

TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD.

2X800 MW UPPUR STPP

TECHNICAL SPECIFICATION

FOR

BUTTERFLY VALVES (WATER SYSTEM)

SPECIFICATION NO. PE-TS-425-100-M008



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

	TECHNICAL SPECIFICATION BUTTERFLY VALVES (WATER SYSTEM)	SPECIFICATION NO. PE-TS-425-100-M008	
		REV. NO.: 00	DATE:01/05/2018
		SHEET 1 OF 1	

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SECTION-I

SPECIFIC TECHNICAL REQUIREMENTS

	SPECIFIC TECHNICAL REQUIREMENTS BUTTERFLY VALVES (WATER SYSTEM) 2X800MW UPPUR TPP		SPECIFICATION NO. PE-TS-425-100-M008
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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 sheets 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, as mentioned in Datasheet-A (Sheet-1).
- 2.3 Set of special tools and tackles if required for the maintenance, erection etc. of the equipment supplied.
- 2.4 Mandatory spares, as mentioned in Datasheet-A (Sheet-1)..
- 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 and manufacture of the butterfly valves shall suit the design parameters specified in Datasheet-A & comply with the requirements of latest revisions of the following standards. However, the testing shall be as per AWWA C504 including disc strength test (all sizes of valves), gear box POD Test & Valve POD test.
 - a. American Water Works Association standard AWWA C504.
 - b. BS EN 593 (replaces BS 5155).
- 3.2 In case of any conflict between the above Codes/Standards and this specification, the latter shall prevail and in case any further conflict in this matter, the interpretation of the specification by the BHEL engineer shall be final & binding.

4. DESIGN REQUIREMENTS:

- 4.1 Valves for design pressure up to 10.5 kg/cm² shall be offered as per AWWA C504 in Cl.150 rating. Valves for design pressure greater than 10.5 kg/cm² shall be offered as per BSEN 593.
- 4.2 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.

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- 4.3 The butterfly valves shall be suitable for indoor/outdoor installation with shaft either in horizontal or vertical position.
- 4.4 The butterfly valves shall be of short body, double flanged, minimum double offset seat design and either eccentric or a concentric disc configuration type, with shaft suitable for mounting either in horizontal or vertical position. The design should ensure bubble tight shut off at the design pressure as indicated in the Data sheet-A. Flanges shall be as per ASME B 16.5 for valves manufactured as per AWWA C504 and BS EN 1092-1 for valves manufactured as per BS EN 593 design. Flanges shall be raised face for steel.
- 4.5 Materials:
- 4.5.1 The materials of construction of main parts of the butterfly valves shall be specified in Data sheet-A.
- 4.5.2 The materials of construction of the remaining parts shall be as per relevant standard governing the valves and to suit the service conditions. These materials shall be subject to approval of the purchaser.
- 4.5.3 Materials used in manufacture of valves shall be of tested quality.
- 4.6 Accessories:
- The butterfly valve shall include electric operators with hand operated gearing mechanism, if specified in Data sheet-A. Valves with manual operation up to 150 NB size shall be lever operated and for sizes greater than 150 NB they shall be gear operated (gearing mechanism totally enclosed in the casing). Gear Box shall be POD tested as per AWWA C504.

5. CONSTRUCTION FEATURES

- 5.1 Valve Body:
- 5.1.1 The valve body shall have integral flanges (for flanged type valve) and hubs for shaft bearing housing (for AWWA standard valves). The minimum body shell thickness and minimum diameter of seat bore shall be as per the requirement of the applicable table of AWWA-C504. For BS standard valves, body rating for steel material shall be as per ASME B16.34 (standard class).
- 5.1.2 An arrow shall be embossed/ engraved and painted on outside of body to clearly indicate the direction of flow.
- 5.2 Valve Shaft:
- 5.2.1 The shaft of each butterfly valve shall be securely attached to the disc through Bolting, Riveting, threading, upsetting or cross pinning, adequately locked.
- 5.2.2 Valve shaft design shall consist of one piece unit extending completely through the valve disc. or may be the "Stub Shaft" type which consists of

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diameter. The connection between the shaft and the disc shall be designed to transmit shaft torque equivalent to at least 75% of the torsional strength of the minimum required shaft diameter. The minimum shaft diameter shall be as per the relevant standard and shall be such that it will safely sustain the maximum differential pressure across the closed valve and transmit the maximum torque required to operate the valve.

5.2.3 Surface finish for shaft shall be minimum 16 RMS in the area of gland packing.

5.3 Valve Disc:

The valve disc shall have no external ribs transverse to the flow and shall sustain full differential pressure across a closed valve disc without exceeding a working stress of one fifth of the tensile strength of the material used. The valve disc shall be designed to rotate 90° from full open to tight shut off position. The thickness of valve disc shall be designed as per applicable standard.

5.4 Body Seat & Disc Seal (Valve seat)

The soft seat shall be of replaceable type of suitable grade resilient material, adequately reinforced, securely attached to the disc or to the body, and shall be designed to provide bubble tight shut off under all operating conditions. The soft seat/ seal shall be attached by clamping ring, bolting or other suitable methods as per the standard design of the manufacturer. All clamping rings, bolts/studs, nuts used shall be of stainless steel. The sealing ring on the disc shall be continuous type and easily replaceable.

The mating seat surface accordingly shall be on valve body or disc and shall be of stainless steel and securely attached to the body/disc by directly clamping, bolting or suitable methods. All clamps, retaining rings, nuts, screws / all hardware shall be of stainless steel.

5.5 Valve Bearing:

Each butterfly valve shall be fitted with sleeve type bearings contained in the hub of the valve body. The bearing shall be of self-lubricating type and the coefficient of friction of bearing material shall not exceed 0.25 when rubbing at the maximum bearing pressure. The housing for this bearing shall be rigidly attached to the valve body. Thrust bearings shall also be provided for vertical shaft installation. For valves of 350 NB and larger, the bearing should be capable of taking axial thrust also. The material of the bearing shall be self-lubricated type & low coefficient of friction and in accordance with the relevant standard.

5.6 Shaft Seal:

Wherever the shaft projects through the valve body for operation connection, a shaft seal shall be provided. Shaft seal shall be designed for use of Standard 'O' rings seals (minimum 2 nos. for each side for inner face & 2 nos. at outer face and they shall be contained in a removable corrosion resistant recess. Shaft seals shall be designed to allow its replacement without removal of the valve shaft. If gland packing is provided then gland & gland flange both shall be in two pieces construction for uniform tightening.

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5.7 Nameplate:

Each valve shall be fitted with a circular Stainless steel 2mm thick nameplate indicating the valve Tag No., size and service description as given in Data sheet-A. All details shall be engraved 1 mm deep and filled with black enamel paint.

5.8 All valves shall be fitted with position indicators to indicate valves 'open' and 'shut' position.

5.9 The stops which limit the travel of any valve in the 'Open' or 'Shut' position shall be arranged exterior to the valve body.

5.10 All valves shall be closed by rotating the hand wheel in a clockwise direction when looking at the face of the hand wheel. The hand wheels of diameters 300mm or less shall be provided with handles for ease of operation. The pulling force required on hand wheel rim shall not exceed 25 Kgf when operating the valve under full flow and operating pressure. The face of each hand wheel shall be clearly marked with the words 'Open' and 'Shut' with arrows adjacent to indicate the direction of rotation to which each refers.

5.11 Special attention shall be given to the operating mechanism (gear box) for large size valves (200 NB & above) in order that quick and easy operation is obtained and maintenance is kept to a minimum.

5.12 Eyebolts shall be provided where necessary to facilitate handling of heavy valves or part of valves.

5.13 All valves and accessories shall be designed for easy dismantling and maintenance.

5.14 Wherever practicable, heavy valves of total weight including actuator drive motor, etc. equal to or greater than 500 Kgs. shall be provided with suitable lugs to permit direct suspension by hanger rods or direct resting on bottom support, as applicable.

6. SPECIAL FEATURES:

6.1 Motorized Valves:

6.1.1 The motorized valves shall be offered with the electric actuators of reputed make. 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 Datasheet A.

6.1.2 Electric actuators shall be mounted directly on the valves.

6.1.3 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.

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7. QUALITY ASSURANCE

- 7.1 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.
- 7.2 The Quality Plan enclosed with this specification specify minimum quality control requirement. During contract stage vendor shall furnish this Quality Plan duly signed & stamped for BHEL approval. Quality plans 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 be informed later. In case of the foreign bidder, inspection shall be carried out by reputed third party.
- 7.3 The charges for third party inspection (Lloyds, TUV or equivalent) for foreign bidders shall be included in the base price of the item by the bidder. This third party agency shall be approved by BHEL. Bidder to inform the same in the offer and mention the same in Quality Plan.

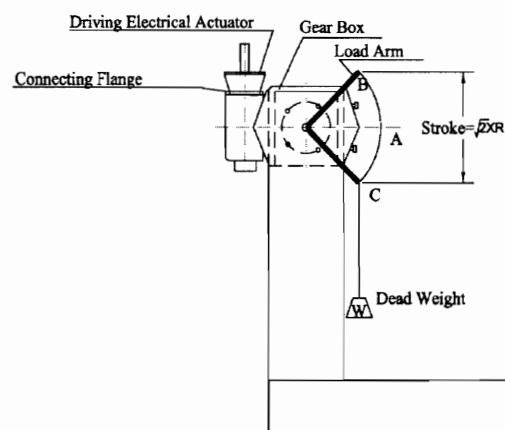
Note: There may be minor changes in quality plan depending on customer/consultant comments which will have to be accommodated by vendor at no extra cost.

8. P.O.D. Tests:

- 8.1 POD (Proof-of-design) Test as per AWWA C504 is required to be carried out for valves. In case the valve POD Test has been done earlier, only Test Report of POD test for same model/ type/size/ rating is required to be submitted for verification. If POD test for valves/gear box are required to be carried out than the vendors shall do so at their own cost. No extra charge on this account will be admissible to the vendors.
- 8.2 Gear Box and Electric Actuator shall be designed & tested in accordance with latest editions of AWWA C 504(valve) and AWWA C 540 (actuator) respectively. Gear Box shall be designed to hold the valve disc in intermediate position between full open and full closed position without creeping or fluttering.
- 8.3 For valves designed and manufactured as per AWWA and BS, valve POD shall follow the guidelines of AWWA-C-504. Actuators shall meet the requirements of POD test of AWWA-C-540.
- 8.4 Gear box POD test: - Valve POD and gear box POD tests should be done separately. Gear box POD test shall be done as per the procedure described below or as per the procedure agreed between purchaser & vendor.
- 8.5 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;

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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

9. PERFORMANCE GUARANTEE:

- 9.1 The vendor shall guarantee the material & workmanship of all components as well as operation of the equipment as per the requirements of the specification.
- 9.2 The vendor shall also guarantee for each of the butterfly valve for the following:
 - a. Minimum pressure drop
 - b. The valve opening and closing time as specified in specific requirements for electric operated valves.

10. 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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11. PAINTING REQUIREMENT:

Two (2) coats of primer followed by three (3) coats of epoxy of approved color code/shade (color/shade will be as per approved GA drawing) shall be applied to all exposed surfaces of CI valves to prevent corrosion, before dispatch. The total DFT of painting shall be 150 micron (minimum).

If during transport, unloading/unpacking or erection at site any part of the painted surface gets damaged, the same shall be made good by the vendor by repainting with compatible painting primer and enamel to the satisfaction of BHEL.

No painting is required in case of Duplex SS valves.

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 of dispatch of valves will be given only after satisfactory packing condition of valves from vendors work.

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13. SPARES

- 13.1 **Mandatory Spares:** As mentioned in Datasheet-A.
- 13.2 Order for the spares may be placed simultaneously or otherwise at the option of purchaser.

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.

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SECTION-II

- DATA SHEET – A
- QUALITY PLAN
- COMPLIANCE SHEET

	DATA SHEET-A BUTTERFLY VALVES (WATER SYSTEM) 2X800MW UPPUR STPP	SPECIFICATION NO. PE-TS-425-100-M008	
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Material of Construction

SERVICE: SEA WATER (ACW):

SL. NO	PART NAME	MATERIALS FOR DUPLEX SS VALVES
1	BODY (RAISED FACED FLANGED SHORT BODY)	DUPLEX SS
2	DISC	DUPLEX SS
3	BODY SEAT	DUPLEX SS
4	DISC SEAL	EPDM
5	SEAL RETAINING RINGS	DUPLEX SS
6	INTERNAL BOLTS/ HARDWARES	DUPLEX SS
7	EXTERNAL HARDWARES BOLTS AND NUTS	DUPLEX SS
8	SHAFT	DUPLEX SS
9	SHAFT SEALS - (O' RING)	NITRILE RUBBER
10	GUIDE BUSH	ASTM A439 Gr.D2/ ASTM B62-85-5-5-5
11	BEARING	SLEEVE TYPE, SELF LUBRICATED
12	PACKING	PTFE / NITRILE
13	PACKING FOLLOWER/ PLATE	DUPLEX SS
14	THRUST PAD	DUPLEX SS
15	BOTTOM PLATE/ CAP	DUPLEX SS
16	BOTTOM GASKET/ 'O' RING	NITRILE RUBBER
17	GEARS (TOTALLY ENCLOSED)	STEEL TO IS: 2004 CL. 4 / EN8
18	HANDWHEEL/LEVER	MALLEABLE IRON

NOTES:

- THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS OF DATASHEET-A (SHEET 1 OF 2) AT S. No. 1
- MATERIALS FOR ITEMS NOT SPECIFIED ABOVE SHALL ALSO BE EQUIVALENT AND SUITABLE FOR SEA WATER APPLICATION.
- THE BIDDER SHALL CLEARLY SPECIFY THE GRADE OF DUPLEX SS MATERIAL CONSIDERED IN THE OFFER FOR THESE ITEMS (S No.1). THE BIDDER SHALL PROVIDE VALVES WITH SAME OR SUPERIOR GRADE DURING THE CONTRACT STAGE.

Prashant Singh

	DATA SHEET-A BUTTERFLY VALVES (WATER SYSTEM) 2X800MW UPPUR STPP	SPECIFICATION NO. PE-TS-425-100-M008	
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SERVICE: WATER (DMCW):

SL. NO	PART NAME	MATERIALS FOR CAST IRON VALVES
1	BODY (FLAT FACED FLANGED SHORT BODY)	IS 210 Gr. FG 260 +2% Ni (EPOXY COATED)
2	DISC	IS 210 Gr. FG 260 +2% Ni (EPOXY COATED)
3	BODY SEAT	ASTM A 240 TYPE 304
4	DISC SEAL	NITRILE RUBBER
5	SEAL RETAINING RINGS	ASTM A 479 TYPE 316/ AISI 316
6	INTERNAL BOLTS/ HARDWARES	ASTM A193 Gr.B7/ A194 Gr.2H
7	EXTERNAL HARDWARES BOLTS AND NUTS	ASTM A 193 Gr.B7
8	SHAFT	ASTM A 479 TYPE 410 CLASS 2
9	SHAFT SEALS - (O' RING)	PTFE/ BUNA-N / NITRILE RUBBER
10	GUIDE BUSH	ASTM A439 Gr.D2/ ASTM B62-85-5-5-5
11	BEARING	SLEEVE TYPE, SELF LUBRICATED
12	PACKING	PTFE / NITRILE
13	PACKING FOLLOWER/ PLATE	ASTM A479 TYPE 316
14	THRUST PAD	ASTM A240 TYPE 316
15	BOTTOM PLATE/ CAP	ASTM A479 TYPE 316
16	BOTTOM GASKET/ 'O' RING	CAF/ EPDM
17	GEARS (TOTALLY ENCLOSED)	STEEL TO IS: 2004 CL. 4 / EN8
18	HANDWHEEL/LEVER	MALLEABLE IRON

NOTE:

1. THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS OF DATASHEET-A (SHEET 1 OF 2) AT S. No. 2, 3, 4, 5 & 6.

Prashant Singh

QUALITY PLAN			CUSTOMER: TANGEDCO		PROJECT: 2X800MW UPPUR STPP				SPEC. NO :PE-SS-425-100-M008		
			BIDDER/VENDOR: LATER		QAP NO PE-QP-425-100-M020		REV.00 dtd 01-05-18		SPEC. TITLE TWO WAY BUTTERFLY VALVE		
			SYSTEM WATER SYSTEM LP VALVES		ITEM: DUPLEX STEEL & CI BUTTERFLY VALVES				SECTION II		
SHEET 1 OF 5	CHARACTERISTICS CHECKED	CATE GOR Y	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS		
								P	W	V	

RING & S.S. VALVE	1 MECH./CHEM PROPERTIES	MA	CHEM & PHYS. TESTS	ONE/ HEAT/ BATCH	APPD DRG/ TECH SPEC	APPD DRG/ TECH SPEC	TEST CERT.	3/2	2	1	- CORRELATION REQUIRED FOR BODY DISC - FOR CI ONLY MECH. PROPERTIES DIA 40 MM & GREATER RT ON SS VALVES (FILM REVIEW BY BHEL) - SOLUTION ANNEALING FOR OTHER MATL. AS PER REL. SPEC FOR S.S MATING SEAT THICKNESS 25MM & ABOVE	
	2.DIMENSIONS	MA	MEASURE- MENT UT(**)	100%	TECH. SPEC	TECH SPEC	LOG BOOK	2	2	1		
	3. SUB-SURFACE DEFECTS OF SHAFT	CR		100%	ASTM A388	ASTM A388	TEST CERT.	3/2	2	1		
	4. CASTINGS SURFACE DEFECTS	CR	1) VISUAL	100%	MSS SP55	MSS SP55	--DO--	3/2	2	1		
			2) MPI	100%	ASTM E-709/165	NO DEFECTS	--DO--	3/2	2	1		
			3) DPT	100%	ASTM E165	-DO-	-DO-	3/2	2	1		
			4) RT	100%	ASM E B16.34	ASM E B16.34	-DO-	3/2	2	1		
	5. HEAT TREATMENT	MA	REVIEW OF HT RECORD	100%	TECH. SPEC	REL. MATL. STD	MATL. T.C	3/2	2	1		
	1)CHEM., PHYS PROPS	MA	CHEM. PHYS TESTS	1/HEAT	TEST SPEC/ APPD DATA SHEET	TECH SPEC/APPD DATA SHEET	LAB REPORT	3/2	2	1		
	2) INTERNAL DEFECTS	MA	UT TEST(**)	100%	ASTM A388	ASTM B16.34 APPENDIX-IV	TEST CERT	3/3	2	1		
	3) VISUAL INSPN	MA	VISUAL	100%	TECH. SPEC	NO DEFECTS	TEST CERT.	3/2	2	1		
	4)CHEMICAL TESTING OF BODY SEAT RING, MATING SEAT (SS)	CR	IGC TEST	1/HEAT/BA TCH	ASTM A262	ASTM A262 PRACTICE 'E'	TEST REPORT	3/2	2	1		

BHEL			PARTICULARS		BIDDER/VENDOR	
PRABHJYOT SINGH			NAME			
<i>Prabjyot Singh</i>			SIGNATURE			
01.05.2018			DATE		BIDDER'S/ VENDOR'S COMPANY SEAL	

QUALITY PLAN			CUSTOMER: TANGEDCO		PROJECT: 2X800MW UPPUR STPP		SPEC. NO.:PE-SS-425-100-M008	
			BIDDER/VENDOR: LATER		QAP NO. PE-QP-425-100-M020		REV.00 dtd 01-05-18	
			SYSTEM		WATER SYSTEM LP VALVES		ITEM: DUPLEX STEEL & CI BUTTERFLY VALVES	
SHEET 2 OF 5			CHARACTERISTICS CHECKED		CATE GOR Y		TYPE/ METHOD OF CHECK	
			EXTENT OF CHECK		REFERENCE DOCUMENT		ACCEPTANCE NORMS	
			FORMAT OF RECORD		AGENCY		REMARKS	
			P		W		V	
			SECTION II					

LITITY PLAN		CUSTOMER: TANGEDCO		PROJECT: 2X800MW UPPUR STPP		SPEC. NO.: PE-SS-425-100-M008			
BIDDER/VENDOR: LATER		QAP NO.: PE-QP-425-100-M020		REV. 00 dtd 01-05-18		SPEC. TITLE TWO WAY BUTTERFLY VALVE			
SHEET 3 OF 5		SYSTEM WATER SYSTEM LP VALVES		ITEM: DUPLEX STEEL & CI BUTTERFLY VALVES		SECTION II			
CHARACTERISTICS CHECKED	CATE GOR Y	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS	
						P	W	V	
b) GEAR BOX P.O.D. (LIFE CYCLE TEST)	MA	(CYCLE TESTING)	ONE/ TYPE/ SIZE / RATED TORQUE	APPROVED PROCEDURE/ AWWA C504 CL 4.5.8.5.9	APPROVED PROCEDURE/ AWWA C504 CL 4.5.8.5.9	TEST CERT.	2	1*	REFER NOTE
1. TORQUE TESTING & SETTING OF TORQUE SWITCH	MA	{MECH., ELEC. TESTS	100%	TECH. SPEC./ APPD. DRG./ DATA SHEET/ IS:9334	APPD. DRG./ DATA SHEET/ IS:9334	INSPN. REPORT	3	2	1
2. TRAVEL/STROKE	MA	}							
3. TRAVEL TIME	MA	}							
4. OPERATION OF LIMIT SWITCH	MA	}							
5. MANUAL OPERATION THROUGH HAND WHEEL	MA	}							
6. OPERATION TEST WITH POWER SUPPLY VARIATION ENERGISES TO OPEN/CLOSE	MA	}							
7. IR, HV, IR	MA	{WATER, DUST TEST	1/ TYPE	TECH. SPEC./ APPD. DRG./ DATA SHEET/ IS:9334	APPD. DRG./ DATA SHEET/ IS:9334	3RD PARTY TEST CERT.	3	-	2,1
8. DEGREE OF PROTECTION	MA	{TYPE TEST	ONE/MODEL / TYPE/ SIZE / RATING	AWWA C540/	AWWA C540	TEST CERT	3/2	2	1*
9. DESIGN VERIFICATION	MA								
1 DIMENSIONS	MA	MEASURE- MENT VISUAL	100%-	MFG DRG	MFG DRG	LOG BOOK	2	2	1
2. SURFACE DEFECTS	CR		100%	FINISH	NO VISUAL DEFECTS	INSP REPORT	2	2	1
3. SURFACE DEFECTS	CR	DP/ MPI	100%	ASTM E165	NO SURFACE DEFECTS	INSP REPORT	3/2	2	1
									MACHINED AREAS
1. DISC STRENGTH TEST	MA	HYDRO TEST	ONE/ TYPE/	AWWA C504	AWWA C504	TEST CERT.	3/2	1*	Refer note
BHEL		PARTICULARS		BIDDER/VENDOR					
PRABHJYOT SINGH		NAME							
<i>Prabhyot Singh</i>		SIGNATURE							
01.05.2018		DATE							
				BIDDER'S/ VENDOR'S COMPANY SEAL					

QUALITY PLAN			CUSTOMER: TANGEDCO		PROJECT: 2X800MW UPPUR STPP		SPEC. NO :PE-SS-425-100-M008			
BIDDER/VENDOR: LATER			QAP NO:PE-QP-425-100-M020		REV.00 dtd 01-05-18		SPEC. TITLE TWO WAY BUTTERFLY VALVE			
SHEET 4 OF 5		SYSTEM	WATER SYSTEM LP VALVES		ITEM: DUPLEX STEEL & CI BUTTERFLY VALVES		SECTION II			
CHARACTERISTICS CHECKED	CATE GOR Y	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY		REMARKS	
							P	W	V	
TESTS	2. LIFE CYCLE TESTING	MA	SIZE/ CLASS ONE/TYPE/ CLASS / SIZE GROUP 100%	CL 5.1.4 APPROVED PROCEDURE/ AWWA C504 CL 5.1.4 APPD. DRGS/ RELV STD	CL 5.1.4 APPROVED PROCEDURE AWWA C504 CL 5.1.4 NO LEAKAGE	TEST CERT.	3/2	1*	--	Refer note
	1. SHELL TEST	MA	HYDRO TEST			TEST CERT	2	1	--	Refer note
	2. SEAT LEAKAGE	MA	HYDRO TEST/ AIR TEST (IF AIR TEST SPECIFIED IN APPD DRG)	100%	APPD. DRGS/ RELV STD	NO LEAKAGE	TEST CERT	2	1	--
TESTING	1. SETTING OF LIMIT, TORQUE SWITCHES & OPERATION	MA	TESTING	100%	TECH SPEC/ APPD.DRG/ APPD DATA SHEET/IS:9334	TECH SPEC/ APPD.DRG/ APPD DATA SHEET/IS:9334	TEST CERT.	3/2	1	
	2. OPERATION TEST WITH POWER SUPPLY ENERGISED,OPEN/ CLOSE & CURRENT DRAWN	MA	TESTING	100%	TECH SPEC/ APPD.DRG/ APPD DATA SHEET/IS:9334	TECH SPEC/ APPD.DRG/ APPD DATA SHEET/IS:9334	TEST CERT.	3/2	1	
TESTING	1.VALVE & ACTUATOR PERFORMANCE	MA	**	100%	TECH SPEC/ RELV STD	SMOOTH OPERATION	TEST CERT	2	1	**OPERATING THREE TIMES FROM THE FULLY CLOSED TO THE FULLY OPENED AND THE REVERSE UNDER DESIGN CONDITION. MANUALLY AS WELL AS THROUGH OPERATOR.
INSPECTION	1. OVERALL L DIMENSION	MA	MEAS.	100%	APPD DRG		INSPN REPORT	2	1	
	2. CLEANLINESS	MA	VISUAL	100%	APPD DRG/ TECH SPEC		INSPN REPORT	2	2	1
	3. NAMEPLATE WITH VALVE TAG NOS.	MA	VISUAL	100%	APPD DRG/ TECH SPEC		INSPN REPORT	3/2	2	1
BHEL			BIDDER/VENDOR							
PRABHJYOT SINGH			NAME							
Prabhjot Singh			SIGNATURE							
01.05.2018			DATE							
			BIDDER'S/ VENDOR'S COMPANY SEAL							

LITY PLAN		CUSTOMER: TANGEDCO		PROJECT: 2X800MW UPPUR STPP		SPEC. NO :PE-SS-425-100-M008	
		BIDDER/VENDOR: LATER		QAP NO. PE-QP-425-100-M020		REV.00 dtd 01-05-18	
SHEET 5 OF 5		SYSTEM	WATER SYSTEM LP VALVES	ITEM: DUPLEX STEEL & CI BUTTERFLY VALVES		SECTION II	
CHARACTERISTICS CHECKED	CATE GOR Y	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P W V
							REMARKS

AS PER BHEL TECH. SPEC	MA	VISUAL	100%	AS PER TECH. SPEC.	COMPLAANCE REPORTS & PHOTOGRAP H	3/2	2	1	FOR CI VALVES ONLY
SOUNDNESS	MI	VISUAL	100%	AS PER TECH SPECIFICATION	INSP REPORT	2	2	1	PHOTOGRAPHS OF WOODEN CASES HAVING DULY PACKED VALVES TO BE FURNISHED TO BHEL-PEM FOR VERIFICATION TO OBTAIN MDCC

NEW/ VERIFICATION OF INSPECTION REPORTS / TEST CERTIFICATES, IN CASE THESE TESTS CARRIED OUT EARLIER ON THE IDENTICAL SIZE/CLASS RATING/ SIZE GROUP OF TESTED VALVES, GEAR BOX, ACTUATOR AND WITNESS BY REPUTED CUSTOMER LIKE NTPC OR THIRD CTION AGENCY LIKE LLOYDS, TUV , DNV ETC. If the same above TCs are not available then the required type tests to be carried out by the tical valves, electric actuators, gear box without any commercial implications/ at their own cost AND the POD tests shall be witnessed by BHEL/

NS: CHP=CUSTOMER HOLD POINT CR= CRITICAL ACTIVITY MA= MAJOR ACTIVITY PT= DYE PENETRATION TEST P=PERFORMED BY Y W= WITNESSED BY (customer at random) TC= TEST CERTIFICATE, UT=Ultrasonic test, 2= VENDOR 3= SUB VENDOR I R= INSPECTION REPORT MPI=magnetic particle inspection, trant inspection,

TEAM PROBE OF 20/10MM DIA & 2/2.5 MHz SHALL BE USED. USING THIS PROBE THE BACK WALL ECHO SHALL BE SET AT 100% FULL SCREEN IN SOUND AREA. AT THIS SENSITIVITY LEVEL THE ITEM SHALL BE SCANNED & ANY DEFECT ECHO MORE THAN 20% FSH IS NOT ALSO ANYWHERE COMPLETE LOSS OF BACK WALL ECHO IS NOT ACCEPTABLE

BHEL PRABHIYOT SINGH <i>Prabhiyot Singh</i> 01.05.2018	PARTICULARS	BIDDER/VENDOR
	NAME	
	SIGNATURE	
	DATE	BIDDER'S/ VENDOR'S COMPANY SEAL

	COMPLIANCE SHEET BUTTERFLY VALVES WATER SERVICE		SPECIFICATION NO. PE-TS-425-100-M008
			SECTION : II
	REV. NO.: 00		DATE: 01.05.2018
	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 items at Sl. No.1 in Data Sheet-A.

Name of Bidder / Authorized Representative :-

Designation :-

Signature:-

Company Seal :-

Date :-

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.: PE-TS-425-100-M016	
			SECTION II	
			REV. NO. 00	DATE: 17.01.18
			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	2X800MW UPPUR STPP (UNIT#1&2)	
	OFFER REFERENCE		
	* TAG NO. SERVICE	REFER DATASHEET-A	
	* DUTY	☐ ON / OFF ☒ INCHING	
	* LINE SIZE (inlet/outlet): MATERIAL	REFER DATASHEET-A	
	* VALVE TYPE	☐ GLOBE ☐ GATE ☐ REG. GLOBE ☒ BUTTERFLY	
	* OPENING / CLOSING TIME	REFER DATASHEET-A	
	* WORKING PRESSURE	REFER DATASHEET-A	
	AMBIENT CONDITION	SHALL BE SUITABLE FOR CONTINUOUS OPERATION UNDER AN AMBIENT TEMP. OF -20 to 70 DEG C AND RELATIVE HUMIDITY OF 0-95% IN HOT HUMID AND TROPICAL ATMOSPHERE AND HIGHLY POLLUTED AT PLACES OF COAL DUST AND FLY DUST	
	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, DUST TIGHT SUITABLE FOR OUTDOOR USE WITHOUT CANOPY, NEMA6/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 90% OF RATED VOLTAGE. FOR ISOLATING SERVICE THREE SUCCESSIVE OPEN-CLOSE OPERATIONS OR 15 MINS. WHICHEVER IS HIGHER. FOR INCHING SERVICE - 150 STARTS/HR MINIMUM.	
HANDWHEEL	* REQUIRED	☒ YES ☐ NO	
	* ORIENTATION	☐ TOP MOUNTED ☒ SIDE MOUNTED	
	*TO DISENGAGE AUTOMATICALLY DURING MOTOR OPERATION.		
ELECTRIC ACTUATOR	ACTUATOR MAKE/MODEL	BIDDER TO SPECIFY	
	MOTOR MAKE / MODEL / TYPE / RATING (KW)	BIDDER TO SPECIFY	
	@ MOTOR TYPE	SQUIRREL CAGE INDUCTION MOTOR, STARTING CURRENT LIMITED TO SIX TIMES THE RATED CURRENT-INCLUSIVE OF I.S. TOLERANCE	
	ACTUATOR APPLICABLE WIRING DIAGRAM	☒ ENCLOSED (BIDDER TO CONFIRM) A: ☐ DRG. NO. 3-V-MISC-24227 R00 B: ☐ DRG. NO. 3-V-MISC-24550 R00 C: ☒ DRG. NO. 3-V-MISC-24283 R00 D: ☐ DRG. NO. 4-V-MISC-90271 R11 E: ☐ For Thyristor based Integral starter, Bidder/Vendor to furnish wiring diagram	
	COLOUR SHADE	☐ BLUE (RAL 5012) ☒ SIEMENES GRAY RAL 7030	
	PAINT TYPE (## Refer Notes)	☐ ENAMEL ☒ EPOXY ☐	
	SHAFT RPM	BIDDER TO SPECIFY	
	OLR SET VALUE	BIDDER TO SPECIFY	
	@ STARTING / FULL LOAD CURRENT	BIDDER TO SPECIFY	
	NO. OF REV FOR FULL TRAVEL	BIDDER TO SPECIFY	
	@ PWR SUPP TO MTR / STARTER	415V +/- 10%, 3 Phase, 3 Wire 50HZ +/-5%	
	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED FROM THE POWER SUPPLY TO THE STARTER ☐ 230 V ☒ 110 V	

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.: PE-TS-425-100-M016	
			SECTION II	
			REV. NO. 00	DATE: 17.01.18
			SHEET 2	OF 4
Data Sheet A & B				
DATA SHEET-A (TO BE FILLED BY PURCHASER)			DATA SHEET-B (TO BE FILLED-UP BY BIDDER)	
INTEGRAL STARTER	@ INSULATION CLASS	CLASS-F TEMP. RISE LIMITED TO CLASS-B		
	@ WINDING TEMP PROTECTION	☒ THERMOSTAT (3 Nos., 1 IN EACH PHASE) ☐ -----		
	SINGLE PHASE / WRONG PHASE SEQUENCE PROTECTION	REQUIRED		
	INTEGRAL STARTER	☒ REQUIRED ☐ NOT REQUIRED		
	TYPE OF SWITCHING DEVICE	☒ CONTACTORS(Reversing type) ☐ THYRISTORS		
	TYPE	☒ CONVENTIONAL ☐ SMART (NON-INTRUSIVE)		
	IF SMART			
	a) SERIAL LINK INTERFACE	☐ INTEGRAL ☐ FIELD MOUNTED		
	b) SERIAL LINK PROTOCOL	☐ FOUNDATION FIELD-BUS ☐ PROFI-BUS ☐ DEVICE NET ☐		
	c) SERIAL LINK MEDIA	☐ TWISTED PAIR Cu-CBL ☐ CO-AXIAL Cu-CBL ☐ OFC		
	d) HAND HELD PROGRAMMER	☐ REQUIRED ☐ NOT REQUIRED		
	e) TYPE OF HAND HELD PROGRAMMER	☐ BLUETOOTH ☐ INFRARED ☐		
	f) MASTER STATION	☐ REQUIRED ☐ NOT REQUIRED		
	g) MASTER STN INTRFACE WITH DCS	☐ MODBUS ☐ TCP/IP		
	h) DETAILS OF SPECIAL CABLE	☐ ENCLOSED ☐ NOT REQUIRED		
	STEP DOWN CONT. TRANSFORMER	☒ REQUIRED		
	OPEN-STOP-CLOSE PB(running open/close LED) THREE POSITION SELECTOR SWITCH	☒ REQUIRED ☐ NOT REQUIRED		
	INDICATING LAMPS	☒ REQUIRED ☐ NOT REQUIRED		
LOCAL-OFF- REMOTE S/S(THREE POSITION SELECTOR SWITCH)	☒ REQUIRED ☐ NOT REQUIRED			
STATUS CONTACTS FOR MONITORING	☒ REQUIRED ☐ NOT REQUIRED			
INTEGRAL STARTER DISTURBED SIGNAL	REQUIRED (MOTOR THERMOSTAT TRIP/O/L RELAY OPERATED, CONT. /POWER SUPPLY FAILED, S/S IN LOCAL/OFF MODE, TORQUE SWITCH OPEN/CLOSE CUT OFF/STOP PB OPTD.)			
INTERPOSING RELAY/OPTO COUPLER (Applicable for integral Starter)	TYPE OF ISOLATING DEVICE	☐ INTERPOSING RELAY ☒ OPTO COUPLER ☐ EITHER		
	QUANTITY	☒ 2 Nos. ☐ 3 Nos.		
	DRIVING VOLTAGE	☒ 20.5 – 24V DC ☐ _____ V DC		
	DRIVING CURRENT	☒ 125mA MAX ☐ _____ mA MAX		
	LOAD RESISTANCE	☒ > 192 ohms - <25 k ohms ☐ > _____ ohms - < _____ ohms		
TORQUE SWITCH (Not Applicable for Smart Actuator) (\$\$ Refer Notes)	MFR & MODEL NO.	BIDDER TO SPECIFY		
	OPEN / CLOSE	☒ 1 No. ☐ 2Nos. / ☒ 1 No. ☐ 2Nos		
	CONTACT TYPE	2 NO + 2 NC		
	RATING	5A 250V AC AND 0.5A 220V DC		
	CALIBRATED KNOBS(OPEN&CLOSE TS)	REQUIRED FOR SETTING DESIRED TORQUE		
	ACCURACY	+3% OF SET VALUE		
LIMIT SWITCH (Not Applicable for Smart Actuator) (\$\$ Refer Notes)	MFR & MODEL NO.	BIDDER TO SPECIFY		
	OPEN : INT : CLOSE	☒ 2 Nos.	☐ 2 nos(adj)	☒ 1 No. ☐ 2Nos.
	CONTACT TYPE	2 NO + 2 NC		
	RATING (AC / DC)	5A 250V AC AND 0.5A 220V DC		

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.: PE-TS-425-100-M016	
			SECTION II	
			REV. NO. 00	DATE: 17.01.18
			SHEET 3	OF 4
Data Sheet A & B				
DATA SHEET-A (TO BE FILLED BY PURCHASER)			DATA SHEET-B (TO BE FILLED-UP BY BIDDER)	
POSITION TRANSMITTER	POSITION TRANSMITTER (For inching duty & other specific applications)	REQUIRED for regulating/inching duty only.		
	MFR & MODEL NO.	BIDDER TO SPECIFY		
	TYPE	☐ ELECTRONIC (2 WIRE) R/I CONVERTER ☒ ELECTRONIC (2 WIRE) contactless inductive type		
	SUPPLY	☒ 24V DC ☐		
	OUTPUT	☒ 4-20mA		
	ACCURACY	$\pm 1\%$ FS		
SPACE HEATER	@SPACE HEATER	REQUIRED		
	@ POWER SUPPLY (NON INTEGRAL)	230V AC, 1 PH., 50 Hz		
	@ POWER SUPPLY (INTEGRAL)	BIDDER TO SPECIFY		
	@ RATING			
TERMINAL BOX	ACTUATOR/MOTOR TERMINAL BOX	REQUIRED		
	ENCL CLASS ACTUATOR/MOTOR T.B.	☒ IP 68 @ ☐ NEMA6		
	@ EARTHING TERMINAL	REQUIRED		
	PLUG & SOCKET(9 PIN) (FOR COMMD, LS/TS FEED BACK, PoT)	☒ REQUIRED ☐ NOT REQUIRED ☐ ☒ 2 NOS. ☐		
CABLE GLANDS	@ POWER CABLE GLAND	SIZE: SHALL BE FURNISHED DURING DETAIL ENGG. AFTER RECEIPT OF MOTOR RATING		
	@ SPACE HEATER CABLE GLAND	SIZE: 2C X 2.5 SQ MM Cu XLPE		
	OTHER CONTROL CABLE GLANDS-1	☐ 1No. for BFV of CW PUMP(Cable size 2Px1.5mm2)		
	OTHER CONTROL CABLE GLANDS-2	1 no suitable for 8P X 0.5 sq mm Additional 1 no suitable for 2P X 0.5 sq mm(inching duty only)		

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.: PE-TS-425-100-M016	
			SECTION II	
			REV. NO. 00	DATE: 17.01.18
			SHEET 4	OF 4
Data Sheet A & B				
DATA SHEET-A (TO BE FILLED BY PURCHASER)			DATA SHEET-B (TO BE FILLED-UP BY BIDDER)	
WEIGHT	TOTAL WEIGHT (ACTUATOR + ACCESSORIES)	BIDDER TO SPECIFY		_____ Kg.
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 AND IS-4722 - 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 OPERATE SATISFACTORILY UNDER THE +/- 10% SUPPLY VOLTAGE VARIATION AT RATED FREQUENCY, -5% TO +3% VARIATION IN FREQUENCY AT RATED SUPPLY VOLTAGE, SIMULTANEOUS VARIATION IN VOLTAGE & FREQUENCY THE SUM OF ABSOLUTE PERCENTAGE NOT EXCEEDING 10%. - THE MOTOR SHALL BE SUITABLE FOR DIRECT ON LINE STARTING. \$\$ TORQUE SWITCH & LIMIT SWITCH SHALL ACT INDEPENDENT OF EACH OTHER. TANDEM OPERATION IS NOT ACCEPTABLE. ## EPOXY PAINT IS RECOMMENDED FOR COASTAL AREAS. - IT SHOULD BE POSSIBLE TO OPERATE THE ACTUATOR LOCALLY. LOCKABLE LOCAL/REMOTE SELECTION SHALL BE PROVIDED ON THE ACTUATOR. - POSITION INDICATOR SHALL BE PROVIDED FOR 0 TO 100 % TRAVEL - WIRING SHALL BE SUITABLE VOLTAGE GRADE COPPER WIRE 1.5 SQ. MM. - THE MOTOR SHALL BE CAPABLE OF STARTING AT 85 PERCENT OF RATED VOLTAGE AND 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. - THE ACTUATORS SHALL BE DESIGNED TO BE SELF-LOCKING UPON LOSS OF POWER. MOTOR SHALL BE DESIGNED TO CLOSE IN 30 SECS. FROM FULL OPEN POSITION AND SHALL HAVE ADEQUATE CAPACITY TO OPEN AND CLOSE UNDER FULL UNBALANCED DESIGN PRESSURE. - ALL SIX (6) LIMIT SWITCHES SHALL BE CHANGEOVER TYPE AND ADJUSTABLE BESIDES HAVING THE SNAP FACILITY. - THE 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. - THE REMOTE COMMAND SIGNAL (OPEN-STOP-CLOSE) FROM DCS/RESPECTIVE CONTROL SYSTEM/CONTROL PANEL SHALL BE ISOLATED FROM CONTROL ELECTRONICS THROUGH OPTO-ISOLATOR. - THE FOLLOWING INDIVIDUAL STATUS ANNUNCIATION LED'S (COLOUR-GREEN) 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				
NOTES* = TO BE FILLED BY MPL (LEAD AGENCY). = TO BE FILLED BY ES				

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.: PE-TS-425-100-M016	
			SECTION II	
			REV. NO. 00	DATE: 17.01.18
			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)

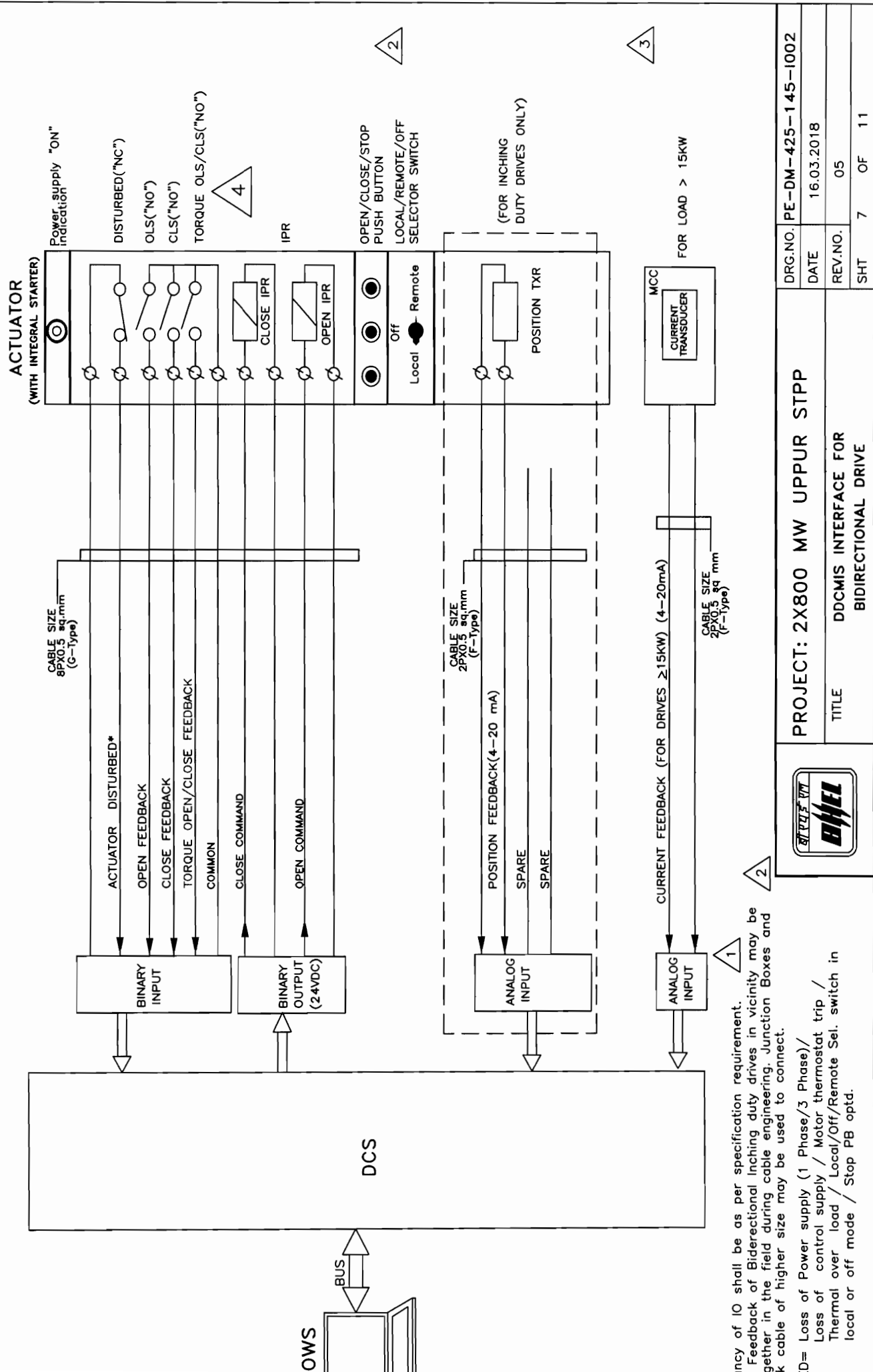
GENERAL*	* PROJECT	2X800MW UPPUR STPP (UNIT#1&2)	
	OFFER REFERENCE		
	* TAG NO. SERVICE	REFER DATASHEET-A	
	* DUTY	☒ ON / OFF ☐ INCHING	
	* LINE SIZE (inlet/outlet): MATERIAL	REFER DATASHEET-A	
	* VALVE TYPE	☐ GLOBE ☐ GATE ☐ REG. GLOBE ☒ BUTTERFLY	
	* OPENING / CLOSING TIME	REFER DATASHEET-A	
	* WORKING PRESSURE	REFER DATASHEET-A	
	AMBIENT CONDITION	SHALL BE SUITABLE FOR CONTINUOUS OPERATION UNDER AN AMBIENT TEMP. OF -20 to 70 DEG C AND RELATIVE HUMIDITY OF 0-95% IN HOT HUMID AND TROPICAL ATMOSPHERE AND HIGHLY POLLUTED AT PLACES OF COAL DUST AND FLY DUST	
	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, DUST TIGHT SUITABLE FOR OUTDOOR USE WITHOUT CANOPY, NEMA6/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 90% OF RATED VOLTAGE. FOR ISOLATING SERVICE THREE SUCCESSIVE OPEN-CLOSE OPERATIONS OR 15 MINS. WHICHEVER IS HIGHER. FOR INCHING SERVICE - 150 STARTS/HR MINIMUM.	
HANDWHEEL	* REQUIRED	☒ YES ☐ NO	
	* ORIENTATION	☐ TOP MOUNTED ☒ SIDE MOUNTED	
	* TO DISENGAGE AUTOMATICALLY DURING MOTOR OPERATION.		
ELECTRIC ACTUATOR	ACTUATOR MAKE/MODEL	BIDDER TO SPECIFY	
	MOTOR MAKE / MODEL / TYPE / RATING (KW)	BIDDER TO SPECIFY	
	@ MOTOR TYPE	SQUIRREL CAGE INDUCTION MOTOR, STARTING CURRENT LIMITED TO SIX TIMES THE RATED CURRENT-INCLUSIVE OF I.S. TOLERANCE	
	ACTUATOR APPLICABLE WIRING DIAGRAM	☒ ENCLOSED (BIDDER TO CONFIRM) A: ☐ DRG. NO. 3-V-MISC-24227 R00 B: ☐ DRG. NO. 3-V-MISC-24550 R00 C: ☒ DRG. NO. 3-V-MISC-24283 R00 D: ☐ DRG. NO. 4-V-MISC-90271 R11 E: ☐ For Thyristor based Integral starter, Bidder/Vendor to furnish wiring diagram	
	COLOUR SHADE	☐ BLUE (RAL 5012) ☒ SIEMENS GRAY RAL 7030	
	PAINT TYPE (## Refer Notes)	☐ ENAMEL ☒ EPOXY ☐	
	SHAFT RPM	BIDDER TO SPECIFY	
	OLR SET VALUE	BIDDER TO SPECIFY	
	@ STARTING / FULL LOAD CURRENT	BIDDER TO SPECIFY	
	NO. OF REV FOR FULL TRAVEL	BIDDER TO SPECIFY	
	@ PWR SUPP TO MTR / STARTER	415V +/- 10%, 3 Phase, 3 Wire 50HZ +/-5%	
	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED FROM THE POWER SUPPLY TO THE STARTER ☐ 230 V ☒ 110 V	

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.: PE-TS-425-100-M016	
			SECTION II	
			REV. NO. 00	DATE: 17.01.18
			SHEET 2	OF 4
Data Sheet A & B				
DATA SHEET-A (TO BE FILLED BY PURCHASER)			DATA SHEET-B (TO BE FILLED-UP BY BIDDER)	
	@ INSULATION CLASS	CLASS-F TEMP. RISE LIMITED TO CLASS-B		
	@ WINDING TEMP PROTECTION	☒ THERMOSTAT (3 Nos. 1 IN EACH PHASE) ☐		
	SINGLE PHASE / WRONG PHASE SEQUENCE PROTECTION	REQUIRED		
INTEGRAL STARTER	INTEGRAL STARTER	☒ REQUIRED ☐ NOT REQUIRED		
	TYPE OF SWITCHING DEVICE	☒ CONTACTORS(Reversing type) ☐ THYRISTORS		
	TYPE	☒ CONVENTIONAL ☐ SMART (NON-INTRUSIVE)		
	IF SMART			
	a) SERIAL LINK INTERFACE	☐ INTEGRAL ☐ FIELD MOUNTED		
	b) SERIAL LINK PROTOCOL	☐ FOUNDATION FIELD-BUS ☐ PROFI-BUS ☐ DEVICE NET ☐		
	c) SERIAL LINK MEDIA	☐ TWISTED PAIR Cu-CBL ☐ CO-AXIAL Cu-CBL ☐ OFC		
	d) HAND HELD PROGRAMMER	☐ REQUIRED ☐ NOT REQUIRED		
	e) TYPE OF HAND HELD PROGRAMMER	☐ BLUETOOTH ☐ INFRARED ☐		
	f) MASTER STATION	☐ REQUIRED ☐ NOT REQUIRED		
	g) MASTER STN INTRFACE WITH DCS	☐ MODBUS ☐ TCP/IP		
	h) DETAILS OF SPECIAL CABLE	☐ ENCLOSED ☐ NOT REQUIRED		
	STEP DOWN CONT. TRANSFORMER	☒ REQUIRED		
	OPEN-STOP-CLOSE PB(running open/close LED) THREE POSITION SELECTOR SWITCH	☒ REQUIRED ☐ NOT REQUIRED		
	INDICATING LAMPS	☒ REQUIRED ☐ NOT REQUIRED		
	LOCAL-OFF- REMOTE S/S(THREE POSITION SELECTOR SWITCH)	☒ REQUIRED ☐ NOT REQUIRED		
	STATUS CONTACTS FOR MONITORING	☒ REQUIRED ☐ NOT REQUIRED		
	INTEGRAL STARTER DISTURBED SIGNAL	REQUIRED (MOTOR THERMOSTAT TRIP/O/L RELAY OPERATED, CONT. /POWER SUPPLY FAILED, S/S IN LOCAL/OFF MODE, TORQUE SWITCH OPEN/CLOSE CUT OFF/STOP PB OPTD.)		
INTERPOSING RELAY/OPTO COUPLER (Applicable for integral Starter)	TYPE OF ISOLATING DEVICE	☐ INTERPOSING RELAY ☒ OPTO COUPLER ☐ EITHER		
	QUANTITY	☒ 2 Nos. ☐ 3 Nos.		
	DRIVING VOLTAGE	☒ 20.5 – 24V DC ☐ _____ V DC		
	DRIVING CURRENT	☒ 125mA MAX ☐ _____ mA MAX		
	LOAD RESISTANCE	☒ > 192 ohms - <25 k ohms ☐ > _____ ohms - < _____ ohms		
TORQUE SWITCH (Not Applicable for Smart Actuator) (\$\$ Refer Notes)	MFR & MODEL NO.	BIDDER TO SPECIFY		
	OPEN / CLOSE	☒ 1 No. ☐ 2Nos. / ☒ 1 No. ☐ 2Nos		
	CONTACT TYPE	2 NO + 2 NC		
	RATING	5A 250V AC AND 0.5A 220V DC		
	CALIBRATED KNOBS(OPEN&CLOSE TS)	REQUIRED FOR SETTING DESIRED TORQUE		
	ACCURACY	+3% OF SET VALUE		
LIMIT SWITCH (Not Applicable for Smart Actuator) (\$\$ Refer Notes)	MFR & MODEL NO.	BIDDER TO SPECIFY		
	OPEN : INT : CLOSE	☒ 2 Nos.	2 nos(adj)	☐ 1 No. ☒ 2Nos.
	CONTACT TYPE	2 NO + 2 NC		
	RATING (AC / DC)	5A 250V AC AND 0.5A 220V DC		

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.: PE-TS-425-100-M016	
			SECTION II	
			REV. NO. 00	DATE: 17.01.18
			SHEET 3	OF 4
Data Sheet A & B				
DATA SHEET-A (TO BE FILLED BY PURCHASER)			DATA SHEET-B (TO BE FILLED-UP BY BIDDER)	
POSITION TRANSMITTER	POSITION TRANSMITTER (For inching duty & other specific applications)	REQUIRED for regulating/inching duty only.		
	MFR & MODEL NO.	BIDDER TO SPECIFY		
	TYPE	☐ ELECTRONIC (2 WIRE) R/I CONVERTER ☒ ELECTRONIC (2 WIRE) contactless inductive type		
	SUPPLY	☒ 24V DC ☐		
	OUTPUT	☒ 4-20mA		
	ACCURACY	± 1% FS		
SPACE HEATER	@SPACE HEATER	REQUIRED		
	@ POWER SUPPLY (NON INTEGRAL)	230V AC, 1 PH., 50 Hz		
	@ POWER SUPPLY (INTEGRAL)	BIDDER TO SPECIFY		
	@ RATING			
TERMINAL BOX	ACTUATOR/MOTOR TERMINAL BOX	REQUIRED		
	ENCL CLASS ACTUATOR/MOTOR T.B.	☒ IP 68 ☐ NEMA6		
	@ EARTHING TERMINAL	REQUIRED		
	PLUG & SOCKET (9 PIN) (FOR COMMD, LS/TS FEED BACK, PoT)	☒ REQUIRED ☐ NOT REQUIRED ☒ 2 NOS. ☐		
CABLE GLANDS	@ POWER CABLE GLAND	SIZE: SHALL BE FURNISHED DURING DETAIL ENGG. AFTER RECEIPT OF MOTOR RATING		
	@ SPACE HEATER CABLE GLAND	SIZE: 2C X 2.5 SQ MM Cu XLPE		
	OTHER CONTROL CABLE GLANDS-1	☐ 1No. for BFV of CW PUMP (Cable size 2Px1.5mm ²)		
	OTHER CONTROL CABLE GLANDS-2	1 no suitable for 8P X 0.5 sq mm Additional 1 no suitable for 2P X 0.5 sq mm (inching duty only)		

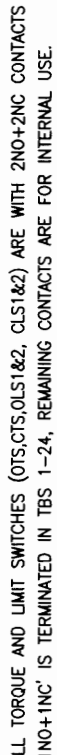
	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.: PE-TS-425-100-M016	
			SECTION II	
			REV. NO. 00	DATE: 17.01.18
			SHEET 4	OF 4
Data Sheet A & B				
DATA SHEET-A (TO BE FILLED BY PURCHASER)			DATA SHEET-B (TO BE FILLED-UP BY BIDDER)	
WEIGHT	TOTAL WEIGHT (ACTUATOR + ACCESSORIES)	BIDDER TO SPECIFY	_____ Kg.	
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 AND IS-4722 - 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 OPERATE SATISFACTORILY UNDER THE +/- 10% SUPPLY VOLTAGE VARIATION AT RATED FREQUENCY, -5% TO +3% VARIATION IN FREQUENCY AT RATED SUPPLY VOLTAGE, SIMULTANEOUS VARIATION IN VOLTAGE & FREQUENCY THE SUM OF ABSOLUTE PERCENTAGE NOT EXCEEDING 10%. - THE MOTOR SHALL BE SUITABLE FOR DIRECT ON LINE STARTING. \$\$ TORQUE SWITCH & LIMIT SWITCH SHALL ACT INDEPENDENT OF EACH OTHER. TANDEM OPERATION IS NOT ACCEPTABLE. ## EPOXY PAINT IS RECOMMENDED FOR COASTAL AREAS. - IT SHOULD BE POSSIBLE TO OPERATE THE ACTUATOR LOCALLY. LOCKABLE LOCAL/REMOTE SELECTION SHALL BE PROVIDED ON THE ACTUATOR. - POSITION INDICATOR SHALL BE PROVIDED FOR 0 TO 100 % TRAVEL - WIRING SHALL BE SUITABLE VOLTAGE GRADE COPPER WIRE 1.5 SQ. MM. - THE MOTOR SHALL BE CAPABLE OF STARTING AT 85 PERCENT OF RATED VOLTAGE AND 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. - THE ACTUATORS SHALL BE DESIGNED TO BE SELF-LOCKING UPON LOSS OF POWER. MOTOR SHALL BE DESIGNED TO CLOSE IN 30 SECS. FROM FULL OPEN POSITION AND SHALL HAVE ADEQUATE CAPACITY TO OPEN AND CLOSE UNDER FULL UNBALANCED DESIGN PRESSURE. - ALL SIX (6) LIMIT SWITCHES SHALL BE CHANGEOVER TYPE AND ADJUSTABLE BESIDES HAVING THE SNAP FACILITY. - THE 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. - THE REMOTE COMMAND SIGNAL (OPEN-STOP-CLOSE) FROM DCS/RESPECTIVE CONTROL SYSTEM/CONTROL PANEL SHALL BE ISOLATED FROM CONTROL ELECTRONICS THROUGH OPTO-ISOLATOR. - THE FOLLOWING INDIVIDUAL STATUS ANNUNCIATION LED'S (COLOUR-GREEN) 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				
NOTES* = TO BE FILLED BY MPL (LEAD AGENCY). @ = TO BE FILLED BY ES				

DCS INTERFACE FOR BIDIRECTIONAL DRIVE(WITH INTEGRAL STARTER)



PROJECT: 2X800 MW UPPUR STPP	DRG.NO.	PE-DM-425-145-I002		
	DATE	16.03.2018		
TITLE DDCMIS INTERFACE FOR BIDIRECTIONAL DRIVE	REV.NO.	05		
	SHT	7	OF	11

DRAWING NO. 3-V-MISC-24



Also refer approved control philosophy DCP SH 7 of 11 R05 attached along with this wiring diagram.

FOR COMMANDS & EPT EITHER INTERNALLY GENERATED 24 VDC OR EXTERNAL SUPPLY OF 24VDC CAN BE USED

Size A3

SPECIFICATION NO. PE-TS-425-100-M008																				
SECTION II																				
REV. NO.: 00 DATE: 01.05.2018																				
SHEET 1 OF 3																				
SL NO.	TAG NOS.	TYPE OF VALVE	SIZE mm (NB)	OPERATION	DESIGN		SERVICE	RATING, DESIGN & TESTING CODE	BODY & DISC MATERIAL	TRIM MATERIAL	END CONN	SPECIAL FEATURES	MATCHING PIPE OD X THKN		TOTAL MAIN VALVES WITHOUT COMMISSIO NING SPARES NOS.	+++COMMISSIONING SPARES				MANDATORY SPARES (COMPLETE VALVE ASSEMBLY) INCLUDING ACTUATOR WITHOUT COMMISSIONING SPARES (SETS).
					PRESSURE KG/CM2(G)	TEMP (DEG C)							MM	MM		BONNET/ COVER GASKET (NOS)	GLAND PACKING (SETS)	DISC SEALS (**)	O-RINGS AND SEALS FOR ELECTRIC ACTUATORS	
1	ACW-5, ACW-6, ACW-7 & ACW-8 (Each 2 nos.)	BFV	300	MAN	10	60	ACW	Class 150 of AWWA C504-10	DUPLEX SS	DUPLEX SS	ASME B16.5, Raised Flange	GEAR OPERATED	323.9	4.57	8	8	8	-	2	
2	DMCW-38 (Each 2 nos.)	BFV	250	MO	10	60	DMCW	Class 150 of AWWA C504-10	IS 210 Gr. FG 260 +2% Ni	AISI-410	DOUBLE FLANGED FLAT FACED & DRILLING AS PER ASME B16.1 CLASS 125	OPEN /CLOSE TIME:40-60 SEC.	273	6.4	2	2	2	2	2	
3	DMCW-53 (Each 2 nos.)	BFV	250	MO	10	60	DMCW	Class 150 of AWWA C504-10	IS 210 Gr. FG 260 +2% Ni	AISI-410	DOUBLE FLANGED FLAT FACED & DRILLING AS PER ASME B16.1 CLASS 125	1. OPEN /CLOSE TIME:40-60 SEC 2. INCHING TYPE	273	6.4	2	2	2	2	2	
4	DMCW-101 & DMCW-102 (Each 2 nos.)	BFV	350	MAN	12	60	DMCW	PN 16 OF BSEN 593 (BS 5155)	IS 210 Gr. FG 260 +2% Ni	AISI-410	DOUBLE FLANGED FLAT FACED & DRILLING AS PER BSEN 1092-OPERATED 2 (PN16)	1. WITH LIMIT SWITCH 2. GEAR OPERATED	355.6	8.0	4	4	4	-	2	
5	DMCW-105 &, DMCW-106 (Each 2 nos.)	BFV	300	MO	12	60	DMCW	PN 16 OF BSEN 593 (BS 5155)	IS 210 Gr. FG 260 +2% Ni	AISI-410	DOUBLE FLANGED FLAT FACED & DRILLING AS PER BSEN 1092- & 100% OPENING 2 (PN16)	1. OPEN /CLOSE TIME:40-60 SEC 2. LS AT 0%, 10% PER BSEN 1092	323.9	6.4	4	4	4	4	2	
6	DMCW-107, DMCW-108, DMCW-109, DMCW-110 DMCW-117 & DMCW-118 (Each 2 nos.)	BFV	300	MAN	12	60	DMCW	PN 16 OF BSEN 593 (BS 5155)	IS 210 Gr. FG 260 +2% Ni	AISI-410	DOUBLE FLANGED FLAT FACED & DRILLING AS PER BSEN 1092- 2 (PN16)	GEAR OPERATED	323.9	6.4	12	12	12	-	2	
TOTAL													TOTAL		32	32	32	8	32	12

12.4.2018 Supt- D

Prabhat Singh

NOTES:
1. Valve POD test charges/ Gear box POD test charges or any other test charges, required as per this technical specification, shall not be included in the unit quoted prices of main valves as these tests are the mandatory requirements of valve governing standard AWWA C504 and this enquiry specification. If the bidder has not carried these test earlier, then the bidder is required to do these tests without any charges to BHEL in case of order on the bidder i.e. NO EXTRA CHARGES ON THIS ACCOUNT IS ADMISSIBLE TO BIDDERS.
2. Mandatory spare consists of complete valve along with actuator without commissioning spares shall be considered as identical to main valve excluding commissioning spares.
3. Main valve prices shall BE EXCLUSIVE of cost of Commissioning Spares prices.
4. Bidder is required to quote unit price of each item under commissioning spares shall not be clubbed/ included in the unit price of Main valves.
5. Commissioning spares --> One set each of Bottom/ Cover Gasket, Gland Packing, Disc seals and actuator "o" rings and seal as applicable.
ABBREVIATIONS:- BFV (WS)--- BUTTERFLY VALVES (WATER SYSTEM), MO - MOTOR OPERATED, MAN - MANUAL

Signature of the bidder with name, designation, date and company's seal