



Ref. PE/PG/UDN/E-6319/2019/01

Date 27.11.2019

Enquiry Ref. No.:- PE/PG/UDN/E-6319/2019 DATED 31-10-2019

Project: 2X660 MW UDANGUDI SUPERCRITICAL TPP ST-I

Package: MISC. PUMPS (HORIZONTAL)

DUE DATE
10.12.2019
BY 02:00 P.M.

CORRIGENDUM-4**Amendment No.1 to Tech. Spec. and Due date extension up to 10.12.2019**

1. Amendment No.1 to Technical Specification No. PE-TS-435-100-N001 (Rev-0) has been issued.
2. Due date of Bid Submission has been extended **upto 10.12.2019 (02:00PM)** and the Bids shall be opened on **10.12.2019 (3:00PM)**. Please submit your best offer before due date and due time.

All other terms and conditions shall remain as per NIT and subsequent corrigendum, if any.

With Regards,
For & on behalf of BHEL

(Jitendra Kumar Soni)
Dy. Manager/PG-I
BHEL-PEM

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TANGEDCO

2X660 MW UDANGUDI TPP STG I

AMENDMENT NO. 1

**TO TECHNICAL SPECIFICATION
FOR
MISCELLANEOUS PUMPS**

Specification No. : PE-TS-435-100-N001 (REV. 0)



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
PPEI BUILDING, SECTOR 16 A
NOIDA - 201301**

	TECHNICAL SPECIFICATIONS MISCELLANEOUS PUMPS		SPECN. NO.:		PE-TS-435-100-N001	
	AMENDMENT NO. 1		REV. NO.	0	DATE:	25.11.2019

1.0	With reference to Datasheet A, Section ID of Technical Specification, please consider the Specification amended as below:				
S.No.	Clause as mentioned in Technical Specification		Ammended Clause		
1.1	Maximum permissible speed of pump (RPM) at S.No. 2.5 of Datasheet-A is mentioned as following: a. Service Water Pump: 1500 b. HVAC Mup Pumps: 1500 c. Hotwell Makeup Pumps: 1500		Maximum permissible speed of pump (RPM) mentioned at S.No. 2.5 of Datasheet-A is amended as following: a. Service Water Pump: Preferably 1500 RPM, however 3000 RPM is also acceptable with a proven model of 3000 RPM Pump Supply. b. HVAC Mup Pumps: Preferably 1500 RPM, however 3000 RPM is also acceptable with a proven model of 3000 RPM Pump Supply. c. Hotwell Makeup Pumps: Preferably 1500 RPM, however 3000 RPM is also acceptable with a proven model of 3000 RPM Pump Supply.		
1.2	Max. limit on shut off head Corresponding to pump TDH (MWC) at 51.5 Hz at S.No. 2.6 of Datasheet-A is mentioned as following: a. DMCW PUMPS FOR TG & STATION AUXILIARIES: About 15% more than Total Dynamic Head b. DMCW PUMPS FOR SG AUXILIARIES: About 15% more than Total Dynamic Head		Max. limit on shut off head Corresponding to pump TDH (MWC) at 51.5 Hz at S.No. 2.6 of Datasheet-A is amended as following: a. DMCW PUMPS FOR TG & STATION AUXILIARIES: Not to Exceed 60 MWC b. DMCW PUMPS FOR SG AUXILIARIES: Not to Exceed 70 MWC		

2.0	Amended End Customer Specification (Annexure-3 of Section IA) is attached.
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5.0.0 CONSTRUCTIONAL REQUIREMENTS

5.1.0 Pumps

General design and construction DMCW/CCCW pumps shall be as per HI standard.

Pumps shall be identical in construction and similar parts of the pumps shall be interchangeable.

Continuous motor rating at high ambient for all pumps shall be at least 10% above the maximum power requirement at any condition of entire characteristic curve of the pump.

Casing shall be provided with a drain & vent connection comprising of an isolation valve and blind flange (with fasteners and gaskets) terminated at the edge of the base plate. The minimum size of any connection or piping shall be 1/2 inch nominal pipe size.

Each pump and its components shall be designed to facilitate installation and removal. Components requiring periodic inspections or maintenance shall be easily accessible.

Suction and discharge nozzles shall be flanged and shall conform to ASME standard.

Shaft sealing shall be by mechanical seal.

Sound power level shall not exceed 85 dBA at one (1) meter from the equipment.

The casing shall be designed to withstand the maximum shut-off pressure or 150% of maximum pressure under which the pump can operate at design fluid temperature, whichever is higher. Each pump shall preferably be of such construction that it is possible to service the internals of the pump without disturbing suction and discharge piping connections. Casings shall be of such thickness as well be suitable for maximum discharge and hydrostatic testing pressure and pumping temperature, with a 3 mm minimum corrosion allowance.

Impeller shall be of shrouded type. Impeller shall be of single piece casting (fabricated impellers not acceptable), smooth finished and dynamically balanced along with shaft on proper balancing equipment so as not to cause any vibration.

Replaceable type wearing rings shall be furnished to prevent damage to impeller and casing. A suitable method of locking the wearing ring shall be used, such as by the use of grub screws. Wearing rings shall have a close tolerance fit to permit only a minimum of recirculation flow. Impeller wearing rings shall have surfaces harder than surfaces of opposed casing wearing or shall be made of non-galling material to suit the pump medium.

Bearings shall be of antifriction grease/oil lubricated heavy duty ball or roller bearings capable of carrying heavy loads in either direction of rotation for continuous operation. The bearing shall be designed for a minimum life of 40,000 hrs in continuous operation at rated pump conditions. Hydrodynamics radial and/or thrust bearings shall be provided if required. Bearing housings shall preferably be arranged so that bearings can be replaced without disturbing pump drives or mountings. The housing shall be effectively protected against the ingress of water, pumped fluid and dust. When oil lubrication is provided all bearing oil wells shall be fitted with visual oil level indicators. Non-pressure oil lubricated bearings shall be equipped with constant level oilers. Means of draining bearing housings shall be provided.

Proper lubricating may be by oil/ grease. In case of Oil lubricated bearings, the type shall be of the ring oil/Flooded type, incorporating an ample oil reservoir and fitted with an oil level sight glass/indicator and thermometer. Free access to all lubrication ports shall be incorporated in the pump design. Means of draining bearing housings shall be provided.



VOLUME II
SUB-SECTION 2.24
GENERAL MECHANICAL REQUIREMENTS

1.0.0 GENERAL

This section covers the general mechanical requirements of all other sections of this specification and shall be complied with in every respect unless otherwise stated or agreed by the Owner.

2.0.0 CASTINGS AND FORGINGS

The quality requirements of approved international other national standards shall be taken as the minimum requirements.

Cast iron is not to be used for any part of equipment which is in tension or which is subjected to impact, or to a working temperature exceeding 100°C unless specifically approved by the Owner. Materials for iron castings shall comply with approved international or national standards.

All forgings are to be manufactured from basic electric steel or fully killed acid open-hearth steel. Consideration shall be given to the use of vacuum-degassed steels in appropriate cases.

Forgings shall be free of cracks externally or internally, extensive non-metallic inclusions and surface defects which cannot be removed by subsequent machining.

Each forging shall be suitably branded with an identification number which shall be transferred throughout all final machining stages. The identification number shall be marked on all documents and test certificates relative to the forging.

3.0.0 PUMPS

The following represents general requirements for pumps Intended for various services and the same shall be read in conjunction with the requirement specified elsewhere in the detailed mechanical specification.

General

All pumps shall be so designed that they are suitable for continuous operation and outdoor condition unless otherwise specified.

Pumps installed for parallel operation or as standby sets are to be of the same design, i.e. interchangeable.

Standard-type pumps with suitable characteristics shall be used wherever practical. Only proven makes and models are to be supplied. All accessories and the overall design of pump sets are to be such that they are suitable for automatic operation as planned for the relevant systems.

All pumps shall comply with the latest applicable recommendations of Hydraulic Institute Standards (U.S.A) or approved equivalents.



Pump types

Centrifugal pumps shall be used wherever possible.

Rotary-type positive displacement pumps will be accepted for handling fuel oil/sludge handling etc., and reciprocating pumps shall be used for chemical dosing and metering purposes

The pumps shall have a continuously rising head (upto shut-off) characteristics with the minimum shut-off head of 110% but not exceeding 125% of the head at best efficiency point for the rated impeller.

The pump shall be designed to have best efficiency between the rated and normal point. However in no case the rated point should be beyond 115 % of the best efficiency point. Moreover the minimum continuous stable flow shall not be less than 20 % of the best efficiency point.

The Contractor shall note that the pump characteristics as obtained during the performance testing of pump shall not deviate from the characteristic furnished during tender stage particularly with regard to the operating point and shut off head and steepness of the curve beyond the duty point.

The pump shall be capable of meeting the actual requirement for continuous operation at 47.5 Hz.

The equipment shall be made suitable for outdoor installation. Weather/environmental conditions under which the equipment must operate are specified in the 'Project Data'. However, for the Owner's guidance, the Contractor shall list in the proposal any special protection that the Owner is required to arrange.

Pump shall be capable of automatic start up from stand still condition with discharge valve fully open. Motor shall be selected according to the above requirement.

Difference in flows handled by the two pumps when operating the parallel shall not be more than 5% of the flow through any one pump.

The impeller shall be of non-overloading type.

A hardness difference of 50 BHN minimum shall be maintained between the impeller ring and wearing ring, inter-stage bushing and spacer sleeve and balancing and spacer sleeve and Balancing disc/piston and counter balancing disc.

Mechanical seal of shall be provided at both ends of the shaft of pump for DM water/Feedwater/Condensate/oil application.

The maximum temperature rise of bearings shall not exceed as per standard over ambient temperature.

All major rotating components shall be dynamically balanced. The assembled rotors shall be dynamically balanced.

The tender shall also demonstrate that the pump can operate at the quoted minimum continuous stable flow without exceeding the vibration limits as stipulated in HIS.



Pump-motor set shall run smooth without undue noise and vibration .The limits of vibrations shall be applicable with maximum wearing clearances.

Acceptance of the forced lubrication system shall be subjected to the approval by the Owner. In case forced oil lubrication is recommended the lubrication system shall include shaft driven lube oil pump and lube oil plant with interconnecting piping and controls. Acceptable peak to peak vibration limits shall generally be guided by HIS.

The drive motor rating shall be selected such that a minimum margin of 25% upto 18.5KW, 15% for 22-55KW, 10% for above 75 KW is available over the pump input power required at the rated duty point. However, motor rating shall not be less than the maximum power required by the pump at any point on the curve including the run-off condition. ~~All motors shall be energy efficient type with efficiency not less than 94%.~~