

APGENCO

1X800 MW Dr. NTTPS VIJAYAWADA

**TECHNICAL SPECIFICATION
FOR
BUTTERFLY VALVE-STEAM SERVICE**

**SPECIFICATION NO. PE-TS-419-100-M016
Rev. No.: 00**



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

	TECHNICAL SPECIFICATION BUTTERFLY VALVE-STEAM SERVICE 1X800 MW Dr. NTTPS VIJAYAWADA		SPECIFICATION NO. PE-TS-419-100-M016
			REV. NO.: 00 DATE: 14.2.2017
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SECTION-I

SPECIFIC TECHNICAL REQUIREMENTS

	SPECIFIC TECHNICAL REQUIREMENTS BUTTERFLY VALVES (STEAM SERVICE)		SPECIFICATION NO.: PE-TS-419-100-M016
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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, 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.

4.0 CODES AND STANDARDS:

The design, manufacture, inspection and testing of the butterfly valves shall suit the design parameters specified in datasheet-A1 & comply with the requirements of latest revisions of the following standards. However, the testing shall be as per American Water Works Association AWWA C504-10 and C516-10 (whichever is applicable) including disc strength test (all sizes of valves), gear box POD Test & Valve POD test.

- a) AWWA C504-10 upto size 1800 mm.
- b) AWWA C516-10 upto for size 2000 mm and above.

- 4.1 In case of any conflict between the above Codes/Standards and this specification, the later shall prevail and in case any further conflict in this matter, the interpretation of the specification by the BHEL engineer shall be final & binding.

5.0 DESIGN REQUIREMENTS:

- 5.1 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.
- 5.2 The butterfly valves shall be suitable for Indoor/outdoor installation with shaft either in horizontal or vertical position.
- 5.3 The valves shall have min. single off-set type disc (design with shaft eccentric to disc) and long body design for AWWA C504-10 and maximum laying length for AWWA C516-10 as specified in Data sheet-A.
- 5.4 The butterfly valves shall be with butt welded ends as specified in Data sheet-A1 and designed to ensure bubble tight shut off at the rated pressure of valve.

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5.5 MATERIALS

- 5.5.1 The materials of construction of main parts of the butterfly valves (steam service) shall be specified in Data sheet-A.
- 5.5.2 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.
- 5.5.3 Materials used in manufacture of valves shall be of tested quality.

6.0 CONSTRUCTION FEATURES

6.1 Valve Body

- 6.1.1 The valve body shall have integral hubs for shaft bearing housing. The minimum body shell thickness and minimum diameter of seat bore shall be as per requirement of the applicable table/equation of AWWA-C504-10/C516-10 (whichever is applicable). Material of construction of body and valve parts shall be as per materials indicated in Data sheet-A1.
- 6.1.2 An arrow shall be embossed/ engraved and painted on the outside of body to clearly indicate the direction of flow.

6.2 Valve Shaft

- 6.2.1 The shaft of each butterfly valve shall be securely attached to the disc through Bolting, Riveting, threading, upsetting or cross pinning, adequately locked.
- 6.2.2 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 two separate shafts inserted into the disc. Each stub shaft shall be inserted into the valve disc hubs for a minimum distance of at least 1.5 times shaft 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.
- 6.2.3 Surface finish for shaft shall be minimum 16 RMS in the area of gland packing.

6.3 Valve Disc:

The valve disc shall have no external ribs transverse to the flow and shall sustain full differential pressure across closed valve disc without exceeding working stress of one fifth of the tensile strength of the material used. The thickness of the valve disc shall not be more than $2 \frac{1}{4}$ times the shaft diameter listed in AWWA-C504-10/C516-10 (whichever is applicable). The valve disc shall be designed to rotate 90° from full open to tight shut off position. Material of Disc shall be as per the Data sheet-A1.

6.4 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

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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.

6.5 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 in accordance with the relevant standard.

6.6 Shaft Seal:

Wherever the shaft project through the valve body for actuator connection, a shaft seal shall be provided. Shaft seal shall be designed for use of Standard 'O' rings seals 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.

The hand wheel shall be of malleable iron or equivalent.

6.8 Body Ends:

These shall be as butt welded as per ASME B 16.25 as specified in Data sheet-A1.

6.9 Nameplate:

Each valve shall be fitted with a circular Stainless steel 2mm thick nameplate indicating the valve Tag No. and service description given in Data sheet-A1. All details shall be engraved 1 mm deep and filled with black enamel paint.

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

6.11 All valves shall be closed by rotating the handwheel in a clockwise direction when looking at the face of the handwheel. The pulling force required on handwheel 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 adjacent arrows to indicate the direction of rotation to which each refers.

6.12 Special attention shall be given to the operating mechanism for large size valves in order that quick and easy operation is obtained and maintenance is kept to a minimum.

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

6.14 Wherever practical, valves (including actuator, drive motor, integral bypass etc.) of total weight equal to or greater than 500 Kg shall be provided with suitable lugs to permit direct suspension by hanger rods or direct resting on bottom support, as applicable.

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- 6.15 The valves as well as accessories shall be designed for easy dismantling and maintenance.
- 6.16 The disc shall rotate through 90° from full open to the tight shut position. The disc shall be contoured to ensure the least possible resistance to flow and be suitable for throttling operation. While the disc is in throttled position, the valve shall not create any noise or vibration.
- 6.17 It may be noted that all construction features design and parameters will be governed by AWWA-C504-10 for sizes upto 1800 mm and AWWA-C516-10 for sizes 2000 mm and above.

7.0 SPECIAL FEATURES:

7.1 Gland Sealing Arrangement:

Butterfly valves, provided with gland sealing arrangement, shall be vacuum tested. All valves required with this arrangement shall be provided with G3/8" connection (duly plugged) for water sealing. Sealing water shall be supplied at 4 ata and 50°C unless otherwise specifically indicated for the particular project.

7.2 Motorised Valves:

- 7.2.1 The motorized 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 in Datasheet A.

- 7.2.2 Electric actuators shall be mounted directly on the valves.

- 7.2.3 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.

Gear box and Electric Actuator shall also meet the inspection & testing requirements of latest revision of AWWA-C504-10 /AWWA C542-10 respectively.

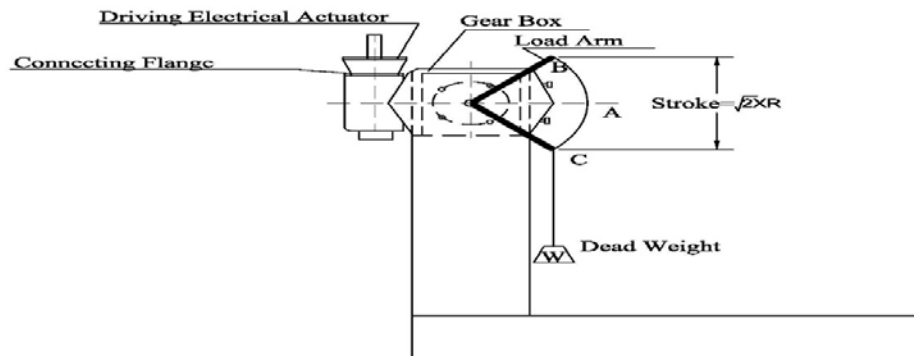
8.0 INSPECTION AND TESTING:-

All inspection & Testing for valve, Gear box and actuators shall be as per the requirements of the relevant standard.

The minimum NDT/testing and inspection requirements for valve, Gear Box, electric actuator etc. shall be as per the 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.

8.1 P.O.D. Tests:

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TEST SET UP

FIG. 1

- POD (Proof-of-design) Test as per AWWA-C504-10/C516-10 (whichever is applicable) 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.
- Gear Box and Electric Actuator shall be designed & tested in accordance with latest editions of AWWA C 504-10(gearbox) and AWWA C 542-10 (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.
- For valves designed and manufactured as per AWWA POD shall follow the guidelines of AWWA-C504-10/C516-10 (whichever is applicable) and Actuators shall meet the requirements of POD test of AWWA-C-542-10.
- Gear box POD test: - Valve POD and gear box POD tests should be done separately on each one of the valve & the gear box. Gear box POD test shall be done as per the procedure described below or as per the procedure agreed between purchaser & vendor.
- 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 Sketch 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.(refer fig.1)
- Irrespective of the requirement of conducting the type tests, the vendor shall submit the reports of the type tests carried out within last five years from the date of bid opening. These reports should be for the tests conducted on the equipment same (model / type/ size / rating) to those proposed to be supplied. Tests should have been conducted at an independent laboratory or should have been witnessed by a client.

These valves are for vacuum service and shall be provided with gland sealing arrangement which shall be vacuum tested with vacuum and helium gas.

9.0 PERFORMANCE GUARANTEE:

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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 the following for each butterfly valve:

- a) Pressure drop as per the approved drop vs. opening curve.
- b) The valve opening and closing time.

10.0 EXCLUSIONS:

Erection & Commissioning of equipment at site.

11.0 QUALITY ASSURANCE

11.1 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.

11.2 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.

11.3 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.

12.0 PAINTING REQUIREMENT:

Surface preparation shall be as per SSPC-SP-3/ Power Tool Cleaning followed by 2 coat of Heat Resistance Aluminium paint to IS 13183 Gr. I or equivalent, paint shade Aluminium and total DFT of paint will be equal to 80 microns minimum.

13.0 PACKING INSTRUCTIONS:

- a) 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.
- b) The valve has to be dispatched in total assembled form.
- c) Discs of all valves shall be properly secured while dispatching so that there is no risk of damage to the disc & seat.
- d) Body ends shall be suitably sealed to protect them against damage during transit and storage.

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- e) Valves with butt-welding ends shall be protected by means of polythene caps/rubber and protectors to prevent damage to ends & also to avoid foreign material entering the valve while shipment & storage.
- f) Valve Tag Nos. shall be incorporated in all the dispatch documents.
- g) Proper care shall be taken to avoid damage to the painted surface during transit.
- h) 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.

14.0 SPARES

- a) **Mandatory Spares:** These shall be as per Data Sheet-A.
- b) Order for the spares may be placed simultaneously or otherwise at the option of purchaser.

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
- ACTUATOR DATA SHEET & WIRING DIAGRAM
- COMPLIANCE SHEET

 Maharaja Company		DATASHEET - A												SPECIFICATION NO.: PE-TS-419-100-M016														
		1X800 MW Dr. NTPPS VIJAYAWADA												SECTION: II														
		Butterfly Valves Steam Services												REV NO.: 00						DATE: 14.2.2017								
														SHEET 1 OF 1														
1	2	3	4	5	6		7	8	9	11	12	13		14	15	16	17	18	19	20	21	22	23	24	25	26	27	
SL NO.	TAG NOS.	TYPE OF VALVE	SIZE mm (NB)	OPERATION	DESIGN		SERVICE	RATING, DESIGN & TESTING CODE	BODY & DISC MATERIAL	END CONN	SPECIAL FEATURES	MATCHING PIPE		MAIN VALVES QTY WITHOUT COMMISSIONING SPARES NOS.	COMMISSIONING SPARES				MANDATORY SPARES									
					PRESSURE KG/CM2(G)	TEMP (DEG ⁰ C)						OD (MM)	THK(MM)		GLAND PACKING (VALVES) (SETS)	BOTTOM GASKET (VALVES) (SETS)	O' RING AND SEALS FOR ELECTRIC ACTUATORS (SETS)	DISC SEAL (SETS)	COMPLETE VALVE ASSEMBLY WITH ACTUATOR & GEAR BOX WITHOUT COMMISSIONING SPARES (As per Sno. IV (3.1) & ID No. 779) (No.)	COMPLETE ACTUATOR (As per Sno. 13.1 & ID No. 2588) (No.)	LIMIT SWITCH (As per Sno. 13.2 & ID No. 2589) (No.)	TORQUE SWITCH (As per Sno. 13.3 & ID No. 2590) (No.)	AUXILIARY CONTACT (As per Sno. 13.4 & ID No. 2591) (No.)	COMPLETE MOTOR USED IN ACTUATOR (As per Sno. 13.5 & ID No. 2592) (No.)	COMPLETE SEAL KIT (As per Sno. 13.6 & ID No. 2593) (SET)	COMPLETE 'O' RING SET (As per Sno. 13.7 & ID No. 2594) (SETS)	ELECTRONIC CARD (As per Sno. 13.8 & ID No. 2595) (No.)	
1	EXV-31, EXV-32 (1 EACH)	BFV	2000	MO	Full vacuum and 2 kg/sq.cm	100	BFP DRIVE TURBINE EXHAUST LINE	CL.75 (MINIMUM) OF AWWA C516-2010	CCS (ASTM A216 GR. WCB)	BW AS PER ASME B16.5	SG, MO, OT = 50 ~ 90 SEC, SHAFT AXIS ORIENTATION HORIZONTAL/ VERTICAL SUITABLE FOR BOTH DIRECTIONS; ELECTRIC ACTUATOR WITH INTEGRAL STARTER.	2032	16	2	2	2	2	2	1	1	3	3	1	1	1	1	1	
													TOTAL	2	2	2	2	2	1	1	3	3	1	1	1	1	1	

ABBREVIATIONS:-
 BW- BUTT WELDED, CCS - CAST CARBON STEEL, SG - SEALED GLAND, MO - MOTORISED ELECTRIC ACTUATOR OT - OPENING/CLOSING TIME OF VALVE WITH ELECTRIC ACTUATOR OPERATION IBR - INDIAN BOILER REGULATION

1. Valve POD , Gear box POD & Actuator POD test, if already carried out by bidder for similar model/ type/ size/ rating for any BHEL/NTPC/REPUTED CUSTOMER project within the last 5 years from the date of bid opening of this project, i.e. 15/12/2015, shall be considered applicable for this project, if found satisfactory by BHEL/ CUSTOMER.

2. Valve POD, Gear box POD & Actuator POD test, if required, as per technical specification & AWWA C516, 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.

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 separately & individually i.e. prices of all commissioning spares shall not be clubbed/ included in the unit price of Main valves.

5. Commissioning spares --> One set each of Bottom/ Cover Gasket with'O' Rings & Seals, Gland Packing with 'O' ring & seals in Gland packing area and actuator "o" rings and seal as applicable.

6. All the mandatory spares are to be quoted individually & separately.

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

	DATA SHEET-A1 BUTTERFLY VALVES (STEAM SERVICE) 1X800 MW Dr. NTTPS VIJAYAWADA		SPECIFICATION NO. PE-TS-419-100-M016
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Material of Construction

SL NO.	PART NAME	MATERIALS
VALVE		
a.	Valve Body Butt welded	ASTM A-216 Gr. WCB
b.	Valve Disc.	ASTM A-216 Gr.WCB
c.	Shaft	ASTM A182 Gr..F304
d.	Disc Seal/Seat	EPDM (70 ~ 75 SHORE 'A')
e.	Valve body seat edge	AISI 316 (WELD OVERLAY/ DEPOSIT)
f.	Seat retaining ring and internal Bolts etc.	SS 304/316
g.	Bearing	SLEEVE TYPE, SELF LUBRICATED
h.	Shaft seal :	'O' RINGS TYPE (65~70 SHORE 'A')
i.	Fasteners (bolts & nuts)	ASTM A193 Gr. B7 (BOLTS) / ASTM A194 Gr. 2H(NUTS)
j.	Hand wheel (actuator)	MALLEABLE IRON (or equivalent)
GEAR BOX. (Bevel type)		
k.	Main Housing /Cover (Totally enclosed construction)	Cast Iron IS:210 Gr. FG 220/260
l.	Input shaft	13/% Cr SS/ EN8 (~200 BN)
m.	Worm	EN8 (~200 BN)
n.	Worm Wheel	Ductile iron / S.G iron
o.	Hand wheel	Malleable Iron (or equivalent)

		QUALITY PLAN		CUSTOMER: APGENCO			PROJECT : 1X800 MW DR. NTPPS VIJAYAWADA			SPEC. NO : PE-SS-999-100-M016		
				VENDOR:			QP NO. . PE-QP-999-100-M024		REV. 00 DT. 14.2.2017		SPEC. TITLE STANDARD SPEC. FOE TWO WAY BF VALVE FOR STEAM SERVICE	
		SHEET 1 OF 8		SYSTEM STEAM SERVICE			ITEM: CAST CARBON STEEL BUTTERFLY VALVE SIZE 2000 MM NB/ CLASS 75B MOTORISED			SECTION - VOLUME		
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CAT E- GO RY	TYPE/METH OD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY P W V	REMARKS		

1.1	MATERIALS BODY, DISC, SHAFT	1 CHEM. COMPOSITION & MECH. PROPERTIES	MA	1) CHEM. TESTS	ONE PER HEAT	APPD DRG/ TECH SPEC	APPD DRG/ TECH SPEC	TEST CERT.	3/2	2	1	- MPI ON 100% AREA (ACCESSIBLE) RT ON CHANGE OF SECTION AND BW ENDS OF BODY (RT FILM REVIEW BY BHEL) <
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BHEL	PARTICULARS	BIDDER/VENDOR	
	NAME		
	SIGNATURE		
	DATE		
			BIDDER'S/ VENDOR'S COMPANY SEAL

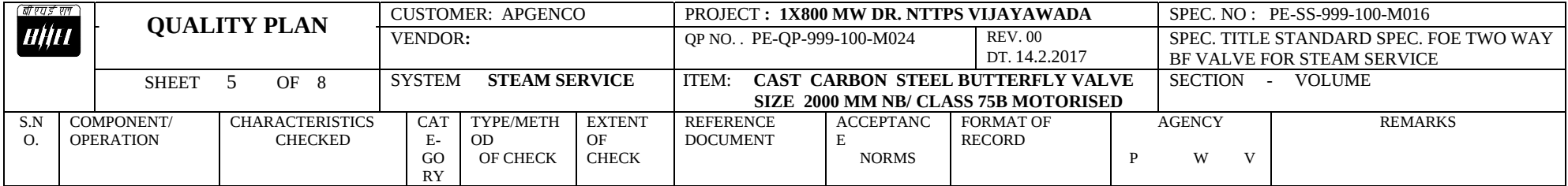
		QUALITY PLAN		CUSTOMER: APGENCO			PROJECT : 1X800 MW DR. NTPPS VIJAYAWADA			SPEC. NO : PE-SS-999-100-M016		
				VENDOR:			QP NO. . PE-QP-999-100-M024		REV. 00 DT. 14.2.2017		SPEC. TITLE STANDARD SPEC. FOF TWO WAY BF VALVE FOR STEAM SERVICE	
		SHEET 2 OF 8		SYSTEM STEAM SERVICE			ITEM: CAST CARBON STEEL BUTTERFLY VALVE SIZE 2000 MM NB/ CLASS 75B MOTORISED			SECTION - VOLUME		
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED		CAT E- GO RY	TYPE/METH OD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY P W V		REMARKS

				2) MECH TESTS	ONE PER HEAT & HEAT TREATMENT BATCH	APPD DRG/ TECH SPEC.	APPD DRG/ TECH SPEC	TEST CERT.	3/2	2	1	
1.3	DISC SEAL (FROM VENDOR'S REGULAR & APPROVED SOURCE)	1. VISUAL INSPN	MA	VISUAL	100%	APPD DRG	APPD DRG	INSPN. REPORT LOG BOOK	3/2	2	1	SPECIMEN TYPE A, 40 DEG CENTIGRADE FOR 70 HRS
		2.DIMENSIONS	MA	MEASURE-MENT	100%	APPD DRG	APPD DRG		3/2	2	1	
		3. TENSILE AND HARDNESS FOR VULCANISING	MA	MEASUREM ENT	1/BATCH	MFG TECH.SPEC/ APPD DRG	MFG TECH. SPEC/ APPD DRG	TEST CERT	3/2	2	1	
		4. OZONE CRACK RESISTANCE	MA	TESTING	1/ BATCH	TECH. SPEC + ASTM D1149	TECH. SPEC + ASTM D1149* AWWA C 504	TEST CERT.	3/2	2	1	
		5. ELONGATION	MA	TESTING	1/ BATCH	IS 3400 PART-I	250% MIN.	TEST CERT	3/2	2	1	
		6. BLEED RESISTANCE	MA	TESTING	1/ BATCH	SAMPLE TO BE KEPT IN 33% HCL, DM WATER, 48% NaOH FOR 72 HRS.	NO DISCOLOURA TION. WEIGHT GAIN +/-0 TO 2%	TEST CERT	3/2	2	1	
		7. AGEING TEST	MA	TESTING	1/BATCH	TECH. SPEC + IS 3400 PART IV	TECH. SPEC +IS3400 PART IV *	TEST CERT	3/2	2	1	
		8. HYDRAULIC STABILITY TEST (AFTER AGEING)	MA	TESTING	1/BATCH	TECH SPEC./ REL STD.	TECH. SPEC./ REL STD.	TEST CERT	3//2	2	1	
BHEL				PARTICULARS		BIDDER/VENDOR			BIDDER'S/ VENDOR'S COMPANY SEAL			
				NAME								
				SIGNATURE								
				DATE								

		QUALITY PLAN		CUSTOMER: APGENCO			PROJECT : 1X800 MW DR. NTPPS VIJAYAWADA			SPEC. NO : PE-SS-999-100-M016		
				VENDOR:			QP NO. . PE-QP-999-100-M024		REV. 00 DT. 14.2.2017		SPEC. TITLE STANDARD SPEC. FOE TWO WAY BF VALVE FOR STEAM SERVICE	
		SHEET 3 OF 8		SYSTEM STEAM SERVICE			ITEM: CAST CARBON STEEL BUTTERFLY VALVE SIZE 2000 MM NB/ CLASS 75B MOTORISED			SECTION - VOLUME		
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CAT E- GO RY	TYPE/METH OD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY P W V		REMARKS	

		9. WEAR RESISTENCE	MA	TESTING	TYPE TEST	AWWA C-504/ AWWA C-516	NO DAMAGE	TEST REPORT	3/2	2	1	TYPE TEST REPORT WILL BE FURNISHED FOR REVIEW
1.4	FASTENERS ASTM A193 GR B7 ASTM A194 GR2H, GRB8M	1. VERIFICATION OF MAKE, GRADE, REVIEW OF TEST CERTIFICATES	MI	VISUAL	100%	TECH. SPEC/ DATA SHEET	TECH. SPEC/ DATA SHEET	INSPN REPORT	3/2	2	1	
		2. DIMENSIONS	MA	MEASURE- MENT	SAMPL- ING PLAN	APPD DRG	APPD DRG	INSP REPORT	2	2	1	
1.5	OPERATORS											
1.5.1	GEAR OPERATOR											
	A)GEAR, WORM & SHAFT	1. CHEM. COMP. & PHYS PROPERTIES	MA	CHEM & PHYS TEST	1/ BATCH	RELVD STD/ DATA SHT/ MFG DRG	RELVD STD/ DATA SHT/ MFG DRG	TEST CERT	3/2	2	1	
		2. DIMENSIONS	MA	MEASURE- MENT	100%	RELVD STD/ DATA SHT/ MFG DRG	RELVD STD/ DATA SHT/ MFG DRG	INSP REPORT	3/2	2	1	
		3. HARDNESS	MA	MEASURE- MENT	100%	RELVD STD/ DATA SHT/ MFG DRG	RELVD STD/ DATA SHT/ MFG DRG	TEST CERT	3/2	2	1	
	B) TORQUE TEST	1. TORQUE TRANSMITTING	MA	TORQUE TEST AT TWICE THE RATED TORQUE	ONE/ TYPE	AWWA C-504/ AWWA C516/ DATA SHT/ MFG DRG.	AWWA C-504/ AWWA C516/ DATA SHT/ MFG DRG..	INSP REPORT*	3/2	1*	--	*VERTIFICATION OF TEST REPORT ON GEAR BOX EARLIER CARRIED OUT FOR NTPC PROJECT / REPUTED CUSTOMER (SAME SIZE, MODEL & RATING)
		2. DESIGN VERIFICATION	MA	CYCLE TEST AT FULL RATED TORQUE OF GEAR BOX	ONE/ TYPE	AWWA-C504/ C516 (at full rated torque of gear box) / APPD PROCEDURE FOR GEAR BOX	AWWA-C504/ C516 / APPD PROCEDURE FOR GEAR BOX	INSP REPORT*	3/2	1*	--	* VERTIFICATION OF TEST RECORDS ON GEAR BOX EARLER CARRIED OUT FOR NTPC PROJECTS/ REPUTED CUSTOMER (SAME MODEL, SIZE & RATING)

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		9.DESIGN VERIFICATION	MA	TYPE TEST (CYCLE TEST)	1/TYPE	AWWA C504 & AWWA C540	AWWA C504 & AWWA C540	TEST CERT	3/2	2	1	
2.0 2.1	INPROCESS CONTROL:- BODY & DISC	1 DIMENSIONS	MA	MEASURE- MENT P.T.	100%	MFG DRG	MFG DRG	INSPN. REPORT	2	--	1	ON MACHINED AREA ONLY.
		2. SURFACE DEFECTS	CR		100%	ASTM E165	ASME B 16.34 APPENDIX III	INSPN. REPORT	2	2	1	
2.2	WELDING OVERLAY DEPOSIT	WELDING PROCEDURE AND WELDER PERFORMANCE QUALIFICATION	CR	VISUAL MECH. TESTS	100%	ASME IX	ASME IX	INSPN. REPORT	3/2	--	--	ONLY BHEL / CUSTOMER QUALIFIED WELDERS SHALL BE ENGAGED FOR WELDING WPS SHALL BE SUBMITTED FOR APPROVAL
		CLADDING	MA	DEPTH MEASUREM ENT	100%	MFG. DWG	MFG. DWG	TEST REPORT	2	2	1	
			MA	SURFACE DEFECT LPI ON WELD OVERLAY AND ADJACENT AREA	100%	ASTM E 165	FREE FROM POROSITY/ CRACK	NDT REPORT	2	2	1	
2.2.1	SEAT RING	SUB-SURFACE DEFECT	MA	RT/UT	100%	ASME B16.34	ASME B16.34	INSP REPORT	3/2	2	1	
		SURFACE DEFECTS	MA	LPI	100%	ASTM E165	FREE FROM CRACKS	INSP REPORT	2	2	1	
2.3	BODY (BUTT WELD ENDS)	SUB-SURFACE DEFECT	CR	MPI	100% ON BW AREA	ASTM A709	ASME B 16.34 APPENDIX III	INSP REPORT	2	2	1	NOTE-1
		SURFACE DEFECTS	CR	RT	100% ON BW AREA	ASME B16.34	ASME B16.34	RT REPORT	2	2	1	RT (100%) OF BODY INCLUDING BW ENDS AS PER SL. NO. 1.1 CLAUSE NO.2
2.4	SHAFT	1. DIMENSION	MA	MEASURE- MENT	100%	MFG DRG	MFG DRG	LOG BOOK	2	--	--	
		2.SURFACE	MA	P.T.	100%	ASTM E165	ASME B 16.34	INSPN	2	2	1	
BHEL				PARTICULARS		BIDDER/VENDOR						
				NAME								
				SIGNATURE								
				DATE								
									BIDDER'S/ VENDOR'S COMPANY SEAL			

		QUALITY PLAN		CUSTOMER: APGENCO			PROJECT : 1X800 MW DR. NTPPS VIJAYAWADA			SPEC. NO : PE-SS-999-100-M016		
				VENDOR:			QP NO. . PE-QP-999-100-M024		REV. 00 DT. 14.2.2017		SPEC. TITLE STANDARD SPEC. FOE TWO WAY BF VALVE FOR STEAM SERVICE	
		SHEET 6 OF 8		SYSTEM STEAM SERVICE			ITEM: CAST CARBON STEEL BUTTERFLY VALVE SIZE 2000 MM NB/ CLASS 75B MOTORISED			SECTION - VOLUME		
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CAT E- GO RY	TYPE/METH OD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY P W V			REMARKS

3.1	VERIFICATION OF ALL PREVIOUS TESTS AND DOCUMENTS	DEFECTS VERIFICATION OF RECORDS	MA	---	100%	TECH SPEC	APPENDIX III TECH SPEC	REPORT ---	2	1	1	
3.2	TESTS (HYDRAULIC)	1. BODY TEST	CR	HYDRO TEST	100%	AWWA C-504 / AWWA C-516/ APPD DRG.	NO LEAKAGE	INSP. REPORT	2	1	--	
		2. DISC STRENGTH	CR	HYDRO TEST	100%	AWWA C-504 / AWWA C-516/ APPD DRG.	NO DEFORMATION, NO STRUCTURAL DAMAGE TO DISC	INSP. REPORT	2	1	-	ONE VALVE/SIZE SHALL BE TESTED FOR TWICE THE DESIGN PRESSURE FROM BOTH SIDE OF THE VALVE IN ADDITION TO 100% TESTING IN THE NORMAL FLOW DIRECTON. NO PART OF DISC/ VALVE SHALL BE PEERMANENTLY DEFORMED/DAMAGED. DISC DEFORMATION IS MEASURED USING DIAL GAUGE AND BODY DEFORMATION BY MEASURING TAPE
		3.SEAT LEAKAGE WITH ACTUATOR (BOTH DIRECTION)	CR	HYDRO/ AIR TEST	100%	AWWA C-504 / AWWA C-516/ APPD DRG.	NO LEAKAGE	INSP. REPORT	2	1	-	
		4. PERFORMANCE TEST	CR	PERFORM- ANCE	100%	AWWA C-504* / AWWA C-516 *	SMOOTH OPERATION	INSP. REPORT	2	1	-	*COMPLETE VALVE ASSEMBLY ALONGWITH ACTUATOR SHALL BE 1) PARTIALLY OPENED 3 TIMES UNDER LOAD (5.25 kg/sqcm) IN HORIZONTAL POSITION ONLY 2) OPERATED 25 CYCLES UNDER NO LOAD IN HORIZONTAL OR VERTICAL POSITION AND FOLLOWING SHALL BE CHECKED i) OPERATING TIME

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		QUALITY PLAN		CUSTOMER: APGENCO			PROJECT : 1X800 MW DR. NTPPS VIJAYAWADA			SPEC. NO : PE-SS-999-100-M016		
				VENDOR:			QP NO. . PE-QP-999-100-M024		REV. 00 DT. 14.2.2017		SPEC. TITLE STANDARD SPEC. FOF TWO WAY BF VALVE FOR STEAM SERVICE	
		SHEET 7 OF 8		SYSTEM STEAM SERVICE			ITEM: CAST CARBON STEEL BUTTERFLY VALVE SIZE 2000 MM NB/ CLASS 75B MOTORISED			SECTION - VOLUME		
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED		CAT E- GO RY	TYPE/METH OD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY P W V		REMARKS

												ii) OPERATION OF TORQUE & LIMIT SWITCHES ii) CURRENT DRAWN BY ACTUATORS
		5. GLAND LEAK TEST (TOP GLAND AND BOTTOM FLANGES)	CR	HELIUM LEAK TESTS	100%	MFG APPD PROCEDURE	MFG APPD PROCEDURE	INSP. REPORT	2	1	-	PROCEDURE SHALL BE SUBMITTED TO BHEL FOR REVIEW.
		6. VACUUM TEST	CR	VACUUM TEST	100%	MFG APPD PROCEDURE	MFG APPD PROCEDURE	INSP. REPORT	2	1	--	PROCEDURE SHALL BE SUBMITTED TO BHEL FOR REVIEW.
		7.PROOF OF DESIGN TEST (LIFE CYCLE TEST)	CR	CYCLE TEST	AS PER AWWA C 504 ON ONE VALVE/ SIZE/ TYPE/ RATING	APPROVED TEST PROCEDURE / AWWA C504/ AWWA C-516		INSP REPORT	2	1*	1	* VERIFICATION OF TEST REPORTS OF POD TEST ON SAME MODEL/TYPE/SIZE/RATING CARRIED OUT EARLIER FOR ANY BHEL/NTPC/REPUTED CUSTOMER PROJECT WITHIN THE LAST 5 YEARS FROM THE DATE OF BID OPENING OF THIS PROJECT, I.E. 15/12/2015
4.0	SHIPPING RELEASE											
4.1	FINAL INSPECTION	1. OVERALL DIMENSION	MA	MEAS.	100%	APPD DRG		INSP REPORT	2	1	-	NOTE-1
		2. DOCUMENTATION REVIEW	MA	REVIEW	100%	APPD DRG/ TECH SPEC		INSP REPORT	2	1	-	
		3. CLEANLINESS	MA	VISUAL	100%	APPD DRG/ TECH SPEC		INSP REPORT	2	1	-	
		4. NAMEPLATE	MA	VIAUAL	100%	APPD DRG/ TECH SPEC		INSP REPORT	2	1	-	
5.0	PAINTING	1. SURFACE PREPARATION	MI	VISUAL & MEASURE-MENT	100%	APPROVED DATA SHEET FROM BHEL/ CUSTOMER		INSP REPORT	2	2	1	
		2. UNIFORMITY & THICKNESS	MI	VISUAL & MEASURE-MENT	100%	-DO-		-DO-	2	2	1	

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		QUALITY PLAN			CUSTOMER: APGENCO			PROJECT : 1X800 MW DR. NTPPS VIJAYAWADA				SPEC. NO : PE-SS-999-100-M016		
					VENDOR:			QP NO. . PE-QP-999-100-M024		REV. 00 DT. 14.2.2017		SPEC. TITLE STANDARD SPEC. FOE TWO WAY BF VALVE FOR STEAM SERVICE		
		SHEET 8 OF 8			SYSTEM STEAM SERVICE			ITEM: CAST CARBON STEEL BUTTERFLY VALVE SIZE 2000 MM NB/ CLASS 75B MOTORISED				SECTION - VOLUME		
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED		CAT E- GO RY	TYPE/METH OD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD		AGENCY P W V		REMARKS	

6.0	PACKING	SOUNDNESS	MI	VISUAL	100%	AS PER TECH SPECIFICATION	INSP REPORT	2	2	1	PHOTOGRAPHS OF VALVES AFTER PACKING TO BE VERIFIED BY BHEL BEFORE ISSUING MDCC.
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NOTES:- CR- MEANS CRITICAL MA- MEANS MAJOR MI- MINOR
PT-PENETRATION TEST UT- ULTRA SOUND TEST MPI= MAGNETIC PARTICAL EXAMINATION
1- BHEL (PURCHASER) 2- VENDOR (MAIN) 3- SUB-VENDOR OF VENDOR
ALL MATERIALS SHALL BE AS PER APPROVED DRGS/ DATA SHEET FOR VALVES.

NOTE: ALL THE NDT TEST PROCEDURES SHALL BE AS PER ASME B 16.34

Note-1: BW ends to be machined after final tests (3.2), documents related to BW ends shall be reviewed by BHEL & customer after final inspection and subsequent matching.

Note-2: After the BW end preparation the test carried out are MPI (as per QP clause No. 2.3) and dimension check (As per QP clause no. 4.1.1).

BHEL	PARTICULARS	BIDDER/VENDOR	
	NAME		
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SPECIFICATION FOR MOTORISED VALVE ACTUATOR

SPECIFICATION NO.:

VOLUME

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Data Sheet A & B

DATA SHEET-A
(TO BE FILLED BY PURCHASER)

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

GENERAL*	* PROJECT	1 X 800 MW VIJAYWADA TPS			
	OFFER REFERENCE				
	* TAG NO. SERVICE	EXV-31, EXV-32	STEAM SERVICE		
	* DUTY	☒ ON / OFF ☐ INCHING			
	* LINE SIZE (inlet/outlet): MATERIAL	OD 2032 X 16			
	* VALVE TYPE	☐ GLOBE ☐ GATE ☐ REG. GLOBE ☒ BUTTERFLY			
	* OPENING / CLOSING TIME				
	* WORKING PRESSURE				
	AMBIENT CONDITION	SHALL BE SUITABLE FOR CONTINUOUS OPERATION UNDER AN AMBIENT TEMP. OF 0-55 DEG C AND RELATIVE HUMIDITY OF 0-95%			
	VALVE SEAT TEST PRESS	BIDDER TO SPECIFY			
	REQUIRED VALVE TORQUE	BIDDER TO SPECIFY			
	ACTUATOR RATED TORQUE	BIDDER TO SPECIFY			
CONSTRUCTION AND SIZING	CONSTRUCTION	TOTALLY ENCLOSED, DUST TIGHT, WEATHER PROOF, SUITABLE FOR OUTDOOR USE WITHOUT CANOPY, IP:65			
	MECHANICAL POSITION INDICATOR	TO BE PROVIDED FOR 0-100% TRAVEL			
	BEARINGS	DOUBLE SHIELDED, GREASE LUBRICATED ANTI-FRICTION.			
	GEAR TRAIN FOR LIMIT SWITCH/TORQUE SWITCH OPERATION	METAL (NOT FIBRE GEARS). SELF-LOCKING TO PREVENT DRIFT UNDER TORQUE SWITCH SPRING PRESSURE WHEN MOTOR IS DE-ENERGIZED.			
	SIZING	OPEN/CLOSE AT RATED SPEED AGAINST DESIGNED DIFFERENTIAL PRESSURE AT 90% OF RATED VOLTAGE. FOR ISOLATING SERVICE THREE SUCCESSIVE OPEN-CLOSE OPERATIONS OR 15 MINS. WHICHEVER IS HIGHER. FOR REGULATING 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 ☒ DRG. NO. 3-V-MISC-24227 R00 (INDICATIVE)			
	COLOUR SHADE	☒ BLUE (RAL 5012), To be decided during detail Engg.			
	PAINT TYPE (## Refer Notes)	☐ ENAMEL ☒ EPOXY ☐			
	SHAFT RPM	BIDDER TO SPECIFY			
	OLR SET VALUE	BIDDER TO SPECIFY			
	@ STARTING / FULL LOAD CURRENT	BIDDER TO SPECIFY			
	NO. OF REV FOR FULL TRAVEL	BIDDER TO SPECIFY			
	@ PWR SUPP TO MTR / STARTER	415V, 3PH, AC, 3 WIRE			
	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED FROM THE POWER SUPPLY TO THE STARTER ☐ 230 V ☐ 110 V			
	@ ENCLOSURE CLASS OF MOTOR	☐ IP 65 ☐ FLAME PROOF			



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Data Sheet A & B

DATA SHEET-A
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DATA SHEET-B
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	@ INSULATION CLASS	CLASS-F TEMP. RISE LIMITED TO CLASS-B			
	@ WINDING TEMP PROTECTION	☒ THERMOSTAT (3 Nos., 1 IN EACH PHASE) ☐			
	SINGLE PHASE / WRONG PHASE SEQUENCE PROTECTION	REQUIRED			
INTEGRAL STARTER	INTEGRAL STARTER	☒ REQUIRED ☐ NOT REQUIRED			
	TYPE OF SWITCHING DEVICE	☒ CONTACTORS ☐ THYRISTORS			
	TYPE	☒ CONVENTIONAL ☐ SMART (NON-INTRUSIVE)			
	IF SMART	NOT APPLICABLE			
	a) SERIAL LINK INTERFACE	☐ INTEGRAL ☐ FIELD MOUNTED			
	b) SERIAL LINK PROTOCOL	☐ FOUNDATION FIELD-BUS ☐ PROFI-BUS ☐ DEVICE NET ☐			
	c) SERIAL LINK MEDIA	☐ TWISTED PAIR Cu-CBL ☐ CO-AXIAL Cu-CBL ☐ OFC			
	d) HAND HELD PROGRAMMER	☐ REQUIRED ☐ NOT REQUIRED			
	e) TYPE OF HAND HELD PROGRAMMER	☐ BLUETOOTH ☐ INFRARED ☐			
	f) MASTER STATION	☐ REQUIRED ☐ NOT REQUIRED			
	g) MASTER STN INTRFACE WITH DCS	☐ MODBUS ☐ TCP/IP			
	h) DETAILS OF SPECIAL CABLE	☐ ENCLOSED ☐ NOT REQUIRED			
	STEP DOWN CONT. TRANSFORMER	☒ REQUIRED			
	OPEN / CLOSE PB	☒ REQUIRED ☐ NOT REQUIRED			
	STOP PB	☒ REQUIRED ☐ NOT REQUIRED			
	INDICATING LAMPS	☒ REQUIRED ☐ NOT REQUIRED			
	LOCAL REMOTE S/S	☒ REQUIRED ☐ NOT REQUIRED			
	STATUS CONTACTS FOR MONITORING	☒ REQUIRED ☐ NOT REQUIRED			
	INTEGRAL STARTER DISTURBED SIGNAL	REQUIRED (O/L RELAY OPERATED, CONT. /POWER SUPPLY FAILED, S/S IN LOCAL, TORQUE SWITCH OPTD. MID WAY)			
	INTERPOSING RELAY/OPTO COUPLER (Applicable for integral Starter)	TYPE OF ISOLATING DEVICE	☒ INTERPOSING RELAY ☐ OPTO COUPLER ☐ EITHER		
QUANTITY		☐ 2 Nos. ☒ 3 Nos.			
DRIVING VOLTAGE		☒ 20.5 – 24V DC ☐ _____ V DC			
DRIVING CURRENT		☒ 125mA MAX ☐ _____ mA MAX			
LOAD RESISTANCE		☒ > 192 ohms - <25 k ohms ☐ > _____ ohms - < _____ ohms			
TORQUE SWITCH (Not Applicable for Smart Actuator) (\$\$ Refer Notes)	MFR & MODEL NO.	BIDDER TO SPECIFY			
	OPEN / CLOSE	☒ 1 No. ☐ 2Nos. / ☒ 1 No. ☐ 2Nos			
	CONTACT TYPE	2 NO + 2 NC			
	RATING	5A 240V AC AND 0.5A 220V DC			
	CALIBRATED KNOBS(OPEN&CLOSE TS)	REQUIRED FOR SETTING DESIRED TORQUE			
	ACCURACY	+3% OF SET VALUE			
LIMIT SWITCH (Not Applicable for Smart Actuator) (\$\$ Refer Notes)	MFR & MODEL NO.	BIDDER TO SPECIFY			
	OPEN : INT : CLOSE	☐ 1 No ☒ 2 Nos.	2 Nos. (ADJ.)	☐ 1 No. ☒ 2Nos.	
	CONTACT TYPE	2 NO + 2 NC			
	RATING (AC / DC)	5A 240V AC AND 0.5A 220V DC			



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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	☒ 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)	240V AC , 1 PH/415/240 V CTRL TRANSFORMER WITH PRIMARY AND SECONDARY FUSES	
	@ RATING		
TERMINAL BOX	ACTUATOR/MOTOR TERMINAL BOX	REQUIRED	
	ENCL CLASS ACTUATOR/MOTOR T.B.	@ ☐ IP 68 @ ☐	
	@ EARTHING TERMINAL	REQUIRED	
	PLUG & SOCKET(9 PIN) (FOR COMMD, LS/TS FEED BACK, P0T)	☐ REQUIRED ☒ NOT REQUIRED ☐ 2 NOS. ☐	
CABLE GLANDS	@ POWER CABLE GLAND	SIZE:-----	
	@ SPACE HEATER CABLE GLAND	SIZE:-----	
	OTHER CONTROL CABLE GLANDS-1	☐ 1No. for BFV of CW PUMP(Cable size 2Px1.5mm2)	
	OTHER CONTROL CABLE GLANDS-2	QUANTITY & SIZE: 1no., 2.5 sq. mm	
WEIGHT	TOTAL WEIGHT (ACTUATOR + ACCESSORIES)	BIDDER TO SPECIFY	_____ Kg.

NOTES:

1. **SCOPE:** DESIGN, MANUFACTURE, INSPECTION, TESTING AND DELIVERY TO SITE OF ELECTRIC ACTUATOR FOR INCHING OR OPEN / CLOSE DUTY.
 2. **CODES & STANDARDS:** DESIGN AND MATERIALS USED SHALL COMPLY WITH THE RELEVANT LATEST NATIONAL AND 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
 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, WITH NICKEL COATING SHALL BE PROVIDED.
 5. THE TORQUE SWITCHES SHALL BE PROVIDED WITH MECHANICAL LATCHING DEVICE TO PREVENT OPERATION WHEN UNSEATING FROM THE END POSITIONS. THE LATCHING DEVICE SHALL UNLATCH AS SOON AS THE VALVE LEAVES THE END POSITION. IF SUCH PROVISION IS NOT POSSIBLE, THE TORQUE SWITCHES SHALL BE BYPASSED BY END-POSITION LIMIT SWITCHES WHICH OPENS ON VALVE LEAVING END POSITION. THESE LIMIT SWITCHES ARE ADDITIONAL TO THE NUMBER OF LIMIT SWITCHES SPECIFIED ELSEWHERE.
 6. THE MOTOR SHALL OPERATE SATISFACTORILY UNDER THE +/- 10% SUPPLY VOLTAGE VARIATION AT RATED FREQUENCY, -5% TO +3% VARIATION IN FREQUENCY AT RATED SUPPLY VOLTAGE, SIMULTANEOUS VARIATION IN VOLTAGE & FREQUENCY THE SUM OF ABSOLUTE PERCENTAGE NOT EXCEEDING 10%.
 7. THE MOTOR SHALL BE SUITABLE FOR DIRECT ON LINE STARTING.
- \$\$ TORQUE SWITCH & LIMIT SWITCH SHALL ACT INDEPENDENT OF EACH OTHER. TANDEM OPERATION IS NOT ACCEPTABLE.**
- ## EPOXY PAINT IS RECOMMENDED FOR COASTAL AREAS.**

VENDOR COMPANY SEAL

NAME

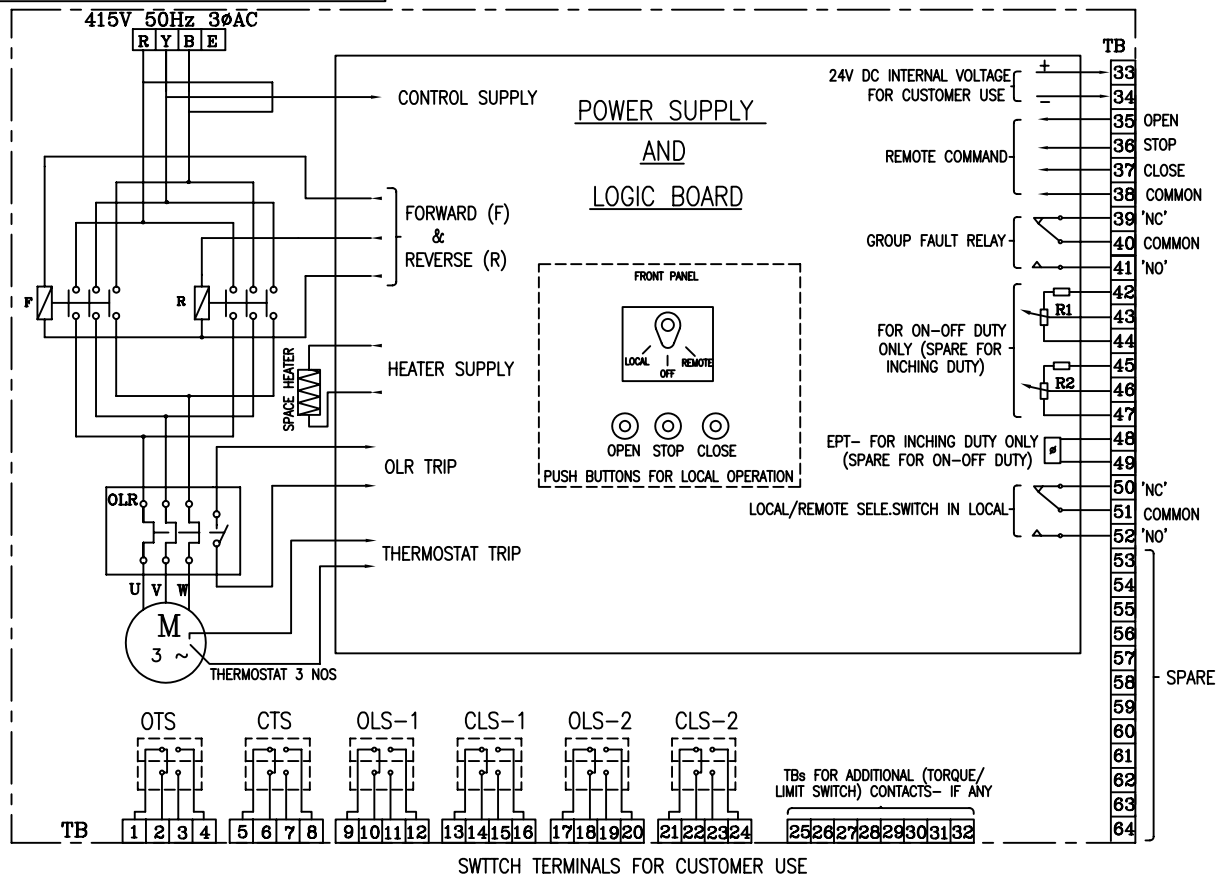
SIGNATURE

DATE

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

3-V-MISC-24227

DRAWING NO.



CONTACT DEVELOPMENT DIAGRAM

OTS	1-2	OPEN AT OVER TORQUE DURING OPENING TRAVEL				
	3-4	CLOSE AT OVER TORQUE DURING OPENING TRAVEL				
CTS	5-6	OPEN AT OVER TORQUE DURING CLOSING TRAVEL				
	7-8	CLOSE AT OVER TORQUE DURING CLOSING TRAVEL				
OLS-1	9-10					
	11-12					
CLS-1	13-14					
	15-16					
OLS-2	17-18					
	19-20					
CLS-2	21-22					
	23-24					
SWITCH	TERMINAL NO.	FULL OPEN	a	INTERMEDIATE	b	FULL CLOSE
		VALVE POSITION				
————— INDICATES CONTACT CLOSED - - - - - INDICATES CONTACT OPEN						
CONTACT RATING: 5A AT 250V AC & 0.5A AT 220V DC						

SETTING PROCEDURE OF POSITION LIMIT AND TORQUE SWITCH

VALVES	OPEN		CLOSE	
	MAIN	BACK UP	MAIN	BACK UP
GATE VALVE OF 100 mm AND ABOVE IN 1500 CL AND ABOVE RATINGS	OLS	OTS *	CLS	CTS
ALL OTHER GATE & GLOBE VALVES	OLS	OTS *	CTS	#
# - CLS NOT TO BE CONNECTED IN TRIP CIRCUIT				
* - BYPASS OTS FOR INITIAL 5% OF TRAVEL (FOR GATE VALVES ONLY)				

NOTE:-

- 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 (POTENTIOMETRIC 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 3φ 415V 50 Hz AC SUPPLY

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 any way detrimental to the interest of the company.

TYPE OF PRODUCT ELECTRICAL VALVE ACTUATORS (AC) WITH INTEGRAL STARTERS OR NAME OF CUSTOMER/PROJECT		ELECTRICAL VALVE ACTUATORS (AC) WITH INTEGRAL STARTERS (DRAWN FOR INTERMEDIATE POSITION OF VALVES)	
 365-121 DEPT VL CODE	BHARAT HEAVY ELECTRICALS LTD., UNIT: HIGH PRESSURE BOILER PLANT. TIRUCHIRAPALLI-620014.		DRN N.P.ESWAR CHD D.DINAKARAN APPD K.ARUNACHALAM
	SCALE WEIGHT (KG).		SIGN N.P DATE 07.10.04 DATE 07.10.04 DATE 07.10.04
	TITLE WIRING DIAGRAM (TERMINAL PLAN) FOR ACTUATOR WITH INTEGRAL STARTER		CARD CODE U 01
REFERENCE INFORMATION DRAWING NO. 3-V-MISC-24227		REV 0	

	COMPLIANCE SHEET BUTTERFLY VALVE- STEAM SERVICE		SPECIFICATION NO. PE-TS-419-100-M016	
			SECTION : II	
	REV. NO.: 00		DATE: 14.2.2017	
	Sheet 1 of 1			

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.

Name of Bidder / Authorized Representative :- -----

Designation :- -----

Signature :- -----

Company Seal :- -----

Date :- -----

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE					
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL	

APPDCL

1X800 MW KRISHNAPATANAM

TECHNICAL SPECIFICATION FOR BUTTERFLY VALVE-STEAM SERVICE

SPECIFICATION NO. PE-TS-420-100-M016
Rev. no.: 00



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

	TECHNICAL SPECIFICATION BUTTERFLY VALVE-STEAM SERVICE 1X800 MW KRISHNAPATANAM		SPECIFICATION NO. PE-TS-420-100-M016
			REV. NO.: 00 DATE: 13.2.2017
	SHEET 1 OF 1		

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2.	SECTION-II	i) DATA SHEET-A ii) QUALITY PLAN iii) ACTUATOR DATA SHEET & WIRING DIAGRAM iv) COMPLIANCE SHEET	2 11 3 1

	TECHNICAL SPECIFICATION BUTTERFLY VALVE-STEAM SERVICE		SPECIFICATION NO. PE-TS-420-100-M016
			REV. NO.: 00 DATE: 13.2.2017
	SHEET 1 OF 1		

SECTION-I

SPECIFIC TECHNICAL REQUIREMENTS

	SPECIFIC TECHNICAL REQUIREMENTS BUTTERFLY VALVES (STEAM SERVICE)		SPECIFICATION NO.: PE-TS-420-100-M016
			SECTION - I
	REV. NO.: 00		DATE: 13.2.2017
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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, 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.

4.0 CODES AND STANDARDS:

The design, manufacture, inspection and testing of the butterfly valves shall suit the design parameters specified in datasheet-A1 & comply with the requirements of latest revisions of the following standards. However, the testing shall be as per American Water Works Association AWWA C504-10 and C516-10 (whichever is applicable) including disc strength test (all sizes of valves), gear box POD Test & Valve POD test.

- a) AWWA C504-10 upto size 1800 mm.
- b) AWWA C516-10 upto for size 2000 mm and above.

- 4.1 In case of any conflict between the above Codes/Standards and this specification, the later shall prevail and in case any further conflict in this matter, the interpretation of the specification by the BHEL engineer shall be final & binding.

5.0 DESIGN REQUIREMENTS:

- 5.1 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.
- 5.2 The butterfly valves shall be suitable for Indoor/outdoor installation with shaft either in horizontal or vertical position.
- 5.3 The valves shall have min. single off-set type disc (design with shaft eccentric to disc) and long body design for AWWA C504-10 and maximum laying length for AWWA C516-10 as specified in Data sheet-A.
- 5.4 The butterfly valves shall be with butt welded ends as specified in Data sheet-A1 and designed to ensure bubble tight shut off at the rated pressure of valve.

	SPECIFIC TECHNICAL REQUIREMENTS BUTTERFLY VALVES (STEAM SERVICE)		SPECIFICATION NO.: PE-TS-420-100-M016
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5.5 MATERIALS

- 5.5.1 The materials of construction of main parts of the butterfly valves (steam service) shall be specified in Data sheet-A.
- 5.5.2 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.
- 5.5.3 Materials used in manufacture of valves shall be of tested quality.

6.0 CONSTRUCTION FEATURES

6.1 Valve Body

- 6.1.1 The valve body shall have integral hubs for shaft bearing housing. The minimum body shell thickness and minimum diameter of seat bore shall be as per requirement of the applicable table/equation of AWWA-C504-10/C516-10 (whichever is applicable). Material of construction of body and valve parts shall be as per materials indicated in Data sheet-A1.
- 6.1.2 An arrow shall be embossed/ engraved and painted on the outside of body to clearly indicate the direction of flow.

6.2 Valve Shaft

- 6.2.1 The shaft of each butterfly valve shall be securely attached to the disc through Bolting, Riveting, threading, upsetting or cross pinning, adequately locked.
- 6.2.2 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 two separate shafts inserted into the disc. Each stub shaft shall be inserted into the valve disc hubs for a minimum distance of at least 1.5 times shaft 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.
- 6.2.3 Surface finish for shaft shall be minimum 16 RMS in the area of gland packing.

6.3 Valve Disc:

The valve disc shall have no external ribs transverse to the flow and shall sustain full differential pressure across closed valve disc without exceeding working stress of one fifth of the tensile strength of the material used. The thickness of the valve disc shall not be more than $2 \frac{1}{4}$ times the shaft diameter listed in AWWA-C504-10/C516-10 (whichever is applicable). The valve disc shall be designed to rotate 90° from full open to tight shut off position. Material of Disc shall be as per the Data sheet-A1.

6.4 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

	SPECIFIC TECHNICAL REQUIREMENTS BUTTERFLY VALVES (STEAM SERVICE)		SPECIFICATION NO.: PE-TS-420-100-M016
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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.

6.5 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 in accordance with the relevant standard.

6.6 Shaft Seal:

Wherever the shaft project through the valve body for actuator connection, a shaft seal shall be provided. Shaft seal shall be designed for use of Standard 'O' rings seals 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.

The hand wheel shall be of malleable iron or equivalent.

6.8 Body Ends:

These shall be as butt welded as per ASME B 16.25 as specified in Data sheet-A1.

6.9 Nameplate:

Each valve shall be fitted with a circular Stainless steel 2mm thick nameplate indicating the valve Tag No. and service description given in Data sheet-A1. All details shall be engraved 1 mm deep and filled with black enamel paint.

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

6.11 All valves shall be closed by rotating the handwheel in a clockwise direction when looking at the face of the handwheel. The pulling force required on handwheel 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 adjacent arrows to indicate the direction of rotation to which each refers.

6.12 Special attention shall be given to the operating mechanism for large size valves in order that quick and easy operation is obtained and maintenance is kept to a minimum.

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

6.14 Wherever practical, valves (including actuator, drive motor, integral bypass etc.) of total weight equal to or greater than 500 Kg shall be provided with suitable lugs to permit direct suspension by hanger rods or direct resting on bottom support, as applicable.

 Maharashtra Company	SPECIFIC TECHNICAL REQUIREMENTS BUTTERFLY VALVES (STEAM SERVICE)	SPECIFICATION NO.: PE-TS-420-100-M016	
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6.15 The valves as well as accessories shall be designed for easy dismantling and maintenance.

6.16 The disc shall rotate through 90° from full open to the tight shut position. The disc shall be contoured to ensure the least possible resistance to flow and be suitable for throttling operation. While the disc is in throttled position, the valve shall not create any noise or vibration.

6.17 It may be noted that all construction features design and parameters will be governed by AWWA-C504-10 for sizes upto 1800 mm and AWWA-C516-10 for sizes 2000 mm and above.

7.0 SPECIAL FEATURES:

7.1 Gland Sealing Arrangement:

Butterfly valves, provided with gland sealing arrangement, shall be vacuum tested. All valves required with this arrangement shall be provided with G3/8" connection (duly plugged) for water sealing. Sealing water shall be supplied at 4 ata and 50°C unless otherwise specifically indicated for the particular project.

7.2 Motorised Valves:

7.2.1 The motorized 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 in Datasheet A.

7.2.2 Electric actuators shall be mounted directly on the valves.

7.2.3 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.

Gear box and Electric Actuator shall also meet the inspection & testing requirements of latest revision of AWWA-C504-10 /AWWA C542-10 respectively.

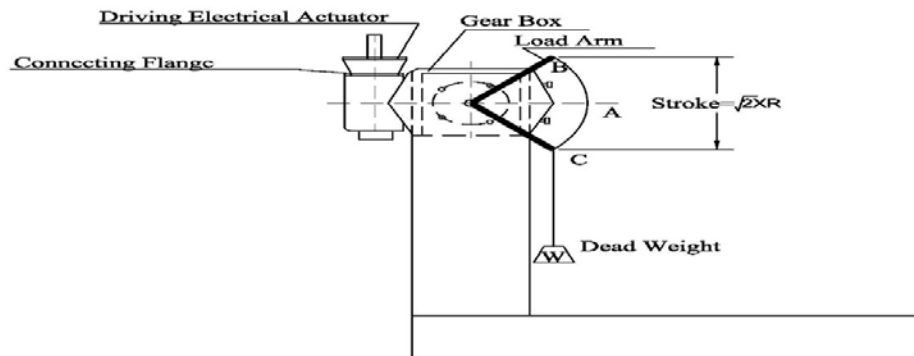
8.0 INSPECTION AND TESTING:-

All inspection & Testing for valve, Gear box and actuators shall be as per the requirements of the relevant standard.

The minimum NDT/testing and inspection requirements for valve, Gear Box, electric actuator etc. shall be as per the 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.

8.1 P.O.D. Tests:

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TEST SET UP

FIG. 1

- a) POD (Proof-of-design) Test as per AWWA-C504-10/C516-10 (whichever is applicable) 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.
- b) Gear Box and Electric Actuator shall be designed & tested in accordance with latest editions of AWWA C 504-10(gearbox) and AWWA C 542-10 (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.
- c) For valves designed and manufactured as per AWWA POD shall follow the guidelines of AWWA-C504-10/C516-10 (whichever is applicable) and Actuators shall meet the requirements of POD test of AWWA-C-542-10.
- d) Gear box POD test: - Valve POD and gear box POD tests should be done separately on each one of the valve & the gear box. Gear box POD test shall be done as per the procedure described below or as per the procedure agreed between purchaser & vendor.
- e) 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 Sketch 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.(refer fig.1)
- f) Irrespective of the requirement of conducting the type tests, the vendor shall submit the reports of the type tests carried out within last five years from the date of bid opening. These reports should be for the tests conducted on the equipment same (model / type/ size / rating) to those proposed to be supplied. Tests should have been conducted at an independent laboratory or should have been witnessed by a client.

These valves are for vacuum service and shall be provided with gland sealing arrangement which shall be vacuum tested with vacuum and helium gas.

9.0 PERFORMANCE GUARANTEE:

	SPECIFIC TECHNICAL REQUIREMENTS BUTTERFLY VALVES (STEAM SERVICE)		SPECIFICATION NO.: PE-TS-420-100-M016
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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 the following for each butterfly valve:

- a) Pressure drop as per the approved drop vs. opening curve.
- b) The valve opening and closing time.

10.0 EXCLUSIONS:

Erection & Commissioning of equipment at site.

11.0 QUALITY ASSURANCE

11.1 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.

11.2 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.

11.3 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.

12.0 PAINTING REQUIREMENT:

Surface preparation shall be as per SSPC-SP-3/ Power Tool Cleaning followed by 2 coat of Heat Resistance Aluminium paint to IS 13183 Gr. I or equivalent, paint shade Aluminium and total DFT of paint will be equal to 80 microns minimum.

13.0 PACKING INSTRUCTIONS:

- a) 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.
- b) The valve has to be dispatched in total assembled form.
- c) Discs of all valves shall be properly secured while dispatching so that there is no risk of damage to the disc & seat.
- d) Body ends shall be suitably sealed to protect them against damage during transit and storage.

	SPECIFIC TECHNICAL REQUIREMENTS BUTTERFLY VALVES (STEAM SERVICE)		SPECIFICATION NO.: PE-TS-420-100-M016
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- e) Valves with butt-welding ends shall be protected by means of polythene caps/rubber and protectors to prevent damage to ends & also to avoid foreign material entering the valve while shipment & storage.
- f) Valve Tag Nos. shall be incorporated in all the dispatch documents.
- g) Proper care shall be taken to avoid damage to the painted surface during transit.
- h) 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.

14.0 SPARES

- a) **Mandatory Spares:** These shall be as per Data Sheet-A.
- b) Order for the spares may be placed simultaneously or otherwise at the option of purchaser.

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

	TECHNICAL SPECIFICATION BUTTERFLY VALVE-STEAM SERVICE		SPECIFICATION NO. PE-TS-420-100-M016
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SECTION-II

- DATA SHEET – A
- QUALITY PLAN
- ACTUATOR DATA SHEET & WIRING DIAGRAM
- COMPLIANCE SHEET

 Maharaja Company		DATASHEET - A												SPECIFICATION NO.: PE-TS-420-100-M016														
		1X800 MW KRISHNAPATANAM												SECTION: II														
		Butterfly Valves Steam Services												REV NO.: 00						DATE: 13.2.2017								
														SHEET 1 OF 1														
1	2	3	4	5	6		7	8	9	11	12	13		14	15	16	17	18	19	20	21	22	23	24	25	26	27	
SL NO.	TAG NOS.	TYPE OF VALVE	SIZE mm (NB)	OPERATION	DESIGN		SERVICE	RATING, DESIGN & TESTING CODE	BODY & DISC MATERIAL	END CONN	SPECIAL FEATURES	MATCHING PIPE		MAIN VALVES QTY WITHOUT COMMISSIONING SPARES NOS.	COMMISSIONING SPARES				MANDATORY SPARES									
					PRESSURE KG/CM2(G)	TEMP (DEG ⁰ C)						OD (MM)	THK(MM)		GLAND PACKING (VALVES) (SETS)	BOTTOM GASKET (VALVES) (SETS)	O' RING AND SEALS FOR ELECTRIC ACTUATORS (SETS)	DISC SEAL (SETS)	COMPLETE VALVE ASSEMBLY WITH ACTUATOR & GEAR BOX WITHOUT COMMISSIONING SPARES (As per Sno. IV (3.1) & ID No. 779) (No.)	COMPLETE ACTUATOR (As per Sno. 13.1 & ID No. 2588) (No.)	LIMIT SWITCH (As per Sno. 13.2 & ID No. 2589) (No.)	TORQUE SWITCH (As per Sno. 13.3 & ID No. 2590) (No.)	AUXILIARY CONTACT (As per Sno. 13.4 & ID No. 2591) (No.)	COMPLETE MOTOR USED IN ACTUATOR (As per Sno. 13.5 & ID No. 2592) (No.)	COMPLETE SEAL KIT (As per Sno. 13.6 & ID No. 2593) (SET)	COMPLETE 'O' RING SET (As per Sno. 13.7 & ID No. 2594) (SETS)	ELECTRONIC CARD (As per Sno. 13.8 & ID No. 2595) (No.)	
1	EXV-31, EXV-32 (1 EACH)	BFV	2000	MO	Full vacuum and 2 kg/sq.cm	100	BFP DRIVE TURBINE EXHAUST LINE	CL.75 (MINIMUM) OF AWWA C516-2010	CCS (ASTM A216 GR. WCB)	BW AS PER ASME B16.5	SG, MO, OT = 50 ~ 90 SEC, SHAFT AXIS ORIENTATION HORIZONTAL/ VERTICAL SUITABLE FOR BOTH DIRECTIONS; ELECTRIC ACTUATOR WITH INTEGRAL STARTER.	2032	16	2	2	2	2	1	1	1	3	3	1	1	1	1	1	
													TOTAL	2	2	2	2	1	1	1	3	3	1	1	1	1	1	

ABBREVIATIONS:-
 BW- BUTT WELDED, CCS - CAST CARBON STEEL, SG - SEALED GLAND, MO - MOTORISED ELECTRIC ACTUATOR OT - OPENING/CLOSING TIME OF VALVE WITH ELECTRIC ACTUATOR OPERATION IBR - INDIAN BOILER REGULATION

1. Valve POD , Gear box POD & Actuator POD test, if already carried out by bidder for similar model/ type/ size/ rating for any BHEL/NTPC/REPUTED CUSTOMER project within the last 5 years from the date of bid opening of this project, i.e. 15/12/2015, shall be considered applicable for this project, if found satisfactory by BHEL/ CUSTOMER.

2. Valve POD, Gear box POD & Actuator POD test, if required, as per technical specification & AWWA C516, 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.

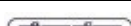
3. Main valve prices shall BE EXCLUSIVE of cost of Commissioning Spares prices.

4. Bidder is required to quote unit price of each item under commissioning spares separately & individually i.e. prices of all commissioning spares shall not be clubbed/ included in the unit price of Main valves.

5. Commissioning spares --> One set each of Bottom/ Cover Gasket with'O' Rings & Seals, Gland Packing with 'O' ring & seals in Gland packing area and actuator "o" rings and seal as applicable.

6. All the mandatory spares are to be quoted individually & separately.

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

 Maharaja Company	DATA SHEET-A1 BUTTERFLY VALVES (STEAM SERVICE) 1X800 MW KRISHNAPATANAM	SPECIFICATION NO. PE-TS-420-100-M016	
		SECTION : II	
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Material of Construction

SL NO.	PART NAME	MATERIALS
VALVE		
a.	Valve Body Butt welded	ASTM A-216 Gr. WCB
b.	Valve Disc.	ASTM A-216 Gr.WCB
c.	Shaft	ASTM A182 Gr..F304
d.	Disc Seal/Seat	EPDM (70 ~ 75 SHORE 'A')
e.	Valve body seat edge	AISI 316 (WELD OVERLAY/ DEPOSIT)
f.	Seat retaining ring and internal Bolts etc.	SS 304/316
g.	Bearing	SLEEVE TYPE, SELF LUBRICATED
h.	Shaft seal :	'O' RINGS TYPE (65~70 SHORE 'A')
i.	Fasteners (bolts & nuts)	ASTM A193 Gr. B7 (BOLTS) / ASTM A194 Gr. 2H(NUTS)
j.	Hand wheel (actuator)	MALLEABLE IRON (or equivalent)
GEAR BOX. (Bevel type)		
k.	Main Housing /Cover (Totally enclosed construction)	Cast Iron IS:210 Gr. FG 220/260
l.	Input shaft	13/% Cr SS/ EN8 (~200 BN)
m.	Worm	EN8 (~200 BN)
n.	Worm Wheel	Ductile iron / S.G iron
o.	Hand wheel	Malleable Iron (or equivalent)

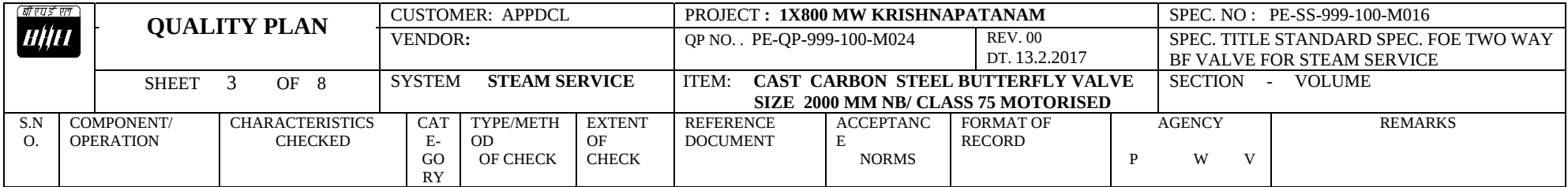
		QUALITY PLAN		CUSTOMER: APPDCL			PROJECT : 1X800 MW KRISHNAPATANAM			SPEC. NO : PE-SS-999-100-M016		
				VENDOR:			QP NO. . PE-QP-999-100-M024		REV. 00 DT. 13.2.2017		SPEC. TITLE STANDARD SPEC. FOE TWO WAY BF VALVE FOR STEAM SERVICE	
		SHEET 1 OF 8		SYSTEM STEAM SERVICE			ITEM: CAST CARBON STEEL BUTTERFLY VALVE SIZE 2000 MM NB/ CLASS 75 MOTORISED			SECTION - VOLUME		
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CAT E- GO RY	TYPE/METH OD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY P W V		REMARKS	

1.1	MATERIALS BODY, DISC, SHAFT	1 CHEM. COMPOSITION & MECH. PROPERTIES	MA	1) CHEM. TESTS	ONE PER HEAT	APPD DRG/ TECH SPEC	APPD DRG/ TECH SPEC	TEST CERT.	3/2	2	1	- MPI ON 100% AREA (ACCESSIBLE) RT ON CHANGE OF SECTION AND BW ENDS OF BODY (RT FILM REVIEW BY BHEL) <
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BHEL	PARTICULARS	BIDDER/VENDOR	
	NAME		
	SIGNATURE		
	DATE		
			BIDDER'S/ VENDOR'S COMPANY SEAL

	QUALITY PLAN		CUSTOMER: APPDCL			PROJECT : 1X800 MW KRISHNAPATANAM			SPEC. NO : PE-SS-999-100-M016			
			VENDOR:			QP NO. . PE-QP-999-100-M024		REV. 00 DT. 13.2.2017		SPEC. TITLE STANDARD SPEC. FOE TWO WAY BF VALVE FOR STEAM SERVICE		
	SHEET 2 OF 8		SYSTEM STEAM SERVICE			ITEM: CAST CARBON STEEL BUTTERFLY VALVE SIZE 2000 MM NB/ CLASS 75 MOTORISED			SECTION - VOLUME			
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CAT E- GO RY	TYPE/METH OD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY P W V			REMARKS

				2) MECH TESTS	ONE PER HEAT & HEAT TREATMENT BATCH	APPD DRG/ TECH SPEC.	APPD DRG/ TECH SPEC	TEST CERT.	3/2	2	1	
1.3	DISC SEAL (FROM VENDOR'S REGULAR & APPROVED SOURCE)	1. VISUAL INSPN	MA	VISUAL	100%	APPD DRG	APPD DRG	INSPN. REPORT LOG BOOK	3/2	2	1	SPECIMEN TYPE A, 40 DEG CENTIGRADE FOR 70 HRS
		2.DIMENSIONS	MA	MEASURE-MENT	100%	APPD DRG	APPD DRG		3/2	2	1	
		3. TENSILE AND HARDNESS FOR VULCANISING	MA	MEASUREM ENT	1/BATCH	MFG TECH.SPEC/ APPD DRG	MFG TECH. SPEC/ APPD DRG	TEST CERT	3/2	2	1	
		4. OZONE CRACK RESISTANCE	MA	TESTING	1/ BATCH	TECH. SPEC + ASTM D1149	TECH. SPEC + ASTM D1149* AWWA C 504	TEST CERT.	3/2	2	1	
		5. ELONGATION	MA	TESTING	1/ BATCH	IS 3400 PART-I	250% MIN.	TEST CERT	3/2	2	1	
		6. BLEED RESISTANCE	MA	TESTING	1/ BATCH	SAMPLE TO BE KEPT IN 33% HCL, DM WATER, 48% NaOH FOR 72 HRS.	NO DISCOLOURATION. WEIGHT GAIN +/-0 TO 2%	TEST CERT	3/2	2	1	
		7. AGEING TEST	MA	TESTING	1/BATCH	TECH. SPEC + IS 3400 PART IV	TECH. SPEC +IS3400 PART IV *	TEST CERT	3/2	2	1	
		8. HYDRAULIC STABILITY TEST (AFTER AGEING)	MA	TESTING	1/BATCH	TECH SPEC./ REL STD.	TECH. SPEC./ REL STD.	TEST CERT	3//2	2	1	
BHEL				PARTICULARS		BIDDER/VENDOR						
				NAME								
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गोपनीय		QUALITY PLAN		CUSTOMER: APPDCL			PROJECT : 1X800 MW KRISHNAPATANAM			SPEC. NO : PE-SS-999-100-M016	
				VENDOR:			QP NO. . PE-QP-999-100-M024		REV. 00 DT. 13.2.2017		SPEC. TITLE STANDARD SPEC. FOE TWO WAY BF VALVE FOR STEAM SERVICE
		SHEET 4 OF 8		SYSTEM STEAM SERVICE			ITEM: CAST CARBON STEEL BUTTERFLY VALVE SIZE 2000 MM NB/ CLASS 75 MOTORISED			SECTION - VOLUME	
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CAT E- GO RY	TYPE/METH OD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY P W V	REMARKS	

						MODEL						
1.6	ELECTRICAL ACTUATOR											
		1. TORQUE TESTING & SETTING OF TORQUE SWITCH	MA	{MECH., }ELEC. }{TESTS } } } } } } }	100%	TECH. SPEC./ APPD. DRG./ DATA SHEET/ IS:9334	TECH. SPEC./ APPD. DRG./ DATA SHEET/ IS:9334	INSP 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									
		8. .DEGREE OF PROTECTION	MA									
				}	1/TYPE	TECH. SPEC./ APPD. DRG./ DATA SHEET/ IS:9334	TECH. SPEC./ APPD. DRG./ DATA SHEET/ IS:9334	3rd PARTY TEST CERT.	3	-	1	

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		QUALITY PLAN		CUSTOMER: APPDCL			PROJECT : 1X800 MW KRISHNAPATANAM			SPEC. NO : PE-SS-999-100-M016		
				VENDOR:			QP NO. . PE-QP-999-100-M024		REV. 00 DT. 13.2.2017		SPEC. TITLE STANDARD SPEC. FOE TWO WAY BF VALVE FOR STEAM SERVICE	
		SHEET 5 OF 8		SYSTEM STEAM SERVICE			ITEM: CAST CARBON STEEL BUTTERFLY VALVE SIZE 2000 MM NB/ CLASS 75 MOTORISED			SECTION - VOLUME		
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CAT E- GO RY	TYPE/METH OD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY P W V		REMARKS	

		9.DESIGN VERIFICATION	MA	TYPE TEST (CYCLE TEST)	1/TYPE	AWWA C504 & AWWA C540	AWWA C504 & AWWA C540	TEST CERT	3/2	2	1	
2.0	INPROCESS CONTROL:- BODY & DISC	1 DIMENSIONS	MA	MEASURE- MENT P.T.	100%	MFG DRG	MFG DRG	INSPN. REPORT INSPN. REPORT	2	--	1	ON MACHINED AREA ONLY.
2.1		2. SURFACE DEFECTS	CR		100%	ASTM E165	ASME B 16.34 APPENDIX III		2	2	1	
2.2	WELDING OVERLAY DEPOSIT	WELDING PROCEDURE AND WELDER PERFORMANCE QUALIFICATION	CR	VISUAL MECH. TESTS	100%	ASME IX	ASME IX	INSPN. REPORT	3/2	--	--	ONLY BHEL / CUSTOMER QUALIFIED WELDERS SHALL BE ENGAGED FOR WELDING WPS SHALL BE SUBMITTED FOR APPROVAL
		CLADDING	MA	DEPTH MEASUREM ENT	100%	MFG. DWG	MFG. DWG	TEST REPORT	2	2	1	
			MA	SURFACE DEFECT LPI ON WELD OVERLAY AND ADJACENT AREA	100%	ASTM E 165	FREE FROM POROSITY/ CRACK	NDT REPORT	2	2	1	
2.2.1	SEAT RING	SUB-SURFACE DEFECT	MA	RT/UT	100%	ASME B16.34	ASME B16.34	INSP REPORT	3/2	2	1	
		SURFACE DEFECTS	MA	LPI	100%	ASTM E165	FREE FROM CRACKS	INSP REPORT	2	2	1	
2.3	BODY (BUTT WELD ENDS)	SUB-SURFACE DEFECT	CR	MPI	100% ON BW AREA	ASTM A709	ASME B 16.34 APPENDIX III	INSP REPORT	2	2	1	NOTE-1
		SURFACE DEFECTS	CR	RT	100% ON BW AREA	ASME B16.34	ASME B16.34	RT REPORT	2	2	1	RT (100%) OF BODY INCLUDING BW ENDS AS PER SL. NO. 1.1 CLAUSE NO.2
2.4	SHAFT	1. DIMENSION	MA	MEASURE- MENT P.T.	100%	MFG DRG	MFG DRG	LOG BOOK	2	--	--	
		2.SURFACE	MA		100%	ASTM E165	ASME B 16.34	INSPN	2	2	1	

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		QUALITY PLAN		CUSTOMER: APPDCL			PROJECT : 1X800 MW KRISHNAPATANAM			SPEC. NO : PE-SS-999-100-M016		
				VENDOR:			QP NO. . PE-QP-999-100-M024		REV. 00 DT. 13.2.2017		SPEC. TITLE STANDARD SPEC. FOE TWO WAY BF VALVE FOR STEAM SERVICE	
		SHEET 6 OF 8		SYSTEM STEAM SERVICE			ITEM: CAST CARBON STEEL BUTTERFLY VALVE SIZE 2000 MM NB/ CLASS 75 MOTORISED			SECTION - VOLUME		
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CAT E- GO RY	TYPE/METH OD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY P W V			REMARKS

3.1	VERIFICATION OF ALL PREVIOUS TESTS AND DOCUMENTS	DEFECTS VERIFICATION OF RECORDS	MA	---	100%	TECH SPEC	APPENDIX III TECH SPEC	REPORT ---	2	1	1	
3.2	TESTS (HYDRAULIC)	1. BODY TEST	CR	HYDRO TEST	100%	AWWA C-504 / AWWA C-516/ APPD DRG.	NO LEAKAGE	INSP. REPORT	2	1	--	
		2. DISC STRENGTH	CR	HYDRO TEST	100%	AWWA C-504 / AWWA C-516/ APPD DRG.	NO DEFORMATION, NO STRUCTURAL DAMAGE TO DISC	INSP. REPORT	2	1	-	ONE VALVE/SIZE SHALL BE TESTED FOR TWICE THE DESIGN PRESSURE FROM BOTH SIDE OF THE VALVE IN ADDITION TO 100% TESTING IN THE NORMAL FLOW DIRECTON. NO PART OF DISC/ VALVE SHALL BE PEERMANENTLY DEFORMED/DAMAGED. DISC DEFORMATION IS MEASURED USING DIAL GAUGE AND BODY DEFORMATION BY MEASURING TAPE
		3.SEAT LEAKAGE WITH ACTUATOR (BOTH DIRECTION)	CR	HYDRO/ AIR TEST	100%	AWWA C-504 / AWWA C-516/ APPD DRG.	NO LEAKAGE	INSP. REPORT	2	1	-	
		4. PERFORMANCE TEST	CR	PERFORM- ANCE	100%	AWWA C-504* / AWWA C-516 *	SMOOTH OPERATION	INSP. REPORT	2	1	-	*COMPLETE VALVE ASSEMBLY ALONGWITH ACTUATOR SHALL BE 1) PARTIALLY OPENED 3 TIMES UNDER LOAD (5.25 kg/sqcm) IN HORIZONTAL POSITION ONLY 2) OPERATED 25 CYCLES UNDER NO LOAD IN HORIZONTAL OR VERTICAL POSITION AND FOLLOWING SHALL BE CHECKED i) OPERATING TIME

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		QUALITY PLAN			CUSTOMER: APPDCL			PROJECT : 1X800 MW KRISHNAPATANAM			SPEC. NO : PE-SS-999-100-M016		
					VENDOR:			QP NO. . PE-QP-999-100-M024		REV. 00 DT. 13.2.2017		SPEC. TITLE STANDARD SPEC. FOE TWO WAY BF VALVE FOR STEAM SERVICE	
		SHEET 7 OF 8			SYSTEM STEAM SERVICE			ITEM: CAST CARBON STEEL BUTTERFLY VALVE SIZE 2000 MM NB/ CLASS 75 MOTORISED			SECTION - VOLUME		
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED		CAT E- GO RY	TYPE/METH OD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY P W V		REMARKS	

												ii) OPERATION OF TORQUE & LIMIT SWITCHES ii) CURRENT DRAWN BY ACTUATORS
		5. GLAND LEAK TEST (TOP GLAND AND BOTTOM FLANAGES)	CR	HELIUM LEAK TESTS	100%	MFG APPD PROCEDURE	MFG APPD PROCEDURE	INSP. REPORT	2	1	-	PROCEDURE SHALL BE SUBMITTED TO BHEL FOR REVIEW.
		6. VACUUM TEST	CR	VACUUM TEST	100%	MFG APPD PROCEDURE	MFG APPD PROCEDURE	INSP. REPORT	2	1	--	PROCEDURE SHALL BE SUBMITTED TO BHEL FOR REVIEW.
		7.PROOF OF DESIGN TEST (LIFE CYCLE TEST)	CR	CYCLE TEST	AS PER AWWA C 504 ON ONE VALVE/ SIZE/ TYPE/ RATING	APPROVED TEST PROCEDURE / AWWA C504/ AWWA C-516		INSP REPORT	2	1*	1	* VERIFICATION OF TEST REPORTS OF POD TEST ON SAME MODEL/TYPE/SIZE/RATING CARRIED OUT EARLIER FOR ANY BHEL/NTPC/REPUTED CUSTOMER PROJECT WITHIN THE LAST 5 YEARS FROM THE DATE OF BID OPENING OF THIS PROJECT, I.E. 15/12/2015
4.0	SHIPPING RELEASE											
4.1	FINAL INSPECTION	1. OVERALL DIMENSION	MA	MEAS.	100%	APPD DRG		INSP REPORT	2	1	-	NOTE-1
		2. DOCUMENTATION REVIEW	MA	REVIEW	100%	APPD DRG/ TECH SPEC		INSP REPORT	2	1	-	
		3. CLEANLINESS	MA	VISUAL	100%	APPD DRG/ TECH SPEC		INSP REPORT	2	1	-	
		4. NAMEPLATE	MA	VIAUAL	100%	APPD DRG/ TECH SPEC		INSP REPORT	2	1	-	
5.0	PAINTING	1. SURFACE PREPARATION	MI	VISUAL & MEASURE- MENT	100%	APPROVED DATA SHEET FROM BHEL/ CUSTOMER		INSP REPORT	2	2	1	
		2. UNIFORMITY & THICKNESS	MI	VISUAL & MEASURE- MENT	100%	-DO-		-DO-	2	2	1	

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		QUALITY PLAN		CUSTOMER: APPDCL			PROJECT : 1X800 MW KRISHNAPATANAM			SPEC. NO : PE-SS-999-100-M016		
				VENDOR:			QP NO. . PE-QP-999-100-M024		REV. 00 DT. 13.2.2017		SPEC. TITLE STANDARD SPEC. FOE TWO WAY BF VALVE FOR STEAM SERVICE	
		SHEET 8 OF 8		SYSTEM STEAM SERVICE			ITEM: CAST CARBON STEEL BUTTERFLY VALVE SIZE 2000 MM NB/ CLASS 75 MOTORISED			SECTION - VOLUME		
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CAT E- GO RY	TYPE/METH OD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANC E NORMS	FORMAT OF RECORD	AGENCY P W V			REMARKS

6.0	PACKING	SOUNDNESS	MI	VISUAL	100%	AS PER TECH SPECIFICATION	INSP REPORT	2	2	1	PHOTOGRAPHS OF VALVES AFTER PACKING TO BE VERIFIED BY BHEL BEFORE ISSUING MDCC.
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NOTES:- CR- MEANS CRITICAL MA- MEANS MAJOR MI- MINOR
PT-PENETRATION TEST UT- ULTRA SOUND TEST MPI= MAGNETIC PARTICAL EXAMINATION
1- BHEL (PURCHASER) 2- VENDOR (MAIN) 3- SUB-VENDOR OF VENDOR
ALL MATERIALS SHALL BE AS PER APPROVED DRGS/ DATA SHEET FOR VALVES.

NOTE: ALL THE NDT TEST PROCEDURES SHALL BE AS PER ASME B 16.34

Note-1: BW ends to be machined after final tests (3.2), documents related to BW ends shall be reviewed by BHEL & customer after final inspection and subsequent maching.

Note-2: After the BW end preparation the test carried out are MPI (as per QP clause No. 2.3) and dimension check (As per QP clause no. 4.1.1).

BHEL	PARTICULARS	BIDDER/VENDOR	
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SPECIFICATION FOR MOTORISED VALVE ACTUATOR

SPECIFICATION NO.:

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Data Sheet A & B

DATA SHEET-A
(TO BE FILLED BY PURCHASER)

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

GENERAL *	* PROJECT	1 X 800 MW KRISHNAPATNAM TPS			
	OFFER REFERENCE				
	* TAG NO. SERVICE	EXV-31 & EXV-32			
	* DUTY	☒ ON / OFF ☐ INCHING			
	* LINE SIZE (inlet/outlet): MATERIAL				
	* VALVE TYPE	☐ GLOBE ☐ GATE ☐ REG. GLOBE ☒ BUTTERFLY			
	* OPENING / CLOSING TIME				
	* WORKING PRESSURE				
	AMBIENT CONDITION	SHALL BE SUITABLE FOR CONTINUOUS OPERATION UNDER AN AMBIENT TEMP. OF 0-55 DEG C AND RELATIVE HUMIDITY OF 0-95%			
	VALVE SEAT TEST PRESS	BIDDER TO SPECIFY			
	REQUIRED VALVE TORQUE	BIDDER TO SPECIFY			
	ACTUATOR RATED TORQUE	BIDDER TO SPECIFY			
CONSTRUCTION AND SIZING	CONSTRUCTION	TOTALLY ENCLOSED, DUST TIGHT, WEATHER PROOF, SUITABLE FOR OUTDOOR USE WITHOUT CANOPY, IP:65			
	MECHANICAL POSITION INDICATOR	TO BE PROVIDED FOR 0-100% TRAVEL			
	BEARINGS	DOUBLE SHIELDED, GREASE LUBRICATED ANTI-FRICTION.			
	GEAR TRAIN FOR LIMIT SWITCH/TORQUE SWITCH OPERATION	METAL (NOT FIBRE GEARS). SELF-LOCKING TO PREVENT DRIFT UNDER TORQUE SWITCH SPRING PRESSURE WHEN MOTOR IS DE-ENERGIZED.			
	SIZING	OPEN/CLOSE AT RATED SPEED AGAINST DESIGNED DIFFERENTIAL PRESSURE AT 90% OF RATED VOLTAGE. FOR ISOLATING SERVICE THREE SUCCESSIVE OPEN-CLOSE OPERATIONS OR 15 MINS. WHICHEVER IS HIGHER. FOR REGULATING 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 ☒ DRG. NO. 3-V-MISC-24227 R00 (INDICATIVE)			
	COLOUR SHADE	☒ BLUE (RAL 5012), To be decided during detail engg.			
	PAINT TYPE (## Refer Notes)	☐ ENAMEL ☒ EPOXY ☐			
	SHAFT RPM	BIDDER TO SPECIFY			
	OLR SET VALUE	BIDDER TO SPECIFY			
	@ STARTING / FULL LOAD CURRENT	BIDDER TO SPECIFY			
	NO. OF REV FOR FULL TRAVEL	BIDDER TO SPECIFY			
	@ PWR SUPP TO MTR / STARTER	415V, 3PH, AC, 3 WIRE			
	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED FROM THE POWER SUPPLY TO THE STARTER ☐ 230 V ☐ 110 V			
	@ ENCLOSURE CLASS OF MOTOR	☐ IP 65 ☐ FLAME PROOF			



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Data Sheet A & B

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



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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	☒ 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	$\pm 1\%$ FS	
SPACE HEATER	@SPACE HEATER	REQUIRED	
	@ POWER SUPPLY (NON INTEGRAL)	240V AC, 1 PH., 50 Hz	
	@ POWER SUPPLY (INTEGRAL)	240V AC , 1 PH/415/240 V CTRL TRANSFORMER WITH PRIMARY AND SECONDARY FUSES	
	@ RATING		
TERMINAL BOX	ACTUATOR/MOTOR TERMINAL BOX	REQUIRED	
	ENCL CLASS ACTUATOR/MOTOR T.B.	@ ☐ IP 68 @ ☐	
	@ EARTHING TERMINAL	REQUIRED	
	PLUG & SOCKET (9 PIN) (FOR COMM, LS/TS FEED BACK, PoT)	☐ REQUIRED ☒ NOT REQUIRED ☐ 2 NOS. ☐	
CABLE GLANDS	@ POWER CABLE GLAND	SIZE:-----	
	@ SPACE HEATER CABLE GLAND	SIZE:-----	
	OTHER CONTROL CABLE GLANDS-1	☐ 1No. for BFV of CW PUMP (Cable size 2Px1.5mm ²)	
	OTHER CONTROL CABLE GLANDS-2	QUANTITY & SIZE: 1no., 2.5 sq. mm	
WEIGHT	TOTAL WEIGHT (ACTUATOR + ACCESSORIES)	BIDDER TO SPECIFY	_____ Kg.

NOTES:

1. **SCOPE:** DESIGN, MANUFACTURE, INSPECTION, TESTING AND DELIVERY TO SITE OF ELECTRIC ACTUATOR FOR INCHING OR OPEN / CLOSE DUTY.
 2. **CODES & STANDARDS:** DESIGN AND MATERIALS USED SHALL COMPLY WITH THE RELEVANT LATEST NATIONAL AND 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
 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, WITH NICKEL COATING SHALL BE PROVIDED.
 5. THE TORQUE SWITCHES SHALL BE PROVIDED WITH MECHANICAL LATCHING DEVICE TO PREVENT OPERATION WHEN UNSEATING FROM THE END POSITIONS. THE LATCHING DEVICE SHALL UNLATCH AS SOON AS THE VALVE LEAVES THE END POSITION. IF SUCH PROVISION IS NOT POSSIBLE, THE TORQUE SWITCHES SHALL BE BYPASSED BY END-POSITION LIMIT SWITCHES WHICH OPENS ON VALVE LEAVING END POSITION. THESE LIMIT SWITCHES ARE ADDITIONAL TO THE NUMBER OF LIMIT SWITCHES SPECIFIED ELSEWHERE.
 6. THE MOTOR SHALL OPERATE SATISFACTORILY UNDER THE +/- 10% SUPPLY VOLTAGE VARIATION AT RATED FREQUENCY, -5% TO +3% VARIATION IN FREQUENCY AT RATED SUPPLY VOLTAGE, SIMULTANEOUS VARIATION IN VOLTAGE & FREQUENCY THE SUM OF ABSOLUTE PERCENTAGE NOT EXCEEDING 10%.
 7. THE MOTOR SHALL BE SUITABLE FOR DIRECT ON LINE STARTING.
- \$\$ TORQUE SWITCH & LIMIT SWITCH SHALL ACT INDEPENDENT OF EACH OTHER. TANDEM OPERATION IS NOT ACCEPTABLE.**
- ## EPOXY PAINT IS RECOMMENDED FOR COASTAL AREAS.**

VENDOR COMPANY SEAL

NAME

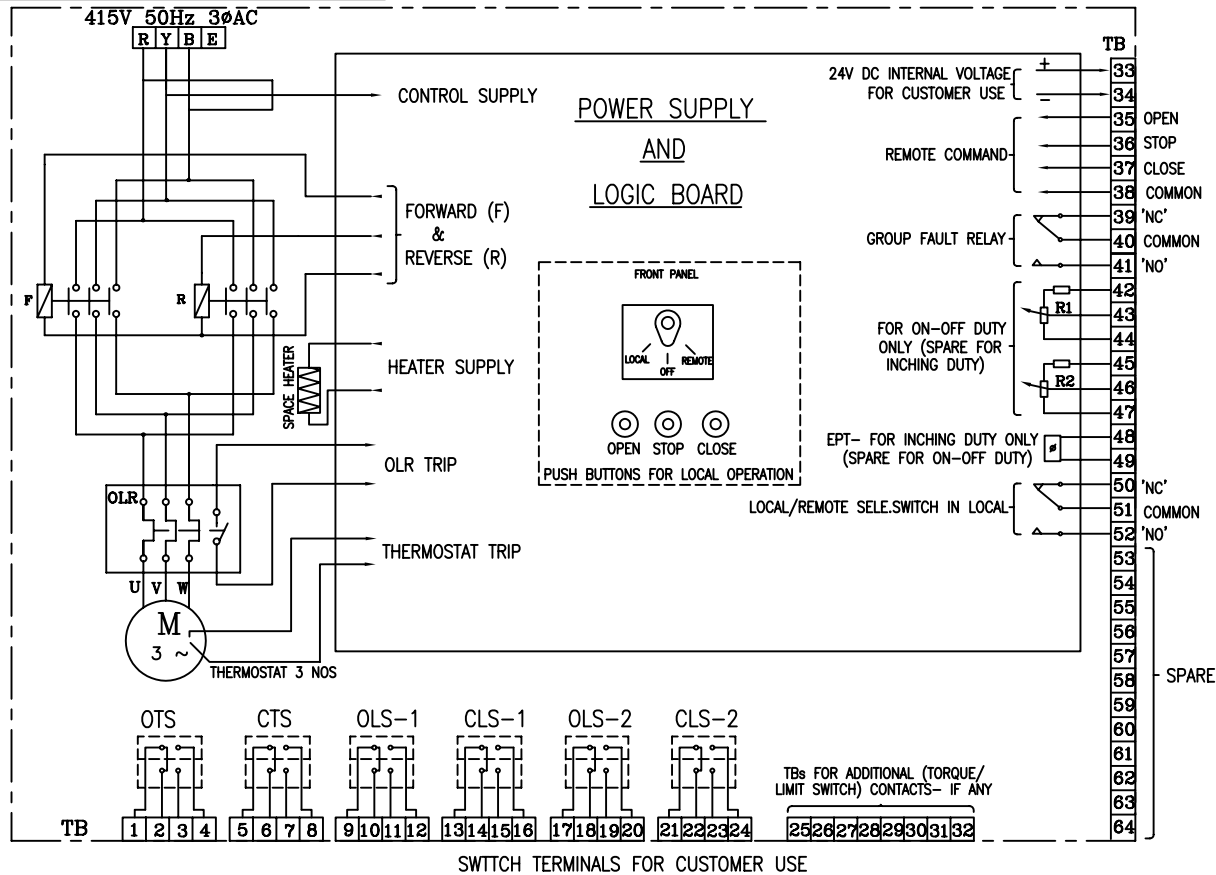
SIGNATURE

DATE

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

3-V-MISC-24227

DRAWING NO.



CONTACT DEVELOPMENT DIAGRAM

OTS	1-2	OPEN AT OVER TORQUE DURING OPENING TRAVEL				
	3-4	CLOSE AT OVER TORQUE DURING OPENING TRAVEL				
CTS	5-6	OPEN AT OVER TORQUE DURING CLOSING TRAVEL				
	7-8	CLOSE AT OVER TORQUE DURING CLOSING TRAVEL				
OLS-1	9-10					
	11-12					
CLS-1	13-14					
	15-16					
OLS-2	17-18					
	19-20					
CLS-2	21-22					
	23-24					
SWITCH	TERMINAL NO.	FULL OPEN	a	INTERMEDIATE	b	FULL CLOSE
		VALVE POSITION				
 INDICATES CONTACT CLOSED						
 INDICATES CONTACT OPEN						
CONTACT RATING: 5A AT 250V AC & 0.5A AT 220V DC						

SETTING PROCEDURE OF POSITION LIMIT AND TORQUE SWITCH

VALVES	OPEN		CLOSE	
	MAIN	BACK UP	MAIN	BACK UP
GATE VALVE OF 100 mm AND ABOVE IN 1500 CL AND ABOVE RATINGS	OLS	OTS *	CLS	CTS
ALL OTHER GATE & GLOBE VALVES	OLS	OTS *	CTS	#
# - CLS NOT TO BE CONNECTED IN TRIP CIRCUIT				
* - BYPASS OTS FOR INITIAL 5% OF TRAVEL (FOR GATE VALVES ONLY)				

NOTE:-

- 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 (POTENTIOMETRIC 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 3 ϕ 415V 50 Hz AC SUPPLY

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 any way detrimental to the interest of the company.

TYPE OF PRODUCT ELECTRICAL VALVE ACTUATORS (AC) WITH INTEGRAL STARTERS OR NAME OF CUSTOMER/PROJECT		ELECTRICAL VALVE ACTUATORS (AC) WITH INTEGRAL STARTERS (DRAWN FOR INTERMEDIATE POSITION OF VALVES)	
BHARAT HEAVY ELECTRICALS LTD., UNIT: HIGH PRESSURE BOILER PLANT. TIRUCHIRAPALLI-620014.		DRN N.P.ESWAR	SIGN N.P.
365-121		CHD D.DINAKARAN	DATE 07.10.04
DEPT VL		APPD K.ARUNACHALAM	DATE 07.10.04
CODE	SCALE	WEIGHT (KG).	REFERENCE INFORMATION
TITLE	CARD CODE	DRAWING NO.	REV
WIRING DIAGRAM (TERMINAL PLAN) FOR ACTUATOR WITH INTEGRAL STARTER	U 01	3-V-MISC-24227	0

	COMPLIANCE SHEET BUTTERFLY VALVE- STEAM SERVICE		SPECIFICATION NO. PE-TS-420-100-M016	
			SECTION : II	
	REV. NO.: 00		DATE: 13.2.2017	
	Sheet 1 of 1			

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.

Name of Bidder / Authorized Representative :- -----

Designation :- -----

Signature :- -----

Company Seal :- -----

Date :- -----

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE					
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL	