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		VOLUME . II B	
		SECTION D	
		REV. NO. 02	DATE. 26-06-2009
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1.0 GENERAL AND SCOPE OF SUPPLY

1.1 This standard specification covers the design, material, constructional features, manufacture, inspection and testing at the Vendor's and/or his Sub-vendor's works, suitable painting and packing requirements of two way butterfly valves (soft seated) complete with all accessories as specified hereinafter.

1.2 **SCOPE OF SUPPLY:-** Butterfly Valves, as per this specification, shall be selected as per "Requirements of Butterfly valves" as specified in the attached Annexure-'A' or in sec. C. Vol.B

1.3 **RECOMMENDED SPARES:-** In addition to "requirements of Butterfly Valves" at 1.2 above, the bidders is required to submit an offer for Recommended Spares for Butterfly Valves (valves for 5 years operation and Electric actuators for 3 years operation) with unit rates of validity for 5 years for future ordering by the purchaser. Bidders are required to indicate description of each spare part of the valve & actuator along with the quantity of each individual spare part as recommended by the bidder for each size/type/ rating of main valves as mentioned in the Annexure-A/ or sec-C Vol IIB for the above-mentioned periods. Details of these each spares shall be clearly indicated along with separate price of each spares as order for these spares shall be separate.

2.0 CODES AND STANDARDS:

2.1 The design, manufacture, inspection and testing of the butterfly valves shall comply with the requirements of latest revisions of the following standard. However the testing shall be as per AWWA C504 including disc strength test (all sizes of valves), gear box POD Test & Valve POD test.


- American Water Works Association standard for rubber seated butterfly valves-ANSI/AWWA C504
- Industrial valves-metallic butterfly valves-BS EN 593 (replaces BS 5155)
- Butterfly valves: double flanged, lug & wafer type-API 609.

2.2 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 Engineer shall be final & binding.

3.0 DESIGN REQUIREMENTS:

3.1 Valves, for designed pressure up to 10.5 kg/cm², shall only be offered as per AWWA C504, in rating CI.150 and testing will also be as per AWWA C504 only, except valves size 65 NB & design pressure greater than 10.5 Kg/cm² which shall be as per BSEN 593(replaces BS-5155) and no alternate offer as per any other standard shall be acceptable for above mentioned design pressure. For butterfly valves designed and manufactured to BS-5155, the POD test methods and procedures shall generally follow the guidelines of AWWA-C-504 in all respect except that body & seat hydro test and disc strength test shall be conducted at the pressures specified in BS-5155 code. Actuators shall also meet requirements of POD test of AWWA-C-504. Routine testing of BS designed valves shall be as per BS-5155, however other testing such as disc strength test, gear box torque test & gear box POD & valve POD shall only be as per the requirement of AWWA-C-504.


3.2 The butterfly valves shall be of short body double flanged design, 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 basic materials of construction are indicated as below unless otherwise specified in Annexure-A./ or sec-C Vol IIB.

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S L N O	PART NAME	MATERIAS FOR CAST IRON BODY VALVES	MATERIAS FOR CARBON STEEL BODY VALVES	MATERIAS FOR STAINLESS STEEL BODY VALVES	MATERIAS FOR SEA WATER APPLICATION ASTM A439 Gr.D2 BODY VALVES
1	BODY (FLAT FACED FLANGED SHORT BODY)	IS 210 Gr. FG 260 OR EQUIVALENT (2% Ni Cl, IF CALLED IN ANNEXURE-A (EPOXY COATED)	ASTM A216 Gr.WCB EPOXY COATED	ASTM A351 Gr. CF8M	ASTM A439 GR. D2
2	DISC	210 Gr. FG 260 WITHOUT OR WITH 2% Ni Cl EPOXY CAOTED/ ASTM A351 Gr.CF8M	ASTM A216 Gr.WCB EPOXY COATED	ASTM A351 Gr. CF8M	ASTM A439 GR. D2
3	BODY SEAT	ASTM A240 TYPE 316/ OR 304 IF CALLED IN ANN-A	ASTM A240 TYPE 316 OR 304 IF CALLED IN ANN-A	ASTM A240 TYPE 316	ASTM A240 TYPE 316L
4	DISC SEAL	NITRILE RUBBER	EPT/ BUNA-N/ / NEOPRENE	EPT/ BUNA-N/ NEOPRENE	BUNA-N/EPDM/ NEOPRENE/ EPDM
5	SEAL RETANING RINGS	ASTM A240 TYPE 316	ASTM A240 TYPE 316	ASTM A240 TYPE 316	ASTM A240 TYPE 316L
6	INTERNAL BOLTS/ HARDWARES	ASTM A 479 TYPE 316/ AISI 316	ASTM A 479 TYPE 316/ AISI 316	ASTM A 479 TYPE 316/ AISI 316	ASTM A 479 TYPE 316L/ AISI 316L
7	EXTERNAL HARDWARES BOLTS AND NUTS	ASTM A193 Gr.B7/ A194 Gr.2H	ASTM A193 Gr.B8M/ A194 Gr.8M	ASTM A193 Gr.B8M/ A194 Gr.8M	ASTM A 479 TYPE 316L/ AISI 316L
8	SHAFT	ASTM A 479 TYPE 410 CLASS 2	ASTM A 182 Gr. F 316 OR 304 IF CALLED IN ANN-A	ASTM A 182 Gr. F 316	ASTM A 182 Gr. F 316L
9	SHAFT SEALS - (O' RING)	PTFE/ BUNA-N / NITRILE RUBBER	PTFE/ BUNA-N / NITRILE RUBBER	PTFE/ BUNA-N / NITRILE RUBBER	PTFE/ BUNA-N / NITRILE RUBBER
10	GUIDE BUSH	ASTM A439 Gr.D2/ ASTM B62-85-5-5-5	ASTM A439 Gr.D2/ ASTM B62-85-5-5-5	ASTM A439 Gr.D2/ ASTM B62-85-5-5-5	ASTM A439 Gr.D2
11	BEARING	SLEEVE TYPE, SELF LUBRICATED	SLEEVE TYPE, SELF LUBRICATED	SLEEVE TYPE, SELF LUBRICATED	SLEEVE TYPE, SELF LUBRICATED
12	PACKING	PTFE / NITRILE	PTFE / NITRILE	PTFE	PTFE
13	PACKING FOLLOWER/ PLATE	ASTM A479 TYPE 316	ASTM A479 TYPE 316	ASTM A479 TYPE 316	ASTM A479 TYPE 316L
14	THRUST PAD	ASTM A240 TYPE 316	ASTM A240 TYPE 316	ASTM A240 TYPE 316	AISI 316L
15	BOTTOM PLATE/ CAP	ASTM A479 TYPE 316	ASTM A479 TYPE 316	ASTM A479 TYPE 316	ASTM A479 TYPE 316L
16	BOTTOM GASKET/ 'O' RING	CAF/ EPDM	CAF/ EPDM	EPDM	EPDM
17	GEARS (TOTALLY ENCLOSED)	STEEL TO IS: 2004 CL. 4 / EN8	STEEL TO IS: 2004 CL. 4 / EN8	STEEL TO IS: 2004 CL. 4 / EN8	STEEL TO IS: 2004 CL. 4 / EN8
18	HANDWHEEL/LEVER	MALLEABLE IRON ONLY, NO ALTERNATE MATERIAL ALLOWED	MALLEABLE IRON ONLY, NO ALTERNATE MATERIAL ALLOWED	MALLEABLE IRON ONLY, NO ALTERNATE MATERIAL ALLOWED	MALLEABLE IRON ONLY, NO ALTERNATE MATERIAL ALLOWED
19	CLEANING, PAINTING FOR CORROSION PROTECTION	Painting (Non Coastal environment):-Valve shall be painted externally after necessary testing has been carried out. Just before painting valve bodies and other items shall be thoroughly cleaned with wire brush/hand tool(st1/st2/st3) as applicable. The valve shall be first paintedwith two coats of primer red oxidezinc chromate (alkydmedium) as per IS:2074 with each coat of DFT equal to 25-35 microns minimum. Finish paintshall be two coats ofsynthetic enamel (alkyd medium) as per IS:2932and eachcoat of DFT shall be 20-35 microns. Total DFT of primerandfinish paint shall be 150 microns. Paint colour shadesshall be grey as per RAL 9002		No Pain ting on SS valv es	D2-Body Painting (Coastal environment):- Valve shall be painted externally after necessary testing has been carried out. Just before painting valve bodies and other items shall be thoroughly cleaned by blast-cleaning or power driven wire brushes as applicable. Primer coat :- For coastal environment the primer shall be two coats of epoxy red oxide zinc phosphate with each coat of DFT equal to 25-35 microns. Total DFT of primer coats 50 Microns minimum. Intermediate coat :- 2 coats (each coat 20-30 DFT) of Epoxy based TiO2 pigmmted paint with minimum total DFT of 50 micron shall be applied over primer painted surface for coastal environment. Finished coat :- 2 coats (each coat 20-30 DFT) of Epoxy based finish paint of minimum DFT as 50 micron shall be applied over intermediate painted surface for coastal environment. Finished Paint colour shade shall be grey as per RAL 9002. Total DFT of primer+intermediate+Finish paint shall not be less than 150 microns in case coastal environment.

3.2.1 The butterfly valves shall be double flanged short body design /lugged (U section or double lugged) / wafer type and designed to ensure bubble tight shut off at the design pressure as indicated in the specific requirements at sec-C Vol IIB or at Annexure-A. Flange shall be as per ASME B16.1/16.5/BS EN 1092-1/ BS EN 1092-2 (BS design)- flat face for CI & raised face for steel or as specified in Ann.- A/ section-C

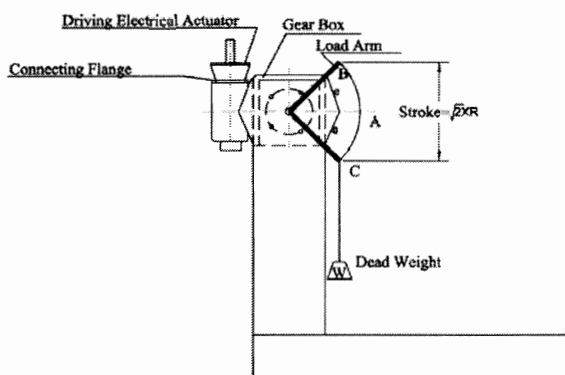
3.3 The butterfly valve shall be suitable for handling the fluid as specified in specific requirements.

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3.4 Bidders to carry out valve POD test as per AWWA C 504 for each size/type/ rating of valves/ size group (i.e. for all type of valves) of this tender technical specification. Size/type/ rating of valve(s) to be POD tested by successful bidder will be identified during contract stage which may be noted by bidders, however bidders to note that no additional separate charges are admissible for this valve POD test and any other kind of testing required as per AWWA C504 such as manual gear box POD testing, electric actuator testing etc. and all such charges on account of valve POD test, materials used during POD, or any other testing costs shall be included by the bidders in the quoted unit rates of the valves.

3.5 BIDDER TO NOTE THAT VALVE POD AND GEAR BOX POD TEST SHOULD BE DONE SEPARATELY AND INDIVIDUALLY. GEAR BOX POD TEST (LIFE CYCLE TESTING) SHALL BE DONE AS PER THE TEST PROCEDURE AS DISCUSSED BELOW:-

Valve operators (Gear Box and Electric Actuator) shall be designed & tested in accordance with latest editions of AWWA C 504 and AWWA C 540 (actuator) respectively. Gear Box shall be so designed to hold the valve disc in intermediate position between full open and full closed position without creeping or fluttering. Gear box POD Test (cycle testing) shall be carried out only at full rated torque of gear box, through out 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 below for Gear Box P.O.D set up Test. Dead weight and length of arm shall be so selected that the torque generated at point "C" and "B" is not less than the full rated torque of gear box.



TEST SET UP

FIG. 1

4.0 ACCESSORIES:


The butterfly valve shall be complete with electric operators if specified in specific requirements. Otherwise they shall be manually operated. Manual operation valves up to 150 NB size shall be lever operated & 200 NB & above sizes shall be gear operated (gearing mechanism totally enclosed in the casing). Gear Box shall be POD tested as per AWWA C504. Gears shall be of standard make.

5.0 CONSTRUCTIONAL FEATURES:

5.1 Valve Body

The valve body shall have integral flanges (for flanged type valve) and hubs for shaft bearing housing (for AWWA STD 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 & API STD valves bodies rating for ductile iron shall be as per ASME B16.42 & for copper alloys as per ASME B16.24 & for steel, nickel & alloy or special materials shall be as per ASME B16.34 (standard class).

5.1.1 An arrow shall be embossed/ engraved and painted on outside of body to clearly indicate the direction of flow.

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5.2 Valve Shaft

The shaft of each butterfly valve shall be securely attached to the disc, through any one of the following fixing arrangements. Shaft diameter shall be as per AWWA C504.

- i) Keys
- ii) Dowel Pins
- iii) Taper Pins.

The shaft material shall be suitable for the duty conditions as specified and as given in applicable standard. 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.

Surface finish of shaft shall be mirror/ very fine finish 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 designed as per applicable standard.

5.4 Soft Seat & Mating 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 (continuous 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.


- 5.5 The mating seat surface accordingly shall be on valve body or disc & 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 hardwares 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 project 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 The lever shall be of EN8 material with plastic grip for lever operated valves & hand wheel shall be of malleable cast iron for gear operated valves.

5.8 Nameplate:

Each valve shall be fitted with a circular/ rectangular stainless steel nameplate (2 mm thick) indicating the valve Tag No. & service description as given in specific requirements at Sec-C Vol IIB or Annexure-A. This is over and above the rating plate being provided manufacturer as per relevant valve standard

5.9 All valves shall be fitted with indicators so that it may be readily seen whether the valves are open or shut.

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

5.11 Levers, gear operators and automatic actuators shall be equipped with provisions to prevent movement of disc from desired position set during normal operating conditions. Normal operating conditions include throttling service when specified in specific requirements. Levers preferably shall be designed with locking indications at intermediate position of opening at 10 degree intervals/ open or shut.

5.11 All valves shall be closed by rotating the hand wheel in a clockwise direction when looking at the face of the hand wheel. 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 arrows adjacent to indicate the direction of rotation to which each refers.

5.12 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.

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

5.14 The valves shall be suitable for installation in any position (horizontal/ vertical).

5.15 The valves as well as the accessories shall be designed for easy disassembly and maintenance.

5.14 Wherever practicable, heavy valves of total weight including actuator, drive motor, integral bypass 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.

6.0 SPECIAL FEATURES:

6.1 Gland Sealing Arrangement:

All valves required with this arrangement shall be provided with 3/8" BSP connection (duly plugged) for water sealing. Sealing water shall be supplied at 4 ata and 50°C unless otherwise stated in specific requirements

6.2 Motorised Valves:

6.2.1 The motorised valves shall be provided with electric actuators of any of the following make:


i) Rotork

ii) Limitorque

iii) AUMA


iv) Antrieb

6.2.2 The motorised valve electric actuators shall be of approved make. A particular make and type of actuator shall be designed for the maximum differential working pressure with suitable safety margin


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of more than 10% for rating selection of actuator. The selected actuators running torque shall be no less than the valve unseating/seating torque requirement at the maximum differential working pressure(design pressure) and required operating time as mentioned in specific requirements of valves.

- 6.2.3 **Electric Actuator sizing calculations** (valve torque, shall be furnished with the offer for the selected actuator. This Actuator sizing calculations to be submitted by the bidders with their offer, shall indicate in detail, the total required operating Valve Torque required for opening as well as for closing of valve with break-up of seating or un-seating torque, dynamic torque, bearing friction torque etc. The calculations shall be furnished for both with shaft vertical and with shaft horizontal. Calculations of opening and closing times shall also be furnished . Bidder to submit the technical details of gear box (mechanical advantage, speed reduction ratio, no. of turns to close, max. output of torque etc.) and also submit the GA drawings of offered Gear Box indicating materials of construction and hardness of worm & worm wheel etc
- 6.2.4 Motors of actuators shall be provided with class "F" insulation for the design of class "B " insulation. For on-off operation Duty cycle shall be S2-15 minutes (60 starts/ hour), however for inching operation Duty cycle shall be S-4- 25% (150 starts/ hour).
- 6.2.5 For actuators, refer detailed technical specification of electric actuators no PE-SS-999-145-1007.However basic design shall be of three types i.e standard (basic type/conventional type syncroset i.e. without integral starters) /with integral starter/smart. Control connection types shall be standard (convectional without integral starters) i.e with cable glands & cable lugs /9 pin plug and socket wired & suitably mounted in starter box itself to terminate open/close command and status feedback signals with external control systems along with 1 No. additional same 9 pin spare plug & socket for ON-OFF duty.x For inching duty 1 No. additional 9 pin plug and socket wired & suitably mounted in the starter box itself for actuators with 4-20mA for position transmitter alongwith necessary glands for power cables, Type of motor protection shall be thermistor /thermostat –one for each phase (trip unit to be included for thermistor type for standard type actuator Jhnu for mounting in MCC & for integral starter type it shall be a part of actuator).
- 6.2.6 Electric actuators shall be directly mounted on the valves except wherever specifically mentioned in specific requirements
- 6.2.7 The motors, gearing and disengaging hand wheel shall be adequate to open and close the valve under full unbalanced design pressure and shall be completely assembled on the respective valve and shop test before shipment.
- 7.0 **SHOP INSPECTION & TESTING:**
- Shop Inspection & Testing shall include the following as per attached quality plan. However brief details are as below
- 7.1 POD tests as indicated in AWWA C504 for valve & operators (gear box & actuator). Instead of conducting these tests Vendor can submit earlier carried POD test certificates in presence of approved inspecting agency/ or done for reputed customer like NTPC, on same seat design POD tested valves & operator .
- 7.2 Identification of Materials as specified for critical components such as.
- Body
 - Disc.
 - Shaft
 - soft seat & SS seat
 - Valve bearings.
 - clamping rings with fasteners
- 7.3 Supply of Certificate of conformance for all other material as specified in quality plan
- 7.4 **NDT as below:**

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- 7.4.1 Ultrasonic testing of valve shafts and valve seat (SS) as per ASTM E317 (if diameter is more than 40 mm and valve seat thickness is more than 25 mm) & liquid penetration examination on shaft, valve seating & machined surfaces
- 7.4.2 Magnetic particle/ liquid penetration examination of valve body and disc for CI & steel body valves sizes 350 NB & above & for all stainless steel castings irrespective of valve size.
- 7.4.3 Hydraulic tests (as per STD) for valves with operators also
- 7.7 Dimensional checks of
- Layout length
 - Total height
 - Extension of valve disc beyond laying length.
 - Shaft diameter.
 - Inside Base.
 - Flange drilling, PCD, etc. and all other overall dimensions as per approved drgs.
- 7.8 Any test for Electric actuator as called for in actuator specification & quality plan
- 7.9 Visual Inspection.
- 7.10 Painting & Packing
- 8.0 PERFORMANCE GUARANTEE:
- 8.1 The vendor shall guarantee the material & workmanship of all components as well as operation of the equipment as per the requirements of the specification.
- 8.2 The vendor shall also guarantee for each of the butterfly valve for the following:
- Minimum pressure drop
 - The valve opening and closing time as specified in specific requirements for electric operated valves.
- 9.0 PAINTING:
- CI & CCS body Valves shall be painted externally after the necessary testing has been carried out. Just before the painting, valve bodies and other items shall be thoroughly cleaned with wire brush/hand tool (Sa1/St2/St3 as applicable). The valves shall be first painted with two coats of primer zinc chromate to IS 2074 (alkyd medium) each coat of DFT shall be minimum 25 to 35 microns. Finish paint shall be of 3 (three) coats of synthetic enamel (alkyd medium) as per IS 2932 & each coat DFT shall be 20-35 microns & Paint colour shade shall be sea green shade no. 217 of IS 5 or Grey as per RAL 9002, the total DFT of primer & finish paint shall be 150 minimum microns. For drinking water service CCS body valves shall be hot dip galvanized as per IS 2629 (galvanizing thickness 70 microns approx.) instead of painting.
- 10.0 CLEANING AND PROTECTION FOR DESPATCH:
- 10.1 Each valve shall be drained, cleaned, prepared and suitably protected by providing protective packaging/caps for butt welded/flanged valves in such a way so as to minimize the possibility of damage /deterioration due to dirt, debris, humidity etc. during transit and storage.
- 10.2 Discs of all valves (without actuators) may open due to shaking or vibration on transit. Hence necessary arrangement shall be made to ensure that there is no risk of damage to the disc.
- 10.3 Body ends shall be suitably sealed to protect them against damage during transit & storage at site.

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- 10.3 Valve Tag Nos. shall be incorporated in all the dispatch documents.
- 11.0 DATA/DOCUMENTS/DRGS TO BE FURNISHED WITH THE BID.
- 11.1 Relevant drawings/leaflets for the offered valves showing following information.
- Complete cross sectional arrangement of the valve.
 - Binding dimensions, dismantling clearances, valve weights and test pressures etc.
 - Bill of material incorporating all the materials of construction of various parts along with IS/BS/ASTM standards to which the materials conform to.
 - Special features, if any, as called for in the specific requirements
- 11.2 Flow coefficient values
- 11.3 Relevant catalogue/leaflet on the actuators.
- 11.4 Operation & maintenance manual for valves & actuators. (one copy of this shall be enclosed with the packing slip/wooden cases so that at receiving end, care can be taken for proper storage & commissioning).
- 11.5 Attached Quality Plan duly signed stamped with bidder's seal as token of acceptance..
- 11.6 Field Quality Plan
- 11.7 Data sheet- A & B duly filled up for offered electric actuator for open/close or inching duty valves alongwith relevant wiring Diagram of actuator and actuator sizing/ torque calculations.
- 11.8 Relevant Proof-of-Design (P.O.D.) test alongwith Data sheet & Drawing of B/Fly valve on which P.O.D. Test conducted
- 11.7 List of recommended spares for 3 years trouble free operation of valves and actuators.
- 11.8 Drawings/documents submission schedule (in case of placement of the order).

MOTOR OPERATED VALVE ACTUATOR DATA SHEET



PEEGT
MINISTRY OF ELECTRICITY
SYRIA ARAB REPUBLIC

2 X 200 MW TISHREEN TPP
SYRIAN ARAB REPUBLIC



Bharat Heavy Electrical Ltd.

TO					JOB NO.	323	DEPTT		NAME	SIGN	DATE
NO					STATUS	CONTRACT	CODE	DRN.	kk	<i>Vas</i>	14.02.2011
REV	DATE	ALTD	CHKD	APPD	DISTRIBUTION		I	DESN.	kk	<i>Vas</i>	14.02.2011
					TO			CHD.	BS	<i>Vas</i>	14.02.2011
					No			APPD.	SHB	<i>Mot</i>	14.02.2011
					TITLE:						
					MOTOR OPERATED VALVE ACTUATOR DATA SHEET						
					DEPTT	SCALE	NTS	DOCUMENT NO:			
					SIGN			PE-ID-323-145-I902			
					DATE			Page 1 of 6 REV -00			

Actuators:-

General:

- For most applications the P.E.E.G.T. has a preference for actuators that are electrically operated. Tenderers shall indicate clearly the different types of actuator proposed and where they will be utilized. These shall be subject to the P.E.E.G.T.'s approval.
- The Tenderer shall give full details of the type of actuator proposed for each individual service. The thrust and length of travel of each actuator shall be specified.
- All drive levers shall be designed for heavy-duty operation and to withstand the maximum capability of the drive.
- All actuators shall be equipped with travel and torque limit switches for the P.E.E.G.T.'s use, in addition to those that may be necessary for interlock and control functions.
- All actuators shall be equipped with a position transmitter with output 4-20mA corresponding to 0-100% stroke (4 mA corresponds to zero position). Position transmitters shall conform to the requirements of Section 11.6. Transmitters using the slide wire principle and variable resistance are not acceptable.
- A mechanical position indicator shall also be provided.
- Each actuator shall be of weatherproof construction, with electric heater and thermostat for outdoor operation. All limit switches and position transmitters shall also be housed in a weatherproof enclosure, and shall be wired to a single connection box on the actuator capable of accepting 19 x 1.5mm² cable.
 - In order to determine accurately the torque capabilities of the actuator, the Tenderer shall state the following:
 - The magnitude of the system error signal that is required to develop full drive unit torque.
 - Maximum torque developed at the driven shaft by drive unit and linkage combination at rated voltage.

The Tenderer shall state the time taken for full travel of each actuator type.

Electric Actuators :

- Actuator motors shall be suitable for use on a 380V, 3 phase 50 Hz or 220V, single phase.
- All modulating motors shall be rated for at least 1200 starts per hour.

- Actuator motors shall be fitted where necessary with a thermal protection device. This device shall be connected to terminals and shall provide a signal proportional to temperature. The additional equipment necessary to convert this to a binary signal shall also be provided.
- Switching equipment utilizing only thyristors or other solid state devices is required.
- Torque switches or electronic torque control shall be provided for controlling the motor in the extreme closing position and protecting the motor in the opening position if required. The torque switches shall be independently adjustable and adjustable for each position.
- Equipment shall be provided to prevent manual operation while the electrical drive is engaged.
- Electrical actuators shall be provided with a means for local hand operation.
- All electrical actuators shall be fitted with devices for freezing the actuator under the following conditions:
 - Failure of the operating medium;
 - Failure of Supply;
 - Back driving of an unbalanced load.

12.12. Hazardous Areas

Instruments installed in hazardous zones shall have approved safety barrier devices to limit energy throughput to the outer zones.


13. SPECIFIC REQUIREMENTS


13.1. OIS (Operation Information System)


The P.E.E.G.T. requires that all block operational information be logged in all the specified different formats and time scales. In addition full alarm and event recording facilities together with an efficiency package and shall be offered together with any other facilities offered by the Tenderer in his standard package.

Tenderers shall include in their offer a facility to export the above mentioned values to a future central management supervisory system. The interface shall preferably take the form of being OPC (OLE for process control) compliant.

13.2. Natural Gas Flow Measurement

	SPECIFICATION SHEET FOR MOTORISED VALVE ACTUATOR 2 X 200 MW TISHREEN TPP SYRIAN ARAB REPUBLIC		SPECIFICATION NO.: PE-ID-323-145-1902	
			VOLUME	
			SECTION	
			REV. NO. 00	DATE: 14.02.11
			PAGE 1 OF 3	
Data Sheet A & B				
DATA SHEET-A (TO BE FILLED BY PURCHASER)			DATA SHEET-B (TO BE FILLED-UP BY BIDDER)	
GENERAL*	* PROJECT	2 X 200 MW TISHREEN TPP		
	OFFER REFERENCE			
	* TAG NO. SERVICE	REFER S.No.2,7,9,10 OF ANNEXURE-A		
	* DUTY	<input checked="" type="checkbox"/> ON / OFF <input type="checkbox"/> INCHING		
	* LINE SIZE (inlet/outlet): MATERIAL	REFER S.No.2,7,9,10 OF ANNEXURE-A		
	* VALVE TYPE	<input type="checkbox"/> GLOBE <input type="checkbox"/> GATE <input type="checkbox"/> REG. GLOBE <input checked="" type="checkbox"/> BUTTERFLY		
	* OPENING / CLOSING TIME	20-30 SECONDS		
	* WORKING PRESSURE	10 Kg/cm ² g		
	AMBIENT CONDITION	SHALL BE SUITABLE FOR CONTINUOUS OPERATION UNDER AN AMBIENT TEMP. OF (-)10 to 55 DEG C AND RELATIVE HUMIDITY OF 0-95%		
	VALVE SEAT TEST PRESS	BIDDER TO SPECIFY		
	REQUIRED VALVE TORQUE	BIDDER TO SPECIFY		
	ACTUATOR RATED TORQUE	BIDDER TO SPECIFY		
CONSTRUCTION AND SIZING	CONSTRUCTION	TOTALLY ENCLOSED, WEATHER PROOF, IP:55		
	MECHANICAL POSITION INDICATOR	TO BE PROVIDED FOR 0-100% TRAVEL		
	BEARINGS	DOUBLE SHIELDED, GREASE LUBRICATED ANTI-FRICTION.		
	GEAR TRAIN FOR LIMIT SWITCH/TORQUE SWITCH OPERATION	METAL (NOT FIBRE GEARS). SELF-LOCKING TO PREVENT DRIFT UNDER TORQUE SWITCH SPRING PRESSURE WHEN MOTOR IS DE-ENERGIZED.		
	SIZING	OPEN/CLOSE AT RATED SPEED AGAINST DESIGNED DIFFERENTIAL PRESSURE AT 85% OF RATED VOLTAGE. FOR ISOLATING SERVICE THREE SUCCESSIVE OPEN-CLOSE OPERATIONS OR 15 MINS. WHICHEVER IS HIGHER. FOR REGULATING SERVICE 1200 STARTS/HR MIN.		
HANDWHEEL	* REQUIRED	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
	* ORIENTATION	<input type="checkbox"/> TOP MOUNTED <input type="checkbox"/> 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.		
	ACTUATOR APPLICABLE WIRING DIAGRAM	<input checked="" type="checkbox"/> ENCLOSED (BIDDER TO CONFIRM) <input type="checkbox"/> DRG. NO. 3-V-MISC-24227 R00 <input checked="" type="checkbox"/> DRG. NO. 3-V-MISC-24550 R00 <input type="checkbox"/> DRG. NO. 4-V-MISC-90271 R11		
	COLOUR SHADE	<input checked="" type="checkbox"/> BLUE (RAL 5012) ENAMEL <input type="checkbox"/>		
	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	380V,3PH,AC (motor rated voltage 400V)		
	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED FROM THE POWER SUPPLY TO STARTER <input checked="" type="checkbox"/> 110 V AC <input type="checkbox"/> 230 V AC		
	@ ENCLOSURE CLASS OF MOTOR	<input checked="" type="checkbox"/> IP 65 <input type="checkbox"/> IP 67 <input type="checkbox"/> FLAME PROOF <input type="checkbox"/> IP 55, TOTALLY ENCL, SELF VENTILATED.		
	@ INSULATION CLASS	<input type="checkbox"/> CLASS-B <input checked="" type="checkbox"/> CLASS-F WITH TEMPERATURE RISE LIMITED TO CLASS-B		
	@ WINDING TEMP PROTECTION	<input checked="" type="checkbox"/> THERMISTERS (3 Nos.,1 IN EACH PHASE) <input type="checkbox"/> -----		
	SINGLE PHASE / WRONG PHASE SEQUENCE PROTECTION	REQUIRED		

	SPECIFICATION SHEET FOR MOTORISED VALVE ACTUATOR 2 X 200 MW TISHREEN TPP SYRIAN ARAB REPUBLIC		SPECIFICATION NO.: PE-ID-323-145-1902	
			VOLUME	
			SECTION	
			REV. NO. 00	DATE: 14.02.11
PAGE 2 OF 3				
Data Sheet A & B				
DATA SHEET-A (TO BE FILLED BY PURCHASER)			DATA SHEET-B (TO BE FILLED-UP BY BIDDER)	
INTEGRAL STARTER	INTEGRAL STARTER	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		
	TYPE OF SWITCHING DEVICE	<input type="checkbox"/> CONTACTORS <input checked="" type="checkbox"/> THYRISTORS		
	TYPE	<input checked="" type="checkbox"/> CONVENTIONAL <input type="checkbox"/> SMART (NON-INTRUSIVE)		
	IF SMART	NOT APPLICABLE		
	a) SERIAL LINK INTERFACE	<input type="checkbox"/> INTEGRAL <input type="checkbox"/> FIELD MOUNTED		
	b) SERIAL LINK PROTOCOL	<input type="checkbox"/> FOUNDATION FIELD-BUS <input type="checkbox"/> PROFI-BUS <input type="checkbox"/> TCP/IP <input type="checkbox"/>		
	c) SERIAL LINK MEDIA	<input type="checkbox"/> TWISTED PAIR Cu-CBL <input type="checkbox"/> CO-AXIAL Cu-CBL <input type="checkbox"/> OFC		
	d) HAND HELD PROGRAMMER	<input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		
	e) MASTER STATION (See note-10)	<input type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		
	f) MASTER STN INTRFACE WITH DCS	<input type="checkbox"/> MODBUS <input type="checkbox"/> TCP/IP		
	g) DETAILS OF SPECIAL CABLE	<input type="checkbox"/> ENCLOSED <input type="checkbox"/> NOT REQUIRED		
	STEP DOWN CONT. TRANSFORMER	<input checked="" type="checkbox"/> REQUIRED		
	OPEN / CLOSE PB	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		
	STOP PB	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		
	INDICATING LAMPS	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		
	LOCAL REMOTE S/S	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		
	STATUS CONTACTS FOR MONITORING	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> 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 (Applicable for integral Starter)	INTERPOSING RELAY	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		
	INTERPOSING RELAY (QUANTITY)	<input checked="" type="checkbox"/> 2 NOs. <input type="checkbox"/> 3 NOs.		
	DRIVING VOLTAGE	<input checked="" type="checkbox"/> 20.5 – 24V DC <input type="checkbox"/> _____ V DC		
	DRIVING CURRENT	<input checked="" type="checkbox"/> 125mA MAX <input type="checkbox"/> _____ mA MAX		
	LOAD RESISTANCE	<input checked="" type="checkbox"/> > 192 ohms - <25 k ohms <input type="checkbox"/> > _____ ohms - < _____ ohms		
TORQUE SWITCH (Not Applicable for Smart Actuator)	MECHANICAL LATCHING DEVICE	NOT APPLICABLE		
	MFR & MODEL NO.	BIDDER TO SPECIFY		
	OPEN / CLOSE	<input checked="" type="checkbox"/> 1 No. <input type="checkbox"/> 2Nos. / <input checked="" type="checkbox"/> 1 No. <input type="checkbox"/> 2Nos		
	CONTACT TYPE	2 NO + 2 NC		
	RATING	5A 240V AC AND 0.5A 220V DC		
	ENCLOSURE	NOT APPLICABLE		
	CALIBRATED KNOBS(OPEN&CLOSE TS)	REQUIRED FOR SETTING DESIRED TORQUE		
ACCURACY	+3% OF SET VALUE			
LIMIT SWITCH (Not Applicable for Smart Actuator)	MFR & MODEL NO.	BIDDER TO SPECIFY		
	OPEN : INT : CLOSE	<input checked="" type="checkbox"/> 1 No. <input type="checkbox"/> 2 Nos.	2 Nos. (ADJ.)	<input checked="" type="checkbox"/> 1 No. <input type="checkbox"/> 2Nos.
	CONTACT TYPE	2 NO + 2 NC		
	RATING (AC / DC)	5A 240V AC AND 0.5A 220V DC		
	ENCLOSURE CLASS	NOT APPLICABLE		

	SPECIFICATION SHEET FOR MOTORISED VALVE ACTUATOR 2 X 200 MW TISHREEN TPP SYRIAN ARAB REPUBLIC	SPECIFICATION NO.: PE-ID-323-145-I902	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE: 14.02.11
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)	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
	MFR & MODEL NO.	BIDDER TO SPECIFY	
	TYPE	<input type="checkbox"/> ELECTRONIC (2 WIRE) R/I CONVERTER <input checked="" type="checkbox"/> ELECTRONIC (2 WIRE) CONTACTLESS	
	SUPPLY	<input checked="" type="checkbox"/> 24V DC <input type="checkbox"/>	
	OUTPUT	<input checked="" type="checkbox"/> 4-20mA	
	ACCURACY	± 1% FS	
	ENCLOSURE CLASS	NOT APPLICABLE	
SPACE HEATER	@ REQUIRED	PROVIDED	
	@ POWER SUPPLY	220V, AC, SINGLE PHASE	
	@ RATING	BIDDER TO SPECIFY	
TERMINAL BOX	MOTOR TERMINAL BOX	REQUIRED	
	ACTUATOR TERMINAL BOX	REQUIRED	
	ENCL CLASS MTR T.B. / ACTUATOR T.B.	<input checked="" type="checkbox"/> IP 65 @ <input type="checkbox"/> <input checked="" type="checkbox"/> IP65 <input type="checkbox"/>	
	@ EARTHING TERMINAL	PROVIDED, SIZE: DURING DETAILED ENGINEERING.	
	PLUG & SOCKET(9 PIN) (FOR COMMD, LS/TS FEED BACK, PoT)	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED <input checked="" type="checkbox"/> 2 NOS. <input type="checkbox"/>	
CABLE GLANDS	@ POWER CABLE GLAND	SIZE: LATER-DURING DETAILED ENGINEERING	
	@ SPACE HEATER CABLE GLAND	SIZE: AS PER REQUIREMENT (MIN. SIZE OF CONDUCTOR-2.5SQ.MM (Cu).	
	OTHER CONTROL CABLE GLANDS	1 NO (1PX0.5 SQ.MM CABLE) APPLICABLE FOR BFV OF CW PUMPS	
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 75 DEG. C FOR AMBIENT TEMPERATURE OF 45 DEG C.
- CABLE GLANDS OF DOUBLE COMPRESSION TYPE, Having tinned brass material conforming to BS-6121 SHALL BE PROVIDED.
- VOID
- 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.
- PLEASE REFER SECTION-C, SPECIFIC TECH. REQUIREMENTS, FOR PROGRAMMING KIT QUANTITY.

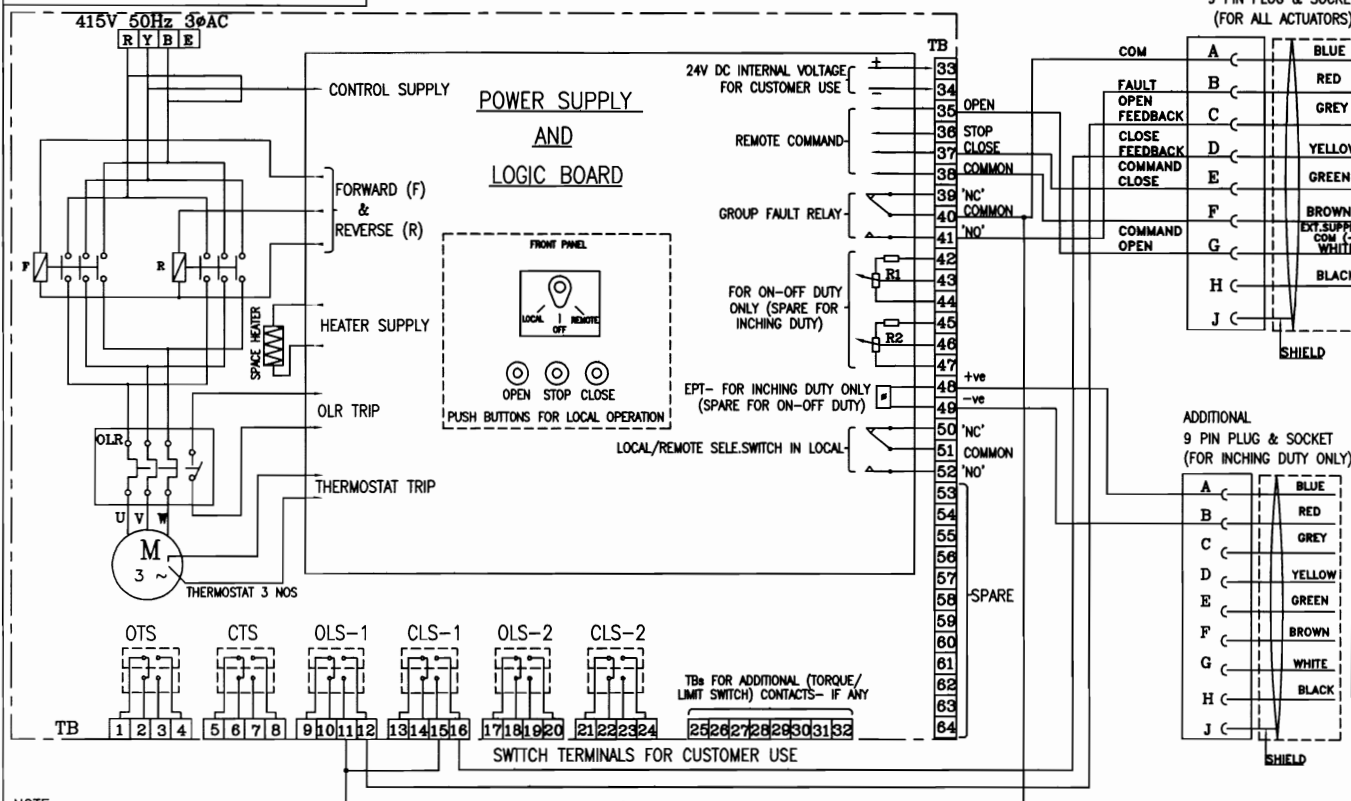
NAME SIGNATURE DATE	PREPARED BY	CHECKED BY	APPROVED BY	VENDOR COMPANY SEAL
	KAMAL SHARMA	BHARAT SINGH	S.BHATNAGAR	NAME
				SIGNATURE
	14.02.2011	14.02.2011	14.02.2011	DATE

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

@= TO BE FILLED BY ES

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

3-V-MISC-24283
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	INTERMEDIATE	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 (CONTACTLESS TYPE, FOR INCHING DUTY)
- R1-R2-POTENTIOMETER 2 x 100 OHMS (FOR ON-OFF DUTY)
- FOR COMMANDS & EPT EITHER INTERNALLY GENERATED 24VDC OR EXTERNAL SUPPLY OF 24VDC CAN BE USED
- M - MOTOR 3φ 415V 50 Hz AC SUPPLY
- TORQUE SWITCH BYPASS WITH LIMITSWITCH BOTH ON OPEN & CLOSE DIRECTION TO BE DONE INTERNALLY.

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 OR NAME OF CUSTOMER/PROJECT		ELECTRICAL VALVE ACTUATORS (AC) WITH INTEGRAL STARTERS FOR NTPC PROJECTS (DRAWN FOR INTERMEDIATE POSITION OF VALVES)			
BHARAT HEAVY ELECTRICALS LTD., UNIT: HIGH PRESSURE BOILER PLANT. TIRUCHIRAPALLI-620014.		DRN N.P.ESWAR	SIGN N.P.	DATE 17.03.05	NO. OF VAR.
365-121		CHD D.DINAKARAN	D.D.	17.03.05	-
APPD K.ARUNACHALAM		K.A.	17.03.05		
DEPT VL	SCALE NTS	WEIGHT (KG).	REFERENCE INFORMATION		
CODE					
TITLE WIRING DIAGRAM (TERMINAL PLAN) FOR ACTUATOR WITH INTEGRAL STARTER WITH PLUG & SOCKET FOR NTPC PROJECTS		CARD CODE U 01	DRAWING NO. 3-V-MISC-24283		REV 0

**2x200 MW TISHREEN THERMAL POWER STATION EXTENSION
DOCUMENTATION REQUIREMENTS**

Requirements of drawings/documents to be furnished by successful bidder after award of contract/LOI are as listed below. First submission of GA drgs, QP, Actuator Data Sheet & wiring diagram, torque calculations, testing procedures, works/ plant standards etc. requiring approval shall be submitted within 15 days from LOI.

SL. NO.	DOCUMENT	NO. OF COPIES	
		FOR APPROVAL	AFTER APPROVAL
1.	SUBMISSION OF GA DRGS./ DOCS (SUCH AS ACUATOR DATA SHEET, POD TEST PROCEDURES ETC.) AS APPLICABLE, EACH TIME FOR APPROVAL	6 PRINTS + SOFT COPY	--
2.	SUBMISSION OF FINALLLY APPROVED DRGS & DOCS	---	6 PRINTS + 2 SETS OF CD ROM.
3.	DATA SHEETS, DESIGN CALCULATIONS. ELECTRICAL LOAD LIST ETC. AS APPLICABLE	6 PRINTS + SOFT COPY	--
4.	MATERIAL TEST CERTIFICATES, TEST REPORTS, IBR CERTIFICATES ETC.	--	1 No. original +4 copies
5.	QUALITY PLANS	6 PRINTS + SOFT COPY	--
6.	O & M MANUALS DRAFT FINAL	2 COPIES --	-- 6 COPIES + 2 SETS OF CD ROM



TOTAL 2 NOS. CD-ROM (EACH CD-ROM WILL CONTAIN DOCUMENTS AT SL. NO. 2 AND 6 ABOVE.)



QUALITY PLAN

CUSTOMER: SYRIAN ARAB REPUBLIC

PROJECT: 2X200 MW TISHREEN TPS EXTENSION

SPEC. NO :PE-SS-999-100-M008

BIDDER/VENDOR

QAP NO.PE-QP-999-100-M020

REV.00 dtd 20.07.2011

SPEC. TITLE TWO WAY BUTTERFLY VALVE

SHEET 1 OF 5

SYSTEM WATER SYSTEM LP VALVES

ITEM: CAST IRON/CAST CARBON STEEL/ CAST STAINLESS STEEL/AUSTENITIC D.I A439 GR-D2 BUTTERFLY VALVES (65 TO 350NB SIZE)

SECTION VOLUME

S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE - GOR Y	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	

1.	MATERIALS											
1.1	BODY, DISC, SHAFT	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 CAST IRON ONLY MECH..PROP
		2.DIMENSIONS	MA	MEASURE- MENT	100%	TECH. SPEC	TECH SPEC	LOG BOOK	2	2	1	
		3. SUB-SURFACE DEFECTS OF SHAFT	CR	UT(**)	100%	ASTM A388	ASTM A388	TEST CERT.	3/2	2	1	DIA 40 MM & GREATER
		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	- MPI for CI & CCS VALVE of SIZES 350MM
				3) DPT	100%	ASTM E165	-DO-	-DO-	3/2	2	1	- ON MACHINED SURFACE OF CI & CCS VALVES OF SIZE BELOW 350NB.
1.2	SOFT SEAT CLAMPING RING & SOFT SEAT S.S. MATING SEAT	5. HEAT TREATMENT	MA	REVIEW OF HT RECORD	100%	TECH. SPEC	REL. MATL. STD	MATL. T.C	3/2	2	1	- SOLUTION ANNEALING FOR SS. FOR OTHER MATL. AS PER REL. SPEC
		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	FOR S.S MATING SEAT THICKNESS 25MM & ABOVE
		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	
VISHAKHA JAIN	NAME		
	SIGNATURE		
20.07.2011	DATE		BIDDER'S/ VENDOR'S COMPANY SEAL

**QUALITY PLAN**

CUSTOMER: SYRIAN ARAB REPUBLIC

PROJECT: 2X200 MW TISHREEN TPS EXTENSION

SPEC. NO :PE-SS-999-100-M008

BIDDER/VENDOR

QAP NO.PE-QP-999-100-M020

REV.00 dtd 20.07.2011

SPEC. TITLE TWO WAY BUTTERFLY VALVE

SHEET 2 OF 5

SYSTEM WATER SYSTEM LP VALVES

ITEM: CAST IRON/CAST CARBON STEEL/ CAST STAINLESS STEEL/AUSTENITIC D.I A439 GR-D2 BUTTERFLY VALVES (65 TO 350NB SIZE)

SECTION VOLUME

S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE - GOR Y	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	

1.3.	SOFT SEAT	1. VISUAL INSPN	MA	VISUAL	100%	TECH. SPEC/ APPD DRG	TECH. SPEC/ APPD DRG	LOG BOOK	3/2	2	1	
		2.DIMENSIONS	MA	MEASURE- MENT	100%	TECH. SPEC	TECH. SPEC	LOG BOOK.	2	2	1	
		3. TENSILE STRENGTH	MA	TESTING	1. SAMPLE / BATCH	IS:3400(PART-1)	120Kg/CM ² (MIN)	I.R	3/2	3/2	1	
		4.ELONGATION	MA	TESTING	-DO-	IS:3400(PART-1)	250%(min)	I.R	3/2	3/2	1	
		5. HARDNESS	MA	TESTING	-DO-	MFG. STD.	70 ⁰ ±5 ⁰ (Shore-A)	I.R	3/2	3/2	1	
		6. BLEED RESISTANCE	MA	TESTING	-DO-	SAMPLE TO BE KEPT IN 33% HCL, DM WATER, 48% NaOH FOR 72 HRS	NO DISCOLOU- RATION, WEIGHT GAIN ± 0% TO +2%	T.C	3/2	3/2	1	
		7. OZONE RESISTANCE	MA	TESTING	1/ BATCH	ASTM-D-1149	NO CRACKS AT 50 pphm Ozone	TEST CERT	3/2	3/2	1	
		8. AGEING TEST	MA	TESTING	1/ BATCH	ASTMD-573	No deterioration	TEST CERT	3/2	3/2	1	
		9. HYDRAILIC STABILITY TEST AFTER AGING	MA	TESTING	1/BATCH	TECH SPEC./ AWWA C504	TECH SPEC./ AWWA C504	TEST CERT.	3/2	2	1	WATER ABSORPTION BY VOLUME TO BE < 2%
1.4	FASTENERS	1. VERIFICATION OF MAKE, GRADE 2. DIMENSIONS	MI MA MA	VISUAL MEASURE- MENT	100% SAMPL- ING PLAN	TECH. SPEC/ DATA SHEET RELV STD.	TECH. SPEC/ DATA SHEET RELV STD.	INSPN REPORT INSP REPORT	3 3	3/2 3/2	1 1	
1.5	GEAR BOX GEAR, WORM , BUSH & SHAFT	1. CHEM. COMP. & PHYS PROPERTIES	MA	CHEM & PHYS TEST	1/ BATCH	RELV STD/ DATA SHT/ MFG DRG	RELV STD/ DATA SHT/ MFG DRG	TEST CERT	3/2	2	1	
		2. DIMENSIONS	MA	MEASURE- MENT	100%	RELV STD/ DATA SHT/ MFG DRG	RELV STD/ DATA SHT/ MFG DRG	INSP REPORT	2	2	1	
		3. HARDNESS(GEAR & WORM) 4. <u>DESIGN VERIFICATION</u>	MA	MEASURE- MENT	100%	RELV STD/ DATA SHT/ MFG DRG	RELV STD/ DATA SHT/ MFG DRG	TEST CERT	3/2	2	1	
		a) TORQUE CAPABILITY	MA	TESTING (TORQUE AT TWICE OF RATED TORQUE OF GEAR BOX)	ONE/ TYPE/SIZE /RATED TORQUE	AWWA C504 CL 4.5.8.5.8	AWWA C504 CL 4.5.8.5.8	TEST CERT.	3/2	1	-	REFER NOTE

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PARTICULARS

BIDDER/VENDOR

VISHAKHA JAIN

NAME

SIGNATURE

20.07.2011

DATE

BIDDER'S/ VENDOR'S COMPANY SEAL



QUALITY PLAN

CUSTOMER: SYRIAN ARAB REPUBLIC

PROJECT: 2X200 MW TISHREEN TPS EXTENSION

SPEC. NO : PE-SS-999-100-M008

BIDDER/VENDOR

QAP NO. PE-QP-999-100-M020

REV.00 dtd 20.07.2011

SPEC. TITLE TWO WAY BUTTERFLY VALVE

SHEET 3 OF 5

SYSTEM WATER SYSTEM LP VALVES

ITEM: CAST IRON/CAST CARBON STEEL/ CAST STAINLESS STEEL/AUSTENITIC D.I A439 GR-D2 BUTTERFLY VALVES (65 TO 350NB SIZE)

SECTION VOLUME

S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE - GOR Y	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P W V	REMARKS
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		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
1.6	ELECTRICAL ACTUATORS	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	}								
		8. DEGREE OF PROTECTION	MA	}								
		9. DESIGN VERIFICATION	MA	TYPE TEST	ONE/MODEL / TYPE/ SIZE /RATING	AWWA C540/ AWWA C540	AWWA C540	TEST CERT	3/2	2	1`	
2.0	INPROCESS CONTROL:-											
2.1	BODY, DISC, SHAFT, SOFT SEAT MATING SEAT	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	

BHEL	PARTICULARS	BIDDER/VENDOR	
VISHAKHA JAIN	NAME		
	SIGNATURE		
20.07.2011	DATE		BIDDER'S/ VENDOR'S COMPANY SEAL



QUALITY PLAN

CUSTOMER: SYRIAN ARAB REPUBLIC

PROJECT: 2X200 MW TISHREEN TPS EXTENSION

SPEC. NO : PE-SS-999-100-M008

BIDDER/VENDOR

QAP NO. PE-QP-999-100-M020

REV.00 dtd 20.07.2011

SPEC. TITLE TWO WAY BUTTERFLY VALVE

SHEET 4 OF 5

SYSTEM WATER SYSTEM LP VALVES

ITEM: CAST IRON/CAST CARBON STEEL/ CAST STAINLESS STEEL/AUSTENITIC D.I A439 GR-D2 BUTTERFLY VALVES (65 TO 350NB SIZE)

SECTION VOLUME

S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE - GOR Y	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P W V			REMARKS
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		3. SURFACE DEFECTS	CR	DP/ MPI	100%	ASTM E165	NO SURFACE DEFECTS	INSP REPORT	3/2	2	1	MACHINED AREAS DP FOR SS BODY ONLY
3.0	TESTING											
3.1	PROOF OF DESIGN TESTS	1. DISC STRENGTH TEST	MA	HYDRO TEST	ONE/ TYPE/ SIZE/ CLASS	AWWA C504 CL 5.2.4.2	AWWA C504 CL 5.2.4.2	TEST CERT.	3/2	1*	--	Refer note
		2. LIFE CYCLE TESTING	MA	HYDRO TEST	ONE/TYPE/ CLASS / SIZE GROUP	APPROVED PROCEDURE/ AWWA C504 CL 5.2.4.3 APPD. DRGS/ RELV STD	APPROVED PROCEDURE AWWA C504 CL 5.2.4.3 NO LEAKAGE	TEST CERT.	3/2	1*	--	Refer note
3.2	VALVE LEAK TIGHTNESS TEST	1. SHELL TEST	MA	HYDRO TEST	100%	APPD. DRGS/ RELV STD	NO LEAKAGE	TEST CERT	2	1	--	
		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	--	
3.3	FUNCTIONAL TEST OF ACTUATOR WITH VALVE	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		
3.4	PERFORMANCE TEST	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,

BHEL

PARTICULARS

BIDDER/VENDOR

VISHAKHA JAIN

NAME

SIGNATURE

20.07.2011

DATE

BIDDER'S/ VENDOR'S COMPANY SEAL



QUALITY PLAN		CUSTOMER: SYRIAN ARAB REPUBLIC				PROJECT: 2X200 MW TISHREEN TPS EXTENSION			SPEC. NO : PE-SS-999-100-M008		
		BIDDER/VENDOR				QAP NO. PE-QP-999-100-M020		REV.00 dtd 20.07.2011		SPEC. TITLE TWO WAY BUTTERFLY VALVE	
SHEET 5 OF 5		SYSTEM WATER SYSTEM LP VALVES				ITEM: CAST IRON/CAST CARBON STEEL/ CAST STAINLESS STEEL/AUSTENITIC D.I A439 GR-D2 BUTTERFLY VALVES (65 TO 350NB SIZE)			SECTION VOLUME		
COMPONENT/ OPERATION	CHARACTERISTICS CHECKED		CATE - GOR Y	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY		REMARKS
									P	W	V

4.0	COMPLETE ASSEMBLY FINAL INSPECTION	1. OVERALL L DIMENSION	MA	MEAS.	100%	APPD DRG		INSPN REPORT	2	1		MANUALLY AS WELL AS THROUGH OPERATOR.
4.1		2. CLEANLINESS	MA	VISUAL	100%	APPD DRG/ TECH SPEC		INSPN REPORT	2	1		
		3. NAMEPLATE WITH VALVE TAG NOS.	MA	VISUAL	100%	APPD DRG/ TECH SPEC		INSPN REPORT	3/2	2	1	
5.0	PAINTING	1. SURFACE PREPARATION 2. UNIFORMITY & THICKNESS	MI MI	VISUAL & MEASURE-MENT	100%	TECHNICAL SPEC.		INSPN REPORT	3/2	2	1	For CCS, CI & AU, D.I GR-D2 body valves only

NOTE: REVIEW/ VERIFICATION OF INSPECTION REPORTS / TEST CERTIFICATES, IN CASE THESE TESTS CARRIED OUT EARLIER ON THE IDENTICAL MODEL/TYPE SIZE/CALSS RATING/ SIZE GROUP OF TESTED VALVES, GEAR BOX, ACTUATOR AND WITNESS BY REPUTED CUSTOMER LIKE NTPC OR THIRD PARTY INSPECTION 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 bidder on identical valves, electric actuators, gear box without any commercial implications/ at their own cost AND the POD tests shall be witnessed by BHEL/ customer.

ABBREVIATIONS: CHP=CUSTOMER HOLD POINT CR= CRITICAL ACTIVITY MA= MAJOR ACTIVITY PT= DYE PENETRATION TEST P=PERFORMED BY V=VERIFIED BY W= WITNESSED BY (customer at random) 1= BHEL(CUSTOMER if CHP) 2= VENDOR 3= SUB VENDOR I R= INSPECTION REPORT TC= TEST CERTIFICATE, UT=Ultrasonic test, LPI=liquid penetrant inspection, MPI=magnetic particle inspection.

() NORMAL BEAM 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 HEIGHT (FSH) IN SOUND AREA. AT THIS SENSITIVITY LEVEL THE ITEM SHALL BE SCANNED & ANY DEFECT ECHO MORE THAN 20% FSH IS NOT ACCEPTABLE. ALSO ANYWHERE COMPLETE LOSS OF BACK WALL ECHO IS NOT ACCEPTABLE**

BHEL	PARTICULARS	BIDDER/VENDOR	
VISHAKHA JAIN	NAME		
	SIGNATURE		
20.07.2011	DATE		
			BIDDER'S/ VENDOR'S COMPANY SEAL

2 X 200 MW TISHREEN THERMAL POWER STATION EXTENSION
PROCUREMENT OF BUTTERFLY VALVES (WATER SYSTEM)

(The Technical requirements in this entire Annexure A/ Section-C are specific to the project and shall prevail/ over/ over-ride the corresponding technical requirements specified under Section-D of Technical Specifications, in case of any contradiction)

1.0 SCOPE OF SUPPLY: Following are the Requirements of Butterfly Valves (Water System) along with commissioning spares.

SL NO.	TAG NO.	SIZE (MM) NB	TYPE OF VALVE	OPERATION	DESIGN		SERVICE	BODY MATL.	TRIM MATL. & VALVE INTERNALS***	BODY RATING	TESTING OF VALVES	TEST PRESSURE SHELL / SEAT Kg/Cm ² (g)AS PER BSEN-593	DISC STRENGTH TEST PRESSURE Kg/Cm ² (g) AS PER AWWA C504	HYD. SEAT TEST PRESSURE FOR VALVE WITH ACTUATOR OPERATION	END DETAIL	MATCHING PIPE OD (mm) X THKN(mm)	SPECIAL FEATURES	TOTAL QTY MAIN SUPPLY (NOS) WITHOUT COMMISSIONING SPARES	COMMISSIONING SPARES			MANDATORY SPARES
					PRESSURE KG/CM ² g	TEMP. °C													GLAND PACKING (O-RING) SETS	BOTTOM GASKET SETS	ACTUATOR SPARES SETS	COMPELETE VALVE WITH ACTUATOR (Nos)
1	ACW-23 TO ACW-26, ACW-40 TO ACW-43, ACW-57 TO ACW-60 (EACH 2 Nos.), RO-7, RO-8, RO-9 (EACH 1 No.)	65	BFV	MAN	10	60	WATER (ACW & PW SYSTEM)	CI AS PER IS210 Gr. FG260	ASTM A 479 TYPE 410	PN 10 OF BS EN 593 (replaces BS 5155)	BS EN 593/ AWWA C504	15/11	15	-	DOUBLE FLANGED FLAT FACED & DRILLING AS PER BSEN 1092-2 (PN16)	76.6X4.5	LEVER OPERTD., SOFT SEAT	27	27	27	----	NIL
2	ACW-21, ACW-22, ACW-27, ACW-28, ACW-38, ACW-39, ACW-44, ACW-45, ACW-55, ACW-56, ACW-61, ACW-62 (EACH 2 Nos.), SW-3, SW-14, PW-3, PW-14, RO-15, SUMP PUMP DISCHARGE (4 NOS.)	80	BFV	MAN	10	60	WATER (ACW, SW & PW SYSTEM)	--DO--	--DO--	CLASS 150 OF AWWA C504	AWWA C504	21/10.5	21	-	DOUBLE FLANGED FLAT FACED & DRILLING AS PER ASME B 16.1 CLASS 125	89.5X4.8	LEVER OPERTD., SOFT SEAT	33	33	33	----	NIL
3	ACW-9, ACW-10, ACW-17 TO ACW-20, ACW-34 TO ACW-37, ACW-51 TO ACW-54, ACW-74, ACW-76 (EACH 2 Nos.), SW-2, SW-24, SW-28, SW-29, SW-33, SW-34, SW-38, SW-39, SW-43, SW-89, SW-90, PW-2 , PW-36 (EACH 1 No.)	100	BFV	MAN	10	60	WATER (ACW, SW & PW SYSTEM)	--DO--	--DO--	--DO--	--DO--	--DO--	--DO--	-	--DO--	115X5.4	LEVER OPERTD., SOFT SEAT	45	45	45	----	NIL
4	SW-91, SW-94	100	BFV	MAN	10	60	WATER (SW SYSTEM)	--DO--	--DO--	--DO--	--DO--	--DO--	--DO--	-	--DO--	115X5.4	LEVER OPERTD., SOFT SEAT WITH LIMIT SWITCH	2	2	2	----	NIL
5	SW-1, SW-93, SW-96, PW-1	100	BFV	MO	10	60	WATER (SW SYSTEM)	--DO--	--DO--	--DO--	--DO--	--DO--	--DO--	11	--DO--	115X5.4	MOTORISED ELECTRIC ACTUATOR WITH INTEGRAL STARTERS OT=20 - 30 SECS	4	4	4	4 SETS OF O-RING AND SEALS	NIL
6	ACW-13, ACW-29, ACW-30, ACW-46, ACW-47, ACW-63, ACW-72, ACW-73 (EACH 2 Nos.), SW-86, SW-87, SW-88 (EACH 1 No.)	150	BFV	MAN	10	60	WATER (ACW, SW & PW SYSTEM)	--DO--	--DO--	--DO--	--DO--	--DO--	--DO--	-	--DO--	166.5X5.4	LEVER OPERTD., SOFT SEAT	19	19	19	----	NIL
7	RO-1, RO-4	150	BFV	MAN	10	60	WATER (RO SYSTEM)	--DO--	--DO--	--DO--	--DO--	--DO--	--DO--	-	--DO--	166.5X5.4	LEVER OPERTD., SOFT SEAT WITH LIMIT SWITCH	2	2	2	----	NIL

2 X 200 MW TISHREEN THERMAL POWER STATION EXTENSION
PROCUREMENT OF BUTTERFLY VALVES (WATER SYSTEM)

SL NO.	TAG NO.	SIZE (MM) NB	TYPE OF VALVE	OPERATION	DESIGN		SERVICE	BODY MATL.	TRIM MATL. & VALVE INTERNALS***	BODY RATING	TESTING OF VALVES	TEST PRESSURE SHELL / SEAT Kg/Cm ² (g)AS PER BSEN-593	DISC STRENGTH TEST PRESSURE Kg/Cm ² (g) AS PER AWWA C504	HYD. SEAT TEST PRESSURE FOR VALVE WITH ACTUATOR OPERATION	END DETAIL	MATCHING PIPE OD (mm) X THKN(mm)	SPECIAL FEATURES	TOTAL QTY MAIN SUPPLY (NOS) WITHOUT COMMISSIONING SPARES	COMMISSIONING SPARES			MANDATORY SPARES
					PRESSURE KG/CM ² g	TEMP. °C													GLAND PACKING (O-RING) SETS	BOTTOM GASKET SETS	ACTUATOR SPARES SETS	COMPELETE VALVE WITH ACTUATOR (Nos)
8	ACW-16, ACW-33, ACW-50 (EACH 2 Nos.), RO-3, RO-6 (EACH 1 No.)	150	BFV	MO	10	60	WATER (ACW SYSTEM)	--DO--	--DO--	--DO--	--DO--	--DO--	--DO--	11	--DO--	166.5X5.4	MOTORISED ELECTRIC ACTUATOR WITH INTEGRAL STARTERS OT=20 - 30 SECS	8	8	8	8 SETS OF O-RING AND SEALS	NIL
9	ACW-68, ACW-69 (EACH 2 Nos.), SW-94, SW-96 (EACH 1 No.)	200	BFV	MO	10	60	WATER (ACW & SW SYSTEM)	--DO--	--DO--	--DO--	--DO--	--DO--	--DO--	11	--DO--	219.1X6	MOTORISED ELECTRIC ACTUATOR WITH INTEGRAL STARTERS OT=20 - 30 SECS	6	6	6	6 SETS OF O-RING AND SEALS	NIL
10	ACW-64, ACW-65 (EACH 2 Nos.)	250	BFV	MAN	10	60	WATER (ACW SYSTEM)	--DO--	--DO--	--DO--	--DO--	--DO--	--DO--	-	--DO--	273X6	GEAR OPERTD., SOFT SEAT WITH LIMIT SWITCH	4	4	4	----	NIL
11	ACW-5 TO ACW-8, ACW-5C, ACW-6C (EACH 2 Nos.)	300	BFV	MAN	10	60	WATER (ACW SYSTEM)	--DO--	--DO--	--DO--	--DO--	--DO--	--DO--	-	--DO--	323.9X6	GEAR OPERTD., SOFT SEAT	12	12	12	----	NIL
TOTAL																		162				NIL

Commissioning spares --> One set each of Bottom Gasket with'O' Rings& Seals, Gland Packing with 'O' ring & seals in Gland packing area, Upper Gasket etc as applicable.
*** FOR DETAIL MATERIAL OF CONSTRUCTION REFER CLAUSE 3.2 OF TECHNICAL SPECIFICATION NO. PE-SS-999-100-M008

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

LEGENDS :
MAN = MANUAL GO =GEAR OPERATED
MO = MOTORISED (ELECTRIC ACTUATOR)
VALVE:-

1.) MANDATORY SPARES :- 5 % OF THE TOTAL POPULATION OR MINIMUM 2 NOS. OF EACH TYPE,MATERIAL , SIZE AND CLASS WHICH EVER IS HIGHER.

- Main valve prices shall BE EXCLUSIVE of cost of Commissioning Spares prices.
- Bidder is required to quote unit price of each & every item under commissioning spares separately & individually i.e. prices of all commissioning spares shall not be clubbed/ included in the unit perice of Main valves.

--NOTE:--
Kindly note that the Bidder to quote separate unit prices of each and every item under Mandatory Spares with suitable validity for future ordering. Bidder is required to quote MANDATORY (COMPLETE VALVES) PRICES EXCLUSIVE OF COST OF COMMISSIONING SPARES. Bidder to note that prices of Mandatory Spares should not be clubbed with main valve prices as Purchase order for MANDATORY SPARES shall be placed separately and these spares shall also be supplied duly packed in separate packing boxes.---

**2 X 200 MW TISHREEN THERMAL POWER STATION EXTENSION
PROCUREMENT OF BUTTERFLY VALVES (WATER SYSTEM)**

**ANNEXURE-A
PAGE 3 of 3**

- 2 Offered Gear Box & electric actuator shall be designed & tested in accordance with latest editions of per AWWA C504 & AWWA C540 (actuator) respectively. In case the Gear box is not earlier POD tested for any NTPC job/ Reputed Power Plant customer, then the bidder to carry out POD Test on Gear Box, at their own cost, in line with clause 3.5 of attached Tech Spec. No. PE-SS-999-100-M008. No separate charges for Gear POD Test shall be quoted by the bidder as these tests are the mandatory requirements of AWWA C504 and of this enquiry technical specification, therefore, the charges/ costs on this account, if any, may be built in the quoted unit prices of valves. NO EXTRA CHARGES ON THIS ACCOUNT IS ADMISSIBLE TO BIDDERS.
- 3 In case POD Test on valves covered in this enquiry is not done earlier by the bidder for any NTPC project/ Reputed Power Plant customer, then the bidder is required to carry out POD test on valves in line with clause 3.4 of above mentioned Tech spec. No. PE-SS-999-100-M008 of the purchase order at their own cost (size of the valve to be POD tested will be decided by the purchaser at contract stage) i.e. no extra charges permissible to bidder as the valve POD test is the mandatory requirements of AWWA C504 as well as of this enquiry technical specification. POD TESTED VALVE WILL NOT BE SUPPLIED TO CUSTOMER / BHEL. CHARGES OF POD TEST, MATERIALS USED DURING POD TEST, OR ANY OTHER TESTING COST SHALL BE BUILT IN/ INCLUDED IN QUOTED UNIT PRICE OF VALVES. NO EXTRA CHARGES ON THIS ACCOUNT IS ADMISSIBLE TO BIDDERS.
- 4 Bidder to submit an Offer of Recommended Spare as specified in clause no.1.3 of specification NO. .PE-SS-999-100-M008 for future ordering.
- 5 The technical requirements for Butterfly valves shall, in general, be as per Tech Specification No. PE-SS-999-100-M008 including material of construction & painting.
- 6 Specification of Electric Actuators shall be as per "MOTOR OPERATED VALVE ACTUATOR DATA SHEET – Spec. NO. PE-ID-323-145-1902 REV 00 (5 Sheets) & WIRING DIAGRAM NO. 3-V-MISC-24283 REV 0 (1 sheet) attached herewith in place of Spec.No. PE-SS-999-145-I007 indicated at clause 6.2.5 of butterfly valve Spec. No. PE-SS-999-100-M008 section-D. Actuators shall be selected for full open & full close operation only i.e. on- off duty for all valves of this Technical Specification. Bidder to only confirm to comply with above electric actuator specification and therefore, need not submit the same duly filled up with the offer since this data sheet will be required at contract stage in case of order on the bidder.
However the bidder is required to indicate the following details in their technical offer while submitting the bids:
1) Actuator Make, model no., size/ rating, opening closing time of valve, the actuator's rated torque etc. of the offered Electric Actuator.
2) Required Valve torque value, valve spindle details, selected Gear box make, model & rated torque etc. as indicated in clause 6.2.3 of the above standard Tech Spec.
- 7 Documentation required shall be as per attached Annexure'B'.
- 8 Inspection & Testing shall be by both BHEL & customer jointly or separately.
- 9 All test and inspection shall be as per attached Quality Plan. The bidder to return a copy of the same duly signed and stamped as a token of acceptance. However the bidder to get Quality Plan approved from the customer, in case of order, without any commercial implication to BHEL.
- 10 Vendor has to supply main quantity along with commissioning spares and mandatory spares.
- 11 TECHNICAL OFFERS FROM BIDDERS
No detailed offer and drawing/ Data Sheets are required to be submitted along with the technical bid. Bidder to note that no kind of deviation is acceptable to BHEL. Instead, bidder shall categorically specify "NO DEVIATION" in their bid document and in addition submit a confirmation to comply to this specification in totality. The bidder to also return copy of the total enquiry Tech Specification duly signed with their company stamp as a token of acceptance

NOTE:-- The bidders who have never supplied earlier butterfly valves to BHEL are required to submit their detailed technical offers in line with clause 11.1 to 11.8 of Technical sSpecification NO. PE-SS-999-100-M008

The successful bidder, in case of order, will be required to submit drawings, calculations and stamped copy of Quality Plan after award of contract within 15 days for BHEL's approval. Based on BHEL's comments, vendor will be required to make necessary changes, if required, on these documents so that the valves meet the technical requirements of this specification. BHEL reserves the right to make modification to minor design detail like ends/weld details, etc. and the vendor will comply with BHEL requirements.

✓ Jain