2X800 MW USTPP, MAHAN(PH-II)SINGRAULI

Customer: Mahan Energen Limited (Subsidiary of M/s Adani Power)
Consultant: TCE

TECHNICAL SPECIFICATION
FOR
DEBRIS FILTER

SPECIFICATION No. **PE-TS-504-165-W003**

REV NO. 00

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

514367/2024/PS-PEM-WSE

BHEL	TECHNICAL SPECIFICATION DEBRIS FILTER 2X800 MW USTPP, MAHAN(PH-II) SINGRAULI	PE-TS-504-165-W003 Rev. No. 00 Date :16.08.24

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PROJECT INFORMATION

SL.NO	DESCRIPTION	DETAILS
1	**METEOROLOGICAL DATA**	
1.1	MAXIMUM TEMPERATURE	48.8 Deg C
1.2	MINIMUM TEMPERATURE	1 Deg C
1.3	MAXIMUM RELATIVE HUMIDITY	85%
1.4	MINIMUM RELATIVE HUMIDITY	20%
1.5	AVERAGE ANNUAL RAINFALL	1132.7 mm
1.6	SEISMIC ZONE (AS PER IS 1893)	Zone: IV as defined in
1.7	HEIGHT ABOVE MSL	(+) 272.0 Meter above
1.8	BASIC WIND SPEED (AS PER IS 875)	47 m/s
2	**ELECTRICAL DATA**	
2.1	AMBIENT TEMPERATURE FOR DESIGN OF ELECTRICAL EQUIPMENT	50 Deg C
2.2	RATED FREQUENCY	refer part A of spec.
2.3	FREQUENCY VARIATION	
2.4	AC VOLTAGE	
2.5	AC VOLTAGE VARIATION	
2.8	FAULT LEVEL (KA/SEC)	

	GENERAL TECHNICAL REQUIREMENT
1	The debris filter (DF) is intended to prevent accumulation of debris in CW Pipe before entering into the condenser. The cooling water system is of closed circuit type with cooling towers or open circuit type as specified. The water analysis is indicated with Datasheet-A. It shall be capable of housing the various forms of debris / sludge i.e., suspended particles / matter, mussels, grass, leaves, wood pieces etc. The performance of the Debris Filter shall be continuous with minimum number of flushing/ backwashing operations.
2	Unless otherwise necessary manufacturer's standard and proven models of the DEBRIS FILTER shall be supplied.
3	The equipment shall comply with all applicable safety codes and statutory regulations of India where the equipment is to be installed.
4	The design, manufacture and testing of the DEBRIS FILTER complete with all accessories, shall generally conform to the latest editions of the appropriate standards.
5	Latest codes and standards shall be applicable as on date of bid submission.
6	In the event of any conflict between the requirements of two clauses of this specification, documents or requirements of different codes and standards specified, stringent requirement as per the interpretation of the owner shall apply.
7	Bidder to note that drawing/document submission shall be through web based Document Management System. Bidder shall be provided access to the DMS for drg/doc approval and adequate training for the same. Bidder to ensure proper net connectivity at their end.
8	The first revision drawings/ documents submitted by vendor shall be complete in all respects. Any incomplete drawing submitted shall be treated as non- submission with delays attributable to vendor's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL / Customer's place as per the requirement for across the table submissions / discussions/ finalizations of drawings.
9	Supply of debris disposal pipe work upto the Terminal Point (refer Flow Diagram in COMPLIANCE DRAWING Section) including flanges/counter flanges, bends, fittings, supports, gaskets, fasteners etc. shall be in the scope of Bidder. However, bidder has to consider minimum debris disposal pipe length and no. of bends as per the list of BOQ mentioned in Technical Data PART A in their scope. In case actual piping comes out to be less than the BOQ of Technical Data Part-A, still bidder has to supply the same as minimum requirement. Bidder shall finalize the pipework in their scope to suit the layout at contract stage in such a way that minimum site welding is required for pipework by purchaser at site.
10	Debris Discharge backwash pipe of DEBRIS FILTER shall be connected to CW return header. Velocity in the pipe work shall be less than 2.5 m/ sec.
11	Metallurgy specified in Technical Data Part-A is minimum. Equivalent or Superior materials suitable for fluid handled is also acceptable subject to Customer/BHEL approval.
12	Housing/ body of DEBRIS FILTER shall be designed and manufactured as per the applicable codes for pressure vessels and to take care of force and moments as enclosed in the specification. However, in no case thickness of housing/ body shall be less than connecting pipe thickness as specified in Technical Data Part-A of DEBRIS FILTER.
13	Debris Discharge valve shall be BFV Valve. All instrument root valves shall be Ball Valves/Globe Valves.

14	The DEBRIS FILTER shall be capable of safe, proper and continuous operation. Vibration, noise, mechanical stresses shall be kept within allowable limits specified by relevant codes / standards and in design due attention shall be given to ease of maintenance, repair and cleaning.
15	The inlet and outlet pipes of the DEBRIS FILTER shall be in line with each other on the same axis.
16	One man hole shall be provided for screen /internal inspection of Debris Filter. Additional manhole for access to BFV for its inspection shall be provided in case of BFV mounted on Debris Filter.
17	Thickness of body flange of Debris Filter shall be as per Drg no PE-DG-999-141-MO17 enclosed as compliance drawing.
18	Unless otherwise specified in Data Sheet -A, debris discharge / wash water flow rate during flushing/back washing operation shall be limited to 10% of the total flow rate and flushing / backwashing operation shall be completed within a period of maximum three (3) minutes. The pressure drop across the debris filter during flushing/ backwashing operation shall not be more than the pressure drop under partially (50%) chocked condition.
19	The coarse particles and floating matter accumulating at the filter section/screen are flushed out of the system by the debris flushing / backwash unit such that the pressure drop across the filter after flushing / backwashing, shall not be more than 1.1 times the pressure drop under clean conditions.
20	DEBRIS FILTER shall house the filter section / screen assembly and shall have flanged inlet, outlet, flushing/debris discharge openings and pressure measuring tappings etc.
21	In design of DEBRIS FILTER housing/ body due attention shall be given for easy removal and replacement of filter section / screen assembly.
22	The DEBRIS FILTER section/screen shall be securely positioned by a supporting cage and shall be securely mounted in the housing or body. The arrangement of the Strainer section shall be such that the forced accumulation of debris on the filter screen / section shall be minimum.
23	Automatic flushing/ back- washing operation effected by Differential pressure, Adjustable timer and Manual push Button shall be provided.
24	Separate power feeder for Gear Motor drive and supply feeder for Debris Discharge valve shall be provided by Purchaser.
25	Drawing / documents to be submitted by bidder shall be as per "Documentation Requirement" given in this specification.
26	Equipment must be safe, reliable, and easy to maintain at all operating conditions.
27	It is mandatory for the bidder to submit along with the bid, the deviations if any – whether major or minor in the schedule of deviations only. In the absence of deviations listed in the “Schedule of deviations, the offer shall be deemed to be full conformity with the specification, “not-withstanding” anything else stated elsewhere in bidder’s offer. The implied/indirect deviations shall not be binding on the purchaser.

28	All the equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection. The Bidder shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. BHEL shall have right to insist for completion of works in shops before despatch of materials for transportation.
29	The makes of various bought out items of bidder (i.e. motor, instruments etc.) shall be subject to BHEL/Customer approval in the event of order.

C&I TECHNICAL REQUIREMENT

1	Control of DEBRIS FILTER System shall be through DCS with CRT based OWS located in Control Room. DCS is in BHEL Scope.
2	Complete Field Intrumentation for monitoring and operation of DEBRIS FILTER System shall be provided by Vendor.
3	The quantity of instruments for the system shall be as per tender P &ID wherever provided of the respective system as a minimum, for bidding purpose.
4	Root valves, impulse piping, drain cocks, gauge-zeroing cocks, valve manifold, junction boxes and all other accessories required for erection of local / remote instruments shall be provided by Vendor.
5	The contacts of equipment mounted instruments, sensors, switches etc. for external connection including spare contacts shall be wired out in flexible/rigid conduits, independently to suitably located common junction boxes.
6	**TYPE TEST GENERAL REQUIREMENT**
6.1	Submission of type test results and certificate shall be acceptable provided:
6.1.1	The same has been carried out by the Bidder/ sub-vendor on exactly the same model /rating of equipment.
6.1.2	There has been no change in the components from the offered equipment & tested equipment.
6.1.3	The test has been carried out as per the latest standards alongwith amendments as on the date of bid opening.
6.2	In case the approved equipment is different from the one on which the type test had been conducted earlier or any of the above grounds, then the tests have to be repeated and the cost of such tests shall be borne by the Bidder/ sub-vendor within the quoted price and no extra cost will be payable by the Employer on this account.
6.3	The schedule of conduction of type tests/ submission of reports shall be submitted and finalized during pre-award discussion.
6.4	For the type tests to be conducted, Contractor shall submit detailed test procedure for approval by Employer. This shall clearly specify test setup, instruments to be used, procedure, acceptance norms (wherever applicable), recording of different parameters, interval of recording precautions to be taken etc. for the tests to be carried out.

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TECHNICAL DATA - PART - A (MECHANICAL)

SL.NO	DESCRIPTION	UOM	DETAIL
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 of DEBRIS FILTERs along with mandatory spares complete with all accessories as per the requirements specified in this specification, installation check & commissioning at site and any other services, etc. if called for in the succeeding sections of the specification.		
1.1	Scope of supply of DEBRIS FILTER Accessories and Spares in Bidder's Scope:		
1.1.1	(a) Counter Flange of DEBRIS FILTER (Shell/Body Inlet/Outlet) (b) Associated Gaskets, nuts and bolts		(a) No (b) Yes
1.1.2	Drain/Vent connection along with isolation valve		Yes
1.1.3	Debris Discharge Motorized Valve in Debris discharge backwash piping		Yes
1.1.4	Debris Discharge Piping & associated fittings		Yes (to be connected with CW return lines)
1.1.5	Sacrificial Anode type Cathodic Protection		No (provision to be provided only)
1.1.6	Supporting arrangement complete with saddle support, foundation plates, anchor bolts, nuts, sleeves, inserts, all installation materials, fixing bolts, clamps and other accessories etc. for complete equipment supplied under this package.		Yes
1.1.7	Lifting/ handling attachments/lugs for DEBRIS FILTER		Yes
1.1.8	Differential pressure measuring system for DEBRIS FILTER comprising of 2 Nos. DPT + 1 No. DPG (with remote seal arrangement) for each DEBRIS FILTER along with necessary junction box, fittings, accessories, valve manifold etc.		Yes
1.1.9	Local Control Panel / Switchgear Panel		No
1.1.10	Electrical Scope		Yes, As per ELECTRICAL SCOPE
1.1.11	Erection and commissioning spares, "on as required" basis		Yes
1.1.12	Set of special tools and tackles if required for maintenance and erection of the equipment supplied.		Yes
1.1.13	Mandatory Spares (Details as per BOQ Schedule)		No
1.2	Scope of Services:		
1.2.1	Installation Check of DEBRIS FILTER at site		Yes
1.2.2	Commissioning of DEBRIS FILTER at site		Yes
2.0	**DESIGN CODES & STANDARDS**		
2.1	Housing/Body excluding Flange		ASME Sec VIII, DIV I
2.2	Flange/Counter Flange		BS 4504
2.3	Drilling Standard		BS 4504

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2.4	Butterfly Valve		AWWA C 504/516
3.0	**DESIGN /SYSTEM PARAMETERS**		
3.1	Liquid Handled		Clarified Water
3.2	Size of DEBRIS FILTER	NB	2500
3.3	Length of DEBRIS FILTER b/w inlet & outlet nozzle	mm	As per bidder's design
3.4	Connecting pipe size (OD x Thk)	mm x mm	2540 X 20 (CS)
3.5	Filter type/ duty		On-line / continuous
3.6	Location		Condenser Inlet (in CW pit inside TG Hall)
3.7	Operating pressure at DEBRIS FILTER Inlet Flange	kg/cm2 (g)	2.0-2.5
3.8	Design pressure for DEBRIS FILTER Shell	kg/cm2 (g)	5.0 Kg/cm2 (g) & Vacuum 0.1Kg/cm2 (abs)
3.9	Design Mechanical temperature	Deg. C	50
3.10	Flow rate through filter		
3.10.1	Normal	Cub m/Hr	41800
3.10.2	Maximum	Cub m/Hr	50160
3.11	Design differential pressure for filter section/ screen	kg/cm2 (g)	1.5 (Min.)
3.12	Differential pressure measuring system set pressure		
3.12.1	For initiating flushing/ backwashing	mbar	60
3.12.2	For alarm/ annunciation	mbar	90
3.13	Filter section/ screen perforation size	mm	5 (Max)
3.14	Free flow area in the screen basket		Atleast 110 % of pipe inlet area
3.15	Debris discharge flow during flushing period	Cub m/Hr	<2.5% of Normal Flow
3.16	Debris Discharge Piping		
3.16.1	Dia of Debris Discharge Pipe		To be decided by bidder
3.16.2	Length of Debris Discharge Pipe	mtr	30 M (Minimum)
3.16.3	Number of bends required for Debris Discharge Pipe	nos	8 (Minimum)
3.16.4	Pressure drop across debris discharge piping between Debris Filter & CW return header	MWC	4.5
4.0	**CONSTRUCTION FEATURES**		
4.1	Length of Debris Filter (excluding counter flanges) *Note-:1) Debris Filter shall be mounted directly on the existing Butterfly valve - ReferCW piping layout attached..* *2) Flap of butterfly valve shall be extended to approx 1050 mm inside the Debris Filter. Refer attached Butterfly valve GA drawing.*	mm	4700

4.2	Foundation/Installation Details to be complied by Bidder as per Approved CW piping Layout Arrangement for RCC Pedestal Plan & Elevation (already constructed at site)		Refer attached drg no PE-DG-504-165-M001
4.3	(a)Size of Man Hole for Screen/Internal Inspection Purpose (b)Size of Man Hole for BFV Access Purpose	mm mm	600 600
4.4	Corrosion allowance (for Carbon Steel parts)	mm	1.6 (min)
4.5	Device for flushing out accumulated debris / sludge		Debris discharge/backwash outlet valve with associated actuator
4.6	Suitable lifting arrangement (lifting lugs, hooks etc) for handling during erection and maintenance.		Yes (In Bidder's Scope)
4.7	Size of Inspection hole with bolted cover	mm	To suit DEBRIS FILTER O&M
4.8	Cathodic Protection		Provision to be provided by Bidder
5.0	**MATERIALS OF CONSTRUCTION**		
5.1	Filter body/ housing		Fabricated Carbon Steel to IS :2062 and internally painted with Epoxy.
5.2	Connecting pipe (Inlet/ Outlet)		CS as per IS :2062
5.3	Filter screen/ section		SS 316
5.4	Other Internals (including nuts and bolts)		SS 316
5.5	Shaft		SS 316
5.6	Supporting cage		SS 316
5.7	Differential measuring system		As per Instrument Datasheet
5.8	Flushing/ backwashing unit		SS 316
5.9	Backwash rotor shoes		Neoprene
5.9	**Valves**		
5.9.1	Butterfly Valve		
	a) Body & disc		2% Ni CI as per IS 210, FG 260/ ASTM A 48, Gr. 40 with 2 % Ni / Epoxy coated Fabricated Steel (IS:2062 GR E-250B)
	b) Shaft		BS 970 431 S:291 / EN 57, or SS-410
	c) Seat Ring		18-8 SS
	d) Seal		Nitrile Rubber

5.9.2	Gate Valve/Globe Valve/Check Valve (For Size 65 Nb and Above)		
	a) Body & Bonnet		ASTM A 216 Gr. WCB
	b) Disc for Check Valve		ASTM A 216 Gr. WCB
	c) Trim		ASTM A 182 Gr. F6 or Equivalent
5.9.3	Gate Valve/Globe Valve/Check Valve (For Size 50 Nb and Below)		
	a) Body & Bonnet		ASTM A105
	b) Stem		ASTM A105
	c) Disc & Seat Ring		ASTM A 182 Gr. F6 or Equivalent
5.9.4	Ball Valves		
	a) Body		ASTM A105
	b) Ball		ASTM A 182 Gr. F6 or Equivalent
	c)Stem		ASTM A105
5.10	**Debris discharge/ Interconnecting Piping**		
5.10.1	For size upto 150 NB		CARBON STEEL ERW AS PER IS 1239 (HEAVY)
5.10.2	For size 200 NB and above		CARBON STEEL (IS 2062 Gr.E-250B), ROLLED & WELDED CONFIRMING TO IS 3589 Gr.410.
5.11	**COUNTER FLANGES FOR DEBRIS FILTER SHELL /OTHER FLANGES**		
5.11.1	Flanges		CS to IS 2062
5.11.2	Fasteners		A 193 & A 194
5.11.3	Gaskets		Min 4 mm thick rubber
5.12	Any other internal hardware /pipes etc.		To suit requirement inline with Specification
6.0	**PERFORMANCE PARAMETERS**		
6.1	Pressure drop across the filter (i.e. between inlet and outlet connection) at normal flow		
6.1.1	Clean condition	MWC	0.5
6.1.2	Partially (50%) chocked condition	MWC	1.0

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TECHNICAL DATA - PART - A (ELECTRICAL)

SL.NO	DESCRIPTION	UOM	DETAIL
1.0	**DESIGN CODES & STANDARDS**		
1.1	Three phase induction motors :		IS15999, IEC:60034, IS: 12615, IS: 325
1.2	Single phase AC motors		IS:996, IEC:60034
1.3	Energy Efficient motors		IS 12615, IEC:60034-30
1.4	Crane duty motors		IS:3177, IS/IEC:60034
1.5	Mechanical Vibration of Rotating Electrical Machines with Shaft Heights 56 mm and Higher - Measurement, Evaluation and Limits of Vibration Severity		IS 12075/IEC 60034-14
1.6	Designation of Methods of Cooling of Rotating Electrical Machines		IS 6362
1.7	Designation for types of construction and mounting arrangement of rotating electrical machines		IS 2253
2.0	**DESIGN /SYSTEM PARAMETERS**		
2.1	Rated voltage	V	415
2.2	Frequency	Hz	50
2.3	Permissible variations for		
a)	Voltage	%	+/-10
b)	Frequency	%	(+)3 to (-)5
c)	Combined	%	10 (absolute sum)
2.4	System fault level at rated voltage for 1 sec	kA	50
2.5	Short time rating for terminal boxes for 0.25 sec	kA	50
2.6	Type of motors		a)Squirrel cage induction motor suitable for direct-on-line starting (for non- VFD motors). b)Motor operating through VFD (if applicable) shall be suitable for inverter duty with VPI insulation.
2.7	Efficiency class		*IE3*
2.8	Rating		
a)	Motor duty		Continously rated-S1
b)	Design margin over continous max. demand of the driven equipment (min)		10%
3.0	**CONSTRUCTION FEATURES**		
3.1	Winding		Electrolytic grade Copper conductor
3.2	Enclosure Details		
a)	Degree of protection		

	i) Indoor motors		*IP55*
	ii) Outdoor motors		IP 55 with detachable metal canopy
b)	Method of ventilation		Totally enclosed fan cooled (TEFC)
3.3	Insulation		Class 'F' with temperature rise limited to class 'B'. Non-hygroscopic, oil resistant, flame resistant Insulation.
3.4	Bearings		Grease lubricated ball or roller bearings for Horizontal motors Grease lubricated ball or roller bearings or combined thrust and guide beaing for Vertical motors.
3.5	Main terminal box		
a)	Type		-Motor terminal box shall be detachable type and located in accordance with Indian Standards clearing the motor base- plate/ foundation. -Terminals shall be stud or lead wire type, substantially constructed and thoroughly insulated from the frame. - The terminals shall be clearly identified by phase markings, with corresponding direction of rotation marked on the non-driving end of the motor.
b)	DOP		Same as motor
c)	Position when veiwed from the non driving end		Left hand side
d)	Rotation		90 Deg.
e)	Space heater		Motors rated 30KW and above shall have space heater suitable for 240V, 50 Hz single phase AC supply.
f)	Cable glands and lugs		-Motor terminal box shall be furnished with Solder less crimping type heavy duty Lugs (aluminium lugs for aluminium cables and copper lugs for copper cables) and double compression Ni-Cr plated brass glands to match with cable used.
3.6	Earthing points suitable for conenction		Motor body shall be grounded at two earthing points on opposite sides with two separate and distinct grounding pads complete with tapped holes, GI bolts and washers.
3.7	Paint shade (Corrosion proof paints of colour shade)		RAL 7032/

3.8	The spacing between gland plate & centre of bottom terminal stud		Above 7 KW - upto 13 KW 115 Above 13 KW - upto 24 KW 167 Above 90 KW - upto 125 KW 331 Above 125 KW-upto 200 KW 385/203 (For Single core cables only)
3.9	Minimum inter-phase and phase-earth air clearances with lugs installed		UP to 110 KW 10mm Above 110 KW and upto 150 KW 12.5mm Above 150 KW 19mm
4.0	**PERFORMANCE PARAMETERS**		
4.1	Starting requirement		
a)	Minimum permissible voltage as a percentage of rated voltage, at start to bring the driven equipment upto the driven equipment upto rated speed		*The motors shall be capable of operation at full load at a supply voltage of 80% of the rated voltage for 5 minutes commencing from hot condition.*
b)	Maximum locked rotor current		as per IS 12615
c)	Starting duty		No. of consecutive cold startups : 3 (with initial temperature of the motor at ambient level) No. of consecutive hot startups : 2 (with initial temperature of motor at full load operating level)
d)	The locked rotor withstand time under hot condition at highest voltage limit		a) atleast 2.5 secs. more than starting time(for motors with starting time upto 20 secs. at minimum permissible voltage during starting) b)atleast 5 secs. more than starting time(for motors with starting time more than 20 secs. and upto 45 secs. at minimum permissible voltage during starting) c) more than starting time by at least 10% of the starting time(For motors with starting time more than 45 secs.at minimum permissible voltage during starting) Speed switches mounted on the motor shaft shall be provided in cases where above requirements are not met.
e)	The ratio of locked rotor KVA at rated voltage to rated KW		(a) Below 110KW : 10.0 (b) From 110 KW & upto 200 KW : 9.0

4.2	Torque (percent of full load torque)		1] Accelerating torque at any speed with the lowest permissible starting voltage shall be at least 10% motor full load torque. 2]Pull out torque at rated voltage shall not be less than 205% of full load torque.
4.3	Noise level (max.)		85 dB(A)
4.4	Vibration shall be limited within the limits		as per IS:12075 IEC
5.0	**INSPECTION/TESTING**		
5.1	All type & Routine tests shall be as per attached quality plan		

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TECHNICAL DATA - PART - A (C&I)			
SL.NO	**DESCRIPTION**	**UOM**	**DETAIL**
1.0	**DESIGN CODES & STANDARDS**		
1.1	IMPULSE PIPES, TUBES (Material, Rating)		ANSI B31.1, ANSI B31.1a, ANSI/ISA 77.70
1.2	VALVES (Material, Pr. Class, Size)		ASTM A182/ASTM A105 as per ASME 16.34
1.3	FITTINGS (Size, Rating, Material)		ANSI B31.1, ANSI B31.1a, ASME B16.11
1.4	INSTALLATION SCHEMES		BS 6739-2009, ANSI/ISA 77.70
1.5	ACTUATOR		EN15714-2
1.6	FIELDBUS CONCEPTS		IEC 61158
1.7	INSTRUMENTS AND APPARATUS FOR PRESSURE MEASUREMENT		ASME PTC19.2
1.8	ELECTONIC TRANSMITTERS		BS-6447, IEC-60770
1.9	BOURDON TUBE PRESSURE AND VACUUM GAUGES		IS-3624
1.10	AUTOMATIC NULL BALANCING ELECTRICAL MEASURING INSTRUMENTS		ANSI C 39.4 (Rev. 1973): IS:9319
1.11	SAFETY REQUIREMENTS FOR ELECTRICAL AND ELECTRONIC MEASURING AND CONTROLING INSTRUMENT		ANSI C 39.5
1.12	DIRECT ACTING ELECTRICAL INDICATING INSTRUMENT		IS:1248
1.13	STANDARD DIGITAL INTERFACE FOR PROGRAMMABLE INSTRUMENTATION		IEEE-488.2 -1990
1.14	TYPE OF ENCLOSURES		NEMA ICS Part - 6 - 1978 (with Rev. 1 4/80) through 110.22 (Type 4 to 13)
1.15	RACKS, PANELS AND ASSOCIATED EQUIPMENT		EIA : RS - 310 C- 1983 (ANSI C83.9 - 1972)
1.16	PROTECTION CLASS FOR ENCLOSURES, CABINETS, CONTROL PANELS & DESKS		IS:2147 -1962
TECHNICAL DATA - PART - A			
SL.NO	**DESCRIPTION**	**UOM**	**DETAIL**
2.1	**DATASHEET - PRESSURE TRANSMITTER, DIFFERENTIAL PRESSURE TRANSMITTER**		
2.1.1	Working Principle		Smart
2.1.2	Type		2 - Wire
2.1.3	Output Signal		Simultaneous transmission of digital and 4-20 mA DC signal. HART protocol.
2.1.4	Signal Processing		Silicon solid state electronic circuitry
2.1.5	Measuring Element		Capsule / Diaphragm

2.1.6	Element material		AISI-316 (Stainless Steel) or better
2.1.7	Static Pressure		150 % of maximum span continuously, without affecting the calibration
2.1.8	Turn-down ratio		100:1
2.1.9	Span and Zero		Locally adjustable non interacting. Facility for elevation and suppression by 100% of span
2.1.10	Enclosure Class		IP-65 (Explosion proof for NEC Class-1, Division 1 area)
2.1.11	Output Indicator		LCD type
2.1.12	Nameplate		Tag number, service engraved in stainless steel tag plate
2.1.13	Body		Forged Carbon Steel (SS for DM Water)
2.1.14	Operating Voltage		16 - 48 Volts D.C.
2.1.15	Load		600 Ohms (min.) at 24 Volts D.C.
2.1.16	Ambient Temperature		0 - 50 deg C
2.1.17	Performance:		
2.1.17.1	Accuracy		For PT: ± 0.04% or better of FSR for BTG package, ± 0.065% or better of FSR for BOP packages and ± 0.2% for remote seal type transmitter. For DPT: ± 0.025 % of calibrated span or better
2.1.17.2	Repeatability		+/- 0.05% of Span or better
2.1.17.3	Response time		100 msec or better
2.1.17.4	Warranty & Stability		min. of 5 yrs or better
2.1.18	Sealing/Isolation		Extended diaphragm with 5 meters SS armored capillary for corrosive, viscous and dirty fluid applications. Material for separator diaphragm as per application
2.1.19	Accessories		a) Universal mounting bracket suitable for pipe mounting. b) High tensile carbon steel U- bolts c) Installation accessories as per relevant installation drawing. d) Syphons for steam and hot water services. e) For PT: - ½" NPT 2-valve stainless steel manifold, constructed from SS316 bar stock f) Companion flange with nuts, bolts and gaskets

	TECHNICAL SPECIFICATION DEBRIS FILTER 2X800 MW USTPP, MAHAN(PH-II) SINGRAULI		PE-TS-504-165-W003 Rev. No. 00 Date :16.08.24
			g) Hand held configuration kit for calibration of Smart Transmitter. h) ½" NPT cable gland i) For DPT: - ½" NPT generally 5-valve stainless steel manifold, constructed from SS316 bar stock.
2.2	**DATASHEET - PRESSURE GAUGE, DIFFERENTIAL PRESSURE GAUGE**		
2.2.1	Type		Bourdon/Bellows/Diaphragm
2.2.2	MOC Sensing & Socket		AISI-316 SS
2.2.3	Movement Material		AISI-304 SS
2.2.4	Case Material		Stainless steel. Enclosure IP-65
2.2.5	Dial Size		Generally 150 mm (100 mm for SWAS gauges)
2.2.6	Scale		Black lettering on white background in 270 Deg. arc.
2.2.7	Window		Shatterproof glass
2.2.8	Range Selection		Normal process pressure – 50 ~ 70 % of range (approximately)
2.2.9	Over-range Protection		125% of maximum range by internal stop. External stop at zero
2.2.10	Adjustment		Micrometer screw for zero adjustment. Internal micrometer screw for range adjustment.
2.2.11	Element Connection		Argon welding
2.2.12	Process Connection		1/2" NPT(M) Bottom connection for local mounting, back connection for panel mounting.
2.2.13	Performance		Accuracy of +/- 1.0 % of span or better
2.2.14	Operating ambient temperature		0 - 50 degC
2.2.15	Safety Feature		Blow out disc./diaphragm at the back

2.2.16	Accessories		a) Snubber and Glycerin filled for pulsating fluid applications and at pump discharge. b) Stainless steel Diaphragm seals for corrosive, viscous and solid bearing or slurry type process fluids c) 3-Way stainless steel Gauge cock for pressure gauges. Process connection ½" NPT d) 5-valve SS316 manifold constructed from barstock for differential pressure gauge. Process connection ½" NPT. e) Union, nut & tail piece and other Installation accessories as required. f) Syphons for steam and hot water services.
2.2.17	Electrical Contact rating		240V, 5A AC/ 220V, 0.5A DC (for gauges with alarm contact). Number of Contacts:1 SPDT
2.2.18	Nameplate		Tag number, service engraved in stainless steel tag plate
2.3	**JUNCTION BOX**		
2.3.1	Type of Enclosure		Dust tight & weatherproof conforming to IP65
2.3.2	Material		3 mm Sheet Steel or better
2.3.3	At least 20 percent spare unwired terminals shall be provided for junction box. This shall be in addition to 20% spare wired terminals of spare IO channels.		

	TECHNICAL SPECIFICATION DEBRIS FILTER 2X800 MW USTPP, MAHAN(PH-II) SINGRAULI	PE-TS-504-165-W003 Rev. No. 00 Date :16.08.24

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

SL.NO		UOM	DETAIL
1.0	**GENERAL**		
i)	Manufacturer & Country of origin.		
ii)	Equipment driven by motor)		
iii)	Motor type		
iv)	Country of origin		
v)	Quantity	nos.	
2.0	**DESIGN AND PERFORMANCE DATA**		
i)	Frame size		
ii)	Type of duty		
iii)	Type of enclosure and method of cooling		
vi)	Type of mounting		
vii)	Direction of rotation as viewed from DE END		
viii)	Standard continuous rating at 40 deg.C. ambient temp. as per Indian Standard	(KW)	
ix)	(A) Derated rating for specified normal condition i.e. 50 deg. C ambient temperature	(KW)	
	(B) Rating as specified in load list	(KW)	
xi)	Rated speed at rated voltage and frequency	rpm	
xii)	At rated Voltage and frequency		
	a) Full load current	A	
	b) No load current	A	
xiii)	Power Factor at		
	a) 100% load		
	b) At duty point		
	c) 75% load		
	d) 50% load		
	e) NO load		
	f) Starting.		
xiv)	Efficiency at rated voltage and frequrecy		
	a) 100% load		
	b) At duty point		
	c) 75% load		
	d) 50% load		
xv)	Starting current*(inclusive of IS tolerance)* at		
	a. 100 % voltage	A	
	b. Minimum starting voltage	A	
xvi)	Starting time with minimum permissible voltage		

	a. Without driven equipment coupled	sec	
	b. With driven equipment coupled	sec	
xvii)	Safe stall time with 110% of rated voltage		
	a. From hot condition	sec	
	b. From cold condition	sec	
xviii)	**Torques :**		
	a. Starting torque at min. permissible voltage	(kg-mtr.)	
	b. Pull up torque at rated voltage.	(kg-mtr.)	
	c. Pull out torque	(kg-mtr.)	
	d. Min accelerating torque available	(kg-mtr.)	
	e. Rated torque	(kg-mtr.)	
xix)	Stator winding resistance per phase (at 20 Deg.C.)	Ohm	
xx)	GD^2 value of motors		
xxi)	Locked rotor KVA input (at rated voltage)		
xxii)	Locked rotor KVA/KW.		
xxiii)	**Bearings**		
	a. Type		
	b. Manufacturer		
	c. Self Lubricated or forced Lubricated		
	d. Recommended Lubricants		
	e. Guaranteed Life in Hours		
	f. Whether Dial Type thermometer provided		
	g. Oil pressure Gauge/switch		
	i. Range		
	ii. Contact Nos. & ratings		
	iii. Accuracy		
xxiv)	**Vibration**		
	a) Velocity	mm/s	
	b) Displacement	microns	
xxv)	Noise level	db	
3	**CONSTRUCTIONAL FEATURES**		
i	Stator winding insulation		
	a. Class & Type		
	b. Tropicalised (Yes/No)		
	c. Temperature rise over specified max.		
	i. Cold water temperature of 38 DEG. C.		
	ii. Ambient Air 50 DEG. C.		
	d. Method of temperature measurement		
	e. Stator winding connection		
	f. Number of terminals brought out		
ii	Type of terminal box for		
	a. stator leads		
	b. space heater		

	c. Temperature detectors		
	d. Instrument switch etc.		
iii)	For main terminal box		
	a. Location		
	b. Entry of cables		
	c. Recommended cable size		
	d. Fault level	MVA	
iv)	Temperature detector for stator winding		
	a Type		
	b. Nos. provided		
	c . Location		
	d. Make		
	e. Resistance value at 0 deg. C	ohms	
vi)	Paint shade		
vii).	Weight of(approx)		
	a. Motor stator (KG)		
	b. Motor Rotor (KG)		
	c. Total weight (KG)		
4	Relevant motor curves		
5.0	**INSTRUMENT DETAILS**		
5.1	MAKE		
5.2	MODEL		
5.3	TAG NO. / KKS NO.		
5.4	SERVICE		
5.5	QUANTITY		
5.6	OPERATING PRESSURE		
5.7	OPERATING TEMPERATURE		
5.8	DESIGN PRESSURE		
5.9	DESIGN TEMPERATURE		
5.10	RANGE		

COMPLIANCE DRAWING

A) FLOW DIAGRAM FOR DEBRIS FILTER

B) CW PIPING LAYOUT

C) GA OF BUTTERFLY VALVE (2500 NB)

D) FLANGE/COUNTER FLANGE DETAILS

E) INSTRUMENTATION STUB DETAIL

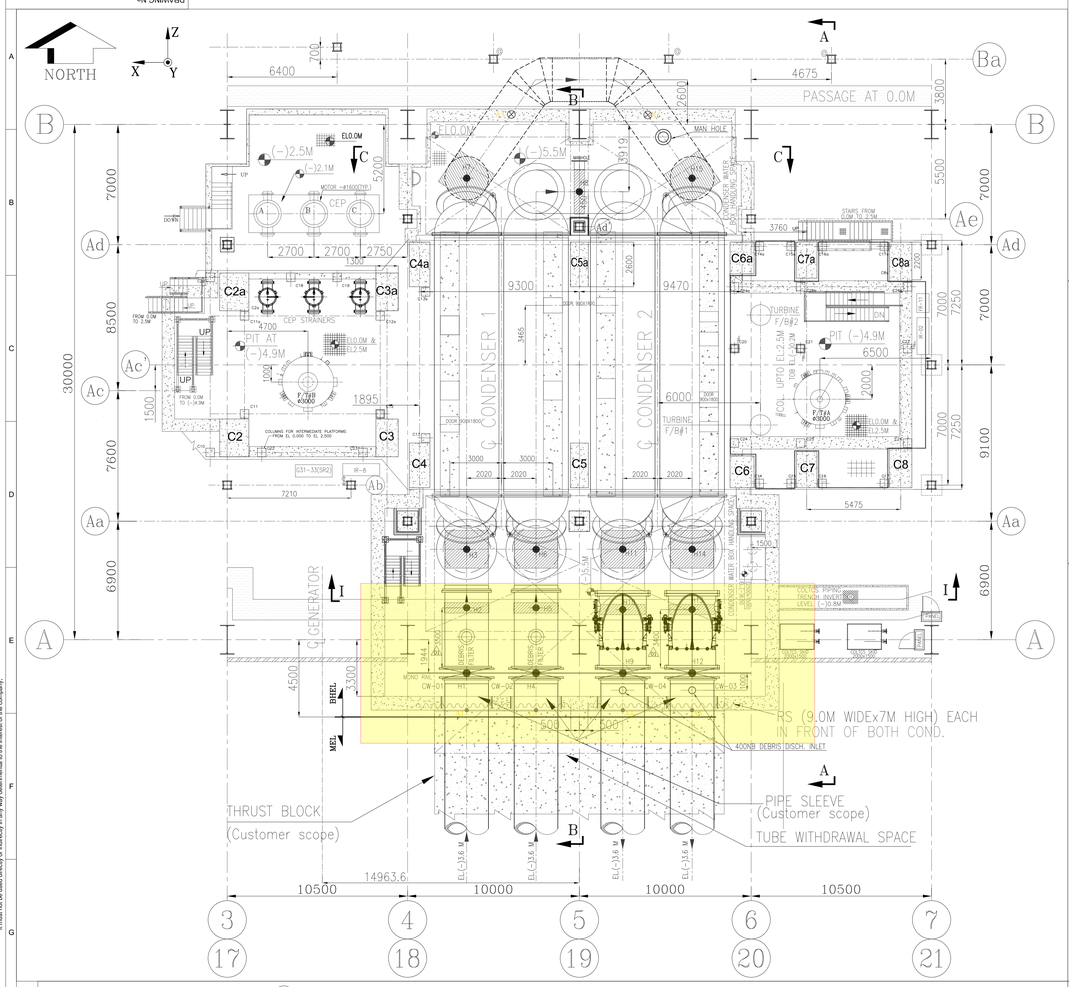
F) DDCMIS INTERFACE FOR LT DRIVE

G) MOTORIZED VALVE ACTUATOR DATASHEET

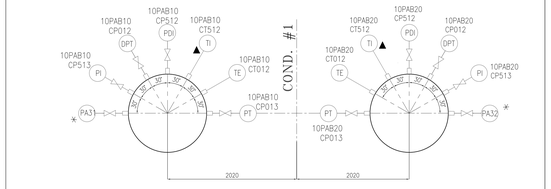
H) CHECKLIST FOR INSTRUMENTS

I) ELECTRICAL SCOPE SPLIT

J) WATER ANALYSIS

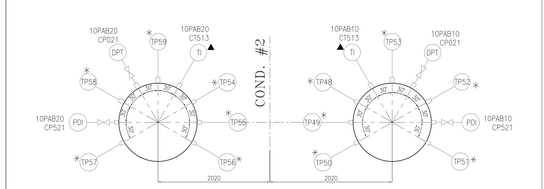


GENERATOR SIDE — TURBINE SIDE



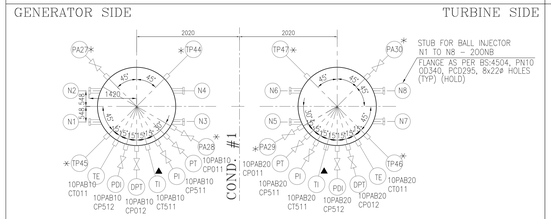
PLAN VIEW
DETAILS OF INSTRUMENT STUBS ON OUTLET OF CONDENSER #1

GENERATOR SIDE — TURBINE SIDE



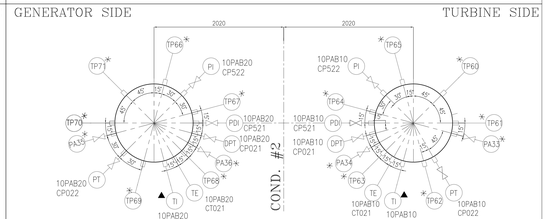
PLAN VIEW
DETAILS OF INSTRUMENT STUBS ON INLET OF CONDENSER #2

GENERATOR SIDE — TURBINE SIDE



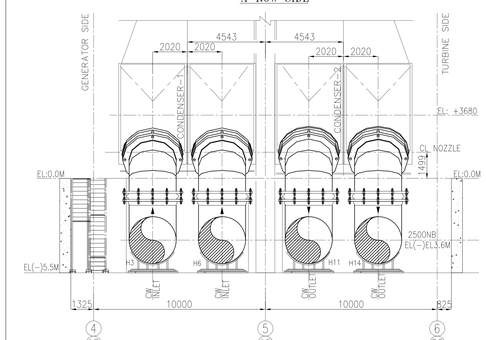
PLAN VIEW
DETAILS OF BALL INJECTION NOZZLES & INST. STUBS ON INLET OF CONDENSER #1

GENERATOR SIDE — TURBINE SIDE



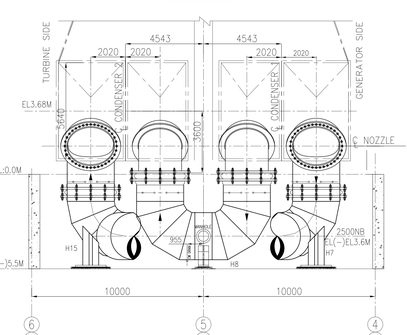
PLAN VIEW
DETAILS OF INSTRUMENT STUBS ON OUTLET OF CONSENSER #2 AT EL (-)0.25M

A-ROW SIDE

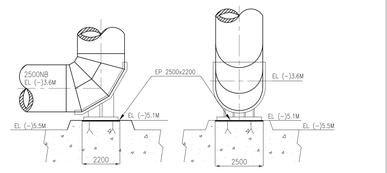


SECTION I-I
(NTS)

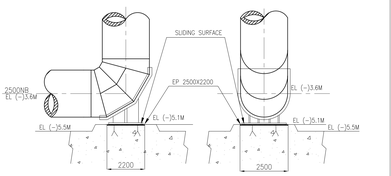
B-ROW SIDE



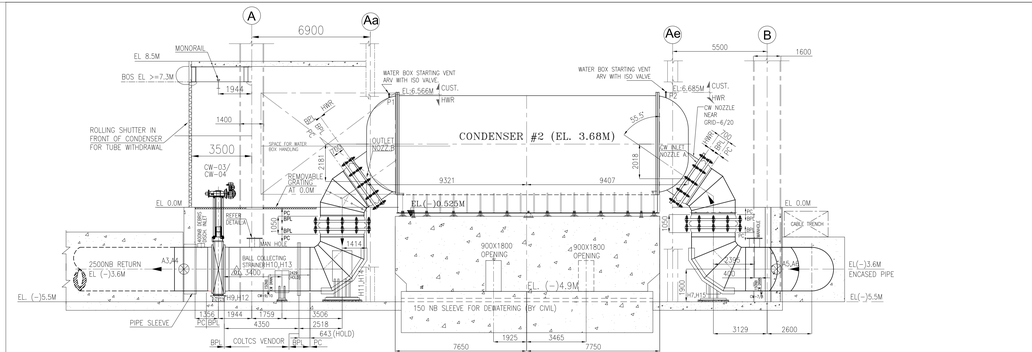
VIEW C-C
(NTS)



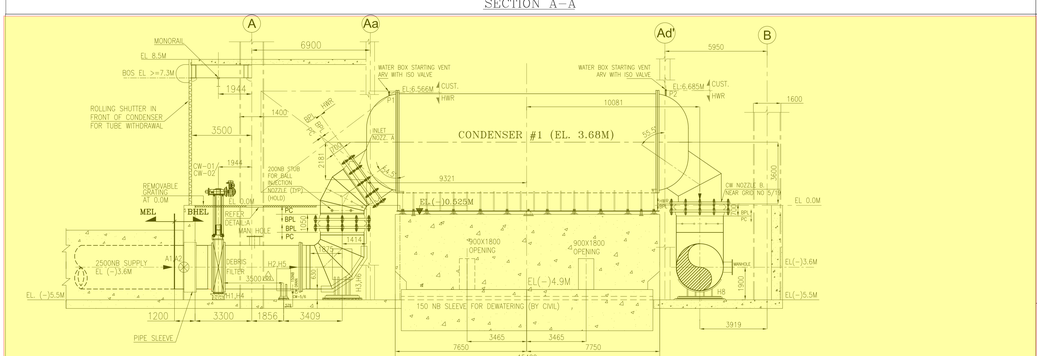
SUPPORT DETAILS for H-3, H-6, H-11, H-14
(NTS)



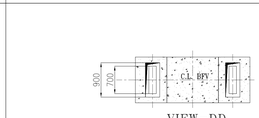
SUPPORT DETAILS for H-7, H-15
(NTS)



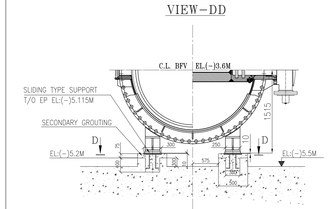
SECTION A-A



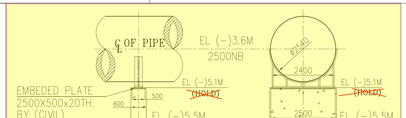
SECTION B-B



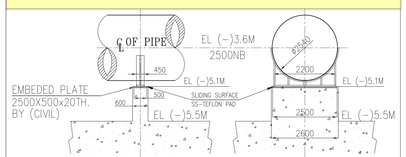
VIEW-DD



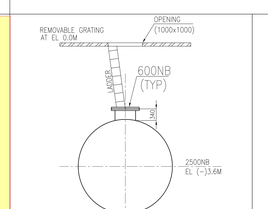
2500NB BFV SUPPORT DETAILS for H-1, H-4, H-9 & H12



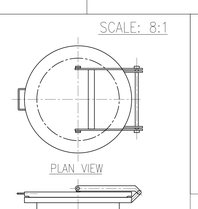
SUPPORT DETAILS for H-2, H-10, H-5, H-13



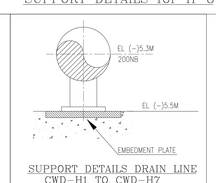
SUPPORT DETAILS for H-8



TYPICAL MANHOLE ARRANGEMENT DETAIL:A



DAVIT ARRANGEMENT MANHOLE 600NB DETAIL:B



SUPPORT DETAILS DRAIN LINE CWD-H1 TO CWD-H7

ORIENTATION OF BFV

VALVE DETAILS (HOLD)				
SL NO	VALVE TAG NUMBER	SIZE	TYPE	SCOPE
1	CW-1, 2, 3, 4	2500	BFV (MO)	BPL
2	CW - 5, 6, 7, 8, 9, 10	150	GV	FEM

LOAD DETAILS								
SL NO	HANGER / SUPPORT NUMBER	LOAD (TONNE)			MOMENTS (T-m)			
		Fx	Fy	Fz	Mx	My	Mz	
1	H1	0.4	(-)37.3	3.2				
2	H2	2.1	(-)65.9	8.4				
3	H3	1.0	(-)51.0	4.7				
4	H4	0.1	(-)37.3	3.1				
5	H5	0.4	(-)68.9	8.4				
6	H6	0.2	(-)51.0	4.0				
7	H7	5.7	(-)53.2	(-)4.7				
8	H8	3.8	(-)79.0	22.5				
9	H9	0.3	(-)35.0	4.1	BOTTOM SLIDING SUPPORTS			
10	H10	1.8	(-)97.7	19.0				
11	H11	0.3	(-)47.7	3.3				
12	H12	0.1	(-)35.0	3.9				
13	H13	0.4	(-)99.8	19.0				
14	H14	0.1	(-)47.7	3.2				
15	H15	(-)3.1	(-)53.2	(-)3.1				
18	ANCHOR A1	1.9	(-)3.6	(-)33.4	8.9	28.2	(-)21.6	
19	ANCHOR A2	0.4	(-)3.6	(-)34	9.3	6.0	(-)4.5	
20	ANCHOR A3	0.8	(-)36.4	21.5	(-)31.0	(-)52.2	(-)77.6	
21	ANCHOR A4	2.9	(-)4.5	(-)44.5	4.1	36.1	(-)23.4	
22	ANCHOR A5	0.6	(-)4.5	(-)45.0	4.2	7.2	(-)4.3	
23	ANCHOR A6	6.0	(-)47.9	20.8	(-)71.0	31.3	74.7	

(+)X=>TURBINE to GENERATOR
(+)Y=>VERTICALLY UPWARDS
(+)Z=>"A" ROW to "B" ROW

NOTES:-

1. ALL DIMENSIONS ARE IN MM AND ELEVATIONS IN METERS UNLESS STATED OTHER WISE.
2. ALL ELEVATION MARKED ARE W.R.T. TO HALL FINISHED FLOOR ELEVATION OF EL 0.00M WHICH CORRESPONDS TO RL(+)338.3M .
3. DESIGN PARAMETERS:
   CW PRESSURE: 5.0 kg /sq.cm (g)
   ACW PRESSURE: 7.5.0 kg /sq.cm (g)
   CW INLET TEMP. TO COND. & VACUUM PUMP HEAT EXCH.: 33°C.
   ACW INLET TEMP. TO PHEs: 38°C
   DESIGN MECHANICAL TEMPERATURE: 50°C.
4. FOR CW & ACW PIPE SPECIFICATION REFER P&ID PE-DG-504-165-M001.
5. INSTRUMENTS MARKED ▲ SHALL BE SUPPLIED ALONG WITH THE EQUIPMENTS
6. ALL PRESSURE TAPPINGS TO BE OF 15NB.
7. CW DRAIN & VENT VALVES IS OF SIZE: 150NB.
8. ALL 2700NB BENDS ARE OF MITRE TYPE WITH RADIUS 0.75D.
9. INSTRUMENTS MARKED WITH * MARK ARE FOR PERFORMANCE GUARANTEE TEST.
10. MATING FLANGES FOR BFVs, AND BALL COLLECTING STRAINERS ARE WITH NECK PIECES AND SHALL BE SUPPLIED WITH BFV ONLY.
11. FOOTINGS OF A-ROW COLUMNS A7/8, 5/13 & 6/20 TO BE KEPT BELOW CW PIT LEVEL SUCH THAT NO PART OF BASE-PLATE PROJECTS ABOVE PIT SURFACE.
12. REFER SEPARATE COLTCS VENDOR DRAWING FOR COLTCS PIPING LAYOUT.
13. FLANGED STUB TO BE PROVIDED BY PC COLTCS PIPING AS PER VENDOR DRAWING.
14. FOR PAINTING AND SURFACE PROTECTION REQUIREMENT, KINDLY REFER CR & ACW P&ID.
15. PIPE DETAILS OF PIPING FROM DEBRIS FILTER TO DEBRIS DISCHARGE WILL BE FINALIZED ON PLACEMENT OF ORDER.
16. SUPPLY OF COUNTER FLANGES FOR ARV/ISOLATION VALVE IS IN BHEL-CUSTOMER SCOPE.

HOLD:-
COLTS
DEBRIS FILTER

CW PIT TO BE DESIGNED BY CONSIDERING FORCES AND MOMENTS ON ANCHORS A5 & A6~ B-ROW SIDE FROM CONDENSER.
THRUST BLOCK TO BE DESIGNED CONSIDERING THE FORCES AND MOMENTS ON THRUST BLOCK COMING FROM CW PUMP SIDE TO CONDENSER & FORCES AND MOMENTS ON ANCHORS A1, A2, A4 & A5 ARE FOR PIPING FROM CONDENSER UPTO ANCHOR LOCATION (A~ROW).

LEGENDS:-
CONCRETE
RAIL TRACK
GRATING FLOOR
ROLLING SHUTTER

PROGRESSIVE COPY DATED. 22/05/2024

PROJECT:	MAHAN ENERGEN LIMITED 2x800MW ULTRA SUPER CRITICAL THERMAL POWER PROJECT MAHAN (PH-II) SINGRAULI, MP
CUSTOMER: adani	ADANI POWER LIMITED
CONSULTANT: TATA	TATA CONSULTING ENGINEERS LIMITED MUMBAI INDIA

JOB NO. 504
STATUS CONTRACT
DISTRIBUTION

REV.	DATE	ALTD	CHD	APPD

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

DEPT CODE		NAME	SIGN	DATE
M	DRN	SDK		15.04.2024
	DESN	PKU		15.04.2024
	CHD	SK		15.04.2024
	APPD	BKA		15.04.2024

TITLE: LAYOUT OF CW PIPING LOCAL TO CONDENSER

DEPT. SCALE 1:125 SIGN

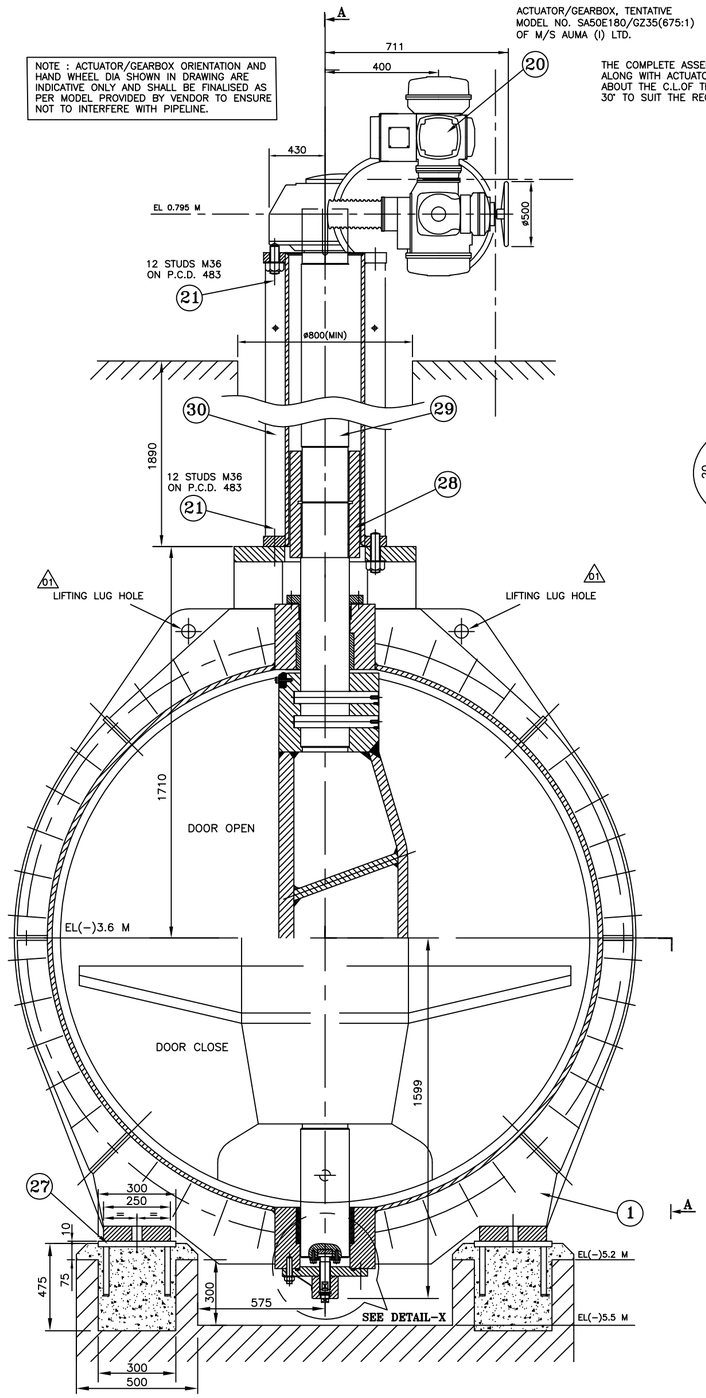
BEL DRG.NO. 552H-E-BTG-TCA-DM-P-V-0017
BHEL DRG.NO. PE-DG-504-165-M001
SHEET 1 OF 1 REV. 0A
SIZE-A0

DRG. NO. 0 951 38 00262

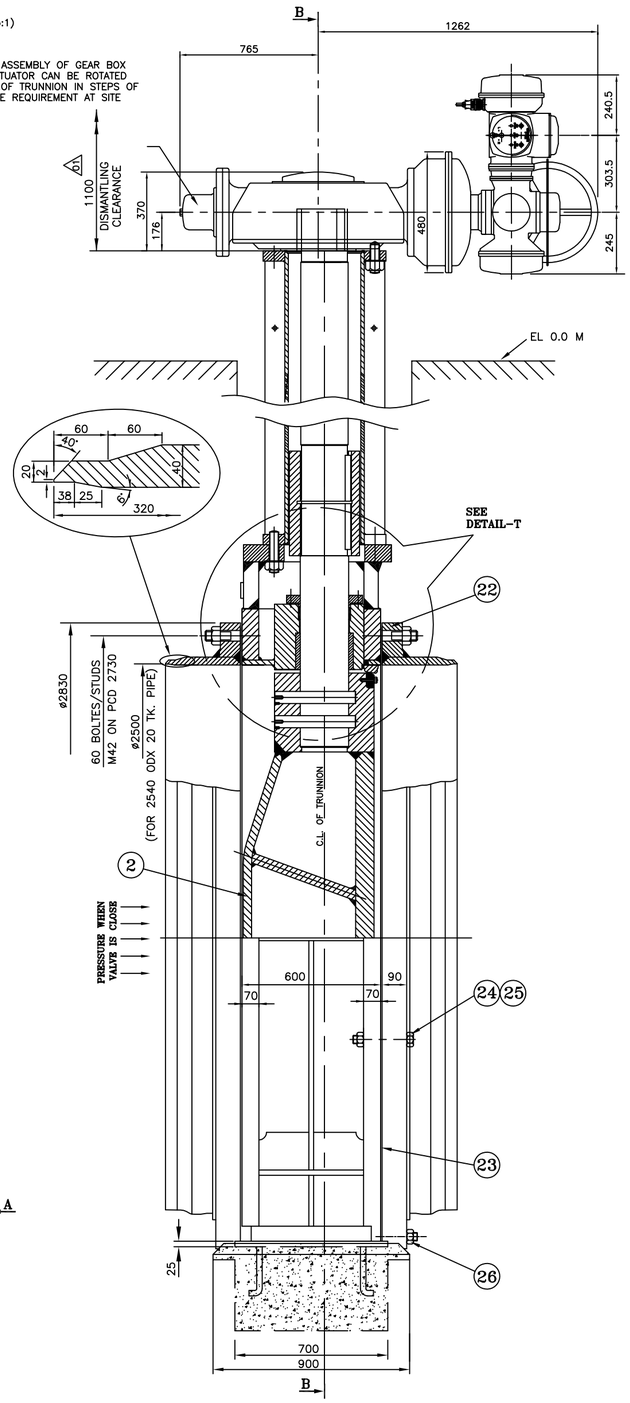
NOTE : ACTUATOR/GEARBOX ORIENTATION AND HAND WHEEL DIA SHOWN IN DRAWING ARE INDICATIVE ONLY AND SHALL BE FINALISED AS PER MODEL PROVIDED BY VENDOR TO ENSURE NOT TO INTERFERE WITH PIPELINE.

ACTUATOR/GEARBOX, TENTATIVE
MODEL NO. SA50E180/GZ35(675:1)
OF M/S AUMA (I) LTD.

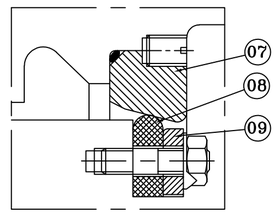
THE COMPLETE ASSEMBLY OF GEAR BOX ALONG WITH ACTUATOR CAN BE ROTATED ABOUT THE C.L.OF TRUNNION IN STEPS OF 30° TO SUIT THE REQUIREMENT AT SITE



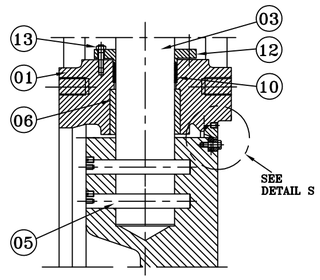
SECTION AT B−B
TYPICAL ELEVATION



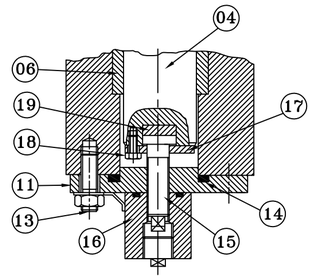
SECTION AT A−A
SIDE VIEW



DETAIL−S

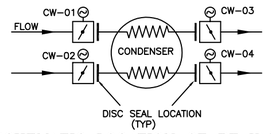


DETAIL−T



CENTERING PIN DETAIL−X

KKS TAG NO.	TAG NO.	SERVICE DESCRIPTION	QUANTITY UNIT−3	QUANTITY UNIT−4
30PAB10 AA001	CW−01	CONDENSER INLET	1	1
30PAB20 AA001	CW−02	CONDENSER INLET	1	1
30PAB10 AA002	CW−03	CONDENSER OUTLET	1	1
30PAB20 AA002	CW−04	CONDENSER OUTLET	1	1
TOTAL QTY. OF BFV			8	



SCHEMATIC LOCATION OF BF VALVE

WEIGHT OF COMPANION FLANGES = 2876 KG
ACTUATOR WEIGHT = 1225 KG
TOTAL WEIGHT OF VALVE = 14912 KG

TECHNICAL REQUIREMENTS

1. DESIGN PRESSURE = 5.0 kg/sq cm (g)
2. TEST PRESSURE:−
   VALVE BODY / DOOR − 10.0 kg/sq cm FOR 10 MIN. DURATION.
   VALVE SEAL − 5.0 kg/sq cm FOR 5 MIN. DURATION
3. ALL HARDWARES (EXCEPT S.S. HARDWARES) ARE TO BE ZINC PLATED WITH PLATING THICKNESS 10−14 MICRONS.
4. VALVES SHALL BE PAINTED WITH COATING SYSTEM C4 AS PER THE TECHNICAL SPECIFICATION ANNEXURE−1: TECHNICAL SPECIFICATION FOR PAINTING & COATING OF EQUIPMENT & STRUCTURES.
5. TECHNICAL SPECIFICATION:−
   A) MAX. FLOW DISCHARGE = 41800 cub m/hr .
   B) MAX. TORQUE = 11186 Kg−m.
   C) DESIGN WATER TEMP. = 50°C
   D) DESIGN STD:− AWWA C516
   E) TESTING STD:− AWWA C516
   F) OPEN/CLOSE TIME = 40−60 SECONDS
6. TESTING AND INSPECTION TO BE DONE AS PER AGREED QUALITY PLAN NO. BP−QP−504−100−0004
7. REFER DRG. NO. PE−DG−504−165−W001 FOR P & ID OF CW & ACW SYSTEM.

ITEM NO.	DESCRIPTION	MATERIAL	SPECIFICATION	QTY.
30	ACTUATOR STAND	CARBON STEEL	FABRICATED ASSY.	001
29	EXTENSION SHAFT	ALLOY STEEL	IS 4367 40Ni6Cr4Mo3	001
28	SLEEVE	ALLOY STEEL	IS 4367 40Ni6Cr4Mo3	001
27	BASE PLATE	CARBON STEEL	IS 2062 GrB	002
26	STUD M42	CARBON STEEL	IS 1367 CL P8.8	016
25	NUT M42	CARBON STEEL	IS 1367 CL P8.8	120
24	BOLT M42	CARBON STEEL	IS 1367 CL P8.8/8	104
23	GASKET	NON ASBESTOS		002
22	COMPANION FLANGE	CARBON STEEL	IS 2062 GrB	002
21	STUD & NUT FOR ACTUATOR MOUNTING	CARBON STEEL	IS 1367 CL P8.8/8	12 NOs, EACH
20	ELECTRICAL ACTUATOR	Mfr's STANDARD/PURCHASED	TENTATIVE	001
19	DISC PAD	PHOSPHOR BRONZE	IS 7811	001
18	RETAINING PLATE SCREW	STAINLESS STEEL	ASTM A−479 TP316	008
17	RETAINING PLATE	STAINLESS STEEL	ASTM A−240 TP316	001
16	CAP NUT	STAINLESS STEEL	IS 6603 Gr.15Cr16Ni2	001
15	JACKING BOLT M36	STAINLESS STEEL	IS 6603 Gr.15Cr16Ni2	001
14	RUBBER CORD	ACRYLO NITRILE RUBBER (BUNA−N)		001
13	STUD & NUT FOR END COVER & COVER PLATE	CARBON STEEL	IS 1367 CL P8.8/8	10 NOs, EACH
12	COVER PLATE	CARBON STEEL	IS 2062 Gr. A	001
11	END COVER	MILD STEEL	IS 2062 Gr. A	001
10	GLAND PACKING	PTFE−TEFLON		001
09	DOOR SEAL CLAMPING	STAINLESS STEEL	ASTM A−240 TP316	001
08	VALVE DOOR SEAL	ACRYLO NITRILE RUBBER (BUNA−N)		001
07	VALVE SEAT	STAINLESS STEEL	ASTM A−240 TP316	001
06	BEARING/BUSH	SELF LUBRICATING	FEROFORM/THORPLAS	002
05	PARALLEL DOWEL PIN	STAINLESS STEEL	IS 6603 Gr.15Cr16Ni2	003
04	TRUNNION (NON DRIVING SIDE)	STAINLESS STEEL	IS 6603 Gr.15Cr16Ni2	001
03	TRUNNION (DRIVING SIDE)	STAINLESS STEEL	IS 6603 Gr.15Cr16Ni2	001
02	ø2500 B.F. VALVE DOOR	FABRICATED	IS 2062 Gr.B	001
01	ø2500 B.F. VALVE BODY	FABRICATED	IS 2062 Gr.B	001

ADDITIONAL INFORMATION	MEL DRG. NO. 552H−E−BTG−TGA−BM−G−V−0037 / BHEL DRG. NO. BP−DG−504−104−0001
CUSTOMER	adani MAHAN ENERGEN LIMITED (MEL)
CUSTOMER'S CONSULTANT	TATA CONSULTING ENGINEERS LIMITED CONTRACT BANGALORE, INDIA
ADDITIONAL INFORMATION	
STATUS OF DRAWING	उत्पाद का प्रकार या ग्राहक/परियोजना का नाम TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 2X800 MW ULTRA SUPER CRITICAL THERMAL POWER PROJECT MAHAN (PH−II) SINGRAULI, MP
DISTRIBUTION OF PRINTS: CDE − 2, TGX − 1, STM − 5	भारत हेवी इलेक्ट्रिकल्स लिमिटेड भोपाल BHARAT HEAVY ELECTRICALS LTD. BHOPAL

	नाम/ NAME	हस्ता./ SIGN	दिनांक/DATE	रे.ई. की संख्या NO. OF VAR
बनाया DRN	सर्वेश अष्ठाना	सर्वेश	02.02.24	00
चेक्ड CKD	कुंज बिहारी सिंह	कुंज बिहारी सिंह	02.02.24	
स्वीकृत APPD	ए.के.माहौर		02.02.24	

REV.	DATE		
01	01.05.24	ALTERED	सर्वेश अष्ठाना सर्वेश
		CHECKED	कुंज बिहारी सिंह कुंज बिहारी सिंह
		APPROVED	ए.के.माहौर

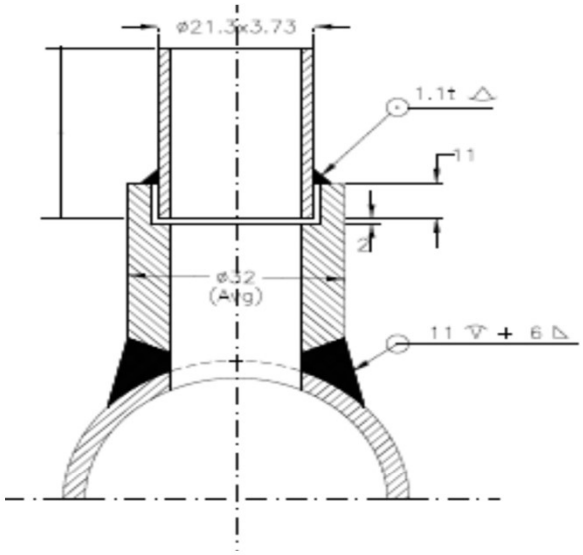
DRG. REVISED IN LINED WITH CUTOMER'S COMMENTS & REVISION MARKED AS 01

विभाग DEPT CDE	उत्प. टल. नाप की श्रेणी UNTOL.DIMS. GR.		उत्पात SCALE NTS	भार कि.ग्रा. WEIGHT (K.G.) 14912	उसे. ड्राईंग का संदर्भ REF. TO ASSY. DRG. 0 951 38 01213
कोड CODE 411	−				मद सं. ITEM NO. −

शीर्षक/ TITLE	ARRGT OF ø2500 BF VALVE WITH ELECTRICAL ACTUATOR AND EXT. SHAFT (TAG NOs. CW−01,02,03,04)
ड्राईंग सं./DRAWING NO.	0 951 38 00262
पुन./REV	01
पृष्ठ सं./SHT. No.	01
पृष्ठों की संख्या/NO. OF SHT.	01
मद संख्या NO. OF ITEM	−

A2

STUB DETAIL FOR PRESSURE MEASUREMENT



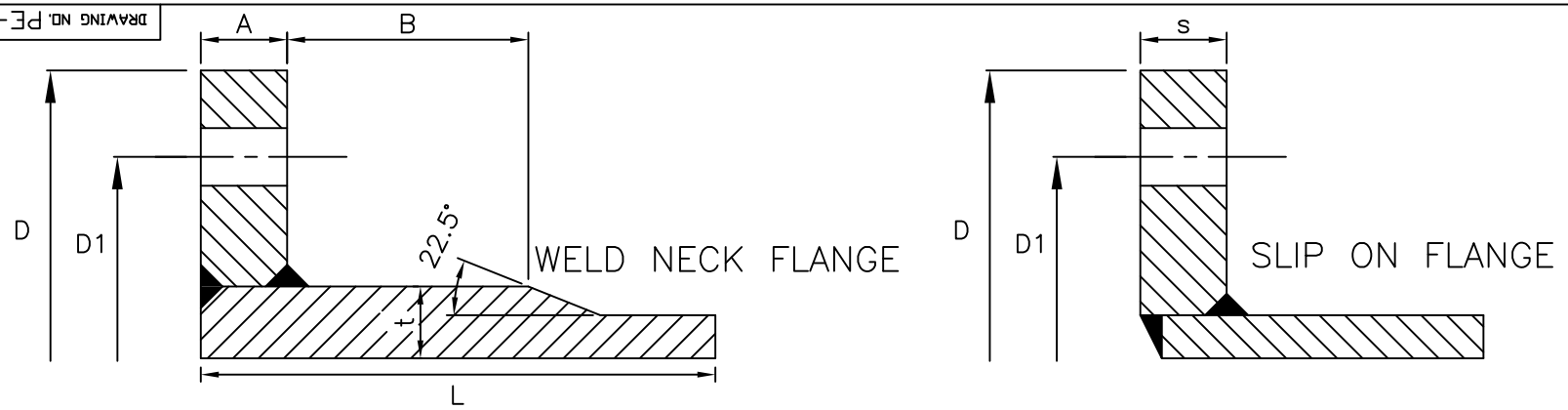
NOTE :

1. MATERIAL OF THE BOSS AND NIPPLE SHALL BE THE SAME AS THE PIPE INTO WHICH IT IS WELDED AND CONFORM TO ANSI B16.11.
2. THE LENGTH OF NIPPLE SHALL BE 250 MM.
3. STUB LENGTH SHALL BE 64mm UPTO 200Nb PIPE, 45mm ABOVE 200Nb PIPE SIZE.
4. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE INDICATED
5. EDGE HOLE MUST BE CLEAN AND SQUARE OR ROUNDED SLIGHTLY (1/64" RADIUS) FREE FROM BURRS, WIRE EDGES OR OTHER IRREGULARITIES

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM

DRAWING NO. PE-DG-999-141-M017



PIPE SIZE	PIPE THK.	FLANGE OD 'D'	Bolt PCD 'D1'	WELD NECK FLANGE				SLIP-ON FLANGE TKICKNESS S*
				FLANGE THK. 'A'	NECK THK. 't'	NECK Length 'B'	Appx. Total Length 'L'	
1000	10	1289	1200	34	20	70	200	70
1200	10–12	1465	1380	40	24	70	200	90
1400	14	1675	1590	50	24	70	200	100
1600	14	1915	1820	60	32	80	220	110
1800	14–16	2115	2020	70	32	90	250	120
2000	18	2325	2230	75	36	100	250	130
2200	18	2550	2420	80	36	100	300	140
2300	20	2660	2550	80	36	110	310	145
2400	20	2760	2650	80	40	110	310	150
2500	20	2860	2760	80	40	120	350	155
2600	20	2960	2850	85	40	130	350	160
2700	20	3070	2960	90	40	130	350	165
2800	20	3180	3070	90	40	140	350	–
2900	20	3290	3180	90	40	150	350	–

NOTES:–

Flange thicknesses listed are for

1. Design pressure=5Kg/cm^2(g)
2. Dimensions are mentioned in Table
3. Material: Carbon Steel as per IS:2062

* Slipon Flange thickness listed are for pipe thickness mentioned in table.

In case of any change in Design pressure, Pipe ID & Thickness, Flange PCD & OD, Neck Thickness & dimensions and Material of Construction, Flange thickness to be worked out on case to case basis.

REV.	DATE	DESCRIPTION	ALTD	CHD	APPD
03	01.03.19	FLANGE DETAILS ADDED FOR 2600,2800 & 2900NB	AC	PM	SPV
02	02.05.11	FLANGE DETAILS ADDED FOR 2300,2500 & 2700NB	PM	SPV	SM
01	25.08.08	FLANGE DETAILS ADDED FOR 1000 & 2000NB	PM	SPV	SM

BHARAT HEAVY ELECTRICALS LTD
POWER GROUP
PROJECTS ENGINEERING MANAGEMENT
PPEI, NOIDA

DEPT CODE		NAME	SIGN	DATE
M	DRN	PM		25.06.07
	DSGN	PM		25.06.07
	CHD	SPV		25.06.07
	APPD	SM		25.06.07

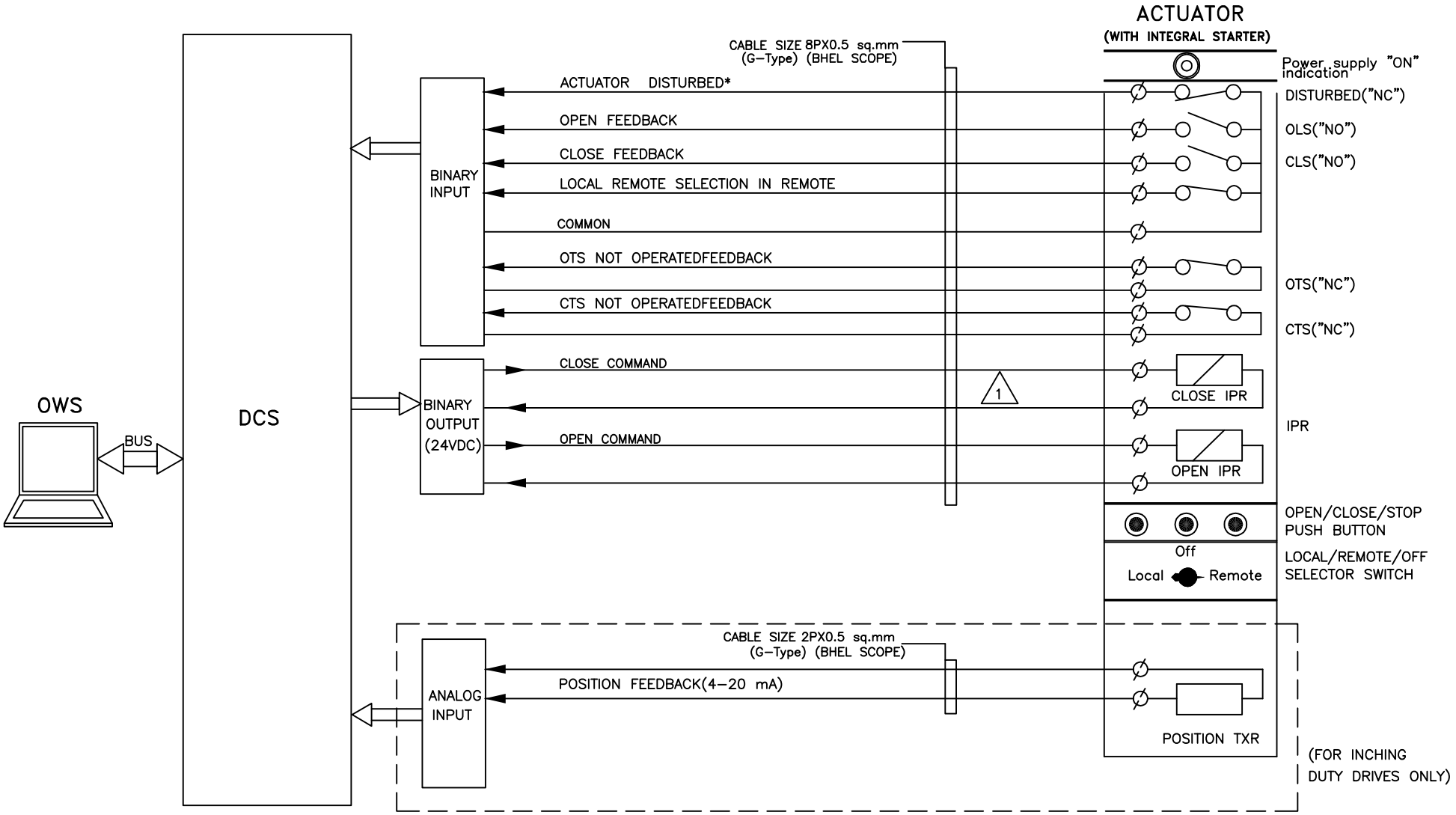
JOB NO.	999
STATUS	–
DISTRIBUTION	

TITLE: SUGGESTIVE DIMENSIONAL DRAWING FOR CARBON STEEL COUNTER FLANGE

DRAWING NO. PE-DG-999-141-M017

SHEET 01 OF 01 REV 03

DCS INTERFACE FOR BIDIRECTIONAL DRIVE(WITH INTEGRAL STARTER)

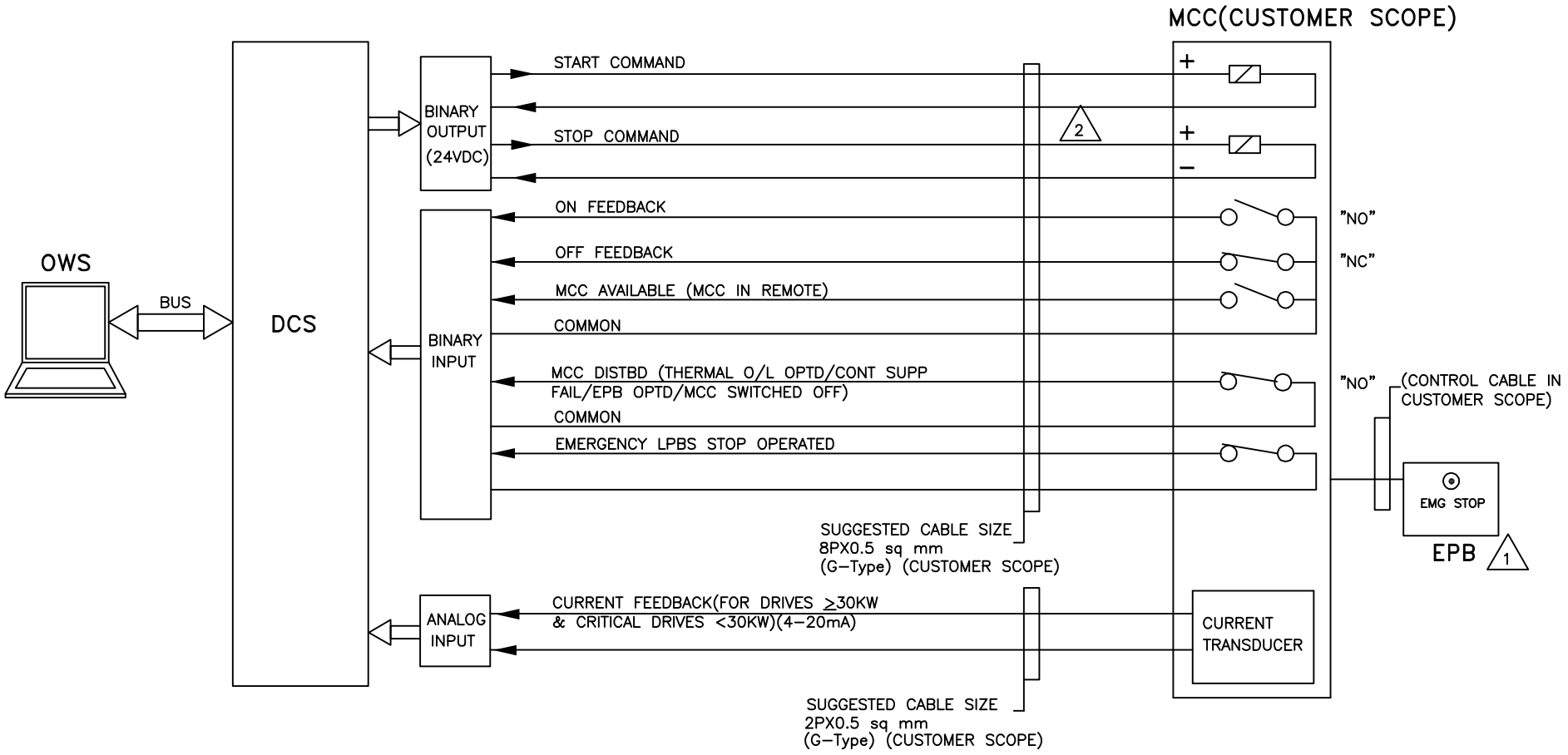


NOTE:

* DISTURBED= Loss of Power supply (1 Phase/3 Phase)/ Loss of control supply/ Motor thermostat trip/ Thermal over load/ Local Stop PB optd.

BHEL	PROJECT: 2x800 MW (Phase–II) Mahan TPP, Singrauli, M.P	DRG.NO. PE–DM–504–145–H002
	TITLE: DDCMIS INTERFACE FOR BIDIRECTIONAL DRIVE	DATE 19.01.24
		SHT 7 OF 11

DCS INTERFACE FOR UNIDIRECTIONAL LT DRIVE



BHEL	PROJECT: 2x800 MW (Phase-II) Mahan TPP, Singrauli, M.P	DRG.NO. PE-DM-504-145-H002
	TITLE: DDCMIS INTERFACE FOR UNIDIRECTIONAL LT DRIVE	DATE 02.02.24
		SHT 8 OF 11

FORM NO. PEM-6666-0

BHEL	**SPECIFICATION FOR MOTORISED VALVE ACTUATOR**	SPECIFICATION NO.: PE-SS-504-145-I007 VOLUME II B SECTION D REV. NO. 00 DATE: 20.05.24 SHEET 1 OF 3

Data Sheet A & B

	DATA SHEET-A (TO BE FILLED BY PURCHASER)		DATA SHEET-B (TO BE FILLED-UP BY BIDDER)
GENERAL*	* PROJECT	2 X 800 MW MAHAN (Ph-II) USCTP & 2x800MW Adani Raigarh	
	OFFER REFERENCE		
	* TAG NO. SERVICE		
	* DUTY	☐ ON / OFF ☐ INCHING	
	* LINE SIZE (inlet/outlet): MATERIAL		
	* VALVE TYPE	☐ GLOBE ☐ GATE ☐ REG. GLOBE ☐ BUTTERFLY	
	* OPENING / CLOSING TIME		
	* WORKING PRESSURE		
	AMBIENT CONDITION	SHALL BE SUITABLE FOR CONTINUOUS OPERATION UNDER AN AMBIENT TEMP. OF 0-55 DEG C AND RELATIVE HUMIDITY OF 0-95%	
	VALVE SEAT TEST PRESS	BIDDER TO SPECIFY	
	REQUIRED VALVE TORQUE	BIDDER TO SPECIFY	
	ACTUATOR RATED TORQUE	BIDDER TO SPECIFY	
CONSTRUCTION AND SIZING	CONSTRUCTION	TOTALLY ENCLOSED, DUST TIGHT, WEATHER PROOF, SUITABLE FOR OUTDOOR USE WITHOUT CANOPY, IP:65	
	MECHANICAL POSITION INDICATOR	TO BE PROVIDED FOR 0-100% TRAVEL	
	BEARINGS	DOUBLE SHIELDED, GREASE LUBRICATED ANTI-FRICTION.	
	GEAR TRAIN FOR LIMIT SWITCH/TORQUE SWITCH OPERATION	METAL (NOT FIBRE GEARS). SELF-LOCKING TO PREVENT DRIFT UNDER TORQUE SWITCH SPRING PRESSURE WHEN MOTOR IS DE-ENERGIZED.	
	SIZING	OPEN/CLOSE AT RATED SPEED AGAINST DESIGNED DIFFERENTIAL PRESSURE AT 85% OF RATED VOLTAGE. FOR ISOLATING SERVICE THREE SUCCESSIVE OPEN-CLOSE OPERATIONS OR 15 MINS. WHICHEVER IS HIGHER. **FOR INCHING SERVICE - 150 STARTS/HR MINIMUM & FOR REGULATING SERVICE - 600 STARTS/HR MINIMUM.**	
HANDWHEEL	* REQUIRED	■ YES ☐ NO	
	* ORIENTATION	☐ TOP MOUNTED ☐ SIDE MOUNTED	
	*TO DISENGAGE AUTOMATICALLY DURING MOTOR OPERATION.		
ELECTRIC ACTUATOR	ACTUATOR MAKE/MODEL	BIDDER TO SPECIFY	
	MOTOR MAKE / MODEL / TYPE / RATING (KW)	BIDDER TO SPECIFY	
	@ MOTOR TYPE	SQUIRREL CAGE INDUCTION MOTOR, STARTING CURRENT LIMITED TO SEVEN TIMES THE RATED CURRENT as per IEC-60034-30	
	ACTUATOR APPLICABLE WIRING DIAGRAM	■ ENCLOSED (BIDDER TO CONFIRM) A: ■ DRG. NO. 3-V-MISC-24227 R00 B: ☐ DRG. NO. 3-V-MISC-24550 R00 C: ☐ DRG. NO. 3-V-MISC-24283 R00 D: ☐ DRG. NO. 4-V-MISC-90271 R11 E: ☐ For Thyristor based Integral starter, Bidder/Vendor to furnish wiring diagram	
	COLOUR SHADE	■ BLUE (RAL 9003) ☐	
	PAINT TYPE **(## Refer Notes)**	☐ ENAMEL ■ EPOXY ☐	
	SHAFT RPM	BIDDER TO SPECIFY	
	OLR SET VALUE	BIDDER TO SPECIFY	
	@ STARTING / FULL LOAD CURRENT	BIDDER TO SPECIFY	Starting current shall not exceed 7 times rated current as per IEC 60034 for IE-3 motors.
	NO. OF REV FOR FULL TRAVEL	BIDDER TO SPECIFY	

514367/2024/PS-PEM-WSE

FORM NO. PEM-6666-0

BHEL	**SPECIFICATION FOR MOTORISED VALVE ACTUATOR**	SPECIFICATION NO.: PE-SS-504-145-I007	
		VOLUME	II B
		SECTION	D
		REV. NO. 00	DATE: 20.05.24
		SHEET 2	OF 3

Data Sheet A & B

	DATA SHEET-A (TO BE FILLED BY PURCHASER)		DATA SHEET-B (TO BE FILLED-UP BY BIDDER)
	@ PWR SUPP TO MTR / STARTER	415V, 3PH, AC	
	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED FROM THE POWER SUPPLY TO THE STARTER ☐ 230 V ☐ 110 V	
	@ ENCLOSURE CLASS OF MOTOR	☐ IP 67 ☐ FLAME PROOF	
	@ INSULATION CLASS	CLASS-F TEMP. RISE LIMITED TO CLASS-B	As per IEC-60034
	@ WINDING TEMP PROTECTION	■ THERMOSTAT (3 Nos.,1 IN EACH PHASE) ☐ ----------	
	SINGLE PHASE / WRONG PHASE SEQUENCE PROTECTION	REQUIRED	
INTEGRAL STARTER	INTEGRAL STARTER	■ REQUIRED ☐ NOT REQUIRED	
	TYPE OF SWITCHING DEVICE	■ CONTACTORS ☐ THYRISTORS	
	TYPE	■ CONVENTIONAL ☐ SMART (NON-INTRUSIVE)	
	IF SMART		
	a) SERIAL LINK INTERFACE	☐ INTEGRAL ☐ FIELD MOUNTED	
	b) SERIAL LINK PROTOCOL	☐ FOUNDATION FIELD-BUS ☐ PROFI-BUS ☐ DEVICE NET ☐.....	
	c) SERIAL LINK MEDIA	☐ TWISTED PAIR Cu-CBL ☐ CO-AXIAL Cu-CBL ☐ OFC	
	d) HAND HELD PROGRAMMER	☐ REQUIRED ☐ NOT REQUIRED	
	e) TYPE OF HAND HELD PROGRAMMER	☐ BLUETOOTH ☐ INFRARED ☐.....	
	f) MASTER STATION	☐ REQUIRED ☐ NOT REQUIRED	
	g) MASTER STN INTRFACE WITH DCS	☐ MODBUS ☐ TCP/IP	
	h) DETAILS OF SPECIAL CABLE	☐ ENCLOSED ☐ NOT REQUIRED	
	STEP DOWN CONT. TRANSFORMER	■ REQUIRED	
	OPEN / CLOSE PB	■ REQUIRED ☐ NOT REQUIRED	
	STOP PB	■ REQUIRED ☐ NOT REQUIRED	
	INDICATING LAMPS	■ REQUIRED ☐ NOT REQUIRED	
	LOCAL REMOTE S/S	■REQUIRED ☐ NOT REQUIRED	
	STATUS CONTACTS FOR MONITORING	■ REQUIRED ☐ NOT REQUIRED	
	INTEGRAL STARTER DISTURBED SIGNAL	REQUIRED (O/L RELAY OPERATED, CONT./POWER SUPPLY FAILED, S/S IN LOCAL, TORQUE SWITCH OPTD. MID WAY)	
INTERPOSING RELAY/OPTO COUPLER (Applicable for integral Starter)	TYPE OF ISOLATING DEVICE	■ INTERPOSING RELAY ☐ OPTO COUPLER ☐ EITHER	The coils of interposing relays shall be connected to freewheeling diode.
	QUANTITY	■ 2 NOs. ☐ 3 NOs.	
	DRIVING VOLTAGE	■ 20.5 – 24V DC ☐ _____V DC	
	DRIVING CURRENT	■ 125mA MAX ☐ _____mA MAX	
	LOAD RESISTANCE	■ > 192 ohms - <25 k ohms ☐ > _____ohms - < _____ohms	
TORQUE SWITCH (Not Applicable for Smart Actuator) **($$ Refer Notes)**	MFR & MODEL NO.	BIDDER TO SPECIFY	
	OPEN / CLOSE	■1 No. ☐2Nos. / ■1 No. ☐2Nos	
	CONTACT TYPE	2 NO + 2 NC	
	RATING	5A 240V AC AND 0.5A 220V DC	
	CALIBRATED KNOBS(OPEN&CLOSE TS)	REQUIRED FOR SETTING DESIRED TORQUE	
	ACCURACY	+3% OF SET VALUE	
LIMIT SWITCH (Not Applicable	MFR & MODEL NO.	BIDDER TO SPECIFY	
	OPEN : INT : CLOSE	■1 No ☐2 Nos.	2 Nos. (ADJ.) ■1 No. ☐2Nos.

514367/2024/PS-PEM-WSE

FORM NO. PEM-6666-0

BHEL	**SPECIFICATION FOR MOTORISED VALVE ACTUATOR**	SPECIFICATION NO.: PE-SS-504-145-I007 VOLUME II B SECTION D REV. NO. 00 DATE: 20.05.24 SHEET 3 OF 3

Data Sheet A & B

	DATA SHEET-A (TO BE FILLED BY PURCHASER)		DATA SHEET-B (TO BE FILLED-UP BY BIDDER)
for Smart Actuator) **($$ Refer Notes)**	CONTACT TYPE	2 NO + 2 NC	
	RATING (AC / DC)	5A 240V AC AND 0.5A 220V DC	

POSITION TRANSMITTER	POSITION TRANSMITTER (For inching duty & other specific applications)	■ REQUIRED ☐ NOT REQUIRED	
	MFR & MODEL NO.	BIDDER TO SPECIFY	
	TYPE	☐ ELECTRONIC (2 WIRE) R/I CONVERTER ■ ELECTRONIC (2 WIRE) CONTACTLESS	
	SUPPLY	■ 24V DC ☐	
	OUTPUT	■ 4-20mA	
	ACCURACY	± 1% FS	
SPACE HEATER	@SPACE HEATER	REQUIRED	
	@ POWER SUPPLY (NON INTEGRAL)	230V AC,1 PH.,50 Hz	
	@ POWER SUPPLY (INTEGRAL)	BIDDER TO SPECIFY	
	@ RATING		
TERMINAL BOX	ACTUATOR/MOTOR TERMINAL BOX	REQUIRED	
	ENCL CLASS ACTUATOR/MOTOR T.B.	@☐ IP 68 @☐.....	
	@ EARTHING TERMINAL	REQUIRED	
	PLUG & SOCKET (9 PIN) (FOR COMMD, LS/TS FEED BACK, PoT)	☐ REQUIRED ■ NOT REQUIRED☐ ☐ 2 NOS. ☐ ----------	
CABLE GLANDS	@ POWER CABLE GLAND	SIZE:----------	
	@ SPACE HEATER CABLE GLAND	SIZE:----------	
	OTHER CONTROL CABLE GLANDS-1		
	OTHER CONTROL CABLE GLANDS-2	QUANTITY & SIZE :----------	
WEIGHT	TOTAL WEIGHT (ACTUATOR + ACCESSORIES)	BIDDER TO SPECIFY	_____ Kg.

NOTES:

1. **SCOPE**: DESIGN, MANUFACTURE, INSPECTION, TESTING AND DELIVERY TO SITE OF ELECTRIC ACTUATOR FOR INCHING OR OPEN / CLOSE DUTY.
2. **CODES & STANDARDS**: DESIGN AND MATERIALS USED SHALL COMPLY WITH THE RELEVANT LATEST INTERNATIONAL STANDARD (INDIAN CODES ARE NOT ACCEPTABLE).
3. TEMPERATURE RISE SHALL BE RESTRICTED TO 70 DEG. C FOR AMBIENT TEMPERATURE OF 50 DEG C.
4. CABLE GLANDS OF DOUBLE COMPRESSION TYPE, Tinned brass conforming to BS: 6121.
5. THE TORQUE SWITCHES SHALL BE PROVIDED WITH MECHANICAL LATCHING DEVICE TO PREVENT OPERATION WHEN UNSEATING FROM THE END POSITIONS. THE LATCHING DEVICE SHALL UNLATCH AS SOON AS THE VALVE LEAVES THE END POSITION. IF SUCH PROVISION IS NOT POSSIBLE, THE TORQUE SWITCHES SHALL BE BYPASSED BY END-POSITION LIMIT SWITCHES WHICH OPENS ON VALVE LEAVING END POSITION.THESE LIMIT SWITCHES ARE ADDITIONAL TO THE NUMBER OF LIMIT SWITCHES SPECIFIED ELSEWHERE.
6. THE MOTOR SHALL OPERATE SATISFACTORILY UNDER THE +/- 10% SUPPLY VOLTAGE VARIATION AT RATED FREQUENCY, -6% TO +4% VARIATION IN FREQUENCY AT RATED SUPPLY VOLTAGE, SIMULTANEOUS VARIATION IN VOLTAGE & FREQUENCY THE SUM OF ABSOLUTE PERCENTAGE NOT EXCEEDING 10%.
7. THE MOTOR SHALL BE SUITABLE FOR DIRECT ON LINE STARTING.
8. DAMPERS ETC. ARE TO BE FITTED WITH SOCKET AND PLUG OF WELL-ESTABLISHED MAKE IN ACCORDANCE TO IEC 60309 OR EQUIVALENT FOR THE POWER CABLE CONNECTION. FOR THE CONTROL CABLE CONNECTION SEPARATE SOCKET AND PLUG SHALL BE PROVIDED.

$$ TORQUE SWITCH & LIMIT SWITCH SHALL ACT INDEPENDENT OF EACH OTHER. TANDEM OPERATION IS NOT ACCEPTABLE.

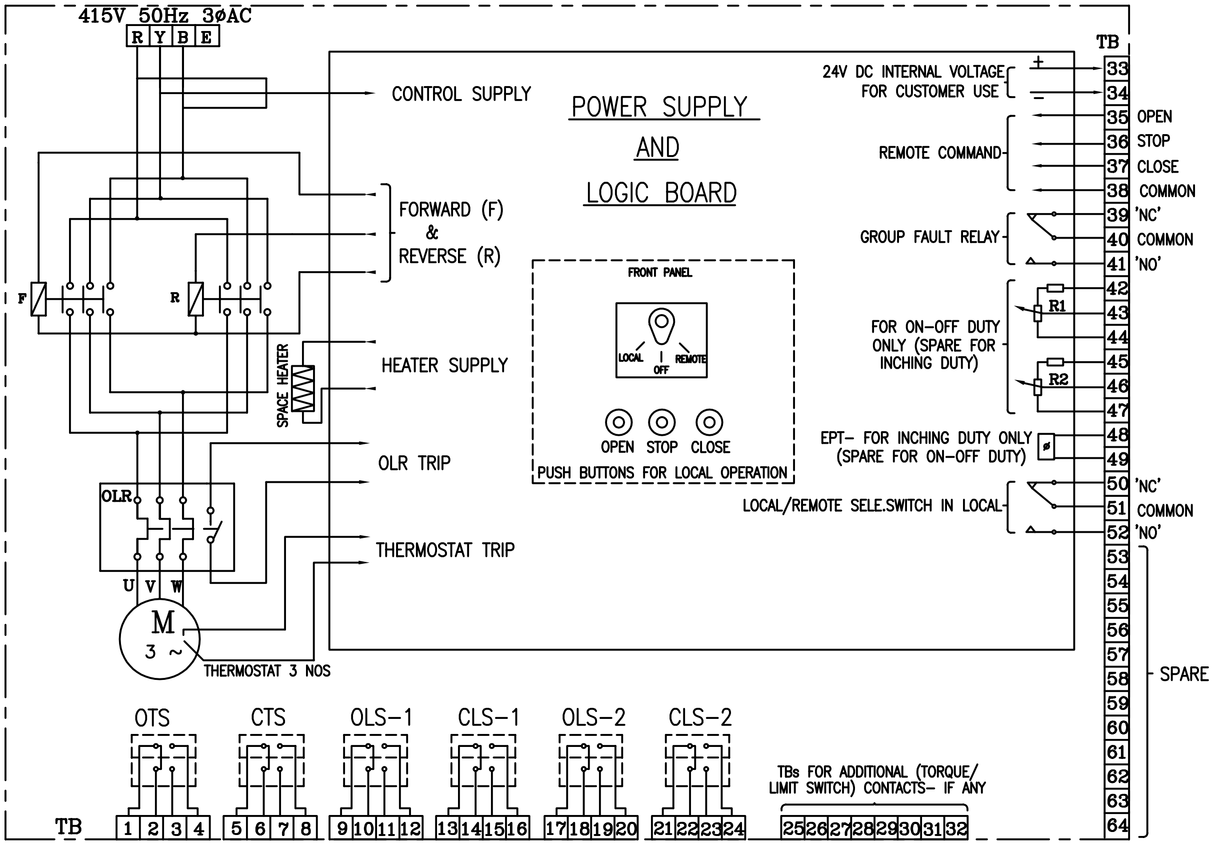
EPOXY PAINT IS RECOMMENDED FOR COASTAL AREAS.

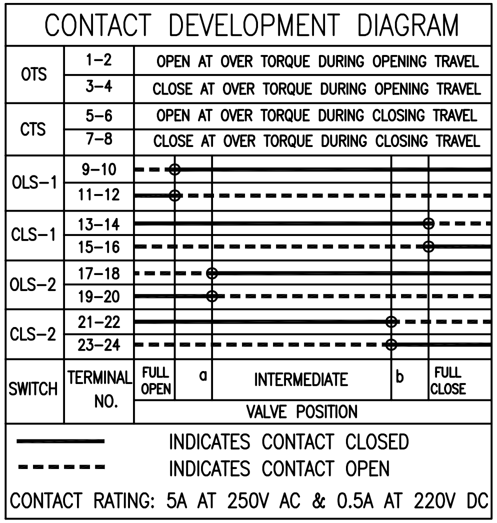
.

NOTES* = TO BE FILLED BY MPL (LEAD AGENCY). @= TO BE FILLED BY ES

ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

DRAWING NO. 3-V-MISC-24227





SETTING PROCEDURE OF POSITION LIMIT AND TORQUE SWITCH

VALVES	OPEN		CLOSE	
	MAIN	BACK UP	MAIN	BACK UP
GATE VALVE OF 100 mm AND ABOVE IN 1500 CL AND ABOVE RATINGS	OLS	OTS *	CLS	CTS
ALL OTHER GATE & GLOBE VALVES	OLS	OTS *	CTS	#

– CLS NOT TO BE CONNECTED IN TRIP CIRCUIT
* – BYPASS OTS FOR INITIAL 5% OF TRAVEL (FOR GATE VALVES ONLY)

NOTE:-

1. ALL TORQUE AND LIMIT SWITCHES (OTS,CTS,OLS1&2, CLS1&2) ARE WITH 2NO+2NC CONTACTS '1NO+1NC' IS TERMINATED IN TBS 1-24, REMAINING CONTACTS ARE FOR INTERNAL USE. ANY SPARE CONTACTS WHICH ARE NOT USED INTERNALLY ARE TO BE TERMINATED IN TBS 25-32
2. CTS – TORQUE SWITCHES FOR CW ROTATION (CLOSE)
3. OTS – TORQUE SWITCHES FOR CCW ROTATION (OPEN)
4. OLS-1, OLS-2 – LIMITSWITCHES FOR POSITION OPEN
5. CLS-1, CLS-2 – LIMITSWITCHES FOR POSITION CLOSE
6. EPT – ELECTRONIC POSITION TRAMSMITTER (POTENTIOMETRIC TYPE, FOR INCHING DUTY)
7. R1-R2-POTENTIOMETER 2 x 100 OHMS (FOR ON-OFF DUTY)
8. FOR COMMANDS & EPT EITHER INTERNALLY GENERATED 24 VDC OR EXTERNAL SUPPLY OF 24VDC CAN BE USED
9. M – MOTOR 3ø 415V 50 Hz AC SUPPLY

REV	DATE	ALTERED
		CHD & APPD

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: ELECTRICAL VALVE ACTUATORS (AC) WITH INTEGRAL STARTERS (DRAWN FOR INTERMEDIATE POSITION OF VALVES)

BHARAT HEAVY ELECTRICALS LTD., UNIT: HIGH PRESSURE BOILER PLANT. TIRUCHIRAPALLI-620014.
365-121

	NAME	SIGN	DATE	NO.OF VAR.
DRN	N.P.ESWAR	N.P	07.10.04	
CHD	D.DINAKARAN	D.D	07.10.04	
APPD	K.ARUNACHALAM	K.A	07.10.04	

DEPT VL | CODE | SCALE | WEIGHT (KG). | REFERENCE INFORMATIONS | NO. OF ITEMS

TITLE: WIRING DIAGRAM (TERMINAL PLAN) FOR ACTUATOR WITH INTEGRAL STARTER

CARD CODE: U 01

DRAWING NO.: 3-V-MISC-24227

REV: 0

Size A3

STANDARD CHECK LIST FOR C&I INSTRUMENTS

CHECK LIST FOR TRANSMITTER

Sl. No.	Test / Checks	Quantum of check	Reference Doc. / Acceptance Norms	Agency **			Remarks
				M	C	B	
1	CHECKS FOR	SEE NOTE-1 BELOW	APPROVED SPEC./ DATA SHEETS	P	W	V	
	VISUAL.						
	MODEL/TAG No						
2	PROCESS CONNECTION			P	W	V	
3	ACCURACY			P	W	V	
4	REPEATABILITY			P	W	V	
5	HYSTERESIS			P	W	V	
6	EFFECT OF TEMP VARIATION ON ACCURACY			P	W	V	
7	SPAN / ZERO ADJUSTMENT	ONE / TYPE		P	W	V	
8	EFFECT OF SUPPLY VOLTAGE VARIATION			P	W	V	
9	EFFECT OF LOADING (500 OHM METERS)			P	W	V	
10	HIGH PRESSURE TEST	SEE NOTE-1 BELOW		P	W	V	
11	BURN-IN TEST	ONE / TYPE		P	W	V	
12	DEGREE OF PROTECTION			P	W	V	
13	ACCESSORIES AS APPLICABLE	SEE NOTE-1 BELOW		V	V	V	

Legend :

** M = Manufacturer / Sub-contractor, C = Contractor / Nominated Inspecting Agency, B = BHEL, P = Perform, W = Witness, V = Verification

Note :

1. Quantum of check shall be as below :
   100 % - By Manufacturer
2. Manufacturer to maintain calibrated instrument having better accuracy than the item under test. Inspecting engineer shall check the same.
3. When material corelation are not available manufacturer's compliance to be provided.
4. Contractor to provide compliance certificate for tests/checks verifid by contractor and submit the same alongwith test certificates to be verified by BHEL.

STANDARD CHECK LIST FOR C&I INSTRUMENTS

CHECK LIST FOR PRESSURE & DP GAUGE

Sl. No.	Test / Checks	Quantum of check	Reference Doc. / Acceptance Norms	Agency **			Remarks
				M	C	B	
1	CHECK FOR	SEE NOTE-1 BELOW	APPROVED SPEC./ DATA SHEETS	P	W	V	
	SENSOR TYPE						
	DIAL SIZE						
	MODEL NO/TAG NO						
	RANGE/SCALE						
	SWITCH CONTACT RATING & NOS.						
	END CONNECTION						
2	CALIBRATION			P	W	V	
	ACCURACY						
	REPEATABILITY						
	SET POINT ADJUSTMENT						
3	OVER PRESSURE & LEAK TEST			P	W	V	
4	OPERATION OF PRESSURE. RELIEF DEVICE	ONE		P	W	V	
5	REVIEW OF TC FOR	FOR LOT		V	V	V	
	MATERIALS OF SENSOR						
	MOVEMENT						
	PROCESS CONNECTION						
	HOUSING						
6	REVIEW OF TC FOR DEGREE OF PROTECTION	TYPE TEST		V	V	V	
7	ACCESSORIES AS APPLICABLE	SEE NOTE-1 BELOW		V	V	V	

Legend :

** M = Manufacturer / Sub-contractor, C = Contractor / Nominated Inspecting Agency, B = BHEL, P = Perform, W = Witness, V = Verification

Note :

1. Quantum of check shall be as below :
   100 % - By Manufacturer
2. Manufacturer to maintain calibrated instrument having better accuracy than the item under test. Inspecting engineer shall check the same.
3. Manufacturer to carry out ROUTINE TEST on 100 %.
4. When material corelation is not available, MFR's compliance to be provided
5. Contractor to provide compliance certificate for tests/checks verifid by contractor and submit the same alongwith test certificates to be verified by BHEL.

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

PACKAGE: COLTCS, SCS and Debris Filter(Electrical Package)

PROJECT:

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	415 V MCC	MEL	MEL	240 V AC (supply feeder)/415 V AC (3 PHASE 4 WIRE) supply shall be provided by MEL 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)	Vendor	MEL	Located near the motors.
3	Power cables and control cables	MEL	MEL	Incoming cable from MEL supplied MCC will be informed by MEL.
4	Screened control cables	BHEL	MEL	Screened control cable between DCS & field equipment will be informed by BHEL. Vendor shall provide lugs & glands accordingly.
4	Cable trays, accessories & cable trays supporting system	MEL	MEL	
5	Cable glands and lugs for equipments supplied by Vendor	Vendor	MEL	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type heavy duty tinned copper lugs for power and control cables.
6	Equipment grounding (Above ground)	BHEL	MEL	
7	Lightning protection	MEL	MEL	
8	Below grade grounding	MEL	MEL	
9	LT Motors with base plate and foundation hardware	Vendor	MEL	Makes shall be subject to BHEL/MEL approval at contract stage.
10	Any other equipment/material/service required for completeness of system but not specified above (to ensure trouble free and efficient operation of the system).	Vendor	MEL	

NOTES:

1. Make of all electrical equipments/items supplied shall be reputed make & shall be subject to approval of BHEL/MEL after award of contract.
2. All QPs shall be subject to approval of BHEL/MEL after award of contract without any commercial implication.
3. MEL- Customer: MAHAN ENERGEN LIMITED.

CLARIFIED WATER ANALYSIS

Sl no	Parameter	Unit	Result
1	TEMPERATURE	Degree C	**36**
2	pH	-	**8.13**
3	CONDUCTIVITY at 25 Deg. C	Micro mho/cm	**165**
4	M·ALKALINITY AS CaCO3	mg/l	**60**
5	TOTAL HARDNESS AS CaCO3	mg/l	**60**
6	CALCIUM HARDNESS	mg/l	**40**
7	CHLORIDES AS CI	mg/l	**18**
8	SILICA AS SiO2	mg/l	**10**
9	TURBIDITY	NTU	**< 10**
10	TOTAL SUSPENDED SOLIDS	ppm	**< 10**
11	TOTAL IRON AS Fe	ppm	**< 0.1**

Note

1 For Circulating Water Analysis. COC of 6 shall be considered on above analysis.

PERFORMANCE DEMONSTRATION DURING COMMISSIONING AT SITE

1 Pressure drop across DEBRIS FILTER shall be demonstrated during commissioning (along with commissioning of all DEBRIS FILTER Mechnical, C&I and Electrical Systems).

2 **Performance Parameters shall be as under:**

(a) Max. Pressure drop in DEBRIS FILTER in clean condition – not exceeding 0.5 MWC. The Bids shall be technically rejected for pressure drop quoted higher than 0.5 MWC.

(b) Any deviation to above pressure drop will not be accepted.

(c) In case the successful bidder fails to demonstrate above parameter, he shall carry out modifications at his own cost, to purchaser's approval.

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

BHEL	TECHNICAL SPECIFICATION DEBRIS FILTER 2X800 MW USTPP, MAHAN(PH-II) SINGRAULI	PE-TS-504-165-W003 Rev. No. 00 Date :16.08.24

SCHEDULE OF PERFORMANCE DEMONSTRATION DURING COMMISSIONING FOR DEBRIS FILTER (DEBRIS FILTER)

Sl no	DESCRIPTION	UNIT OF MEASUREMENT	2X800 MW USTPP, MAHAN(PH-II) SINGRAULI
1	Pressure drop across the DEBRIS FILTER (i.e. between inlet & outlet nozzle) under clean condition and Normal flow condition	MWC	**Bidder to fill**

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date

QUALITY PLAN

Quality Assurance and Quality Plan

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

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

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

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

5 During detailed engineering, the various shop test procedures Hydro test, Dry run test etc. shall be submitted by bidder along with the quality plan for BHEL/customer approval.

514367/2024/PS-PEM-WSE

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS- 999-165-W009	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-165-W009 REV-00	DATE: 12.12.2023
	PROJECT:		PO NO.:	DATE:
	ITEM: DEBRIS FILTER	SYSTEM: CW SYSTEM	SECTION:	SHEET 1 of 5

SL NO.	COMPONENT & OPERATIONS	CLASS	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					M	B/ C				D	M	B	C	
1	2	3	4	5	6		7	8	9		**			
1.0.0	DEBRIS FILTER													
1.1.0	Raw Material													
(a)	Housing Shell, Nozzle flanges & Main flanges/Counter Flange, Nozzle Pipes, Flange, Screen Basket	Chemical properties	MA	Chemical Analysis	One sample/cast / heat / batch	One sample/cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Test Certificate/lab test report	√	P	V	V	All raw material identification as per manufacturer TC/Lab report by BHEL/TPIA
		Physical properties	MA	Physical test	One sample/cast / heat / batch	One sample/cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Test Certificate/ lab test report	√	P	V	V	
		Sub Surface Defects	MA	Ultrasonic Test	100%	100%	ASME A 435/A609	ASME A 435/A609	Inspection report	√	P	V	V	Plates > 20mm Thk only
1.2.0	IN PROCESS INSPECTION													
1.2.1	Welding procedure specification / Welder performance qualification	Correctness / Weld soundness	CR	Scrutiny / Physical test	100%	100%	ASME Sec. IX	ASME Sec. IX	ASME Sec.IX	√	P	V	V	Welding procedure already approved by BHEL/ LRQA / NTPC shall be followed.
1.2.3	Weld Quality for Pressure Parts													
1.2.4	[a] Root run	Surface defects	MA	Penetrant test / Visual	100%	100%	ASME Sec.VIII Div. I / sec V	ASME Sec.VIII Div. I Appendix 8	Operation Process Sheet		P			
	[a] Completed butt welds	1.Surface defects	MA	Penetrant test	100%	100%	ASME Sec.VIII Div. I / sec V	ASME Sec.VIII Div. I Appendix 8	Inspection report	√	P	V	V	
		2.Sub-surface defects	CR	Radiography test	10% of total weld length+ 100% T Joints.	10% of total weld length+ 100% T Joints.	ASME Sec.VIII Div. I / sec V	ASME Sec.VIII Div. I Appendix 4 / UW 52	Radiographs and inspection report	√	P	V	V	RT films will be reviewed by BHEL/TPIA
	[b] Completed fillet welds	Surface defects	MA	Penetrant test	100%	100%	ASME Sec.VIII Div. I / sec V	ASME Sec.VIII Div. I Appendix 8	Inspection report	√	P	V	V	
1.2.5	Pickling and Passivation	Protection Layer	MA	Visual	100%	100%	IS : 10117	IS : 10117	Log Book	√	P	–	–	
		1.Dimensions, Orientation	MA	Measurement by visual	100%	100%	Manufacturing Drawing	Manufacturing Drawing	Inspection report	√	P	V	V	
1.2.6	Fabricated Shell (Prior to sand	2. Hydro test	CR	Hydrostatic Pr. @ 1.5	100%	100%	ASME Sec.VIII Div.1	ASME Sec.VIII Div.1	Inspection report		P	V	V	

BIDDER/SUPPLIER	
Sign & Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:		Nishant Shekhar	Checked by:		Yuvraj Mohan
Reviewed by:	vishal	Vishal Kr Yadav	Reviewed by:		Harish Kumar

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

514367/2024/PS-PEM-WSE

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS- 999-165-W009	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-165-W009 REV-00	DATE: 12.12.2023
	PROJECT:		PO NO.:	DATE:
	ITEM: DEBRIS FILTER	SYSTEM: CW SYSTEM	SECTION:	SHEET 2 of 5

SL NO.	COMPONENT & OPERATIONS	CLASS	CHARACT ERISTICS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			
					M	B/ C				D	M	B	C	
	blasting)			times of design pr.(positive) [Duration 30 minutes]						√				
1.3.0	Final tests (completed equipments) - After assembly	1.Dimensions, orientation, workmanship & finish	MA	Measurement by visual	100%	100%	G.A.drawing	G.A.drawing	Inspection report	√	P	V	V	
		2. Leak tightness for assembly	CR	Leak test @ design pr.(positive) [Duration 30 minutes]	100%	100%	ASME Sec.VIII Div.1	No leakage	Inspection report	√	P	W	V	
		3.Dry function test for Debris filter	CR	Operational test	100%	100%	Approved Procedure	Approved Procedure	Inspection report	√	P	W	V	
1.4.0	Rubber Lining -Shell (Applicable for sea water application)													
1.4.1	Rubber Formulation	Tensile, elongation & hardness	MA	Physical test	One per lot	One per lot	Manufacturer's procedure	BS 6374/Equivalent	Test certificate	√	P	V	V	
		Polymer Identification	MA	Flame test	One per lot	One per lot	For Semi Ebonite /Ebonite Polymer catches fire and on removal from fire continues to burn	For Semi Ebonite /Ebonite Polymer catches fire and on removal from fire continues to burn	Inspection report	√	P	V	V	
		% Change in weight after 24 hours of immersion in sea water at 70°C	MA	Immersion test (bleeding test)	One per lot	One per lot	ASTM D 471	+ / - 1%	Inspection report	√	P	V	V	
1.4.2	Surface preparation of items to be lined	Free from rust, scale,dust & grease	MA	Visual	100%	100%	SA 2.5	SA 2.5	Internal Inspection report		P	–	–	
1.4.3	Vulcanizing	Temperature, Pressure & Time	MA	Process monitoring	100%	100%	Manufacturer's procedure	Manufacturer Procedure	Process Procedure		P	–	–	
		[a] Chip test	MA	Chip test	One per lot	One per lot	Approved Drawing & BS 6374/Equivalent	BS 6374/Equivalent	Inspection report	√	P	V	V	
		[b] Adhesion, Thickness &	MA	Measurement	100% hardness at	100% hardness at	Approved Drawing & BS	BS 6374/Equivalent	Inspection report		P	V	V	

BIDDER/SUPPLIER	
Sign & Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:		Nishant Shekhar	Checked by:		Yuvraj Mohan
Reviewed by:	vishal	Vishal Kr Yadav	Reviewed by:		Harish Kumar

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

514367/2024/PS-PEM-WSE

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS- 999-165-W009	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-165-W009 REV-00	DATE: 12.12.2023
	PROJECT:		PO NO.:	DATE:
	ITEM: DEBRIS FILTER	SYSTEM: CW SYSTEM	SECTION:	SHEET 3 of 5

SL NO.	COMPONENT & OPERATIONS	CLASS	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					M	B/ C				D	M	B	C	
1	2	3	4	5	6		7	8	9		**			
		Hardness			random	random	6374/Equivalent			√				
		[c] Spark test for Pin Holes at 5 kv/mm	MA	Spark test for Pin Holes	100%	100%	Approved Drawing & BS 6374/Equivalent	BS 6374/Equivalent	Inspection report	√	P	V	V	
2.0.0	Ball valves													
2.1.0	Materials of Body and Tail End Pieces, Ball & Stem	Mechanical/ Chemical Properties	Major	Mechanical & Chemical Test	One Sample/ Cast / Heat	One Sample/ Cast / Heat	Drawing/ Technical Data Sheet	Drawing/Technical Data Sheet	MTC/ Compliance Certificate	√	P	V	V	
2.2	**Performance test after completion of testing**													
2.2.1	Assembly	a) Dimensions, Workmanship, Tag no & Appearance	Major	Measurement	100%	100%	Drawing / Technical Data Sheet	Drawing / Technical Data Sheet	Manufacturer's Test Certificate	√	P	V	V	
		b) Opening/Closing	Major	Operation	100%	100%	As per Approved Data Sheet	As per Approved Data Sheet	Inspection Report	√	P	W	V	
3.0.0	**Butterfly Valves**													
3.1.0	Materials of Body and Disk and Shaft (Stem) / Seat	Mechanical/ Chemical Properties	Major	Mechanical & Chemical Test	One Sample/ Cast /Heat	One Sample/ Cast /Heat	Drawing/ Technical Data Sheet	Drawing/Technical Data Sheet	Manufacturers Test Certificate / Compliance Certificate	√	P	V	V	
3.3.0	**Performance test**													

BIDDER/SUPPLIER	
Sign & Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:		Nishant Shekhar	Checked by:		Yuvraj Mohan
Reviewed by:		Vishal Kr Yadav	Reviewed by:		Harish Kumar

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Doc No:			
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Reviewed by:			
Approved by:			

514367/2024/PS-PEM-WSE

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS- 999-165-W009	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-165-W009 REV-00	DATE: 12.12.2023
	PROJECT:		PO NO.:	DATE:
	ITEM: DEBRIS FILTER	SYSTEM: CW SYSTEM	SECTION:	SHEET 4 of 5

SL NO.	COMPONENT & OPERATIONS	CLASS	CHARACT ERISTICS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			
					M	B/ C				D	M	B	C	
	after completion of testing													
3.3.1	Assembly	a) Dimensions, Workmanship, Tag no & Appearance	Major	Measurement	100%	100%	Drawing / Technical Data Sheet	Drawing / Technical Data Sheet	Manufacturer's Test Certificate	√	P	V	V	
		b) Opening/Closing	Major	Operation	100%	100%	As per Approved Data Sheet	As per Approved Data Sheet	Inspection Report	√	P	V	V	
4.0.0	GEARED MOTOR DRIVE	Running Test	CR	Functional Test	100%	100%	Approved Data Sheet	Approved Data Sheet	Test certificate		P	V	V	
		No load	CR	Functional test	100%	100%	Approved Data Sheet	Approved Data Sheet	Inspection Report	√	P	V	V	
		Noise test	CR	Functional test	100%	100%	Approved Data Sheet	Approved Data Sheet	Inspection Report	√	P	V	V	
		Oil leakage test	CR	Functional test	100%	100%	Approved Data Sheet	Approved Data Sheet	Inspection Report	√	P	V	V	
		Visual	CR	_	100%	100%	Approved Data Sheet	Approved Data Sheet	Inspection Report	√	P	V	V	
		Name plate verification	CR	_	100%	100%	Approved Data Sheet	Approved Data Sheet	Inspection Report	√	P	V	V	
4.1.0	Complete Unit of planetary gear	No Leak Test	CR	Functional test	One Sample/lot	One Sample/lot	Approved Data Sheet	Supplier Catalogue	Manufacturer's compliance certificate	√	P	V	V	
		Noise Level	MI	Functional test	One Sample/lot	One Sample/lot	Approved Data Sheet	Approved Data Sheet	Inspection Report	√	P	V	V	
		Visual Name plate Verification	MI	_	100%	100%	Approved Data Sheet	Approved Data Sheet	Inspection Report		P	V	V	
4.2.0	Actuators	Functional test	MA	Electrical test	100%	100%	Supplier catalogue/Appd data sheet	Supplier catalogue/Appd data sheet	Test certificate	√	P	V	V	
		Make, Range, Model	MA	Visual	100%	100%	Supplier catalogue/Appd data sheet	Supplier catalogue/Appd data sheet	Inspection Report	√	P	V	V	

BIDDER/SUPPLIER	
Sign & Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:		Nishant Shekhar	Checked by:		Yuvraj Mohan
Reviewed by:	vishal	Vishal Kr Yadav	Reviewed by:		Harish Kumar

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514367/2024/PS-PEM-WSE

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS- 999-165-W009	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-165-W009 REV-00	DATE: 12.12.2023
	PROJECT:		PO NO.:	DATE:
	ITEM: DEBRIS FILTER	SYSTEM: CW SYSTEM	SECTION:	SHEET 5 of 5

SL NO.	COMPONENT & OPERATIONS	CLASS	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					M	B/ C				D	M	B	C	
1	2	3	4	5	6		7	8	9		**			
		Assembly check alongwith valves	MA	Visual	100%	100%	Supplier catalogue/Appd data sheet	Supplier catalogue/Appd data sheet	Inspection Report	√	P	V	V	
5.0	**DIFFERENTIAL PRESSURE GAUGE**													
5.1	**Make / Model & Function test**	**Make / Model & Function test**	MA	See Remarks	100%	100%	APPD. DATA SHEET	APPD. DATA SHEET	MTC/ COC/ Manufacturer catalog.		P	V	-	Manufacture to carry out ROUTINE TEST on 100%.
6.0	**DIFFERENTIAL PRESSURE TRANSMITTER**													
6.1	**Make / Model & Function test**	**Make / Model & Function test**	MA	See Remarks	100%	100%	APPD. DATA SHEET	APPD. DATA SHEET	MTC/ COC/ Manufacturer catalog.		P	V	-	Manufacture to carry out ROUTINE TEST on 100%.
7.0	**Fasteners**													
5.1	**Fasteners**	Chemical & Mechanical Properties	MA	Chemical & physical analysis	One sample/heat	100%	Approved GA drg	Material specification/Standard	MTC/Lab test report	√	P	V	V	
8.0	**ALL COMPONENTS / EQUIPMENTS**													
8.1	**All components / Equipments**	**Painting DFT**	MA	Measurement	Random	Random	Painting schedule	Painting schedule	IR	√	P	V	V	
		Packing	MA	Visual / Item counting	100%	100%	Approved procedure	Approved procedure	IR	√	P	V	V	

Legends:

D: Documentation; Records identified with "Tick"(√), shall be essentially included by supplier in QA Documentation

M: Supplier/ Manufacturer/ Sub-Supplier | MA: Major Characteristic | P: Perform | HT: Heat Treatment

B: Main Supplier/BHEL/ Third Party Inspection agency | CR: Critical Characteristic | W: Witness | LPT: Liquid Penetrant Test

C: Customer | TC: Test Certificate | V: Verification | UT: Ultrasonic Test

TPIA: Third Party Inspection Agency | TR: Test Report | IR: Inspection Report | RT: Radiography Test

BIDDER/SUPPLIER	
Sign & Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:		Nishant Shekhar	Checked by:		Yuvraj Mohan
Reviewed by:		Vishal Kr Yadav	Reviewed by:		Harish Kumar

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

SUB VENDOR LIST

SUB VENDOR LIST

LT MOTORS	CGL	AHMEDNAGAR
	MARATHON ELECTRIC	KOLKATA
	Marathon Regal Beloit Wuxi Co. Ltd.	China
	Siemens	China
	ABB	FARIDABAD,CHINA
	BHARAT BIJALI	MUMBAI
	KEC	BANGALORE/HUBLI
	BHEL	BHOPAL
	SHANGHAI ELECTRIC COMPANY	CHINA
	XIANGTAN ELECTRIC MANUFACTURING CO LTD	CHINA
	SIEMENS LTD	MUMBAI, CHINA
	JYOTI LTD.	BARODA
	NGEF	HUBLI
	SHANGHAI SHANGDIAN ELECTRIC MACHINERY	CHINA
	JIANGSU DAZHONG ELECTRIC MOTORS CO. LTD	CHINA

Pressure &Differential /level Transmitter	Rosemount	China
	Yokogawa	Japan/China
	Siemens	China
	ABB	China
	E+H	Germany
	Krohne	UK
Pressure &Differential Pressure switch	SOR	USA
	UE	USA
	Ashcroft	USA
	Magnetrol	USA
Electronic transmitters (pressure, DP & flow)	EMERSON (Rosemount)	USA/ Pawane
	YOKOGAWA	JAPAN
	Yokogawa India Pvt. Ltd.	Bangalore
	ABB	Bangalore
	ABB	GERMANY / Italy
	Siemens	France / India
	Honeywell	Pune
	ENDRESS & HOUSER	Aurangabad/ Germany

PRESSURE GAUGE / DP GAUGE	ASHCROFT		
	FORBES MARSHALL		
	GENERAL INST CONSORTIUM		
	WAAREE INSTRUMENTS LIMITED		
	WIKA INSTRUMENTS INDIA PVT. LTD.		
	FIEBIG MANOMETER (I) PVT. LTD		
	SWITZER INSTRUMENTS		
	A.N. INSTRUMENTS PVT LTD		
	H GURU INSTRUMENTS (SI) P. LTD		
	GOA THERMOSTATIC INSTRUMENTS PVT LTD.		
	BUDENBERG		
	PYRO ELECTRIC		
	GLUCK		
	PYRO ELECTRIC		
	Anhui Tiankang	CHINA	
	Chongqing Chuanyi Automation	CHINA	
	Shanghai Automation Instrumentation	CHINA	

	Shanghai Automation Instrumentation Co.Ltd	CHINA	
	Jiangshu Huibang Control System Co.,Ltd.	CHINA	

Import electrical actuators	EMG	Germany
	MOOG JAPAN CO	Japan
	ROTORK	UK
	Limitorque	USA
	Sipos	Germany
	Auma	Germany

The makes of various bought out items of bidder (i.e. DPT, DPG, actuators, drive motor etc.) other than above shall be subject to purchaser's approval in the event of order.

BHEL	TECHNICAL SPECIFICATION DEBRIS FILTER 2X800 MW USTPP, MAHAN(PH-II) SINGRAULI	PE-TS-504-165-W003 Rev. No. 00 Date :16.08.24

PAINTING REQUIREMENT

1	Stainless Steel, Non- Ferrous and Galvanised item/portion will not be painted.
2	Painting on steel surfaces/parts shall be as per below table and all exposed External surface coating shall confirm to C-4 as per ISO 12944.

Sl no	Condition	Surface Preparation	Primer Coat	No. of Coats	DFT (Microns)	Intermediate Coat	No. of Coats	DFT (Microns)	Final Coat	No. of Coats	DFT (Microns)	Total DFT
1	Indoor/ Outdoor	S.A 2.5 of Swedish Specification no. SIS-05-5900-1967	inorganic ethyl self curing zinc silicate primer (coating)	1	75	High build epoxy MIO coating cured with polyamide hardener	1	100	High Build Gloss Aliphatic Acrylic Polyurethane	1	50	225

PACKING REQUIREMENT

Sl.no	DESCRIPTION
1	**Type of Packing:**
1.1	Item shall be fully covered with multi layered cross laminated colourless polyethylene sheet of at least 100 GSM and shall be packed inside wooden box or crate or fixed on wooden pallet depending upon the size.
1.2	Item shall be firmly fixed to the bottom of the packing box/crate/pallet with the help of supports/blocks to arrest the movement from all sides. The branch pipe ends and all opening shall be protected with polyethylene blind end caps.
1.3	Loose items/accessories like nipples, expander/reducer, root valves etc. shall be separately packed with polyethylene sheet of at least 100 GSM inside the packing box/crate.
2	**Quality of wood:**
2.1	**Quality of wood:** Wood used for packing box shall be Pinewood, Rubber wood, Mango wood, Fir wood, Silver Oak wood or other as per availability with moisture content not exceeding 30%.
3	**Cushioning material and moisture absorber:**
3.1	Suitable cushioning shall be provided by rubberized coir/ thermocol / expanded soft polyethylene foam.
3.2	Adequate quantity of packed desiccant shall be suitably placed inside the packing box.
4	**Packing slip & holder:**
4.1	Packing slip kept in polyethylene bag shall be placed inside the wooden box at appropriate
4.2	One copy of packing slip wrapped in polyethylene bag covered in galvanized iron tin sheet/ aluminium packing slip holder shall be fixed on the external surface the packing box.

BHEL	TECHNICAL SPECIFICATION DEBRIS FILTER 2X800 MW USTPP, MAHAN(PH-II) SINGRAULI	PE-TS-504-165-W003 Rev. No. 00 Date :16.08.24

BILL OF QUANTITY			
	2X800 MW USTPP, MAHAN(PH-II)SINGRAULI, MP		
SL NO	**ITEM DESCRIPTION**	**UOM**	**TOTAL QTY.**
1.0	**Main Supply:**		
1.1	DEBRIS FILTER	Nos	4
2.0	**Mandatory Spares**	NOT APPLICABLE	
3.0	**Installation checks & Commissioning at Site**		
3.1	Lump sum visit charges for engineer including travel (except daily charges)	Visits	4
3.2	Lump Sum daily charges for engineer including boarding/lodging, local conveyance, medical, insurance etc.	Mandays	16

BHEL	TECHNICAL SPECIFICATION DEBRIS FILTER 2X800 MW USTPP, MAHAN(PH-II) SINGRAULI	PE-TS-504-165-W003 Rev. No. 00 Date :16.08.24

DOCUMENTATION REQUIREMENT

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY ALL THE BIDDERS ALONG WITH THE BID	
Sl. No.	**DOCUMENT TITLE**
1	PQR CREDENTIALS
2	COMPLIANCE SHEET (SIGNED AND STAMPED COPY)
3	SCHEDULE OF PERFORMANCE DEMONSTRATION DURING COMMISSIONING (SIGNED AND STAMPED COPY)
4	GENERAL ARRANGEMENT DRAWINGS OF THE DEBRIS FILTER INDICATING THE PRINCIPAL DIMENSIONS, FOUNDATION DETAILS AND WEIGHT OF EQUIPMENT OFFERED (FOR REFERENCE PURPOSE ONLY)

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT ALONG WITH SUBMISSION SCHEDULE		
Sl. No.	**DOCUMENT TITLE**	**SUBMISSION SCHEDULE**
1	P&ID OF DEBRIS FILTER SYSTEM	Within 15 days from LOI/PO
2	TECHNICAL DATA SHEET-DEBRIS FILTER	Within 15 days from LOI/PO
3	GENERAL ARRANGEMENT & INSTALLATION PLAN OF DEBRIS FILTER	Within 15 days from LOI/PO
4	QP-DEBRIS FILTER	Within 15 days from LOI/PO
5	O& M MANUAL - DEBRIS FILTER	Within 15 days from approval of above (Sl. No. 1 to 4) DEBRIS FILTER documents.
6	PERFORMANCE TEST PROCEDURE	Within 15 days from approval of above (Sl. No. 1 to 4) DEBRIS FILTER documents.

BHEL/Customer comments/approval and Vendor Re-submission schedule	
BHEL Customer on first submission	Within 10 days of Vendor submission.
BHEL/Customer comments/approval on revised submission	Within 18 days of Vendor submission.
Vendor Re-submission	Within 7 days of BHEL / Customer comments.

Important Instructions for Drawings & Documents to be submitted after award of Contract

	TECHNICAL SPECIFICATION DEBRIS FILTER 2X800 MW USTPP, MAHAN(PH-II) SINGRAULI	PE-TS-504-165-W003 Rev. No. 00 Date :16.08.24
1	Final versions of the following drawings should have the below mentioned details to enable BHEL to finalise the layout and to design foundations and structures: a. General arrangement / Installation drawings of the DEBRIS FILTER with all accessories, indicating the principal dimensions and weights of equipment offered, size and location of various nozzle connections, withdrawal space and scope of supply etc. b. Foundation arrangement drawings (wherever applicable) showing load data on supports, size and location of anchor bolts etc.	
2	Successful Vendor to provide the following details for further engineering by BHEL: 1. CONTROL & OPERATIONAL WRITE-UP FOR THE SYSTEM WITH SET POINTS 2. IO LIST (ANALOG & BINARY) 3. INSTRUMENT SCHEDULE WITH SET POINTS. 4. CABLE SCHEDULE & INTERCONNECTION (IN EXCEL FORMAT) 5. CABLE INTERCONNECTION DETAILS 6. WIRING DIAGRAM (AS APPLICABLE) 7. HMI PICTURES/PLANT SCHEMATICS 8. ANNUNCIATION & SOE LIST 9. INSTRUMENTS INSTALLATION DIAGRAM	

DRAWINGS & DOCUMENTS TO BE SUBMITTED AS FINAL/AS-BUILT DOCUMENT

Sl. No.	DOCUMENT TITLE
1	O&M MANUAL
2	APPROVED DOCUMENTS
3	ALL TEST CERTIFICATES / REPORTS

PRE QUALIFICATION REQUIREMENT (TECHNICAL)

514367/2024/PS-PEM-WSE

	PRE-QUALIFYING REQUIREMENTS (TECHNICAL) – DEBRIS FILTERS (DF)	TECHNICAL SPECIFICATION NO: TECHNICAL PQR NO: REV NO. DATE: STANDARD PQR NO: PE-PQ-STD-165-N003 REVISION NO: 03 DATE: 12.03.2020 SHEET: 1 of 2

ORM NO. PEM 6100-0

ENQUIRY NO.:

PROJECT: 2X800 MW USTPP, MAHAN(PH-II) SINGRAULI

PACKAGE: DEBRIS FILTER

1. The bidder should have designed, manufactured, tested, inspected & supplied the Debris Filters with minimum size of 1500NB, which have been successfully in use for at least 1 year in thermal power plant or similar industry/ application and bidder is in business of Debris Filters on continuous basis.

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

   A. Bidder's Experience list of Debris Filter for last 5 years (as on the enquiry/NIT date) for assessment of bidder for supplying the Debris Filter on regular basis for establishing business continuity in enclosed format- Annexure-1.

      Bidder shall furnish the PO copy of at least one executed Contract as indicated in the experience list.

   B. Bidder shall furnish any one from below in support of successful performance of Debris Filter for one year:

      i. Satisfactory Performance feedback certificates from End Customer (Owner) (in English) for at least one successfully executed contract which has been in use for atleast One year indicating salient features like year of commissioning of Debris Filter, rating of project, Size of Debris Filter, project name etc., date of issue of certificate and name/ designation of the certificate issuer for power plant/similar application industry. The reference Debris Filter should have been in successful operation for at least one (1) year prior to the date of subject enquiry/NIT.

      OR

      ii. The bidder has been awarded One repeat contract for Debris Filter from End Customer (Owner) / Purchaser (in English) for power plant/similar application industry. Repeat contract shall be considered when the second contract is given by the same purchaser/ owner after lapse of minimum 1 year from execution (viz. commissioning) of first contract. Supporting documents for execution of the first contract like commissioning report or PG test report along with the PO Copy to be furnished, if bidder intends to submit the documents for Repeat Contracts. The date of repeat contract order should not be later than the date of subject enquiry/NIT.

Notes:-1. Purchase order copy, supporting drgs/technical data sheets etc. are to be submitted along with the bid for which the bidder intends to furnish the performance feedbacks / repeat contracts for reference purpose only.

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

2- Offers of the JV companies/ Joint Bidders/ bidders having collaboration/ licensing agreement / MOU/ Indian subsidiaries shall be evaluated as follows:

a. If bidder happens to be an Indian subsidiaries of foreign OEM, then the credentials of the foreign OEM can also be considered for meeting PQR.

b. If bidder happens to be the Joint Venture Company, then the credentials of any of JV

	PRE-QUALIFYING REQUIREMENTS (TECHNICAL) – DEBRIS FILTERS (DF)	TECHNICAL SPECIFICATION NO: TECHNICAL PQR NO: REV NO. DATE: STANDARD PQR NO: PE-PQ-STD-165-N003 REVISION NO: 03 DATE: 12.03.2020 SHEET: 2 of 2

partners can be also considered for meeting PQR.

c. If bidder happens to bid jointly with their partner, then credentials of both the partners will be considered for meeting PQR as per distribution of the work. In all such cases, lead bidder as specified in bid documents shall be responsible for overall execution of the contract and all guarantee/ warranty.

d. If bidder happens to be the having valid collaboration agreement/ MOU/ licensing agreement with some other company, then the credentials of collaborator/ MOU partner/ licensing company can also be considered for meeting PQR.

Note: If bidder(s) qualifies on the basis of credentials of his principal/ JV partner/ Collaborator/ joint bidder/licensing Company etc., then the principal/ JV partner/ Collaborator/ MOU partner/ joint bidder/ licensing Company shall be responsible for overall design vetting and warranty/ guarantee of the package. The scope matrix clearly defining their respective roles including design vetting, manufacturing of critical component, E&C etc. and warranty/ guarantee shall be submitted along with the offer.

3. Bidder to note that the arrangement of bidding (joint bid partners/ collaborator/ MOU partner/ licensing company etc.) once offered to BHEL as a part of bidding documents cannot be changed till the execution of the project.

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

5. Consideration of offer shall be subject to customer's approval of bidders, if applicable.

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

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

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

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

Annexure – A-1

EXPERIENCE LIST

EQUIPMENT/PACAKAGES : DEBRIS FILTER **Vendor :**

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SL. NO.	PROJECT	CUSTOMER/ CONSULTANTS	YEAR OF SUPPLY	SIZE (MM)	CAPACITY (Cub. M/ Hr)	QTY	MATERIAL OF CONSTRUCTION (HOUSING/STRAINER ELEMENT)	QUALITY OF WATER HANDLED	Performance feedback certificate from end user (enclosed/not enclosed)	

COMPANY SEAL

COMPLAINCE CERTIFICATE	
1	It is hereby confirm that the complete technical specification has been read, understood. We confirm compliance to the tender specification including any clarification and amendments without any deviation.
2	It is hereby declared that any technical submittals which was not specifically asked for in NIT shall stand withdrawn.

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date

2X800 MW USTPP, MAHAN(PH-II) SINGRAULI **ANNEXURE-A**

UNPRICE SCHEDULE CUM BOQ OF DEBRIS FILTER

SL NO	ITEM DESCRIPTION	UOM	HSN CODE	TOTAL QTY.	Unit Ex-works Price (Duly packed) (INR)	Total Ex-works Price (Duly packed) (INR)	% of Freight with respect to Total Ex-works price	Frieght amount in INR	Total price (Ex-works + freight) (INR)	Type of GST applicable (IGST/CGST + SGST/UTGST)	GST rate in % on (Total Ex-Works+Freight)	Total GST amount in INR	Total FOR site Price (INR)
1.0	Total price for design, manufacture, assembly, inspection, testing, packing for transportation and delivery, including final check up of installation, commissioning of FOUR (4) sets of Debris Filter complete in all respect including all accessories & auxiliaries as specified in technical specification and as necessary including mandatory spares, commissioning spares of Debris Filter (as applicable) and special tools & tackles (as required) for erection & maintenance.	SETs		4									
	MAJOR BREAKUP OF PRICES GIVEN IN 1.0 ABOVE												
2.0	Design, manufacture, inspection and testing, packing and delivery of Debris Filter complete with all accessories including E&C Spares (as applicable) except for clause no. 3.0 below												
2.1	Debris Filter	Nos	8421	4									
3.0	Installation checks & Commissioning												
3.1	Lump sum visit charges for engineer including travel (except daily charges)	Visits	99833	4									
3.2	Lump Sum daily charges for engineer including boarding/lodging, local conveyance, medical, insurance etc.	Mandays	99833	16									

Notes:-

1	Unit price quoted by bidder, as above, shall be binding for quantity variation as per NIT.
2	Price of commissioning & erection spares (as applicable) and other accessories not listed above shall be included in price of equipment & shall be supplied as per Technical Specification.
3	Amount payable for engineer per visit to site = Unit Price quoted for visit + (Daily charges for Manday X No. of actual days at site). No. of actual days at site - To be certified by BHEL site.
4	Lump sum visit charges for engineer for site activities (Installation checks & Commissioning) shall be inclusive of travelling, boarding/lodging, local conveyance, medical, insurance etc.
5	In case of non-completion of Installation checks & Commissioning in site visits stipulated as above, for any reasons not attributable to vendor (to be certified by BHEL site), vendor shall complete above activities in subsequent site visits for which cost shall be borne by BHEL on pro-rata basis on price of site visit quoted by bidder.
6	Bidders to indicate Quote/Unquote in above columns.
7	**In GEM bid, UOM is considered as "SET" for item at sl. No. 2.1 , 3.1, 3.2 above. All the Bidders to quote their prices considering the UOM as "Nos." for sl. No. 2.1, "Visits" for Sl. No. 3.1, "Mandays" for sl. No. 3.2 respectively.**