general description of the contents shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purpose of identification.	
39	The makes of various bought out items of bidder (i.e. motor, bearings, mechanical seal etc.) shall be subject to BHEL/Customer approval in the event of order.	

CHECKLIST FOR INSTALLATION CHECK OF THE HORIZONTAL PUMP AT SITE

Note:

- To be filled in by BHEL Site Engineer and Pump Vendor Service Engineer
- Strike off which is not applicable

Project Name / PO No.:	**Date of Check:**
Pump Name:	**Pump Serial No:**

S. No.	ACTIVITY DESCRIPTION	OBSERVATION	REMARKS (IF ANY)
1.	Relevant Engineering data like General Arrangement Drawing & Cross Sectional Drawing is available with site engineer for reference	Yes/No	
2.	All components are available as per packing list or Approved Documents	Yes/No	
3.	Condition of Pump components	OK/Not OK	
4.	Pump foundation dimensions as per GA drawing (List out deviations if any)	OK/Not OK	
5.	Suction & discharge piping as per GA drawing and pump is free from piping strains.	Yes/No	
6.	Leveling & Center line matching of base plate	OK/Not OK	
7.	Grouting of base plate- Tightness of foundation bolts to be checked	OK/Not OK	
8.	Is there any need of inserting shims under motor, if yes then total thickness of shims provided	Yes/No mm	
9.	Is the pump shaft free to rotate	Yes/No	
10.	Bearings are properly Lubricated (Re-greasing of Bearings to be checked)	Yes/No	
11.	Cooling/Flushing Connections provided for Packing Box/Mech. Seal Assembly	Yes/No	
12.	Radial run out between pump & motor shafts at coupling	mm	
13.	Tightness of bolts between pump-base plate and motor-base plate	OK/Not OK	
14.	No load test of motor performed (As per Pump/Motor Manufacturer Recommendation) If yes then Vibration levels at Drive end of Motor	Yes/No A- V- H-	
15.	Fitment of coupling halves on pump & motor shafts with respective hardwares & key	Ok/Not OK	
16.	Key Slot / Notch for VMS available as per GA Drawing	Yes/No	

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17.	Any abnormal observation at this stage. If yes, then specify, trace out the cause & correct it.	Yes/No	
18.	Any abnormal observation during initial trial run of the pumping set, If yes, then specify, trace out the cause & correct it	Yes/No	
19.	Vibration level at **Drive end** of pump	A- V- H-	
20.	Vibration Level at **Non Drive End** of pump	A- V- H-	
21.	Temperature of bearings after initial trial run of one hour (a). At drive end (b). At Non drive end	 °C °C	
22.	Max Stabilized temperature of bearings (a). At drive end (b). At non drive end ©. Ambient temp	°C °C °C	
23.	Observed Noise Level at 1meter distance from the Pump	dbA	
24.	Amount of leakage through Gland packing	Permissible/Not Permissible	
25.	Mechanical Seal available at Site (for applicable Pumps only)	Yes/No	

ADDITIONAL REMARKS/OBSERVATION (IF ANY)

1.

2.

3.

Pump Vendor Service Engineer Name Designation Sign & Date	BHEL Site Engineer Name Designation Sign & Date	End Customer (If Required) Name Designation Sign & Date

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TECHNICAL DATA - PART - A			
SL.NO	**DESCRIPTION**	**UOM**	**DETAIL**
	Designation/Name of the Pump		DMCW PUMPS FOR FGD AUX'S
1.0	**Scope of Supply & Services**		
	The scope covers the design, manufacture, assembly, inspection and testing at manufacturer's and/or his sub-contractors works, proper packing for delivery and installation checks & supervision of replacement of gland packing with Mechanical Seal arrangement (if applicable) at site for Miscellaneous Pumps along with mandatory spares complete with all accessories as per the requirements specified in this specification, PG Test at site and any other services, etc. if called for in the succeeding sections of the specification.		
1.1	Scope of supply of Pump Accessories and Spares:		
1.1.1	LT Electric motor with cable glands and lugs at motor end.		Yes
1.1.2	Strainer at Pump Suction with Drain/Vent Valves		Yes, Simplex Basket Type
1.1.3	Pump motor coupling (Heavy duty) along with coupling guard		Yes
1.1.4	Common base plate for pumps and motor		Yes
1.1.5	Self contained lubrication system along with all internal piping, valves, fittings, specialties etc. as required		Yes
1.1.6	Counter flanges for suction/ discharge nozzles along with fixing nuts, bolts and gaskets		Yes
1.1.7	Anchor bolts, nuts, seating steel works, shims etc. as necessary for mounting the pump-motor unit on civil foundations		Yes
1.1.8	Vent with piping, valves and Priming Connection on Pump Casing		Yes
1.1.9	Drain connections in Casing and Base Plate with piping & isolating valves/plugs		Yes
1.1.10	Lifting/ handling attachments/lugs for the pump and motor		Yes
1.1.11	First fill of lubricants with toping requirements for one year of operation after commissioning and handing over of equipment		Yes
1.1.12	Set of "Special" Tools & Tackles for Pumps and motors, if any		Yes
1.1.13	Erection and commissioning spares, "on as required" basis		Yes
1.1.14	1 No. RTD for each Pump Bearing		No
1.1.15	1 No. Reverse Rotation Indicating Switch for each Pump		No
1.1.16	Mandatory Spares (Details as per BOQ Schedule)		Yes

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1.2	Scope of Services:		
1.2.1	Installation Check of Pumps at site prior to their commissioning		Yes
1.2.2	Replacement of Gland Packing with Mechanical Seal at Site after commissioning		Yes
1.2.3	Performance Testing at Site		Yes
2.0	**DESIGN CODES & STANDARDS**		
2.1	Design Standard		IS-6595/IS-5120/IS-5659/HIS
2.2	Performance Standard		IS-9137/IS-5120/HIS/ASME PTC 8.2
2.3	Strainer Housing/Body excluding Flange		ASME Sec VIII, DIV I
2.4	Flange/Counter Flange		AWWA class - C-207
2.5	Structural steel		IS 2062
2.6	Cast Iron		IS 210
2.7	Threaded Steel Fasteners		IS 1367
2.8	Alloy-Steel and Stainless Steel Bolting		ASTM A193
2.9	Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts		ASTM A194
2.10	Carbon Steel Castings		ASTM A216
2.11	Carbon Steel Forgings		ASTM A105
2.12	Stainless Steel Castings		ASTM A351
2.13	Stainless Steel Forgings		ASTM A276
2.14	Duplex Stainless Steel Castings		ASTM A890 / ASTM A995
2.15	Corrosion Resistance Alloy Steel Castings		ASTM A743
3.0	**DESIGN /SYSTEM PARAMETERS**		
3.1	KKS Number (TAG NO.)/Description		PGB01AP001 & PGB02AP001
3.2	Total No. of pumps (Nos.)		2
3.3	No. of working & standby pumps		1 Working + 1 Standby
3.4	Location		Indoor
3.5	Pump suitable for parallel operation		Not Applicable
3.6	Pump Duty		Continuous
3.7	Rated capacity (No negative tolerance permitted) (cu.m/hr)	cu.m/hr	190
3.8	Total Dynamic Head (TDH) at rated capacity (No negative tolerance permitted)	MWC	52
3.9	Max. limit on shut off head Corresponding to pump TDH (MWC) at 51.5 Hz	MWC	About 15% more than rated head
3.10	Required Range of Operation of the Pump (% of Rated Capacity)		30-130% of design duty point flow

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3.11	The pumps offered have continuously rising head		Yes
3.12	The pumps offered have stable rising H-Q curves		Yes
3.13	Pump characteristics		Non Overloading type & stable
3.14	Maximum permissible speed of pump	RPM	1500
3.15	Suction Pressure (Available)	MWC	10
3.16	System Design Pressure	kg/cm2 (g)	10
3.17	Design Temperature	Deg. C	60
3.18	Specific Gravity of fluid to be handled		1
3.19	Quality of Water Handled		Passivated DM Water
3.20	Torque speed curve of the pump & drive motor furnished for pumps with drive motor rating of 100 KW and above.		Yes
4.0	**CONSTRUCTION FEATURES**		
4.1	Type of Pump to be offered		Horizontal centrifugal type Between Bearing Pump / End Suction Pump
4.2	Type of pump casing to be offered		Axially/Radial split type
4.3	Type of Impeller to be offered		Closed
4.4	Type of Pump Lubrication allowed		Self Liquid/Grease
4.5	Sealing Arrangement		Gland packing initially & Mechanical seal finally after commisioning
4.6	Pump is designed so that pump internals can be attended without disturbing suction and discharge piping.		Yes

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4.7	Motor rating selection criteria		Motor rating at ambient temperature of 50 Deg.Cel. (including voltage and frequency variations) shall be the maximum of the following requirements: a) 15% margin over the pump shaft input power at the rated duty point. b) 10% margin over the maximum pump shaft input power required within the entire characterstic curve of the pump. c) Pump shaft input power required considering the overloading of the pump assuming single pump operation in the event of tripping of one or more of the pumps operating in parallel.
4.8	Type of coupling between pump & motor		Flexible Type
4.9	**Material of Construction**		
4.9.1	Casing		ASTM-A-351 CF 8M
4.9.2	Impeller		ASTM-A-351 CF 8M
4.9.3	Shaft		SS 316
4.9.4	Shaft sleeves		SS 410
4.9.5	Impeller Wear ring (as applicable)		SS 316
4.9.6	Casing Wear ring (as applicable)		SS 316
4.9.7	Fasteners (Wetted)		SS
4.9.8	Fasteners (Non-Wetted)		SS
4.9.9	Coupling		CI
4.9.10	Gland		SS 316
4.9.11	Stuffing Box		ASTM-A-351 CF 8M
4.9.12	Lantern ring		Bronze
4.9.13	Mechanical seals (faces)		As per Manufacturer standard
4.9.14	Gland packing		Teflon Impregnated (Non-Asbestos type)
4.9.15	Base plate		MS Fabricated IS-2062 (min. thk.-10 mm)
4.9.16	Counter Flange		Carbon Steel
4.9.17	Suction Strainer Housing/Body		CS as per IS :2062

4.9.18	Suction Strainer Element / Basket including Basket Stiffeners and Handle		SS304
4.9.19	Suction Strainer Gasket		Nitrile Rubber / EPDM (Min. 3 mm thick)
4.10	Design Life of Bearing	Hrs	40000
4.11	Sealing/Cooling of Stuffing Box		By Self Water
4.12	Type of Mechanical Seal (If applicable)		Cartridge Type
4.13	Cooling/Lubrication Arrangement to be provided for Mechanical Seal		By Self Water
4.14	The bidder shall make provisions for mounting following on the pump/ pump shaft: a. Purchaser's probes in both DE/NDE bearings of pumps b. Flat surface with dimensions 60 MM x60 MM on bearing Housing for mounting vibration measuring block c. Key slots of dimensions 30MM (L) X 15 MM (W) X 3 MM (D) on each pump shaft or some other suitable location		Not Applicable
4.15	**Construction Features of Suction Strainer**		
4.15.1	Type of Strainer		Simplex Basket Type
4.15.2	Type of Strainer Element		Wire Mesh supported with Perforated Plate
4.15.3	Perforation/Mesh size		20 Mesh
4.15.4	Maximum Permissible Pressure Drop under Clean condition	MWC	1
4.15.5	Inlet/Outlet Connecting Pipe Size	mm X mm	273 X 6.35
4.15.6	Ratio of Screen Clear Flow Area vis-à-vis Pipe Inlet Area		6
4.15.7	Orientation of Inlet/Outlet Connecting Pipe		Horizontal and Co-axial
4.15.8	Type of Welding allowed for fabrication of Strainer Basket/Element		Only TIG Welding
4.15.9	End Conection		Flanged
5.0	**PERFORMANCE PARAMETERS**		
5.1	Performance Guarantee Tests at Shop/Works		Yes, To be performed by Manufacturer
5.2	Performance Guarantee Tests at Site		Yes, To be performed by Manufacturer
5.3	Benchmark Pump efficiency (P) for Bid evaluation	%	75
5.4	Benchmark Motor efficiency(M) for Bid evaluation	%	93.3

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5.5	Bid Evaluation Rate (The bid evaluation shall be done at the rate as specified in Data Sheet A per one (1) KW Power consumption, per working pump (and not standby)).	Rs./kW	2,35,360
5.6	Guaranteed vibration at manufacturer's works on any pump /motor bearing w.r.t. velocity (Vrms) as per ANSI/ HIS 9.6.4	Vrms	4.8
5.7	Guaranteed vibration at site on any pump /motor bearing w.r.t. velocity (Vrms) as per ANSI/ HIS 9.6.4	Vrms	3.8
5.8	Max. noise Level (Guaranteed at site)	dB	85 dB at 1 M distance

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TECHNICAL DATA - PART - A

SL.NO	DESCRIPTION	UOM	DETAIL
1.0	**DESIGN CODES & STANDARDS**		
1.1	Three phase induction motors :		IS:325, IEC:60034, IS: 12615
1.2	Single phase AC motors		IS:996, IEC:60034
1.3	Energy Efficient motors		IS 12615, IEC:60034-30
1.4	Designation of Methods of Cooling of Rotating Electrical Machines		IS 6362
1.5	Designation for types of construction and mounting arrangement of rotating electrical machines		IS 2253
1.6	Noise levels		IS 12065
2.0	**DESIGN /SYSTEM PARAMETERS**		
2.1	Rated voltage	V	415
2.2	Frequency	Hz	50
2.3	Permissible variations for		
a)	Voltage	%	+/-10
b)	Frequency	%	(+)3 to (-)5
c)	Combined	%	10 (absolute sum)
2.4	System fault level at rated voltage for 1 sec	kA	50
2.5	Short time rating for terminal boxes for 0.25 sec	kA	50
2.6	Type of motors		Squirrel cage induction motor suitable for
2.7	Efficiency class		IE3 class as per IS 12615.
2.8	Rating		
a)	Motor duty		Continuosly rated -S1
b)	Design margin		i) The motor name plate rating shall have 15% margin over duty point input (or) 10% margin over the maximum demand of driven equipment whichever is higher considering highest system frequency. Ii). Service shall be considered as 1.0 only
3.0	**CONSTRUCTION FEATURES**		
3.1	Winding		Electrolytic grade Copper conductor, Winding shall be tropicalized and suitably varnished, baked and treated for operating
3.2	Enclosure Details		
a)	Degree of protection		
	i) Indoor motors		IP 55
	ii) Outdoor motors		IP 55(Weather proof)
	iii) hazardous location		IP 55(flame proof)
b)	Method of ventilation		LT motors shall be totally enclosed fan cooled (TEFC), type IC411. The cooling shall be effected by self-driven bi-directional centrifugal fan protected by fan cover.
3.3	Insulation		Class ‘F’ with temperature rise limited to class ‘B’

3.4	Bearings		i) Grease lubricated ball or roller bearings for Horizontal motors Grease lubricated ball or roller bearings or combined trust and guide beaing for Vertical motors. ii) For bearing temperature measurement, duplex RTDs shall be provided for each bearing and shall be wired upto the terminal box. iii) Each bearing shall be provided with dial type thermometer.
3.5	Main terminal box		
a)	Type		i) Motor terminal box shall be detachable type and located in accordance with Indian Standards clearing the motor base- plate/ foundation. ii) Terminals shall be stud or lead wire type, substantially constructed and thoroughly insulated from the frame. iii) The terminals shall be clearly identified by phase markings, with corresponding direction of rotation marked on the non-driving end of the motor.
b)	DOP		Same as motor
c)	Position when veiwed from the non driving end		For LT motors, terminal box shall be located on top, unless otherwise specified.
d)	Rotation		360° in steps of 90°
e)	Space heater		i) Space heaters rated for 240V AC, 50 Hz supply shall be provided for motors rated 30KW and above to maintain windings in dry condition when motor is standstill. ii) Five number of Temperature detectors / thermisters shall be provided for L.T. motors above 90 KW (3 numbers winding temperatures & 2 numbers bearing temperatures)
f)	Cable glands and lugs		i) Motor terminal box shall be furnished with suitable cable lugs and double compression brass glands to match with cable used. ii) Removable Gland plates of thickness 3 mm (hot/cold rolled sheet steel) or 4 mm (non magnetic material for single core cables) shall be provided in case of cable boxes.
g)	Minimum clearances to be provided between phase to phase and phase to earth	mm	25
3.6	Earthing points suitable for conenction		Motor body shall be grounded at two earthing points on opposite sides with two separate and distinct grounding pads complete with tapped holes, GI bolts and washers.
3.7	Paint shade (Corrosion proof paints of colour shade)		The final thickness of paint film on steel shall not be less than 100 microns. Paint Shade for the Motor shall be RAL 7032 (Siemens Grey).

3.8	The spacing between gland plate & centre of bottom terminal stud		UP to 3 KW As per manufacturer's practice. Above 3 KW - upto 7 KW 85 Above 7 KW - upto 13 KW 115 Above 13 KW - upto 24 KW 167 Above 24 KW - upto 37 KW 196 Above 37 KW - upto 55 KW 249 Above 55 KW - upto 90 KW 277 Above 90 KW - upto 125 KW 331 Above 125 KW-upto 200 KW 203
3.9	Minimum inter-phase and phase-earth air clearances with lugs installed		UP to 110 KW 10mm Above 110 KW and upto 150 KW 12.5mm Above 150 KW 19mm
4.0	**PERFORMANCE PARAMETERS**		
4.1	Starting requirement		
a)	Minimum permissible voltage as a percentage of rated voltage, at start to bring the driven equipment upto the driven equipment upto rated speed		i) Motors shall be capable of starting and accelerating the load at following starting voltage, with direct on line starting, without exceeding specified winding temperatures. • LT motors : 80% of rated voltage ii) The motor shall be capable of operating at full load at a supply voltage of 80% of the rated voltage for 5 minutes. iii) The motor shall be capable of withstanding the stresses imposed if started at 110% rated voltage. iv) Motor shall not stall if the supply voltage drops to 70% of the rated voltage two (2) second duration.
b)	Maximum locked rotor current		as per IS 12615
c)	Starting duty		i) No. of consecutive hot starts shall be 2 (with initial temperature of the motor at full load operating level). Ii) No. of consecutive cold starts shall be 3 (with initial temperature of the motor at ambient temperature).

d)	The locked rotor withstand time under hot condition at highest voltage limit		i) For the LT motors having starting time upto 20 seconds at minimum permissible voltage, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 2.5 seconds more than the starting time. ii) For the motors having starting time more than 20 seconds and up to 45 seconds at minimum permissible voltage, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 5 seconds more than the starting time. iii) For motors having starting time more than 45 seconds at minimum permissible voltage, the locked rotor withstand time under hot condition at highest voltage limit shall be more than starting time by at least 10% of the starting time. iv) The motors shall be designed to withstand 120% of rated speed for 2 minutes without any mechanical damage
4.2	Torque (percent of full load torque)		i) Accelerating torque at any speed with the lowest permissible starting voltage shall be at least 10% motor full load torque. ii) Pull out torque at rated voltage shall not be less than 205% of full load torque. iii) Motors subjected to reverse rotation shall be designed to withstand the stresses encountered when starting with non-energized shaft rotating at 125% of rated speed in reverse direction. iv) The motor shall be designed to withstand momentary overload of 60% of full load torque for 15 second without any damage.
4.3	Noise level (max.)		85 dB(A)
4.4	Vibration shall be limited within the limits		as per IS:12075
4.5	Name Plates		Motor shall have stainless steel nameplate(s) showing diagram of connections, all particulars as per IS:325 / IS: 12615 and shall also have ‘BEE’ marking.
4.4	Vibration shall be limited within the limits		as per IS:12075
5.0	**INSPECTION/TESTING**		
5.1	Routine and Type Tests are to be conducted for all HT motors and for LT motors above 60 KW rating in presence of customer’s representative as per IS:325, IS:4722, IS:9283 and required copies of test certificates are to be furnished for approval.		
5.2	Test certificates for Routine tests conducted as per IS:325, IS:4722, IS:9283 for motors of rating 60 KW and below shall be submitted for TANGEDCO review, approval and dispatch clearance.		

	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24

TECHNICAL DATA - PART - B FOR PUMP (SUPPLIER DATA TO BE FURNISHED AFTER AWARD OF CONTRACT)

SL.NO	DESCRIPTION	UOM	DETAIL
1.0	**GENERAL**		
1.1	Designation of the Pump		
1.2	Manufacturer		
1.3	Model No.		
1.4	No. of pumps		
1.5	System Design Pressure	Nos.	
1.6	Specific Gravity of fluid to be handled	Kg/cm^2	
2.0	**PERFORMANCE PARAMETERS**	-	
2.1	Performance standard		
2.2	Rated capacity. (No negative tolerance)	M^3/hr	
2.3	Total Dynamic Head (TDH) at rated capacity (No negati	MWC	
2.4	Shut off head	MWC	
2.5	Range of Operation of the Pump		
	a) Min.Flow	M^3/hr	
	b) Max.Flow	M^3/hr	
2.6	capacity curves from the duty point towards shut off point.		
2.7	The pumps offered have stable rising H-Q curves within the "Range of Operation"		
2.8	Pump rated speed	RPM	
2.9	Vibration measurements (2.9.2 is applicable in addition to 2.9.1 for Pumps with speed less than 600 RPM)		
2.9.1	Max.value of vibration on any pump /motor bearing w.r.t. velocity (Vrms) as per ANSI/ HIS 9.6.4 for speed > 600 RPM		
	a) Guaranteed at manufacturer's works	mm/s	
	b) Guaranteed at site	mm/s	
2.9.2	Max.value of vibration on any pump /motor bearing w.r.t. peak to peak amplitude as per ANSI/ HIS 9.6.4 for speed <= 600 RPM		
	a) Guaranteed at manufacturer's works	microns	
	b) Guaranteed at site	microns	
2.10	Max. noise Level (Guaranteed at site)	dB	
2.11	Guaranteed Pump efficiency at rated head & rated capa	%	
2.12	Power consumption		
	a) Guaranteed pump input power at duty point	KW	
	b) Guaranteed max. Pump input power within rang	KW	
	c) Max. pump input power at shut off	KW	
	d) Guranteed power at motor input	KW	
2.13	NPSH required at rated capacity	MWC	

	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24

3.0	**DESIGN & CONSTRUCTION FEATURES**		
3.1	Type of pump casing		
3.2	Pump duty		
3.3	Type of Impeller		
3.4	Location		
3.5	Pump suitable for parallel operation		
3.6	Torque speed curve of the pump & drive motor furnished for pumps with drive motor rating of 100 KW		
3.7	Pump number of stages		
3.8	Specific speed N= $\frac{\text{RPM x (Flow in USGPM)}^{1/2}}{\text{(Head in Ft.)}^{3/4}}$		
3.9	Minimum suction head required in MLC for pump operation at maximum discharge point within the 'Range of Operation' specified (NPSHR at max. flow).		
3.10	Whether pump is suitable/designed so that pump internals can be attended without disturbing suction and discharge piping.		
3.11	Type of coupling between pump & motor		
3.12	Bearing (DE & NDE)		
	a) Type and manufacturer		
	b) Bearing no.		
	c) Type of lubrication		
	d) Design life (Hrs.)		
3.13	Shaft Sealing arrangement		
	a) Type and Make/Model details		
	b) Sealing liquid		
	c) Requirement of external water if any		
	i) Quality		
	ii) Quantity/ Pump	M^3/hr	
3.14	In case separate oil/grease/water pump or any such equipment required for bearing lubrication/stuffing box gland sealing,furnish full technical details of these equipment and their drive.		
3.15	Critical Speed of Pump Rotating Assembly	RPM	
4.0	**MATERTIAL OF CONSTRUCTION (Indicate applicable code/ standard)**		
4.1	Casing		
4.2	Impeller		
4.3	Shaft		
4.4	Shaft sleeves		
4.5	Wear ring		
4.6	fasteners		

	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24

4.7	Gland		
4.8	Lantern ring		
4.9	Mechanical seals (faces)/		
	Gland packing		
4.10	Base plate		
5.0	**CONNECTIONS AND OTHER DIMENSIONAL DETAILS**		
5.1	Impeller diameter	mm	
6.0	**DRIVE DATA**		
6.1	Drive unit output at 50°C ambient condition	KW/ P	
7.0	**INSPECTION & TESTING**		
7.1	Material test		
7.2	Hydrostatic test pressure	Kg/cm^2	
7.3	Hydrostatic test duration	Min.	
7.4	Performance test on pump at shop		
7.5	Dyanamic balance test		
8.0	**WEIGHT AND LOADING DATA**		
8.1	Weight of the pump & drive assembly	Kg	
8.2	Weight of the heaviest piece to be handled	Kg	
8.3	Size of base plate (length x width)	mm	

	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24

TECHNICAL DATA - PART - B FOR MOTOR (SUPPLIER DATA TO BE FURNISHED AFTER AWARD OF CONTRACT)

SL.NO		UOM	DETAIL
1.0	**GENERAL**		
i)	Manufacturer & Country of origin.		
ii)	Equipment driven by motor)		
iii)	Motor type		
iv)	Country of origin		
v)	Quantity	nos.	
2.0	**DESIGN AND PERFORMANCE DATA**		
i)	Frame size		
ii)	Type of duty		
iii)	Type of enclosure and method of cooling		
vi)	Type of mounting		
vii)	Direction of rotation as viewed from DE END		
viii)	Standard continuous rating at 40 deg.C. ambient temp.	(KW)	
ix)	(A) Derated rating for specified normal condition i.e. 50 deg. C ambient temperature	(KW)	
	(B) Rating as specified in load list	(KW)	
xi)	Rated speed at rated voltage and frequency	rpm	
xii)	At rated Voltage and frequency		
	a) Full load current	A	
	b) No load current	A	
xiii)	Power Factor at		
	a) 100% load		
	b) At duty point		
	c) 75% load		
	d) 50% load		
	e) NO load		
	f) Starting.		
xiv)	Efficiency at rated voltage and frequrecy		
	a) 100% load		
	b) At duty point		
	c) 75% load		
	d) 50% load		
xv)	Starting current*(inclusive of IS tolerance)* at		
	a. 100 % voltage	A	
	b. Minimum starting voltage	A	
xvi)	Starting time with minimum permissible voltage		
	a. Without driven equipment coupled	sec	
	b. With driven equipment coupled	sec	
xvii)	Safe stall time with 110% of rated voltage		
	a. From hot condition	sec	
	b. From cold condition	sec	

	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)		PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24
xviii)	**Torques :**		
	a. Starting torque at min. permissible voltage	(kg-mtr.)	
	b. Pull up torque at rated voltage.	(kg-mtr.)	
	c. Pull out torque	(kg-mtr.)	
	d. Min accelerating torque available	(kg-mtr.)	
	e. Rated torque	(kg-mtr.)	
xix)	Stator winding resistance per phase (at 20 Deg.C.)	Ohm	
xx)	GD^2 value of motors		
xxi)	Locked rotor KVA input (at rated voltage)		
xxii)	Locked rotor KVA/KW.		
xxiii)	**Bearings**		
	a. Type		
	b. Manufacturer		
	c. Self Lubricated or forced Lubricated		
	d. Recommended Lubricants		
	e. Guaranteed Life in Hours		
	f. Whether Dial Type thermometer provided		
	g. Oil pressure Gauge/switch		
	i. Range		
	ii. Contact Nos. & ratings		
	iii. Accuracy		
xxiv)	**Vibration**		
	a) Velocity	mm/s	
	b) Displacement	microns	
xxv)	Noise level	db	
3	**CONSTRUCTIONAL FEATURES**		
i	Stator winding insulation		
	a. Class & Type		
	b. Tropicalised (Yes/No)		
	c. Temperature rise over specified max.		
	i. Cold water temperature of 38 DEG. C.		
	ii. Ambient Air 50 DEG. C.		
	d. Method of temperature measurement		
	e. Stator winding connection		
	f. Number of terminals brought out		
ii	Type of terminal box for		
	a. stator leads		
	b. space heater		
	c. Temperature detectors		
	d. Instrument switch etc.		
iii)	For main terminal box		
	a. Location		
	b. Entry of cables		
	c. Recommended cable size		
	d. Fault level	MVA	
iv)	Temperature detector for stator winding		
	a Type		
	b. Nos. provided		

	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24

	c . Location		
	d. Make		
	e. Resistance value at 0 deg. C	ohms	
vi)	Paint shade		
vii).	Weight of(approx)		
	a. Motor stator (KG)		
	b. Motor Rotor (KG)		
	c. Total weight (KG)		
4	Relevant motor curves		

BHEL	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24

COMPLIANCE DRAWING

1 WATER ANALYSIS
2 ELECTRICAL SCOPE SPLIT

A. DM WATER ANALYSIS:

Conductivity:	Less than 0.1 microS/cm
Total silica:	Less than 0.02 ppm
pH:	8.5 to 9.5

REV: 0 DATE: 23.04.2022

STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR (FOR EPC PROJECTS)

PACKAGE: MISC. PUMP (Supply Package)

PROJECT: **1X800MW TANGEDCO NORTH CHENNAI TPP STAGE-III (FGD SYSTEM & AUXALIRIES)**

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	415 V MCC	BHEL	BHEL	240 V AC (supply feeder)/415 V AC (3 PHASE 4 WIRE) supply shall be provided by BHEL based on load data provided by vendor at contract stage for all equipment supplied by vendor as part of contract. Any other voltage level (AC/DC) required will be derived by the vendor.
2	Local Push Button Station (for motors)	BHEL	BHEL	Located near the motors.
3	Power cables, control cables and screened control cables	BHEL	BHEL	Incoming cable from BHEL supplied MCC will be informed by BHEL. Screened control cable between DCS & field equipment will also be informed by BHEL. Vendor shall provide lugs & glands accordingly.
4	Cable trays, accessories & cable trays supporting system	BHEL	BHEL	
5	Cable glands and lugs for equipments supplied by Vendor	Vendor	BHEL	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type heavy duty tinned copper lugs for power and control cables.
6	Conduit and conduit accessories for cabling between equipments supplied by vendor	BHEL	BHEL	
7	Equipment grounding & lightning protection	BHEL	BHEL	
8	Below grade grounding	BHEL	BHEL	
9	LT Motors with base plate and foundation hardware	Vendor	BHEL	Makes shall be subject to BHEL approval at contract stage.
10	Mandatory spares	Vendor	-	Vendor to quote as per specification.
11	Recommended O & M spares	Vendor	-	As per specification
12	Any other equipment/material/service required for completeness of system but not specified above (to ensure trouble free and efficient operation of the system).	Vendor	BHEL	
13	Electrical equipment GA drawing	Vendor	-	For necessary interface review.

NOTES:

1. Make of all electrical equipments/items supplied shall be reputed make & shall be subject to approval of BHEL after award of contract.
2. All QPs shall be subject to approval of BHEL after award of contract without any commercial implication.

BHEL	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24

PERFORMANCE GUARANTEES TO BE DEMOSTRATED AT SHOP & SITE

ANNEXURE FOR PERFORMANCE GUARANTEE AND TESTING

A. GENERAL

1 Performance Guarantees for pumps shall stand valid till the satisfactory completion of performance testing by BHEL and its acceptance by BHEL / customer.

B. PG Testing at Shop

1 The guaranteed power consumption of Pumps shall be demonstrated by the successful bidder during performance testing at Vendor works/ shop. Applicabilty of Test for each type of Pump shall be as per TECHNICAL DATA - PART - A.

2 The efficiencies for pumps and motors for arriving at benchmark power consumption for Bid Evaluation shall be as indicated in TECHNICAL DATA - PART - A for various pumps.
No advantage shall be given to the bidder for quoting Power consumption (kW) at motor inlet lower than the benchmark kW value calculated with benchmark efficiencies given in Datasheet. However, in such case, quoted power consumption (kW) at motor inlet by the bidder shall be replaced with Benchmark Power consumption for both evaluation as well as LD purposes.

3 For the purpose of Bid Evaluation, Efficiencies for HT motors and LT motors which are not in bidder's scope shall be taken based on the maximum value as furnished in TECHNICAL DATA - PART - A.
During contract stage, for Pumps driven by BHEL supplied drives (HT/LT), Revised guarantee power consumption shall be calculated for M = motor efficiency as per approved datasheet of the supplied HT/LT motor. All other parameters shall remain same.

4 The bid evaluation applicable at the rate as specified below to be calculated per working pump (and not standby) as follows:

Power consumption at inlet to the motors:

$$KW = \frac{Q \times H \times S}{P \times M \times 367.2}$$

Where,

Q = Rated capacity M^3/hr
H = Rated TDH, MWC
P = Pump Efficiency
M = Motor Efficiency.
S = Specific Gravity of fluid handled

5 **LIQUIDATED DAMAGES:** The liquated damages @ twice the bid evaluation rate per KW per working pump shall be levied in the event of failure of bidder to demonstrate the power consumption as per guaranteed values.

C. PG Testing at Site

1 After commissioning of pumps at site, performance test for Noise, Vibration and Parallel running of pumps shall be conducted by pump vendor at project site to ensure that the pumps meet the specified requirements. PG Test shall be conducted as per approved PG Test Procedure. Applicabilty of Performance Test for each type of Pump shall be as per TECHNICAL DATA - PART - A.

2 Vendor to replace / take corrective action for any deficiency in performance parameters at site.
If the site performance is found not meeting the requirements in any respect as specified, then the equipment shall be rectified or replaced by the vendor, without any price implication.

3 All instruments required for PG testing of Noise, vibration and parallel running of pumps are to be provided by Bidder and taken back after the Test. All instruments used for PG Test shall be duly calibrated.

SCHEDULE OF PERFORMANCE GUARANTEES

Following parameters are guaranteed for following pumps

Sl. No.	Pump Description	Guaranteed Capacity	Guaranteed TDH	Guaranteed Pump Eff.	Guaranteed Motor Eff.	Guaranteed Power consumption at inlet to motor terminals	Motor Rating	Motor GD^2 Value for HT motor only	Pump RPM	T/S Curve attached for HT motor
		(M3/Hr)	(MWC)	%	%	(KW)	(KW)			
	Horizontal pumps									
1	# DMCW PUMPS FOR FGD AUX'S	190	52					NA		NA

Bid evaluation and LD is applicable for pumps marked with (#) only as per TECHNICAL DATA - PART - A.

We the undersigned hereby undertake to meet the performance guarantees as listed in the table above on the conditions as elsewhere specified. Any variation of the specified conditions during official tests will be taken in account by BHEL as per specification.

PARTICULARS OF BIDDER/ AUTHORISED REPRESENTATIVE

NAME DESIGNATION SIGNATURE DATE COMPANY SEAL

	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24

QUALITY PLAN

Quality Assurance and Quality Plan

1 Typical quality plan is enclosed in specification for guidance. The bidder shall comply with these minimum requirements and shall furnish his own quality plan for approval. The quality plan shall be subjected to customer's / purchaser's approval in the event of order without any cost implication.

2 Manufacturer shall conduct all tests and stage inspections as per the approved quality plan to ensure that the Pumps shall conform to the requirements of this specification and of the applicable codes/ standards.

3 All materials used for manufacture/ fabrication of the Pump components shall be of tested quality.

4 Qualification of welding procedures and welders shall be as per ASME B&PV Code, Section-IX/applicable code.

5 During detailed engineering, the various shop test procedures for DP test, Hydro test, Peformance test, NPSH Test etc. as per Approved QAP shall be submitted by bidder along with the quality plan for BHEL/customer approval.

6 Hydraulic tested equipment shall not be packed till the inside surface becomes dry.

7 BHEL's / Customer's representative shall be given full access to the shop in which the equipment are being manufactured or tested and all test records shall be made available to him.

8 Inspection of Mandatory spares shall be in line with approved QP for main supply.

228910/2024/PS-PEM-WSE

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	QUALITY PLAN		SPEC NO.:PE-TS-999-100-W001		
	CUSTOMER:		QP NO.: PE-QP-999-100-W001 R00	DATE	03.01.2024
	PROJECT :		PO NO.:	DATE	
	ITEM: MISC. PUMPS (HORIZONTAL/VERTICAL)	SYSTEM: CW/ACW/DMCW/PLANT/ COMMON	SECTION:	SHEET 1 OF 4	

S. No.	COMPONENT & OPERATION	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY ** M	AGENCY ** B	AGENCY ** C	REMARKS
1	2	3	4	5	6	7	8	9		10			11
					M B/C								
1	RAW MATERIALS												
1.1	CASINGS (INCLUDING BOWLS,DIFFUSERS, STAGE BODIES, DISCH HEAD (IF CAST)), ETC, - (AS APPLICABLE) AND IMPELLER	MECHANICAL AND CHEMICAL PROPS	CR	MECHANICAL AND CHEM. ANALYSIS	ONE/HEAT/BATCH	APPROVED CS DRAWING/DATA SHEET	RELEVANT MATERIAL SPECN.	LAB REPORT/ MTC	√	P	V	V	REFER NOTE 1.
1.2	STUFFING BOX, SUCTION BELL, WEARING RINGS,NECK RINGS, SHAFT SLEEVES	MECHANICAL AND CHEMICAL PROPS	MA	MECHANICAL AND CHEM. ANALYSIS	ONE/HEAT/BATCH	APPROVED CS	RELEVANT MATERIAL SPECN.	LAB REPORT/ MTC	√	P	V	V	
		HARDNESS DIFFERENCE BETWEEN CASING / IMPELLER AND WEARING RING	MA	LAB. TEST	100%	APPROVED CS DRAWING/ DATA SHEET	50 BHN MIN.	LAB, REPORT	√	P	V	V	
1.3	BARS/FORGINGS FOR SHAFTS, LINE SHAFTS	PHYSICAL & CHEMICAL PROPS	CR	MECHANICAL & CHEMICAL ANALYSIS.	1/CAST OR 1/BARS	APPROVED CS DRAWING/DATA SHEET	RELEVANT MATERIAL SPECN.	MILL T.C, OR LAB.REPORT	√	P	V	V	CORRELATION REQUIRED, IDENTIFICATION AS PER TC
		INTERNAL DEFECTS FOR 40MM & ABOVE DIA SHAFTS.	CR	ULTRA SONIC TEST	100%	ASTMA388 BACK WALL ECHO 100%	DEFECT ECHO MAX 20% OF B.W.E. LOSS OF BACK WALL ECHO 20% MAX	NDT CERTIFICATE	√	P	V	V	
1.4	STRESS RELIEVING/ HEAT TREATMENT OF CASTING OF ALL ABOVE (IF APPLICABLE) / SOLUTION ANNEALING OF SS CASTING	1. VERIFICATION OF HT CHART	MA	VERIFICATION OF SR/HT CHART	ALL BATCHES	RELEVANT MATERIAL SPECN.	RELEVANT MATERIAL SPECN.	CORRELATED SR/HT.CHARTS	√	P	V	V	
		2. IGC TEST FOR SS CASTING	MA	LAB. TEST	ONE SAMPLE/ HT BATCH	ASTM A 262	ASTM A 262 Gr A	LAB, REPORT	√	P	V	V	
1.5	SHAFT ENCLOSING TUBES, COLUMN PIPES & DISCHARGE ELBOW	1. MECHANICAL & CHEMICAL PROPS. 2. DIMENSIONS. 3. SURFACE FINISH	MA	1. MECH & CHEM TEST 2. MEASUREMENT 3. VISUAL EXAM	1/BATCH 100% 100%	APPROVED GA DRG./DATA SHEET	RELEVANT MATERIAL SPECN./MAFG./ APPROVED DOCS	MFR T.C OR LAB. REPORT	√	P	V	V	
1.6	PLATE FLANGE, C/FLANGE	1. MECHANICAL & CHEMICAL PROS. 2. DIMENSIONS. 3. SURFACE FINISH	MA	1. MECH & CHEM TEST 2. MEASUREMENT 3. VISUAL EXAM	1/CAST 100% 100%	APPROVED GA DRG./DATA SHEET	RELEVANT MATERIAL SPECN./ MFR. DRG./ APPROVED DOC	MILL TC/ LAB REPORT	√	P	V	V	CORRELATION REQ. FOR MAT. OTHER THAN IS 2062
1.7	SUCTION STRAINER (IF APPLICABLE)	MECHANICAL & CHEMICAL PROS.	MI	MECH. & CHEMICAL TEST	1/HEAT	APPROVED GA DRG./DATA SHEET	RELEVANT MATERIAL SPECN./ MFR. DRG./ APPROVED DOC	MILL TC/ LAB REPORT	√	P	V	V	
1.8	PUMP CASING, IMPELLER, DIFFUSER, SHAFT	PMI (MATERIAL GRADE IDENTIFICATION)	CR	RECORD	100%	MANUFACTURER'S TEST PROCEDURE	MANUFACTURER'S TEST PROCEDURE	REPORT	√	P	V	V	
1.9	a. MECHANICAL SEAL b. PUMP BEARINGS	TYPE, SIZE, MFRS, NO., MAKE	MA	VISUAL EXAM	100%	APPROVED DATASHEET / GA	APPROVED DATASHEET		√	P	V	V	COMPLIANCE TC FOR APPROVED MAKE

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name				Sign & Date	Name	Seal
Prepared by:	Prashant	PRASHANT AGARWAL	Checked by:	Gaurav Garg	GAURAV GARG	Seal		Reviewed by:			
Reviewed & Approved by:	Vishal Kumar Yadav	VISHAL KR. YADAV	Reviewed by:	Harish Kumar	HARISH KUMAR			Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	QUALITY PLAN		SPEC NO.:PE-TS-999-100-W001	DATE	
	CUSTOMER:		QP NO.: PE-QP-999-100-W001 R00	DATE	03.01.2024
	PROJECT :		PO NO.:	DATE	
	ITEM: MISC. PUMPS (HORIZONTAL/VERTICAL)	SYSTEM: CW/ACW/DMCW/PLANT/ COMMON	SECTION:	SHEET 2 OF 4	

S. No.	COMPONENT & OPERATION	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY **			REMARKS
										M	B	C	
1	2	3	4	5	6	7	8	9	* D	10			11
					M B/C								
2.0	**IN PROCESS CONTROL**												
2.1	IMPELLER	DYNAMIC BALANCING	CR	DYNAMIC BALANCING	100%	ISO 1940	ISO1940 Gr 6.3	BALANCING CERTIFICATE	√	P	W	V	WTNESSING ONLY FOR SIZE GREATER THAN 10KW
2.2	IMPELLER-ALL ACCESSIBLE SURFACES, DIFFUSERS, SHAFT	DP TEST	MA	DP TEST ON M/CED AREA	100%	ASTM E 165	NO RELEVANT INDICATION ALLOWED	NDT CERTIFICATE	√	P	W	V	
2.3	WEARING RING, SHAFT SLEEVES, CASING	DP TEST	MA	DP TEST ON M/CED AREA	100%	ASTM E 165	NO RELEVANT INDICATION ALLOWED	NDT CERTIFICATE	√	P	V	V	
2.5	CASINGS/ BOWLS, STAGE BODIES, DISCHARGE HEAD (IF CAST), SUCTION HOUSING, COLUMN PIPE DISCHARGE PIPE ETC	LEAK TIGHTNESS	CR	HYDRO TEST	100%	APPROVED TECHNICAL DATA SHEET	NO LEAKAGE FOR TEST DURATION OF 30 MIN.	HT CERTIFICATE	√	P	W	V	1. HAMMERING OF CASTINGS WITH WOODEN/ RUBBER MALLET BEFORE HYDRO TEST 2. NO WELD REPAIRS PERMITTED ON CI CASTING
2.6	FABRICATED COMPONENTS												
2.6.1	a. WELDING PROCEDURE SPECIFICATION b. WELDING PROCEDURE QUALIFICATION RECORD c. WELDER PERFORMANCE QUALIFICATION	CORRECTNESS	MA	VERIFICATION	100%	ASME SEC.IX	ASME SEC.IX	ASME SEC.IX	√	P	V	V	WELDING PROCEDURE APPROVAL BY BHEL ALT. 3RD PARTY (LLYODS,BVQI OR EQ.) IS ACCEPTABLE.
2.6.2	WELD & ASSEMBLY FIT UPS	DIMENSION & ALIGNMENT	MA	MEASUREMENT, VISUAL EXAMINATION	100%	WPS/MFG DRG	WPS/MFG DRG	IR/LOG BOOK	√	P	V	V	
2.6.3	WELDMENTS	SURFACE DEFECTS	MA	PENETRANT TEST	100% | 10%	ASTM E 165	ASME-VIII,DIV I	INSPN REPORT	√	P	W	V	10%WITNESS BY BHEL & VERIFICATION BY CUSTOMER
2.6.4	BUTT WELDS	INTERNAL DEFECT	MA	UT/RT	100%	ASME SEC. V	ASME-VIII,DIV I	IR	√	P	W	V	WITNESSING OF U.T

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY					Doc No:			
	Sign & Date	Name		Sign & Date	Name	Sign & Date			Sign & Date	Name	Seal
Prepared by:	Prashant	PRASHANT AGARWAL	Checked by:	Gaurav Garg	GAURAV GARG	Seal		Reviewed by:			
Reviewed & Approved by:		VISHAL KR. YADAV	Reviewed by:	Harish Kumar	HARISH KUMAR			Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	QUALITY PLAN		SPEC NO.:PE-TS-999-100-W001	DATE	
	CUSTOMER:		QP NO.: PE-QP-999-100-W001 R00	DATE	03.01.2024
	PROJECT :		PO NO.:	DATE	
	ITEM: MISC. PUMPS (HORIZONTAL/VERTICAL)	SYSTEM: CW/ACW/DMCW/PLANT/ COMMON	SECTION:	SHEET 3 OF 4	

S. No.	COMPONENT & OPERATION	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY **			REMARKS
										M	B	C	
1	2	3	4	5	6	7	8	9	* D	10			11
					M B/C								
3.0	SUB-ASSEMBLY CONTROL												
3.1	ROTOR ASSEMBLY	ECCENTRICITY	MA	MEASUREMENT	100%	APPROVED GA DRG/ MFR.DRAWING	APPROVED GA DRG/ MFR.DRAWING	IR/LOG BOOK	√	P	V	V	
3.2	ROTOR ASSEMBLY RESIDUAL UNBALACE	STATIC & DYNAMIC	CR	STATIC & DYNAMIC BALANCING	100%	ISO 1940	ISO1940 Gr 6.3	BALANCING CERTIFICATE	√	P	W	V	WTNESSING ONLY FOR SIZE GREATER THAN 10KW
3.3	COMPLETE PUMP ASSEMBLY	COMPLETENESS, CORRECTNESS, CLEANLINESS, CLEARANCES, FREENESS, ALIGNMENT	MA	VISUAL EXAM, MEASUREMENT	100%	APPROVED DRG & MFG STANDARDS	APPROVED DRG & MFG STANDARDS	I.R. & CHECK LISTS	√	P	V	V	KEY SLOT IN SHAFT/COUPLING & VMS PAD AS PER APPROVED GA/CS DRAWING TO BE SPECIFICALLY CHECKED (AS APPLICABLE)
4	FINAL INSPECTION, TESTS & PACKING DESPATCH CONTROL												
4.1	PUMP WITH JOB/SHOP MOTOR ASSEMBLED ON INDIVIDUAL BASE FRAME	1. Q V/S HEAD, 2. Q V/S POWER, 3. Q V/S PUMP EFF. 4. VIBRATION 5. NOISE 6. BEARING TEMP. 7. LEAKAGES	CR	PERFORMANCE TEST	100%	APPD. PERFORMANCE TEST PROCEDURE/ APPD. DATA SHEET/APPD. CURVES FOR VIBRATIONS - AS PER ANSI/HIS 9.6.4-2009 (VALUES AS PER APPROVED DATA SHEET) FOR BEARING TEMP - BEARING HOUSING SHOULD NOT BE UNTOUCHABLY HOT. FOR LEACKAGE - MINOR LEKAGE (DROP BY DROP) IN CASE OF GLAND PACKING ARRANGEMENT.	I.R., PERF. TEST RECORD, PLOTED CURVES	√	P	W	W	* MINIMUM 7 POINTS FROM SHUT-OFF TO MAX. OPERATING FLOW COVERING ENTIRE OPERATION RANGE OF PUMP SHALL BE TAKEN. * CUSTOMER HOLD POINT
		NPSH REQUIRED	CR	NPSH TEST	1/MODEL	APPD. PERFORMANCE TEST PROCEDURE/ APPD. DATA SHEET/APPD. CURVES		IR. NPSH TEST RECORD, PLOTED CURVES	√	P	W	W	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY					Doc No:			
	Sign & Date	Name		Sign & Date	Name	Sign & Date			Sign & Date	Name	Seal
Prepared by:	Prashant	PRASHANT AGARWAL	Checked by:	Gaurav Garg	GAURAV GARG	Seal		Reviewed by:			
Reviewed & Approved by:		VISHAL KR. YADAV	Reviewed by:	Harish Kumar	HARISH KUMAR			Approved by:			

228910/2024/PS-PEM-WSE

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	QUALITY PLAN		SPEC NO.:PE-TS-999-100-W001	DATE	
	CUSTOMER:		QP NO.: PE-QP-999-100-W001 R00	DATE	03.01.2024
	PROJECT :		PO NO.:	DATE	
	ITEM: MISC. PUMPS (HORIZONTAL/VERTICAL)	SYSTEM: CW/ACW/DMCW/PLANT/ COMMON	SECTION:	SHEET 4 OF 4	

S. No.	COMPONENT & OPERATION	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY **			REMARKS
										M	B	C	
1	2	3	4	5	6	7	8	9	* D	10			11
					M B/C								
4.2	STRIP DOWN AFTER PERFORMANCE TEST	UNDUE WEAR TEAR AND RUBBING	MA	VISUAL EXAM AFTER STRIPPING	1/MODEL	NO UNDUE WEAR TEAR & RUBBING ON IMPELLER & WEAR RING		INSP. REPORT	√	P	W	W	WITNESS REQUIRED ONLY WHEN ABNORMAL SOUND OBSERVED DURING PERFORMING TEST.
4.3	COMPLETE PUMP WITH UNIT MOTOR BASE FRAME, COUNTER FLANGES ETC. INCLUDING ALL ACCESSORIES AS PER SECTION C OF SPECN.	COMPLETENESS, CLEANLINESS, OVERALL DIMENSIONS ORIENTATION, WORKMANSHIP AND FINISH	MA	VISUAL EXAM MEASURMENT	100%	APPD. G.A DRAWING	APPD. G.A DRAWING	INSP. REPORT	√	P	W	V	REFER NOTE 2 & 3.
4.4	PAINTING	SURFACE FINISH, DFT, MARKINGS ETC.	MA	VISUAL EXAM, MEASURMENT, AESTHETIC	100%	APPD.DRG.	APPD.DOCS	IR.	√	P	V	V	
4.5	PACKING, MARKING	SOUNDNESS OF PACKING	MI	VISUAL, AESTHETIC	100%	TECHNICAL SPECIFICATION/ MFG. STANDARD	TECHNICAL SPECIFICATION/ MFG. STANDARD	PHOTOGRAPHS	√	P	V	-	

NOTES:

1.AS CAST HEAT MARKS SHALL BE PROVIDED ON CI CASTING LIKE TOP & BOTTOM CASING FOR CORRELATION.

2. PUMPS WITH MECHANICAL SEAL ARRANGEMENT TO BE TESTED AND SUPPLIED WITH GLAND PACKING ARRANGEMENT. HOWEVER MANUFACTURER TO ENSURE DIMENTIONAL MATCHING OF MECHANICAL SEAL WITH PUMP GA DRAWING.

3. KEY NOTCH FOR VMS TO BE ENSURED FOR APPLICABLE PUMPS.

LEGEND : - * RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,
** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **B**: BHEL/ THIRD PARTY INSPECTION AGENCY, **C**: CUSTOMER
P- PERFORM, **W-** WITNESS, **V-**VERIFICATION, AS APPROPRIATE
MA: MAJOR, **MI**: MINOR, **CR**: CRITICAL, **MTC -**Mill Test Certificate, **TC-**Test Certificate, **IGC**- Inter Granular Corrosion.
GA -GENERAL ARRANGEMENT DRAWING, **CS-**CROSS-SECTIONAL DRAWING

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name				Sign & Date	Name	Seal
Prepared by:	Prashant	PRASHANT AGARWAL	Checked by:	Gaurav Garg	GAURAV GARG	Seal		Reviewed by:			
Reviewed & Approved by:		VISHAL KR. YADAV	Reviewed by:	Harish Kumar	HARISH KUMAR			Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
		CUSTOMER :		QP NO.: PE-QP-999-Q-006, REV-02	DATE: 17.04.2020
		PROJECT:		PO NO.:	DATE:
		ITEM: AC ELECT. MOTORS UPTO 55KW (LV (415V))	SYSTEM:	SECTION: II	SHEET 1 of 2

S. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D	**			
					M	C/ N					M	C	N	
1.0	ASSEMBLY	1.WORKMANSHIP	MA	VISUAL	100%	-	MFG. SPEC.	MFG. SPEC.	LOG BOOK		P	-	-	
		2.DIMENSIONS	MA	VISUAL	100%	-	MFG. DRG./ MFG. SPEC.	MFG. DRG./ MFG. SPEC.	LOG BOOK		P	-	-	
		3.CORRECTNESS COMPLETENESS TERMINATIONS/ MARKING/ COLOUR CODE	MA	VISUAL	100%	-	MFG.SPEC./	MFG.SPEC.	LOG BOOK		P	-	-	
2.0	PAINTING	1.SHADE	MA	VISUAL	SAMPLE	-	MFG. SPEC/ APPROVED DATASHEET	MFG. SPEC/ APPROVED DATASHEET	LOG BOOK	✓	P	V	-	
3.0	TESTS	1.ROUTINE TEST INCLUDING SPECIAL TEST	MA	VISUAL	100%	-	IS-325 / IS-12615/ APPROVED DATA SHEET	IS-325 / IS-12615/ APPROVED DATA SHEET	TEST/ INSPN. REPORT	✓	P	V *	-	* NOTE -1
		2.OVERALL DIMENSIONS & ORIENTATION	MA	MEASUREMENT & VISUAL	100%	-	APPROVED DRG/ DATA SHEET	APPROVED DRG/ DATA SHEET	TEST/ INSPN. REPORT	✓	P	V *	-	* NOTE -1 & NOTE-2

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	HEMA KUSHWAHA	HEMA KUSHWAHA	Checked by:		KUNAL GANDHI
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
		CUSTOMER :		QP NO.: PE-QP-999-Q-006, REV-02	DATE: 17.04.2020
		PROJECT:		PO NO.:	DATE:
		ITEM: AC ELECT. MOTORS UPTO 55KW (LV (415V))	SYSTEM:	SECTION: II	SHEET 2 of 2

		3.NAMEPLATE DETAILS	MA	VISUAL	100%	-	IS-325 / IS-12615 / APPROVED DATA SHEET	SAME AS COL. 7	TEST/ INSPN. REPORT	✓	P	V	-	
4.0	PACKING	SURFACE FINISH & COMPLETENESS	MA	VISUAL	100%	100%	AS PER MFG. STANDARD / (#)	AS PER MFG. STANDARD / (#).	INSPC. REPORT	✓	P	W	-	(#) REFER NOTE-8

NOTES:
1. Routine tests on 100% motors shall be done by the vendor. However, BHEL/ Customer shall witness routine tests on random samples. The sampling plan shall be mutually agreed upon.
2. For exhaust/ventilation fan motors of rating up to 1.5 KW, only routine test certificates shall be furnished for scrutiny.
3. In case test certificates for these tests on similar type, size and design of motor from independent laboratory are available, the same is valid for 5 years.
4. BHEL reserves the right to perform repeat test, if required.
5. After packing and prior to issue MDCC, photographs of items to be despatched shall be sent to BHEL for review.
6. In case of any changes in QP commented by customer at contract stage, same shall be carried out by bidder without any implication to BHEL/ Customer.
7. Project specific QP to be developed based on customer requirement.
8. For export job, BHEL technical specification for seaworthy packing to be followed.
9. Packing shall be suitable for storage at site in tropical climate conditions.
10. Latest revision/ year of issue of all the standards (IS/ ASME/ IEC etc.) indicated in QP shall be referred.

LEGENDS:

*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,
** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, B: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **C**: CUSTOMER,
P: PERFORM, **W**: WITNESS, **V:** VERIFICATION, AS APPROPRIATE
MA: MAJOR, **MI**: MINOR**, CR:** CRITICAL
D: DOCUMENTATION

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	HEMA KUSHWAHA	HEMA KUSHWAHA	Checked by:		KUNAL GANDHI
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

2.3.0 MOTORS

Item/ Components/ Sub-system	Tests/ Checks																	
	Visual	Dimensional	Make,Type,Rating,TC,General physical	Mechanical, Chemical properties	NDT, DP or MPI, UT	Metallography	Electrical characteristics	Welding/ Brazing (WPS/ PQR)	Heat treatment	Magnetic characteristics	Hydraulic, Leak, Pressure test	Thermal characteristics	Run out	Dynamic balancing	All tests as per IS:325/ IS:4722/ IS:9283	Vibration	Over speed	Tan delta, shaft voltage and polarisation
Plates for stator frame, end shield, spider etc.	Y	Y	Y	Y					Y									
Shaft	Y	Y	Y	Y	Y	Y			Y									
Magnetic material	Y	Y	Y	Y	Y		Y			Y		Y						
Rotor copper/ Aluminium	Y	Y	Y	Y		Y	Y		Y									
Stator copper	Y	Y	Y	Y			Y		Y			Y						
SC ring	Y	Y	Y	Y	Y	Y	Y	Y	Y									
Insulating material	Y		Y	Y			Y					Y						
Tubes for cooler	Y	Y	Y	Y	Y				Y		Y							
Sleeve bearing	Y	Y	Y	Y	Y				Y		Y							
Stator, Rotor coils	Y	Y	Y				Y	Y										
Castings, stator frame, terminal box and bearing housing etc.	Y	Y	Y	Y	Y			Y										
Fabrication and machining of stator, rotor, terminal box	Y	Y			Y				Y									
Wound stator	Y	Y					Y	Y										
Rotor complete	Y	Y					Y						Y	Y				

Item/ Components/ Sub-system	Tests/ Checks																	
	Visual	Dimensional	Make,Type,Rating,TC,General physical	Mechanical, Chemical properties	NDT, DP or MPI, UT	Metallography	Electrical characteristics	Welding/ Brazing (WPS/ PQR)	Heat treatment	Magnetic characteristics	Hydraulic, Leak, Pressure test	Thermal characteristics	Run out	Dynamic balancing	All tests as per IS:325/ IS:4722/ IS:9283	Vibration	Over speed	Tan delta, shaft voltage and polarisation
Stator, Rotor, Terminal Box assembly	Y	Y					Y											
Accessories, RTD, BTD,CT, Brushes, Diodes, space heater, antifriction bearing, cable glands, lugs, gaskets etc.	Y	Y	Y															
Complete motor (IS: 325/ IS:4722/ IS:9283)	Y	Y	Y												Y	Y	Y	Y
Y =Test applicable, Y1 = for 11kV and 3.3kV motors only																		
Note																		
This is an indicative list of tests/ checks. The manufacture is to furnish the detailed Quality Plan indicating the practices and procedure followed along with relevant supporting documents during QP finalization. However QP approval is not envisaged for 415V motors upto 50 KW.																		

Site Tests :

The following minimum tests/ checks shall be conducted at site. Any other tests/ checks as per the manufacturer's recommendation shall also be carried out

i) Measurement of vibration.
ii) Measurement of insulation resistance and polarization index
iii) Measurement of full load current.
iv) Test running of the motors, checking the temperature rise and identifying the hot spot etc.

BHEL	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24

SUB VENDOR LIST

ITEM CODE	ITEM/SERVICE DESCRIPTION	SL NO.	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
ES53	LV MOTORS (NON FLAME PROOF)	1	A24	ABB	14, MATHURA ROAD, FARIDABAD, HARYANA-121003	0129-2567580, 09871799449	
	LV MOTORS (NON FLAME PROOF)	2	E1027	BHARAT BIJLEE LTD.	BHARAT BIJLEE LIMITED, 1ST FLOOR, 7-B, RAJINDRA PARK, PUSA ROAD, NEW DELHI - 110 060.	Tel.: + 91 (11) 25816931-33, 35 & 36| DT: +91 25724318 Fax: + 91 (11) 25819640| M:+ 91	
	LV MOTORS (NON FLAME PROOF)	3	C02	CROMPTON GREAVES	3RD FLOOR, EXPRESS BUILDING,9-10, BAHADUR SHAH ZAFAR MARG, NEAR ITO CROSSING,NEW DELHI-110002, INDIA	91 11 23460700 - 999 Sunil.Das@cgglobal.com	
	LV MOTORS (NON FLAME PROOF)	4	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	LV MOTORS (NON FLAME PROOF)	5	K01	KIRLOSKAR ELECTRIC CO LTD.	P.O. BOX 5555 , MALLESWARAM WEST ,BANGALORE 560055	Tel: +91-80-23374865 Fax: +91-80-23377706	
	LV MOTORS (NON FLAME PROOF)	6	L04	LAXMI HYDRAULICS PVT. LTD	129/130, INDUSTRIAL ESTATE PATIL NAGAR, HOTGI ROAD SOLAPUR-413003, MAHARASHTRA	0217- 2357001-005	APPROVED UPTO 200KW
	LV MOTORS (NON FLAME PROOF)	7	M01	MARATHON	MARATHON ELECTRIC INDIA PRIVATE LTD.SECTOR - 11, MODEL TOWN, FARIDABAD - 121006	Ph: +91-129-2286421, 2265340, 4006601 to 4006610	
	LV MOTORS (NON FLAME PROOF)	8	A35	NGEF	POCKET NO.10, FLAT NO. 37 & 38, EXPANDABLE DDA FLATS, NASIRPUR DWARKA, PHASE-I NEW	Ph: (011) 2539 7763	
	LV MOTORS (NON FLAME PROOF)	9	E1115	RAJINDRA ELECT INDUSTRIES	14 SHAH IND.ESTATE VEERA DESAI RD,ANDHERI(W) MUMBAI-400053	91-22-26730823, 26730789; 91)-(22)-26730154	
	LV MOTORS (NON FLAME PROOF)	10	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com	
	LV MOTORS (NON FLAME PROOF)	11	HM06	HAVELLS INDIA LIMITED	Plot No. SP 181-189, Industrial Area Phase-II, Neemrana, Dist. Alwar, Rajasthan-301705, India	M: 9644355595 Mr. Kapil Jain (L): +91120-4772317 (Kapil Jain <Kapil.Jain@havells.com>)	APPROVED UPTO 200KW
ES54	LV MOTORS (FLAME PROOF)	1	E1115	RAJINDRA ELECT INDUSTRIES	14 SHAH IND.ESTATE VEERA DESAI RD,ANDHERI(W) MUMBAI-400053	91-22-26730823, 26730789; 91)-(22)-26730154	

SUB VENDOR LIST FOR SIMPLEX BASKET STRAINER

Sl No	Supplier Name	Supplier Communication Address	Supplier Works Address
1	ACME FLUID SYSTEMS	Mr. Rakesh Sharma 152/2, Road No. 5, GIDC Kathwada, Ahmedabad Phone- 0120-2541259 Pincode : 383430 Email : rakesh@strainersindia.com	Works-1->Mr. Rakesh Sharma Others 152/2, Road No. 5, GIDC Kathwada, -Ahmedabad-GUJARAT INDIA Phone- 01202541259 FAX : 01204313342 Pincode : 382430 Email : rakesh@strainersindia.com
2	BHATIA ENGINEERING CO.	6, DSIDC, JHILMIL INDUSTRIAL AREA, G.T.ROAD, SHAHDARA. DELHI Phone- 22583488, 55258066 Pincode : 110095 Email : sales@strainwell.com	Works-1->MR.B.S.BHATIA 6, DSIDC,JHILMIL INDUSTRIAL AREA,G.T.ROAD, SHAHDARA. -DELHI-DELHI INDIA Phone- 011-22583488 FAX : 011-22583277 Pincode : 110095 Email : sales@strainwell.com
3	FILTERATION ENGINEERS (I) PVT. LTD.	Plot No. W-62 (B) T.T.C Industrial Area MIDC , Rabale Navi Mumbai Phone-02227608501 Pincode : 400701 Email : sales@feipl.com	Works-1-> Plot no. W62 B, TTC Industrial area, Road no. 3,MIDC-Rabale -Navi Mumbai-MAHARASHTRA INDIA Phone- FAX : Pincode : 400701 Email : sales@feipl.com
4	GRAND PRIX ENGINEERING PVT. LTD.	Mr. S C Sharma, Director-Sales Plot No. 82, Sector 25, Faridabad Phone-9868021512 Pincode : 121004 Email : sales@grandprixfilters.com	Works-1->Ms. S.C. Sharma Others Plot No. 82, Sector 25, -Faridabad-HARYANA INDIA Phone- 0129-4097716 FAX : 0129-4151821 Pincode : 121004 Email : scsharma@grandprixfilters.com
5	GUJARAT OTOFILT	Mr. Mahesh I Patel Plot No. 3712 & 3714, Phase IV, GIDC Vatva B/H New Nirma, Ahmedabad Phone-079-25841164 Pincode : 382445 Email : gujfilter@gmail.com	Works-1->Mr. Mahesh I Patel Others Plot No. 3712 & 3714, Phase IV, GIDC Vatva B/H New Nirma -Ahmedabad-GUJARAT INDIA Phone-9824017311 FAX : 079-25842719 Pincode : 382445 Email : gujfilter@gmail.com

6	JAY-EESH ENGINEERING COMPANY	Mr.JAYWANT MISTRY UNIT NO.17/20,ACHARYA INDUSTRIAL ESTATE, ANDHERI KURLA ROAD MUMBAI Phone- 9819914473 Pincode : 400072 Email : jayeesh_engg@rediffmail.com	Works-1->Mr. JAYWANT MISTRY Others UNIT NO. 17 and 20,A.K.ROAD, SAKI NAKA, -MUMBAI-MAHARASHTRA INDIA Phone- 022 28502168,9819914473 FAX : Pincode : 400072 Email : jayeesh_engg@rediffmail.com
7	MICON VALVES (INDIA) PVT. LTD.	7, WADEE MANZIL, 2ND FLOOR, OPP. MEMON CO-OP. BANK, 75-77E, LADY JAMSHEDJI ROAD, MAHIM, MUMBAI Phone- 022-24460711/0712 Pincode : 400016 Email : miconvalve@vsnl.net	Works-1->Md. Ilyas Shaikh CEO Plot No R-634 Rabale TTC, MIDC Industrial Area, Navi Mumbai, -Navi Mumbai-MAHARASHTRA INDIA Phone- 9223255699 FAX : Pincode : 400701 Email : mdmiconvalves@gmail.com
8	NISAN SCIENTIFIC PROCESS EQUIPMENT PVT. LTD.	Mr. Nitin S. Nikam R-587/1, M.I.D.C. RABALE, T.T.C. INDL. AREA NAVI MUMBAI Phone- 022-27691220 Pincode : Email : sales@nisanprocess.com	Works-1->Mr. Nitin S. Nikam Dir R-587/1, M.I.D.C. RABALE, T.T.C. INDL. AREA -Navi Mumbai-MAHARASHTRA INDIA Phone- 022-27691220 FAX : 022-27693317 Pincode : Email : sales@nisanprocess.com
9	OTOKLIN GLOBAL BUSINESS LIMITED	R-02, "Remi Bizcourt", PLOT NO.09 SHAH INDUSTRIAL AREA,VEERA DESAI RAOD ANDHERI (WEST) MUMBAI Phone- 022 - 2673 2134/35 Pincode : 400053 Email : sales@otoklin.com	Works-1->Mr.Abdul Wahab W-71A,MIDC,Anand Nagar Additional,Ambernath Industrial Area -Thane-MAHARASHTRA INDIA Phone- 0251-2621917 FAX : Pincode : 421 506 Email : sales@otoklin.com
10	SUNGOV ENGINEERING PVT. LTD.	MR. S PRAKASH 160 BABA NAGAR, VILLIVAKKAM CHENNAI Phone- 044 26501404 Pincode : 600049 Email : domesticsales@sungov.com	Works-1->Mr.S PRAKASH Others K-27, AMBATTUR INDUSTRIAL ESTATE, AMBATTUR -CHENNAI-TAMILNADU INDIA Phone- 044 26359940 FAX : Pincode : 600058 Email : domesticsales@sungov.com

11	VENUS VALVES & ENGINEERING WORKS	Mr. RAJESH AGARWAL Shibtolla Industrial Estate, Balitikuri Shibtalla, Howrah-Amta Road Howrah Phone-9831091232 Pincode : 711113 Email : info@venusvalves.in	Works-1->Rajesh Agarwal,Shibtolla Industrial Estate, Others Balitikuri, Shibtalla,Howrah-Amta Road - Howrah-WEST BENGAL INDIA Phone-9831091232 FAX : Pincode : 711113 Email : info@venusvalves.in

	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24

PAINTING REQUIREMENT

1 Stainless Steel, Non- Ferrous and Galvanised item/portion will not be painted.
2 Painting on steel surfaces/parts shall be as per below table.

Package	Condition	Surface Preparation	Primer Coat	No. of Coats	DFT (in Microns)	Intermediate Coat (in Microns)	No. of Coats	DFT (in Microns)	Final Coat	No. of Coats	DFT (in Microns)	Total DFT
1	Indoor/Outdoor	S.A 2.5 of Swedish Specification no. SIS-05-5900-1967	Catalysed Zn rich Primer with a VS of 60% min, complying to SSPC Paint 20 level 2.	1	75	Two component High Build high Solid Aliphatic Amine Cured Epoxy coating. - Min VS 85%.	1	100	2 pack Acrylic Aliphatic Polyurethane top coat - with Gloss retention of at least 90% on QUVB exposure of minimum 1000 hrs.	2	75	250 (Min.)

BHEL	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24

PACKING REQUIREMENT

Sl.no	DESCRIPTION
1	**Type of Packing:**
1.1	Item shall be fully covered with multi layered cross laminated colourless polyethylene sheet of at least 100 GSM and shall be packed inside wooden box or crate or fixed on wooden pallet depending upon the size.
1.2	Item shall be firmly fixed to the bottom of the packing box/crate/pallet with the help of supports/blocks to arrest the movement from all sides. Internal threads shall be protected with metal plug sealed with Teflon tape (if applicable). External thread shall be protected with PVC sleeve. Flanged opening if any shall be covered with blank flanges sealed with blank gasket of natural rubber or equivalent.
1.3	Loose material, primary and secondary shall be packed in corrugated box and plastic bags with proper tagging.
2	**Quality of wood:**
2.1	**Quality of wood:** Wood used for packing box shall be Pinewood, Rubber wood, Mango wood, Fir wood, Silver Oak wood or other as per availability with moisture content not exceeding 30%.
3	**Moisture protection:**
3.1	External machined C.S. Surfaces shall be protected against corrosion with corrosion resisting coating or grease/ shall be coated with rust preventive primer. Equiment shall be covered with HDPE sheet/ polythene sheet inside the box to prevent from moisture ingress.
4	**Packing slip & holder:**
4.1	Packing slip kept in polyethylene bag shall be placed inside the wooden box at appropriate place.
4.2	One copy of packing slip wrapped in polyethylene bag covered in galvanized iron tin sheet/ aluminium packing slip holder shall be fixed on the external surface the packing box.

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BILL OF QUANTITY

BOQ SCHEDULE

1.0	**Supply of Pumps and Motors:**	**UOM**	**QUANTITY**
1.1	**DMCW PUMPS FOR FGD AUX'S**		
1.1.1	Pump	Nos.	2
1.1.2	Motor	Nos.	2
1.1.3	Suction Strainer	Nos.	2
1.1.4	Mandatory Spares (as per S.No. 3.0 below)	Lot	1
NOTE: Commissioning & Erection spares, special Tools & tackle and other accessories applicable as per Specification but not listed above shall be included in the price of pump/motor & shall be supplied with the pump/motor.			
2.0	**SITE SERVICES:**	**UOM**	**QUANTITY**
2.1	Installation Check & Supervision for replacement of Gland packing with Mechanical Seal at Site as per Specification		
2.1.1	Site Visit Charges	Nos. of Visits	2
2.1.2	Manday Charges at Site	Nos. of Mandays	6
2.2	PG Test of pumps at site as per Specification	Lot	1
NOTE:			
1	Service charges at Sl.no 2.1.1 shall include to/fro travel expenses, medical and insurance.		
2	Service Charges at Sl.no 2.1.2 shall include boarding/lodging, local conveyance or any other applicable charge for completion of site services. No. of mandays at site defined at Sl.no. 2.1.2 above shall be calculated on the basis of presence at site (travelling time/days is excluded).		
3.0	**Mandatory Spares for**	**UOM**	**QUANTITY**
3.1	**DMCW PUMPS FOR FGD AUX'S**		
3.1.1	Impeller with nuts & other accessories	Set	1
3.1.2	Wearing rings (Impeller & Casing ; as applicable)	Sets	2
3.1.3	Shaft	Set	1
3.1.4	Shaft Sleeves	Sets	2
3.1.5	Pump & Drive Coupling, bushes, pins with all fasteners	Set	1
3.1.6	Pump bearings	Set	1
3.1.7	Mechanical Seal	Set	1
NOTE:			
1	One(1) set consists of quantity required for complete replacement for one(1) Pump of each type/size. Also the 'set' would include all components/hardware required to replace the item.		
2	In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities as specified in the Technical specification.		

BHEL	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24

DOCUMENTATION REQUIREMENT

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY ALL THE BIDDERS ALONG WITH THE BID	
Sl. No.	**DOCUMENT TITLE**
1	PQR CREDENTIALS (APPLICABLE AS PER NIT)
2	COMPLIANCE CERTIFICATE (Duly Signed and Stamped)
3	GA DRAWINGS OF PUMP & MOTOR SET INDICATING PUMP OUTLINE DIMENSIONS AND CIVIL LOAD DETAILS (Only for Reference and not for Comment/Approval)
4	Data for Drive Motor which is not in bidder's scope of supply: Load torque speed curves of the pumps, selected motor rating, rpm, GD2 of driven equipment.
5	SCHEDULE OF PERFORMANCE GUARANTEES (Duly Signed & Stamped and as per the format provided with Specification)

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT ALONG WITH SUBMISSION SCHEDULE		
Sl. No.	**DOCUMENT TITLE**	**SUBMISSION SCHEDULE**
1	TDS AND PERFORMACE CURVES, GENERAL ARRANGEMENT AND CROSS SECTIONAL - MISC. PUMPS (H)	Rev-00 to be submitted within 15 days of LOI/PO date.
2	TDS AND CURVES OF MOTORS FOR MISC. PUMPS (H)	
3	QP-MISC PUMPS (H)	
4	QP- MOTORS	
5	MOTOR TYPE TEST DOC - If Applicable	Rev-00 to be submitted within 15 days of approval of documents at S.No. 2 & 4 above.
6	O & M MANUAL - MISC PUMPS (H)	Rev-00 to be submitted within 15 days of approval of above documents.
7	PG TEST PROCEDURE - MISC PUMPS (H) - If Applicable	
BHEL/Customer comments/approval and Vendor Re-submission schedule		
BHEL comments on First Submission		Within 10 days of Vendor submission.

	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001
		Rev. No. 00
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	BHEL/Customer comments/approval on Revised Submission	Within 18 days of Vendor submission.
	Vendor Re-submission	Within 7 days of BHEL / Customer comments.

	Important Instructions for Drawings & Documents to be submitted after award of Contract
1	Fully dimensioned outline general arrangement drawings of the pump and motor assembly (including suction strainer) should include foundation base plate/sole plate details as applicable, civil foundation, anchor bolt details, loading data (Static and Dynamic), points of connections of external piping, cables and mounting of devices furnished by the supplier and details for Gap between Coupling Shafts, Float & details for axial/radial tolerance allowed etc. which are required for erecting agency during erection of pump.
2	Characteristic curves of pumps showing the following to be submitted: a) Flow Vs Head b) Flow Vs Power c) Flow Vs Efficiency d) Flow Vs NPSHR/ minimum submergence

DRAWINGS & DOCUMENTS TO BE SUBMITTED AS FINAL/AS-BUILT DOCUMENT	
Sl. No.	**DOCUMENT TITLE**
1	APPROVED DOCUMENTS
2	O&M MANUAL
3	ALL TEST CERTIFICATES / REPORTS
4	DRAWINGS OF COMPONENTS AND DETAILS AS DEEMED NECESSARY.
5	STORAGE INSTRUCTIONS

BHEL	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24

PRE QUALIFICATION REQUIREMENT (TECHNICAL)

228910/2024/PS-PEM-WSE

FORM NO. PEM 6100-0

BHEL	PRE - QUALIFYING REQUIREMENTS (TECHNICAL)	TECHNICAL SPECIFICATION NO- PE-TS-485-100-N001 TECHNICAL PQR NO. REV NO. 00 DATED 05.04.24 STANDARD PQR NO: PE-PQ-STD-100-N111 REVISION NO: 04 DATE: 07.02.2020 SHEET: 1 of 2

ENQUIRY NO:

PROJECT: 1X800 MW NORTH CHENNAI STG III - FGD

PACKAGE: MISC. PUMPS (HORIZONTAL)

1. The bidder should have designed, manufactured, tested, inspected & supplied the Horizontal Centrifugal pumps for water application with minimum rated flow of 170 CuM/Hr, which have been successfully in use for at least 1 year in two different thermal power plants or similar industry/ application and bidder is in business of Horizontal centrifugal pumps for water application on continuous basis.

2. The Bidders shall furnish following support documents for assessment of Bidder w.r.t. PQR as indicated at Sl. No. 1 above:

   A. Bidder's Experience list of Horizontal centrifugal pumps for water application for last 5 years (as on the Enquiry/NIT date) for assessment of bidder for supplying the Horizontal centrifugal pumps for water application on regular basis for establishing business continuity in the enclosed format- Annexure-1.

      Bidder shall furnish the PO copy of at least two (2) executed Contracts as indicated in the experience list.

   B. Bidder shall furnish any one from below in support of successful performance of Horizontal centrifugal pumps for water application for one year:

      i. Satisfactory Performance feedback certificates from End Customer (Owner) (in English) for at least Two successfully executed contracts (from different End customers (Owners) which have been in use for atleast one year indicating salient features like year of commissioning of Horizontal centrifugal pumps for water application, rating of project, flow of Horizontal centrifugal pumps for water application, project name etc., date of issue of certificate and name/ designation of the certificate issuer for power plant/similar application industry. The time duration of Satisfactory performance completion should be before the date of subject Enquiry/NIT.

      OR

      ii. The bidder has been awarded two repeat contracts for Horizontal centrifugal pumps for water application from two different End Customer (Owner) / Purchaser for power plant/similar application industry. Repeat contract shall be considered when the second contract is given by the same purchaser/ owner after lapse of minimum 1 year from execution (viz. supply) of first contract. Supporting documents for execution of the first contract like dispatch ^{N2} details or commissioning report or PG test report along with the PO Copy to be furnished, if bidder intends to submit the documents for Repeat Contracts. The date of repeat contract order should not be later than the date of subject Enquiry/NIT.

PREPARED BY:	REVIEWED BY:	APPROVED BY:
NAME: DESIGNATION / DEPT.:	NAME: DESIGNATION / DEPT.:	NAME: DESIGNATION / DEPT.:

OR

iii. Satisfactory Performance feedback certificates from End Customer (Owner) (in English) for one successfully executed contract which have been successfully in use for atleast one year indicating salient features like year of commissioning of Horizontal centrifugal pumps for water application, rating of project, flow of Horizontal centrifugal pumps for water application, project name etc., date of issue of certificate and name/ designation of the certificate issuer for power plant/similar application industry. The time duration of Satisfactory performance completion should be before the date of subject Enquiry/NIT.

AND

The bidder has been awarded repeat contracts for Horizontal centrifugal pumps for water application from minimum one End customer (owner)/Purchaser (other than the one for which the bidder has furnished the performance feedback above) for power plant/similar application industry. Repeat contract shall be considered when the second contract is given by the same purchaser/ owner after lapse of minimum 1 year from execution of first contract (viz. supply). Supporting documents for execution of the first contract like dispatch [N2] details or commissioning report or PG test report along with the PO Copy to be furnished, if bidder intends to submit the documents for Repeat Contracts. The date of repeat contract order should not be later than the date of subject Enquiry/NIT.

Notes:-

N1 -Purchase order copy, Supporting drawings/technical data sheets etc. are to be submitted along with the bid for which the bidder intends to furnish the performance feedbacks / repeat contracts for reference purpose only.

N2 - Dispatch details shall include any one of the following documents:

a.Tax Invoice.

b.Site receipt/Receipted LR.

c.Customer's material dispatch clearance certificate.

Any additional document required in support of above documents to establish the correlation between the above documents and the supplied item shall be provided by the bidder.

N3. Purchase order for spare items shall not be considered as repeat order qualifying criteria.

N4. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.

N5. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder/collaborators to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.

N6. After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.

EXPERIENCE LIST

PROJECT NAME	CUSTOMER	PUMP PARAMETERS		PUMP MODEL	NO. OF PUMPS	TYPE OF FLUID	TYPE OF PUMP	YEAR OF SUPPLY	PERFORMANE FEEDBACK CERTIFICATE ENCLOSED (Y/N)
		FLOW	TDH						
		(Cu M/Hr.)	(MWC)						

	TECHNICAL SPECIFICATION MISC. PUMPS (HORIZONTAL) 1X800 MW NORTH CHENNAI STG III (FGD PKG)	PE-TS-485-100-W001 Rev. No. 00 Date : 04.04.24

COMPLIANCE CERTIFICATE

1	It is hereby confirm that the technical specification (sheet 1 to 58) has been read, understood. We confirm compliance to the tender specification including any pre-bid clarifications and amendments, without any deviation.
2	It is hereby declared that any technical submittals which was not specifically asked for in NIT shall be considered withdrawn.

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date