

2X660MW UDANGUDI STPP

TECHNICAL SPECIFICATION FOR STEEL GATE, GLOBE AND NON RETURN VALVES

SPECIFICATION NO. PE-TS-435-100-M001



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

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		SECTION: -	
		REV. NO.: 00	DATE: 23.01.2020
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SECTION-I

SPECIFIC TECHNICAL REQUIREMENTS

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1. GENERAL

- 1.1 The valves shall meet the technical requirements and conform to the requirements of Section-I and Data sheet-A of Section-II. However, in the event of contradictions between Section-I & Section-II/Data Sheet-A, Data Sheet-A will prevail.
- 1.2 The technical requirements for valves shall, in general, be as per the attached Data Sheet-A of Section-II.

2. SCOPE OF SUPPLY

- 2.1 The valves complete with all accessories shall be supplied as per Data sheet-A of Section-II. For detail refer the same. Each valve (quantity and other details specified in Data Sheet-A) shall be complete with the following accessories.
- i) Lifting arrangement provision for handling i.e., lifting lugs, eye bolts etc.
 - ii) Actuators and limit switches as required to make valve complete in all respects.
- 2.2 Commissioning spares, if any.
- 2.3 Set of special tools and tackles if required for the maintenance, erection etc. of the equipment supplied.
- 2.4 Mandatory spares as applicable depending upon the project requirement.
- 2.5 Finish paints for touch-up painting of equipment after erection at site in sealed containers.

3. CODES AND STANDARDS

- 3.1 The design, material, construction, manufacture, inspection and testing of valves shall conform to the latest applicable codes and standards.
The design and testing of valves covered under this specification shall be governed by the following standards. However, the valves conform to other International Standards may be acceptable provided they are equivalent or superior to those listed below:

S.NO.	DESCRIPTION	DESIGN STANDARD	TESTING STANDARD
1	For Gate, Globe and PLNRV of sizes 50 NB and smaller	BS EN ISO 15761/ASME B16.34/IS554 FEMALE PARALLEL	ISO 5208/ ASME B16.34
2	Gate valves of sizes 65 NB to 350 NB.	BS EN ISO 10434/ASME B16.34/ ASME B16.10 / API 600/ ASME B16.5(R/F)	ISO 5208/ API 598/ASME B16.34
3	Globe valves of sizes 65 NB to 350 NB.	BS:1873 /ASME B16.34/ ASME B16.10/ ASME B16.5(R/F)	BSEN ISO 12266/ ASME B16.34
4	Non-return valves of sizes 65 NB to 500 NB.	BS:1868 /ASME B16.34/ ASME B16.10/ASME B16.5(R/F)	BSEN ISO 12266/ ASME B16.34

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- 3.2 In case of any conflict between the above codes/ standards and this specification, the latter shall prevail and in case of any further conflict in the matter, the interpretation of the specification by the Engineer shall be final and binding.

4. DESIGN REQUIREMENTS

- 4.1 The valves shall be used for services like condensate water, feed water, D.M. Water, oil and gas unless otherwise specified in Data Sheet-A. All valves shall be suitable for the service conditions i.e. flow, temperature and pressure under which they are required to operate and those performing similar duties shall be interchangeable with each other unless otherwise specified.
- 4.2 Unless otherwise specified, all valves of sizes up to and including 50 NB shall have a forged steel body and sizes 65 NB & above shall have cast steel body.

5. Materials

- 5.1 The materials of construction of main parts of the Gate, Globe, Regulating Globe valve and Swing check Non-return valve shall be as specified in Data Sheet-A.
- 5.2 The materials of construction of the remaining parts shall be as per the relevant standard governing the valves and to suit service conditions. These materials shall be subject to purchaser's approval.

6. CONSTRUCTIONAL FEATURES

- 6.1 End Connections:
- 6.1.1 Socket details of valves with socket welding ends shall be as per ANSI B16.11 and shall suit pipe size indicated in Data Sheet-A.
- 6.1.2 Screw detail of valves with screwed ends shall be as per IS 554 female parallel and shall suit pipe size indicated in Data Sheet-A.
- 6.1.3 Valves above 50NB & up to 500NB with flanged ends shall have raised face flanges and drilling details as per ASME B16.5 and shall suit pipe size indicated in Data Sheet-A.
- 6.2 Gate and Globe valves shall be of outside screw and yoke type with rising spindle and shall be capable of being closed against the design pressure.
- 6.3 All Gate, Globe and Swing check valves shall have an arrow indicating the direction of flow cast or embossed on the valve body. The direction of flow for globe valves shall be from under to over the disc.
- 6.4 Gate and globe valves shall have back seating arrangement for replacement of packing while working under full working pressure.
- 6.5 Gate and globe valves of size 50 NB and above shall be provided with position indicator unless otherwise specified.
- 6.6 For Globe valves of size 50NB and above, the disc shall be free to revolve on the spindle.

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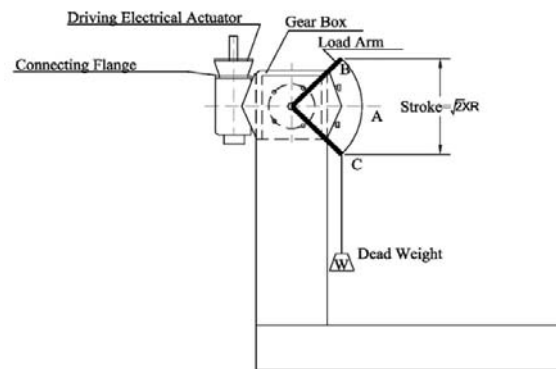
- 6.7 Globe valves for regulating duties shall be provided with spherical type disc or parabolic type disc and shall be capable of regulating the flow from zero flow to fully open. All regulating valves shall be designed to prevent erosion of valve discs and seats when the valves are operated partially opened.
- 6.8 Differential hardness shall be provided between seat and disc facings. Stellite thickness shall be minimum 3 mm unless otherwise specified.
- 6.9 All valves shall have bolted bonnet construction.
- 6.10 Eye bolts shall be provided to facilitate handling heavy valves or part of valves, where the weight is greater than 500 Kg.
- 6.11 Gate and globe valves shall be required with integral bypass valve, if specified in Data Sheet-A. Size of the integral bypass shall conform to MSS-SP-45 as a minimum standard.
- 6.12 All gate and globe valves shall be closed by rotating the hand wheel in the clockwise direction when looking at the face of the hand wheel. Where valves are not of the rising pattern, the hand wheel shall also be rotated in clockwise direction to close the valve when viewed from the outer end of the spindle. In case where the hand wheel is not directly attached to the valve spindle, suitable gearing shall be introduced to reconcile the above condition. The face of each hand wheel shall be clearly marked "Open" and "Shut" with arrows indicating the direction of rotation to which they refer. Each valve hand wheel shall be fitted with a circular nameplate of an approved material indicating the valve Tag No., duty or service condition intended and the function of the valve. For valves of smaller size, a permanent steel tag may be fixed on the valve body indicating the purchaser's valve Tag Number and service. The above are in addition to rating plates and labels being provided by the manufacturer. Also note that Valves with solid hand wheels are not acceptable.
- 6.13 All valves up to 50 NB shall have reduced sized ports and 65 NB and above shall have full sized Ports.
- 6.14 All valves shall be fitted with indicators so that it may be readily seen whether the valves are open or shut.
- 6.15 All Gate, Globe, Regulating Globe valve and check valves shall be designed for reconditioning of seating surfaces and replacement of Stem & Disc without removing the valve body from pipe line.
- 6.16 The body seat for Swing check valves shall be inclined to such an angle to minimize chatter.
- 6.17 Check valves shall be provided with outside lever & counter weight if specified in Data Sheet A, for quick closing in case of low velocities so that a minimum pressure is required to open disc and that resistance to flow past the disc is minimized.
- 6.18 All valves must be suitable for outdoor installation with due consideration of the special climate and environmental conditions at the Site.
- 6.19 Gate/Globe Valves of size above 200 NB shall be gear operated (as applicable).

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6.20 Gear box POD Test:

a). Gear box POD test shall be done as per the procedure described below or as per the procedure agreed between BHEL/Customer & vendor. In case, the Gear box POD test has been done earlier (within the last 5 years from placement of Purchase Order), Test report/certificate of POD test for identical model/ type/rating of gear box is required to be submitted for review by BHEL/customer. These tests should have been conducted at an independent laboratory or should have been witnessed by reputed customers like NTPC etc. or third party inspection agency like LLOYDS, TUV, DNV etc. If found satisfactory, Gear Box POD test need not be done.

Gear box POD Test shall be carried out only at full rated torque of gear box, throughout the full cycle of testing i.e. at no point during each full cycle of testing; the applied torque should be less than the full rated torque of Gear Box. Refer suggestive Fig.1 below for Gear Box POD test set up. Dead weight and length of arm shall be so selected that the torque generated at point "C" and "B" shall in no case be less than the full rated torque of the gear box.



TEST SET UP

FIG. 1

b). Gear box POD test, if required, then the charges for the same shall deemed to be included in the unit quoted prices of main valves. Bidder shall not indicate these charges as a separate head in the price bids. If POD test for gear box are required to be carried out, then the vendor shall do so at his own cost. No extra charge on this account will be admissible to the vendors.

7. SPECIAL FEATURES OF VALVES

7.1 Extension spindle arrangement:

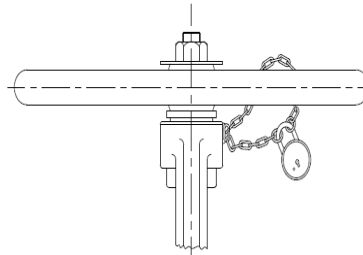
7.1.1 Extension spindle/ chain operation to the valves shall be provided wherever required as specified in Data Sheet- A.

7.1.2 Where required as specified in Data Sheet-A, valve yoke/spindles shall be lengthened so that the hand wheel is at a height of approximately one meter above the level of the floor or platform from which the valve is to be operated.

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7.2 Locking arrangement

For valves that are to be kept locked in full “Open” or “Close” position, as specified in Data Sheet-A, the locking arrangement shall be provided with a non-detachable locking arrangement by means of chain and padlock as shown below.



7.3 Valves for Vacuum Service:

7.3.1 Valves of size up to 50 NB and operating under vacuum shall be offered with long neck gland & special and deep gland packing in order to avoid ingress of atmospheric air entry to the system through gland of the valves. In such case the depth of the stuffing box shall be at least 25% more than the normal valves and suitable for vacuum service.

7.3.2 All valves of size 65NB and above and operating under vacuum conditions shall be provided with water sealed glands. Valves with sealed gland arrangement shall be required with 3/8” BSP connections duly plugged on both sides of the bonnet. Sealing water shall be supplied at 4 ata and 50°C, unless otherwise stated in Data sheet-A.

7.4 Valves with limit switch:

Valves with limit switches (as mentioned in Data sheet- A) shall be required only for indication or for interlocking with some equipment. Two numbers of position limit switches (one for open and one for close) each with 2 NO and 2NC potential free contacts shall be provided. The limit switches shall be of independently adjustable type. Limit switches mechanism shall be rust proof suitable for damp atmospheres. Limit switch compartment shall be weatherproof and spacious enough for easy setting. The limit switches shall be suitable for both 240 Volts AC, 10 A and 220 V DC, 0.5 Amps. The limit switches shall be of reputed make observing strict quality control and approved by reputed customers.

7.5 Motorised Valves

7.5.1 The motorised valves shall be offered with the electric actuators of reputed make observing strict quality control and approved by reputed customers. A particular make and type of actuator shall be designed for the maximum differential working pressure. However, the stall torque of the selected actuators shall be minimum 1.5 times the valve unseating torque requirement at the maximum differential working pressure (design pressure) and required operating time as mentioned in Data sheet - A.

7.5.2 Electric actuators shall be mounted directly on the valves.

7.5.3 In case integral bypass is provided to the main valve which is motorised, the integral bypass valve shall also be motorised. Actuator shall be provided with hand wheel also for manual operation.

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7.5.4 The motors, gearing and disengaging hand wheel shall be adequate to open and close the valve under maximum differential pressure and shall be completely assembled on the respective valve and shop tested before shipment.

7.6 500NB Steel SCNRV shall be provided with Hydraulic Dashpot arrangement. Also note that SCNRV shall be installed in vertical direction, hence dashpot shall be designed for vertical installation of SCNRV. Dashpot shall be of reputed make observing strict quality control and approved by reputed customers.

7.7 The maximum permissible forces for actuation hand wheels are 300 N for wheels with diameter up to 400 mm and 600 N for larger diameters. Differential pressures requiring higher forces for actuation of hand wheels shall entail fitting the valve with gears. For calculation of the gears or all other actuators the design pressures shall be taken as differential pressures.

8. MANUFACTURE OF VALVES

8.1 Valve forging and castings shall be procured from foundries observing strict quality control and approved by reputed customers.

8.2 Particular care shall be taken to ensure that all foundry sand and loose material is properly removed from castings by fettling before the valve's manufacture is started.

9. LUBRICATION:

9.1 Provision shall be made for suitable lubrication wherever necessary to ensure a smooth easy operation and freedom from undue wear.

9.2 Where oil filled gear boxes are used they shall be provided with filling and drain plugs, oil level gauges or dip sticks. Housing for ball and roller bearings shall be packed with grease at the time of assembly.

9.3 Choice of oil and grease for all motor drives shall be based on ambient temperature of 60°C.

9.4 Type of oil/grease to be used and its annual consumption (based on 100 operations per year) shall be indicated by the bidder.

10. QUALITY ASSURANCE, TESTING AND INSPECTION

10.1 The items covered under this contract shall be subjected to inspection, testing and quality surveillance. The inspection agency shall, at all reasonable times have access to Vendor's works, Quality control records and all facilities as reasonably required for carrying out the inspection and testing efficiently and these shall be provided by the vendor free of cost.

10.2 The Quality plans enclosed with this specification specify minimum quality control requirement. During contract stage, vendor shall furnish this Quality Plans duly signed and stamped for BHEL approval. Quality Plan shall be approved by BHEL and Customer. All inspection and testing shall be carried out by BHEL/ BHEL representative and Customer (as applicable). In case inspection is by both BHEL and their Customer, then the inspection can be carried out jointly or separately, which will

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be informed later. In case of the foreign bidder, inspection shall be carried out by reputed third party.

- 10.3 The charges for third party inspection (Lloyds, TUV or equivalent) for foreign bidder shall be included in the base price of the item by the bidder. This third party agency shall be approved by BHEL.
- 10.4 The minimum NDT/ testing and inspection requirement for valve shall be as per attached Quality Plan. However, in case of order, final inspection and testing shall be carried out as per the final approved Quality Plan without any price implications.

Note: There may be minor changes in Quality Plan depending on Customer/ Consultant comments which will have to be accommodated by vendor at no extra cost.

- 10.5 Hydrostatic/Air Tests:
- 10.5.1 Manually operated valves: All valves shall be tested hydraulically for strength, tightness of seats and tightness of back seating at the pressures as mentioned in BSEN ISO 12266/ISO 5208/ API 598/ASME B16.34 (as applicable).
- 10.5.2 Motor operated Valves:
- All the motor operated valves shall be tested hydraulically for body without Elect. actuator at the pressure as mentioned in BSEN ISO 12266/ISO 5208/ API 598/ASME B16.34.
 - All the motor operated valves shall also be tested hydraulically for seat and backseat with and without Elect. actuator at the pressures as mentioned in BSEN ISO 12266/ISO 5208/ API 598/ASME B16.34 (as applicable).
 - All motor operated valves shall be tested for seat tightness test at 1.1 times of design/ operating pressure.
- 10.6 Gate and Globe valves seats shall also be tested on air at a pressure of 7kg/cm2.
- 10.7 Dimensional and functional checks shall be carried out.

11. PAINTING REQUIREMENT (FOR CARBON STEEL HOSE VALVE):

Coastal locations:

Valve shall be painted externally after the necessary testing has been carried out. Just before the painting, valve bodies and other items shall be thoroughly cleaned with wire brush/hand tool (Sa1/St2/St3 as applicable). For coastal environment the primer shall be two coats of epoxy red oxide zinc phosphate with each coat of DFT equal to 25-35 microns. Total DFT of primer coats 50 Microns minimum. This shall be followed by 2 coats of Intermediate coat (each coat 20-30 DFT) of Epoxy based TiO2 pigmented paint with minimum. Total DFT of 50 microns shall be applied over primer painted surface. 2 finished coats (each coat 20-30 DFT) of Epoxy based finish paint of minimum DFT as 50 microns shall be applied over intermediate painted surface. Finished Paint color shade shall be grey as per RAL 9002. Total DFT of primer+Intermediate+Finish paint shall not be less than 150 microns in case coastal environment.

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Valves shall be painted externally after the necessary testing has been carried out. Just before the painting, valve bodies and other items shall be degreased & thoroughly cleaned with wire brush/hand tool (Sa1/St2/St3 as applicable). The valves for temperature service shall be painted with four coats (each coat of 20 microns) of heat resistance aluminum paint to IS 13183 Gr II. Total DFT shall be minimum 80 microns.

12. PACKING INSTRUCTIONS:

- 12.1 Each valve shall be drained, cleaned, prepared and suitably protected in such a way so as to minimize the possibility of damage and deterioration during transit and storage.
- 12.2 The valve shall be dispatched in total assembled form.
- 12.3 Discs of all valves shall be properly secured while dispatching so that there is no risk of damage to the disc & seat.
- 12.4 Body ends shall be suitably sealed to protect them against damage during transit and storage.
- 12.5 A thin sheet steel circular blanking plate of a diameter 6mm less than the bolt holes inner P.C.D. shall be firmly fixed to the flange faces by the application of adhesive after first ensuring that the flange faces have been thoroughly degreased. A thin coat of adhesive shall be applied to the flange face and the blanking plate and then allowed to dry for 15-20 minutes. The coated face of the blanking plate should then be offered up to the face of the flange taking care that the plate is concentric with the flange. Firm pressure shall be applied to ensure intimate contact between plate and flange. A wooden blank should then be bolted to the flange using a minimum of 4 bolts.
- 12.6 Valve Tag Nos. shall be incorporated in all the dispatch documents.
- 12.7 Proper care shall be taken to avoid damage to the painted surface during transit.
- 12.8 All the valves shall be packed suitably in wooden cases in order to avoid damage during transit and also during storage at site in tropical climate conditions for a period of 15-18 months.
- 12.9 Vendor to provide soft copy of photos/snaps of duly packed valve. The soft copies to be provided by vendor after final inspection of valves. Clearance for dispatch of valves will be given only after satisfactory packing conditions of valves from vendor's work.

13. SPARES:

- a) Mandatory Spares: Mandatory spare shall be supplied in line with Data Sheet-A.
- b) Order for the spares may be placed simultaneously or otherwise at the option of purchaser.

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14. DOCUMENTS TO BE SUBMITTED ALONG WITH OFFER:

Bidder shall submit the following documents duly filled, signed and stamped along with the bid:

- a) Compliance sheet
- b) Documents as per the list indicated in the NIT.

The above are the only documents which will be used for technical evaluation unless other documents are asked for during technical clarifications. Any other technical document enclosed with the bid shall be ignored for the purpose of technical evaluation. All other documents attached with the specification are for information of the vendor and no comments shall be marked on these.

15. DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT:

Category-A (Primary Documents):

- a). GA Drawing indicating complete cross sectional arrangement of valve, binding dimensions, dismantling clearances, weight and Bill of Material incorporating all material of construction (MOC) of various parts & relevant standard to which MOC confirms to.
- b). Quality plans duly signed and stamped.
- c). Actuator Data Sheets (ADS)

Submission/ Resubmission of above documents shall be considered for delay analysis by BHEL.

Category-B (Secondary Documents):

- a). Gear box POD test procedure or test report/certificate for earlier conducted test in line with clause no. 6.20 of Technical specification.
(Project specific Gear box POD test procedure or test report/certificate applicable if any)
- b). Torque & force calculations for 200NB & above size valves (as applicable).

Approval on above documents shall be obtained before final inspection.

16. EXCLUSIONS:

The following are excluded from the bidder's scope:

- a) Counter flanges and their nuts and bolts.
- b) Erection & Commissioning of equipment at site.

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SECTION-II

DATA SHEET – A

01 02 03 04 05 06  2		DATA SHEET-A														SPECIFICATION NO. PE-TS-435-100-M001					
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		STEEL(GATE/GLOBE/NRV) PACKAGE														REV.00, DATE: 23.01.2020					
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1	2	3	4	5	6		7	8	9	10	11	12	13	14		15	16			17	18
SL NO.	VALVE TAG	TYPE OF VALV	SIZE mm (NB)	OPERATION	DESIGN		SERVICE	RATING, DESIGN & TESTING CODE	BODY &BONNET MATERIAL	HINGE PIN MATERIAL	STEM / SPINDLE MATERIAL	END CONNECTIO N	SPECIAL FEATURES	MATCHING PIPE		MAIN VALVES QUANTITY	+COMMISSIONING SPARES			MAND. SPARE (COMP. ACTUATOR)	REMARKS
					PRESSUR E KG/CM2(G)	TEMP (DEG ° C)								MM	MM		BONNET / COVER GASKET (NOS)	GLAND PACKING (SETS)	ACTUATO R O-RING AND SEAL (SETS)		
1	SW 85-140 (COMMON FOR BOTH UNITS)	HV	25	MAN	8	60	SERVICE WATER SYSTEM	#800 OF BSEN ISO 15761	FCS AS PER ASTM A105	--	ASTM A 479 TYPE 410-2	SOCKET WELDED AS PER ASME B 16.11	GLOBE TYPE HOSE VALVE & LOCKED OPEN ARRANGEMENT	34.20	4.55	56	56	--	--		
2	DMCW-104 (1 NO. FOR EACH UNIT)	GV	25	MAN	8	60	DMCW SYSTEM	#800 OF BSEN ISO 15761	ASTM A 182 Gr. F316L	--	ASTM A 479 TYPE 410-2	SOCKET WELDED AS PER ASME B 16.11	LOCKED OPEN ARRANGEMENT	34.20	4.55	2	2	--	--		
3	PW 13,14 (COMMON FOR BOTH UNITS)	GV	50	MAN	8	60	PLANT WATER SYSTEM	#800 OF BSEN ISO 15761	ASTM A 182 Gr. F316L	--	ASTM A 479 TYPE 410-2	SCREWED AS PER ISS54 FEMALE PARALLEL	LOCKED OPEN ARRANGEMENT	60.33	3.91	2	2	--	--		
4	DW-3,4,70 (COMMON FOR BOTH UNIT),DMCW-26,32,38,85 (1 NO. FOR EACH UNIT)	GV	80	MAN	8,10	60	PLANT WATER & DMCW SYSTEM	#150 OF BSEN ISO 10434	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	LOCKED OPEN ARRANGEMENT	88.90, 89.50	3.05, 5.54	11	11	11	--		
5	PW-6,7,10,11 (COMMON FOR BOTH UNIT)	GV	100	MAN	8	60	PLANT WATER SYSTEM	#150 OF BSEN ISO 10434	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	LOCKED OPEN ARRANGEMENT	114.30	3.05	4	4	4	--	VALVE TO BE PROVIDED WITH LIMIT SWITCH AT OPEN & CLOSE POSITION	
6	DMCW-99,111 (COMMON FOR BOTH UNIT),DMCW-57,58,69(I NO. FOR EACH UNIT)	GV	100	MAN	10	60	DMCW SYSTEM	#150 OF BSEN ISO 10434	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	LOCKED OPEN ARRANGEMENT	115.00	6.02	8	8	8	--		
7	PW-65 (COMMON FOR BOTH UNIT)	GV	100	MO	8	60	PLANT WATER SYSTEM	#150 OF BSEN ISO 10434	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	1. OPEN /CLOSE TIME 40-60 SEC. 2. ON/OFF DUTY	114.30	3.05	1	1	1	1	2	FOR ACTUATOR DETAIL, REFER ACTUATOR DATA SHEET SPEC. NO. PE-ID-435-145-I902(A)
8	PW-12,DW-01,02 (COMMON FOR BOTH UNIT),DMCW-16,18,45,47,49,51 (1 NO. FOR EACH UNIT)	GV	150	MAN	8,10	60	PLANT WATER & DMCW SYSTEM	#150 OF BSEN ISO 10434	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	LOCKED OPEN ARRANGEMENT	168.30, 166.50	3.40, 7.11	15	15	15	--		
9	DMCW-41,43 (1 NO. FOR EACH UNIT), DMCW-93 (COMMON FOR BOTH UNIT)	GV	200	MAN	10	60	DMCW SYSTEM	#150 OF BSEN ISO 10434	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	LOCKED OPEN ARRANGEMENT	219.10	8.18	5	5	5	--		
10	DMCW-97 (COMMON FOR BOTH UNIT)	GV	250	MAN	10	60	DMCW SYSTEM	#150 OF BSEN ISO 10434	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	LOCKED OPEN ARRANGEMENT	273.00	9.27	11	11	11	--		
11	DMCW-40 (1 NO. FOR EACH UNIT), DMCW-77,78 (1 NO. FOR EACH UNIT)	GV	250	MO	10	60	DMCW SYSTEM	#150 OF BSEN ISO 10434	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	1. OPEN /CLOSE TIME 40-60 SEC. 2. ON/OFF DUTY	273.00	9.27	6	6	6	6	2	FOR ACTUATOR DETAIL, REFER ACTUATOR DATA SHEET SPEC. NO. PE-ID-435-145-I902(A)
12	DMCW-113 (COMMON FOR BOTH UNIT)	GV	350	MAN	10	60	DMCW SYSTEM	#150 OF BSEN ISO 10434	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	LOCKED OPEN ARRANGEMENT	355.60	9.53	1	1	1	--		
13	DMCW-73,74 (1 NO. FOR EACH UNIT)	GV	350	MO	12	60	DMCW SYSTEM	#150 OF BSEN ISO 10434	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	1. OPEN /CLOSE TIME 40-60 SEC. 2. ON/OFF DUTY	355.60	9.53	4	4	4	4	2	FOR ACTUATOR DETAIL, REFER ACTUATOR DATA SHEET SPEC. NO. PE-ID-435-145-I902(A)
14	ACW51-65,PW201-220 (COMMON FOR BOTH UNITS)	GLV	25	MAN	8	60	ACW & PLANT WATER SYSTEM	#800 OF BSEN ISO 15761	ASTM A 182 Gr. F316L	--	DUPLEX SS	SOCKET WELDED AS PER ASME B 16.11	LOCKED OPEN ARRANGEMENT	33.40	3.38	35	35	35	--		
15	DW-6,DW 7-11,DW-13,DW 15-17,DW 19-21,DW 23-27,DW 29-38,DW 40-51,DW-53,55,DW 61-64,DW 66-69, DW 71-73,DW 81-120 (COMMON FOR BOTH UNITS)	GLV	25	MAN	8	60	ACW & PLANT WATER SYSTEM	#800 OF BSEN ISO 15761	ASTM A 182 Gr. F316L	--	ASTM A 479 TYPE 410-2	SCREWED AS PER ISS54 FEMALE PARALLEL	LOCKED OPEN ARRANGEMENT	33.40	3.38	93	93	93	--		
16	DMCW 20-25,DMCW-55,56,65,68,105,106,107,109, 110 (1 NO. FOR EACH UNIT)	GLV	25	MAN	10	60	DMCW SYSTEM	#800 OF BSEN ISO 15761	ASTM A 182 Gr. F316L	--	ASTM A 479 TYPE 410-2	SOCKET WELDED AS PER ASME B 16.11	LOCKED OPEN ARRANGEMENT	34.20	4.55	114	114	114	--		
17	DMCW-59,66 (1 NO. FOR EACH UNIT), DMCW-71 (1 NO. FOR EACH UNIT),	GLV	25	MO	10	60	DMCW SYSTEM	#800 OF BSEN ISO 15761	ASTM A 182 Gr. F316L	--	ASTM A 479 TYPE 410-2	SOCKET WELDED AS PER ASME B 16.11	1. OPEN /CLOSE TIME 40-60 SEC. 2. ON/OFF DUTY	34.20	4.55	6	6	6	6	2	FOR ACTUATOR DETAIL, REFER ACTUATOR DATA SHEET SPEC. NO. PE-ID-435-145-I902(B)
18	DW-5,12,14,28,52,54,56 ,57 , DW 76-80 (COMMON FOR BOTH UNITS)	GLV	40	MAN	10	60	PLANT WATER SYSTEM	#800 OF BSEN ISO 15761	ASTM A 182 Gr. F316L	--	ASTM A 479 TYPE 410-2	SCREWED AS PER ISS54 FEMALE PARALLEL	LOCKED OPEN ARRANGEMENT	48.26	3.68	13	13	13	--		
19	DMCW-67 (1 NO. FOR EACH UNIT),	GLV	40	MAN	10	60	DMCW SYSTEM	#800 OF BSEN ISO 15761	ASTM A 182 Gr. F316L	--	ASTM A 479 TYPE 410-2	SOCKET WELDED AS PER ASME B 16.11	LOCKED OPEN ARRANGEMENT	48.80	5.08	2	2	2	--		
20	ACW41-50 (1 NO. FOR EACH UNIT),SWI 121-130, PW 96-105 (COMMON FOR BOTH UNITS)	GLV	50	MAN	8	60	ACW SYSTEM	#800 OF BSEN ISO 15761	ASTM A 182 Gr. F316L	--	DUPLEX SS	SOCKET WELDED AS PER ASME B 16.11	LOCKED OPEN ARRANGEMENT	60.30	3.91	40	40	40	--		
21	PW-66,DW-18,22,39, 58,59,60,65,74 (COMMON FOR BOTH UNITS)	GLV	50	MAN	8	60	PLANT WATER SYSTEM	#800 OF BSEN ISO 15761	ASTM A 182 Gr. F316L	--	ASTM A 479 TYPE 410-2	SCREWED AS PER ISS54 FEMALE PARALLEL	LOCKED OPEN ARRANGEMENT	60.30	3.91	9	9	9	--		
22	DMCW 28-31,34-37,53,54,62,64,115,116 (1 NO. FOR EACH UNIT), DMCW 87-90(1 NO. FOR EACH UNIT),DMCW 121-150(COMMON FOR BOTH UNIT)	GLV	50	MAN	10	60	DMCW SYSTEM	#800 OF BSEN ISO 15761	ASTM A 182 Gr. F316L	--	ASTM A 479 TYPE 410-2	SOCKET WELDED AS PER ASME B 16.11	LOCKED OPEN ARRANGEMENT	60.80	5.54	66	66	66	--		
23	DMCW 61,63 (1 NO. FOR EACH UNIT)	GLV	50	MO	10	60	DMCW SYSTEM	#800 OF BSEN ISO 15761	ASTM A 182 Gr. F316L	--	ASTM A 479 TYPE 410-2	SOCKET WELDED AS PER ASME B 16.11	1. OPEN /CLOSE TIME 40-60 SEC. 2. ON/OFF DUTY	60.80	5.54	4	4	4	4	2	FOR ACTUATOR DETAIL, REFER ACTUATOR DATA SHEET SPEC. NO. PE-ID-435-145-I902(B)
24	DMCW 27,33,39 (1 NO. FOR EACH UNIT), DMCW 86 (1 NO. FOR EACH UNIT)	GLV	80	MAN	10	60	DMCW SYSTEM	#150 OF BS1873	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	LOCKED OPEN ARRANGEMENT	89.50	5.54	8	8	8	--		
25	DMCW 110,112 (COMMON FOR BOTH UNIT)	GLV	100	MAN	10	60	DMCW SYSTEM	#150 OF BS1873	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	LOCKED OPEN ARRANGEMENT	115.00	6.02	2	2	2	--		
26	DMCW 17,19,46,48,50,52 (1 NO. FOR EACH UNIT)	GLV	150	MAN	10	60	DMCW SYSTEM	#150 OF BS1873	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	LOCKED OPEN ARRANGEMENT	166.50	7.11	12	12	12	--		
27	DMCW 42,44 (1 NO. FOR EACH UNIT),DMCW 94(COMMON FOR BOTH UNIT)	GLV	200	MAN	10	60	DMCW SYSTEM	#150 OF BS1873	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	LOCKED OPEN ARRANGEMENT	219.10	8.18	5	5	5	--		
28	DMCW 98 (COMMON FOR BOTH UNIT)	GLV	250	MAN	10	60	DMCW SYSTEM	#150 OF BS1873	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	LOCKED OPEN ARRANGEMENT	273.00	9.27	3	3	3	--		
29	DMCW 114 (COMMON FOR BOTH UNIT)	GLV	350	MAN	10	60	DMCW SYSTEM	#150 OF BS1873	ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	LOCKED OPEN ARRANGEMENT	355.60	9.53	1	1	1	--		
30	DMCW 96 (1 NO. FOR EACH UNIT)	RGLV	150	MO	12	60	DMCW SYSTEM		ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	1. OPEN /CLOSE TIME 40-60 SEC. 2. INCHING TYPE	166.50	7.11	2	2	2	2	2	FOR ACTUATOR DETAIL, REFER ACTUATOR DATA SHEET SPEC. NO. PE-ID-435-145-I902(C)
31	DMCW 95 (1 NO. FOR EACH UNIT)	RGLV	250	MO	10	60	DMCW SYSTEM		ASTM A351 Gr. CF3M	--	ASTM A 479 TYPE 410-2	FLANGED AS PER ASME B16.5 R/F	1. OPEN /CLOSE TIME 40-60 SEC. 2. INCHING TYPE	273.00	9.27	2	2	2	2	2	FOR ACTUATOR DETAIL, REFER ACTUATOR DATA SHEET SPEC. NO. PE-ID-435-145-I902(C)

 2		DATA SHEET-A 2x660MW UDANGUDI STPP STEEL(GATE/GLOBE/NRV) PACKAGE												SPECIFICATION NO. PE-TS-435-100-M001 SECTION:II REV.00, DATE: 23.01.2020 SHEET Page 1 of 2							
1	2	3	4	5	6		7	8	9	10	11	12	13	14		15	16			17	18
SL NO.	VALVE TAG	TYPE OF VALV	SIZE mm (NB)	OPERATION	DESIGN		SERVICE	RATING, DESIGN & TESTING CODE	BODY &BONNET MATERIAL	HINGE PIN MATERIAL	STEM / SPINDLE MATERIAL	END CONNECTIO N	SPECIAL FEATURES	MATCHING PIPE		MAIN VALVES QUANTITY	+COMMISSIONING SPARES			MAND. SPARE (COMP. ACTUATOR)	REMARKS
					PRESSUR E KG/CM2(G)	TEMP (DEG ° C)								MM	MM		BONNET / COVER GASKET (NOS)	GLAND PACKING (SETS)	ACTUATO R O-RING AND SEAL (SETS)		
32	DMCW 60,72 (1 NO. FOR EACH UNIT)	PLNRV	25	AUTO	10	60	DMCW SYSTEM	#800 OF BSEN ISO 15761	ASTM A 182 Gr. F316L	SS316L	--	SOCKET WELDED AS PER ASME B 16.11	--	34.20	4.55	4	4	--	--	--	
33	PW-8,9 (COMMON FOR BOTH UNIT)	SCNRV	100	AUTO	10	60	PLANT WATER SYSTEM	#150 OF BS1868	ASTM A351 Gr. CF3M	SS316L	--	FLANGED AS PER ASME B16.5 R/F	--	114.30	3.05	2	2	--	--	--	
34	DMCW 75,76 (1 NO. FOR EACH UNIT)	SCNRV	250	AUTO	12	60	DMCW SYSTEM	#150 OF BS1868	ASTM A351 Gr. CF3M	SS316L	--	FLANGED AS PER ASME B16.5 R/F	--	273.00	9.27	4	4	--	--	--	
35	DMCW 102 (1 NO. FOR EACH UNIT)	SCNRV	400	AUTO	10	60	DMCW SYSTEM	#150 OF BS1868	ASTM A351 Gr. CF3M	SS316L	--	FLANGED AS PER ASME B16.5 R/F	--	406.40	9.53	2	2	--	--	--	
36	DMCW 04,05,06 (1 NO. FOR EACH UNIT)	SCNRV	500	AUTO	10	60	DMCW SYSTEM	#150 OF BS1868	ASTM A351 Gr. CF3M	SS316L	--	FLANGED AS PER ASME B16.5 R/F	--	508.00	9.53	6	6	--	--	--	WITH DASHPOT ARRANGEMENT
														TOTAL		561	561	543	25	14	

NOTES

1. LEGENDS: MAN=MANUAL, MO=MOTORISED, AUTO= AUTOMATIC, GV=GATE VALVE, GLV=GLOBE VALVE,RGLV= REGULATING GLOBE VALVE, SC NRV= SWING CHECK NON RETURN VALVE , PLNRV= PISTON LIFT NON RETURN VALVE ,HV=HOSE VALVE

2.+ COMMISSIONING SPARES: a). ONE SET OF GLAND PACKING & BONNET GASKET FOR EACH GATE /GLOBE VALVE
b)ONE NO. OF COVER GASKET FOR NON RETURN VALVE.

3. FOR TECHNICAL REQUIREMENT AND QAP,REFER TECH. SPEC. NO. PE-TS-435-100-M001.

4.MAIN VALVE PRICES SHALL BE EXCLUSIVE OF COST OF COMMISSIONING SPARES PRICES.

5. BIDDER IS REQUIRED TO QUOTE UNIT PRICE OF EACH AND EVERY ITEMS UNDER COMMISSIONING SPARES SEPARATELY (I.e. PRICES OF ALL COMMISSIOING SPARES SHALL NOT BE CLUBBED/INCLUDED IN THE UNIT PRICES OF MAIN VALVES).

6.MANDATORY SPARES PRICES SHALL BE QUOTED BY BIDDER SEPARATELY.

7. FOR MOC OF VALVE, REFER MATERIAL DATA SHEET.

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-435-100-M001	
		SECTION : II	
		REV. NO.: 00	DATE: 23.01.2020
		Sheet 3 of 8	

MATERIAL DATA SHEET
(FORGED CARBON STEEL GLOBE TYPE HOSE VALVE)

SERVICE: SERVICE WATER

SL.NO.	PART NAME	MATERIAL REQUIRED
1	BODY	FCS AS PER ASTM A 105
2	BONNET/YOKE/CAP, CHAIN	FCS AS PER ASTM A 105
3	WEDGE	FCS AS PER ASTM A 105
4	STEM	ASTM A479 TYPE 410-2
5	BACK SEAT	13 % Cr. SS AS PER ASTM A182 Gr.F6a (BACK SEAT STELLITE)
6	BODY SEAT RING, WEDGE SEAT RING (SCREWED)	13 % Cr. SS AS PER ASTM A182 Gr.F6a + STELLITE
7	GLOBE VALVE DISC	13 % Cr. SS AS PER ASTM A182 Gr.F6a + STELLITE
8	DISC HOLDER FOR GLOBE VALVE	13 % Cr. SS AS PER ASTM A182 Gr.F6a
9	YOKE SLEEVE	ASTM A439 Gr. D2/ AISI 316
10	GLAND PACKING	GRAPHITE WITH NON ASBESTOS FIBRE
11	GLAND	ASTM A276 T-410
12	GLAND FLANGE	FCS AS PER ASTM A 105
13	COVER & CHAIN (HOSE VALVE)	FCS AS PER ASTM A 105+ CHAIN CARBON STEEL
14	INDICATOR & INDICATING SCALE WITH FITTINGS	AISI316
15	BOLTS	ASTM A193 Gr. B7
16	NUTS	ASTM A 194 Gr.2H
17	HANDWHEEL	ASTM A47 Gr. 32510
18	STEM PROTECTION COVER	PVC(TRANSPARENT)
19	GASKET(CAP)	NATURAL RUBBER
20	PAINTING	PAINTING SHALL BE AS PER CLAUSE NO.11.
21	CHAIN & PADLOCK FOR LOCKING ARRANGEMENT	AS PER MANUFACTURER'S STANDARD

NOTE: THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEM GIVEN AT SL. No. 1 OF DATA SHEET-A (SH.01 OF 08).

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-435-100-M001	
		SECTION : II	
		REV. NO.: 00	DATE: 23.01.2020
		Sheet 4 of 8	

MATERIAL OF CONSTRUCTION
FORGED STAINLESS STEEL (FSS) GATE/ GLOBE VALVES

SERVICE: NON-SEA WATER & DM WATER

SL.NO.	PART NAME	MATERIAL REQUIRED
1	BODY	ASTM A182 Gr.F316L
2	BONNET/YOKE	ASTM A182 Gr.F316L
3	WEDGE	ASTM A182 Gr.F316L
4	STEM, BACK SEAT	ASTM A479 TYPE 410-2
5	BODY SEAT RING, WEDGE/DISC SEAT RING	ASTM A182 Gr. F316L (BODY SEAT RING TO BE STELLITED)
6	YOKE NUT	ASTM A-439 TYPE-D2
7	GLAND PACKING	GRAFOIL
8	GLAND	SS-316L
9	GLAND FLANGE	SS-316L
10	BOLTS	STEEL(ASTM A193 Gr.B7)
11	NUTS	STEEL(ASTM A 194 Gr.2H)
12	HANDWHEEL	ASTM A47 Gr. 32510
13	STEM PROTECTION COVER	PVC (TRANSPARENT)
14	GASKET	SWG (GRAFOIL)
15	NAME PLATE	SS316 (2 MM THICK)
16	PAINTING	NO PAINTING NEEDS TO BE DONE AS THESE ARE STAINLESS STEEL BODY VALVES
17	CHAIN & PADLOCK FOR LOCKING ARRANGEMENT	AS PER MANUFACTURER'S STANDARD (EXCEPT MOTORIZED VALVE)

NOTE: THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS GIVEN AT SL.
No. 2,3,15,16,17,18,19,21,22 & 23 OF DATA SHEET-A (SH. 01 OF 08).

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES		SPECIFICATION NO. PE-TS-435-100-M001
			SECTION : II
		REV. NO.: 00	DATE: 23.01.2020
		Sheet 5 of 8	

MATERIAL OF CONSTRUCTION
FORGED STAINLESS STEEL (FSS) GLOBE VALVES

SERVICE: SEA WATER

SL.NO	PART NAME	MATERIAL REQUIRED
1	BODY	ASTM A182 Gr.F316L
2	BONNET/YOKE	ASTM A182 Gr.F316L
3	WEDGE	ASTM A182 Gr.F316L
4	STEM, BACK SEAT	DUPLEX SS (DUPLEX SS GRADE TO BE MENTIONED)
5	BODY SEAT RING, WEDGE/DISC SEAT RING	ASTM A182 Gr. F316L (BODY SEAT RING TO BE STELLITED)
6	YOKE NUT	ASTM A-439 TYPE-D2
7	GLAND PACKING	GRAFOIL
8	GLAND	SS-316L
9	GLAND FLANGE	SS-316L
10	BOLTS	STEEL(ASTM A193 Gr.B7)
11	NUTS	STEEL(ASTM A 194 Gr.2H)
12	HANDWHEEL	ASTM A47 Gr. 32510
13	STEM PROTECTION COVER	PVC (TRANSPARENT)
14	GASKET	SWG (GRAFOIL)
15	Name plate	SS316 (2 MM THICK)
16	PAINTING	NO PAINTING NEEDS TO BE DONE AS THESE ARE STAINLESS STEEL BODY VALVES
17	CHAIN & PADLOCK FOR LOCKING ARRANGEMENT	AS PER MANUFACTURER'S STANDARD (EXCEPT MOTORIZED VALVE)

NOTE: THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS GIVEN AT SL.
No. 14 & 20 OF DATA SHEET-A (SH.01 OF 08).

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-435-100-M001	
		SECTION : II	
		REV. NO.: 00	DATE: 23.01.2020
		Sheet 6 of 8	

MATERIAL DATA SHEET
FORGED STAINLESS STEEL (FSS) PISTON LIFT NON RETURN VALVE
(PLNRV)

SERVICE: DM WATER

SL.NO	PART NAME	MATERIAL REQUIRED
1	BODY	ASTM A182 Gr.F316L
2	COVER	ASTM A182 Gr.F316L
3	DISC (FULLY GUIDED)	ASTM A182 Gr.F316L +STELLITE
4	DISC NUT/ WASHER	ASTM A182 Gr. F316L
5	BODY SEAT RING	ASTM A182 Gr. F316L+STELLITE
6	GASKET	SWG SS316 (GRAFOIL)
7	BOLTS	ASTM A193 Gr.B7
8	NUTS	ASTM A 194 Gr.2H
9	NAME PLATE	SS316 (2 mm Thick)
10	PAINTING	NO PAINTING NEEDS TO BE DONE AS THESE ARE STAINLESS STEEL BODY VALVES

NOTE: THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS GIVEN AT
SL. No.32 OF DATA SHEET-A (SH.02 OF 08).

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-435-100-M001	
		SECTION : II	
		REV. NO.: 00	DATE: 23.01.2020
		Sheet 7 of 8	

MATERIAL OF CONSTRUCTION
(CAST STAINLESS STEEL GATE/GLOBE VALVES)

SERVICE: NON-SEA WATER & DM WATER

SL.NO	PART NAME	MATERIAL REQUIRED
1	BODY	ASTM A351 Gr.CF3M
2	BONNET/YOKE	ASTM A351 Gr.CF3M
3	WEDGE	ASTM A351 Gr.CF3M
4	STEM, BACK SEAT	ASTM A 479 TYPE 410-2
5	BODY SEAT RING, WEDGE SEAT RING	ASTM A 479 TYPE 410-2
6	YOKE NUT	ASTM A 439 TYPE D2
7	GLAND PACKING	GRAFOIL
8	GLAND	ASTM A 479 TYPE 410-2
9	GLAND FLANGE	ASTM A 479 TYPE 410-2
10	BOLTS	ASTM A193 Gr.B7
11	NUTS	ASTM A 194 Gr.2H
12	HANDWHEEL	ASTM A47 Gr. 32510
13	STEM PROTECTION COVER	PVC (TRANSPARENT)
14	GASKET	SWG (GRAFOIL)
15	NAME PLATE	SS316 (2 MM THICK)
16	PAINTING	NO PAINTING NEEDS TO BE DONE AS THESE ARE STAINLESS STEEL BODY VALVES
17	CHAIN & PADLOCK FOR LOCKING ARRANGEMENT	AS PER MANUFACTURER'S STANDARD (EXCEPT MOTORIZED VALVE)

NOTE: THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS GIVEN AT
SL. NO. 4 TO 13 AND SL. NO 24-31 OF DATA SHEET-A (SH. 01&02 OF 08)

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-435-100-M001	
		SECTION : II	
		REV. NO.: 00	DATE: 23.01.2020
		Sheet 8 of 8	

MATERIAL DATA SHEET
CAST STAINLESS STEEL SWING CHECK NON RETURN VALVE

SERVICE: DM WATER

SL.NO	PART NAME	MATERIAL (REQUIRED)
1	BODY	ASTM A351 Gr.CF3M
2	COVER	ASTM A351 Gr.CF3M
3	DISC	ASTM A351 Gr.CF3M +STELLITE
4	DISC NUT/ WASHER	ASTM A351 Gr.CF3M
5	BODY SEAT RING, DISC SEAT RING	ASTM A351 Gr.CF3M +STELLITE
6	GASKET	SWG SS316 (GRAFOIL)
7	BOLTS	ASTM A193 Gr.B7
8	NUTS	ASTM A 194 Gr.2H
9	HINGE	ASTM A351 Gr.CF3M
10	HINGE PIN	ASTM A182 Gr.F316L
11	COTTER PIN FOR DISC NUT	ASTM A182 Gr.F316L
12	NAME PLATE	SS316 (2 mm Thick)
13	PAINTING	NO PAINTING NEEDS TO BE DONE AS THESE ARE STAINLESS STEEL BODY VALVES

NOTE: THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS GIVEN AT
SL. No. 33 TO 36 OF DATA SHEET-A (SH.02 OF 08).

	TECHNICAL SPECIFICATION STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-435-100-M001	
		SECTION: -	
		REV. NO.: 00	DATE: 23.01.2020
		SHEET 1 OF 1	

SECTION-II

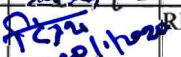
QUALITY PLAN

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN						SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020	
			CUSTOMER : TANGEDCO						QP NO.: PE-QP-435-100-M004(A)		DATE: 17.01.2020	
			PROJECT: 2X660MW UDANGUDI STPP.						PO NO.: LATER		DATE: XXX	
			ITEM: FORGED SS GATE,GLOBE VALVE/ HOSE VALVE(FCS), SIZE 25 TO 50NB,CLASS 800,MANUAL OPERATION				SYSTEM:		SECTION:		SHEET 1 OF 3	
SL 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	*	**	10	
					M C/N				D	M C N		

1.0 MATERIAL:														
1.1	BODY, BONNET, DISC, SPINDLE,	1. PHYS. & CHEM. PROPERTIES	MA	PHYSICAL & CHEMICAL TEST	ONE/HEAT	-	APPROVED DRAWING	APPROVED DRAWING	MTC	√	P/W	V	V	CORRELATION OF BODY & BONNET REQD. WITH MTC HEAT NO.
		2. HEAT TREATMENT	MA	REVIEW OF H.T.	100%	-	-DO-	-DO-	HT(MTC)	√	P/W	V	V	SOLUTION ANNEALING FOR STAINLESS STEEL
1.2	BODY, BONNET	SURFACE & SUB SURFACE DEFECTS	CR	PT	100%	-	ASME B16.34 AND TECH. SPEC.	ASME B16.34	MTC	√	P/W	V	V	PT FOR SS VALVES
2.0	SS/ STELLITE DEPOSIT ON DISC & BODY SEAT	SURFACE DEFECTS	CR	PT	100%	-	ASME B16.34 & APPD DRG.	ASME B16.34 & APPD DRG.	MTC	√	P/W	V	V	
3.0 IN-PROCESS INSPECTION:														
3.1	MACHINING OF ALL COMPONENTS	1. DIMENSIONS, WORKMANSHIP AND FINISH	MA	MEAS., VISUAL	100%	-	MFG.DRG.	MFG.DRG.	LOG BOOK	-	P	V	V	
		2.SURFACE & SUB SURFACE DEFECTS	CR	PT (machined hard surfaces)	100%	-	ASME B16.34	ASME B16.34	-DO-	-	P	V	V	
3.2	DISC & SEAT RING	LAPPING	CR	BLUE MATCHING	100%	-	UNIFORM METAL TO METAL CONTACT		INSPN. REPORT	√	P	V	V	
4.0 TESTING:														
4.1	BODY, SEAT, BACK SEAT	1. LEAK TIGHTNESS OF BODY	CR	HYDRAULIC TEST	100%	REFER NOTE-2	APPD. DRG. / BSEN ISO 15761	NO LEAKAGE	INSPN REPORT	√	P	W	V	
		2. LEAK TIGHTNESS OF BACK SEAT AND SEAT	CR	HYDRAULIC TEST	100%		-DO-	LEAKAGE PERMISSIBLE AS PER API 598	-DO-	√	P	W	V	

BHEL				BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING		QUALITY		Sign & Date		Doc No:			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Sign & Date		Name	Seal
Reviewed by:	Sanjay Kumar	Reviewed by:	RK Jaiswal			Reviewed by:			
						Approved by:			

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020		
			CUSTOMER : TANGEDCO					QP NO.: PE-QP-435-100-M004(A)		DATE: 17.01.2020		
			PROJECT: 2X660MW UDANGUDI STPP.					PO NO.: LATER		DATE: XXX		
			ITEM: FORGED SS GATE,GLOBE VALVE/ HOSE VALVE(FCS), SIZE 25 TO 50NB,CLASS 800,MANUAL OPERATION			SYSTEM:		SECTION:		SHEET 2 OF 3		
SL 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	*	**	10	
					M C/N				D	M C N		
		3. LEAK TIGHTNESS OF SEAT	CR	PNEUMATIC TEST	100%	REFER NOTE-2	APPD. DRG./ BSEN ISO 15761	LEAKAGE PERMISSIBLE AS PER API 598	INSPN REPORT	√	P W V	
4.2	OPERATIONAL TESTING FOR MANUALLY OPERATED VALVES	SMOOTH & FULL OPENING AND CLOSING	CR	MANUAL	100%	REFER NOTE-2	SMOOTH OPERATION OF VALVES & CLEAR BORE		INSPN. REPORT	√	P W V	
5.0	COMPLETE VALVES	OVERALL DIMENSION	MA	MEAS	SAMPLE	-	APPD.DRG	APP.DRG.	-DO-	√	P V V	
6.0	END CONNECTION DETAILS	DIMENSIONS	MA	MEAS.	100%	REFER NOTE-2	APPD. DRG.	APPD. DRG.	-DO-	√	P W V	
7.0	FINAL INSPECTION	CLEANLINESS & COMPLETENESS, NAME WITH VALVE TAG NOS.	MA	VISUAL	100%	-	APPD. DRG.	APPD. DRG.	INSPN. REPORT	√	P V V	
8.0	PAINING	1. SURFACE PREPARATION 2.UNIFORMITY & THICKNESS	MI	VISUAL	100%		APPD. DRG.	APPD. DRG.	-DO-	√	P V V	APPLICABLE FOR FCS HOSE VALVE
			MI	MEASUREME NT	100%		-DO-	-DO-	-DO-			
9.0	PACKING	APPD. DRG.	MA	VISUAL	100%	-	APPD. DRG.	APPD. DRG.	SOFT COPY OF PHOTOGR APH	√	P V V	REFER NOTE '3'

BHEL					
ENGINEERING			QUALITY		
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name
		GK Morye			KK yadav
Reviewed by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name
		Sanjay Kumar			RK Jaiswal

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020	
			CUSTOMER : TANGEDCO					QP NO.: PE-QP-435-100-M004(A)		DATE: 17.01.2020	
			PROJECT: 2X660MW UDANGUDI STPP.					PO NO.: LATER		DATE: XXX	
			ITEM: FORGED SS GATE, GLOBE VALVE/ HOSE VALVE(FCS), SIZE 25 TO 50NB, CLASS 800, MANUAL OPERATION			SYSTEM:		SECTION:		SHEET 3 OF 3	
SL NO.	COMPONENT & OPERATIONS	CHARACTERIST- ICS	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	*	**	10
					M C/N				D	M C N	

NOTES:

- In case of foreign supplier, all test certificates shall be furnished by the supplier, duly witnessed/verified by supplier's TPI.
- 10% or min. 2 nos. at random by BHEL/Customer & 100% by supplier for each type, size & rating.
- Supplier to provide the followings:
 - Photographs of valves duly placed inside the wooden box just before the final packing.
 - Photographs of the wooden box in which valves have been finally packed just before dispatch.
 - Clearance for dispatch of valves will be given only after receipt of the photos of valves in satisfactory condition as mentioned above.

LEGENDS:

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

** M: Supplier/ Manufacturer/ Sub-Supplier

P: Perform

MA: Major Characteristic

MTC: Mill Test Certificate

C: Main Supplier/BHEL/ Third Party Inspection agency

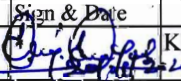
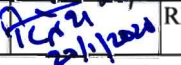
W: Witness

MI: Minor Characteristic

N: Customer

V: Verification

CR: Critical Characteristic

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Seal		Sign & Date	Name	Seal	
		GK Morye			KK yadav						
Reviewed by:		Sanjay Kumar	Reviewed by:		RK Jaiswal						

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN						SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020	
			CUSTOMER : TANGEDCO						QP NO.: PE-QP-435-100-M004(B)		DATE: 17.01.2020	
			PROJECT: 2X660MW UDANGUDI STPP						PO NO.: LATER		DATE: XXX	
			ITEM: FORGED SS GATE/GLOBE VALVE SIZE 25 TO 50NB, CL.800, MOTORIZED				SYSTEM: LP PIPING(WS)		SECTION:		SHEET 1 OF 3	
SL 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	*	**	10	
					M C/N				D	M C N		

1.0 MATERIAL:

1.1	BODY, BONNET, DISC, SPINDLE,	1. PHYSICAL & CHEMICAL PROPERTIES	MA	PHYSICAL & CHEMICAL TESTS	ONE/HEAT	-	APPROVED DRAWING	APPROVED DRAWING	MTC	√	P/W	V	V	CORRELATION OF BODY & BONNET REQD. WITH MTC HEAT NO.
		2. HEAT TREATMENT	MA	REVIEW OF H.T.	100%	-	-DO-	-DO-	HT(MTC)	√	P/W	V	V	SOLUTION ANNEALING FOR STAINLESS STEEL
1.2	BODY, BONNET	SURFACE & SUB SURFACE DEFECTS	CR	PT	100%	-	ASME B16.34	ASME B16.34	MTC	√	P/W	V	V	PT FOR SS VALVES

1.3 ELECTRICAL ACTUATORS

		1. TORQUE TESTING & SETTING OF TORQUE SWITCH	MA	MECH., ELEC. TESTS	100%	-	APPD. DRG. / DATA SHEET/ IS:9334	DATA SHEET. / IS:9334	ACT. CERT.	√	P/W	V	V	
		2. TRAVEL TIME	MA	-DO-	-DO-	-	-DO-	-DO-	-DO-	√	P/W	V	V	
		3. OPERATION OF LIMIT SWITCH	MA	-DO-	-DO-	-	-DO-	-DO-	-DO-	√	P/W	V	V	
		4. MANUAL OPERATION THROUGH HAND WHEEL	MA	-DO-	-DO-	-	-DO-	-DO-	-DO-	√	P/W	V	V	
		5. OPERATION TEST WITH POWER SUPPLY VARIATION ENERGISES TO OPEN/CLOSE	MA	-DO-	-DO-	-	-DO-	-DO-	-DO-	√	P/W	V	V	
		6. IR, HV, IR	MA	-DO-	-DO-	-	-DO-	-DO-	-DO-	√	P/W	V	V	
		7. DEGREE OF PROTECTION	MA	-DO- WATER, DUST TEST	-DO- 1/ TYPE	-	APPD. DRG. / DATA SHEET/ IS:9334	APPD. DRG./ DATA SHEET/ IS:9334	-DO- ACTUATOR CERTIFICATE	√	P/W	V	V	

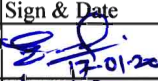
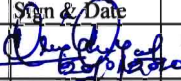
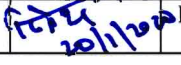
BHEL				
ENGINEERING		QUALITY		
Prepared by:	Sign & Date	Name	Checked by:	Name
Reviewed by:	Sign & Date	Name	Reviewed by:	Name
	17-01-20	GK Morye		KK Yadav
	20.1.2020	Sanjay Kumar		RK Jaiswal

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020	
			CUSTOMER : TANGEDCO					QP NO.: PE-QP-435-100-M004(B)		DATE: 17.01.2020	
			PROJECT: 2X660MW UDANGUDI STPP					PO NO.: LATER		DATE: XXX	
			ITEM: FORGED SS GATE/GLOBE VALVE SIZE 25 TO 50NB, CL.800, MOTORIZED			SYSTEM: LP PIPING(WS)		SECTION:		SHEET 2 OF 3	
SL 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	*	10	
					M C/N				D	M C N	

		8. DESIGN VERIFICATION	MA	TYPE TEST	ONE/MODEL/TYPE/SIZE/RATING	-	IS:9334	IS:9334	ACTUATOR CERTIFICATE	√	P/W	V	V	
2.0	SS/ STELLITE DEPOSIT ON DISC & BODY SEAT	SURFACE DEFECTS	CR	PT	100%	-	ASME B16.34 & APPD DRG.	ASME B16.34 & APPD DRG.	MTC	√	P/W	V	V	
3.0	IN-PROCESS INSPECTION					-								
3.1	MACHINING OF ALL COMPONENTS	1. DIMENSIONS, WORKMANSHIP AND FINISH	MA	MEAS., VISUAL	100%	-	MFG.DRG.	MFG.DRG.	LOG BOOK	-	P	V	V	
		2.SURFACE & SUB SURFACE DEFECTS	CR	PT (machined hard surfaces)	100%	-	ASME B16.34	ASME B16.34	-DO-	-	P	V	V	
3.2	DISC & SEAT RING	LAPPING	CR	BLUE MATCHING	100%	-	UNIFORM METAL TO METAL CONTACT		INSPN. REPORT	√	P	V	V	
4.0	TESTING													
4.1	BODY, SEAT, BACK SEAT FOR MOTOR OPERATED VALVE (WITHOUT ACTUATOR)	1. LEAK TIGHTNESS OF BODY	CR	HYDRAULIC TEST	100%	REFER NOTE-2	APPD. DRG./ BSEN ISO 15761	NO LEAKAGE	INSPN REPORT	√	P/W	V	V	
		2. LEAK TIGHTNESS OF BACK SEAT AND SEAT	CR	HYDRAULIC TEST	100%		-DO-	LEAKAGE PERMISSIBLE AS PER API 598	-DO-	√	P/W	V	V	
		3. LEAK TIGHTNESS OF SEAT	CR	PNEUMATIC TEST	100%		-DO-	-DO-	-DO-	√	P/W	V	V	
4.2	SEAT & BACK SEAT FOR MOTOR OPERATED VALVES WITH ACTUATOR	LEAK TIGHTNESS OF SEAT	CR	HYDRAULIC TEST	100%		APPD. DRG./ BSEN ISO 15761	-DO-	INSPN REPORT	√	P/W	V	V	REFER NOTE '3'

BHEL					
ENGINEERING			QUALITY		
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name
		GK Morye			KK Yadav
Reviewed by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name
		Sanjay Kumar			RK Jaiswal

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN						SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020		
			CUSTOMER : TANGEDCO						QP NO.: PE-QP-435-100-M004(B)		DATE: 17.01.2020		
			PROJECT: 2X660MW UDANGUDI STPP						PO NO.: LATER		DATE: XXX		
			ITEM: FORGED SS GATE/GLOBE VALVE SIZE 25 TO 50NB, CL.800, MOTORIZED				SYSTEM: LP PIPING(WS)		SECTION:		SHEET 3 OF 3		
SL 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	*	**	10		
					M C/N			D	M C N				
4.3	OPERATION AL TESTING FOR. MOTOR OPERATED VALVES	1.ASCENDING & DECENDING LIFT CHARACTERISTIC 2.LIMIT/TORQUE SWITCH SETTING FOR OPENING AND CLOSING TIME	CR CR	ELECTRICAL ELECTRICAL	100% * 100% *	REFER NOTE-2	APPD. DRG. / IS9334 APPD. DRG. / IS9334	APPD. DRG. / IS9334 APPD. DRG./TECH. SPEC./IS9334	INSPN. REPORT INSPN. REPORT	√ √	P/W P/W	V V	V V
5.0	COMPLETE VALVES	OVERALL DIMENSION	MA	HYDRAULIC SEAT	SAMP-LE	-	APPD. DRG.	APP.DRG.	INSPN. REPORT	√	P	V	V
6.0	END CONNECTION DETAILS	DIMENSIONS	MA	MEAS.	100%	REFER NOTE-2	APPD. DRG.	APPD. DRG.	INSPN. REPORT	√	P	V	V
7.0	FINAL INSPECTION	CLEANLINESS & COMPLETENESS, NAME WITH VALVE TAG NOS.	MA	VISUAL	100%	-	APPD. DRG.	APPD. DRG.	INSPN. REPORT	√	P/W	V	V
8.0	PACKING	APPD. DRG.	MA	VISUAL	100%	-	APPD. DRG.	APPD. DRG.	SOFT COPY OF PHOTOGRAPH	-	P	V	-
													REFER NOTE '3'

NOTES:

- In case of foreign supplier, all test certificates shall be furnished by the supplier, duly witnessed/verified by supplier's TPI.
- 10% or min. 2 nos. at random by BHEL/Customer & 100% by supplier for each type, size & rating.
- Supplier to provide the followings:
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 - Photographs of the wooden box in which valves have been finally packed just before dispatch.
 - Clearance for dispatch of valves will be given only after receipt of the photos of valves in satisfactory condition as mentioned above.

LEGENDS:

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

** M: Supplier/ Manufacturer/ Sub-Supplier

C: Main Supplier/BHEL/ Third Party Inspection agency

P: Perform

W: Witness

MA: Major Characteristic

MI: Minor Characteristic

MTC: Mill Test Certificate

N: Customer

V: Verification

CR: Critical Characteristic

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Seal		Sign & Date	Name	Seal	
Prepared by:	17.01.20	GK Morye	Checked by:	17.01.20	KK Yadav						
Reviewed by:	20.1.2020	Sanjay Kumar	Reviewed by:	20.1.2020	RK Jaiswal						

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020	
			CUSTOMER : M/s TANGEDCO					QP NO.: PE-QP-435-100-M004(C)		DATE: 17.01.2020	
			PROJECT: 2X660 UDANGUDI STPP.					PO NO.: LATER		DATE: XXX	
			ITEM: CAST SS GATE/ GLOBE VALVE (ABOVE 50NB SIZE), CLASS 150, MANUAL			SYSTEM: LP PIPING (WATER SYSTEM)		SECTION:		SHEET 1 OF 4	
SL 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	*	**	10
					M C/N			D	M C N		

1.0 MATERIAL:														
1.1	BODY, BONNET, YOKE, WEDGE/ DISC, SEAT, SPINDLE BODY SEAT, BACK SEAT, THRUST PLATE	1. PHYSICAL & CHEMICAL PROPERTIES	MA	PHYS, CHEM. TESTS	ONE/ HEAT	-	APPD. DRG.	APPD. DRG.	MTC	√	P/ W	V	V	CORRELATION OF BODY & BONNET REQD. WITH MTC HEAT NO.
		2. HEAT TREATMENT	MA	REVIEW OF H.T. RECORDS	100%	-	-DO-	-DO-	H.T. INTERNAL INSPN RECORDS	√	P/ W	V	V	SOLUTION ANNEALING FOR SS VALVES
		3. SURFACE DEFECTS	MA	VISUAL	100%	-	MSS-SP-55	MSS-SP-55	INSPN. REPORT	√	P/ W	V	V	
1.2	BODY, BONNET & DISC/ WEDGE	a) <u>CASTINGS</u>	CR	PT	100%	-	ASME B16.34	ASME B16.34	INSPN REPORT	√	P/ W	V	V	RT ON CHANGE OF SECTION FOR ALL VALVES, (RT FILM REVIEW BY BHEL)
		1. SURFACE DEFECTS												
		2. SUB-SURFACE DEFECTS	CR	RT/UT	100%		ASME B16.34	ASME B16.34	INSPN REPORT					
		b) <u>FORGINGS</u>	CR	PT	100%	-	ASME B16.34	ASME B16.34	INSPN REPORT	√	P	V	V	
		1. SURFACE DEFECTS												
		2. SUB-SURFACE DEFECTS	CR	UT	100%		-DO-	-DO-	-DO-					
2.0	SS/ STELLITE DEPOSIT ON DISC & BODY SEAT, BACK SEAT	1. SURFACE DEFECTS	CR	PT	100%	-	ASTM E165 & APP.DRG.	ASME B16.34	INSPN REPORT	√	P/ W	V	V	
		2. HARDNESS	MA	TESTING	100%		APP.DRG.	APP.DRG./ASME B16.34	MTC.	√	P/ W	V	V	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Seal		Reviewed by:	Sign & Date	Name	Seal
Reviewed by:	Sanjay Kumar	20.1.2024	Reviewed by:	RK Jaiswal	20.1.2024			Approved by:			

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020	
			CUSTOMER : M/s TANGEDCO					QP NO.: PE-QP-435-100-M004(C)		DATE: 17.01.2020	
			PROJECT: 2X660 UDANGUDI STPP.					PO NO.: LATER		DATE: XXX	
			ITEM: CAST SS GATE/ GLOBE VALVE (ABOVE 50NB SIZE), CLASS 150, MANUAL			SYSTEM: LP PIPING (WATER SYSTEM)		SECTION:		SHEET 2 OF 4	
SL 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	*	**	10
					M C/N			D	M C N		

3.0 GEAR BOX (AS APPLICABLE)

3.1	GEAR, WORM GEAR & SHAFT	1. PHYSICAL, CHEMICAL PROPS.	MA	PHYSICAL, CHEM. TESTING	1/BATCH	-	REL. STD./ DATA SHEET/ MFG. DRG.	REL. STD./ DATA SHEET/ MFG. DRG.	MTC	√	P/W	V	V	
		2. HARDNESS	MA	MEASUREMNT	100%		REL. STD./ DATA SHEET/ MFG. DRG.	REL. STD./ DATA SHEET/ MFG. DRG.	MTC	√	P/W	V	V	
3.2	GEAR BOX ASSEMBLY	1. APPEARANCE	MA	MEASUREMNT	100%		APPD. DRG/ IS 8935	APPD. DRG./ DATA SHEET/ IS 8935	ACTUATOR CERT.	√	P/W	V	V	
		2. PERFORMANCE	MA	ELECTRICAL	SAMPLE		MFG. STD.	MFG. STD.	TEST REPORT	√	P/W	V	V	
		3. DIMENSIONS	MA	PHYSICAL	100%		APPD. DRG/ IS 8935	APPD. DRG/ IS 8935	-DO-	√	P/W	V	V	
		4. DESIGN VERIFICATION												
		a) TORQUE CAPABILITY	MA	TESTING (TORQUE AT TWICE OF RATED TORQUE OF GEAR BOX)	ONE/ TYPE/ SIZE/ RATE D TORQUE	-	APPROVED PROCEDURE	APPROVED PROCEDURE	MTC	√	P/W	V	V	REFER NOTE-3
		b) GEAR BOX P.O.D. (LIFE CYCLE TEST)	MA	CYCLE TESTING	ONE/ TYPE/ SIZE/ RATE D TORQUE		APPROVED PROCEDURE	APPROVED PROCEDURE	MTC	√	P/W	V	V	REFER NOTE-3

4.0 IN-PROCESS INSPECTION

4.1	MACHINING OF ALL COMPONENTS INCLUDING BW	1. DIMENSIONS, WORKMANSHIP AND FINISH	MA	MEAS., VISUAL	100%	-	MFG.DRG.	MFG.DRG.	LOG BOOK	-	P	V	V	
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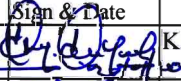
BHEL				BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING		QUALITY		Sign & Date		Doc No:			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name	Seal
Reviewed by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name	Approved by:	Sign & Date	Name	Seal

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020		
			CUSTOMER : M/s TANGEDCO					QP NO.: PE-QP-435-100-M004(C)		DATE: 17.01.2020		
			PROJECT: 2X660 UDANGUDI STPP.					PO NO.: LATER		DATE: XXX		
			ITEM: CAST SS GATE/ GLOBE VALVE (ABOVE 50NB SIZE), CLASS 150, MANUAL			SYSTEM: LP PIPING (WATER SYSTEM)		SECTION:		SHEET 3 OF 4		
SL 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	*	**		10
					M C/N				D	M	C	N

	ENDS	2.SURFACE & SUB-SURFACE DEFECTS	CR	1. PT 2. MPI (ACCESSIBLE AREA OF BODY & BONNET)	100%	-	ASME B16.34	ASME B16.34.	LOG BOOK	-	P/W	V	V	1. IF DIA/THK IS EQUAL OR GREATER THAN 40 mm. 2. IF BODY/ DISC SEATS THICKNESS EQUAL OR GREATER THAN 25 MM
		3.SUB SURFACE DEFECTS (SPINDLE, BODY / DISCS SEAT RING)	CR	UT	100%	-	ASME B16.34	ASME B16.34	LOG BOOK	-	P/W	V	V	
4.2	WEDGE/DISC & SEAT RING, SPINDLE AND BACK SEAT	1. LAPPING	CR	BLUE MATCHING	100%	-	UNIFORM METAL TO METAL CONTACT	UNIFORM METAL TO METAL CONTACT	INSPN. REPORT	√	P	V	V	
5.0	ASSEMBLY	1. DIMENSIONS	MA	MEAS.	100%	-	APPD.DRG.	APPD.DRG.	-DO-	√	P	V	V	FOR GATE VALVE ONLY
		2. WEAR TRAVEL	MA	MEAS.	100%	-	BSEN ISO 10434	-DO-	-DO-	√	P	V	V	
		3. VALVE LIFT	MA	MEAS.	100%	-	APPD.DRG.	-DO-	-DO-	√	P	V	V	

6.0 TESTING

6.1	BODY, SEAT, BACK SEAT	1. LEAK TIGHTNESS OF BODY	CR	HYDRAULIC TEST	100%	REFER NOTE-2	APPD. DRG. /ASME B16.34	NO LEAKAGE	INSPN. REPORT	√	P	W	V	
		2. LEAK TIGHTNESS OF BACK SEAT AND SEAT	CR	HYDRAULIC TEST	100%		-DO-	LEAKAGE PERMISSIBLE AS PER API 598	-DO-	√	P	W	V	
		3. LEAK TIGHTNESS OF SEAT	CR	PNEUMATIC TEST	100%		-DO-	-DO-	-DO-	√	P	W	V	
6.2	OPERATIONAL TESTING FOR MANUALLY OPERATED VALVES	SMOOTH & FULL OPENING AND CLOSING	CR	MANUAL	100%	REFER NOTE-2	-DO-	SMOOTH OPERATION OF VALVES & CLEAR BORE	INSPN. REPORT	√	P	W	V	

BHEL					
ENGINEERING			QUALITY		
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name
		GK Morye			KK Yadav
Reviewed by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name
		Sanjay Kumar			RK Jaiswal

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020		
			CUSTOMER : M/s TANGEDCO					QP NO.: PE-QP-435-100-M004(C)		DATE: 17.01.2020		
			PROJECT: 2X660 UDANGUDI STPP.					PO NO.: LATER		DATE: XXX		
			ITEM: CAST SS GATE/ GLOBE VALVE (ABOVE 50NB SIZE), CLASS 150, MANUAL			SYSTEM: LP PIPING (WATER SYSTEM)		SECTION:		SHEET 4 OF 4		
SL 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	*	**	10	
					M C/N				D	M C N		
7.0	COMPLETE VALVES	OVERALL DIMENSION	MA	MEASUREMENT	SAMPLE	-	APPD.DRG	APP.DRG.	INSPN. REPORT	√	P V V	
8.0	END CONNECTION DETAILS	DIMENSIONS	MA	MEASUREMENT	100%	REFER NOTE-2	APPD. DRG.	APPD. DRG.	-DO-	√	P W V	
9.0	FINAL INSPECTION	CLEANLINESS & COMPLETENESS, NAME WITH VALVE TAG NOS.	MA	VISUAL	100%	-	APPD. DRG..	APPD. DRG.	INSPN. REPORT	√	P V V	
10.0	PACKING	APPD. DRG.	MA	VISUAL	100%	-	APPD. DRG.	APPD. DRG.	SOFT COPY OF PHOTO GRAPH	-	P V V	REFER NOTE-4

NOTES:

- In case of foreign supplier, all test certificates shall be furnished by the supplier, duly witnessed/verified by supplier's TPI.
- 10% or min. 2 nos. at random by BHEL/Customer & 100% by supplier for each type, size & rating.
- Review/ Verification of Test Report/Certificate, in case these tests have been carried out earlier (Within the last 5 years from placement of PO) on the identical Model/Type/Rating of tested Gear Box at an independent laboratory or witnessed by reputed customer like NTPC etc. or third party inspection agency like Lloyds, TUV, DNV etc. if the above Test Reports/Certificates are not available or not found satisfactory by BHEL/Customer, then the required TYPE TEST to be carried out by the Vendor on Gear Box without any commercial implications at his own cost & witnessed by BHEL/Customer.
- Supplier to provide the followings:
 - Photographs of valves duly placed inside the wooden box just before the final packing.
 - Photographs of the wooden box in which valves have been finally packed just before dispatch.
 - Clearance for dispatch of valves will be given only after receipt of the photos of valves in satisfactory condition as mentioned above.

LEGENDS:

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

** M: Supplier/ Manufacturer/ Sub-Supplier

P: Perform

MA: Major Characteristic

MTC: Mill Test Certificate

RT= Radiographic Test

C: Main Supplier/BHEL/ Third Party Inspection agency

W: Witness

MI: Minor Characteristic

PT: Penetrant Test

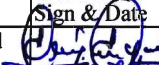
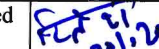
MPI=Magnetic Particle Inspection

N: Customer

V: Verification

CR: Critical Characteristic

UT: Ultrasonic Testing

BHEL					BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY		Sign & Date		Doc No:			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Seal		Sign & Date	Name	Seal
Prepared by:		GK Morye	Checked by:		KK Yadav					
Reviewed by:		Sanjay Kumar	Reviewed by:		RK Jaiswal					

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020	
			CUSTOMER : TANGEDCO					QP NO.: PE-QP-435-100-M004(D)		DATE: 17.01.2020	
			PROJECT: 2X660MW UDANGUDI STPP.					PO NO.: LATER		DATE: XXX	
			ITEM: CSS GATE/ GLOBE /RGLV (ABOVE 50NB SIZE), CLASS 150, MOTORIZED			SYSTEM: LP PIPING (WATER SYSTEM)		SECTION:		SHEET 1 OF 5	
SL NO.	COMPONENT & OPERATIONS	CHARACTERIST- ICS	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	*	**	10
					M C/N				D	M C N	

1.0 MATERIAL:

1.1	BODY, BONNET, YOKE, WEDGE/ DISC, SEAT, SPINDLE BODY SEAT, BACK SEAT, THRUST PLATE	1. PHYSICAL & CHEMICAL PROPERTIES	MA	PHYS. CHEM. TESTS	ONE/ HEAT	-	APPD. DRG.	APPD. DRG.	MTC	√	P/ W	V	V	CORRELATION OF BODY & BONNET REQD. WITH MTC HEAT NO.
		2. HEAT TREATMENT	MA	REVIEW OF H.T. RECORDS	100%	-	-DO-	-DO-	H.T. INTERNAL INSPN RECORDS	√	P/ W	V	V	SOLUTION ANNEALING FOR SS VALVES
		3. SURFACE DEFECTS	MA	VISUAL	100%		MSS-SP-55	MSS-SP-55	INSPN. REPORT	√	P/ W	V	V	
1.2	BODY, BONNET & DISC/ WEDGE	a) <u>CASTINGS</u>								√	P/ W	V	V	RT ON CHANGE OF SECTION FOR ALL VALVES, (RT FILM REVIEW BY BHEL)
		1. SURFACE DEFECTS	CR	PT	100%	-	ASME B16.34	ASME B16.34	INSPN REPORT	√	P/ W	V	V	
		2. SUB-SURFACE DEFECTS	CR	RT/UT	100%		ASME B16.34	ASME B16.34	INSPN REPORT					
		b) <u>FORGINGS</u>								√	P	V	V	
1.3	SS/ STELLITE DEPOSIT ON DISC & BODY SEAT, BACK SEAT	1. SURFACE DEFECTS	CR	PT	100%	-	ASTM E165 & APP.DRG.	ASME B16.34	INSPN REPORT	√	P/ W	V	V	
		2. HARDNESS	MA	TESTING	100%		APP.DRG.	APP. DRG./ ANSI B16.34	MTC	√	P/ W	V	V	

BHEL					
ENGINEERING			QUALITY		
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name
		GK Morye			KK Yadav
Reviewed by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name
		Sanjay Kumar			RK Jaiswal

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020			
			CUSTOMER : TANGEDCO					QP NO.: PE-QP-435-100-M004(D)		DATE: 17.01.2020			
			PROJECT: 2X660MW UDANGUDI STPP.					PO NO.: LATER		DATE: XXX			
			ITEM: CSS GATE/ GLOBE /RGLV (ABOVE 50NB SIZE), CLASS 150, MOTORIZED			SYSTEM: LP PIPING (WATER SYSTEM)		SECTION:		SHEET 2 OF 5			
SL 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	*	**		10
					M	C/N				D	M	C	N

1.4	ACTUATORS 1. ELECTRIC ACTUATORS	1. TORQUE TESTING & SETTING OF TORQUE SWITCH	MA	MECH., ELEC. TESTS	100%	-	APPD. DRG. / DATA SHEET/ IS:9334	APPD. DRG. / DATA SHEET/ IS:9334	INSPN. REPORT	√	P/W	V	V	
		2. TRAVEL/STROKE	MA	--DO--	--DO--	-	--DO--	--DO--	--DO--	√	P/W	V	V	
		3. TRAVEL TIME	MA	--DO--	--DO--	-	--DO--	--DO--	--DO--	√	P/W	V	V	
		4. OPERATION OF LIMIT SWITCH	MA	--DO--	--DO--	-	--DO--	--DO--	--DO--	√	P/W	V	V	
		5. MANUAL OPERATION THROUGH HAND WHEEL	MA	--DO--	--DO--	-	--DO--	--DO--	--DO--	√	P/W	V	V	
		6. OPERATION TEST WITH POWER SUPPLY VARIATION ENERGISES TO OPEN/CLOSE	MA	--DO--	--DO--	-	--DO--	--DO--	--DO--	√	P/W	V	V	
		7. IR,HV,IR	MA	--DO--	--DO--	-	--DO--	--DO--	--DO--	√	P/W	V	V	
		8.DEGREE OF PROTECTION	MA	WATER, DUST TEST	1/ TYPE	-	APPD. DRG. / DATA SHEET/ IS:9334	APPD. DRG. / DATA SHEET/ IS:9334	3RD PARTY TEST CERT.	√	P/W	V	V	
		9. DESIGN VERIFICATION	MA	TYPE TEST	1/TYPE	-	-DO-	-DO-	TEST INSPN REPORT	√	P/W	V	V	

BHEL				BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING		QUALITY		Sign & Date		Doc No:			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Reviewed by:			
Reviewed by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name	Approved by:			

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020	
			CUSTOMER : TANGEDCO					QP NO.: PE-QP-435-100-M004(D)		DATE: 17.01.2020	
			PROJECT: 2X660MW UDANGUDI STPP.					PO NO.: LATER		DATE: XXX	
			ITEM: CSS GATE/ GLOBE /RGLV (ABOVE 50NB SIZE), CLASS 150, MOTORIZED			SYSTEM: LP PIPING (WATER SYSTEM)		SECTION:		SHEET 3 OF 5	
SL 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	*	**	10
					M C/N			D	M	C N	

2.0 IN-PROCESS INSPECTION

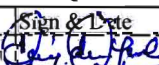
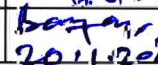
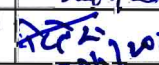
2.1	MACHINING OF ALL COMPONENTS INCLUDING BW ENDS	1. DIMENSIONS, WORKMANSHIP AND FINISH	MA	MEAS., VISUAL	100%	-	MFG.DRG.	MFG.DRG.	LOG BOOK	-	P	V	V	1. IF DIA/THK IS EQUAL OR GREATER THAN 40 mm. 2. IF BODY/ DISC SEATS THICKNESS EQUAL OR GREATER THAN 25 MM
		2.SURFACE & SUB-SURFACE DEFECTS	CR	1. PT 2. MPI (ACCESSIBLE AREA OF BODY & BONNET)	100%		ASME B16.34	ASME B16.34	-DO-	-	P	V	V	
		3.SUB SURFACE DEFECTS (SPINDLE, BODY / DISCS SEAT RING)	CR	UT	100%		ASME B16.34	ASME B16.34	-DO-	-	P	V	V	
2.2	WEDGE/DISC & SEAT RING, SPINDLE AND BACK SEAT	1. LAPPING	CR	BLUE MATCHING	100%	-	UNIFORM METAL TO METAL CONTACT		INSPN. REPORT	√	P	V	V	
3.0	ASSEMBLY	1. DIMENSIONS	MA	MEAS.	100%	-	APPD.DRG.	APPD.DRG.	-DO-	√	P	V	V	
		2. WEAR TRAVEL	MA	MEAS.	100%	-	BSEN ISO 10434	-DO-	-DO-	√	P	V	V	FOR GATE VALVE ONLY
		3. VALVE LIFT	MA	MEAS.	100%	-	-DO-	-DO-	-DO-	√	P	V	V	

4.0 TESTING

4.1	BODY, SEAT, BACK SEAT OF MOTORISED VALVE	1. LEAK TIGHTNESS OF BODY	CR	HYDRAULIC TEST	100%	REFER NOTE-2	APPD. DRG. / ASME B16.34	NO LEAKAGE	INSPN REPORT	√	P	W	V	
		2. LEAK TIGHTNESS OF BACK SEAT AND SEAT	CR	HYDRAULIC TEST	100%		-DO-	LEAKAGE PERMISSIBLE AS PER API 598	-DO--	√	P	W	V	
		3. LEAK TIGHTNESS OF SEAT	CR	PNEUMATIC TEST	100%		-DO-	-DO-	-DO-	√	P	W	V	

BHEL				BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL				
ENGINEERING		QUALITY		Sign & Date		Doc No:				
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Reviewed by:		Sign & Date	Name	Seal
Reviewed by:	Sanjay Kumar	20.1.2020	Reviewed by:	RK Jaiswal	20.1.2020	Approved by:				

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN						SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020		
			CUSTOMER : TANGEDCO						QP NO.: PE-QP-435-100-M004(D)		DATE: 17.01.2020		
			PROJECT: 2X660MW UDANGUDI STPP.						PO NO.: LATER		DATE: XXX		
			ITEM: CSS GATE/ GLOBE /RGLV (ABOVE 50NB SIZE), CLASS 150 , MOTORIZED				SYSTEM: LP PIPING (WATER SYSTEM)		SECTION:		SHEET 4 OF 5		
SL NO.	COMPONENT & OPERATIONS	CHARACTERIST- ICS	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	*	**		10	
					M C/N			D		M	C	N	
4.2	SEAT & BACK SEAT FOR MOTORISED VALVES WITH ACTUATOR	LEAK TIGHTNESS OF SEAT	CR	HYDRUALIC TEST	100%	REFER NOTE-2	APPD. DRG. / ASME B16.34	LEAKAGE PERMISSIBLE AS PER API 598	INSPN REPORT	√	P	W	V
4.3	OPERATION AL TESTING FOR MOTOR OPERATED VALVES	1. ASCENDING & DESCENDING LIFT CHARACTERISTIC 2. LIMIT/TORQUE SWITCH SETTING FOR OPENING AND CLOSING TIME	CR	ELEC.	100%	REFER NOTE-2	APP. DRG. / IS:9334	APP. DRG./ IS:9334	INSPN. REPORT	√	P	W	V
			CR	ELEC.	100%		APP. DRG. / IS:9334	APPD.DRG	INSP. REPORT	√	P	W	V
5.0	COMPLETE VALVES	OVERALL DIMENSION	MA	MEASUREME NT	SAMPLE	-	APPD.DRG	APP.DRG.	-DO-	√	P	V	V
6.0	END CONNECTION DETAILS	DIMENSIONS	MA	MEASUREME NT	100%	REFER NOTE-2	APPD. DRG.	APPD. DRG.	-DO-	√	P	W	V
7.0	FINAL INSPECTION	CLEANLINESS & COMPLETENESS, NAME WITH VALVE TAG NOS.	MA	VISUAL	100%	-	APPD. DRG.	APPD. DRG.	INSPN. REPORT	√	P	V	V
8.0	PACKING	APPD. DRG.	MA	VISUAL	100%	-	APPD. DRG.	APPD. DRG.	SOFT COPY OF PHOTO GRAPH	√	P	V	V
													REFER NOTE-3

BHEL					
ENGINEERING			QUALITY		
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name
		GK Morje			KK Yadav
Reviewed by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name
		Sanjay Kumar			RK Jaiswal

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020		
			CUSTOMER : TANGEDCO					QP NO.: PE-QP-435-100-M004(D)		DATE: 17.01.2020		
			PROJECT: 2X660MW UDANGUDI STPP.					PO NO.: LATER		DATE: XXX		
			ITEM: CSS GATE/ GLOBE /RGLV (ABOVE 50NB SIZE), CLASS 150, MOTORIZED			SYSTEM: LP PIPING (WATER SYSTEM)		SECTION:		SHEET 5 OF 5		
SL NO.	COMPONENT & OPERATIONS	CHARACTERIST- ICS	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	*	**		10
					M C/N				D	M	C	N

NOTES:

- In case of foreign supplier, all test certificates shall be furnished by the supplier, duly witnessed/verified by supplier's TPI.
- 10% or min. 2 nos. at random by BHEL/Customer & 100% by supplier for each type, size & rating.
- Supplier to provide the followings:
 - Photographs of valves duly placed inside the wooden box just before the final packing.
 - Photographs of the wooden box in which valves have been finally packed just before dispatch.
 - Clearance for dispatch of valves will be given only after receipt of the photos of valves in satisfactory condition as mentioned above.

LEGENDS:

*D: Records, identified with "Tick"(✓) shall be essentially included by supplier in QA Documentation.

** M: Supplier/ Manufacturer/ Sub-Supplier

P: Perform

MA: Major Characteristic

MTC: Mill Test Certificate

RT= Radiographic Test

C: Main Supplier/BHEL/ Third Party Inspection agency

W: Witness

MI: Minor Characteristic

PT: Penetrant Test

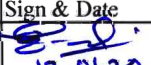
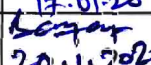
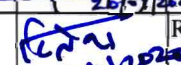
MPI=Magnetic Particle Inspection

N: Customer

V: Verification

CR: Critical Characteristic

UT: Ultrasonic Testing

BHEL					
ENGINEERING			QUALITY		
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name
		GK Morye			KK Yadav
Reviewed by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name
		Sanjay Kumar			RK Jaiswal

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020	
			CUSTOMER : TANGEDCO					QP NO.: PE-QP-435-100-M005(A)		DATE: 17.01.2020	
			PROJECT: 2X660MW UDANGUDI STPP.					PO NO.: LATER		DATE: XXX	
			ITEM: FORGED SS PISTON LIFT NON RETURN VALVES SIZE 25 NB ,CLASS 800			SYSTEM: LP PIPING (WATER SYSTEM)		SECTION: VOLUME		SHEET 1 OF 2	
SL 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	*	**	10
					M C/N			D	M C N		

1.0 MATERIAL:														
1.1	BODY,COVER, DISC	1. PHYS. & CHEM. PROPERTIES	MA	PHYS.CHEM. TESTS	1/HEAT	-	APPD. DRG.	APPD. DRG.	MTC	√	P/W	V	V	CORRELATION OF BODY & COVER REQD. WITH MTC HEAT NO.
		2. HEAT TREATMENT	MA	REVIEW OF HT	100%	-	-DO-	-DO-	MTC RECORDS	√	P/W	V	V	SOLUTION ANNEALING FOR SS VALVE
1.2	BODY, COVER & DISC	SURFACE DEFECTS	CR	PT	100%	-	ASSME B16.34	ASME B16.34	INSPN REPORT	√	P/W	V	V	
2.0 IN PROCESS:														
2.1	SS/STELLITE DEPOSIT ON BODY SEAT RING, DISC/SEAT	SURFACE DEFECTS	CR	PENETRANT TEST	100%	-	ASTM E165	NO DEFECTS	MTC	√	P/W	V	V	
2.2	MACHINING OF ALL COMPONENTS	1.DIMENSIONS	MA	MEASUREMENT	100%	-	MFG. DRAWING	MFG. DRAWING	LOG BOOK	-	P	V	V	
		2.SURFACE & SUB-SURFACE DEFECTS	CR	PT	100%		ASTM E165	NO DEFECTS	INSPN. REPORT	√	P	V	V	
2.3	DISC. AND BODY SEAT RING	LAPPING	CR	BLUE MATCHING	100%	-	UNIFORM METAL TO METAL CONTACT		MTC	√	P	V	V	
3.0	ASSEMBLY	DIMENSIONS (overall dimensions)	MA	MEASUREME NT	100%	-	APPD. DRG..	APPD. DRG.	INSPN. REPORT	√	P	V	V	
4.0 TESTING														
4.1	BODY	LEAK TIGHTNESS	CR	HYDRAULIC TEST	100%	REFER NOTE-2	APPD. DRG. / BSEN ISO 15761	NO LEAKAGE	MTC	√	P	W	V	
4.2	SEAT	LEAK TIGHTNESS	CR	HYDRAULIC SEAT	100%		-DO-	-DO-	-DO-	√	P	W	V	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Seal		Reviewed by:	Sign & Date	Name	Seal
Reviewed by:	Sign & Date	Sanjay kumar	Reviewed by:	Sign & Date	RK Jaiswal			Approved by:			

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 17.01.2020		
			CUSTOMER : TANGEDCO					QP NO.: PE-QP-435-100-M005(A)		DATE: 17.01.2020		
			PROJECT: 2X660MW UDANGUDI STPP.					PO NO.: LATER		DATE: XXX		
			ITEM: FORGED SS PISTON LIFT NON RETURN VALVES SIZE 25 NB ,CLASS 800			SYSTEM: LP PIPING (WATER SYSTEM)		SECTION: VOLUME		SHEET 2 OF 2		
SL NO.	COMPONENT & OPERATIONS	CHARACTERIST- ICS	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	*	**	10	
					M C/N				D	M C N		
5.0	END CONNECTION DETAILS	DIMENSIONS, VALVE TAG NOS	MA	MEASUREME NT/ VISUAL	100%	REFER NOTE-2	APPD. DRG.	APPD. DRG..	MTC	√	P W V	
6.0	PACKING	APPD. DRG.	MA	VISUAL	100%	-	APPD. DRG	APPD. DRG	SOFT COPY OF PHOTOGR APH	-	P V -	REFER NOTE-3

NOTES:

- In case of foreign supplier, all test certificates shall be furnished by the supplier, duly witnessed/verified by supplier's TPI.
- 10% or min. 2 nos. at random by BHEL/Customer & 100% by supplier for each type, size & rating.
- Supplier to provide the followings:
 - Photographs of valves duly placed inside the wooden box just before the final packing.
 - Photographs of the wooden box in which valves have been finally packed just before dispatch.
 - Clearance for dispatch of valves will be given only after receipt of the photos of valves in satisfactory condition as mentioned above.

LEGENDS:

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

** M: Supplier/ Manufacturer/ Sub-Supplier

P: Perform

MA: Major Characteristic

MTC: Mill Test Certificate

C: Main Supplier/BHEL/ Third Party Inspection agency

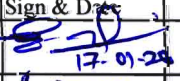
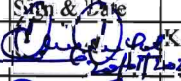
W: Witness

MI: Minor Characteristic

N: Customer

V: Verification

CR: Critical Characteristic

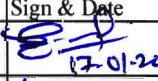
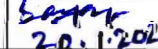
BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:		GK Morye	Checked by:		KK Yadav
Reviewed by:		Sanjay kumar	Reviewed by:		RK Jaiswal

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 16.01.2020	
			CUSTOMER : TANGEDCO					QP NO.: PE-QP-435-100-M005(B)		DATE: 16.01.2020	
			PROJECT: 2X660MW UDANGUDI STPP.					PO NO.: LATER		DATE: XXX	
			ITEM: CSS SWING CHECK NON RETURN VALVES (ABOVE 50NB SIZE), CLASS 150			SYSTEM: LP PIPING (WATER SYSTEM)		SECTION: VOLUME		SHEET 1 OF 3	
SL 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	*	**	10
					M C/N			D	M	C	N

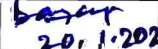
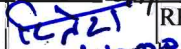
1.0 MATERIAL:														
1.1	BODY, COVER, BODY, SEAT RING, DISC, HINGE, HINGE PIN	1. PHYS. & CHEM. PROPERTIES	MA	PHYS.CHEM. TESTS	1/HEAT	-	APPD. DRG.	APPD. DRG.	MTC.	√	P/W	V	V	CORRELATION OF BODY & COVER REQD. WITH MTC HEAT NO.
		2. HEAT TREATMENT	MA	REVIEW OF HT CHART RECORDS	100%	-	-DO-	-DO-	HT INTERNAL INSPN. RECORDS	√	P/W	V	V	SOLUTION ANNEALING FOR SS VALVE
		3. SURFACE DEFECTS	MA	VISUAL	100%	-	MSS-SP-55	MSS-SP-55	INSPN. REPORT	√	P/W	V	V	
1.2	BODY, COVER, HINGE & DISC	a) CASTINGS	CR	RT / UT	100%	-	ASME B-16.34	ASME B-16.34	MTC	√	P/W	V	V	RT ON CHANGE OF SECTION (RT FILM REVIEW BY BHEL)
		1.SUB-SURFACE DEFECTS												
		2. SURFACE DEFECTS	CR	PT	100%	-	ASTM E165/ ASTM E 709	-DO-	MTC	√	P/W	V	V	
		b) FORGINGS												
		1. SURFACE DEFECTS	CR	PT	100%	-	ASME B16.34	ASME B16.34	INSPN REPORT	√	P/W	V	V	
		2. SUB-SURFACE DEFECTS	CR	UT	100%	-	--DO-	--DO-	--DO-	√	P/W	V	V	
2.0 IN PROCESS:														
2.1	SS/STELLITE DEPOSIT ON BODY SEAT RING, DISC/SEAT	1.SURFACE DEFECTS	CR	PENETRANT TEST	100%	-	ASTM E165	NO DEFECTS	MTC	√	P	V	V	
		2. HARDNESS	MA	MEASUREME NT	100%	-	APPD. DRG	APPD. DRG/ ASME B16.34	MTC	√	P	V	V	

BHEL					
ENGINEERING			QUALITY		
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name
		GK Morye			KK Yadav
Reviewed by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name
		Sanjay Kumar			RK Jaiswal

BIDDER/SUPPLIER	
Sign & Date	
Seal	

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

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN						SPEC. NO : PE-TS-435-100-M001		DATE: 16.01.2020			
			CUSTOMER : TANGEDCO						QP NO.: PE-QP-435-100-M005(B)		DATE: 16.01.2020			
			PROJECT: 2X660MW UDANGUDI STPP.						PO NO.: LATER		DATE: XXX			
			ITEM: CSS SWING CHECK NON RETURN VALVES (ABOVE 50NB SIZE), CLASS 150				SYSTEM: LP PIPING (WATER SYSTEM)		SECTION: VOLUME		SHEET 2 OF 3			
SL 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	*	**		10	
					M	C/N				D	M	C	N	
2.2	MACHINING OF ALL COMPONENTS INCLUDING BW ENDS	1.DIMENSIONS	MA	MEASUREME NT	100%	-	MFG.DRG.	MFG.DRG.	LOG BOOK	-	P	V	V	1. IF DIA/THK IS EQUAL OR GREATER THAN 40 mm. 2. IF BODY/ DISC SEATS THICKNESS EQUAL OR GREATER THAN 25 MM
		2.SURFACE & SUB-SURFACE DEFECTS	CR	1. PT 2. MPI (ACCESSIBLE AREA OF BODY & BONNET)	100%	-	ASTM E165	NO DEFECTS	INSPN. REPORT	√	P	V	V	
		3 SUB SURFACE DEFECTS (HINGE PIN, BODY & DISC SEAT RINGS)	CR	UT	100%	-	ANSI B16.34	ANSI B16.34	MTC	√	P	V	V	
2.3	DISC. AND BODY SEAT RING	LAPPING	CR	BLUE MATCHING	100%	-	UNIFORM METAL TO METAL CONTACT	TEST CERT.	UNIFORM METAL TO METAL CONTACT	√	P	V	V	
3.0	ASSEMBLY	DIMENSIONS	MA	MEASUREME NT	100%		APPD. DRG.	APPD. DRG.	INSPN. REPORT	√	P	W	V	
4.0 TESTING														
4.1	BODY	LEAK TIGHTNESS	CR	HYDRAULIC TEST	100%	REFER NOTE-2	APPD. DRG. / ASME B16.34	NO LEAKAGE	MTC	√	P	W	V	
4.2	SEAT	LEAK TIGHTNESS	CR	HYDRAULIC TEST 1. AT SPECIFIED PRESSURE 2. AT 25% OF SEAT TEST PRESSURE	100%	REFER NOTE-2	-DO-	-DO-	-DO-	√	P	W	V	
4.3	COMPLETE VALVE	PERFORMANCE	CR	OPERATION OF FLAP	100%	-	APPD. DRG.	APPD. DRG	INSPN. REPORT	√	P	V	V	

BHEL					
ENGINEERING			QUALITY		
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name
		GK Morye			KK Yadav
Reviewed by:	Sign & Date	Name	Reviewed by:	Sign & Date	Name
		Sanjay Kumar			RK Jaiswal

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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

	MANUFACTURER/BIDDER/VENDOR NAME & ADDRESS		QUALITY PLAN					SPEC. NO : PE-TS-435-100-M001		DATE: 16.01.2020		
			CUSTOMER : TANGEDCO					QP NO.: PE-QP-435-100-M005(B)		DATE: 16.01.2020		
			PROJECT: 2X660MW UDANGUDI STPP.					PO NO.: LATER		DATE: XXX		
			ITEM: CSS SWING CHECK NON RETURN VALVES (ABOVE 50NB SIZE), CLASS 150			SYSTEM: LP PIPING (WATER SYSTEM)		SECTION: VOLUME		SHEET 3 OF 3		
SL 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	*	**	10	
					M C/N				D	M C N		
5.0	END CONNECTION DETAILS	DIMENSIONS, VALVE TAG NOS	MA	MEASUREME NT/ VISUAL	100%	REFER NOTE-2	APPD. DRG.	APPD. DRG.	INSPN. REPORT	√	P W V	
6.0 PACKING												
6.0	PACKING	APPD. DRG.	MA	VISUAL	100%	-	APPD. DRG.	APPD. DRG.	SOFT COPY OF PHOTOGR APH	-	P V V	REFER NOTE-3

NOTES:

- In case of foreign supplier, all test certificates shall be furnished by the supplier, duly witnessed/verified by supplier's TPI.
- 10% or min. 2 nos. at random by BHEL/Customer & 100% by supplier for each type, size & rating.
- Supplier to provide the followings:
 - Photographs of valves duly placed inside the wooden box just before the final packing.
 - Photographs of the wooden box in which valves have been finally packed just before dispatch.
 - Clearance for dispatch of valves will be given only after receipt of the photos of valves in satisfactory condition as mentioned above.

LEGENDS:

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

** M: Supplier/ Manufacturer/ Sub-Supplier

P: Perform

MA: Major Characteristic

MTC: Mill Test Certificate

RT= Radiographic Test

C: Main Supplier/BHEL/ Third Party Inspection agency

W: Witness

MI: Minor Characteristic

PT: Penetrant Test

MPI=Magnetic Particle Inspection

N: Customer

V: Verification

CR: Critical Characteristic

UT: Ultrasonic Testing

BHEL					BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY		Sign & Date		Doc No:			
Prepared by:	Sign & Date	Name	Checked by:	Sign & Date	Name	Seal		Sign & Date	Name	Seal
Prepared by:	17.01.20	GK Morye	Checked by:	17.01.20	KK Yadav					
Reviewed by:	20.01.2020	Sanjay Kumar	Reviewed by:	20.01.2020	RK Jaiswal					

	TECHNICAL SPECIFICATION STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-435-100-M001	
		SECTION: -	
		REV. NO.: 00	DATE: 23.01.2020
		SHEET 1 OF 1	

SECTION-II

TECHNICAL SPECIFICATION FOR ELECT. ACTUATOR

TECHNICAL SPECIFICATION FOR ELECTRICAL ACTUATORS

1.0.0 INTENT OF SPECIFICATION

This section covers the requirements of motor operated electrical actuators.

2.0.0 CODES AND STANDARDS

The equipment to be furnished under this specification shall be in accordance with the applicable section of the latest edition (including amendments) of the applicable Indian Standards (IS), IEC publications and other codes except where modified and /or supplemented by this specification.

3.0.0 TECHNICAL REQUIREMENTS

3.1.0 Electric actuators shall be provided as specified in Mechanical and C&I section. It shall be equipped with 3 phase induction motor, rated for S2-15 minutes duty for ON/OFF valve and intermittent duty for inching duty

3.2.0 Motor shall be class F insulated with temperature rise limited to class B. Motor shall be of class H insulation with temperature limited to class B used for high pressure and high temperature valves.

3.3.0 Motor shall be surface cooled designed for enclosure protection class of IP 67. Motor shall be suitable for starting direct on-line.

3.4.0 For installation in potentially hazardous areas, the actuators shall have suitable explosion proof / flame proof type enclosure.

3.5.0 Actuators shall be suitable for operation at an ambient temperature of 50 degree C and relative humidity of 95%.

3.6.0 Maximum continuous motor rating shall be atleast 10% above the maximum load derived of the driven equipment under entire operating range including voltage & frequency variation.

3.7.0 Motors shall be capable of operating under following supply variations without exceeding its guaranteed temperature limits.

- Frequency variation : (+) 3% and (-) 5% of 50 Hz
- Voltage variation for LT motors : (±) 10% of 415 V
- Combined variation of voltage and frequency: 10% (absolute sum)

3.8.0 All actuators shall be of integral type. Duty cycle of actuators shall suit the system requirement. The actuators shall be capable of giving the required torque at the output shaft. The actuators shall be designed to take the full thrust.

3.9.0 Electrical Actuators of Inching type position transmitters of non contact type shall be interfaced to DCS.

3.10.0 Actuators shall be of totally enclosed weather proof and dust proof construction with NEMA-6/IP 65 enclosure and shall be suitable for outdoor application without the necessity for a canopy. The actuator shall be suitable for mounting directly on the valve. The actuator shall be capable of giving the required torque, rpm and thrust without the help of any spur gear arrangement. The actuator shall be suitable for mounting in any position. Actuators shall be provided with integral starters.

-
- 3.11.0 The actuator shall be complete with motor, reduction gears, change gears, terminal compartment, switch compartment with limit switches and torque switches, local position indicator, position transmitter for remote position indicator, thermistor, space heaters, cable glands, mechanical position indicator, hand wheel for manual operation, valve attachment etc.
- 3.12.0 Each actuator shall have a hand wheel fitted on it for emergency operation. The hand wheel shall be designed such that it is declutched automatically when the power supply to the motor is restored. The material of the hand wheel shall be either malleable iron or steel. The hand wheel shall have adequate clearance from housing for each gripping and operation. Actuators offered shall be with self-locking worm.
- 3.13.0 Two number adjustable torque switches (one for open and one for close) each with 2 NO and 2 NC potential free contacts shall be provided. It is required to have calibration for the torque switches so that the switches can be easily set to any value desired.
- 3.14.0 Two numbers of position limit switches (one for open and one for close) each with 2 NO and 2 NC potential free contacts shall be provided. Two auxiliary limit switches (one for open and one for close) with 2 NO and 2 NC potential free contacts shall also be provided. The limit switches shall be of independently adjustable type. Limit switches and actuating mechanism shall be rust proof suitable for damp atmospheres. Limit switch compartment shall be weather proof and spacious enough for easy setting. The limit switches shall be suitable for the following ratings, both 240 Volts AC, 10 A and 220 V DC, 0.5 Amps.
- 3.15.0 Each actuator shall have a space heater in the limit switch compartment suitable for 240 V AC 50 Hz single phase supply.
- 3.16.0 The wiring from the limit switches, torque switches etc. shall be brought out in a separate terminal box of adequate size, so as to easily terminate the control cables.
- 3.17.0 Actuators shall be supplied with integral starter which shall have sophisticated electronic controls with field programming feature. It shall be designed for remote control from DCS/Respective control system. Required interposing relays for receiving open/close/stop command from DCS/Respective control system shall be provided. Potential free contacts and transducers shall be provided to provide status indication at remote DCS/Respective control system..
- 3.18.0 A three position selector switch (marked as LOCAL-OFF-REMOTE) and push buttons OPEN-STOP-CLOSE (for local operation) with indication lamps for running OPEN and running CLOSE shall be provided.
- 3.19.0 The Remote command signal (OPEN-STOP-CLOSE) from DCS/Respective control system/Control panel shall be isolated from control electronics through opto-isolator.
- 3.20.0 The following individual sStatus annunciation LED's and fault annunciation LED's shall be provided locally (Integral to actuator) to annunciate the following for easy local monitoring.
- Actuator in local mode
 - Actuator in remote mode
 - Actuator running in OPEN direction
 - Actuator running in CLOSE direction
 - Actuator in inching mode.
 - Actuator in self-retaining mode
 - Limit switch OPEN trip
 - Limit switch CLOSE trip
 - Control voltage availability
- 3.21.0 The following individual fault annunciation LED's (Colour-Red) shall be provided locally. (Integral to Actuator)
-

-
- Torque switch OPEN
 - Torque switch CLOSE
 - Thermo switch trip
 - Electronic overload relay trip
 - Motor single phasing
 - Common fault (Inclusive of any one or combination of above fault)

3.22.0 View port shall be provided on integral starter unit to monitor the above status annunciation and fault annunciation.

3.23.0 Electronic Overload relay shall be provided to trip actuator in case of overload.
Plug in connections/design shall be provided between:-

- Integral starter unit and basic actuator
- Between external customer connections and actuator.

3.24.0 OPEN-CLOSE indication /LED shall be provided for indication of full open/close position.

3.25.0 Automatic phase correction facility and potential free contact for annunciation of power failure shall be provided.

3.26.0 The following individual potential free relay contacts shall be provided in the actuator for remote annunciation to facilitate continuous monitoring of the actuator.

- Actuator (valve) running in OPEN direction.
- Actuator (valve) running in CLOSE direction.
- Actuator in remote mode.
- Actuator in local mode.
- Actuator power switched off /single phasing.
- Torque switch trip, thermo switch trip and overload relay trip

4.0.0 TESTING AND INSPECTION

Equipment offered shall be of type tested and proven type. Routine tests shall be carried out for all the equipment as per applicable standards. Copies of certified reports of all tests carried out at the works shall be furnished.

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.

- Measurement of insulation resistance.
- Measurement of full load current.
- Test running of the motors.

5.0.0 DRAWINGS & DOCUMENTS

The following drawings and documents shall be submitted for approval during detail engineering stage.

- Integral starter details
 - Technical particulars of actuator
 - Wiring diagram
 - General arrangement drawings
 - Test reports
 - Manufacturing quality plan
 - Field quality plan
-

	TECHNICAL SPECIFICATION STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-435-100-M001	
		SECTION: -	
		REV. NO.: 00	DATE: 23.01.2020
		SHEET 1 OF 1	

SECTION-II

ACTUATOR DATA SHEETS

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.: PE-ID-435-145-I902(A)	
			VOLUME	
			SECTION II	
			REV. NO. 00	DATE: 28.08.2019
			SHEET 1	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	2X660 MW UDANGUDI STPP		
	OFFER REFERENCE	BIDDER TO SPECIFY		
	* TAG NO. SERVICE	PW-65(COMMON FOR BOTH UNIT) DMCW-40,73,74,77,78 (1 NO.FOR EACH UNIT)		
	* DUTY	☒ ON / OFF ** ☐ INCHING		
	* LINE SIZE (inlet/outlet): MATERIAL	LINE SIZE & MOC SHALL BE AS PER DATA SHEET-A		
	* VALVE TYPE	☐ GLOBE ☒ GATE ☐ REG. GLOBE ☐ BUTTERFLY		
	* OPENING / CLOSING TIME	40-60 SECONDS		
	* WORKING PRESSURE	AS PER DATA SHEET-A (SH.01 OF 08)		
	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 as per standard EN 12570:2000	* 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) (REFER NOTE NO. 6 & 7)	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) ☒ SIMENS GRAY RAL 7030		
	PAINT TYPE (## Refer Notes)	☐ ENAMEL ☒ EPOXY CONFIRMING TO CORROSION CATEGORY C5-I		
	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 +/- 10%, 3PHASE, 3 WIRE 50HZ +/-5%		

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.: PE-ID-435-145-I902(A)	
			VOLUME	
			SECTION II	
			REV. NO. 00	DATE: 28.08.2019
			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)	
	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED FROM THE POWER SUPPLY TO THE STARTER ☐ 230 V ☐ 110 V		
	@ ENCLOSURE CLASS OF MOTOR	☒ IP 67 ☐ 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 (THERMISTOR PTC)		
INTEGRAL STARTER	INTEGRAL STARTER	☒ REQUIRED ☐ NOT REQUIRED		
	TYPE OF SWITCHING DEVICE	☒ CONTACTORS ☐ THYRISTORS		
	TYPE	☒ CONVENTIONAL ☐ SMART (NON-INTRUSIVE)		
	IF SMART (REFER BELOW POINT a – h)			
	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(Refer Note 14)	REQUIRED (O/L RELAY OPERATED, CONT./POWER SUPPLY FAILED, S/S IN LOCAL, TORQUE SWITCH OPTD. MID WAY,)		
	ACTION ON LOSS OF EXTERNAL ELECTRIC POWER	☒ STAYPUT ☐ FAIL SAFE		
INTERPOSING RELAY/OPTO COUPLER (Applicable for integral Starter) DATASHEET & WIRING DIAGRAM OF ISOLATION DEVICE TO BE PROVIDED	TYPE OF ISOLATING DEVICE	☐ INTERPOSING RELAY ☒ OPTO COUPLER TO BE DECIDED DURING DETAILED ENGINEERING		
	QUANTITY	☒ 2 NOs. ☒ 3 NOs. (for inching type drive)		
	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		

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.: PE-ID-435-145-I902(A)	
			VOLUME	
			SECTION II	
			REV. NO. 00	DATE: 28.08.2019
			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)	
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		
	ACCURACY	2% OF SET VALUE		
POSITION TRANSMITTER	POSITION TRANSMITTER (For inching duty & other specific applications)	☐ REQUIRED ☒ NOT REQUIRED		
	MFR & MODEL NO.	BIDDER TO SPECIFY		
	TYPE	☐ ELECTRONIC (2 WIRE) R/I CONVERTER ☒ ELECTRONIC (2 WIRE) CONTACTLESS		
	SUPPLY	☒ 24V DC ☐		
	OUTPUT	☒ 4-20mA		
	ACCURACY	± 1% FS		
SPACE HEATER	@SPACE HEATER	REQUIRED		
	@ POWER SUPPLY (NON INTEGRAL)	240V 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	☒ REQUIRED ☐ NOT REQUIRED		
	NO. OF PINS REQUIRED (TO BE CHECKED AS PER SIGNALS IN DRIVE CONTROL PHILOSOPHY)			
	NOS. OF PLUG & SOCKET	☐ 1 Nos. ☒ 2 NOS. ☐ OTHER (TO BE SPECIFIED INLINE WITH DRIVE CONTROL PHILOSOPHY)		
CABLE GLANDS	@ POWER CABLE GLAND	SIZE:-----		
	@ SPACE HEATER CABLE GLAND	SIZE:-----		
	CONTROL CABLE GLANDS-1	QTY & SIZE: Cable gland suitable for 8Px0.5 sq mm		
	CONTROL CABLE GLANDS-2	QTY & SIZE: Cable gland suitable for 2Px0.5 sq mm		
WEIGHT	TOTAL WEIGHT (ACTUATOR + ACCESSORIES)	BIDDER TO SPECIFY		
		_____ Kg.		

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR	SPECIFICATION NO.: PE-ID-435-145-I902(A)		
		VOLUME		
		SECTION	II	
		REV. NO.	00	DATE: 28.08.2019
		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)	

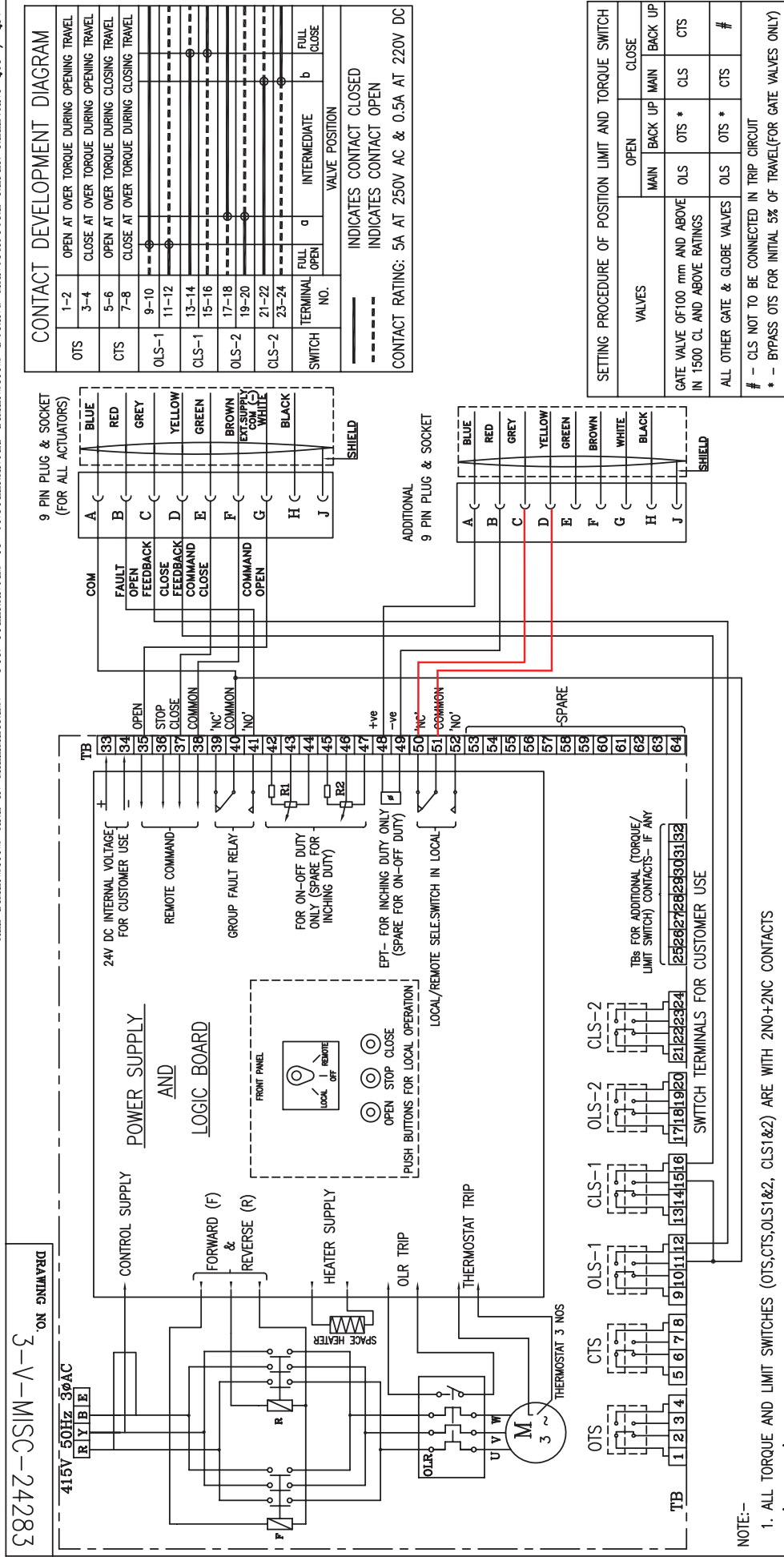
NOTES:

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 INTERNATIONAL STANDARD. AS A MINIMUM, THE FOLLOWING STANDARDS SHALL BE COMPLIED WITH:
IS-9334, IS-2147, IS-2148, IS-325, IS-2959, IS-4691, IS-4722, IEC 60947-5-1 AND EN 15714-3 :2010 OR LATEST VERSION.
 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 BE SUITABLE FOR DIRECT ON LINE STARTING.
 7. THE MOTOR SHALL BE CAPABLE OF STARTING AT 85 PERCENT OF RATED VOLTAGE RUNNING AT 80 PERCENT OF RATED VOLTAGE AT RATED TORQUE AND 85 PERCENT RATED VOLTAGE AT 33 PERCENT EXCESS RATED TORQUE FOR A PERIOD OF 5 MINUTES EACH.
 8. IN ADDITION TO ABOVE REQUIREMENTS FOR LIMIT/TORQUE SWITCH, **MECHANICAL END STOP** WITH ACCURACY OF 2% SHALL BE SUPPLIED.
 9. IT SHOULD BE POSSIBLE TO OPERATE THE ACTUATOR LOCALLY. LOCKABLE LOCAL/REMOTE SELECTION SHALL BE PROVIDED ON THE ACTUATOR.
 10. LOCAL POSITION INDICATOR SHALL BE PROVIDED FOR 0 TO 100 % TRAVEL.
 11. CONTROL WIRING SHALL BE SUITABLE VOLTAGE GRADE COPPER WIRE 1.5 SQ. MM.
 12. ENDURANCE: RATED TORQUE RANGE SHOULD BE BASED ON ISO 5211, ISO5210.
 13. TAG PLATE SHALL BE CONFIRMING TO STANDARD BS-15714.
 14. INTEGRAL STARTER/ACTUATOR DISTURBED SIGNAL SHALL BE CHECKED AND INCLUDE AS PER DRIVE CONTROL PHILOSOPHY.
 15. **** VALVES WITH 10 DEGREE/20DEGREE FEEDBACK REQUIREMENT FOR APPLICATIONS SUCH AS CW/ACW/PLANT WATER SYSTEM ETC SHALL BE CONSIDERED AS INCHING DUTY VALVES. ACCORDINGLY, POSITION FEED BACK TRANSMITTER, PLUG & SOCKET REQUIREMENT SHALL BE CONSIDERED.**
 16. FOR OTHER TECHNICAL INFORMATION, REFER TECHNICAL SPECIFICATION FOR ELECTRICAL ACTUATOR.
- \$\$ TORQUE SWITCH & LIMIT SWITCH SHALL ACT INDEPENDENT OF EACH OTHER. TANDEM OPERATION IS NOT ACCEPTABLE.**
- ## EPOXY PAINT IS RECOMMENDED FOR COASTAL AREAS.**

	PREPARED BY	CHECKED BY	APPROVED BY	VENDOR COMPANY SEAL
NAME	MADHAV GUPTA	VIPUL KUMAR VERMA	SHIVRAJ SINGH BANSALA	NAME
SIGNATURE				SIGNATURE
DATE	15.05.2019	15.05.2019	15.05.2019	DATE

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

@ BE FILLED BY ES



NOTE:—

- | REV | DATE | ALTERED
CHD & APPD |
|---|------|-----------------------|
| <p>1. ALL TORQUE AND LIMIT SWITCHES (OTS,CTS,OLS1&2, CLS1&2) ARE WITH 2NO+2NC CONTACTS '1NO+1NC' IS TERMINATED IN TBS 1-24, REMAINING CONTACTS ARE FOR INTERNAL USE.</p> <p>ANY SPARE CONTACTS WHICH ARE NOT USED INTERNALLY ARE TO BE TERMINATED IN TBS 25-32</p> <p>2. CTS - TORQUE SWITCHES FOR CW ROTATION (CLOSE)</p> <p>3. OTS - TORQUE SWITCHES FOR CCW ROTATION (OPEN)</p> <p>4. OLS-1, OLS-2 - LIMITSWITCHES FOR POSITION OPEN</p> <p>5. CLS-1, CLS-2 - LIMITSWITCHES FOR POSITION CLOSE</p> <p>6. EPT - ELECTRONIC POSITION TRANSMITTER</p> <p>(CONTACTLESS TYPE, FOR INCHING DUTY)</p> <p>7. RT-R2-POTENTIOMETER 2 x 100 OHMS (FOR ON-OFF DUTY)</p> <p>8. FOR COMMANDS & EPT EITHER INTERNALLY GENERATED 24 VDC OR EXTERNAL SUPPLY OF 24VDC CAN BE USED</p> <p>9. M - MOTOR 3ø 415V 50 Hz AC SUPPLY</p> <p>10. TORQUE SWITCH BYPASS WITH LIMITSWITCH BOTH ON OPEN & CLOSE DIRECTION TO BE DONE INTERNALLY.</p> | | |

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT										ELECTRICAL VALVE ACTUATORS (AC) WITH INTEGRAL STARTERS FOR NTPC PROJECTS (DRAWN FOR INTERMEDIATE POSITION OF VALVES)									
 365-121		BHARAT HEAVY ELECTRICALS LTD., UNIT: HIGH PRESSURE BOILER PLANT. TRUCHIRAPALLI-680014.				DRN CHD APTD	NAME N.P.ESWAR D.DINAKARAN K.ARUNACHALAM	SIGN N.P. D.D K.A	DATE 17.03.05 17.03.05 17.03.05	NO OF THRS -									
DEPT VL CODE	-		SCALE	WEIGHT (KG).		REFERENCE INFORMATIONS				NO OF THRS -									
TITLE WIRING DIAGRAM (TERMINAL PLAN) FOR ACTUATOR WITH INTEGRAL STARTER WITH PLUG & SOCKET FOR NTPC PROJECTS		CARD CODE U 01		DRAWING NO. 3-V-MISC-24283				REV 0											

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.: PE-ID-435-145-I902(B)	
			VOLUME	
			SECTION II	
			REV. NO. 00	DATE: 28.08.2019
			SHEET 1	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	2X660 MW UDANGUDI STPP		
	OFFER REFERENCE	BIDDER TO SPECIFY		
	* TAG NO. SERVICE	DMCW-59,61,63,66,71 (1 NO.FOR EACH UNIT)		
	* DUTY	☒ ON / OFF ** ☐ INCHING		
	* LINE SIZE (inlet/outlet): MATERIAL	LINE SIZE & MOC SHALL BE AS PER DATA SHEET-A		
	* VALVE TYPE	☒ GLOBE ☐ GATE ☐ REG. GLOBE ☐ BUTTERFLY		
	* OPENING / CLOSING TIME	40-60 SECONDS		
	* WORKING PRESSURE	AS PER DATA SHEET-A (SH 01 OF 08)		
	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 as per standard EN 12570:2000	* 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) (REFER NOTE NO. 6 & 7)	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) ☒ SIMENS GRAY RAL 7030		
	PAINT TYPE (## Refer Notes)	☐ ENAMEL ☒ EPOXY CONFIRMING TO CORROSION CATEGORY C5-I		
	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 +/- 10%, 3PHASE, 3 WIRE 50HZ +/-5%		

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.: PE-ID-435-145-I902(B)	
			VOLUME	
			SECTION II	
			REV. NO. 00	DATE: 28.08.2019
			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)	
	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED FROM THE POWER SUPPLY TO THE STARTER ☐ 230 V ☐ 110 V		
	@ ENCLOSURE CLASS OF MOTOR	☒ IP 67 ☐ 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 (THERMISTOR PTC)		
INTEGRAL STARTER	INTEGRAL STARTER	☒ REQUIRED ☐ NOT REQUIRED		
	TYPE OF SWITCHING DEVICE	☒ CONTACTORS ☐ THYRISTORS		
	TYPE	☒ CONVENTIONAL ☐ SMART (NON-INTRUSIVE)		
	IF SMART (REFER BELOW POINT a – h)			
	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(Refer Note 14)	REQUIRED (O/L RELAY OPERATED, CONT./POWER SUPPLY FAILED, S/S IN LOCAL, TORQUE SWITCH OPTD. MID WAY,)		
	ACTION ON LOSS OF EXTERNAL ELECTRIC POWER	☒ STAYPUT ☐ FAIL SAFE		
INTERPOSING RELAY/OPTO COUPLER (Applicable for integral Starter) DATASHEET & WIRING DIAGRAM OF ISOLATION DEVICE TO BE PROVIDED	TYPE OF ISOLATING DEVICE	☐ INTERPOSING RELAY ☒ OPTO COUPLER TO BE DECIDED DURING DETAILED ENGINEERING		
	QUANTITY	☒ 2 NOs. ☒ 3 NOs. (for inching type drive)		
	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		

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.: PE-ID-435-145-I902(B)	
			VOLUME	
			SECTION II	
			REV. NO. 00	DATE: 28.08.2019
			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)	
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		
	ACCURACY	2% OF SET VALUE		
POSITION TRANSMITTER	POSITION TRANSMITTER (For inching duty & other specific applications)	☐ REQUIRED ☒ NOT REQUIRED		
	MFR & MODEL NO.	BIDDER TO SPECIFY		
	TYPE	☐ ELECTRONIC (2 WIRE) R/I CONVERTER ☒ ELECTRONIC (2 WIRE) CONTACTLESS		
	SUPPLY	☒ 24V DC ☐		
	OUTPUT	☒ 4-20mA		
	ACCURACY	± 1% FS		
SPACE HEATER	@SPACE HEATER	REQUIRED		
	@ POWER SUPPLY (NON INTEGRAL)	240V 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	☒ REQUIRED ☐ NOT REQUIRED		
	NO. OF PINS REQUIRED (TO BE CHECKED AS PER SIGNALS IN DRIVE CONTROL PHILOSOPHY)			
	NOS. OF PLUG & SOCKET	☐ 1 Nos. ☒ 2 NOS. ☐ OTHER (TO BE SPECIFIED INLINE WITH DRIVE CONTROL PHILOSOPHY)		
CABLE GLANDS	@ POWER CABLE GLAND	SIZE: -----		
	@ SPACE HEATER CABLE GLAND	SIZE: -----		
	CONTROL CABLE GLANDS-1	QTY & SIZE: Cable gland suitable for 8Px0.5 sq mm		
	CONTROL CABLE GLANDS-2	QTY & SIZE: Cable gland suitable for 2Px0.5 sq mm		
WEIGHT	TOTAL WEIGHT (ACTUATOR + ACCESSORIES)	BIDDER TO SPECIFY _____ Kg.		

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR	SPECIFICATION NO.: PE-ID-435-145-I902(B)		
		VOLUME		
		SECTION	II	
		REV. NO.	00	DATE: 28.08.2019
		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)	

NOTES:

- SCOPE:** DESIGN, MANUFACTURE, INSPECTION, TESTING AND DELIVERY TO SITE OF ELECTRIC ACTUATOR FOR INCHING OR OPEN / CLOSE DUTY.
- CODES & STANDARDS:** DESIGN AND MATERIALS USED SHALL COMPLY WITH THE RELEVANT LATEST NATIONAL AND INTERNATIONAL STANDARD. AS A MINIMUM, THE FOLLOWING STANDARDS SHALL BE COMPLIED WITH: IS-9334, IS-2147, IS-2148, IS-325, IS-2959, IS-4691, IS-4722, IEC 60947-5-1 AND EN 15714-3 :2010 OR LATEST VERSION.
- TEMPERATURE RISE SHALL BE RESTRICTED TO 70 DEG. C FOR AMBIENT TEMPERATURE OF 50 DEG C.
- CABLE GLANDS OF DOUBLE COMPRESSION TYPE, BRASS MATERIAL SHALL BE PROVIDED.
- 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.
- THE MOTOR SHALL BE SUITABLE FOR DIRECT ON LINE STARTING.
- THE MOTOR SHALL BE CAPABLE OF STARTING AT 85 PERCENT OF RATED VOLTAGE RUNNING AT 80 PERCENT OF RATED VOLTAGE AT RATED TORQUE AND 85 PERCENT RATED VOLTAGE AT 33 PERCENT EXCESS RATED TORQUE FOR A PERIOD OF 5 MINUTES EACH.
- IN ADDITION TO ABOVE REQUIREMENTS FOR LIMIT/TORQUE SWITCH, **MECHANICAL END STOP** WITH ACCURACY OF 2% SHALL BE SUPPLIED.
- IT SHOULD BE POSSIBLE TO OPERATE THE ACTUATOR LOCALLY. LOCKABLE LOCAL/REMOTE SELECTION SHALL BE PROVIDED ON THE ACTUATOR.
- LOCAL POSITION INDICATOR SHALL BE PROVIDED FOR 0 TO 100 % TRAVEL.
- CONTROL WIRING SHALL BE SUITABLE VOLTAGE GRADE COPPER WIRE 1.5 SQ. MM.
- ENDURANCE: RATED TORQUE RANGE SHOULD BE BASED ON ISO 5211, ISO5210.
- TAG PLATE SHALL BE CONFIRMING TO STANDARD BS-15714.
- INTEGRAL STARTER/ACTUATOR DISTURBED SIGNAL SHALL BE CHECKED AND INCLUDE AS PER DRIVE CONTROL PHILOSOPHY.
- ** VALVES WITH 10 DEGREE/20DEGREE FEEDBACK REQUIREMENT FOR APPLICATIONS SUCH AS CW/ACW/PLANT WATER SYSTEM ETC SHALL BE CONSIDERED AS INCHING DUTY VALVES. ACCORDINGLY, POSITION FEED BACK TRANSMITTER, PLUG & SOCKET REQUIREMENT SHALL BE CONSIDERED.**
- FOR OTHER TECHNICAL INFORMATION, REFER TECHNICAL SPECIFICATION FOR ELECTRICAL ACTUATOR.

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

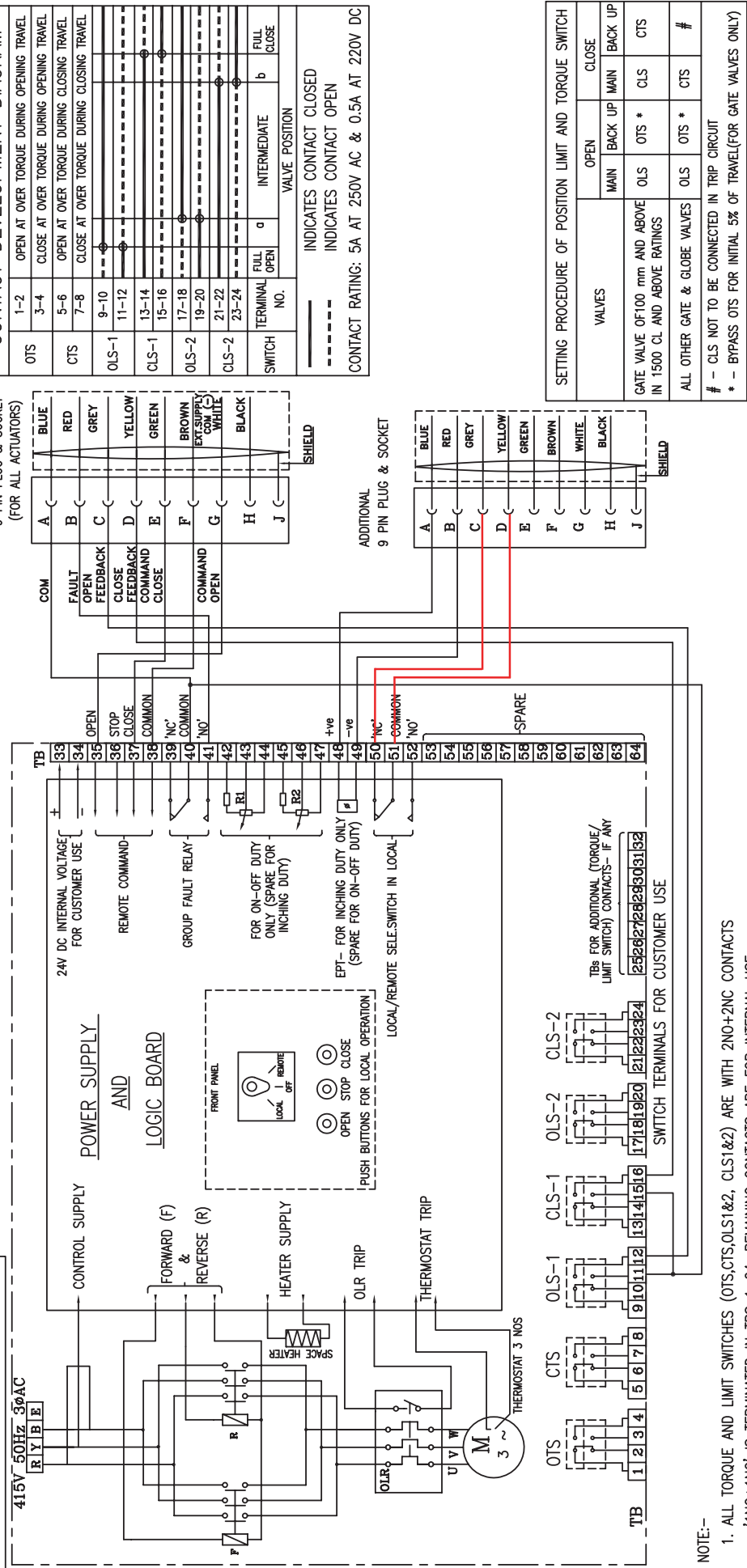
EPOXY PAINT IS RECOMMENDED FOR COASTAL AREAS.

	PREPARED BY	CHECKED BY	APPROVED BY	VENDOR COMPANY SEAL
NAME	MADHAV GUPTA	VIPUL KUMAR VERMA	SHIVRAJ SINGH BANSALA	NAME
SIGNATURE				SIGNATURE
DATE	15.05.2019	15.05.2019	15.05.2019	DATE

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

@ BE FILLED BY ES

DRAWING NO. 58272-CSIW-A-3



TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

ELECTRICAL VALVE ACTUATORS (AC) WITH INTEGRAL STARTERS
FOR NTPC PROJECTS
(DRAWN FOR INTERMEDIATE POSITION OF VALVES)

DEPT 365-121
VL
CODE
TITLE

REV DATE ALTERED
CHD & APPD

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in the interest of any company.

DRN N.P.ESWAR
CHD D.DINAKARAN
APPD K.ARUNACHALAM

DATE 17.03.05
VAR 17.03.05
- 17.03.05

WEIGHT (KG) -
SCALE NTS

CARD CODE
U 01

DRAWING NO.
3-V-MISC-24283

REV 0

FOR ACTUATOR WITH INTEGRAL STARTER WITH PLUG & SOCKET
FOR NTPC PROJECTS

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

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.:PE-ID-435-145-I902(C)	
			VOLUME	
			SECTION II	
			REV. NO. 00	DATE: 28.08.2019
			SHEET 1	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	2X660 MW UDANGUDI STPP		
	OFFER REFERENCE	BIDDER TO SPECIFY		
	* TAG NO. SERVICE	DMCW-95,96 (1 NO.FOR EACH UNIT)		
	* DUTY	☐ ON / OFF ** ☒ INCHING		
	* LINE SIZE (inlet/outlet): MATERIAL	LINE SIZE & MOC SHALL BE AS PER DATA SHEET-A		
	* VALVE TYPE	☐ GLOBE ☐ GATE ☒ REG. GLOBE ☐ BUTTERFLY		
	* OPENING / CLOSING TIME	40-60 SECONDS		
	* WORKING PRESSURE	AS PER DATA SHEET-A (SH.02 OF 08)		
	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 as per standard EN 12570:2000	* 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) (REFER NOTE NO. 6 & 7)	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) ☒ SIMENS GRAY RAL 7030		
	PAINT TYPE (## Refer Notes)	☐ ENAMEL ☒ EPOXY CONFIRMING TO CORROSION CATEGORY C5-I		
	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 +/- 10%, 3PHASE, 3 WIRE 50HZ +/-5%		

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.:PE-ID-435-145-I902(C)	
			VOLUME	
			SECTION II	
			REV. NO. 00	DATE: 28.08.2019
			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)	
	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED FROM THE POWER SUPPLY TO THE STARTER ☐ 230 V ☐ 110 V		
	@ ENCLOSURE CLASS OF MOTOR	☒ IP 67 ☐ 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 (THERMISTOR PTC)		
INTEGRAL STARTER	INTEGRAL STARTER	☒ REQUIRED ☐ NOT REQUIRED		
	TYPE OF SWITCHING DEVICE	☒ CONTACTORS ☐ THYRISTORS		
	TYPE	☒ CONVENTIONAL ☐ SMART (NON-INTRUSIVE)		
	IF SMART (REFER BELOW POINT a – h)			
	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(Refer Note 14)	REQUIRED (O/L RELAY OPERATED, CONT./POWER SUPPLY FAILED, S/S IN LOCAL, TORQUE SWITCH OPTD. MID WAY,)		
	ACTION ON LOSS OF EXTERNAL ELECTRIC POWER	☒ STAYPUT ☐ FAIL SAFE		
INTERPOSING RELAY/OPTO COUPLER (Applicable for integral Starter) DATASHEET & WIRING DIAGRAM OF ISOLATION DEVICE TO BE PROVIDED	TYPE OF ISOLATING DEVICE	☐ INTERPOSING RELAY ☒ OPTO COUPLER TO BE DECIDED DURING DETAILED ENGINEERING		
	QUANTITY	☒ 2 NOs. ☒ 3 NOs. (for inching type drive)		
	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		

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.:PE-ID-435-145-I902(C)	
			VOLUME	
			SECTION II	
			REV. NO. 00	DATE: 28.08.2019
			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)	
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		
	ACCURACY	2% OF SET VALUE		
POSITION TRANSMITTER	POSITION TRANSMITTER (For inching duty & other specific applications)	☒ REQUIRED ☐ NOT REQUIRED		
	MFR & MODEL NO.	BIDDER TO SPECIFY		
	TYPE	☐ ELECTRONIC (2 WIRE) R/I CONVERTER ☒ ELECTRONIC (2 WIRE) CONTACTLESS		
	SUPPLY	☒ 24V DC ☐		
	OUTPUT	☒ 4-20mA		
	ACCURACY	± 1% FS		
SPACE HEATER	@SPACE HEATER	REQUIRED		
	@ POWER SUPPLY (NON INTEGRAL)	240V 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	☒ REQUIRED ☐ NOT REQUIRED		
	NO. OF PINS REQUIRED(TO BE CHECKED AS PER SIGNALS IN DRIVE CONTROL PHILOSOPHY)			
	NOS. OF PLUG & SOCKET	☐ 1 Nos. ☒ 2 NOS. ☐ OTHER (TO BE SPECIFIED INLINE WITH DRIVE CONTROL PHILOSOPHY)		
CABLE GLANDS	@ POWER CABLE GLAND	SIZE: -----		
	@ SPACE HEATER CABLE GLAND	SIZE:-----		
	CONTROL CABLE GLANDS-1	QTY & SIZE: Cable gland suitable for 8Px0.5 sq mm		
	CONTROL CABLE GLANDS-2	QTY & SIZE: Cable gland suitable for 2Px0.5 sq mm		
WEIGHT	TOTAL WEIGHT (ACTUATOR + ACCESSORIES)	BIDDER TO SPECIFY _____ Kg.		

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR	SPECIFICATION NO.:PE-ID-435-145-I902(C)		
		VOLUME		
		SECTION	II	
		REV. NO.	00	DATE: 28.08.2019
		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)	

NOTES:

- SCOPE:** DESIGN, MANUFACTURE, INSPECTION, TESTING AND DELIVERY TO SITE OF ELECTRIC ACTUATOR FOR INCHING OR OPEN / CLOSE DUTY.
- CODES & STANDARDS:** DESIGN AND MATERIALS USED SHALL COMPLY WITH THE RELEVANT LATEST NATIONAL AND INTERNATIONAL STANDARD. AS A MINIMUM, THE FOLLOWING STANDARDS SHALL BE COMPLIED WITH:
IS-9334, IS-2147, IS-2148, IS-325, IS-2959, IS-4691, IS-4722, IEC 60947-5-1 AND EN 15714-3 :2010 OR LATEST VERSION.
- TEMPERATURE RISE SHALL BE RESTRICTED TO 70 DEG. C FOR AMBIENT TEMPERATURE OF 50 DEG C.
- CABLE GLANDS OF DOUBLE COMPRESSION TYPE, BRASS MATERIAL SHALL BE PROVIDED.
- 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.
- THE MOTOR SHALL BE SUITABLE FOR DIRECT ON LINE STARTING.
- THE MOTOR SHALL BE CAPABLE OF STARTING AT 85 PERCENT OF RATED VOLTAGE RUNNING AT 80 PERCENT OF RATED VOLTAGE AT RATED TORQUE AND 85 PERCENT RATED VOLTAGE AT 33 PERCENT EXCESS RATED TORQUE FOR A PERIOD OF 5 MINUTES EACH.
- IN ADDITION TO ABOVE REQUIREMENTS FOR LIMIT/TORQUE SWITCH, **MECHANICAL END STOP** WITH ACCURACY OF 2% SHALL BE SUPPLIED.
- IT SHOULD BE POSSIBLE TO OPERATE THE ACTUATOR LOCALLY. LOCKABLE LOCAL/REMOTE SELECTION SHALL BE PROVIDED ON THE ACTUATOR.
- LOCAL POSITION INDICATOR SHALL BE PROVIDED FOR 0 TO 100 % TRAVEL.
- CONTROL WIRING SHALL BE SUITABLE VOLTAGE GRADE COPPER WIRE 1.5 SQ. MM.
- ENDURANCE: RATED TORQUE RANGE SHOULD BE BASED ON ISO 5211, ISO5210.
- TAG PLATE SHALL BE CONFIRMING TO STANDARD BS-15714.
- INTEGRAL STARTER/ACTUATOR DISTURBED SIGNAL SHALL BE CHECKED AND INCLUDE AS PER DRIVE CONTROL PHILOSOPHY.
- ** VALVES WITH 10 DEGREE/20DEGREE FEEDBACK REQUIREMENT FOR APPLICATIONS SUCH AS CW/ACW/PLANT WATER SYSTEM ETC SHALL BE CONSIDERED AS INCHING DUTY VALVES. ACCORDINGLY, POSITION FEED BACK TRANSMITTER, PLUG & SOCKET REQUIREMENT SHALL BE CONSIDERED.**
- FOR OTHER TECHNICAL INFORMATION, REFER TECHNICAL SPECIFICATION FOR ELECTRICAL ACTUATOR.

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

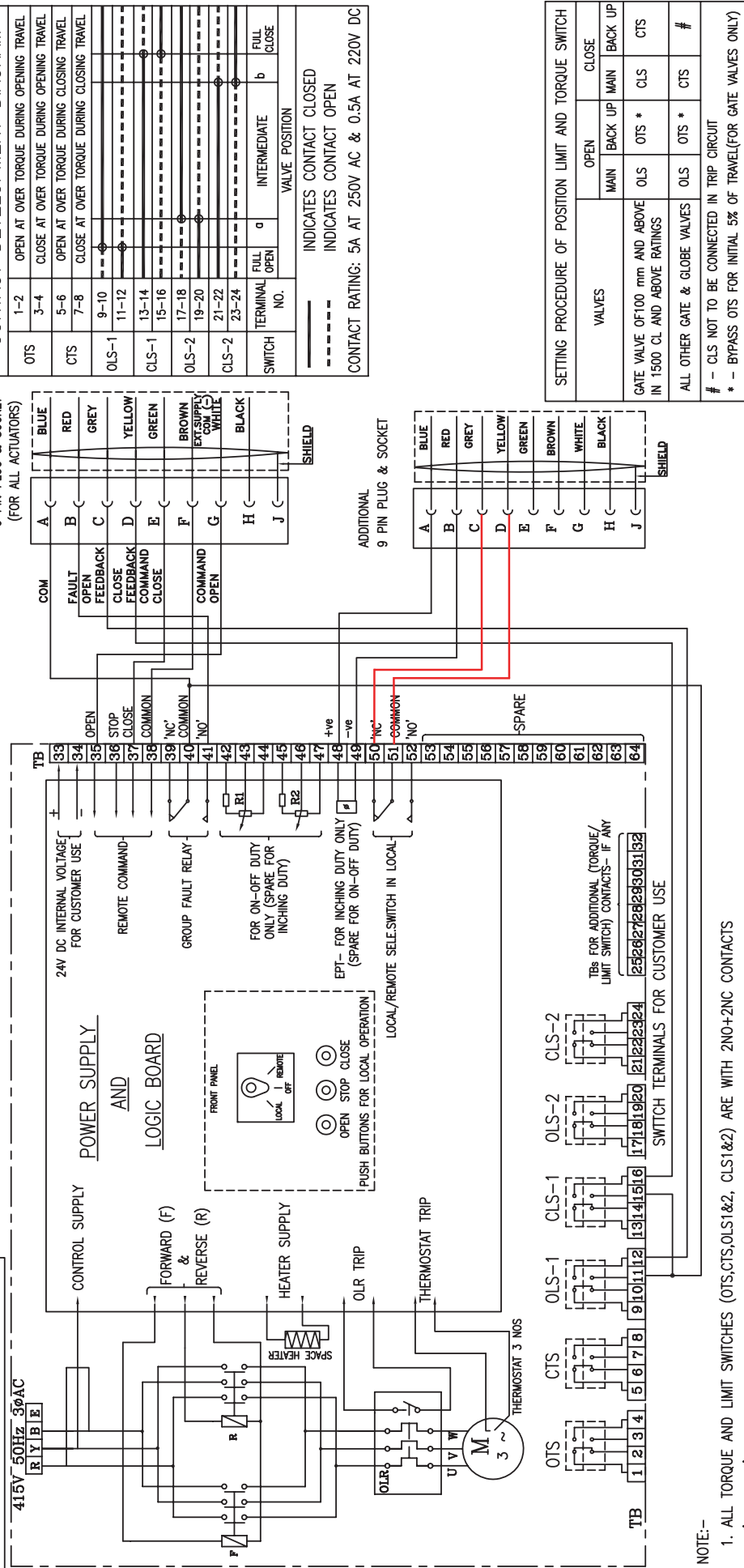
EPOXY PAINT IS RECOMMENDED FOR COASTAL AREAS.

	PREPARED BY	CHECKED BY	APPROVED BY	VENDOR COMPANY SEAL
NAME	MADHAV GUPTA	VIPUL KUMAR VERMA	SHIVRAJ SINGH BANSALA	NAME
SIGNATURE				SIGNATURE
DATE	15.05.2019	15.05.2019	15.05.2019	DATE

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

@ BE FILLED BY ES

DRAWING NO. 58272-CSI-M-A-3



TYPE OF PRODUCT
OR NAME OF CUSTOMER/PROJECT

ELECTRICAL VALVE ACTUATORS (AC) WITH INTEGRAL STARTERS
FOR NTPC PROJECTS
(DRAWN FOR INTERMEDIATE POSITION OF VALVES)

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPPALLI-620014.

DEPT	VL	SCALE	WEIGHT (KG)	REFERENCE INFORMATION
365-121	-	NIS	-	

DRN	N.P.ESWAR	SIGN	DATE	NO. OF VAR
CHD	D.DINAKARAN	D.D	17.03.05	-
APPD	K.ARUNACHALAM	K.A	17.03.05	-

WIRING DIAGRAM (TERMINAL PLAN)
FOR ACTUATOR WITH INTEGRAL STARTER WITH PLUG & SOCKET FOR NTPC PROJECTS

DRAWING NO. 3-V-MISC-24283

REV 0

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

	TECHNICAL SPECIFICATION STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-435-100-M001	
		SECTION: -	
		REV. NO.: 00	DATE: 23.01.2020
		SHEET 1 OF 1	

SECTION-II

COMPLIANCE SHEET

	COMPLIANCE SHEET STEEL GATE/GLOBE/NRV- WATER SERVICE		Page 64 of 64 SPECIFICATION NO. PE-TS-435-100-M001	
			SECTION : II	
			REV. NO.: 00	DATE: 23.01.2020
			Sheet 1 of 1	

A. I hereby comply/not comply (*) to all the requirements of this technical specification in totality.

In case the bidder does not comply to the technical specification, the deviations shall be explicitly listed in the technical deviation sheet of GCC. Deviations listed in technical deviation sheet shall only be considered.

B. Specify DUPLEX SS grade for “stem” for items at Sl. No.14 and 20 specified in Data Sheet-A.

Sl.No. (As per Data Sheet-A)	Valve Type	Valve Size (NB)	Valve Stem Material	Duplex SS Grade (To be filled by Bidder)
14	Globe valve (GLV)	25	Duplex SS	
20	Globe valve (GLV)	50	Duplex SS	

(* - THE BIDDER SHALL PROVIDE VALVES WITH THE SAME OR SUPERIOR GRADE DURING CONTRACT STAGE)

Name of Bidder / Authorized Representative :-

Designation :-

Signature:-

Company Seal :-

Date :-
