BHARAT HEAVY ELECTRICALS LIMITED

PROJECT ENGINEERING MANAGEMENT, NOIDA

Date-12-Nov-25

CORRIGENDUM- 03

PROJECT	**:**	**1X800 MW HPGCL YAMUNANAGAR STPP**
PACKAGE	**:**	**Water Treatment Package**
ENQUIRY NO	**:**	**77/25/6165/AMI dated 16-10-2025**
SUBJECT	**:**	**Amendment to technical specification**

Type of Corrigendum			
Technical Corrigendum -	☑	Commercial Corrigendum -	☐

Amendment to technical specification is enclosed has been issued and enclosed herewith.

All the other terms and conditions of the tender enquiry remain unchanged. All the bidders are requested to quote accordingly.

Yours faithfully,

For and on behalf of BHEL

Amit Kumar
Manager/BOP

	AMENDMENT TO TECHNICAL SPECIFICATION FOR WATER TREATMENT PACKAGES 1X800 MW DEEN BANDHU CHOTU RAM SUPER THERMAL POWER PLANT, YAMUNA NAGAR	SPECIFICATION NO.: PE-TS-510-404-W001 AMENDMENT NO # 1 REV. NO. 00 | DATE: 07/11/2025 Page **1** of **1**

The following modifications with respect to Technical Specification for Water Treatment Packages. BHEL's Technical specification no PE-TS-510-404-W001 shall apply.

Bidder to note that existing clauses/ details as appearing in the specification stands deleted and clauses/details as mentioned in "Modified to or Read as" column shall be applicable and complied by the bidder as listed below in **SCHEDULE A**.

SCHEDULE-A

MODIFIED CLAUSES/ PAGE NUMBERS:

Sl no.	Vol. No.	Section/ Sub-section	Clause no	Page no	Existing clause/details	Modified to or Read as
1.	-	SECTION–I/ SUB-SECTION– IA	3.3.3 (iii)	36 of 3688	Circulating water- 84000 m3/hr-5 kg/hr	Circulating water- 84000 m3/hr-52 kg/hr
2.	-	SECTION – I	-	239 to 242 of 3688	Referred pages.	The referred pages shall be replaced with the attachments enclosed with this amendment.
3.	-	SECTION – I	-	318 to 321 of 3688	Referred pages.	The referred pages shall be replaced with the attachments enclosed with this amendment.

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TECHNICAL DATA - PART - A

SL.NO	DESCRIPTION	UOM	DETAIL TYPE-1	DETAIL TYPE-2	DETAIL TYPE-3	DETAIL TYPE-4	DETAIL TYPE-5	DETAIL TYPE-6	DETAIL TYPE-7	DETAIL TYPE-8	DETAIL TYPE-9
	Designation/Name of the Pump		**ACW PUMP**	**RAW WATER INTAKE PUMP**	**RAW WATER (PT) PUMP**	**RAW WATER (ASH) PUMP**	**CW MAKE UP PUMP**	**APH/ESP WASH PUMP**	**SERVICE WATER PUMP**	**AHP SEAL WATER PUMP**	**POTABLE WATER PUMP**
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 Erection & commissioning at site for Miscellaneous Pumps 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/HT Electric motor with cable glands and lugs at motor end.		No (HT Motor is free issue by BHEL)	Yes	No (HT Motor is free issue by BHEL)	No (HT Motor is free issue by BHEL)	Yes	Yes	Yes	Yes	Yes
1.1.2	Strainer at Pump Bowl Assembly Inlet		As per Bidder's Standard Design	As per Bidder's Standard Design	As per Bidder's Standard Design	As per Bidder's Standard Design	As per Bidder's Standard Design	As per Bidder's Standard Design	As per Bidder's Standard Design	As per Bidder's Standard Design	As per Bidder's Standard Design
1.1.3	Pump motor coupling (Heavy duty) along with coupling guard		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.4	Common base/sole plate for pumps and motor		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.5	Thrust block assembly (Thrust pads, attachments) for transferring the pump thrust to concrete thrust block (concrete thrust block in purchaser scope)		No, Bidder to design the pump foundation system (base plate/ sole plate, discharge head, foundation bolts etc.) capable of transferring the pump thrust to the concrete pump foundation itself.	No, Bidder to design the pump foundation system (base plate/ sole plate, discharge head, foundation bolts etc.) capable of transferring the pump thrust to the concrete pump foundation itself.	No, Bidder to design the pump foundation system (base plate/ sole plate, discharge head, foundation bolts etc.) capable of transferring the pump thrust to the concrete pump foundation itself.	No, Bidder to design the pump foundation system (base plate/ sole plate, discharge head, foundation bolts etc.) capable of transferring the pump thrust to the concrete pump foundation itself.	No, Bidder to design the pump foundation system (base plate/ sole plate, discharge head, foundation bolts etc.) capable of transferring the pump thrust to the concrete pump foundation itself.	No, Bidder to design the pump foundation system (base plate/ sole plate, discharge head, foundation bolts etc.) capable of transferring the pump thrust to the concrete pump foundation itself.	No, Bidder to design the pump foundation system (base plate/ sole plate, discharge head, foundation bolts etc.) capable of transferring the pump thrust to the concrete pump foundation itself.	No, Bidder to design the pump foundation system (base plate/ sole plate, discharge head, foundation bolts etc.) capable of transferring the pump thrust to the concrete pump foundation itself.	No, Bidder to design the pump foundation system (base plate/ sole plate, discharge head, foundation bolts etc.) capable of transferring the pump thrust to the concrete pump foundation itself.
1.1.6	Self contained lubrication system along with all internal piping, valves, fittings, specialties etc. as required		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.7	Counter flanges for suction/ discharge nozzles along with fixing nuts, bolts and gaskets		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.8	Anchor bolts, nuts, seating steel works, shims etc. as necessary for mounting the pump-motor unit on civil foundations		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.9	Vent with piping, valves and Priming Connection on Pump Casing		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.10	Drain connections in Casing and Base Plate with piping & isolating valves/plugs		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.11	Lifting/ handling attachments/lugs for the pump and motor		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.12	Any fixtures, clamps, etc. necessary raising/ lowering of the pump assembly piece by piece		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.13	First fill of lubricants with toping requirements for one year of operation after commissioning and handing over of equipment		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.14	Set of "Special" Tools & Tackles for Pumps and motors, if any		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.15	Erection and commissioning spares, "on as required" basis		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.16	1 No. RTD for Pump Thrust Bearing		Yes	No	Yes	Yes	Yes	Yes	No	No	No
1.1.17	1 No. Reverse Rotation Indicating Switch for each Pump		Yes	No	No	No	No	No	No	No	No
1.1.18	Ratchet for protection from Reverse Rotation		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.19	Mandatory Spares (Details as per BOQ Schedule)		Refer Mandatory spares list as per slno. 03 in BOQ Schedule								
1.2	Scope of Services at Site:										
1.2.1	Erection and commissioning at site		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.2.2	Performance Testing at Site		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.3	Physical Sump Model Study of Pump House		No	No	No	No	No	No	No	No	No
1.4	CFD Sump Model Study of Pump House		No	No	No	No	No	No	No	No	No
1.5	Rubber expansion joints (R.E.J.) at pump discharge		No	No	No	No	Yes	No	No	No	No
2.0	**DESIGN CODES & STANDARDS**										
2.1	Design Standard		IS-1710/IS-5120/IS-5659/HIS	IS-1710/IS-5120/IS-5659/HIS	IS-1710/IS-5120/IS-5659/HIS	IS-1710/IS-5120/IS-5659/HIS	IS-1710/IS-5120/IS-5659/HIS	IS-1710/IS-5120/IS-5659/HIS	IS-1710/IS-5120/IS-5659/HIS	IS-1710/IS-5120/IS-5659/HIS	IS-1710/IS-5120/IS-5659/HIS
2.2	Performance Standard		IS-9137/IS-5120/HIS/ASME PTC 8.2	IS-9137/IS-5120/HIS/ASME PTC 8.2	IS-9137/IS-5120/HIS/ASME PTC 8.2	IS-9137/IS-5120/HIS/ASME PTC 8.2	IS-9137/IS-5120/HIS/ASME PTC 8.2	IS-9137/IS-5120/HIS/ASME PTC 8.2	IS-9137/IS-5120/HIS/ASME PTC 8.2	IS-9137/IS-5120/HIS/ASME PTC 8.2	IS-9137/IS-5120/HIS/ASME PTC 8.2
2.3	Flange & Counter Flange		AWWA class - C-207	AWWA class - C-207	AWWA class - C-207	AWWA class - C-207	AWWA class - C-207	AWWA class - C-207	AWWA class - C-207	AWWA class - C-207	AWWA class - C-207
2.4	Structural steel		IS 2062	IS 2062	IS 2062	IS 2062	IS 2062	IS 2062	IS 2062	IS 2062	IS 2062
2.5	Cast Iron		IS 210	IS 210	IS 210	IS 210	IS 210	IS 210	IS 210	IS 210	IS 210
2.6	Threaded Steel Fasteners		IS 1367	IS 1367	IS 1367	IS 1367	IS 1367	IS 1367	IS 1367	IS 1367	IS 1367
2.7	Alloy-Steel and Stainless Steel Bolting		ASTM A193	ASTM A193	ASTM A193	ASTM A193	ASTM A193	ASTM A193	ASTM A193	ASTM A193	ASTM A193
2.8	Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts		ASTM A194	ASTM A194	ASTM A194	ASTM A194	ASTM A194	ASTM A194	ASTM A194	ASTM A194	ASTM A194
2.9	Carbon Steel Castings		ASTM A216	ASTM A216	ASTM A216	ASTM A216	ASTM A216	ASTM A216	ASTM A216	ASTM A216	ASTM A216

TECHNICAL DATA - PART - A

SL.NO	DESCRIPTION	UOM	DETAIL TYPE-1	DETAIL TYPE-2	DETAIL TYPE-3	DETAIL TYPE-4	DETAIL TYPE-5	DETAIL TYPE-6	DETAIL TYPE-7	DETAIL TYPE-8	DETAIL TYPE-9
	Designation/Name of the Pump		**ACW PUMP**	**RAW WATER INTAKE PUMP**	**RAW WATER (PT) PUMP**	**RAW WATER (ASH) PUMP**	**CW MAKE UP PUMP**	**APH/ESP WASH PUMP**	**SERVICE WATER PUMP**	**AHP SEAL WATER PUMP**	**POTABLE WATER PUMP**
2.10	Carbon Steel Forgings		ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105	ASTM A105
2.11	Stainless Steel Castings		ASTM A351	ASTM A351	ASTM A351	ASTM A351	ASTM A351	ASTM A351	ASTM A351	ASTM A351	ASTM A351
2.12	Stainless Steel Forgings		ASTM A276	ASTM A276	ASTM A276	ASTM A276	ASTM A276	ASTM A276	ASTM A276	ASTM A276	ASTM A276
2.13	Duplex Stainless Steel Castings		ASTM A890 / ASTM A995	ASTM A890 / ASTM A995	ASTM A890 / ASTM A995	ASTM A890 / ASTM A995	ASTM A890 / ASTM A995	ASTM A890 / ASTM A995	ASTM A890 / ASTM A995	ASTM A890 / ASTM A995	ASTM A890 / ASTM A995
2.14	Corrosion Resistance Alloy Steel Castings		ASTM A743	ASTM A743	ASTM A743	ASTM A743	ASTM A743	ASTM A743	ASTM A743	ASTM A743	ASTM A743
3.0	**DESIGN /SYSTEM PARAMETERS**										
3.1	KKS Number (TAG NO.)/Description		-	-	-	-	-	-	-	-	-
3.2	Total No. of pumps (Nos.)		2	3	2	2	2	2	2	2	2
3.3	No. of working & standby pumps		1Working + 1 Standby	2Working + 1 Standby	1Working + 1 Standby	1 Working + 1 Standby	1 Working + 1 Standby	1 Working + 1 Standby	1 Working + 1 Standby	1 Working + 1 Standby	1 Working + 1 Standby
3.4	Location		Indoor	Outdoor	Indoor	Indoor	Indoor	Indoor	Indoor	Indoor	Indoor
3.5	Pump suitable for parallel operation		Yes	Yes	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
3.6	Pump Duty		Continuous	Continuous	Continuous	Continuous	Continuous	Intermittent	Continuous	Continuous	Continuous
3.7	Rated capacity (No negative tolerance permitted)	cu.m/hr	4650	2550	2800	1400	2150	950	400	230	50
3.8	Total Dynamic Head (TDH) at rated capacity (At Bowl, excluding Pumps Internal frictional losses upto discharge) (No negative tolerance permitted)	MWC	40	4.5	40	40	20+Static height **(Refer Note1)**	80+Static height **(Refer Note1)**	60+Static height **(Refer Note1)**	40+Static height **(Refer Note1)**	60+Static height **(Refer Note1)**
3.9	Max. limit on shut off head Corresponding to pump TDH at 51.5 Hz	MWC	115-130% of the rated head	115-130% of the rated head	115-130% of the rated head	115-130% of the rated head	115-130% of the rated head	115-130% of the rated head	115-130% of the rated head	115-130% of the rated head	115-130% of the rated head
3.10	Required Range of Operation of the Pump (% of Rated Capacity)		40% to 130% of the rated flow	40% to 130% of the rated flow	40% to 130% of the rated flow	40% to 130% of the rated flow	40% to 130% of the rated flow	40% to 130% of the rated flow	40% to 130% of the rated flow	40% to 130% of the rated flow	40% to 130% of the rated flow
3.11	The pumps offered have continuously rising head capacity curves from the duty point towards shut off point.		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3.12	The pumps offered have stable rising H-Q curves within the "Range of Operation"		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3.13	Pump characteristics		Non Overloading type & stable	Non Overloading type & stable	Non Overloading type & stable	Non Overloading type & stable	Non Overloading type & stable	Non Overloading type & stable	Non Overloading type & stable	Non Overloading type & stable	Non Overloading type & stable
3.14	Maximum permissible speed of pump	RPM	965	1500	1500	1500	1500	1500	1500	1500	1500
3.15	Floor Level - for Pump Mounting	M	EL(+) 0.7 M	During Detailled Engg. (DDE)	EL(+) 0.5 M	EL(+) 0.5 M	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide
3.16	Minimum Water Level	M	EL (-)1.6 M	DDE	EL (-)3.7 M	EL (-)3.7 M	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide
3.16 (a)	Minimum Submerged Water Level	M	EL (-)1.6 M	DDE	EL (-)3.7 M	EL (-)3.7 M	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide
3.17	Maximum Water Level	M	EL (-) 0.3 M	DDE	EL (-) 0.5 M	EL (-) 0.5 M	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide
3.18	Sump Invert Level	M	EL (-) 5.1 M	DDE	EL (-) 6.5 M	EL (-) 6.5 M	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide
3.19	Crane Hook Level	M	EL (+) 9.5 M	DDE	EL (+) 6.5 M	EL (+) 6.5 M	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide
3.20	Crane Capacity Available	Ton	60 Ton	DDE	8 Ton	8 Ton	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide
3.21	Max. Handling Weight Limit	Ton	-	DDE	6 Ton	6 Ton	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide	Bidder to decide
3.22	System Design Pressure	kg/cm2 (g)	10	10	10	10	10	10	10	10	10
3.23	Design Temperature	Deg. C	60	60	60	60	60	60	60	60	60
3.24	Specific Gravity of fluid to be handled		1	1	1	1	1	1	1	1	1
3.25	Quality of Water Handled		Filtered water	Raw water	Raw water	Raw water	Filtered water	Filtered water	Filtered water	Filtered water	Filtered water
4.0	**CONSTRUCTION FEATURES**										
4.1	Type of Pump to be offered		Vertical turbine, Wet pit & Non-Pull out type	Vertical turbine, Wet pit & Non-Pull out type	Vertical turbine, Wet pit & Non-Pull out type	Vertical Turbine, Mixed Flow Type	Vertical Turbine, Mixed Flow Type	Vertical Turbine, Mixed Flow Type	Vertical Turbine, Mixed Flow Type	Vertical Turbine, Mixed Flow Type	Vertical Turbine, Mixed Flow Type
4.2	Type of Impeller to be offered		Closed / Semi-open	Closed / Semi-open	Closed / Semi-open	Closed/Semi Closed	Closed/Semi Closed	Closed/Semi Closed	Closed/Semi Closed	Closed/Semi Closed	Closed/Semi Closed
4.3	Pump Discharge		Above Floor	Above Floor	Above Floor	Above Floor	Above Floor	Above Floor	Above Floor	Above Floor	Above Floor
4.4	Cooling/Lubrication Arrangement to be provided for Mechanical Seal/Gland		By Self Water	By Forced Water Lubrication	By Forced Water Lubrication	By Forced Water Lubrication	By Self Water	By Self Water	By Self Water	By Self Water	By Self Water
4.5	Cooling/Lubrication Arrangement to be provided for Thrust Bearing		By Grease/Oil/Self Water	By Oil & Forced Water Lubrication	By Oil & Forced Water Lubrication	By Oil & Forced Water Lubrication	By Grease/Oil/Self Water	By Grease/Oil/Self Water	By Grease/Oil/Self Water	By Grease/Oil/Self Water	By Grease/Oil/Self Water
4.6	Cooling/Lubrication Arrangement to be provided for Line Shaft Bearing		By Self Water	By Forced Water Lubrication	By Forced Water Lubrication	By Forced Water Lubrication	By Self Water	By Self Water	By Self Water	By Self Water	By Self Water
4.7	Shaft Sealing Arrangement		Gland Packing	Gland Packing	Gland Packing	Gland Packing	Gland Packing	Gland Packing	Gland Packing	Gland Packing	Gland Packing
4.8	Pump Discharge Connecting Pipe Size (OD x Thk)	mm x mm	914 X 8	DDE	711 X 8	508 X 8	610 X 8	406.4 X 7.1	273 X 6.35	219.1 X 6.35	115 X 5.4
4.9	Minimum Column Pipe Thickness	mm	10	10	10	10	10	10	10	10	10

TECHNICAL DATA - PART - A

SL.NO	DESCRIPTION	UOM	DETAIL TYPE-1	DETAIL TYPE-2	DETAIL TYPE-3	DETAIL TYPE-4	DETAIL TYPE-5	DETAIL TYPE-6	DETAIL TYPE-7	DETAIL TYPE-8	DETAIL TYPE-9
	Designation/Name of the Pump		**ACW PUMP**	**RAW WATER INTAKE PUMP**	**RAW WATER (PT) PUMP**	**RAW WATER (ASH) PUMP**	**CW MAKE UP PUMP**	**APH/ESP WASH PUMP**	**SERVICE WATER PUMP**	**AHP SEAL WATER PUMP**	**POTABLE WATER PUMP**
4.10	Motor rating selection criteria		115 % of duty point requirement or 10 % above the maximum load demand of the driven equipment in the complete operating range (including run-out condition of pump and shut-off condition in case pumps envisaged to be started with the discharge valve closed) whichever is higher to care of the system frequency variation.	75 KW	Continuous motor rating (at 50 deg. Cent, ambient) for pump shall be at least 10% above the maximum load demand of the driven equipment in the complete range.	Continuous motor rating (at 50 deg. Cent, ambient) for pump shall be at least 10% above the maximum load demand of the driven equipment in the complete range.	Continuous motor rating (at 50 deg. Cent, ambient) for pump shall be at least 10% above the maximum load demand of the driven equipment in the complete range.	Continuous motor rating (at 50 deg. Cent, ambient) for pump shall be at least 10% above the maximum load demand of the driven equipment in the complete range.	Continuous motor rating (at 50 deg. Cent, ambient) for pump shall be at least 10% above the maximum load demand of the driven equipment in the complete range.	Continuous motor rating (at 50 deg. Cent, ambient) for pump shall be at least 10% above the maximum load demand of the driven equipment in the complete range.	Continuous motor rating (at 50 deg. Cent, ambient) for pump shall be at least 10% above the maximum load demand of the driven equipment in the complete range.
4.11	Type of coupling between pump & motor		Flexible Type	Flexible Type	Flexible Type	Flexible Type	Flexible Type	Flexible Type	Flexible Type	Flexible Type	Flexible Type
4.12	**Material of Construction**										
4.12.1	Casing & Suction Bell		2.5% Ni CI to IS 210 GR FG-260 (S-0.1% max and P-0.15% max) with ss casing liner	2.5% Ni CI to IS 210 GR FG-260 (S-0.1% max and P-0.15% max) with ss casing liner	2.5% Ni CI to IS 210 GR FG-260 (S-0.1% max and P-0.15% max) with ss casing liner	2.5% Ni CI to IS 210 GR FG-260 (S-0.1% max and P-0.15% max) with ss casing liner	2.5% Ni CI to IS 210 GR FG-260 (S-0.1% max and P-0.15% max) with ss casing liner	2.5% Ni CI to IS 210 GR FG-260 (S-0.1% max and P-0.15% max) with ss casing liner	2.5% Ni CI to IS 210 GR FG-260 (S-0.1% max and P-0.15% max) with ss casing liner	2.5% Ni CI to IS 210 GR FG-260 (S-0.1% max and P-0.15% max) with ss casing liner	2.5% Ni CI to IS 210 GR FG-260 (S-0.1% max and P-0.15% max) with ss casing liner
4.12.2	Column Pipe & Discharge Head		Fabricated steel as per IS: 2062 (minimum thickness 10 mm) with 2 coats of epoxy coating inside & outside	Fabricated steel as per IS: 2062 (minimum thickness 10 mm) with 2 coats of epoxy coating inside & outside	Fabricated steel as per IS: 2062 (minimum thickness 10 mm) with 2 coats of epoxy coating inside & outside	Fabricated steel as per IS: 2062 with 2 coats of epoxy coating inside & outside	Fabricated steel as per IS: 2062 with 2 coats of epoxy coating inside & outside	Fabricated steel as per IS: 2062 with 2 coats of epoxy coating inside & outside	Fabricated steel as per IS: 2062 with 2 coats of epoxy coating inside & outside	Fabricated steel as per IS: 2062 with 2 coats of epoxy coating inside & outside	Fabricated steel as per IS: 2062 with 2 coats of epoxy coating inside & outside
4.12.3	Impeller		Austenitic SS ASTM A743 CF8M Grade	Austenitic SS ASTM A743 CF8M Grade	Austenitic SS ASTM A743 CF8M Grade	Austenitic SS ASTM A743 CF8M Grade	Austenitic SS ASTM A743 CF8M Grade	Austenitic SS ASTM A743 CF8M Grade	Austenitic SS ASTM A743 CF8M Grade	Austenitic SS ASTM A743 CF8M Grade	Austenitic SS ASTM A743 CF8M Grade
4.12.4	Shaft / Line Shaft		SS 410	SS 410	SS 410	SS 410	SS 410	SS 410	SS 410	SS 410	SS 410
4.12.5	Shaft sleeves		SS 410	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316
4.12.6	Shaft Coupling		SS 410	SS 410	SS 410	SS 410	SS 410	SS 410	SS 410	SS 410	SS 410
4.12.7	Wear ring		SS 316	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316
4.12.8	Fasteners (Wetted)		SS-316	SS-316	SS-316	SS-316	SS-316	SS-316	SS-316	SS-316	SS-316
4.12.9	Fasteners (Non-Wetted)		SS-316	SS-316	SS-316	SS-316	SS-316	SS-316	SS-316	SS-316	SS-316
4.12.10	Pump/Motor Coupling		CI	CI	CI	CI	CI	CI	CI	CI	CI
4.12.11	Intermediate stage bearings		Cutless rubber with bronze retainer for below minimum water level and Thordon type for above minimum water level.	- Cutless rubber with ST SHELL (for below minimum water level) - Self Lubricated Type (for above minimum water level)	- Cutless rubber with ST SHELL (for below minimum water level) - Self Lubricated Type (for above minimum water level)	- Cutless rubber with ST SHELL (for below minimum water level) - Self Lubricated Type (for above minimum water level)	Cutless rubber with bronze retainer for below minimum water level and Thordon type for above minimum water level.	Cutless rubber with bronze retainer for below minimum water level and Thordon type for above minimum water level.	Cutless rubber with bronze retainer for below minimum water level and Thordon type for above minimum water level.	Cutless rubber with bronze retainer for below minimum water level and Thordon type for above minimum water level.	Cutless rubber with bronze retainer for below minimum water level and Thordon type for above minimum water level.
4.12.12	Gland Plate & Stuffing Box		2.5% Ni CI to IS 210 GR FG-260	2.5% Ni CI to IS 210 GR FG-260	2.5% Ni CI to IS 210 GR FG-260	2.5% Ni CI to IS 210 GR FG-260	2.5% Ni CI to IS 210 GR FG-260	2.5% Ni CI to IS 210 GR FG-260	2.5% Ni CI to IS 210 GR FG-260	2.5% Ni CI to IS 210 GR FG-260	2.5% Ni CI to IS 210 GR FG-260
4.12.13	Lantern ring		As per Manufacturer standard	As per Manufacturer standard	As per Manufacturer standard	As per Manufacturer standard	As per Manufacturer standard	As per Manufacturer standard	As per Manufacturer standard	As per Manufacturer standard	As per Manufacturer standard
4.12.14	Mechanical seals (faces)		NA	NA	NA	NA	NA	NA	NA	NA	NA
4.12.15	Gland packing		Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)
4.12.16	Base/ Sole Plate		MS Fabricated IS-2062 (min. thk.-12 mm) Epoxy Coated	MS Fabricated IS-2062 (min. thk.-12 mm) Epoxy Coated	MS Fabricated IS-2062 (min. thk.-12 mm) Epoxy Coated	MS Fabricated IS-2062 (min. thk.-12 mm) Epoxy Coated	MS Fabricated IS-2062 (min. thk.-12 mm) Epoxy Coated	MS Fabricated IS-2062 (min. thk.-12 mm) Epoxy Coated	MS Fabricated IS-2062 (min. thk.-12 mm) Epoxy Coated	MS Fabricated IS-2062 (min. thk.-12 mm) Epoxy Coated	MS Fabricated IS-2062 (min. thk.-12 mm) Epoxy Coated
4.12.17	Thrust pad (if applicable)		Carbon Steel with White Metal Lining	Carbon Steel with White Metal Lining	Carbon Steel with White Metal Lining	Carbon Steel with White Metal Lining	Carbon Steel with White Metal Lining	Carbon Steel with White Metal Lining	Carbon Steel with White Metal Lining	Carbon Steel with White Metal Lining	Carbon Steel with White Metal Lining
4.12.18	Counter Flange		Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel
4.13	Design Life of Bearing	Hrs	20000 Hrs	20000 Hrs	20000 Hrs	20000 Hrs	20000 Hrs	20000 Hrs	20000 Hrs	20000 Hrs	20000 Hrs
4.14	Sealing of Stuffing Box		By Gland Packing	By Gland Packing	By Gland Packing	By Gland Packing	By Gland Packing	By Gland Packing	By Gland Packing	By Gland Packing	By Gland Packing
4.15	Type of Mechanical Seal (If applicable)		Cartridge Type	Cartridge Type	Cartridge Type	Cartridge Type	Cartridge Type	Cartridge Type	Cartridge Type	Cartridge Type	Cartridge Type
4.16	Suction strainers/thurst bearing cooling water piping & valves		SS	SS	SS	SS	SS	SS	SS	SS	SS
4.16	The bidder shall make provisions for mounting following on the pump/ pump shaft: a. Purchaser's probes in 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		Yes	Not Applicable	Yes	Yes	Yes	Yes	Not Applicable	Not Applicable	Not Applicable
4.20	**Lubericating Pump MOC**		Not Applicable				Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Casing			2.5 % Ni CI to IS 210 Gr. FG 260.	2.5 % Ni CI to IS 210 Gr. FG 260.	2.5 % Ni CI to IS 210 Gr. FG 260.					
	Impeller			Bronze to IS 318 GR.I/II or SS- 316 / ASTM A 351 CF8M	Bronze to IS 318 GR.I/II or SS- 316 / ASTM A 351 CF8M	Bronze to IS 318 GR.I/II or SS- 316 / ASTM A 351 CF8M					
	Shaft			EN-8 (BS-970)	EN-8 (BS-970)	EN-8 (BS-970)					
	Shaft sleeves			SS - 410	SS - 410	SS - 410					
	Impeller Wear ring (as applicable)			High Leaded bronze to IS-318 Gr.V/SS - 316 in case of SS impeller	High Leaded bronze to IS-318 Gr.V/SS - 316 in case of SS impeller	High Leaded bronze to IS-318 Gr.V/SS - 316 in case of SS impeller					

TECHNICAL DATA - PART - A

SL.NO	DESCRIPTION	UOM	DETAIL TYPE-1	DETAIL TYPE-2	DETAIL TYPE-3	DETAIL TYPE-4	DETAIL TYPE-5	DETAIL TYPE-6	DETAIL TYPE-7	DETAIL TYPE-8	DETAIL TYPE-9
	Designation/Name of the Pump		**ACW PUMP**	**RAW WATER INTAKE PUMP**	**RAW WATER (PT) PUMP**	**RAW WATER (ASH) PUMP**	**CW MAKE UP PUMP**	**APH/ESP WASH PUMP**	**SERVICE WATER PUMP**	**AHP SEAL WATER PUMP**	**POTABLE WATER PUMP**
	Casing Wear ring (as applicable)			High Leaded bronze to IS-318 Gr.V/SS - 316 in case of SS impeller	High Leaded bronze to IS-318 Gr.V/SS - 316 in case of SS impeller	High Leaded bronze to IS-318 Gr.V/SS - 316 in case of SS impeller					
	Fasteners (Wetted)			SS	SS	SS					
	Fasteners (Non-Wetted)			SS	SS	SS					
	Coupling			CI	CI	CI					
	Gland			2.5 % Ni CI to IS 210 Gr. FG 260	2.5 % Ni CI to IS 210 Gr. FG 260	2.5 % Ni CI to IS 210 Gr. FG 260					
	Stuffing Box			2.5 % Ni CI to IS 210 Gr. FG 260	2.5 % Ni CI to IS 210 Gr. FG 260	2.5 % Ni CI to IS 210 Gr. FG 260					
	Lantern ring			Bronze	Bronze	Bronze					
	Mechanical seals (faces)			As per Manufacturer standard	As per Manufacturer standard	As per Manufacturer standard					
	Gland packing			Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)					
	Water seal tube			SS tube	SS tube	SS tube					
	Base plate			MS fabricated IS-2062 IS2062 E250 (min. thickness 10 mm), Painted confirming to C-4 as per ISO 12944	MS fabricated IS-2062 IS2062 E250 (min. thickness 10 mm), Painted confirming to C-4 as per ISO 12944	MS fabricated IS-2062 IS2062 E250 (min. thickness 10 mm), Painted confirming to C-4 as per ISO 12944					
	Counter Flange			Carbon Steel	Carbon Steel	Carbon Steel					
	Lubricating water tank capacity & MOC			5 Cum, Carbon steel (min thk 10 mm)	5 Cum, Carbon steel (min thk 10 mm)	NA					
	Construction Features of Suction Strainer										
	Suction Strainer Housing/Body			CS as per IS :2062	CS as per IS :2062	CS as per IS :2062					
	Suction Strainer Element / Basket including			SS316	SS316	SS316					
	Suction Strainer Gasket			Nitrile Rubber / EPDM (Min. 3 mm thick)	Nitrile Rubber / EPDM (Min. 3 mm thick)	Nitrile Rubber / EPDM (Min. 3 mm thick)					
	Type of Strainer			Simplex Basket Type	Simplex Basket Type	Simplex Basket Type					
	Type of Strainer Element			Wire Mesh supported with Perforated Plate	Wire Mesh supported with Perforated Plate	Wire Mesh supported with Perforated Plate					
	Perforation/Mesh size			10 Mesh (2 mm)	10 Mesh (2 mm)	10 Mesh (2 mm)					
	Strainer Inlet/ outlet Nozzle Size			As manufacturer std	As manufacturer std	As manufacturer std					
	Length of strainer (including counterflanges)			As manufacturer std	As manufacturer std	As manufacturer std					
	Ratio of Screen Clear Flow Area vis-à-vis Pipe			3	3	3					
5.0	**PERFORMANCE PARAMETERS**										
5.1	Performance Guarantee Tests at Shop/Works		Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer
5.2	Performance Guarantee Tests at Site		Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer
5.3	Maximum Limit on Auxiliary Power Consumption (Benchmark kW value) for each Continuous Duty Pump as per sl no.3.6 above, KW	KW	630	42	390	196	205	-	105	42	18
5.4	Maximum Efficiency for HT motors / LT motors which are not in bidder's scope	%	94	-	94	94	-	-	-	-	-
5.5	LIQUIDATED DAMAGES RATE	Rs./kW	Rs 550000	Rs 550000	Rs 550000	Rs 550000	Rs 550000	-	Rs 550000	Rs 550000	Rs 550000
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	5.3	4.3	5.3	5.3	5.3	5.3	4.3	4.3	4.3
5.7	Guaranteed vibration at site on any pump /motor bearing w.r.t. velocity (Vrms) as per ANSI/ HIS 9.6.4	Vrms	4.3	3.3	4.3	4.3	4.3	4.3	3.3	3.3	3.3
5.8	Max. noise Level (Guaranteed at site)	dB	85 dB at 1 M distance	85 dB at 1 M distance	85 dB at 1 M distance	85 dB at 1 M distance	85 dB at 1 M distance	85 dB at 1 M distance	85 dB at 1 M distance	85 dB at 1 M distance	85 dB at 1 M distance
NOTE 1:	These Pumps are envisaged in Filtered water tank after gravity filters. TDH of the these pumps mentioned at s. no. 3.8 is indicated from FGL (RL 270.0 M) only. Bidder to add static height from Minimum water level in filtered water pump house to the FGL in the indicated TDH to derive final TDH at bowl, based to on their design.										

TECHNICAL DATA - PART - A

SL.NO	DESCRIPTION	UOM	DETAIL -TYPE 1	DETAIL -TYPE 2	DETAIL -TYPE 3	DETAIL -TYPE 4	DETAIL -TYPE 5	DETAIL -TYPE 6	DETAIL -TYPE 7	DETAIL -TYPE 8	DETAIL -TYPE 9
	Designation/Name of the Pump		TG DMCW PUMP	SG DMCW PUMP	BOILER FILL PUMPS	EMERGENCY HOT WELL MAKE UP PUMP	DM CYCLE MAKE UP PUMP	HVAC MAKE UP PUMP	CHP MAKE UP PUMP	SERVICE WATER BOOSTER PUMP	POTABLE WATER BOOSTER PUMP
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 Erection and Commissioning & 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/HT Electric motor with cable glands and lugs at motor end.		No (HT Motor is free issue by BHEL)	No (HT Motor is free issue by BHEL)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.2 (a)	Strainer at Pump Suction with Drain/Vent Valves		Yes, Simplex Basket Type	Yes, Simplex Basket Type	Yes, Conical Type	Yes, Conical Type	Yes, Conical Type	NO	NO	NO	NO
1.1.2 (b)	Rubber expansion joints (RE Jooint) at Pump Suction and discharge		Yes	Yes	NO	NO	NO	NO	NO	NO	NO
1.1.3	Pump motor coupling (Heavy duty) along with coupling guard		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.4	Common base plate for pumps and motor		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.5	Self contained lubrication system along with all internal piping, valves, fittings, specialties etc. as required		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.6	Counter flanges for suction/ discharge nozzles along with fixing nuts, bolts and gaskets		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.7	Anchor bolts, nuts, seating steel works, shims etc. as necessary for mounting the pump-motor unit on civil foundations		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.8	Vent with piping, valves and Priming Connection on Pump Casing		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.9	Drain connections in Casing and Base Plate with piping & isolating valves/plugs		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.10	Lifting/ handling attachments/lugs for the pump and motor		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.11	First fill of lubricants with toping requirements for one year of operation after commissioning and handing over of equipment		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.12	Set of "Special" Tools & Tackles for Pumps and motors, if any		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.13	Erection and commissioning spares, "on as required" basis		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.1.14	1 No. RTD for each Pump Bearing		Yes	Yes	Yes	No	No	No	No	No	No
1.1.15	1 No. Reverse Rotation Indicating Switch for each Pump		No	No	No	No	No	No	No	No	No
1.1.16	Mandatory Spares (Details as per BOQ Schedule)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.2	Scope of Services:										
1.2.1	Erection and commissioning of Misc Pump		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.2.2	Replacement of Gland Packing with Mechanical Seal at Site after commissioning		Yes	Yes	Yes	Yes	Yes	No	No	No	No
1.2.3	Performance Testing at Site		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	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**										
3.2	Total No. of pumps (Nos.)		Three (3) nos.	Two (2) nos.	Two (2) nos.	Two (2) nos.	Two (2) nos.	Two (2) nos.	Two (2) nos.	Two (2) nos.	Two (2) nos.
3.3	No. of working & standby pumps		2 Working + 1 Standby	1 Working + 1 Standby	1 Working + 1 Standby	1 Working + 1 Standby	1 Working + 1 Standby	1 Working + 1 Standby	1 Working + 1 Standby	2 Working + 1 Standby	1 Working + 1 Standby
3.4	Location		Indoor	Indoor	Outdoor	Outdoor	Outdoor	Indoor	Indoor	Indoor	Indoor
3.5	Pump suitable for parallel operation		Yes	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
3.6	Pump Duty		Continuous	Continuous	Intermittent	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
3.7	Rated minimum capacity (No negative tolerance permitted)	cu.m/hr	1750	650	200	350	45	80	300	10	10
3.8	minimum Total Dynamic Head (TDH) at rated capacity (No negative tolerance permitted)	MWC	42	55	160	70	65	50	35	25	25
3.8.1	Variation on minimum TDH to be considered by bidder. Final TDH will be finalized during detailed engineering.	%	5	5	-	-	-	5	5	5	5
3.9	Max. limit on shut off head Corresponding to pump TDH (MWC) at 51.5 Hz	MWC	115-130% of the rated head	115-130% of the rated head	115-130% of the rated head	115-130% of the rated head	115-130% of the rated head	115-130% of the rated head	115-130% of the rated head	115-130% of the rated head	115-130% of the rated head
3.10	Required Range of Operation of the Pump (% of Rated Capacity)		40% to 130% of the rated flow	40% to 130% of the rated flow	40% to 130% of the rated flow	40% to 130% of the rated flow	40% to 130% of the rated flow	40% to 130% of the rated flow	40% to 130% of the rated flow	40% to 130% of the rated flow	40% to 130% of the rated flow
3.11	The pumps offered have continuously rising head capacity curves from the duty point towards shut off point.		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3.12	The pumps offered have stable rising H-Q curves within the "Range of Operation"		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3.13	Pump characteristics		Non Overloading type & stable	Non Overloading type & stable	Non Overloading type & stable	Non Overloading type & stable	Non Overloading type & stable	Non Overloading type & stable	Non Overloading type & stable	Non Overloading type & stable	Non Overloading type & stable
3.14	Maximum permissible speed of pump	RPM	1500	1500	1500	1500	1500	1500	1500	1500	1500
3.15	Suction Pressure (Available)	MWC	35.5	35.5	Flooded Suction	Flooded Suction	Flooded Suction	Flooded Suction	Flooded Suction	Flooded Suction	Flooded Suction
3.16	System Design Pressure	kg/cm2 (g)	10	12	20	10	10	10	10	10	10
3.17	Design Temperature	Deg. C	60	60	60	60	60	60	60	60	60
3.18	Specific Gravity of fluid to be handled		1	1	1	1	1	1	1	1	1
3.19	Quality of Water Handled		Passivated DM Water	Passivated DM Water	DM Water	DM Water	DM Water	Clarified Water	Clarified Water	Clarified Water	Clarified Water
3.20	Torque speed curve of the pump & drive motor furnished for pumps with HT drive motor.		Yes	Yes	Yes	No	No	No	No	No	No
4.0	**CONSTRUCTION FEATURES**										
4.1	Type of Pump to be offered		Horizontal centrifugal type Between Bearing Pump	Horizontal centrifugal type Between Bearing Pump	Horizontal centrifugal type Between Bearing Pump / Multi Stage Pump	Horizontal centrifugal type Between Bearing Pump	Horizontal centrifugal type Between Bearing Pump	Horizontal centrifugal type Between Bearing Pump	Horizontal centrifugal type Between Bearing Pump	Horizontal centrifugal type Between Bearing Pump	Horizontal centrifugal type Between Bearing Pump
4.2	Type of pump casing to be offered		Axially split type	Axially split type	Axially/Radial split type	Axially split type	Axially split type	Axially split type	Axially split type	Axially split type	Axially split type
4.3	Type of Impeller to be offered		Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
4.4	Type of Pump Lubrication allowed		Self Liquid/Grease	Self Liquid/Grease	Self Liquid/Grease	Self Liquid/Grease	Self Liquid/Grease	Self Liquid/Grease	Self Liquid/Grease	Self Liquid/Grease	Self Liquid/Grease

4.5	Sealing Arrangement		Gland packing initially & Mechanical seal finally after commisioning	Gland packing initially & Mechanical seal finally after commisioning	Gland packing initially & Mechanical seal finally after commisioning	Gland packing initially & Mechanical seal finally after commisioning	Gland packing initially & Mechanical seal finally after commisioning	Gland packing initially & Mechanical seal finally after commisioning	Gland packing initially & Mechanical seal finally after commisioning	Gland packing initially & Mechanical seal finally after commisioning	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	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4.7	Motor rating selection criteria		Motor rating shall be arrived at considering 15% margin over the duty point input or 10% over the maximum demand of the driven equipment, whichever is higher, considering highest system frequency and voltage variation. If however, a higher margin is stipulated in the accompanying driven equipment specification, the higher stipulated margin shall prevail. *(*Note - Maximum size impellers shall not be quoted for. By installation of a new impeller a head increase of 5 % minimum shall be possible. The performance of the drive motor is to be determined according to the above mentioned technical requirements along with other specification requirements)*								
4.8	Type of coupling between pump & motor		Flexible Spacer Type	Flexible Spacer Type	Flexible Type	Flexible Type	Flexible Type	Flexible Type	Flexible Type	Flexible Type	Flexible Type
4.9	**Material of Construction**										
4.9.1	Casing		ASTM-A-351 CF 8M	ASTM-A-351 CF 8M	ASTM-A-351 CF 8M	ASTM-A-351 CF 8M	ASTM-A-351 CF 8M	2.5 % Ni CI to IS 210 Gr. FG 260.	2.5 % Ni CI to IS 210 Gr. FG 260.	2.5 % Ni CI to IS 210 Gr. FG 260.	2.5 % Ni CI to IS 210 Gr. FG 260.
4.9.2	Impeller		ASTM-A-351 CF 8M	ASTM-A-351 CF 8M	ASTM-A-351 CF 8M	ASTM-A-351 CF 8M	ASTM-A-351 CF 8M	ASTM A 351 CF8M	ASTM A 351 CF8M	ASTM A 351 CF8M	ASTM A 351 CF8M
4.9.3	Shaft		SS 410	SS 410	SS 410	SS 410	SS 410	SS - 410	SS - 410	SS - 410	SS - 410
4.9.4	Shaft sleeves		SS 316	SS 316	SS 410 (Hardened)	SS 410 (Hardened)	SS 410 (Hardened)	SS 316	SS 316	SS 316	SS 316
4.9.5	Impeller Wear ring (as applicable)		SS 316	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316
4.9.6	Casing Wear ring (as applicable)		SS 316	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316
4.9.7	Fasteners (Wetted)		SS	SS	SS	SS	SS	SS	SS	SS	SS
4.9.8	Fasteners (Non-Wetted)		SS	SS	SS	SS	SS	SS	SS	SS	SS
4.9.9	Coupling		SS	SS	SS	SS	SS	CI	CI	CI	CI
4.9.10	Gland		SS 316	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316
4.9.11	Stuffing Box		ASTM-A-351 CF 8M	ASTM-A-351 CF 8M	ASTM-A-351 CF 8M	ASTM-A-351 CF 8M	ASTM-A-351 CF 8M	2.5 % Ni CI to IS 210 Gr. FG 260.	2.5 % Ni CI to IS 210 Gr. FG 260.	2.5 % Ni CI to IS 210 Gr. FG 260.	2.5 % Ni CI to IS 210 Gr. FG 260.
4.9.12	Lantern ring		Bronze	Bronze	Bronze	Bronze	Bronze	SS 316	SS 316	SS 316	SS 316
4.9.13	Mechanical seals (faces)		As per Manufacturer standard	As per Manufacturer standard	As per Manufacturer standard	As per Manufacturer standard	As per Manufacturer standard	NA	NA	NA	NA
4.9.14	Gland packing		Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)	Teflon Impregnated (Non-Asbestos type)
4.9.15	Water seal tube		SS tube	SS tube	SS tube	SS tube	SS tube	SS tube	SS tube	SS tube	SS tube
4.9.16	Base plate		MS fabricated IS-2062 IS2062 E250 (min. thickness 10 mm), Painted confirming to C-4 as per ISO 12944								
4.9.17	Counter Flange		Carbon Steel	Carbon Steel	SS 304	SS 304	SS 304	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel
4.9.18	Suction Strainer Housing/Body		CS as per IS :2062	CS as per IS :2062	SS304	SS304	SS304	NA	NA	NA	NA
4.9.19	Suction Strainer Element / Basket including Basket Stiffeners and Handle		SS316	SS316	SS316	SS316	SS316	NA	NA	NA	NA
4.9.20	Suction Strainer Gasket		Nitrile Rubber / EPDM (Min. 3 mm thick)	Nitrile Rubber / EPDM (Min. 3 mm thick)	Nitrile Rubber / EPDM (Min. 3 mm thick)	Nitrile Rubber / EPDM (Min. 3 mm thick)	Nitrile Rubber / EPDM (Min. 3 mm thick)	NA	NA	NA	NA
4.10	Design Life of Bearing	Hrs	20000	20000	20000	20000	20000	20000	20000	20000	20000
4.11	Sealing/Cooling of Stuffing Box		By Self Water	By Self Water	By Self Water	By Self Water	By Self Water	By Self Water	By Self Water	By Self Water	By Self Water
4.12	Type of Mechanical Seal (If applicable)		Cartridge Type	Cartridge Type	Cartridge Type	Cartridge Type	Cartridge Type	NA	NA	NA	NA
4.13	Cooling/Lubrication Arrangement to be provided for Mechanical Seal		By Self Water	By Self Water	By Self Water	By Self Water	By Self Water	By Self Water	By Self Water	By Self Water	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		Yes	Yes	Yes	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
4.15	**Construction Features of Suction Strainer**										
4.15.1	Type of Strainer		Simplex Basket Type	Simplex Basket Type	Conical type	Conical type	Conical type	NA	NA	NA	NA
4.15.2	Type of Strainer Element		Wire Mesh supported with Perforated Plate	Wire Mesh supported with Perforated Plate	Wire Mesh supported with Perforated Plate	Wire Mesh supported with Perforated Plate	Wire Mesh supported with Perforated Plate	NA	NA	NA	NA
4.15.3	Perforation/Mesh size		10 Mesh (2 mm)	10 Mesh (2 mm)	10 Mesh (2 mm)	10 Mesh (2 mm)	10 Mesh (2 mm)	NA	NA	NA	NA
4.15.4	Maximum Permissible Pressure Drop under Clean condition	MWC	1	1	by Bidder	by Bidder	by Bidder	NA	NA	NA	NA
4.15.5	Strainer Inlet/ outlet Nozzle Size		To suit pump suction size								
4.15.6	Length of strainer (including counterflanges)	mm	by Bidder	by Bidder	250	200	200	NA	NA	NA	NA
4.15.7	Ratio of Screen Clear Flow Area vis-à-vis Pipe Inlet Area		3	3	-	-	-	NA	NA	NA	NA
4.15.8	Orientation of Inlet/Outlet Connecting Pipe		Horizontal and Co-axial	Horizontal and Co-axial	Horizontal and Co-axial	Horizontal and Co-axial	Horizontal and Co-axial	NA	NA	NA	NA
4.15.9	Type of Welding allowed for fabrication of Strainer Basket/Element		Only TIG Welding	Only TIG Welding	Only TIG Welding	Only TIG Welding	Only TIG Welding	NA	NA	NA	NA
4.15.10	End Conection		Flanged	Flanged	Flanged	Flanged	Flanged	NA	NA	NA	NA
5.0	**PERFORMANCE PARAMETERS**										
5.1	Performance Guarantee Tests at Shop/Works		Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer
5.2	Performance Guarantee Tests at Site		Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Not Applicable	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer	Not Applicable	Yes, To be performed by Manufacturer	Yes, To be performed by Manufacturer
5.3	Maximum Auxilaiary Power Consumption for each Continious Duty Pumps as per sl no.3.6 above	%	250	130	-	122	24	20	55	1.5	1.5
5.4	LIQUIDATED DAMAGES RATE	Rs./KW	550000								
5.5	Maximum Efficiencies for HT motors / LT motors which are not in bidder's scope		94	94	94	By bidder	By bidder	By bidder	By bidder	By bidder	By bidder
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	5.6	5.6	5.6	4.8	4.8	4.8	4.8	4.8	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	4.8	4.8	4.8	3.8	3.8	3.8	3.8	3.8	3.8
5.8	Max. noise Level (Guaranteed at site)	dB	85 dB at 1 M distance	85 dB at 1 M distance	85 dB at 1 M distance	85 dB at 1 M distance	85 dB at 1 M distance	85 dB at 1 M distance	85 dB at 1 M distance	85 dB at 1 M distance	85 dB at 1 M distance