1X800 MW NORTH CHENNAI STG III FGD

TECHNICAL SPECIFICATION
FOR
SELF CLEANING STRAINER

SPECIFICATION No. **PE-TS-485-165-W008**

REV NO. 00

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

	TECHNICAL SPECIFICATION **SELF CLEANING STRAINER** 1X800 MW NORTH CHENNAI STG III FGD	PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024

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PROJECT INFORMATION

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

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	GENERAL TECHNICAL REQUIREMENT
1	The Self Cleaning Strainer (SCS) is intended to prevent accumulation of debris in ACW Pipeline. The suspended matter likely to enter the filter are typical debris encountered in closed circuit CW system with Cooling Tower.
2	The water through the self cleaning strainers outlet shall be supplied to the Secondary side of Plate Heat Exchangers. The water analysis is indicated with COMPLIANCE DRAWING SECTION.
3	Unless otherwise necessary manufacturer's standard and proven models of the SCS shall be supplied.
4	The equipment shall comply with all applicable safety codes and statutory regulations of India where the equipment is to be installed.
5	The design, manufacture and testing of the SCS complete with all accessories, shall generally conform to the latest editions of the appropriate standards.
6	Latest codes and standards shall be applicable as on date of bid submission.
7	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.
8	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.
9	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.
10	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.
11	Debris Discharge backwash pipe of Self-Cleaning Strainer shall be connected into the CW Forebay/Channel which is open to atmosphere. Total distance of Debris Discharge Pipe from SCS upto the CW Forebay/Channel is approx. 150 to 170 M. Bidder to provide suitable connection piece (reducer/expander) for connecting the outlet of Backwash Motorized Valve with 80 NB Debris discharge Pipe provided by BHEL. Debris Discharge Pipe Diameter in Bidder's scope to be selected to meet the technical requirement.

12	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.
13	Housing/ body of SCS 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 Self-Cleaning Strainer.
14	Debris Discharge valve shall be BFV/Ball Valve. All instrument root valves shall be Ball Valves/Globe Valves.
15	The Self Cleaning Strainer 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.
16	The Self Cleaning Strainer shall be designed to suit installation in on-line or offline arrangement. In the on-line arrangement, the inlet and outlet pipes of the Self Cleaning Strainer shall be in line with each other on the same axis without any off-set between the centre lines of inlet and outlet pipes. In the off-line arrangement, the Self Cleaning Strainer inlet and outlet pipes shall be at right angle (90 degree) to each other.
17	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.
18	SCS shall house the filter section / screen assembly and shall have flanged inlet, outlet, flushing/debris discharge openings and pressure measuring tappings etc.
19	In design of SCS housing/ body due attention shall be given for easy removal and replacement of filter section / screen assembly.
20	The Self Cleaning Strainer 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	Separate power feeder for Gear Motor drive and supply feeder for Debris Discharge valve shall be provided by Purchaser.
24	Drawing / documents to be submitted by bidder shall be as per "Documentation Requirement" given in this specification.
25	Equipment must be safe, reliable, and easy to maintain at all operating conditions.
26	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.

27	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. While packing all the materials, the limitation from the point of view of the sizes of railway wagons available in India should be taken account of. 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.
28	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	
29	Complete Field Intrumentation for monitoring and operation of SCS, Root valves, impulse piping, drain cocks, gauge-zeroing cocks, valve manifold and all other accessories required for erection of local / remote instruments shall be provided by Vendor.
30	Operation of SCS shall be from DCS (purchaser scope) located in Control Room.
31	The quantity of instruments for the system shall be as per Flow Diagram / Technical Data PART-A wherever provided of the respective system as a minimum.
32	Diaphragm seal shall be provided with Instruments having contact with sea water.
33	For pressure, differential pressure, level and flow measurements root valve shall be Socket Welded globe valve of sizes 1/2”, 3/4”, 1”.
34	All the wetted parts of the instruments including the accessories like root valves, impulse piping, drain cocks, gauge-zeroing cocks, valve manifolds and all the other accessories required for mounting/erection of these local instruments as well as valves shall be of SS-316 material, suitable pressure class and same shall be in bidder’s scope. For all instruments envisaged for seawater applications, they shall be provided with wetted parts of Super duplex SS.
35	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.
36	All instruments shall be terminated on JB in field. Number of Junction Boxes shall be sufficient and positioned in the field to minimize local cabling (max 12-15 mtrs) and trunk cable.
37	All the field instruments shall also be provided with SS tag nameplate and double compression type nickel-plated brass cable gland. Gaskets, fastener, counter and mating flange shall also be included wherever required with instruments.
38	An anti-corrosive paint shall be applied to the field mounted enclosures / instruments. All instruments shall be provided with durable epoxy coating for housings and all exposed surfaces of the instruments.
39	Bidder shall include all the measurements necessary for the safe, efficient, reliable and fully automatic operation of the entire plant including all fail-safe requirements and recommendations of each equipment manufacturer.
40	All electronic instruments and junction box shall be suitable for area classification as per IEC/NEC codes.
41	Number of pairs to be selected for Screen/ Control cable (a) F-Type: 2P/4P/8P/12P(Size : 0.5 mm2) (b) G-Type: 2P/4P/8P/12P(Size : 0.5 mm2) (c) Core Cable: 3CX2.5sqmm2/ 5CX2.5sqmm2/ 12CX1.5sqmm2

42	**TYPE TEST GENERAL REQUIREMENT**
42.1	Submission of type test results and certificate shall be acceptable provided:
42.1.1	The same has been carried out by the Bidder/ sub-vendor on exactly the same model /rating of equipment.
42.1.2	There has been no change in the components from the offered equipment & tested equipment.
42.1.3	The test has been carried out as per the latest standards alongwith amendments as on the date of bid opening.
42.2	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.
42.3	The schedule of conduction of type tests/ submission of reports shall be submitted and finalized during pre-award discussion.
42.4	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 Self Cleaning Strainers 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 SCS Accessories and Spares in Bidder's Scope:		
1.1.1	Counter Flange of SCS Shell/Body Inlet/Outlet along with Gasket & Fasteners		Yes
1.1.2	Drain/Vent connection along with isolation valve		Yes
1.1.3	Debris Discharge Motorized Valve and NRV (Check Valve) in Debris discharge backwash piping		Yes
1.1.4	Debris Discharge Piping & associated fittings		Yes (upto Debris discharge Motorized Valve with connection piece for 80 NB Pipe in BHEL Scope)
1.1.5	Sacrificial Anode type Cathodic Protection		Yes
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 SCS		Yes
1.1.8	Differential pressure measuring system for Self-Cleaning Strainer comprising of 2 Nos. DPT + 1 No. DPG (with remote seal arrangement) for each SCS 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 SPLIT
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)		Yes

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1.2	Scope of Services:		
1.2.1	Installation Check of SCS at site		Yes
1.2.2	Commissioning of SCS 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
3.0	**DESIGN /SYSTEM PARAMETERS**		
3.1	Liquid Handled		Sea water
3.2	Size of SCS	NB	150
3.3	Length of SCS b/w inlet & outlet nozzle	mm	As per bidder's design
3.4	Connecting pipe size (OD x Thk)	mm x mm	168.3 X 3.4 (DUPLEX SS)
3.5	Filter type/ duty		On-line or off-line / continuous
3.6	Location		Indoor
3.7	Operating pressure at SCS Inlet Flange	kg/cm2 (g)	1.5 - 2.0
3.8	Design pressure for SCS Shell	kg/cm2 (g)	7
3.9	Design Mechanical temperature	Deg. C	60
3.10	Flow rate through filter		
3.10.1	Normal	Cub m/Hr	173
3.10.2	Maximum	Cub m/Hr	210
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	110
3.12.2	For alarm/ annunciation	mbar	160
3.13	Filter section/ screen perforation size	mm	2 (Max)
3.14	Free flow area in the screen basket		Atleast 120 % of pipe inlet area
3.15	Debris discharge flow during flushing period	Cub m/Hr	<5
3.16	Debris Discharge Piping		
3.16.1	Dia of Debris Discharge Pipe		To be decided by bidder (upto Debris discharge backwash valve). Further, BHEL has provided 80 NB DUPLEX SS Debris discharge pipe from the outlet (downstream) of Debris discharge backwash valve. Bidder to provide connection piece (reducer/expander) to suit the pipe size provided by BHEL.

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3.16.2	Length of Debris Discharge Pipe	mtr	By Bidder for piping in Bidder's scope(upto Debris discharge Motorized Valve with connection piece with 80 NB Pipe in BHEL Scope). Further, Total distance of Debris Discharge Pipe upto the CW Forebay/Channel is approx. 150 to 170 M.
3.16.3	Number of bends required for Debris Discharge Pipe	nos	By Bidder for Piping in Bidder's scope.
4.0	**CONSTRUCTION FEATURES**		
4.1	Corrosion allowance (for Carbon Steel parts)	mm	1.6 (min)
4.2	Device for flushing out accumulated debris / sludge		Debris discharge/backwash outlet valve with associated actuator
4.3	Suitable lifting arrangement (lifting lugs, hooks etc) for handling during erection and maintenance.		Yes (In Bidder's Scope)
4.4	Size of Inspection hole with bolted cover	mm	To suit SCS O&M
4.5	Cathodic Protection		Cathodic protection (sacrificial anode type protection) to be provided by Bidder
5.0	**MATERIALS OF CONSTRUCTION**		
5.1	Filter body/ housing		CS as per IS :2062 (ebonite lining)
5.2	Connecting pipe (Inlet/ Outlet)		CS as per IS :2062 (ebonite lining)
5.3	Filter screen/ section		DUPLEX SS
5.4	Shaft		DUPLEX SS
5.5	Supporting cage		DUPLEX SS
5.6	Differential measuring system		As per Instrument Datasheet
5.7	Flushing/ backwashing unit		DUPLEX SS
5.8	Backwash rotor shoes		Neoprene
5.9	**Valves**		
5.9.1	Gate Valve/Globe Valve/Check Valve (For Size 65 Nb and Above)		
	a) Body & Bonnet		DUPLEX SS
	a) Disc for Check Valve		DUPLEX SS
	b) Trim		DUPLEX SS
5.9.2	Gate Valve/Globe Valve/Check Valve (For Size 50 Nb and Below)		
	a) Body & Bonnet		DUPLEX SS
	a) Stem		DUPLEX SS
	b) Disc & Seat Ring		DUPLEX SS
5.9.3	Ball Valves		

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	a) Body		DUPLEX SS
	b) Ball		DUPLEX SS
	c)Stem		DUPLEX SS
5.10	**Debris discharge/ Interconnecting Piping**		
5.10.1	For size upto 150 NB		DUPLEX SS
5.10.2	For size 200 NB and above		NA
5.11	**COUNTER FLANGES FOR SELF CLEANING STRAINER SHELL /OTHER**		
5.11.1	Flanges		1. DUPLEX SS for SCS inlet/outlet nozzle & debris discharge pipe/valves 2. CARBON STEEL (EBONITE LINED) for other nozzles
5.11.2	Fasteners		SS 316L
5.11.3	Gaskets		Min 4 mm thick rubber
5.12	Any other internal hardware /pipes etc.		DUPLEX SS
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	1
6.1.2	Partially (50%) chocked condition	MWC	1.6

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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 :		IS:325, IEC:60034, IS: 12615
1.2	Single phase AC motors		IS:996, IEC:60034
1.3	Energy Efficient motors		IS 12615, IEC:60034-30
1.4	Designation of Methods of Cooling of Rotating Electrical Machines		IS 6362
1.5	Designation for types of construction and mounting arrangement of rotating electrical machines		IS 2253
1.6	Noise levels		IS 12065
2.0	**DESIGN /SYSTEM PARAMETERS**		
2.1	Rated voltage	V	415
2.2	Frequency	Hz	50
2.3	Permissible variations for		
a)	Voltage	%	+/-10
b)	Frequency	%	(+)3 to (-)5
c)	Combined	%	10 (absolute sum)
2.4	System fault level at rated voltage for 1 sec	kA	50
2.5	Short time rating for terminal boxes for 0.25 sec	kA	50
2.6	Type of motors		Squirrel cage induction motor suitable for direct on-line starting on full load.All the motor shall be bi-directional.
2.7	Efficiency class		IE3 class as per IS 12615.
2.8	Rating		
a)	Motor duty		Continuosly rated -S1
b)	Design margin		i) The motor name plate rating shall have 15% margin over duty point input (or) 10% margin over the maximum demand of driven equipment whichever is higher considering highest system frequency. Ii). Service shall be considered as 1.0 only
3.0	**CONSTRUCTION FEATURES**		
3.1	Winding		Electrolytic grade Copper conductor, Winding shall be tropicalized and suitably varnished, baked and treated for operating satisfactorily in humid and corrosive atmosphere. Insulation shall be Non-hygroscopic, oil resistant, and flame resistant.
3.2	Enclosure Details		

a)	Degree of protection		
	i) Indoor motors		IP 55
	ii) Outdoor motors		IP 55(Weather proof)
	iii) hazardous location		IP 55(flame proof)
b)	Method of ventilation		LT motors shall be totally enclosed fan cooled (TEFC), type IC411. The cooling shall be effected by self-driven bi-directional centrifugal fan protected by
3.3	Insulation		Class ‘F’ with temperature rise limited to class ‘B’
3.4	Bearings		i) Grease lubricated ball or roller bearings for Horizontal motors Grease lubricated ball or roller bearings or combined trust and guide beaing for Vertical motors. ii) For bearing temperature measurement, duplex RTDs shall be provided for each bearing and shall be wired upto the terminal box. iii) Each bearing shall be provided with dial type thermometer.
3.5	Main terminal box		
a)	Type		i) Motor terminal box shall be detachable type and located in accordance with Indian Standards clearing the motor base- plate/ foundation. ii) Terminals shall be stud or lead wire type, substantially constructed and thoroughly insulated from the frame. iii) The terminals shall be clearly identified by phase markings, with corresponding direction of rotation marked on the non-driving end of the motor.
b)	DOP		Same as motor
c)	Position when veiwed from the non driving end		For LT motors, terminal box shall be located on top, unless otherwise specified.
d)	Rotation		360° in steps of 90°

e)	Space heater		i) Space heaters rated for 240V AC, 50 Hz supply shall be provided for motors rated 30KW and above to maintain windings in dry condition when motor is standstill. ii) Five number of Temperature detectors / thermisters shall be provided for L.T. motors above 90 KW (3 numbers winding temperatures & 2 numbers bearing temperatures)
f)	Cable glands and lugs		i) Motor terminal box shall be furnished with suitable cable lugs and double compression brass glands to match with cable used. ii) Removable Gland plates of thickness 3 mm (hot/cold rolled sheet steel) or 4 mm (non magnetic material for single core cables) shall be provided in case of cable boxes.
g)	Minimum clearances to be provided between phase to phase and phase to earth	mm	25
3.6	Earthing points suitable for conenction		Motor body shall be grounded at two earthing points on opposite sides with two separate and distinct grounding pads complete with tapped holes, GI bolts and washers.
3.7	Paint shade (Corrosion proof paints of colour shade)		The final thickness of paint film on steel shall not be less than 100 microns. Paint Shade for the Motor shall be RAL 7032 (Siemens Grey).
3.8	The spacing between gland plate & centre of bottom terminal stud		UP to 3 KW As per manufacturer's practice. Above 3 KW - upto 7 KW 85 Above 7 KW - upto 13 KW 115 Above 13 KW - upto 24 KW 167 Above 24 KW - upto 37 KW 196 Above 37 KW - upto 55 KW 249 Above 55 KW - upto 90 KW 277 Above 90 KW - upto 125 KW 331 Above 125 KW-upto 200 KW 203
3.9	Minimum inter-phase and phase-earth air clearances with lugs installed		UP to 110 KW 10mm Above 110 KW and upto 150 KW 12.5mm Above 150 KW 19mm
4.0	**PERFORMANCE PARAMETERS**		
4.1	Starting requirement		

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a)	Minimum permissible voltage as a percentage of rated voltage, at start to bring the driven equipment upto the driven equipment upto rated speed		i) Motors shall be capable of starting and accelerating the load at following starting voltage, with direct on line starting, without exceeding specified winding temperatures. • LT motors : 80% of rated voltage ii) The motor shall be capable of operating at full load at a supply voltage of 80% of the rated voltage for 5 minutes. iii) The motor shall be capable of withstanding the stresses imposed if started at 110% rated voltage. iv) Motor shall not stall if the supply voltage drops to 70% of the rated voltage two (2) second duration.
b)	Maximum locked rotor current		as per IS 12615
c)	Starting duty		i) No. of consecutive hot starts shall be 2 (with initial temperature of the motor at full load operating level). Ii) No. of consecutive cold starts shall be 3 (with initial temperature of the motor at ambient temperature).
d)	The locked rotor withstand time under hot condition at highest voltage limit		i) For the LT motors having starting time upto 20 seconds at minimum permissible voltage, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 2.5 seconds more than the starting time. ii) For the motors having starting time more than 20 seconds and up to 45 seconds at minimum permissible voltage, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 5 seconds more than the starting time. iii) For motors having starting time more than 45 seconds at minimum permissible voltage, the locked rotor withstand time under hot condition at highest voltage limit shall be more than starting time by at least 10% of the starting time. iv) The motors shall be designed to withstand 120% of rated speed for 2 minutes without any mechanical damage

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

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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
2.0	**DESIGN /SYSTEM PARAMETERS**		
2.1	**DATASHEET - PRESSURE TRANSMITTER, DIFFERENTIAL PRESSURE TRANSMITTER**		
	Type/Construction		Sealed capacitance/ Inductance/ Silicon resonance type
	Body Material		SS316
	Diaphragm Material		HAST ALLOY C-276
	Measurement element Material		Teflon seal
	Valves		Carbon steel for non-corrosive Applications; SS316 for corrosive applications; Super Duplex SS for sea water application.
	Output signal		4 to 20 m Amp. DC (Two wires) HART Compatible
	Local Indicator		LCD indicator (5 digit) with scale of Engg. Unit
	Overall Accuracy		± 0.065% or better of FSR
	Turn down ratio		10:1 for vacuum / very low pressure application 30:1 for other applications
	Stability		± 0.15% for 10 years.
	Response time		100 msec.
	Power supply		24V DC nominal
	Drive capability		500 Ohms minimum
	Enclosure Class		IP-65 (Explosion proof as per NEC article 500 for hazardous area)
	Span and Zero		Locally adjustable, non-interacting
	Zero suppression / elevation		At least 100% of Span
	Sealing Arrangement		Remote Seal
	Connection		
	Process		Half (1/2) inch NPT (F)
	Electrical		Plug and socket, unused entry with blind plug.
	Span and zero adjustment facility		Required
	Accessories		
	For Absolute Pressure Transmitters		Two (2) valve SS316 manifold
	For Gauge & Vacuum pressure transmitter		Three (3) valve SS316 manifold
	For DP, level & flow Transmitter		Five (5) valve SS316 manifold
	For oil and corrosive liquids		Separator diaphragm seals

	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD		PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024
	Diaphragm material		SS super duplex / Hastelloy - C276
	Flush ring & drain		Provided for lime stone slurry based & sea water applications
	For all transmitters		Mounting bracket
	Mounting		Local (in LIE/LIR)
2.2	**DATASHEET - PRESSURE GAUGE, DIFFERENTIAL PRESSURE GAUGE**		
	Sensing Element and Materials		Bourdon for high pressure, diaphragm/bellow for low pressure of all materials in SS 316
	Case		SS 316/ Die-cast aluminum with stoved enamel black finish. Epoxy coating shall be provided for corrosive atmosphere.
	Protective Diaphragm		HAST ALLOY C-276
	Dial size		150mm with shatter proof glass
	Scale Details		Graduations in black lines on white dial, 270 Deg pointer defection scale provided with glass cover. Smallest scale division shall be one (1) percent of full scale value or smaller. Pointer stop for all gauges.
	Accuracy		± One (1) percent or better
	Connection – Instrument Process		1/2 inch NPT Male Bottom
	Mounting		Local 1/2 inch NPT Male (Back entry) mounted on local gauge board.
	Sealing Arrangement		Remote Seal
	Accessories		
	3 way needle valve/manifolds		For all gauges
	Self-cleaning type Pulsation dampener/snubber		Pump and compressor discharge lines
	Syphon		For all steam lines
	Protective separating		For fuel oil and corrosive liquid lines
	Other particulars		
	Zero & span adjustment Safety device		For all gauges
	Housing		IP 65
	Diaphragm material		SS super duplex / Hastelloy - C276
	Flush ring & drain		Provided for lime stone slurry based & sea water applications
	Ranges 5 to 20 Kg/cm²		Rubber blow out disc with open front construction
	Ranges above 20 Kg/cm²		Neoprene safety diaphragm at the back with solid front construction
	Over range protection		Fifty (50) percent of full scale Movement mechanism shall be glycerin filled for oil services & vibration prone area.
			For corrosive liquid lines diaphragm type sensors required. Armored capillary of 10 mtrs for Corrosive liquid service.
			Contact type pressure gauges are not acceptable for interlock & protection.
	Identification		Identification engraved with service legend or laminated phenolic name plate.
2.3	**DATASHEET - LIMIT SWITCH**		
	Type		Inductive proximity type
	Mounting arrangement		Inside the enclosure
	Operating voltage Range	V	10-40 V DC
	Sensing system		Inductive Proximity type , 2 Wire
	Sensor Contact Type		NO
	Reverse polarity and short circuit protection		Yes
	IP Class-Sensor		IP67
	IP Class-Enclosure(Switch box)		IP67
	Cable entry-Enclosure(Switch box)		2 no-1/2" NPT

BHEL	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD		PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024
	Casing material-Sensor		Brass /SS
	Enclosure(Switch box) Housing material		FRP or SS
	Operating Ambient temp(sensors)	DegC	-5 to 70 deg C
	Max allowed Voltage Drop across sensor	V	5 V
	Standard applicable		EN 60947-5-2 or equivalent.
	Applicable for		Manual valves and solenoid operated on-off valves
2.4	**LOCAL INSTRUMENT ENCLOSURE AND LOCAL INSTRUMENT RACK**		
	Scope		LIE and LIR complete with all fittings, mountings & accessories, drains and utility lighting, cable & grounding cable etc.
	Construction		
	Rack	mm	1.6mm sheet plate
	Frame	mm	3mm thick channel frame of steel
	Free standing type		Yes
	Canopy		Yes, >=3mm thick steel, extended beyond the ends of the rack.
	Degree of Protection		IP-55 for LIE & JB of LIE/LIR
	Junction Box		Applicable
2.5	**JUNCTION BOX**		
	No. of ways		12/24/36/48/64/72/96/128 with 20% spare terminals.
	Material		4mm thick fibre glass reinforced polyester.
	Type		Screwed at all four corners for door. Door handle shall be self locking with common key. Door gasket shall be of synthetic rubber.
	Mounting clamps and structures etc		Suitable for mounting on walls columns
	Accessories		The brackets, bolts, nuts, screws, double compression glands and lugs required for erection shall be of brass, included in Bidders scope of supply. Race ways for routing of cables inside JBs shall be provided.
	Type of TB		Rail mounted maxi termi or cage-clamp type suitable for terminal conductor size upto 2.5mm2. A M6 earthing stud shall be blocks provided.
	Protection class		IP:65 minimum and Explosion/Flame Proof as per area classification
	Grounding		To be provided
	Color		Outside - RAL 7035, inside - Glossy White
	Spare Terminals		At least 20% unused terminals
2.6	**PROCESS CONNECTION**		
2.6.1	**Impulse Tubing**		
	Low pressure and Low temperature services(Water)		Seamless carbon steel piping to ASTM A106 Gr.B; Duplex SS for sea water application.
2.6.2	**Fittings Double compression type**		
	Material for socket weld fittings		ASTM A105 ASTM A182, Gr. F22 6000/3000 lbs
	Dimensions of fittings		ANSI B16.11
2.6.3	**Valves**		
	Isolation and drain valves		Globe valves with FAS

	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD		PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024
2.6.4	**Flexible conduits with fittings**		Lead coated, paper insulated, heat resistant flexible metal conduits with necessary fittings.
2.6.5	**Instrument piping shall not be routed through**		a) Across equipment removal areas b) Below mono-rails and cranes c) Above or below removable gratings d) Above or below cable trays.
2.6.6	**INSPECTION/TESTING**		
2.6.6.1	Type Test requirement		Yes
	Item-1		Electronic Transmitters
	Test & Standard -1		As per Standard, BS-6447 / IEC-60770
	Item-4		Junction Boxes
	Test & Standard -4		Degree ofProtection test, IS-13947
	Test to be specifically conducted (for item1,2,&3)		No
	Customer's approval required. on Test certificate (for item1,2,&3)		Yes
	Item-5		Pressure gauge
	Test & Standard -5.1		Degree of Protection test, IS-2147
	Test & Standard -5.2		Temp interference test, IS -3624
	Item-6		Temperature gauge
	Test & Standard -6		Degree of Protection test, IS-13947
	Test to be specifically conducted (for item 5 & 6)		No
	Customer's approval required. on Test certificate (for item 5 & 6)		No

	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD	PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024

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

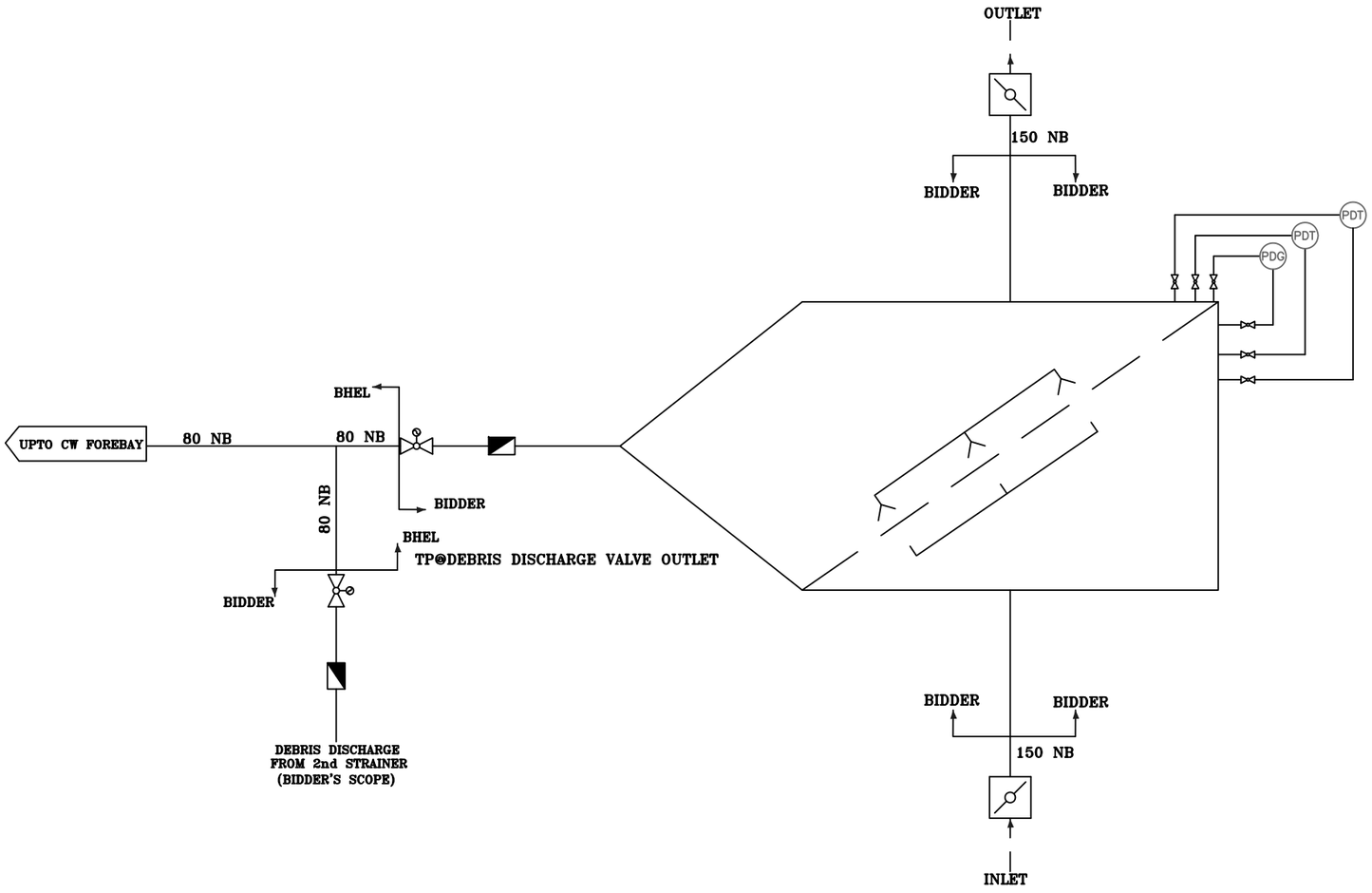
SL.NO	DESCRIPTION	UOM	DETAIL
1.0	**Worm Planetary Gear**		
1.1	Make /Model		
1.2	Quantity	nos.	
1.3	Total reduction ratio		
1.4	Input speed	rpm	
1.5	Output speed	rpm	
1.6	Output torque	Nm	
2.0	**Worm Gear for Valve Actuator**		
2.1	Make/Model		
2.2	Quantity	nos.	
2.3	Worm Gear Output torque (for motor operation)		
2.4	Gear box type		
2.5	Total reduction ratio		
2.6	Hand Wheel		
2.7	Total angle of travel	Deg	
2.8	Suitable Multi turn actuator		
2.9	Mounting Flange for Multi turn actuator		
2.10	Hand Wheel Provided in the Actuator		
2.11	Mounting Flange for the Equipment		
2.12	Protection class		
3.0	**Geared Motor Drive**		
3.1	**GENERAL**		
i)	Manufacturer & Country of origin.		
ii)	Equipment driven by motor)		
iii)	Motor type		
iv)	Country of origin		
v)	Quantity	nos.	
3.2	**DESIGN AND PERFORMANCE DATA**		
i)	Frame size		
ii)	Type of duty		
iii)	Type of enclosure and method of cooling		
vi)	Type of mounting		
vii)	Direction of rotation as viewed from DE END		
viii)	Standard continuous rating at 40 deg.C. ambient temp.	(KW)	
ix)	(A) Derated rating for specified normal condition i.e. 50 deg. C ambient temperature	(KW)	
	(B) Rating as specified in load list	(KW)	
xi)	Rated speed at rated voltage and frequency	rpm	
xii)	At rated Voltage and frequency		
	a) Full load current	A	
	b) No load current	A	

	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD		PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024
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	
3.3	**CONSTRUCTIONAL FEATURES**		
i	Stator winding insulation		
	a. Class & Type		

	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD		PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024
	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)		
3.4	Relevant motor curves		
4.0	**GEAR BOX DETAILS**		
4.1	Model		
4.2	Type Planetary Gear Box		
4.3	Total Reduction ratio		
4.4	Input speed	rpm	
4.5	Output speed	rpm	
4.6	Input torque	Nm	
4.7	Output torque	Nm	
4.8	Cable Gland Type		

COMPLIANCE DRAWING

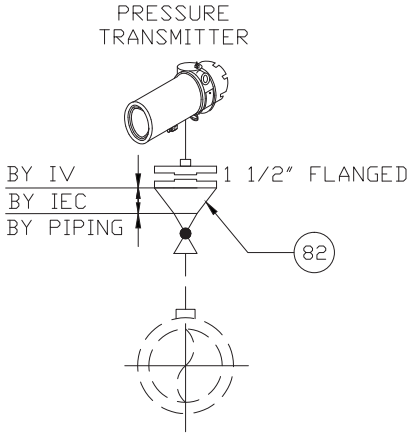
A) FLOW DIAGRAM FOR SCS
B) C&I INSTRUMENTATION INSTALLATION DRG
C) DDCMIS INTERFACE FOR LT DRIVE
D) MOTORIZED VALVE ACTUATOR DATASHEET
E) WATER ANALYSIS
F) ELECTRICAL SCOPE SPLIT



NOTES:

1. SCHEMATIC SHOWN IS TYPICAL FOR ONE SCS, SHALL BE IDENTICAL FOR SECOND SCS.
2. COUNTERFLANGES FOR SCS ARE INCLUDED IN BIDDER'S SCOPE.
3. DEBRIS DISPOSAL PIPING WITHIN TERMINAL POINT IS INCLUDED IN BIDDER'S SCOPE.
4. ALL VALVES & NRVs IN DEBRIS DISPOSAL PIPING ALONG WITH THEIR COUTERFLANGES ARE INCLUDED IN BIDDER'S SCOPE

FLOW DIAGRAM FOR SELF CLEANING STRAINER



82	1"x1 1/2" CS EXPANDER, SW, SS316	1
TAG NO.	DESCRIPTION	QTY.
	BILL OF MATERIAL	

REV.	DATE	DESCRIPTION	DRN.	STR.	MECH.	ELEC.	INST.
				APPROVED BY			
0C	21.01.19	BASED ON COMMENTS	RV				KA
0B	20.12.18	BASED ON COMMENTS	RV				KA
0A	12.05.17	TENDER PURPOSE	KK				KA

PROJECT :

1 x 800MW NORTH CHENNAI TPP STAGE -III
FGD PACKAGE

OWNER :

TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
CHENNAI-600 002, TAMILNADU, INDIA

OWNER'S ENGINEER

FICHTNER INDIA

FICHTNER Consulting Engineers (India) Private Limited
Chennai

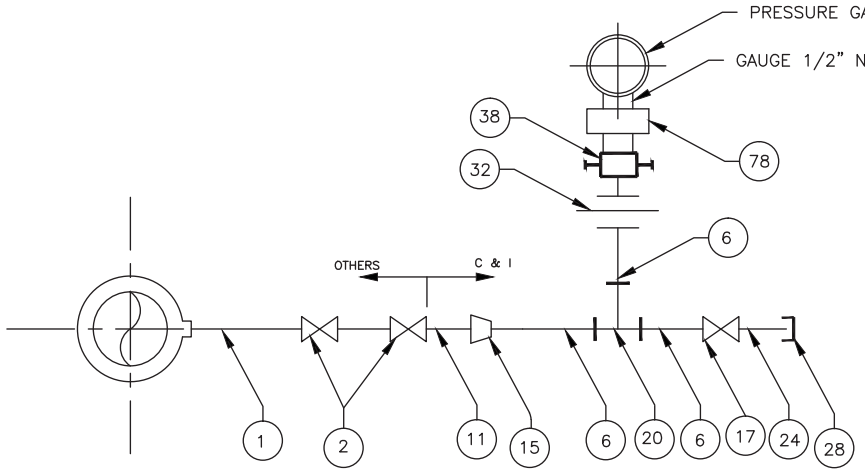
	SIGNATURE	DATE
DRAWN	RV	21.01.19
DESIGNED	KRK	21.01.19
CHECKED	KRK	21.01.19
DEPT.HEAD	KA	21.01.19
PROJ.MGR.	SSR	21.01.19

INST. DRAWING FOR
PRESSURE TRANSMITTERS
DIAPHRAGM SEAL TYPE

RELEASED FOR			DEPT. C&I	JOB NO. 1116127	SCALE: NTS	REV.
	PRELIMINARY					
	TENDER	✓	DWG.NO. ANNEXURE–7			0C
	ENGINEERING					
	CONSTRUCTION				SHEET: 06 OF 17	

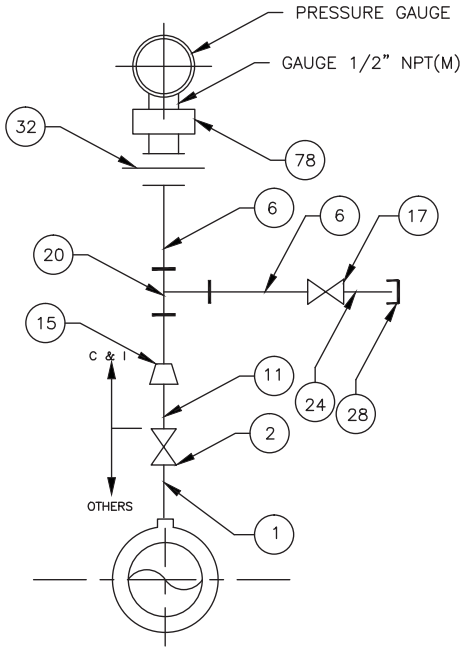
NOTE:–

1. FOR PRESSURE LESS THAN 40KG, ROOT VLV. OF SIZE 1/2"SW, NIPPLE PIECE(11) & 1 TO 1/2"SW REDUCER(15) ARE NOT REQUIRED.
2. BIDDER HAS TO PROVIDE SNUBBER AS REQUIRED.
3. FOR SEA WATER & SLURRY APPLICATION SS SUPER DUPLEX SHALL BE CONSIDERED.
4. FOR LIME STONE SLURRY BASED & SEA WATER APPLICATIONS FLUSH RING & DRAINS SHALL BE PROVIDED.



STEAM/LIQUID SERVICE

FIG–A



AIR SERVICE

FIG–B

TAG NO.	DESCRIPTION	QTY. A	QTY. B	TAG NO.	DESCRIPTION	QTY. A	QTY. B
20	1/2"SW EQUAL TEE, CS/AS	1	1	78	1/2"NPT(F)X1/2"NPT(M) SNUBBER/PULSATION DAMPER AS APPLICABLE	1	1
17	1/2" SW CS/AS GLOBE VALVE	1	1	59	1/2"SW, STRAIGHT PIPE CONNECTOR, CS/AS	AS REQD.	
15	1" TO 1/2" SOCKET WELDED REDUCER	1	1	38	3 WAY GAUGE VALVE 1/2" NB SW	1	–
11	1" NPS SCH–80/160 CS/AS NIPPLE/SS SUPER DUPLEX	1	1	37	6" COILED SYPHON SCH 80/160 1/2"NB CS/SS	AS REQD.	
6	1/2" NPS. SCH–80/160 CS/ AS PIPE/SS SUPER DUPLEX	AS REQD.		32	1/2"NPS,3PIECE PIPE UNION WITH 1/2"NPT(F) SCREWED	1	1
2	1/2"/3/4"/1" ROOT VALVE–SW GLOBE VALVE	2	1	28	1/2"NPT (F) CS CAP	1	1
1	1/2"/3/4"/1" CARBON/ALLOY STEEL NIPPLE OF MTL. SAME AS THAT OF MAIN PIPE(AS PER PROCESS REQD.)	AS REQD.		24	1/2"NPS,SCH–80/160X1/2"NPT(M)CS/AS NIPPLE	1	1

BILL OF MATERIAL | BILL OF MATERIAL

REV.	DATE	DESCRIPTION	DRN.	STR.	MECH.	ELEC.	INST.
							APPROVED BY
0C	21.01.19	BASED ON COMMENTS	RV				KA
0B	20.12.18	BASED ON COMMENTS	RV				KA
0A	12.05.17	TENDER PURPOSE	KK				KA

PROJECT :

1 x 800MW NORTH CHENNAI TPP STAGE -III
FGD PACKAGE

OWNER :

TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
CHENNAI-600 002, TAMILNADU, INDIA

OWNER'S ENGINEER

FICHTNER INDIA

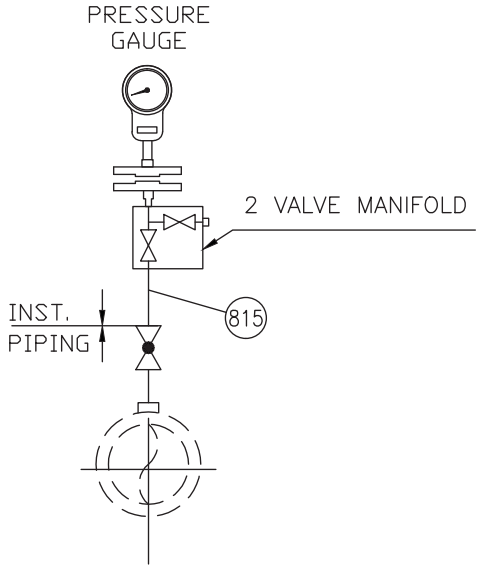
FICHTNER Consulting Engineers (India) Private Limited
Chennai

	SIGNATURE	DATE
DRAWN	RV	21.01.19
DESIGNED	KRK	21.01.19
CHECKED	KRK	21.01.19
DEPT.HEAD	KA	21.01.19
PROJ.MGR.	SSR	21.01.19

INST. DRAWING FOR LOCAL PRESSURE GAUGE

RELEASED FOR			DEPT. C&I	JOB NO. 1116127	SCALE: NTS	REV.
	PRELIMINARY					
	TENDER	✓	DWG.NO. ANNEXURE–7			0C
	ENGINEERING					
	CONSTRUCTION				SHEET: 07 OF 17	

PRESSURE GAUGE WITH DIAPHRAGM SEAL



NOTE:–

1. 2 VALVE INTEGRAL MANIFOLD SHALL BE THE PART OF INSTRUMENT VENDOR SCOPE.
2. SNUBBER SHALL BE PROVIDED FOR PUMP DISCHARGE APPLICATION.
3. DIAPHRAGM SEAL SHALL BE PROVIDED FOR CHEMICAL/OILY WATER APPLICATION.

REV.	DATE	DESCRIPTION	DRN.	STR.	MECH.	ELEC.	INST.
				APPROVED BY			
0C	21.01.19	BASED ON COMMENTS	RV				KA
0B	20.12.18	BASED ON COMMENTS	RV				KA
0A	12.05.17	TENDER PURPOSE	KK				KA

PROJECT :

1 x 800MW NORTH CHENNAI TPP STAGE -III
FGD PACKAGE

OWNER :

TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
CHENNAI-600 002, TAMILNADU, INDIA

OWNER'S ENGINEER

FICHTNER INDIA

FICHTNER Consulting Engineers (India) Private Limited
Chennai

	SIGNATURE	DATE
DRAWN	RV	21.01.19
DESIGNED	KRK	21.01.19
CHECKED	KRK	21.01.19
DEPT.HEAD	KA	21.01.19
PROJ.MGR.	SSR	21.01.19

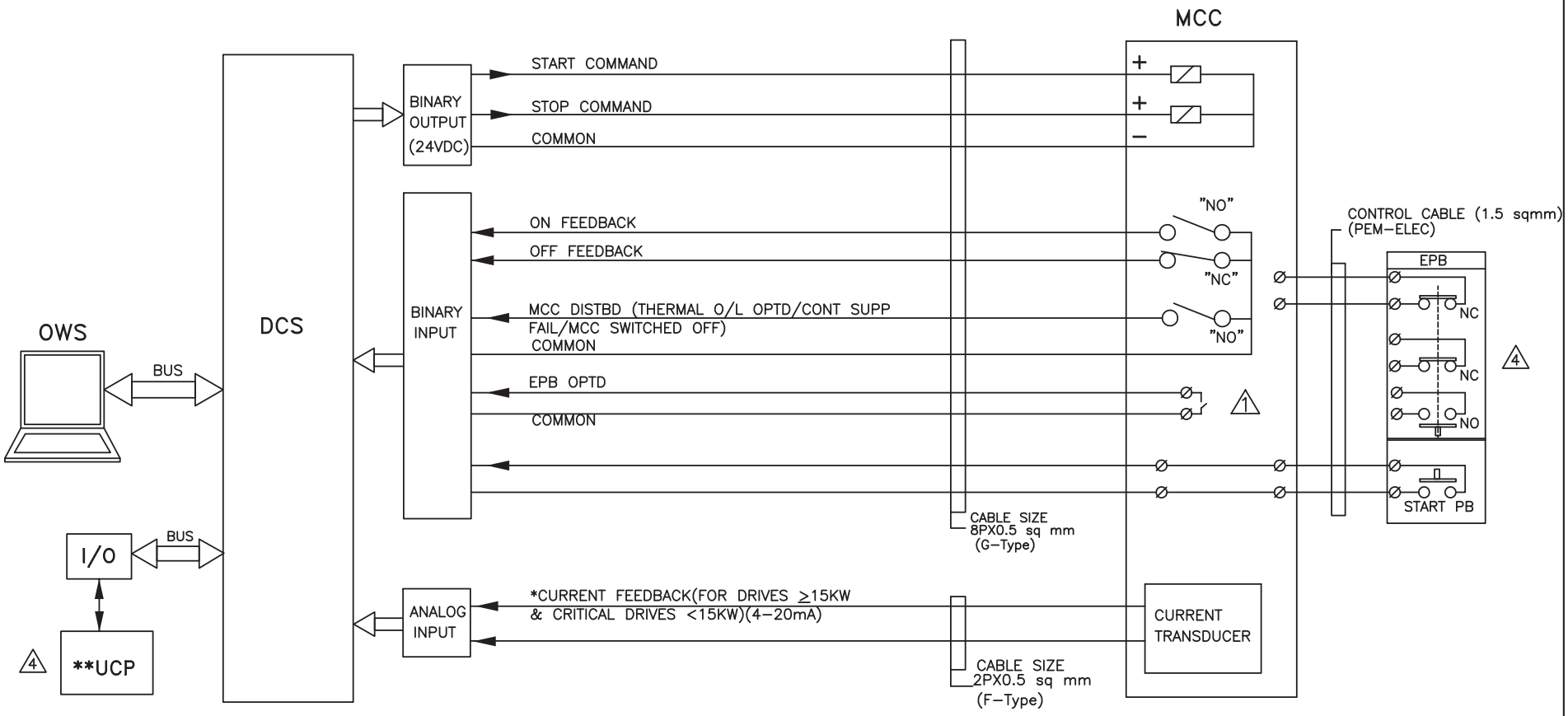
INST. DRAWING FOR
LOCAL PRESSURE GAUGE
DIAPHRAGM SEAL TYPE

RELEASED FOR		DEPT. C&I	JOB NO. 1116127	SCALE: NTS	REV.
	PRELIMINARY				
	TENDER	✓	DWG.NO. ANNEXURE–7		0C
	ENGINEERING				
	CONSTRUCTION		SHEET: 08 OF 17		

BILL OF MATERIAL

TAG NO.	DESCRIPTION	QTY.
1	NIPPLE (100mm), 1/2" NPTM X SW, SCH 80, SS316	1

DCS INTERFACE FOR UNIDIRECTIONAL LT DRIVE(CONTACTOR OPERATED)



NOTE:

* FOR LTUD DRIVES, 4-20mA CURRENT TRANSDUCER SHALL BE CONSIDERED FOR BARRING GEARINGMOTOR, JOP, AIR HEATER MOTOR, LUBE OIL PUMPS, SCANNER AIR FANS, SEAL AIR FANS as applicable. 4

** FOR ESSENTIAL DRIVES FOR SAFE SHUT DOWN OF PLANT.

BHEL	PROJECT: 1X800 MW TANGEDCO NORTH CHENNAI TPP STAGE III-BTG	DRG.NO.	:PE-DM-423-145-1002
		DATE	31.10.2017
	TITLE DDCMIS INTERFACE FOR UNIDIRECTIONAL LT DRIVE	REV.NO.	06
		SHT	8 OF 11

1X800 MW NORTH CHENNAI

Motorized Valve Actuator Datasheet

Sl No.	Clause Ref	TANGEDCO / FI Comments	BHEL reply	TANGEDCO / FI Comments	MOM RESOLUTION DATED 29/05/17	MOM RESOLUTION DATED 14/07/17	TANGEDCO / FI comment	BHEL Reply dated 22.02.18	TANGEDCO / FI comment	BHEL Reply dated 27.03.18	TANGEDCO / FI comment	BHEL Reply dated 23.05.18
1	General	DDCMIS / PLC interface for motor operated actuator (integral starter) signal exchange shall be as per the Drive control philosophy, refer volume II, section 2, part 2.3, cl: 2.3.18.2 - Annexure -B -3.	Noted.	Noted and point closed.	---	---	--	Noted. Point closed.	--	Point closed.		
2	General	Motor actuator shall have following functions as per the specification refer volume II, section 2, part 2.2, cl: 2.2.13.7-ix, x, xi, xiii, xiv.	Noted for cl: 2.2.13.7-ix, x, xi, & xiv, however for xii & xiii only the features available for conventional actuators shall be provided.	BHEL to follow the specification	BHEL will consult with all actuator vendors and will revert back on this. We understand lot of deviations from all the vendors, It shall be discussed and closed in the forthcoming meeting.	LED local indication shall be provided as per "Drive control philosophy (PE-DM-423-I45-I002) & Actuator datasheet (PE-ID-423-145-I902)	Noted, BHEL shall include common fault in red color LED column.	Common fault LED feature is not available with the actuator vendors for conventional actuator. Hence not included.	As agreed during 18/08/2017 meeting at TANGEDCO, BHEL shall provide the same. BHEL shall refer MOM and update accordingly.	BHEL Reply dated 22.02.18 given along with Rev 05 of this document is incorrect. The BHEL reply stated that "Contact for Common Fault shall be wired in the DCS. Binary Input for "Actuator Disturbed" is indicated in the Drive Control Philosophy. Local indication for Common Fault is not required. "		
3	Sheet 2 of 3	Each motor actuator shall have two (2) torque limit switches with two (2) normally opened and two (2) normally closed contacts each as per the specification refer volume II, section 2, part 2.2, cl:2.2.13.13 –b	Noted. Already indicated.	BHEL to indicate 2 no's of open/closed contact instead of 1 NO of contact as indicated in the document.	BHEL stated that actuator shall have two (2) torque limit switches with two (2) normally opened and two (2) normally closed contacts i.e. one for open and one for close. Same has been already indicated.	TANGEDCO/FI noted.	--	Noted. Point closed.	--	Noted. Point closed.		
4	Sheet 2 of 3	Motor actuator limit switch shall be as per the specification refer volume II, section 2, part 2.2, cl: 2.2.13.13 without any deviation.	Noted.	Noted and point closed.	---	---	--	Noted. Point closed.	--	Noted. Point closed.		
5	wiring diagram	The actuator shall include a digital position indicator with a display from fully open to fully close in 1% increments as per the specification refer volume II, section 2, part 2.2, cl:2.2.13.15	Kindly refer note No. 10 on sht 4 of 4.	Noted and point closed.	---	---	--	Noted. Point closed.	--	Noted. Point closed.		
6	Sheet 2 of 3	BHEL considered as optocopler in the Interposing relay / optocoupler for the type of isolating device, But the wiring diagram doesn't indicate any optical interface, BHEL to clarify.	The wiring diagram furnished was indicative only and hence now not submitted along with document. Final vendor wiring diagram shall be furnished after ordering.	Note shall be added	Noted.	---	--	Noted. Point closed.	--	Noted. Point closed.		
7	Sheet 3 of 3	2 nos. of cable glands for other control cables shall be provided with NPT type cable glands.	Noted.	As per drive control philosophy, 2 nos.of plug and socket type cable end connector shall be provided in the actuator end.	As per the clarification to bidder's pre-bid queries, Annexure 1.6, s.no:2. Plug and socket has not been considered. Because in plug and socket type connection we can connect only 5 signals in on off type drives and 6 signals in inching type drives, which is a limited interface compared to standard design. To avoid these problems, we are considering actuator without plug and socket connecter. Hence 2 nos. of cable glands for other control cables will be provided with NPT type cable glands.	BHEL informed the constraints explained about the Plug and socket. However TANGEDCO explained to follow the specification requirement cl: 2.2.13.7 (XV)- pg no: 282 of 530. BHEL agreed to provide plug and socket connecter for the MOV actuators. TANGEDCO / FI noted.	Noted, 2 nos of plug and socket shall be provided as agreed during 18/08/2017 meeting at Tangedco.	2 Nos. Plug & socket shall be provided for inching duty drives only one for limit switch feedback & other for position feedback. Kindly refer note-13 for the same on sht 4 of 4. For ON/OFF drives, 1 no. plug and socket shall be envisaged.	Noted, 2 nos of plug and socket shall be provided as agreed during 18/08/2017 meeting at Tangedco.	BHEL Reply dated 22.02.18 given along with Rev 05 of this document is incorrect. The BHEL reply stated that"2 Nos. Plug & socket shall be provided for inching duty drives only one for limit switch feedback & other for position feedback. Kindly refer note-13 for the same on sht 4 of 4. For ON/OFF drives, 1 no. plug and socket shall be envisaged." TANGEDCO/FI to kindly review this reply.	BHEL SHALL PROVIDE THE NATIVE COPY OF THIS FILE TO PROVIDE REPLY	Noted and native filr file enclosed. Point closed.
8	Drawing no: 3 - V-MISC-24227	Kindly mention the Control Supply voltage and indicate how the same is derived.	The wiring diagram furnished was indicative only and hence now not submitted along with document. Final vendor wiring diagram shall be furnished after ordering.	Noted and point closed.	---	---	--	Noted. Point closed.	--	Noted. Point closed.		
9	Drawing no: 3 V-MISC-24227	As per specification cl.2.2.13.9 below mentioned protection shall also be provided for motors. 1. Motor Protection against unseated jammed valve. 2. de energisation of motor in case of thermostat overheating. 3. Lost phase protection. 4. Short Circuit protection.	Noted.	Noted and point closed.	---	---	--	Noted. Point closed.	--	Noted. Point closed.		
10	Drawing no: 3 - V-MISC-24227	Indicate the control transformer also.	Kindly refer the reply at point No.8 above.	Kindly refer our reply for the same.	---	---	--	Noted. Point closed.	--	Noted. Point closed.		
11	Drawing no: 3 - V-MISC-24227	control transformer shall be fed from 2 no's of 3 phase incomer with overload protection.	Kindly refer the reply at point No.8 above.	Kindly refer our reply for the same.	---	---	--	Noted. Point closed.	--	Noted. Point closed.		
12	Sheet 1 of 3 Construction and sizing	At least two earthing terminals shall be provided for the motor body earthing. Kindly confirm.	Noted.	Noted and point closed.	---	---	--	Noted. Point closed.	--	Noted. Point closed.		
13	Sheet 1 of 3 Construction and sizing	As mentioned in this document BHEL to confirm whether the motor provided for regulating service is suitable for 600 starts per hour.	Noted.	Noted and point closed.	---	---	--	Noted. Point closed.	--	Noted. Point closed.		
14	General	BHEL to note that this submitted document is a generalised document. Some of the parameters are not filled up and vary from application. BHEL to submit all the parameters as applicable.	All the desired parameters are furnished.	Noted and point closed.	---	---	--	Noted. Point closed.	--	Noted. Point closed.		
15							As agreed during 18/08/2017, meeting at TANGEDCO, BHEL shall provide smart with HART type Boiler fan actuator. Same shall be included in the datasheet.	These actuators are under Trichy's scope of supply. Technical details for Boiler fan motorized valve actuators shall be a part of the vendor documents which shall be submitted by Trichy separately.	As per TANGEDCO/FI, BHEL is single entity (BTG contractor), BHEL shall update the smart actuators datasheet in the same document and submitted for review.	BHEL confirms that SMART electrical regulating actuator meeting the functional & contract specification requirements including communication protocol (HART/ Profibus etc as per Vendor standard) are provided for FD,PA,ID fan blade pitch control applications. Command signal (4-20 ma) & position feedback signal (4-20 ma) are hardwired with DCS.		

Hope we have replied to all the points raised by TANGEDCO/FI.

In view of the above, we request TANGEDCO/FI to approve the document at the earliest.

Regards,

226122/2024/PS-PEM-WSE

MOTOR OPERATED VALVE ACTUATOR DATA SHEET

REV.	DATE	ALTD	CHD	APPD
05	22.02.18	CM sd	SCS sd	SCS sd
1.	REVISED AS PER CUSTOMER'S COMMENTS RECVD VIDE LTR No. D923/17 DTD 16.12.17			

REV.	DATE	ALTD	CHD	APPD
06	27.03.18	CM sd	SCS sd	SCS sd
1.	REVISED AS PER CUSTOMER'S COMMENTS RECVD VIDE LTR No. D286/18 DTD 17.03.18			

REV.	DATE	ALTD	CHD	APPD
07	23.05.18	CM	SCS	SCS
1.	NATIVE REPLY SHEET ENCLOSED AS PER CUSTOMER COMMENTS RECD VIDE LTR No. D495/18 dt. 22.05.18.			

REV.	DATE	ALTD	CHD	APPD
02	02.08.17	SK sd	SCS sd	SCS sd
1.	REVISED IN LINE MOM B/W FITCHER, TANGEDCO & BHEL DATED 14.07.17.			

REV.	DATE	ALTD	CHD	APPD
03	03.11.17	SK sd	SCS sd	SCS sd
1.	REPLY SHT ALONG WITH THE MOM ATTACHED AS PER COMMENTS RECVD. VIDE LTR No. D771/17 DTD 28.10.17			

REV.	DATE	ALTD	CHD	APPD
04	12.12.17	SK sd	SCS sd	SCS sd
1.	DOCUMENT REVISED IN LINE WITH CUSTOMER COMMENTS RECVD VIDE LTR No. 1321 DTD 16.11.17			

ALL DIMENSIONS ARE IN mm

CUSTOMER

CUSTOMER'S CONSULTANT

JOB NO. 423

STATUS CONTRACT

DISTRIBUTION

REV.	DATE	ALTD	CHD	APPD
01	03.03.17	SK sd	SCS sd	SCS sd
1.	REVISED IN LINE WITH CUSTOMER COMMENTS RECVD VIDE LTR No. D-42 DTD:03.02.2017.			

CUSTOMER:

TAMILNADU GENERATION & DISTRIBUTION CORPORATION LTD.
5TH FLOOR, WESTERN WING, NPKRR MAALIGAI,
144, ANNA SALAI, CHENNAI-600002

CONSULTANT:

FICHTNER INDIA

FICHTNER CONSULTING ENGINEERS (INDIA) PVT LTD.
MENON ETERNITY, 9TH FLOOR, NO.165, ST. MARY'S ROAD,
ALWARPET, CHENNAI-600018

PROJECT:- 1X800 MW TANGEDCO NORTH CHENNAI TPP
STAGE III-BTG

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

DEPT CODE		NAME	SIGN	DATE
I	DESN	SK	-sd-	20.10.2016
	CHD	SCS	-sd-	20.10.2016
	APPD	DP	-sd-	20.10.2016

TITLE

MOTOR OPERATED VALVE ACTUATOR DATA SHEET

						DEPT.	SCALE 1:1
						SIGN	
						DATE	

DRAWING NO.
PE-ID-423-145-I902

SHEET 1 OF 5 REV. 07

BHEL	**SPECIFICATION FOR MOTORISED VALVE ACTUATOR**	SPECIFICATION NO.: PE-ID-423-145-I902 VOLUME II B SECTION D REV. NO. 07 DATE: 23.05.18 SHEET 2 OF 4

Data Sheet A & B

	DATA SHEET-A (TO BE FILLED BY PURCHASER)	DATA SHEET-B (TO BE FILLED-UP BY BIDDER)
GENERAL*	* PROJECT	1x 800 MW NORTH CHENNAI PROJECT
	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, WEATHER PROOF, IP:68
	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 SIX TIMES THE RATED CURRENT-INCLUSIVE OF **I.S.** TOLERANCE
	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 5012) ☐ …….
	PAINT TYPE **(## Refer Notes)**	☐ ENAMEL ☐ EPOXY ☐ …….
	SHAFT RPM	BIDDER TO SPECIFY
	OLR SET VALUE	BIDDER TO SPECIFY
	@ STARTING / FULL LOAD CURRENT	BIDDER TO SPECIFY
	NO. OF REV FOR FULL TRAVEL	BIDDER TO SPECIFY
	@ 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

BHEL	**SPECIFICATION FOR MOTORISED VALVE ACTUATOR**	SPECIFICATION NO.: PE-ID-423-145-I902 VOLUME II B SECTION D REV. NO. 07 DATE: 23.05.18 SHEET 3 OF 4

Data Sheet A & B

	DATA SHEET-A (TO BE FILLED BY PURCHASER)		DATA SHEET-B (TO BE FILLED-UP BY BIDDER)
	@ ENCLOSURE CLASS OF MOTOR	☐ IP 68 ☐ FLAME PROOF	
	@ INSULATION CLASS	CLASS-F TEMP. RISE LIMITED TO CLASS-B	
	@ 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 or OFF MODE/STOP PB OPTD, TORQUE SWITCH OPTD. MID WAY/MOTOR THERMOSTAT TRIP)	
INTERPOSING RELAY/OPTO COUPLER (Applicable for integral Starter)	TYPE OF ISOLATING DEVICE	☐ INTERPOSING RELAY ☐ OPTO COUPLER ■ EITHER	
	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) **($$ Refer Notes)**	MFR & MODEL NO.	BIDDER TO SPECIFY	
	OPEN / CLOSE	■1 No. ☐2Nos. / ■1 No. ☐2Nos	
	CONTACT TYPE	2 NO + 2 NC	
	RATING	5A 240V AC AND 0.5A 220V DC	
	CALIBRATED KNOBS(OPEN&CLOSE TS)	REQUIRED FOR SETTING DESIRED TORQUE	
	ACCURACY	+3% OF SET VALUE	
LIMIT SWITCH (Not Applicable for Smart Actuator) **($$ Refer Notes)**	MFR & MODEL NO.	BIDDER TO SPECIFY	
	OPEN : INT : CLOSE	☐1 No ■2 Nos. / 2 Nos. (ADJ.) / ☐1 No. ■2Nos.	
	CONTACT TYPE	2 NO + 2 NC	
	RATING (AC / DC)	5A 240V AC AND 0.5A 220V DC	

FORM NO. PEM-6666-0

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR	SPECIFICATION NO.: PE-ID-423-145-I902	
		VOLUME II B	
		SECTION D	
		REV. NO. 07	DATE: 23.05.18
		SHEET 4 OF 4	

Data Sheet A & B

DATA SHEET-A (TO BE FILLED BY PURCHASER)	DATA SHEET-B (TO BE FILLED-UP BY BIDDER)

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	1
	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. ☐ ----------	1
CABLE GLANDS	@ POWER CABLE GLAND	SIZE: suitable for 3Cx2.5sq mm for motor rating 3.7 kW, 3Cx10 sq mm fr motor from 3.7 kW to 5.5 kW.	
	@ SPACE HEATER CABLE GLAND	SIZE:-Space heater cable gland to be derived internally.	
	OTHER CONTROL CABLE GLANDS-2	QUANTITY & SIZE :-------- (8Px0.5 sq mm)	
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 NATIONAL AND INTERNATION STANDARD. AS A MINIMUM, THE FOLLOWING STANDARDS SHALL BE COMPLIED WITH:
   IS-9334, IS-2147, IS-2148, IS-325, IS-2959, IS-4691 AND IS-4722
3. TEMPERATURE RISE SHALL BE RESTRICTED TO 70 DEG. C FOR AMBIENT TEMPERATURE OF 50 DEG C.
4. CABLE GLANDS OF DOUBLE COMPRESSION TYPE, BRASS MATERIAL SHALL BE PROVIDED.
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, -5% TO +3% 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. 2 No. OF EARTHING TERMINALS SHALL BE PROVIDED FOR THE MOTOR BODY EARTHING. 1
9. IN ADDITION TO ABOVE, 2 No. OF CABLE GLANDS (NPT) SHALL BE PROVIDED.
10. LOCAL DIGITAL POSITION INDICATOR SHALL BE PROVIDED FOR INCHING DUTY DRIVES.
11. LED's FOR STATUS ANNUNCIATION SHALL BE PROVIDED LOCALLY FOR 2
    a) ACTUATOR IN LOCAL MODE
    b) ACTUATOR IN REMOTE MODE
    c) ACTUATOR RUNNING IN OPEN DIRECTION
    d) ACTUATOR RUNNING IN CLOSE DIRECTION
    e) LIMIT SWITCH OPEN TRIP
    f) LIMIT SWITCH CLOSE TRIP
    g) CONTROL VOLTAGE AVAILABILITY
12. THE FOLLOWING INDIVIDUAL FAULT ANNUNCIATION LED'S RED COLOR SHALL BE PROVIDED LOCALLY FOR 2
    a) TORQUE SWITCH OPEN
    b) TORQUE SWITCH CLOSE
    c) THERMOSWITCH TRIP
    d) MOTOR SINGLE PHASING
13. IN ADDITION TO THE 9 PIN PLUG IN CONNECTOR FOR TORQUE/LIMIT SWITCH FEEDBACK, SEPARATE 5 PIN PLUG & SOCKET SHALL BE PROVIDED FOR POSITION FEEDBACK. 4

$$ 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

BHEL	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD	PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024

SEA WATER ANALYSIS

Sl no	Parameter	Unit	Result
1	Temperature	Degree C	**35**
2	pH	-	**7.5 - 8.2**
3	LSI		**0 - 0.2**
4	Alkalinity	mg/l	**< 100**
5	Hardness		**< 80 PPM**
6	Chloride		**< 350 PPM**
7	Sodium		**< 170 PPM**
8	Suspended soilds		**< 10**
9	Cl as CaCO3	mg/l	**< 350**
10	COD		**NIL**

REV-0, DATE: 29.03.2024

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

PACKAGES: SELF CLEANING STRAINER (SCS)

SCOPE OF VENDOR: SUPPLY

PROJECT: 1X800MW TANGEDCO NORTH CHENNAI TPP STAGE-III (FGD SYSTEM AND AUXILIARIES)

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	415V ACDB / MCC	BHEL	BHEL	240 V AC (supply feeder)/415 V AC (3 PHASE 4 WIRE) supply shall be provided by BHEL based on load data provided by vendor at contract stage for all equipment supplied by vendor as part of contract. Any other voltage level (AC/DC) required will be derived by the vendor. For single phase motor (if applicable as per bidder design), motor starter will be part of bidder panel and supply voltage to be derived by bidder from the supply feeders provided by BHEL.
2	Local Push Button Station (for motors)	BHEL	BHEL	Located near the motor.
3	Power cables, control cables and screened control cables for a) both end equipment in BHEL's scope b) both end equipment in vendor's scope c) one end equipment in vendor's scope	 BHEL BHEL BHEL	 BHEL BHEL BHEL	1. For 3.b) & c): Sizes of cables required shall be informed by vendor at contract stage (based on inputs provided by BHEL) in the form of cable listing. Finalisation of cable sizes shall be done by BHEL. Vendor shall provide lugs & glands accordingly. 2. Cabling/termination by BHEL.
4	Junction box for control & instrumentation cable	Vendor	BHEL	Number of Junction Boxes shall be sufficient and positioned in the field to minimize local cabling (max 10-12 mtrs) and trunk cable.
5	Any special type of cable like compensating, co-axial, prefab, MICC, fibre optical etc.	Vendor	BHEL	Refer scope/ C&I portion of specification for scope of fibre Optical cables if used between PLC/ microprocessor & DCS.
6	Cable trays, accessories & cable trays supporting system	BHEL	BHEL	
7	Cable glands and lugs for equipment supplied by Vendor	Vendor	BHEL	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type heavy duty copper lugs for power & control cables.
8	Conduit and conduit accessories for cabling between equipment supplied by vendor	Vendor	BHEL	Conduits shall be medium duty, hot dip galvanised cold rolled mild steel rigid conduit as per IS: 9537.

REV-0, DATE: 29.03.2024

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

PACKAGES: SELF CLEANING STRAINER (SCS)

SCOPE OF VENDOR: SUPPLY

PROJECT: 1X800MW TANGEDCO NORTH CHENNAI TPP STAGE-III (FGD SYSTEM AND AUXILIARIES)

S.NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
9	Lighting	BHEL	BHEL	
10	Equipment grounding & lightning protection	BHEL	BHEL	
11	Below grade grounding	BHEL	BHEL	
12	LT Motors with base plate and foundation hardware	Vendor	BHEL	Makes shall be subject to customer/ BHEL approval at contract stage.
13	Mandatory spares	Vendor	-	Vendor to quote as per specification.
14	Recommended O & M spares	Vendor	-	As specified elsewhere in specification
15	Any other equipment/ material/ service required for completeness of system based on system offered by the vendor (to ensure trouble free and efficient operation of the system).	Vendor	BHEL	
16	a) Input cable schedules (Control & Screened Control Cables) b) Cable interconnection details for above c) Cable block diagram	Vendor Vendor Vendor	- - -	Cable listing for Control and Instrumentation Cable in enclosed excel format shall be submitted by vendor during detailed engineering stage.
17	Equipment layout drawings	Vendor	-	For preparation of cabling layout drawings by BHEL, vendor shall furnish Electrical equipment layout drawings (both in print form as well as in AUTOCAD) of the complete plant (including electrical area) indicating location and identification of all equipment requiring cabling,
18	Electrical Equipment GA drawing	Vendor	-	For necessary interface review.

NOTES:

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

BHEL	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD	PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024

PERFORMANCE DEMONSTRATION DURING COMMISSIONING AT SITE

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

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

(a) Max. Pressure drop in Self-Cleaning Strainer in clean condition – not exceeding **1.0 MWC**. The Bids shall be technically rejected for pressure drop quoted higher than 1.0 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 SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD	PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024

SCHEDULE OF PERFORMANCE DEMONSTRATION DURING COMMISSIONING FOR SELF CLEANING STRAINER (SCS)

Sl no	DESCRIPTION	UNIT OF MEASUREMENT	1X800 MW NORTH CHENNAI STG III FGD
1	Pressure drop across the SCS (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

	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD	PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024

QUALITY PLAN

BHEL	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD	PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024

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 Self Cleaning Strainer shall conform to the requirements of this specification and of the applicable codes/ standards.

3 All materials used for manufacture/ fabrication of the Self Cleaning Strainer 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.

		MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS			STANDARD QUALITY PLAN			SPEC. NO	PE-TS-999-165-W008				DATE:
					CUSTOMER :			QP NO.:	PE-QP-999-165-W008		REV-00		DATE: 20.11.2023
					PROJECT:			PO NO.:					DATE:
					ITEM: SCS	SYSTEM:	CW SYSTEM	SECTION:					SHEET 1 OF 3

Sl. No.	Component / Operation	Characteristics Checked	Class	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Record		Agency			Remarks
											M	B	C	
1	2	3	4	5	6		7	8	9		** 10			11
					M	B/C								
1.0.0	**SELF CLEANING STRAINER**													
1.1.0	Raw Material													
[a]	Housing Shell, Nozzle flanges & Main flanges/Counter Flange , Interconnecting Pipes, Screen Basket, Nozzle Flanges, Nozzle Pipes	Chemical properties	Major	Chemical Analysis	One sample/cast / heat / batch	One sample/cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate / lab test report / raw material flow sheet	√	P	V	V	In absence of MTC, check test shall be carried out and record of material correlation shall be provided to BHEL.
		Physical properties	Major	Physical test	One sample/cast / heat / batch	One sample/cast / heat / batch	Approved drg/Data sheet	Approved drg/Data sheet	Mill Test Certificate / lab test report / raw material flow sheet	√	P	V	V	
		Sub Surface Defects	Major	Ultrasonic Test	100%	100%	ASME A 435/A609	ASME A 435/A609	Inspection report	√	P	V	V	Plates > 40 mm Thk only
1.2.0	**Inprocess Quality Control**													
1.2.1	Welding procedure specification / Welding procedure qualification	Correctness / Weld soundness	Critical	Scrutiny / Physical test	100%	100%	ASME Sec. IX	ASME Sec. IX	ASME Sec.IX	√	P	V	V	Welders already qualified by BHEL/ BHEL TPI / LRQA / NTPC in the past shall be employed for this job. Welding procedure already approved by BHEL/ BHEL TPI/ LRQA / NTPC shall be followed.
1.2.3	**Weld quality for Pressure Parts**													
	[a] Root run	Surface defects	Major	Penetrant test	100%	100%	ASME Sec.VIII Div. I / sec V	ASME Sec.VIII Div. I Appendix 8	DPT Report	√	P	–	–	
1.2.4	[a] Completed butt welds	1.Surface defects	Major	Penetrant test	100%	100%	ASME Sec.VIII Div. I / sec V	ASME Sec.VIII Div. I Appendix 8	DPT Report	√	P	V	V	
		2.Sub-surface defects	Critical	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	
	[b] Completed fillet welds	Surface defects	Major	Penetrant test	100%	100%	ASME Sec.VIII Div. I / sec V	ASME Sec.VIII Div. I Appendix 8	DPT Report	√	P	V	V	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL					
ENGINEERING			QUALITY			Sign & Date		Doc No:					
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal		
Prepared by:	NISHANT SHEKHAR	Nishant Shekhar	Checked by	Gaurav Garg	Gaurav Garg			Prepared by:					
Reviewed by:	Vishal Kumar Yadav	Vishal Kr. Yadav	Reviewed by:	Harish Kumar	Harish Kumar			Reviewed by:					

		MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS			STANDARD QUALITY PLAN				SPEC. NO	PE-TS-999-165-W008			DATE:
					CUSTOMER :				QP NO.:	PE-QP-999-165-W008	REV-00		DATE: 20.11.2023
					PROJECT:				PO NO.:				DATE:
					ITEM: SCS	SYSTEM:	CW SYSTEM		SECTION:				SHEET 2 OF 3

Sl. No.	Component / Operation	Characteristics Checked	Class	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Record		Agency			Remarks
											M	B	C	
1	2	3	4	5	6		7	8	9		** 10			11
					M	B/C								
1.2.5	Pickling and Passivation	Protection Layer	Major	Visual	100%	100%	IS : 10117	IS : 10117	Pickling and Passivation Report	√	P	V	_	
1.2.6	Fabricated Shell (Prior to surface preparation)	1.Dimensions, Orientation	Major	Measurement by visual	100%	100%	Approved Drawing	Approved Drawing	Inspection report	√	P	W	V	
		2. Hydro test	Critical	Hydrostatic Pr. @ 1.5 times of design pr.(positive) [Duration 30 minutes]	100%	100%	Approved Drawing/ Data sheet	Approved Drawing/ Data sheet	Inspection report	√	P	W	V	
1.3.0	Final tests (completed equipments) - After assembly	1.Dimensions, orientation	Major	Measurement by visual	100%	100%	G.A.drawing	G.A.drawing	Inspection report	√	P	W	V	
		2. Leak tightness for aasembly	Critical	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	Critical	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	Major	Physical test	One per lot	One per lot	Manufacturer's procedure	BS 6374/Equivalent	Manufacturers Test certificate	√	P	V	V	
		Polymer Identification	Major	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°	Major	Immersion test (bleeding test)	One per lot	One per lot	ASTM D 471	+ / - 1%	Inspection report	√	P	V	V	
1.4.2		Surface preparation	Major	Visual	100%	100%	SA 2.5	SA 2.5	Manufacturers Internal Inspection report	√	P	–	–	
1.4.3	Vulcanising	Temperature, Pressure & Time	Major	Process monitoring	100%	100%	Manufacturer's procedure	Manufacturer Procedure	Process Procedure	√	P	–	–	
1.4.4	Vulcanised Rubber Lined items	[a] Chip test	Major	Chip test	One per lot	One per lot	Approved Drawing & BS 6374/Equivalent	BS 6374/Equivalent	Inspection report	√	P	V	V	
		[b] Adhesion, Visual defects, Thickness & Hardness	Major	Measurement, Visual Inspection	100% visual. Thickness/ hardness at random	100% visual. Thickness/ hardness at random	Approved Drawing & BS 6374/Equivalent	BS 6374/Equivalent	Inspection report	√	P	V	V	
		[c] Spark test for Pin Holes at 5 kv/mm	Major	Spark test for Pin Holes	100%	100%	Approved Drawing & BS 6374/Equivalent	BS 6374/Equivalent	Inspection report	√	P	V	V	

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	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal		
Prepared by:	NISHANT SHEKHAR	Nishant Shekhar	Checked by	Gaurav Garg	Gaurav Garg			Prepared by:					
Reviewed by:		Vishal Kr. Yadav	Reviewed by:	Harish Kumar	Harish Kumar			Reviewed by:					

	BHEL	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS			STANDARD QUALITY PLAN				SPEC. NO	PE-TS-999-165-W008				DATE:
					CUSTOMER :				QP NO.:	PE-QP-999-165-W008		REV-00		DATE: 20.11.2023
					PROJECT:				PO NO.:					DATE:
					ITEM: SCS	SYSTEM:	CW SYSTEM		SECTION:					SHEET 3 OF 3
Sl. No.	Component / Operation	Characteristics Checked	Class	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Record		Agency			Remarks
											M	B	C	
1	2	3	4	5	6		7	8	9		** 10			11
					M	B/C								
2.0.0	GEARED MOTOR DRIVE	Running Test	Critical	Functional Test	100%	100%	Approved Data Sheet	Approved Data Sheet	Manufacturer's compliance certificate	√	P	V	V	
		No load	Critical	Functional test	100%	100%	Approved Data Sheet	Approved Data Sheet			P	V	V	
		Noise test	Critical	Functional test	100%	100%	Approved Data Sheet	Approved Data Sheet			P	V	V	
		Oil leakage test	Critical	Functional test	100%	100%	Approved Data Sheet	Approved Data Sheet			P	V	V	
		Visual	Critical	_	100%	100%	Approved Data Sheet	Approved Data Sheet			P	V	V	
		Name plate verification	Critical	_	100%	100%	Approved Data Sheet	Approved Data Sheet			P	V	V	
2.1.0	Complete Unit of planetary gear	No Leak Test	Critical	Functional test	One Sample/lot	One Sample/lot	Approved Data Sheet	Supplier Catalogue	Manufacturer's compliance certificate	√	P	V	V	
		Noise Level	Minor	Functional test	One Sample/lot	One Sample/lot	Approved Data Sheet	Approved Data Sheet			P	V	V	
		Visual Name plate Verification	Minor	_	100%	100%	Approved Data Sheet	Approved Data Sheet			P	V	V	
3.0.0	Actuators	Functional test	Major	Electrical test	100%	100%	Supplier catalogue/Appd data sheet	Supplier catalogue/Appd data sheet	Test certificate	√	P	V	V	
		Make, Range, Model	Major	Visual	100%	100%	Supplier catalogue/Appd data sheet	Supplier catalogue/Appd data sheet	Inspection Report	_	P	_	_	
		Assembly check alongwith valves	Major	Visual	100%	100%	Supplier catalogue/Appd data sheet	Supplier catalogue/Appd data sheet	Inspection Report	_	P	_	_	
		Functional Check along with settings / Auxillary Caontacts	Major	Visual	100%	100%	Supplier catalogue	Supplier catalogue/Appd data sheet	Inspection Report	_	P	V	_	
4.0.0	All Components / Equipments	Painting Dry film thickness and visual	Major	Measurement	Random	Random	Technical Specification	Technical Specification	Inspection report	√	P	W	V	
		Packing	Major	Measurement	100%	100%	Technical Specification	Technical Specification	Inspection report	√	P	W	_	

LEGENDS:

RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,

** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **B**: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **C**: CUSTOMER,

P: PERFORM, **W**: WITNESS, **V**: VERIFICATION, AS APPROPRIATE

MA: MAJOR, **MI**: MINOR, **CR**: CRITICAL

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL					
ENGINEERING			QUALITY			Sign & Date		Doc No:					
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal		
Prepared by:	NISHANT SHEKHAR	Nishant Shekhar	Checked by	Gaurav Garg	Gaurav Garg			Prepared by:					
Reviewed by:		Vishal Kr. Yadav	Reviewed by:	Harish Kumar	Harish Kumar			Reviewed by:					

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

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

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

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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

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

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

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

LEGENDS:

*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,
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MA: MAJOR, **MI**: MINOR**, CR:** CRITICAL
D: DOCUMENTATION

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

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

2.3.0 MOTORS

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

Item/ Components/ Sub-system	Tests/ Checks																	
	Visual	Dimensional	Make,Type,Rating,TC,General physical	Mechanical, Chemical properties	NDT, DP or MPI, UT	Metallography	Electrical characteristics	Welding/ Brazing (WPS/ PQR)	Heat treatment	Magnetic characteristics	Hydraulic, Leak, Pressure test	Thermal characteristics	Run out	Dynamic balancing	All tests as per IS:325/ IS:4722/ IS:9283	Vibration	Over speed	Tan delta, shaft voltage and polarisation
Stator, Rotor, Terminal Box assembly	Y	Y					Y											
Accessories, RTD, BTD,CT, Brushes, Diodes, space heater, antifriction bearing, cable glands, lugs, gaskets etc.	Y	Y	Y															
Complete motor (IS: 325/ IS:4722/ IS:9283)	Y	Y	Y												Y	Y	Y	Y

Y =Test applicable, Y1 = for 11kV and 3.3kV motors only

Note

This is an indicative list of tests/ checks. The manufacture is to furnish the detailed Quality Plan indicating the practices and procedure followed along with relevant supporting documents during QP finalization. However QP approval is not envisaged for 415V motors upto 50 KW.

Site Tests :

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

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

STANDARD CHECK LIST FOR C&I INSTRUMENTS (for Maux Pkgs)

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 (for Maux Pkgs)

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.

SUB VENDOR LIST

The list of approved make of the LT Motors are as mentioned below:

S. NO.	LIST OF MOTORS	
1	NON FLAME PROOF	ABB
2		BHARAT BIJLEE LTD.
3		CROMPTON GREAVES
4		GE-POWER
5		KIRLOSKAR ELECTRIC CO LTD.
6		LAXMI HYDRAULICS PVT. LTD
7		MARATHON
8		NGEF
9		RAJINDRA ELECT INDUSTRIES
10		SIEMENS
11	FLAME PROOF	RAJINDRA ELECT INDUSTRIES

However, the final list of makes for the LT Motors is subjected to BHEL/Customer approval, during contract stage, without any commercial implications.

BHEL	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD	PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024

PAINTING REQUIREMENT

1 The surfaces of stainless steel, Gunmetal, brass, bronze and non-metallic components shall not be applied with any painting.
2 Following painting schedule shall be followed for steel surfaces.

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

BHEL	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD	PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024

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 pipe ends and all opening shall be protected with polyethylene blind end caps.
1.3	Loose items/accessories like pipes, valves, root valves etc. shall be separately packed with polyethylene sheet of at least 100 GSM inside the packing box/crate.
1.4	Internal threads shall be protected with metal plug sealed with Teflon tape (if applicable). External thread shall be protected with PVC sleeve.Flanged opening if any shall be covered with blank flanges sealed with blank gasket of natural rubber or equivalent.
1.5	External machined C.S. Surfaces shall be protected against corrosion with corrosion resisting coating or grease/ shall be coated with rust preventive primer. Equiment shall be covered with HDPE sheet/ polythene sheet inside the box to prevent from moisture ingress.
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 place.
4.2	One copy of packing slip wrapped in polyethylene bag covered in galvanized iron tin sheet/ aluminium packing slip holder shall be fixed on the external surface the packing box.

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BILL OF QUANTITY

SL NO	ITEM DESCRIPTION	UOM	TOTAL QTY.
1.0	Design, manufacture, inspection and testing, packing and delivery of SCS complete with all accessories including E&C Spares (as applicable)	Nos	2
2.0	**Installation checks & Commissioning at Site**		
2.1	Lump sum visit charges for engineer including travel (except daily charges)	Visits	2
2.2	Lump Sum daily charges for engineer including boarding/lodging, local conveyance, medical, insurance etc.	Mandays	8
3.0	**Mandatory Spares**		
3.1	MEASURING INSTRUMENTS		
3.1.1	All type of Transmitters including sensors (of each type and model)	No.	1
3.1.2	Limit switches for isolation valves (of each type)	Nos.	2
3.1.3	Local Indicators like temperature gauges, pressure gauges, differential pressure gauges, flow gauges, flow meters etc., (of each make, model and type)	No.	1
3.2	Any other instrument (as applicable) (of each type and model)	No.	1
3.3	PROCESS CONNECTION PIPING (For Impulse Piping / Tubing as Applicable)		
3.3.1	Valves of all types and models (of each type, class, size and model)	No.	1
3.3.2	2 way, 3way, 5way valve manifolds (of each type, class, size and model)	No.	1
3.3.3	Fittings (of each type, class, size and model)	Packet	1

Important note for Charges of Installation checks & Commissioning:

1.0	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.
2.0	Lump sum visit charges for engineer for site activities (Installation checks & Commissioning) shall be inclusive of travelling, boarding/lodging, local conveyance, medical, insurance etc.
3.0	In case of non-completion of Installation checks & Commissioning in site visits stipulated at sl. no. 2 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.

BHEL	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD	PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024

Important note for Mandatory Spares:

1.0	In case Mandatory spares indicated in the list above are not applicable as per specification requirement, same to be quoted as NOT APPLICABLE by Bidder. Applicability of such spares shall be verified during detailed engineering after award of contract. Any spare, quoted as 'NOT APPLIACBLE' and found as applicable during detailed engineering shall be supplied by the Bidder without any price implication.

BHEL	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD	PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024

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)

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 SCS SYSTEM	Within 15 days from LOI/PO
2	TECHNICAL DATA SHEET-SCS	Within 15 days from LOI/PO
3	GENERAL ARRANGEMENT & INSTALLATION PLAN OF SCS	Within 15 days from LOI/PO
4	QP-SCS	Within 15 days from LOI/PO
5	O& M MANUAL - SCS	Within 15 days from approval of above (Sl. No. 1 to 4) SCS documents.
6	PERFORMANCE TEST PROCEDURE	Within 15 days from approval of above (Sl. No. 1 to 4) SCS 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	
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 Self Cleaning Strainer 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.

		TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD	PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024
	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 3. INSTRUMENT SCHEDULE 4. CABLE SCHEDULE (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)

226122/2024/PS-PEM-WSE

	PRE-QUALIFYING REQUIREMENTS (TECHNICAL) SELF CLEANING STRIANER (SCS).	TECHNICAL SPECIFICATION NO: PE-TS-485-165-W008 TECHNICAL PQR NO: PE-PQ-485-165-W008 REV NO. 00 DATE: 10.04.2024 STANDARD PQR NO: PE-PQ-STD-165-N004 REVISION NO: 03 DATE: 12.03.2020 SHEET: 1 of 2

FORM NO. PEM 6100-0

ENQUIRY NO.:

PROJECT: 1X800 MW NORTH CHENNAI STG III FGD

PACKAGE: SELF CLEANING STRAINER (SCS)

1. The bidder should have designed, manufactured, tested, inspected & supplied the SCS with minimum flow of 85 CuM/Hr, 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 SCS 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 SCS for last 5 years (as on the enquiry/NIT date) for assessment of bidder for supplying the SCS 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 SCS 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 SCS, rating of project, Size of SCS, project name etc., date of issue of certificate and name/ designation of the certificate issuer for power plant/similar application industry. The reference SCS 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 SCS 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.

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

	PRE-QUALIFYING REQUIREMENTS (TECHNICAL) SELF CLEANING STRIANER (SCS).	TECHNICAL SPECIFICATION NO: PE-TS-485-165-W008 TECHNICAL PQR NO: PE-PQ-485-165-W008 REV NO. 00 DATE: 10.04.2024 STANDARD PQR NO: PE-PQ-STD-165-N004 REVISION NO: 03 DATE: 12.03.2020 SHEET: 2 of 2

b. If bidder happens to be the Joint Venture Company, then the credentials of any of JV 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. Vendor may also qualify based on the credential of principal meeting package specific qualifying requirements having technical valid collaboration/licensing agreement/MOU/Indian subsidiaries.

8. 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.

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.

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

Annexure – A-1

EXPERIENCE LIST

EQUIPMENT/PACAKAGES : SELF CLEANING STRAINER **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

	TECHNICAL SPECIFICATION SELF CLEANING STRAINER 1X800 MW NORTH CHENNAI STG III FGD	PE-TS-485-165-W008 Rev. No. 00 Date :10.04.2024

COMPLAINCE CERTIFICATE	
1	It is hereby confirm that the technical specification (sheet 1 to 63) 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