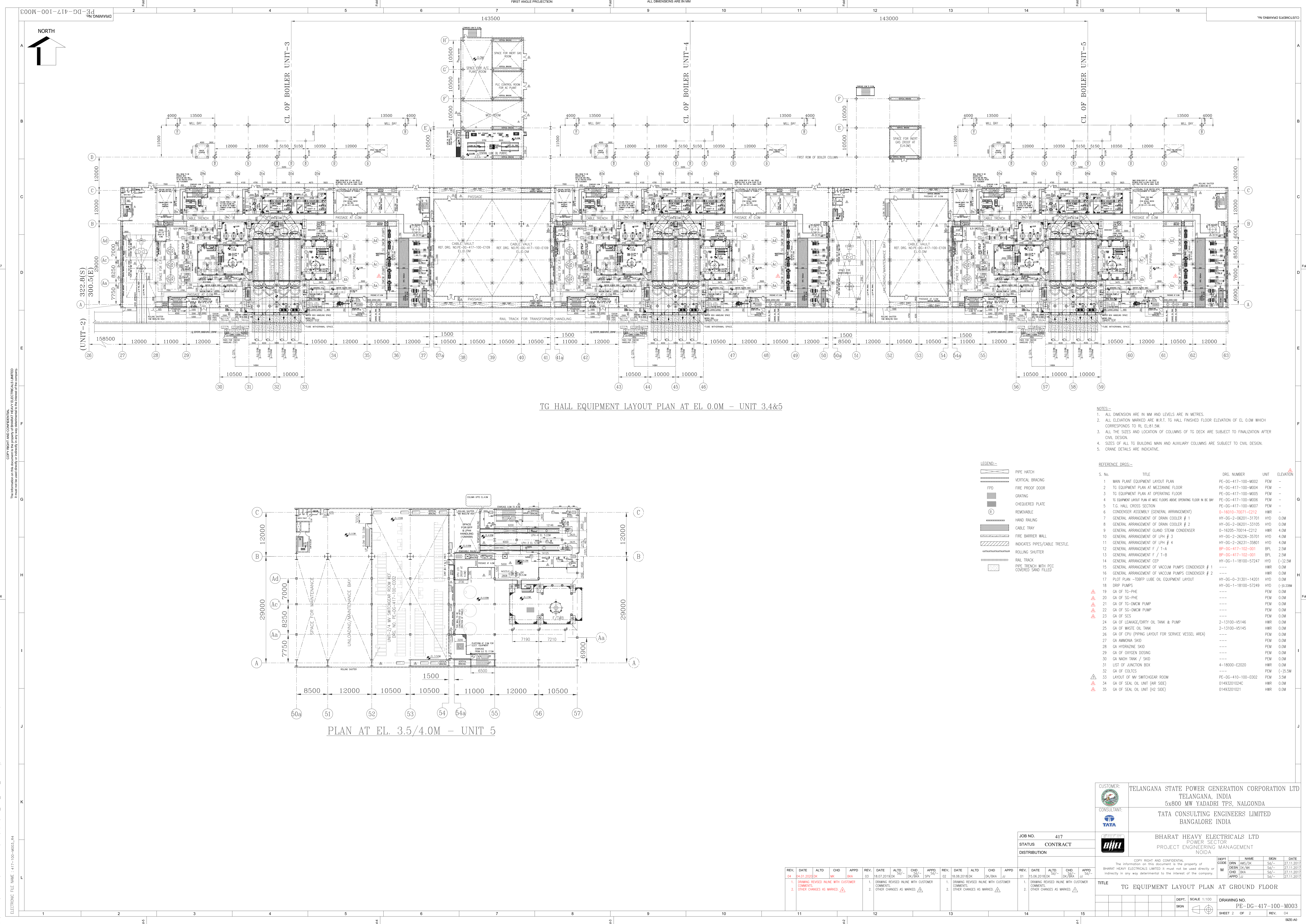




TG HALL EQUIPMENT LAYOUT PLAN AT EL 0.0M - UNIT 3,4&5

- NOTES:-
1. ALL DIMENSION ARE IN MM AND LEVELS ARE IN METRES.
 2. ALL ELEVATION MARKED ARE W.R.T. TO HALL FINISHED FLOOR ELEVATION OF EL 0.0M WHICH CORRESPONDS TO RL EL+81.0M.
 3. ALL THE SIZES AND LOCATION OF COLUMNS OF TG DECK ARE SUBJECT TO FINALIZATION AFTER CIVIL DESIGN.
 4. SIZES OF ALL TO BUILDING MAIN AND AUXILIARY COLUMNS ARE SUBJECT TO CIVIL DESIGN.
 5. CRANE DETAILS ARE INDICATIVE.

LEGEND:-

- PIPE HATCH
- VERTICAL BRACING
- FIRE PROOF DOOR
- GRATING
- CHEQUERED PLATE
- REMOVABLE
- HAND RAILING
- CABLE TRAY
- FIRE BARRIER WALL
- INDICATES PIPES/CABLE TRELLIS
- ROLLING SHUTTER
- RAIL TRACK
- PIPE TRENCH WITH PCC COVERED SAND FILLED

REFERENCE DRS:-

S. No.	TITLE	DRG. NUMBER	UNIT	ELEVATION
1	MAIN PLANT EQUIPMENT LAYOUT PLAN	PE-DG-417-100-M002	PEM	-
2	TG EQUIPMENT PLAN AT MEZZANINE FLOOR	PE-DG-417-100-M004	PEM	-
3	TG EQUIPMENT PLAN AT OPERATING FLOOR	PE-DG-417-100-M005	PEM	-
4	TG EQUIPMENT LAYOUT PLAN AT MSC FLOORS ABOVE OPERATING FLOOR IN BC BAY	PE-DG-417-100-M006	PEM	-
5	T.G. HALL CROSS SECTION	PE-DG-417-100-M007	PEM	-
6	CONDENSER ASSEMBLY (GENERAL ARRANGEMENT)	0-16100-70071-C212	HWR	-
7	GENERAL ARRANGEMENT OF DRAIN COOLER # 1	HY-DG-2-06201-31701	HYD	0.0M
8	GENERAL ARRANGEMENT OF DRAIN COOLER # 2	HY-DG-2-06201-33105	HYD	0.0M
9	GENERAL ARRANGEMENT OF GLAND STEAM CONDENSER	0-16205-70014-C212	HWR	4.0M
10	GENERAL ARRANGEMENT OF LPH # 3	HY-DG-2-26226-35701	HYD	4.0M
11	GENERAL ARRANGEMENT OF LPH # 4	HY-DG-2-26231-35801	HYD	4.0M
12	GENERAL ARRANGEMENT F / 1-A	BP-DG-417-102-001	BPL	2.5M
13	GENERAL ARRANGEMENT F / 1-B	BP-DG-417-102-001	BPL	2.5M
14	GENERAL ARRANGEMENT CEP	HY-DG-1-18100-57247	HYD	(-12.5M)
15	GENERAL ARRANGEMENT OF VACUUM PUMPS CONDENSER # 1	---	HWR	0.0M
16	GENERAL ARRANGEMENT OF VACUUM PUMPS CONDENSER # 2	---	HWR	0.0M
17	PLOT PLAN - TORBP LUBE OIL EQUIPMENT LAYOUT	HY-DG-0-31301-14201	HYD	0.0M
18	DRIP PUMPS	HY-DG-1-18100-57249	HYD	(-10.338M)
19	GA OF TG-PHE	---	PEM	0.0M
20	GA OF SG-PHE	---	PEM	0.0M
21	GA OF TG-DMCW PUMP	---	PEM	0.0M
22	GA OF SG-DMCW PUMP	---	PEM	0.0M
23	GA OF SCS	---	PEM	0.0M
24	GA OF LEAKAGE/DIRTY OIL TANK & PUMP	2-13100-V5146	HWR	0.0M
25	GA OF WASTE OIL TANK	2-13100-V5145	HWR	0.0M
26	GA OF CRU (PIPING LAYOUT FOR SERVICE VESSEL AREA)	---	PEM	0.0M
27	GA AMMONIA SKID	---	PEM	0.0M
28	GA HYDRAZINE SKID	---	PEM	0.0M
29	GA OF OXYGEN DOSING	---	PEM	0.0M
30	GA NAOH TANK / SKID	---	PEM	0.0M
31	LIST OF JUNCTION BOX	4-18000-E2020	HWR	0.0M
32	GA OF COLTCS	---	PEM	(-35.5M)
33	LAYOUT OF MW SWITCHGEAR ROOM	PE-DG-419-100-E002	PEM	3.5M
34	GA OF SEAL OIL UNIT (NR SIDE)	01493201024C	HWR	0.0M
35	GA OF SEAL OIL UNIT (H2 SIDE)	01493201021	HWR	0.0M

PLAN AT EL. 3.5/4.0M - UNIT 5

REV.	DATE	ALTD	CHD	APPD	REV.	DATE	ALTD	CHD	APPD	REV.	DATE	ALTD	CHD	APPD
04	04.01.2023	OK	WE	BHA	03	18.07.2018	OK	CH	SEA	02	18.08.2018	OK	CH	SEA
1. DRAWING REVISED INLINE WITH CUSTOMER COMMENTS.					1. DRAWING REVISED INLINE WITH CUSTOMER COMMENTS.					1. DRAWING REVISED INLINE WITH CUSTOMER COMMENTS.				
2. OTHER CHANGES AS MARKED.					2. OTHER CHANGES AS MARKED.					2. OTHER CHANGES AS MARKED.				

JOB NO.	417
STATUS	CONTRACT
DISTRIBUTION	

CUSTOMER:	TELANGANA STATE POWER GENERATION CORPORATION LTD TELANGANA, INDIA 5x800 MW YADADRI TPS, NALGONDA
CONSULTANT:	TATA CONSULTING ENGINEERS LIMITED BANGALORE INDIA
	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA

DEPT	NAME	SIGN	DATE
DRN	RAJES/DR		27.11.2017
DESIN	RAJES/DR		27.11.2017
CHD	SEA		27.11.2017
APPD	SEA		27.11.2017

TITLE TG EQUIPMENT LAYOUT PLAN AT GROUND FLOOR

DEPT.	SCALE 1:100	DRAWING NO.
SIGN		PE-DG-417-100-M003
		SHEET 2 OF 2
		REV. 04





TITLE : 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
	SECTION : I	
	SUB-SECTION: IB	
	REV. NO. 00	DATE :

SECTION – I
SPECIFIC TECHNICAL REQUIREMENTS
SUB-SECTION IB - Specific Technical Requirements (Electrical)

	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT 5X800 MW YADADRI TPS (ELECTRICAL PORTION)	SPECIFICATION NO.
		VOLUME NO. : II-B
		SECTION : I
		REV NO. : 00 DATE: 09/01/2020
		SHEET : 4 OF 33
<u>SPECIFIC TECHNICAL REQUIREMENTS: ELECTRICAL</u>		
1.0 EQUIPMENT & SERVICES TO BE PROVIDED BY BIDDER: a) Services and equipment as per “Electrical Scope between BHEL and Vendor”. b) Any item/work either supply of equipment or erection material which have not been specifically mentioned but are necessary to complete the work for trouble free and efficient operation of the plant shall be deemed to be included within the scope of this specification. The same shall be provided by the bidder without any extra charge. c) Supply of mandatory spares as specified in the specifications of mechanical equipment’s. d) Electrical load requirement for CONDENSATE PLOSHING UNIT. e) All equipment shall be suitable for the power supply fault levels and other climatic conditions mentioned in the enclosed project information. f) Bidder to furnish list of makes for each equipment at contract stage, which shall be subject to customer/BHEL approval without any commercial and delivery implications to BHEL. g) Various drawings, data sheets as per required format, Quality plans, calculations, test reports, test certificates, operation and maintenance manuals etc. shall be furnished as specified at contract stage. All documents shall be subject to customer/BHEL approval without any commercial implication to BHEL. h) Motor shall meet minimum requirement of motor specification. i) Vendor to clearly indicate equipment locations and local routing lengths in their cable listing furnished to BHEL. j) Cable BOQ worked out based on routing of cable listing provided by the vendor for “both end equipment in vendor’s scope” shall be binding to the vendor with +10 % margin to take care of slight variation in routing length & wastages.		
2.0 EQUIPMENT & SERVICES TO BE PROVIDED BY PURCHASER FOR ELECTRICAL & TERMINAL POINTS: Refer “Electrical Scope between BHEL and Vendor” Annexure - I.		
3.0 DOCUMENTS TO BE SUBMITTED ALONG WITH BID 3.1 The electrical specification without any deviation from the technical/quality assurance requirements stipulated shall be deemed to be complied by the bidder in case bidder furnishes the overall compliance of package technical specification in the form of compliance certificate/No deviation certificate. 3.2 No technical submittal such as copies of data sheets, drawings, write-up, quality plans, type test certificates, technical literature, etc., is required during tender stage. Any such submission even if made, shall not be considered as part of offer.		

	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT 5X800 MW YADADRI TPS (ELECTRICAL PORTION)	SPECIFICATION NO.	
		VOLUME NO. :	II-B
		SECTION :	I
		REV NO. :	00 DATE: 09/01/2020
		SHEET :	5 OF 33

4.0

List of enclosures :

- a) Electrical scope between BHEL & vendor (Annexure –I)
- b) Technical specification for motors.
- c) Datasheets for motors.
- d) Electrical Load data format (Annexure –II)
- e) BHEL cable listing format (Annexure –III)
- f) Quality plan for motors.

	TITLE	SPECIFICATION NO.	
		VOLUME	II B
		SECTION	I
		REV NO. 00	DATE 09/01/2020
		SHEET	18 OF 33
	LV MOTORS		
	<u>DATA SHEET-A</u>		
1.0	Design ambient temperature	:	50 °C
2.0	Maximum acceptable kW rating of LV motor	:	≤175KW
3.0	Installation (Indoors/ Outdoors)	:	As required
4.0	Degree Of Protection (Indoor/Outdoor)	:	IP55
5.0	Type of Cooling	:	TEFC/CACA/TETV
6.0	Details of supply system		
	a) Rated voltage (with variation)	:	415V ± 10%
	b) Rated frequency (with variation)	:	50 Hz (Variation: +3% TO –5%)
	c) Combined voltage & freq. variation	:	10%
	d) System fault level at rated voltage	:	50 kA for 1 sec
	e) Short time rating for terminal boxes		
	o 110kW & Above (Breaker controlled)	:	50 kA for 0.25 sec
	o Below 110kW (SFU+ Contactor controlled)	:	50 KA for 0.25 sec.
	f) LV System grounding	:	Solidly
7.0	Class of insulation	:	Class 'F', with temp rise limited to class B.
8.0	Minimum voltage for starting (As percentage of rated voltage)	:	80% of rated voltage
9.0	Power cables data	:	Shall be given during Detailed engg.
10.0	Earth Conductor Size & Material	:	Shall be given during Detailed engg.
11.0	Space heater supply	:	240 V, 1Φ , 50 Hz
12.0	Rating up to which Single phase motor	:	Acceptable below 0.20 kW
13.0	Tests	:	As per Customer motor spec. (enclosed)
14.0	Energy efficient/ Flame proof motor	:	As per Customer spec. requirement
Also detail Customer spec. for Motors to be referred as enclosed with spec.			

TECHNICAL SPECIFICATION

BASIC TECHNICAL FEATURES FOR LT MOTORS (FOR BHEL-PEM SCOPE PACKAGES)

	CUSTOMER: TELANGANA STATE POWER GENERATION CORPORATION LTD TELANGANA, INDIA 5 x 800 MW YADADRI TPS, NALGONDA																																	
	OWNER'S CONSULTANT: TATA CONSULTING ENGINEERS LTD BANGLORE INDIA																																	
	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA																																	
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TITLE BASIC TECHNICAL FEATURES FOR LT MOTORS																																		
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						DEPT.	SCALE	DRAWING NO. PE-DC-417-565-E003																										
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								REV. 02																										

	5 x 800 MW YADRADRI TPS BASIC TECHNICAL FEATURES FOR LT MOTORS (FOR BHEL-PEM SCOPE PACKAGES)	Doc. No.	PE-DC-417-565-E003
		Rev. No.	02
		Dated	16-08-2018
		Page	12 of 33

1.0 This document covers the basic technical features of low tension (LT) squirrel cage induction AC motors employed for driving auxiliaries of BHEL-PEM scope packages in **5 x 800 MW YADRADRI TPS**.

2.0 CODES AND STANDARDS

All motors shall conform to the latest applicable standards as listed below;

- 1) Three phase induction motors: IS: 12615, IEC: 60034
- 2) Single phase AC motors: IS: 996, IEC: 60034
- 3) Crane duty motors: IS: 3177, IEC: 60034
- 4) Energy Efficient motors: IS 12615 or IEC: 60034-30 with Efficiency class IE3

3.0 DESIGN REQUIREMENTS

3.1 Service Conditions

The motors will be installed in hot, humid and tropical atmosphere highly polluted at places with coal dust and/or fly ash. For motor installed outdoor and exposed to direct sunrays, the effect of solar heat shall be considered in the determination of the design ambient temperature.

The design ambient temperature shall be 50 deg C.

3.2 Supply system and rated voltage of motors

KW rating	Supply system	Rated voltage of motor
Upto 0.2 kW	240V/415 V	240V/415 V
Above 0.2 kW & up to 175kW	415 V	415 V

3.2.1 Supply voltage & variations shall be as follows:-

Voltage variation (AC Supply): (+/-) 10%
Frequency variation : (+) 3% to (-) 5%
Combined V & F variation : 10% (sum of absolute values)

During starting of large motor, the voltage may drop to 80% of the rated voltage for a period of 60 seconds. All electrical equipment while running shall successfully ride over such period without affecting system performance.

3.2.2 Motors shall be capable of running continuously at rated output for each of the conditions specified.

3.3 Motor Rating

All motors shall be rated for continuous duty. They shall also be suitable for long period of inactivity. LT motor rating at 50 degree C shall have at least 15% margin over the input power requirement of the driven equipment at rated duty point unless stated otherwise in driven equipment specification. The motor characteristics shall match the requirements of the driven equipment so that adequate starting, accelerating, pull up, break down and full load torques are available for the intended service.

3.4 Starting Requirements

3.4.1 Motor shall start smoothly and rapidly. Motor characteristics such as speed, starting torque, break away torque and starting time shall be properly co-ordinated with the requirements of driven equipment. The

	5 x 800 MW YADRADRI TPS BASIC TECHNICAL FEATURES FOR LT MOTORS (FOR BHEL-PEM SCOPE PACKAGES)	Doc. No.	PE-DC-417-565-E003
		Rev. No.	02
		Dated	16-08-2018
		Page	13 of 33

accelerating torque at any speed with the minimum starting voltage shall be at least 10% higher than that of the driven equipment.

- 3.4.2 Motors shall be capable of starting and accelerating the load with direct on line starting without exceeding acceptable winding temperature.

The limiting value of voltage at rated frequency under which a motor will successfully start and accelerate to rated speed with load shall be taken to be a constant value of 85 (eighty five) percent rated voltage.

- 3.4.3 Continuous duty LT motors up to 175 KW Output rating (at 50 deg. C ambient temperature), shall be Premium efficiency (IE3) as per IEC: 60034-30/ IS: 12615 and the locked rotor current of motors shall as per IS 12615.
However, as per system requirement drives rated in the range of 160-210 KW may be considered in either 415V or 3.3 KV

- 3.4.4 Pump motor subject to reverse rotation shall be designed to withstand the stresses encountered when starting with shaft rotating at 125% rated speed in reverse direction. The motors shall be designed to withstand 120% of rated speed for 2 minutes without any mechanical damage.

- 3.4.5 The following frequency of starts shall apply

- i) Three cold starts in succession with the motor being initially at a temperature not exceeding the ambient temperature.
- ii) Two hot starts in succession with the motor being initially at a temperature not exceeding the rated load temperature.
- iii) Three equally spread starts in an hour the motor being initially at a temperature not exceeding the rated load operating temperature (not to be repeated in the second successive hour)

- 3.4.6 Locked motor withstand time of hot motors at 110% rated voltage shall be as follows:

- a) For motors with starting time upto 20 sec.
- at least 3 sec. more than starting time.
- b) For motor with starting time above 20 secs but not exceeding 45 secs.
- at least 5.0 sec. more than starting time.
- c) For motors with starting time above 45 secs.
- at least 10%. more than starting time.

The starting time of the motor referred above is at minimum permissible voltage. Wherever the above requirements are not complied with, speed switches of approved make & type shall be provided to bypass the locked rotor protection for a pre-selected time during starting of motors. The speed switches shall have one NO & one NC contacts having maximum interrupting capacity of 5 Amps at 240V AC and 0.25 amps at 220 V DC.

Hot thermal withstand curve shall have a margin of at least 10% over the full load current of the motor to permit relay setting utilising motor rated capacity.

	5 x 800 MW YADRADRI TPS BASIC TECHNICAL FEATURES FOR LT MOTORS (FOR BHEL-PEM SCOPE PACKAGES)	Doc. No.	PE-DC-417-565-E003
		Rev. No.	02
		Dated	16-08-2018
		Page	14 of 33

3.5 Running Requirements

- 3.5.1 Motor shall run continuously at rated output over the entire range of voltage and frequency variations as given above.
- 3.5.2 The motor shall be capable of operating satisfactorily at full load for 5 minutes without injurious heating with 75% rated voltage at motor terminals.
- 3.5.3 The motor shall be designed to withstand momentary overload of 60% of full load torque for 15 second without any damage.

3.6 Stress during bus Transfer

- 3.6.1 The motor may be subjected to sudden application of 150% rated voltage during bus transfer, due to the phase difference between the incoming voltage and motor residual voltage.
- 3.6.2 The motor shall be designed to withstand any torsional and/or high current stresses, which may result, without experiencing any deterioration in the normal life and performance characteristics.

4.0 SPECIFIC REQUIREMENTS

4.1 Enclosure

All motor enclosures for outdoor, semi-outdoor & indoor application shall conform to the degree of protection IP-55 unless otherwise specified. Motor for outdoor or semi-outdoor service shall be of weather-proof construction with canopy. For hazardous area approved type of increased safety enclosure shall be furnished.

4.2 Cooling

- 4.2.1 The motor shall be self-ventilated type, either totally enclosed fan cooled IC 411(TEFC), totally enclosed tube ventilated IC 511(TETV) or closed air circuit air- cooled IC 611(CACA).

4.3 Winding and Insulation

All insulated winding shall be of copper. All motors shall have class F insulation but limited to class B temperature rise. Windings shall be impregnated to make them non-hygroscopic and oil resistant.

Tropical Protection

All motors shall have fungus protection involving special treatment of insulation and metal against fungus, insects and corrosion.

All fittings and hardware shall be corrosion resistant.

4.4 Bearings

- 4.4.1 Motor shall be provided with antifriction bearings, unless sleeve bearings are required by the motor application. Bearings shall be rated for minimum service life of 40,000Hrs.
- 4.4.2 Vertical shaft motors shall be provided with thrust and guide bearings. Thrust bearing of tilting pad type is preferred.

	5 x 800 MW YADRADRI TPS BASIC TECHNICAL FEATURES FOR LT MOTORS (FOR BHEL-PEM SCOPE PACKAGES)	Doc. No.	PE-DC-417-565-E003
		Rev. No.	02
		Dated	16-08-2018
		Page	15 of 33

- 4.4.3 Bearings shall be provided with seals to prevent leakage of lubricant or entrance of foreign matters like dirt, water etc. into the bearing area.
- 4.4.4 Sleeve bearings shall be split type, ring oiled, with permanently aligned, close running shaft sleeves.
- 4.4.5 Grease lubricated bearings shall be pre-lubricated and shall have provisions for in-service positive lubrication with drains to guard against over lubrication. LT motors 15kW and above shall be provided with external greasing arrangement.
- 4.4.6 Oiled bearing shall have an integral self-cooled oil reservoir with oil ring inspection ports, oil sight glass with oil level marked for standstill and running conditions and oil fill and drain plugs.
- 4.4.7 Forced lubricated or water cooled bearing shall be used as per requirement.
- 4.4.8 Lubricant shall not deteriorate under all service conditions. The lubricant shall be limited to normally available types with IOC equivalent.
- 4.4.9 Bearings shall be insulated as required to prevent shaft current and resultant bearing damage.

4.5 Noise & Vibration

- 4.5.1 For 415V motors, maximum double amplitude vibrations upto 1500 rpm shall be 40 microns and 15 microns upto 3000 rpm.
- 4.5.2 The noise level shall not exceed 85db (A) at 1.5 meters from the motor.

4.6 Motor Terminal Box

- 4.6.1 Motor terminal box shall be detachable type and located in accordance with Indian Standards clearing the motor base- plate/ foundation
- 4.6.2 Terminal box shall be capable of being turned 360 deg in steps of 90 Deg. for LT motors unless otherwise approved.
- 4.6.3 The terminal box shall be split type with removable cover with access to connections and shall have the same degree of protection as motor.
- 4.6.4 The terminal box shall have sufficient space inside for termination/connection of XLPE insulated armoured aluminium cables.
- 4.6.5 Terminals shall be stud or lead wire type, substantially constructed and thoroughly insulated from the frame.
- 4.6.6 The terminals shall be clearly identified by phase markings, with corresponding direction of rotation marked on the non-driving end of the motor.
- 4.6.7 The terminal box shall be capable of withstanding maximum system fault current for a duration of 0.25 sec.
- 4.6.8 Motor terminal box shall be furnished with suitable cable lugs and double compression brass glands to match with cable used.
- 4.6.9 The gland plate for single core cable shall be non-magnetic type. A suitable cable adopter box shall be provided if the cable size does not allow the direct termination in the main TB.

	5 x 800 MW YADRADRI TPS BASIC TECHNICAL FEATURES FOR LT MOTORS (FOR BHEL-PEM SCOPE PACKAGES)	Doc. No.	PE-DC-417-565-E003
		Rev. No.	02
		Dated	16-08-2018
		Page	16 of 33

4.6.10 Minimum clearances to be provided between phase to phase and phase to earth shall be as under-

Voltage Rating of Motor Minimum Ph-Ph & Ph-Earth clearance

0.415 kV : 25 mm

Note: In case it is not possible to maintain these clearances, the live parts shall be totally insulated from earth and other Phases. Adequate clearances shall be provided for cable connections.

4.7 **Grounding**

The frame of each motor shall be provided with two separate and distinct grounding pads complete with tapped hole, GI bolts and washer.

The cable terminal box shall have a separate grounding pad.

4.8 **Rating Plate**

In addition to the minimum information required by IS, the following information shall be shown on motor rating plate:

- Temperature rise in Deg.C under rated condition and method of measurement.
- Degree of protection.
- Bearing identification no. and Type of lubrication, Quantity and frequency/ time interval
- Location of insulated bearings.

5.0 **ACCESSORIES**

5.1 **SPACE HEATERS**

Motor of rating 30 kW and above shall be provided with space heaters, suitably located for easy removal or replacement. The space heater shall be rated 240 V, 1 Phase, 50Hz and sized to maintain the motor internal temperature above dew point when the motor is idle. The minimum cable size for space heater shall be 2.5 sq.mm copper cable.

5.2 **DELETED**

5.3 **INDICATOR/ SWITCH**

5.3.1 Dial type local indicator with alarm contacts shall be provided for the following:

Hot and cold air temperature of the closed air circuit for CACA motor.

5.3.2 Alarm switch contact rating shall be minimum 2.0 A at 220V D.C. and 10A at 240V A.C.

5.4 **ACCESSORY TERMINAL BOX**

5.4.1 All accessory equipment such as space heater, temperature detector, current transformers etc., shall be wired to and terminated in terminal boxes, separate from and independent of motor (power) terminal box.

5.4.2 Accessory terminal box shall be complete with double compression brass glands and pressure type terminals to suit owner's cable connections.

DRAIN PLUG

	5 x 800 MW YADRADRI TPS BASIC TECHNICAL FEATURES FOR LT MOTORS (FOR BHEL-PEM SCOPE PACKAGES)	Doc. No.	PE-DC-417-565-E003
		Rev. No.	02
		Dated	16-08-2018
		Page	17 of 33

Motor shall have drain plugs so located that they will drain the water, resulting from the condensation or other causes from all pockets of the motor casing.

5.5 LIFTING PROVISIONS

Motor weighing 25 Kg. or more shall be provided with eyebolt or other adequate provision of lifting.

5.6 DOWEL PINS

The motor shall be designed to permit easy access for drilling holes through motor feet or mounting flange for installation of dowel pins after assembling the motor and driven equipment.

7.0 PAINTING

Colour scheme for motors shall be shade 631 of IS-5.

8.0 TESTING

8.1 Type Tests

For LT Motors, type test reports for type tests as per IS: 12615/ IEC: 60034 conducted on equipment similar to those proposed to be supplied shall be submitted. The type Test should have been conducted within last 5 years from enquiry date.

8.2 Routine Tests

All motors shall be subjected to routine tests as per IS: 12615/ IEC: 60034 in the presence of customer or customer representative.

9.0 Variable Frequency Drive motor details:

- i) The motor shall be suitable for operation with a solid-state power supply consisting of an adjustable frequency inverter for speed control.
- ii) The motor shall be suitable for the current waveforms produced by the power supply including the harmonics generated by the drive.
- iii) The Motor shall be designed to operate continuously at any speed over the range 20-100 % of rated speed.
- iv) The permitted voltage variation should take into account the steady state voltage drop across the AC drive and all other system components upstream of the motor.
- v) Motors required to be transferred to DOL, by-pass mode shall be rated for specified variations in system line voltage and frequency. Starting current of motor in DOL, bypass mode shall be limited to value in motor specifications.
- vi) The motor shall be constructed to withstand torque pulsations resulting from harmonics generated by the solid-state power supply.
- vii) The motor insulation shall be designed to accept the applied voltage waveform, within the V_{peak} and dv/dt limits as per IEC-61800-4.
- viii) The drive manufacturer shall be solely responsible for proper selection of the motor for the given load application and the output characteristics of the drive.

REV-0, DATE: 07.03.2015

ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR(FOR EPC PROJECTS)**PACKAGES : CONDENSATE POLISHING UNIT****SCOPE OF VENDOR: SUPPLY, ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT****PROJECT:**

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	415V MCC	BHEL	BHEL	415 V AC, 3 phase, 3 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 motor.
3	Power cables, control cables and screened control cables for a) both end equipment in BHEL's scope b) both end equipment in vendor's scope c) one end equipment in vendor's scope	BHEL BHEL BHEL	BHEL Vendor BHEL	1. For 3.b) & c): Sizes of cables required shall be informed by vendor at contract stage (based on inputs provided by BHEL) in the form of cable listing. Finalisation of cable sizes shall be done by BHEL. Vendor shall provide lugs & glands accordingly. 2. Termination at BHEL equipment terminals by BHEL. 3. Termination at Vendor equipment terminals by Vendor.
4	Junction box for control & instrumentation cable	Vendor	Vendor	Number of Junction Boxes shall be sufficient and positioned in the field to minimize local cabling (max 10-12 mtrs) and trunk cable.
5	Any special type of cable like compensating, co-axial, prefab, MICC, optical fibre etc.	Vendor	Vendor	Refer C&I portion of specification for scope of fibre Optical cables if used between PLC/ microprocessor & DCS.
6	Cable trays, accessories & cable trays supporting system 100/ 50 mm cable trays/ Conduits/ Galvanised steel cable troughs for local cabling	BHEL Vendor	BHEL Vendor	Local cabling from nearby main route cable tray (BHEL scope) to equipment terminal (vendor's scope) shall be through 100/ 50 mm. cable trays/ conduits/ Galvanised steel cable troughs, as per approved layout drawing during contract stage.
7	Cable glands ,lugs and bimetallic strip for equipment supplied by Vendor	Vendor	Vendor	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type heavy duty tinned copper lugs for power and

REV-0, DATE: 09.03.2015

ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR(FOR EPC PROJECTS)

PACKAGES : CONDENSATE POLISHING UNIT

SCOPE OF VENDOR: SUPPLY, ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT

PROJECT:

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
				control cables.
8	Conduit and conduit accessories for cabling between equipment supplied by vendor	Vendor	Vendor	Conduits shall be medium duty, hot dip galvanised cold rolled mild steel rigid conduit as per IS: 9537.
9	Lighting	BHEL	BHEL	
10	Equipment grounding (including electronic earthing) & lightning protection	BHEL	BHEL	Refer note no. 4 for electronic earthing
11	Below grade grounding	BHEL	BHEL	
12	LT Motors with base plate and foundation hardware	Vendor	Vendor	Makes shall be subject to customer/ BHEL approval at contract stage.
13	Mandatory spares	Vendor	-	Vendor to quote as per specification.
14	Recommended O & M spares	Vendor	-	As specified elsewhere in specification
15	Any other equipment/ material/ service required for completeness of system based on system offered by the vendor (to ensure trouble free and efficient operation of the system).	Vendor	Vendor	
16	a) Input cable schedules (Control & Screened Control Cables) b) Cable interconnection details for above c) Cable block diagram	Vendor Vendor Vendor	- - -	Cable listing for Control and Instrumentation Cable and electronic earthing cable in enclosed excel format shall be submitted by vendor during detailed engineering stage.
17	Electrical Equipment & cable tray layout drawings	Vendor	-	For ensuring cabling requirements are met, vendor shall furnish Electrical equipment layout & cable tray layout drawings (both in print form as well as in AUTOCAD) of the complete plant (including electrical area) indicating location and identification of all equipment requiring cabling, and shall incorporate cable trays routing details marked on the drawing as per PEM interface comments. Cabling arrangement of the same (wherever overhead cable trays, trenches, cable ducts, conduits etc.) shall be decided during contract stage. Electrical equipment layout & cable tray layout drawing shall be subjected to BHEL/ customer approval without any commercial implications to BHEL.

REV-0, DATE: 09.03.2015

ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR(FOR EPC PROJECTS)

PACKAGES : CONDENSATE POLISHING UNIT

SCOPE OF VENDOR: SUPPLY, ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT

PROJECT:

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
18	Electrical Equipment GA drawing	Vendor	-	For necessary interface review.

NOTES:

1. Make of all electrical equipment/ items supplied shall be reputed make & shall be subject to approval of BHEL/customer after award of contract.
2. All QPs shall be subject to approval of BHEL/customer after award of contract without any commercial implication.
3. In case the requirement of Junction Box arises on account of Power Cable size mis-match due to vendor engineering at later stage, vendor shall supply the Junction Box for suitable termination.
4. Vendor shall indicate location of Electronic Earth pit in their Civil assignment drawing.

REV: 00 DATE:

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

PACKAGE: ELECTRIC HOIST & CHAIN PULLEY BLOCKS

PROJECT : 5X800 MW YADADRI TPP

SCOPE OF VENDOR: SUPPLY , ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT

<u>S. NO</u>	<u>DETAILS</u>	<u>SCOPE SUPPLY</u>	<u>SCOPE E&C</u>	<u>REMARKS</u>
1	Isolating Switch	Vendor	Vendor	BHEL will provide one number 415 V(3ph, 3W) supply feeder only up to isolating switches for cranes/hoists. Any other voltage level (AC/DC) required will be derived by the vendor. Motor starter shall be part of crane/hoist control panel.
2	Power cables, control cables, screened control cables and any special cables (if required) between equipment supplied by vendor.	Vendor	Vendor	Cable from supply feeder to isolating switch shall be in BHEL scope.
3	Cabling material (cable trays, accessories, cable tray supporting system, conduits etc).	Vendor	Vendor	
4	Equipment Earthing	Vendor	Vendor	All equipment metallic enclosures / frames, metal structure etc. shall be grounded at two points each to the nearest grounding points / risers provided by BHEL.
5	Motors	Vendor	Vendor	
6	Cable glands and lugs for equipment supplied by vendor	Vendor	Vendor	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type heavy duty tinned copper lugs for power & control cables.
7	a) Input cable schedules (C & I) b) Cable interconnection details for above c) Cable block diagram	Vendor Vendor Vendor	- - -	Cable listing for Control and Instrumentation Cable in enclosed excel format shall be submitted by vendor during detailed engineering stage.
8	Equipment layout drawings	Vendor	-	
9	Electrical Equipment GA drawing	Vendor	-	For necessary interface review.

[illegible]

CABLE SCHEDULE FORMAT

[illegible]

	TITLE : 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: IC	
		REV. NO. 00	DATE :

SECTION – I
SPECIFIC TECHNICAL REQUIREMENTS
SUB-SECTION IC - Specific Technical Requirements (C&I)



Technical specification for
CONTROL & INSTRUMENTATION
 5x800 MW YADADRI TPS, NALGONDA

SPEC NO.: **PE-TS-417-145-I**

VOLUME

SECTION

REV. NO.

00

DATE : 16.08.2018

SHEET

OF

SPECIFIC TECHNICAL REQUIREMENT



Specific Technical Requirement For
CONDENSATE POLISHING
SYSTEM

5X800 MW
YADADRI TPS, NALGONDA

1. The bidder shall provide complete Instrumentation for control, monitoring and operation of entire CONDENSATE POLISHING SYSTEM. The requirements given are to be read in conjunction with detailed Technical specification. Further in case of any discrepancy in the requirement within the same section noted by the bidder in the specification, the same will be brought to the notice of BHEL in the form of pre bid clarification. In absence of any pre bid clarification, the more stringent requirement as per interpretation of customer/owner shall prevail without any commercial and time implication.
2. CONDENSATE POLISHING SYSTEM shall be operated & controlled from DCS (DCS is in BHEL's scope). Local Control Panel ,wherever required ,will be in bidder's scope.
3. **Redundancy of sensors shall be provided, irrespective of instrumentation shown in the PID, by bidder as per following:**
 - (i) Triple redundancy for all analog and binary inputs required for protection of system /drives.
 - (ii) For all other control functions & alarms, dual redundancy of the sensors shall be provided by the bidder.
4. The quantity of instruments mentioned in tender P &ID is minimum and redundancy shall be in line with point no. 3 mentioned above. Bidder shall also include in his proposal all the instruments and devices that are needed for the completeness of the plant auxiliary system/ equipment supplied by the bidder, even if the same is not specifically appearing in the P & ID. During detail engineering if any additional instruments are required for safe & reliable operation of plant, bidder shall supply the same without any implication.
5. All the instruments shall be supplied along with necessary fittings, accessories, valve manifold, root valves, Junction box, Canopy & Structural steel as required. Instrument Installation, along with hardware shall be in bidder scope.
6. The junction boxes/LIEs for termination of instruments, solenoid valve, limit switches etc. are in bidder's scope. All instruments shall be terminated on JB/LCP in field and both instrument and JB & LCP are in bidder scope.
7. Double root valves shall be provided where pressure is above 40 Kg/cm².
8. The solenoid operated valves/ damper/gates shall have limit switches for open/ close feedback. Solenoid valve shall be rated for 24 V DC only.
9. Diaphragm seal with capillary shall be provided with Instruments having contact with corrosive media e.g. resin line with DM water.
10. All pneumatic operated regulating control valves shall be envisaged with smart positioner.



Specific Technical Requirement For
CONDENSATE POLISHING
SYSTEM

5X800 MW
YADADRI TPS, NALGONDA

- 11.** Electrical Actuators shall be with integral starter.
- 12.** BHEL shall provide 230 VAC UPS supply feeder at a single point. Further distribution to various instruments shall be in Bidder's scope. Bidder to include necessary power distribution board in his scope. Any power supply other than the above, if required by any instrument/device, has to be derived by the Bidder and all necessary hardware/software for the same shall be in bidder's scope. Bidder to furnish UPS / Electrical load data along with the bid.
- 13.** Power supply derived for Transmitters, contact interrogation, interposing relay and solenoid shall generally be ungrounded 24V D.C only. In all cases redundancy in power modules shall be considered.
- 14.** All transmitters & electronics items including JB's will be explosion proof / intrinsically safe as per hazardous area classification.
- 15.** The make shall be as per approved vendor list. The model of various instruments/items/systems shall be subject to approval of owner/purchaser during detailed engineering stage. No commercial implication in this regard shall be acceptable. In case of any conflict or repetition of clauses in the specification, the more stringent requirements among them are to be complied with.
- 16.** All Instruments must have separate tapping lines. Sharing of the same tapping pipe for redundant instruments or various different instruments is not acceptable.
- 17.** Electronic instruments shall not be located close to hot lines, vessels or other hot equipment. Ambient temperatures exceeding 80 °C shall not result in calibration difficulties or rapid deterioration of electronic components.
- 18.** Mandatory spares as per specification, shall be supplied by bidder.
- 19.** Vendor representative shall be available for 6-7 days during commissioning time at site.
- 20.** The design, manufacture, inspection, testing, site calibration and installation of all C&I equipment and systems covered under this specification shall conform to the latest editions of applicable codes and standards eg. ANSI, ASME, IEEE, ISO, IEC, IGCI, AWS, NFPA, AISC, IGS, SAMA, UBC, UL, NESC, NEMA, ISA, DIN, VDE, IS etc.
- 21.** For instrument & control cable scope of supply refer 'Electrical scope sheet between BHEL & vendor'.
- 22.** Bidder shall provide Cable Schedule in BHEL excel format which shall be provided during detailed engineering. Also, Cable engineering i.e schedule and interconnections for Complete System shall be in Bidders' scope. DCS side details for hardwired signals shall be furnished by BHEL during detailed engineering stage.