

FRAMEWORK AGREEMENT

TECHNICAL SPECIFICATION FOR STEEL GATE, GLOBE AND NON RETURN VALVES

SPECIFICATION NO. PE-TS-020-100-M001



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

	TECHNICAL SPECIFICATION STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-020-100-M001	
		SECTION: -	
		REV. NO.: 00	DATE: 05.09.2017
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SECTION-I

SPECIFIC TECHNICAL REQUIREMENTS

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1. GENERAL

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

2. SCOPE OF SUPPLY

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

3. CODES AND STANDARDS

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

S.NO.	DESCRIPTION	DESIGN STANDARD	TESTING STANDARD
1	For Gate, Globe and PLNRV of sizes 50 NB and smaller	BS EN ISO 15761/ANSI B16.34/IS554 FEMALE PARALLEL	ISO 5208/ ASME B16.34
2	Gate valves of sizes 65 NB to 200 NB.	BS EN ISO 10434/ANSI B16.34/ ANSI B16.10/API 600/ASME B16.5(R/F)	ISO 5208/ API 598/ASME B16.34
3	Globe valves of sizes 65 NB to 200 NB.	BS:1873 /ANSI B16.34/ ANSI B16.10/ ASME B16.5(R/F)	BSEN ISO 12266/ ASME B16.34
4	a).Non-return valves of sizes 65 NB to 600 NB.	BS:1868 /ANSI B16.34/ ANSI B16.10	BSEN ISO 12266/ ASME B16.34
	b).Non-return valves of sizes 800NB.	API- 6D /ANSI B16.34/ ASME B16.47(R/F)	BSEN ISO 12266/ ASME B16.34
	c).Non-return valves of sizes 1000NB.	BSEN 558(BASIC SERIES-1)/ANSI B16.34/ ASME B16.47(R/F)	BSEN ISO 12266/ ASME B16.34

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

4. DESIGN REQUIREMENTS

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

5. Materials

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

6. CONSTRUCTIONAL FEATURES

- 6.1 End Connections:
- 6.1.1 Socket details of valves with socket welding ends shall be as per ANSI B16.11 and shall suit pipe size indicated in Data Sheet-A.
- 6.1.2 Screw detail of valves with screwed ends shall be as per IS 554 female parallel and shall suit pipe size indicated in Data Sheet-A.
- 6.1.3 Valves above 50NB & up to 600NB with flanged ends shall have raised face flanges and drilling details as per ASME B16.5 and valves above 600NB with flanged ends shall have raised face flanges and drilling details as per ASME B16.47 and shall suit pipe size indicated in Data Sheet-A.
- 6.2 Gate and Globe valves shall be of outside screw and yoke type with rising spindle and shall be capable of being closed against the design pressure.
- 6.3 All Gate, Globe and Swing check valves shall have an arrow indicating the direction of flow cast or embossed on the valve body. The direction of flow for globe valves shall be from under to over the disc.
- 6.4 Gate and globe valves shall have back seating arrangement for replacement of packing while working under full working pressure.
- 6.5 Gate and globe valves of size 50 NB and above shall be provided with position indicator unless otherwise specified.

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

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7. SPECIAL FEATURES OF VALVES

- 7.1 Extension spindle arrangement:
 - 7.1.1 Extension spindle/ chain operation to the valves shall be provided wherever required as specified in Data Sheet- A.
 - 7.1.2 Where required as specified in Data Sheet-A, valve yoke/spindles shall be lengthened so that the hand wheel is at a height of approximately one meter above the level of the floor or platform from which the valve is to be operated.
- 7.2 Locking arrangement
For valves that are to be kept locked in full "Open" or "Close" position, if specified in Data Sheet-A, the locking arrangement shall be provided with a non-detachable locking arrangement.
- 7.3 Valves for Vacuum Service:
 - 7.3.1 Valves of size up to 50 NB and operating under vacuum shall be offered with long neck gland & special and deep gland packing in order to avoid ingress of atmospheric air entry to the system through gland of the valves. In such case the depth of the stuffing box shall be at least 25% more than the normal valves and suitable for vacuum service.
 - 7.3.2 All valves of size 65NB and above and operating under vacuum conditions shall be provided with water sealed glands. Valves with sealed gland arrangement shall be required with 3/8" BSP connections duly plugged on both sides of the bonnet. Sealing water shall be supplied at 4 ata and 50°C, unless otherwise stated in Data sheet-A.
- 7.4 Valves with limit switch:
Valves with limit switches (as mentioned in Data sheet- A) shall be required only for indication or for interlocking with some equipment. Valves with such provision shall be offered with required number of limit switches for open/close position of the valve. The limit switches for this application shall have one normally open and one normally closed contact. The limit switches shall be cutler hamner/Siemens/Honeywell make and limit switch housing shall be weather proof. The limit switches shall also be wired to a terminal box.
- 7.5 Motorised Valves
 - 7.5.1 The motorised valves shall be offered with the electric actuators of reputed make observing strict quality control and approved by reputed customers. A particular make and type of actuator shall be designed for the maximum differential working pressure. However, the stall torque of the selected actuators shall be minimum 1.5 times the valve unseating torque requirement at the maximum differential working pressure (design pressure) and required operating time as mentioned in Datasheet-A.
 - 7.5.2 Electric actuators shall be mounted directly on the valves.
 - 7.5.3 In case integral bypass is provided to the main valve which is motorised, the integral bypass valve shall also be motorised. Actuator shall be provided with hand wheel also for manual operation.
 - 7.5.4 The motors, gearing and disengaging hand wheel shall be adequate to open and close the valve under maximum differential pressure and shall be completely assembled on the respective valve and shop tested before shipment.
- 7.6 Steel NRV above 600NB valve size shall be provided with Hydraulic Dashpot

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arrangement. Dashpot shall be of reputed make observing strict quality control and approved by reputed customers.

8. MANUFACTURE OF VALVES

- 8.1 Valve castings shall be procured from foundries observing strict quality control and approved by reputed customers.
- 8.2 Particular care shall be taken to ensure that all foundry sand and loose material is properly removed from castings by fettling before the valve's manufacture is started.

9. LUBRICATION:

- 9.1 Provision shall be made for suitable lubrication wherever necessary to ensure a smooth easy operation and freedom from undue wear.
- 9.2 Where oil filled gear boxes are used they shall be provided with filling and drain plugs, oil level gauges or dip sticks. Housing for ball and roller bearings shall be packed with grease at the time of assembly.
- 9.3 Choice of oil and grease for all motor drives shall be based on ambient temperature of 60°C.
- 9.4 Type of oil/grease to be used and its annual consumption (based on 100 operations per year) shall be indicated by the bidder.

10. QUALITY ASSURANCE, TESTING AND INSPECTION

- 10.1 The Quality Plans enclosed with this specification specify minimum quality control requirement. During contract stage vendor shall furnish these Quality Plans duly signed & stamped for their compliance. Quality plans shall be approved by BHEL and customer (if necessary). All inspection and testing shall be carried out by BHEL and customer (if necessary). In case inspection is by both BHEL and customer, then the inspection can be carried out jointly or separately, which will be informed later.
- 10.2 All valves shall be tested and inspected as per the approved quality plan. The minimum requirements are as indicated in attached quality plan. However, in case of order on the vendor, the QP shall be finalized by vendor with customer without any financial implications to meet customer project technical requirements.
- 10.3 Hydrostatic/Air Tests:
 - 10.3.1 Manually operated valves: All valves shall be tested hydraulically for strength, tightness of seats and tightness, of back seating at the pressures as mentioned in BSEN ISO 12266/ISO 5208/ API 598/ASME B16.34.
 - 10.3.2 Motor operated Valves:
 - a. All the motor operated valves shall be tested hydraulically for seat/backseat with the motor actuator at a pressure as specified in the actuator data sheet.
 - b. Motorized valves shall also be tested hydraulically for body, seat and backseat at the pressures as mentioned in BSEN ISO 12266/ISO 5208/ API 598/ASME B16.34 with hand wheel on the actuator.

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- c. All electric actuators shall be tested for seat tightness test at 1.1 times of design/ operating pressure.
- 10.4 Gate and Globe valves seats shall also be tested on air at a pressure of 7kg/cm².
- 10.5 Dimensional and functional checks shall be carried out.

11. PAINTING REQUIREMENT (FOR CARBON STEEL):

i). Non-Coastal locations:

Valve shall be painted externally after the necessary testing has been carried out. Just before the painting, valve bodies and other items shall be thoroughly cleaned with wire brush/hand tool (Sa1/St2/St3 as applicable). The valves shall be first painted with two coats of primer zinc Chromate to IS 2074 (alkyd medium) each coat of DFT minimum of 25 to 35 microns. Finish paint shall be of three (3) coats of synthetic enamel (alkyd medium) as per IS 2932 & each coat DFT of minimum 20-35 microns & the total DFT of primer & finish paint shall be 150 microns minimum. Colour shade of finished/final paint shall be shade no. 217 of IS 5 or Grey as per RAL 9002.

ii). Coastal locations:

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

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

12. PACKING INSTRUCTIONS:

- 12.1 Each valve shall be drained, cleaned, prepared and suitably protected in such a way so as to minimize the possibility of damage and deterioration during transit and storage.
- 12.2 The valve shall be dispatched in total assembled form.
- 12.3 Discs of all valves shall be properly secured while dispatching so that there is no risk of damage to the disc & seat.

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- 12.4 Body ends shall be suitably sealed to protect them against damage during transit and storage.
- 12.5 A thin sheet steel circular blanking plate of a diameter 6mm less than the bolt holes inner P.C.D. shall be firmly fixed to the flange faces by the application of adhesive after first ensuring that the flange faces have been thoroughly degreased. A thin coat of adhesive shall be applied to the flange face and the blanking plate and then allowed to dry for 15-20 minutes. The coated face of the blanking plate should then be offered up to the face of the flange taking care that the plate is concentric with the flange. Firm pressure shall be applied to ensure intimate contact between plate and flange. A wooden blank should then be bolted to the flange using a minimum of 4 bolts.
- 12.6 Valve Tag Nos. shall be incorporated in all the dispatch documents.
- 12.7 Proper care shall be taken to avoid damage to the painted surface during transit.
- 12.8 All the valves shall be packed suitably in wooden cases in order to avoid damage during transit and also during storage at site in tropical climate conditions for a period of 15-18 months.
- 12.9 Vendor to provide soft copy of photos/snaps of duly packed valve. The soft copies to be provided by vendor after final inspection of valves. Clearance for dispatch of valves will be given only after satisfactory packing conditions of valves from vendor's work.
- 13. SPARES:**
- a) **Mandatory Spares:** These shall be supplied in line with Data Sheet-A.
- b) Order for the spares may be placed simultaneously or otherwise at the option of purchaser.
- 14. DOCUMENTS TO BE SUBMITTED ALONG WITH OFFER:**
- Bidder shall submit the following documents duly filled, signed and stamped along with the bid:
- a) Compliance sheet
b) Documents as per the list indicated in the NIT.
- The above are the only documents which will be used for technical evaluation unless other documents are asked for during technical clarifications. Any other technical document enclosed with the bid shall be ignored for the purpose of technical evaluation. All other documents attached with the specification are for information of the vendor and no comments shall be marked on these.
- 15. DOCUMENTS TO BE SUBMITTED AFTER AWARD OF RATE CONTRACT:**

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- a). Complete cross sectional arrangement of the valve.
- b). Binding dimensions, dismantling clearances & weights.
- c). Bill of material incorporating all the materials of construction of various parts and also specifying the IS/BS/ASTM standards to which the materials conform to.
- d). Standard Quality Plan duly signed with bidder's company seal as a token of acceptance by the bidder.
- e). Actuator Data Sheet (ADS) along with wiring diagram duly signed and stamped as a token of acceptance by bidder.

The above drawings/ documents will be considered as reference documents for different projects PO which will be placed later.

16. EXCLUSIONS:

The following are excluded from the bidder's scope:

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

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SECTION-II

(DATA SHEET – A)

				DATA SHEET-A												SPECIFICATION NO. PE-TS-020-100-M001						
RATE CONTRACT BOQ (CONSOLIDATED) FOR STEEL(GATE/GLOBE/NRV) PACKAGE																SECTION:II						
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1	2	3	4	5		6	7	8	9	10	11	12	13		14	15			16			17
SL NO.	TYPE OF VALVE	SIZE mm (NB)	OPERATION	DESIGN		SERVICE	RATING, DESIGN & TESTING CODE	BODY BONNET & DISC MATERIAL	HINGE PIN MATERIAL	BODY & DISC SEAT AND OTHER TRIM MATERIAL	END CONN	SPECIAL FEATURES	MATCHING PIPE# OD X THKN		MAIN VALVES QUANTITY	+++COMMISSIONING SPARES			MAND. SPARES			REMARKS
				PRESSURE KG/CM2(G)	TEMP (DEG °C)								MM	MM		BONNET / COVER T (NOS)	GLAND PACKING (SETS)	ACTUATOR O-RING AND SEAL (SETS)	DISC(Nos.)	BODY SEAT RING (SET)	BONNET GASKET (SET)	
CATEGORY-A																						
1	HV	25	MAN	10	60	SW	#800 OF BSEN ISO 15761	FCS AS PER ASTM A-105	--	--	SOCKET WELDED as per ASME B16.11	GATE TYPE HOSE VALVE	34.2	4	538	538	538	--	--	--	--	
2	HV	25	MAN	10	60	SW	#800 OF BSEN ISO 15761	FCS AS PER ASTM A-105	--	--	SOCKET WELDED as per ASME B16.11	GLOBE TYPE HOSE VALVE	34.2	4.5	57	57	57	--	3	6	6	
3	GV	25	MAN	10	60	ACW SYSTEM	#800 OF BSEN ISO 15761	DUPLEX SS	--	DUPLEX SS	SCREWED as per IS554 female parallel	--	33.4	3.38	14	14	14	--	--	--	--	
4	GV	50	MAN	10	60	ACW & ETP SYSTEM	#800 OF BSEN ISO 15761	DUPLEX SS	--	DUPLEX SS	SCREWED as per IS554 female parallel	--	60.3	3.91	53	53	53	--	--	--	--	
5	GLV	25	MAN	7.5	60	SEA WATER INTAKE SYSTEM	#800 OF BSEN ISO 15761	DUPLEX SS (UNS 31803/ UNS 32205)	--	DUPLEX SS (UNS 31803/ UNS 32205)	SCREWED as per IS554 female parallel	--	33.4	3.38, 4.0	26	26	26	--	--	--	--	
6	GLV	25	MAN	10.12	60	DMCW SYSTEM	# 800 of BSEN ISO 15761	SS 316L	--	SS 316L	SOCKET WELDED as per ASME B16.11	--	33.4,34.2	3.4, 4.0	56	56	56	--	--	--	--	
7	GLV	40	MAN	10	60	DMCW SYSTEM	# 800 of BSEN ISO 15761	SS 316L	--	SS 316L	SOCKET WELDED as per ASME B16.11	--	48.80	4.00	6	6	6	--	--	--	--	
8	GLV	50	MAN	10.12	60	DMCW SYSTEM	# 800 of BSEN ISO 15761	SS 316L	--	SS 316L	SOCKET WELDED as per ASME B16.11	--	60.8,60.3	4.5, 3.9	31	31	31	--	--	--	--	
9	GLV	50	MAN	8	60	ACW/ PLANT WATER SYSTEM	#800 OF BSEN ISO 15761	DUPLEX SS (UNS 31803/ UNS 32205)	--	DUPLEX SS (UNS 31803/ UNS 32205)	SCREWED as per IS554 female parallel	--	60.8	3.91, 4.5	30	30	30	--	--	--	--	
10	GLV	50	MO	10	60	DMCW SYSTEM	# 800 of BSEN ISO 15761	SS 316L	--	SS 316L	SOCKET WELDED as per ASME B16.11	1. OPEN /CLOSE TIME SHALL BE 40-60 SEC. 2.ON/OFF TYPE	60.3, 60.8	3.9, 4.5	2	2	2	2	--	--	--	FOR ACTUATOR DETAIL, REFER ACTUATOR DATA SHEET SPEC. NO. PE-TS-020-145-1007B
11	PLNRV	25	AUTO	10.12	60	DMCW SYSTEM	# 800 of BSEN ISO 15761	SS 316L	SS 316L	SS 316L	SOCKET WELDED as per ASME B16.11	--	33.40	3.40	2	2	--	--	--	--	--	
12	PLNRV	50	AUTO	10	60	ETP SYSTEM	#800 OF BSEN ISO 15761	DUPLEX SS	--	DUPLEX SS	SCREWED as per IS554 female parallel	--	60.3	3.91	36	36	--	--	--	--	--	
TOTAL															851	851	813	2	3	6	6	
CATEGORY-B																						
1	GV	80	MAN	10.12	60	DMCW SYSTEM	# 150 of BSEN 10434	Equivalent casting grade of SS 316L grade	--	Equivalent casting grade of SS 316L grade	FLANGED as per Class 150 of ASME B16.5 R/F	--	89.50	4.80	3	3	3	--	--	--	--	
2	GV	100	MAN	12.10	60	DMCW SYSTEM	# 150 of BSEN 10434	Equivalent casting grade of SS 316L grade	--	Equivalent casting grade of SS 316L grade	FLANGED as per Class 150 of ASME B16.5 R/F	--	115.00	5.40	4	4	4	--	--	--	--	
3	GV	150	MAN	10	60	DMCW SYSTEM	# 150 of BSEN 10434	Equivalent casting grade of SS 316L grade	--	Equivalent casting grade of SS 316L grade	FLANGED as per Class 150 of ASME B16.5 R/F	--	166.50	5.40	4	4	4	--	--	--	--	
4	GV	150	MAN	8	60	ACW SYSTEM	#150 OF BSEN ISO 10434	DUPLEX SS (UNS 31803/ UNS 32205)	--	DUPLEX SS (UNS 31803/ UNS 32205)	FLANGED AS PER ASME B16.5 R/F	--	168.3	3.40	65	65	65	--	--	--	--	
5	GV	150	MAN	8	60	ACW SYSTEM	#150 OF BSEN ISO 10434	DUPLEX SS	--	DUPLEX SS	FLANGED AS PER ASME B16.5 R/F	--	168.3	3.40	30	30	30	--	--	--	--	
6	GV	200	MAN	5.5/ 5/ 10	60	CW & SEA WATER INTAKE SYSTEM	#150 OF BSEN ISO 10434	DUPLEX SS	--	DUPLEX SS	FLANGED AS PER ASME B16.5 R/F	--	219.1	6.40	22	22	22	--	--	--	--	
7	GV	200	MAN	5.5/ 5/ 10	60	CW & SEA WATER INTAKE SYSTEM	#150 OF BSEN ISO 10434	DUPLEX SS (UNS 31803/ UNS 32205)	--	DUPLEX SS (UNS 31803/ UNS 32205)	FLANGED AS PER ASME B16.5 R/F	--	219.1	6.40	95	95	95	--	--	--	--	
8	GV	200	MAN	10	60	DMCW SYSTEM	# 150 of BSEN 10434	Equivalent casting grade of SS 316L grade	--	Equivalent casting grade of SS 316L grade	FLANGED as per Class 150 of ASME B16.5 R/F	--	219.10	6.40	2	2	2	--	--	--	--	
9	GV	200	MO	10	60	PW SYSTEM	#150 OF BSEN ISO 10434	DUPLEX SS (UNS 31803/ UNS 32205)	--	DUPLEX SS (UNS 31803/ UNS 32205)	FLANGED AS PER ASME B16.5 R/F	1. OPEN /CLOSE TIME SHALL BE 40-60 SEC. 2.ON/OFF TYPE	219.1	6.40	1	1	1	1	--	--	--	FOR ACTUATOR DETAIL, REFER ACTUATOR DATA SHEET SPEC. NO. PE-TS-020-145-1007A
10	GLV	80	MAN	10.12	60	DMCW SYSTEM	# 150 of BS 1873	Equivalent casting grade of SS 316L grade	--	Equivalent casting grade of SS 316L grade	FLANGED as per Class 150 of ASME B16.5 R/F	--	89.50	4.80	3	3	3	--	--	--	--	
11	GLV	100	MAN	10	60	DMCW SYSTEM	# 150 of BS 1873	Equivalent casting grade of SS 316L grade	--	Equivalent casting grade of SS 316L grade	FLANGED as per Class 150 of ASME B16.5 R/F	--	115.00	5.40	1	1	1	--	--	--	--	
12	GLV	150	MAN	10	60	DMCW SYSTEM	# 150 of BS 1873	Equivalent casting grade of SS 316L grade	--	Equivalent casting grade of SS 316L grade	FLANGED as per Class 150 of ASME B16.5 R/F	--	166.50	5.40	4	4	4	--	--	--	--	

1	2	3	4	5		6	7	8	9	10	11	12	13		14	15			16			17
SL NO.	TYPE OF VALVE	SIZE mm (NB)	OPERATION	DESIGN		SERVICE	RATING, DESIGN & TESTING CODE	BODY, BONNET & DISC MATERIAL	HINGE PIN MATERIAL	BODY & DISC SEAT AND OTHER TRIM MATERIAL	END CONN	SPECIAL FEATURES	MATCHING PIPE# OD X THKN		MAIN VALVES QUANTITY	+++COMMISSIONING SPARES			MAND. SPARES			REMARKS
				PRESSURE KG/CM2(G)	TEMP (DEG ° C)								MM	MM		BONNET COVER GASKET (NOS)	GLAND PACKING (SETS)	ACTUATOR O-RING AND SEAL (SETS)	DISC(Nos.)	BODY SEAT RING (SET)	BONNET GASKET (SET)	
13	GLV	150	MAN	8	60	ACW SYSTEM	#150 OF BS 1873	DUPLEX SS (UNS 31803/ UNS 32205)	--	DUPLEX SS (UNS 31803/ UNS 32205)	FLANGED AS PER ASME B16.5 R/F	--	168.3	3.40	4	4	4	--	--	--	--	
14	GLV	150	MAN	10	60	ACW SYSTEM	# 150 of BS 1873	DUPLEX SS	--	DUPLEX SS	FLANGED AS PER ASME B16.5 R/F	--	168.3	3.40	4	4	4	--	--	--	--	
15	GLV	150	MO	12	60	DMCW SYSTEM	# 150 of BS 1873	Equivalent casting grade of SS 316L grade	--	Equivalent casting grade of SS 316L grade	FLANGED as per Class 150 of ASME B16.5 R/F	1. OPEN /CLOSE TIME SHALL BE 40-60 SEC. 2.INCHING TYPE	166.50	5.40	1	1	1	1	--	--	--	FOR ACTUATOR DETAIL, REFER ACTUATOR DATA SHEET SPEC. NO. PE-TS-020-145-1007C
16	GLV	200	MAN	10	60	ACW SYSTEM	# 150 of BS 1873	DUPLEX SS	--	DUPLEX SS	FLANGED AS PER ASME B16.5 R/F	--	219.1	6.40	10	10	10	--	--	--	--	
17	GLV	200	MAN	10	60	DMCW SYSTEM	# 150 of BS 1873	Equivalent casting grade of SS 316L grade	--	Equivalent casting grade of SS 316L grade	FLANGED as per Class 150 of ASME B16.5 R/F	--	219.10	6.40	2	2	2	--	--	--	--	
18	SCNRV	200	AUTO	10	60	CW SYSTEM	#150 OF BS 1868	DUPLEX SS (UNS 31803/ UNS 32205)	DUPLEX SS (UNS 31803/ UNS 32205)	DUPLEX SS (UNS 31803/ UNS 32205)	FLANGED AS PER ASME B16.5 R/F	--	219.1	6.40	4	4	--	--	--	--	--	
19	SCNRV	300	AUTO	12	60	DMCW SYSTEM	# 150 of BS 1868	Equivalent casting grade of SS 316L grade	Equivalent casting grade of SS 316L grade	Equivalent casting grade of SS 316L grade	FLANGED as per Class 150 of ASME B16.5 R/F	--	323.90	6.40	2	2	--	--	--	--	--	
20	SCNRV	400	AUTO	10	60	PLANT WATER INTAKE SYSTEM	#150 OF BS 1868	DUPLEX SS (UNS 31803/ UNS 32205)	DUPLEX SS (UNS 31803/ UNS 32205)	DUPLEX SS (UNS 31803/ UNS 32205)	FLANGED AS PER ASME B16.5 R/F	--	406.4	8.00	3	3	--	--	--	--	--	
21	SCNRV	500	AUTO	10	60	DMCW SYSTEM	# 150 of BS 1868	Equivalent casting grade of SS 316L grade	Equivalent casting grade of SS 316L grade	Equivalent casting grade of SS 316L grade	FLANGED as per Class 150 of ASME B16.5 R/F	--	508.00	8.00	3	3	--	--	--	--	--	
22	SCNRV	800	AUTO	8	60	ACW SYSTEM	#150 OF API- 6D	DUPLEX SS (UNS 31803/ UNS 32205)	DUPLEX SS (UNS 31803/ UNS 32205)	DUPLEX SS (UNS 31803/ UNS 32205)	FLANGED AS PER ASME B16.47 R/F	--	813	10.00	7	7	--	--	--	--	--	SCNRVs TO BE PROVIDED WITH HYDRAULIC DASHPOT ARRANGEMENT
23	SCNRV	1000	AUTO	7.5	60	ACW SYSTEM	#150 OF BSEN558	DUPLEX SS (UNS 31803/ UNS 32205)	DUPLEX SS (UNS 31803/ UNS 32205)	DUPLEX SS (UNS 31803/ UNS 32205)	FLANGED AS PER ASME B16.47 R/F	--	1016	10.00	4	4	--	--	--	--	--	SCNRVs TO BE PROVIDED WITH HYDRAULIC DASHPOT ARRANGEMENT
													TOTAL		278	278	255	2				

NOTES

1. LEGENDS: MAN=MANUAL, MO=MOTORISED, GV=GATE VALVE, GLV=GLOBE VALVE, SC NRv= SWING CHECK NON RETURN VALVE , PLNRV= PISTON LIFT NON RETURN VALVE

2.+++ COMMISSIONING SPARES: a). ONE SET OF GLAND PACKING & BONNET GASKET FOR EACH GATE /GLOBE VALVE

b)ONE NO. OF COVER GASKET FOR SWING CHECK NON RETURN VALVE.

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

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

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

6.#: MATCHING PIPE, OD, THICKNESS ETC. SHALL BE INFORMED AS PER PROJECT SPECIFIC REQUIREMENT.

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-020-100-M001	
		SECTION : II	
		REV. NO.: 00	DATE: 05.09.2017
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MATERIAL OF CONSTRUCTION
DUPLEX SS(UNS31803/UNS32205) GATE/GLOBE VALVES

SERVICE: SEA WATER

SL.N O	PART NAME	MATERIAL REQUIRED
1	BODY	DUPLEX SS(UNS31803/UNS32205)
2	BONNET/YOKE	DUPLEX SS(UNS31803/UNS32205)
3	WEDGE	DUPLEX SS(UNS31803/UNS32205)
4	STEM, BACK SEAT	DUPLEX SS(UNS31803/UNS32205)
5	BODY SEAT RING, WEDGE/DISC SEAT RING	DUPLEX SS(UNS31803/UNS32205) (BODY SEAT RING TO STELLITED.
6	YOKE SLEEVE	SS-316L
7	GLAND PACKING	GRAFOIL
8	GLAND	SS-316L
9	GLAND FLANGE	SS-316L
10	BOLTS	STEEL(ASTM A193 Gr.B7)
11	NUTS	STEEL(ASTM A 194 Gr.2H)
12	HANDWHEEL	MALLEABLE IRON OR EQUIVALENT
13	STEM PROTECTION COVER	PVC (TRANSPARENT)
14	GASKET	SWG (GRAFOIL)
15	Name plate (For valve tag nos.)	SS316 (2 MM THICK)

NOTE: 1. THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS GIVEN AT
 SL. NO. 5,9 OF CATEGORY-A & 4,7,9,13 OF CATEGORY-B.
 2.MATERIALS FOR ITEMS NOT SPECIFIED ABOVE SHALL ALSO BE
 SUITABLE FOR SEA WATER APPLICATION.

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-020-100-M001	
		SECTION : II	
		REV. NO.: 00	DATE: 05.09.2017
		Sheet 4 of 11	

MATERIAL DATA SHEET
DUPLEX SS(UNS31803/UNS32205) NON RETURN VALVE

SERVICE: SEA WATER

SL.NO	PART NAME	MATERIAL (REQUIRED)
1	Body	DUPLEX SS(UNS31803/UNS32205)
2	Cover	DUPLEX SS(UNS31803/UNS32205)
3	Disc (Fully guided)	DUPLEX SS(UNS31803/UNS32205)
4	Disc nut/ washer	DUPLEX SS(UNS31803/UNS32205)
5	Body seat ring	DUPLEX SS(UNS31803/UNS32205)+ STELLITED
6	Gasket	SWG SS316 (GRAFOIL)
7	Bolts	ASTM A193 Gr. B7
8	Nuts	ASTM A 194 Gr.2H
9	Name plate (For valve tag nos.)	SS316 (2 mm Thick)

- NOTE: 1. THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS GIVEN AT
SL. NO. 18,20,22, 23 OF CATEGORY-B.
2. MATERIALS FOR ITEMS NOT SPECIFIED ABOVE SHALL ALSO BE
SUITABLE FOR SEA WATER APPLICATION.

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES		SPECIFICATION NO. PE-TS-020-100-M001
			SECTION : II
			REV. NO.: 00 DATE: 05.09.2017
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MATERIAL OF CONSTRUCTION
DUPLEX SS GATE/GLOBE VALVES

SERVICE: SEA WATER

SL.N O	PART NAME	MATERIAL REQUIRED
1	BODY	DUPLEX SS
2	BONNET/YOKE	DUPLEX SS
3	WEDGE	DUPLEX SS
4	STEM, BACK SEAT	DUPLEX SS
5	BODY SEAT RING, WEDGE/DISC SEAT RING	DUPLEX SS (BODY SEAT RING TO BE STELLITED)
6	YOKE SLEEVE	SS-316L
7	GLAND PACKING	GRAFOIL
8	GLAND	SS-316L
9	GLAND FLANGE	SS-316L
10	BOLTS	STEEL(ASTM A193 Gr.B7)
11	NUTS	STEEL(ASTM A 194 Gr.2H)
12	HANDWHEEL	MALLEABLE IRON OR EQUIVALENT
13	STEM PROTECTION COVER	PVC (TRANSPARENT)
14	GASKET	SWG (GRAFOIL)
15	Name plate	SS316 (2 MM THICK)

NOTE:

1. THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS GIVEN AT SL. No. 3,4 OF CATEGORY-A & SL. NO. 5,6,14,16 OF CATEGORY-B.
2. MATERIALS FOR ITEMS NOT SPECIFIED ABOVE SHALL ALSO BE SUITABLE FOR SEA WATER APPLICATION.
3. THE BIDDER SHALL CLEARLY SPECIFY THE GRADE OF DUPLEX SS MATERIAL CONSIDERED IN THE OFFER FOR THESE SL. Nos. ITEMS. THE BIDDER SHALL PROVIDE VALVES WITH SAME OR SUPERIOR GRADE DURING CONTRACT STAGE.
4. IF MATERIAL GRADE OFFERED FOR THESE SL. Nos. ITEMS ARE SAME AS SPECIFIED FOR ITEMS AT SL. Nos.1 TO 6 FOR SAME VALVE SIZE AND THE BIDDER QUOTES DIFFERENT PRICE FOR THESE VALVES, THE LOWER OF THE TWO SHALL BE CONSIDERED FOR THE ITEMS.

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES		SPECIFICATION NO. PE-TS-020-100-M001
			SECTION : II
			REV. NO.: 00 DATE: 05.09.2017
			Sheet 6 of 11

MATERIAL DATA SHEET
DUPLEX SS NON RETURN VALVE

SERVICE: SEA WATER

SL.NO	PART NAME	MATERIAL (REQUIRED)
1	Body	DUPLEX SS
2	Cover	DUPLEX SS
3	Disc (Fully guided)	DUPLEX SS
4	Disc nut/ washer	DUPLEX SS
5	Body seat ring	DUPLEX SS+ STELLITED
6	Gasket	SWG SS316 (GRAFOIL)
7	Bolts	ASTM A193 Gr. B7
8	Nuts	ASTM A 194 Gr.2H
9	Name plate (For valve tag nos.)	SS316 (2 mm Thick)

NOTE:

1. THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEM GIVEN AT SL. No. 12 OF CATEGORY-A.
2. MATERIALS FOR ITEMS NOT SPECIFIED ABOVE SHALL ALSO BE SUITABLE FOR SEA WATER APPLICATION.
3. THE BIDDER SHALL CLEARLY SPECIFY THE GRADE OF DUPLEX SS MATERIAL CONSIDERED IN THE OFFER FOR THIS SL. NO. ITEM. THE BIDDER SHALL PROVIDE VALVES WITH SAME OR SUPERIOR GRADE DURING CONTRACT STAGE.

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-020-100-M001	
		SECTION : II	
		REV. NO.: 00	DATE: 05.09.2017
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MATERIAL DATA SHEET
(FORGED CARBON STEEL GATE/ GLOBE HOSE VALVE)

SERVICE: WATER

SL.NO	PART NAME	MATERIAL REQUIRED
1	BODY	FCS as per ASTM A 105
2	BONNET/YOKE/CAP, CHAIN	FCS as per ASTM A 105
3	WEDGE	FCS as per ASTM A 105
4	STEM, BACK SEAT	13 % Cr. SS as per ASTM A182 Gr.F6a (BACK SEAT STELLITE)
5	BODY SEAT RING, WEDGE SEAT RING (SCREWED)	13 % Cr. SS as per ASTM A182 Gr.F6a + STELLITE
6	GLOBE VALVE DISC	13 % Cr. SS as per ASTM A182 Gr.F6a + STELLITE
7	DISC HOLDER FOR GLOBE VALVE	13 % Cr. SS as per ASTM A182 Gr.F6a
8	YOKE SLEEVE	ASTM A439 Gr. D2/ AISI 316
9	GLAND PACKING	GRAPHITE WITH NON ASBESTOS FIBRE
10	GLAND	ASTM A276 T-410
11	GLAND FLANGE	FCS as per ASTM A 105
12	COVER & CHAIN (HOSE VALVE)	FCS as per ASTM A 105+ CHAIN CARBON STEEL
13	INDICATOR & INDICATING SCALE WITH FITTINGS	AISI316
14	BOLTS	ASTM A193 Gr. B7
15	NUTS	ASTM A 194 Gr.2H
16	HANDWHEEL	MALLEABLE IRON
17	STEM PROTECTION COVER	PVC(TRANSPARENT)
18	GASKET(CAP)	NATURAL RUBBER
19	PAINTING	PAINTING SHALL BE AS PER CLAUSE NO.11 OF TECH. SPEC.PE-TS-020-100-M001

NOTE: THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS GIVEN AT SL.
 No. 1 & 2 OF CATEGORY-A.

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES		SPECIFICATION NO. PE-TS-020-100-M001
			SECTION : II
			REV. NO.: 00 DATE: 05.09.2017
			Sheet 8 of 11

MATERIAL DATA SHEET
(FORGED STAINLESS STEEL GLOBE VALVE)

SERVICE: SEA WATER

SL.N O	PART NAME	MATERIAL REQUIRED
1	BODY	ASTM A182 Gr.F316L
2	BONNET/YOKE	ASTM A182 Gr.F316L (BOLTED)
3	BODY SEAT RING (SCREWED)	ASTM A182 Gr.F316L + STELLITE
4	STEM, BACK SEAT	ASTMA 182 Gr.F316L (BACK SEAT STELLITE)
5	DISC (CONICAL/TAPER PLUG)	ASTM A182 Gr.F316L + STELLITE
6	DISC HOLDER FOR GLOBE VALVE	ASTM A182 Gr.F316L + STELLITE
7	YOKE SLEEVE	ASTM A182 Gr.F316L
8	GLAND PACKING	GRAFOIL
9	GLAND	AISI 316L
10	GLAND FLANGE	AISI316L
11	INDICATOR & INDICATING SCALE WITH FITTINGS	AISI316L
12	BOLTS	ASTM A193 Gr.B7
13	NUTS	ASTM A 194 Gr.2H
14	HANDWHEEL	MALLEABLE IRON OR EQUIVALENT
15	STEM PROTECTION COVER	PVC (TRANSPARENT)
16	GASKET	SWG (GRAFOIL)
17	Name plate (For valve tag nos.)	SS316 (2 MM THICK)
18	Painting details	No painting needs to be done as these are stainless steel body valves

- NOTE: 1. THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS GIVEN AT
 SL. No.6,7,8,10 OF CATEGORY-A.
2. MATERIALS FOR ITEMS NOT SPECIFIED ABOVE SHALL ALSO BE
 SUITABLE FOR SEA WATER APPLICATION.

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-020-100-M001	
		SECTION : II	
		REV. NO.: 00	DATE: 05.09.2017
		Sheet 9 of 11	

MATERIAL DATA SHEET
FORGED STAINLESS STEEL NON RETURN VALVE

SERVICE: SEA WATER

SL.NO	PART NAME	MATERIAL (REQUIRED)
1.	Body	ASTM A182 Gr.F316L
2.	Cover	ASTM A182 Gr.F316L
3.	Disc (Fully guided)	ASTM A182 Gr.F316L +STELLITE
4.	Disc nut/ washer	ASTM A182 Gr. F316L
5.	Body seat ring	ASTM A182 Gr. F316L+STELLITE
6.	Gasket	SWG SS316 (GRAFOIL)
7.	Bolts	ASTM A193 Gr.B7
8.	Nuts	ASTM A 194 Gr.2H
9.	Name plate	SS316 (2 mm Thick)
10.	Painting details	No painting needs to be done as these are stainless steel body valves

- NOTE: 1. THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS GIVEN AT SL. No. 11 OF CATEGORY-A.
2. MATERIALS FOR ITEMS NOT SPECIFIED ABOVE SHALL ALSO BE SUITABLE FOR SEA WATER APPLICATION.

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-020-100-M001	
		SECTION : II	
		REV. NO.: 00	DATE: 05.09.2017
		Sheet 10 of 11	

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

SERVICE: SEA WATER

SL.NO	PART NAME	MATERIAL REQUIRED
1	BODY	EQUIVALENT CAST GRADE OF SS316L
2	BONNET/YOKE	EQUIVALENT CAST GRADE OF SS316L
3	WEDGE	EQUIVALENT CAST GRADE OF SS316L
4	STEM, BACK SEAT	ASTM A 479 TYPE 316L
5	BODY SEAT RING, WEDGE SEAT RING	ASTM A 479 TYPE 316L
6	YOKE SLEEVE	ASTM A 479 TYPE 316L
7	GLAND PACKING	GRAFOIL
8	GLAND	ASTM A 479 TYPE 316L
9	GLAND FLANGE	ASTM A 479 TYPE 316L
10	BOLTS	ASTM A193 Gr.B7
11	NUTS	ASTM A 194 Gr.2H
12	HANDWHEEL	MALLEABLE IRON OR EQUIVALENT
13	STEM PROTECTION COVER	PVC (TRANSPARENT)
14	GASKET	SWG (GRAFOIL)
15	Name plate	SS316 (2 MM THICK)

- NOTE: 1. THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS GIVEN AT SL. NO. 1,2,3,8,10,11,12,15,17 OF CATEGORY-B.
2. MATERIALS FOR ITEMS NOT SPECIFIED ABOVE SHALL ALSO BE SUITABLE FOR SEA WATER APPLICATION.

	DATA SHEET-A STEEL GATE, GLOBE AND NON RETURN VALVES		SPECIFICATION NO. PE-TS-020-100-M001
			SECTION : II
			REV. NO.: 00 DATE: 05.09.2017
			Sheet 11 of 11

MATERIAL DATA SHEET
CASTE STAINLESS STEEL NON RETURN VALVE

SERVICE: SEA WATER

<u>SL.NO</u>	<u>PART NAME</u>	<u>MATERIAL (REQUIRED)</u>
11.	Body	EQUIVALENT CAST GRADE OF SS316L
12.	Cover	EQUIVALENT CAST GRADE OF SS316L
13.	Disc (Fully guided)	EQUIVALENT CAST GRADE OF SS316L +STELLITE
14.	Disc nut/ washer	EQUIVALENT CAST GRADE OF SS316L
15.	Body seat ring	EQUIVALENT CAST GRADE OF SS316L +STELLITE
16.	Gasket	SWG SS316 (GRAFOIL)
17.	Bolts	ASTM A193 Gr.B7
18.	Nuts	ASTM A 194 Gr.2H
19.	Name plate	SS316 (2 mm Thick)
20.	Painting details	No painting needs to be done as these are stainless steel body valves

- NOTE: 1. THIS MATERIAL DATA SHEET IS APPLICABLE FOR ITEMS GIVEN AT
SL. No. 19 & 21 OF CATEGORY-B.
2. MATERIALS FOR ITEMS NOT SPECIFIED ABOVE SHALL ALSO BE
SUITABLE FOR SEA WATER APPLICATION.

	TECHNICAL SPECIFICATION STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-020-100-M001	
		SECTION: II	
		REV. NO.: 00	DATE: 05.09.2017
		SHEET 1 OF 1	

SECTION-II

(QUALITY PLAN)

		QUALITY PLAN		CUSTOMER:..		PROJECT: FRAMEWORK AGREEMENT		SPEC. NO.: PE-TS-020-100-M001	
				VENDOR:		QP NO. PE-QP-020-100-M004A		REV.0 DT.06.09.17	
		SHEET 1 OF 3		SYSTEM : LP PIPING (WATER SYSTEM)		ITEM: FORGED SS/DUPLEX SS GATE, GLOBE VALVE/HOSE VALVE(FCS) SIZE 25 TO 50 NB CL. 800, MANUAL/ MOTORISED		SECTION VOLUME	
COMPONENT/ OPERATION		CHARACTERISTICS CHECKED		CAT E- GO RY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD
S.N O.								AGENCY	REMARKS
								P W V	

[illegible]

BHEL	PARTICULARS	BIDDER/VENDOR
Grand for moneys	NAME	
	SIGNATURE	
	DATE	
	BIDDER'S/ VENDOR'S COMPANY SEAL	

		QUALITY PLAN SHEET 2 OF 3		CUSTOMER:..		PROJECT: FRAMEWORK AGREEMENT		SPEC. NO : PE-TS-020-100-M001		
				VENDOR:		QP NO PE-QP-020-100-M004A REV.0 DT.06.09.17		SPEC. TITLE:		
		SYSTEM : LP PIPING (WATER SYSTEM)				ITEM: FORGED SS/DUPLEX SS GATE, GLOBE VALVE/HOSE VALVE(FCS) SIZE 25 TO 50 NB CL. 800, MANUAL/ MOTORIZED		SECTION VOLUME		
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CAT E- GO RY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P W V	REMARKS

2.0	SS/ STELLITE DEPOSIT ON DISC & BODY SEAT	1. SURFACE DEFECTS	CR	PT	100%	ASME B16.34 & APPD DRG.	ANSI B16.34 & TECH SPEC. APP DRG./ANSI B16.34	TEST CERT.	2	2	1	
3.0	IN-PROCESS INSPECTION											
3.1	MACHINING OF ALL COMPONENTS	1. DIMENSIONS, WORKMANSHIP AND FINISH 2. SURFACE & SUB SURFACE DEFECTS	MA	MEAS., VISUAL	100%	MFG. DRG.	MFG. DRG.	LOG BOOK	2	-	-	
3.2	DISC & SEAT RING	1. LAPPING	CR	BLUE MATCHING	100%	ASME B16.34 AND TECH SPEC.	ASME B16.34 AND TECH SPEC.	-DO-	2	2	-	
4.0	TESTING							INSPN. REPORT	2	2	-	
4.1	BODY, SEAT, BACK SEAT	1. LEAK TIGHTNESS OF BODY 2. LEAK TIGHTNESS OF BACK SEAT AND SEAT 3. LEAK TIGHTNESS OF SEAT	CR	HYDRAULIC TEST	100% *	APPD. DRG./ TECH. SPEC.	NO LEAKAGE	INSPN REPORT	2	2.1	-	
4.2	SEAT & BACK SEAT FOR MOTORIZED PNEU. VALVES WITH ACTUATOR	1. LEAK TIGHTNESS OF SEAT	CR	HYDRAULIC SEAT	100% *	APPD. DRG./TECH. SPEC.	LEAKAGE PERMISSIBLE AS PER API 596	-DO-	2	2.1	-	
4.3	OPERATIONAL TESTING	1. SMOOTH & FULL OPENING AND CLOSING	CR	MANUAL	100% *	TECH. SPEC.	SMOOTH OPERATION OF VALVES & CLEAR BORE	INSPN. REPORT	2	2.1	-	

BHEL <i>Gandhi Kr. more</i> <i>B. G.</i> 8.9.17	PARTICULARS	BIDDER/VENDOR
	NAME	
	SIGNATURE	
	DATE	BIDDER'S/ VENDOR'S COMPANY SEAL

	QUALITY PLAN		CUSTOMER: ..		PROJECT: FRAMEWORK AGREEMENT		SPEC. NO.: PE-TS-020-100-M001			
	SHEET 3 OF 3		VENDOR:		QP NO: PE-QP-020-100-M004A REV.0 DT: 06.09.17		SPEC. TITLE:			
	CHARACTERISTICS CHECKED		SYSTEM : LP PIPING (WATER SYSTEM)		ITEM: FORGED SS/DUPLEX SS GATE, GLOBE VALVE/HOSE VALVE(FCS) SIZE 25 TO 50 NB CL. 800, MANUAL/ MOTORISED		SECTION VOLUME			
S.N O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CAT E- GO RY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P W V	REMARKS

2. MOTOR OPERATED VALVES	1. ASCENDING & DESCENDING LIFT CHARACTERISTIC	CR	ELECTRICAL	100% *	APPD. DRG./TECH. SPEC./IS9334	APPD. DRG./TECH. SPEC./IS9334	INSPN. REPORT	2	2,1	-	
	2. LIMIT/TORQUE SWITCH SETTING FOR OPENING AND CLOSING TIME	CR	ELECTRICAL	100% *	APPD. DRG./TECH. SPEC./IS9334	APPD. DRG./TECH. SPEC./IS9334	INSPN. REPORT	2	2,1	-	
5.0	COMPLETE VALVES	MA	MEAS	SAMPLE	APPD. DRG.	APP. DRG.	-DO-	2	2,1	-	
6.0	END CONNECTION DETAILS	MA	MEAS.	100%	APPD. DRG. / RELV. STD	APPD. DRG. /	-DO-	2	2,1	-	
7.0	FINAL INSPECTION	MA	VISUAL	100%	APPD. DRG./TECH. SPEC.	APPD. DRG./TECH. SPEC	INSPN. REPORT	2	2	-	
8.0	PAINTING	MI	VISUAL	100%	TECH. SPEC.	TECH. SPEC.	-DO-	3/2	2	2,1	APPLICABLE FOR FCS HOSE VALVE.
		MI	MEASUREMENT	100%	-DO-	-DO-	-DO-	3/2	2	1	
9.0	PACKING	MA	VISUAL	100%	AS PER TECH. SPEC	AS PER BHEL TECH. SPEC	SOFT COPY OF PHOTOGRAPH	2	2	-	PHOTOGRAPH OF WOODEN CASES HAVING DULY PACKED VALVES TO BE FURNISHED TO BHEL-PEM FOR VERIFICATION TO OBTAIN MDCC.

ABBREVIATIONS

CR = CRITICAL CHARACTERISTIC P = PERFORMED BY W = WITNESSED BY V = VERIFIED BY
 1 = PURCHASER (BHEL)/TPI 2 = VENDOR
 MI = MINOR CHARACTERISTIC PT = PENETRANT TEST TPI: THIRD PARTY INSPECTOR MA = MAJOR CHARACTERISTIC

NOTE: A) IN CASE OF FOREIGN BIDDER, ALL TEST CERTIFICATE SHALL BE FURNISHED BY THE VENDOR DULY WITNESSED/ VERIFIED BY VENDOR'S TPI.

* 10% OR MIN. 2 Nos. AT RANDOM BY BHEL/CUSTOMER & 100% BY VENDOR FOR EACH TYPE, SIZE & RATING.

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

QUALITY PLAN				CUSTOMER:		PROJECT: FRAMEWORK AGREEMENT		SPEC. NO. : PE-TS-020-100-M001		
SHEET 1 OF 4				BIDDER/VENDOR:		QP NO. PE-QP-020-100-M004B		REV. 0, DT. 06.09.17		
SYSTEM: LP PIPING (WATER SYSTEM)				ITEM: DUPLEX SS/ CSS GATE/ GLOBE VALVE		SECTION		VOLUME		
S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE- GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P W V	REMARKS
1.0	MATERIALS		MA	PHYS, CHEM. TESTS	ONE/ HEAT	APPD. DRG./ TECH. SPEC.	APPD. DRG./ TECH. SPEC.	TEST CERT.		CORRELATION REQD. FOR BODY BONNET,
1.1	BODY, BONNET, YOKE, WEDGE/DISC, SEAT, SPINDLE, BODY SEAT, BACK SEAT, THRUST PLATE	1. PHYS, CHEM, PROPS	MA	REVIEW OF H.T. RECORDS	100%	-DO-	-DO-	H.T. INTERNAL INSPN RECORDS INSPN. REPORT	3/2	1
		2. HEAT TREATMENT	MA	VISUAL	100%	MSS-SP-55	MSS-SP-55		3/2	2
		3. SURFACE DEFECTS	MA						3/2	1
1.2	a) CASTINGS		CR	PT	100%	ANSI B16.34 AND TECH. SPEC.	ANSI B16.34 AND TECH. SPEC.	INSPN REPORT	3/2	2
	BODY, BONNET & DISC/ WEDGE	1. SURFACE DEFECTS	CR	RT/UT	100%	ANSI B16.34 AND TECH. SPEC.	ANSI B16.34 AND TECH. SPEC.	INSPN REPORT	3/2	1
		2. SUB-SURFACE DEFECTS	CR	1. PT	100%	ANSI B16.34 AND TECH. SPEC.	ANSI B16.34 AND TECH. SPEC.	INSPN REPORT	3/2	2
		b) FORGINGS								
		1) SURFACE DEFECTS	CR	2. UT	100%	-DO-	-DO-	-DO-	3/2	1
		2) SUB-SURFACE DEFECTS	CR						3	1, 2
1.3	ACTUATORS		MA	MECH., ELEC. TESTS	100%	TECH. SPEC./ APPD. DRG./ DATA SHEET/ IS:9334	APPD. DRG./ DATA SHEET/ IS:9334	INSPN. REPORT		
	1. ELECTRIC ACTUATORS	1. TORQUE TESTING & SETTING OF TORQUE SWITCH	MA							
		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							
BHEL				PARTICULARS		BIDDER/VENDOR				
Garival Kar. munge				NAME						
				SIGNATURE						
6.9.17				DATE						
						BIDDER'S/ VENDOR'S COMPANY SEAL				

		QUALITY PLAN SHEET 2 OF 4		CUSTOMER:		PROJECT: FRAMEWORK AGREEMENT		SPEC. NO.: PE-TS-020-100-M001	
				BIDDER/VENDOR:		QP NO. PE-QP-020-100-M004B		REV. 0, DT. 06.09.17	
S.N.O.		COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE- GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	ITEM: DUPLEX SS/ CSS GATE/ GLOBE VALVE (ABOVE 50NB SIZE)	AGENCY	REMARKS
								P	W
								V	

S.N.O.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE- GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	1/ TYPE	TECH. SPEC./ APPD. DRG./ DATA SHEET/ IS-9334	APPD. DRG./ DATA SHEET/ IS-9334	3RD PARTY TEST CERT.	3	2	1	2,1
7. IR, HV, IR			MA	WATER, DUST TEST	100%	100%	ASTME:165 & TECH. SPEC. APP. DRG.	ANSI B16.34 & TECH. SPEC. APP. DRG./ ANSI B16.34	-DO-	3	2	1	2,1
8. DEGREE OF PROTECTION			MA	TYPE TEST	100%	100%	IS-9334	-DO-	TEST INSPN REPORT	3	2	1	2,1
9. DESIGN VERIFICATION			MA	TYPE TEST	100%	100%	IS-9334	-DO-	TEST INSPN REPORT	3	2	1	2,1
2.0	SS/ STELLITE DEPOSIT ON DISC & BODY SEAT, BACK SEAT	1. SURFACE DEFECTS	CR	PT	100%	100%	ASTME:165 & TECH. SPEC. APP. DRG.	ANSI B16.34 & TECH. SPEC. APP. DRG./ ANSI B16.34	-DO-	3/2	2	1	2,1
3.0	IN-PROCESS INSPECTION	2. HARDNESS	MA	TESTING	100%	100%	MFG. DRG.	MFG. DRG.	LOG BOOK	3/2	2	1	2,1
3.1	MACHINING OF ALL COMPONENTS INCLUDING BW ENDS	1. DIMENSIONS, WORKMANSHIP AND FINISH	MA	MEAS., VISUAL	100%	100%	ANSI B16.34 AND TECH. SPEC./	ANSI B16.34 AND TECH. SPEC.	-DO-	3/2	2	1	2,1
		2. SURFACE & SUB- SURFACE DEFECTS	CR	1. PT 2. MPI (ACCESSIBLE AREA OF BODY & BONNET)	100%	100%	ANSI B16.34 AND TECH. SPEC./	ANSI B16.34 AND TECH. SPEC.	-DO-	3/2	2	1	2,1
		3. SUB SURFACE DEFECTS (SPINDLE, BODY / DISCS SEAT RING)	CR	UT	100%	100%	ANSI B16.34 AND TECH. SPEC./	ANSI B16.34 AND TECH. SPEC.	-DO-	3/2	2	1	2,1
3.2	WEDGE/DISC & SEAT RING, SPINDLE AND BACK SEAT	1. LAPPING	CR	BLUE MATCHING	100%	100%	UNIFORM METAL TO METAL CONTACT	UNIFORM METAL TO METAL CONTACT	INSPN. REPORT	3/2	2	1	2,1
4.0	ASSEMBLY	1. DIMENSIONS	MA	MEAS.	100%	100%	APPD. DRG.	APPD. DRG.	-DO-	3/2	2,1	-	-
		2. WEAR TRAVEL	MA	MEAS.	100%	100%	-DO-	-DO-	-DO-	3/2	2,1	-	-
		3. VALVE LIFT	MA	MEAS.	100%	100%	-DO-	-DO-	-DO-	3/2	2,1	-	-
5.0	TESTING	1. LEAK TIGHTNESS OF BODY	CR	HYDRAULIC TEST	100%	100%	APPD. DRG./ TECH. SPEC.	APPD. DRG./ TECH. SPEC.	INSPN REPORT	3/2	2,1	-	-
5.1	BODY, SEAT, BACK SEAT												

BHEL		PARTICULARS		BIDDER/VENDOR	
Ground v. moye		NAME			
		SIGNATURE			
6.9.17		DATE			
				BIDDER'S/ VENDOR'S COMPANY SEAL	

		QUALITY PLAN		CUSTOMER:		PROJECT: FRAMEWORK AGREEMENT		SPEC. NO.: PE-TS-020-100-M001			
				BIDDER/VENDOR:		QP NO. PE-QP-020-100-M004B		REV. 0, DT. 06.09.17		SPEC. TITLE	
SHEET 3 OF 4		CHARACTERISTICS CHECKED		SYSTEM: LP PIPING (WATER SYSTEM)		ITEM: DUPLEX SS/ CSS GATE/ GLOBE VALVE (ABOVE 50NB SIZE)		SECTION		VOLUME	
S.NO.	COMPONENT/ OPERATION	CATE- GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	P	W	V	REMARKS

5.2	SEAT & BACK SEAT FOR MOTORISED/ PNEU. VALVES WITH ACTUATOR OPERATIONAL TESTING	CR	HYDRAULIC TEST	100%	APPD. DRG./ TECH. SPEC.	LEAKAGE PERMISSIBLE AS PER API 598	-DO--	3/2	2,1	-	
5.3	1. MANUALLY OPERATED VALVES	CR	PNEUMATIC TEST	100%	-DO	-DO-	-DO-	3/2	2,1	-	
	1. SMOOTH & FULL OPENING AND CLOSING	CR	MANUAL	100%	TECH. SPEC.	SMOOTH OPERATION OF VALVES & CLEAR BORE	INSPN. REPORT	3/2	2,1	-	
	2. MOTOR OPERATED VALVES	CR	ELEC.	100%	APP. DRG./ TECH. SPEC./ IS-9334	APP. DRG./ TECH. SPEC./ APPD.DRG	INSPN. REPORT	3/2	2,1	-	
6.0	COMPLETE VALVES	MA	MEASUREMENT	SAMPLE	APPD.DRG	APP. DRG./ TECH. SPEC./ IS-9334	-DO-	3/2	2,1	-	
7.0	END CONNECTION DETAILS	MA	MEASUREMENT	100%	APPD. DRG./ RELV. STD	APPD. DRG./ RELV. STD	-DO-	3/2	2,1	-	
8.0	FINAL INSPECTION	MA	VISUAL	100%	APPD. DRG./ TECH. SPEC.	APPD. DRG./ TECH. SPEC.	INSPN. REPORT	3/2	2	2,1	
9.0	PAINTING	MI	VISUAL	100%	TECH. SPEC.	TECH. SPEC.	-DO-	3/2	2	2,1	NOT APPLICABLE FOR SS & DSS VALVES
10.0	PACKING	MA	VISUAL	100%	-DO-	-DO-	-DO-	3/2	2	1	
					AS PER BHEL TECH. SPEC	AS PER BHEL TECH. SPEC	SOFT COPY OF PHOTO GRAPH	3/2	-	2,1	PHOTOGRAPH OF WOODEN CASES HAVING DULY PACKED VALVES TO BE FURNISHED TO BHEL-PEM FOR VERIFICATION TO OBTAIN MDCC

BHEL		PARTICULARS		BIDDER/VENDOR	
		NAME			
		SIGNATURE			
		DATE			
6.9.17				BIDDER'S/ VENDOR'S COMPANY SEAL	

		QUALITY PLAN		CUSTOMER:		PROJECT: FRAMEWORK AGREEMENT		SPEC. NO. : PE-TS-020-100-M001	
				BIDDER/VENDOR:		QP NO. PE-QP-020-100-M004B		REV. 0, DT. 06.09.17	
SHEET 4 OF 4		CHARACTERISTICS CHECKED		SYSTEM: LP PIPING (WATER SYSTEM)		ITEM: DUPLEX SS/ CSS GATE/ GLOBE VALVE (ABOVE 50NB SIZE)		SECTION VOLUME	
S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE- GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P W V
REMARKS									

ABBREVIATIONS

CR = CRITICAL CHARACTERISTIC P = PERFORMED BY W = WITNESSED BY V = VERIFIED BY
MA = MAJOR CHARACTERISTIC 1 = PURCHASER (BHEL)/TPI 2 = VENDOR 3 = SUB VENDOR OF THE VENDOR
MI = MINOR CHARACTERISTIC

PT= PENETRANT TEST, UT= ULTRASONIC TEST, RT= RADIOGRAPHIC TEST MPI=MAGNETIC PARTICAL INSPECTION TPI= THIRD PARTY INSPECTOR.

NOTE: -

A) IN CASE OF FOREIGN BIDDER, ALL TEST CERTIFICATE SHALL BE FURNISHED BY THE VENDOR DULY WITNESSED/ VERIFIED BY VENDOR'S TPI.

BHEL <i>Sandeep K. Mune</i> <i>S.K.</i> 6.9.17	PARTICULARS		BIDDER/VENDOR
	NAME		
	SIGNATURE		
	DATE		
			BIDDER'S/ VENDOR'S COMPANY SEAL

QUALITY PLAN				CUSTOMER:		PROJECT: FRAMEWORK AGREEMENT				SPEC. NO : PE-TS-020-100-M001			
				VENDOR:		QP NO: PE-QP-020-100-M005A				REV.0, DT. 06.09.17			
SHEET 1 OF 2		SYSTEM: LP PIPING (WATER SYSTEM)		ITEM: FORGED SS/DUPLEX SS NON RETURN VALVES SIZE 25 TO 50 NB CLASS 800				SECTION		VOLUME			
S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE- GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	P	W	V	REMARKS
1.0	MATERIALS	1. PHYSICAL, CHEMICAL PROPS.	MA	PHYS.CHEM. TESTS	1/HEAT	APPD. DRG./ TECH. SPEC.	APPD. DRG./ TECH. SPEC	T.C.	-	2	1		CORRELATION REQD. FOR BODY & COVER.
1.1		2. HEAT TREATMENT	MA	REVIEW OF HT	100%	-DO-	-DO-	T.C RECORDS	-	2	2		SOLUTION ANNEALING FOR DSS & SS VALVES.
1.2	BODY, COVER & DISC	1. SURFACE DEFECTS	CR	PT	100%	ANSI B16.34/ TECH. SPEC.	ANSI B16.34/ TECH. SPEC.	INSPN REPORT	2	2	1		
2.0	IN PROCESS												
2.1	SS/STELLITE DEPO-SIT ON BODY SEAT RING, DISC/SEAT	1.SURFACE DEFECTS	CR	PENETRANT TEST	100%	ASTME-165	NO DEFECTS	TEST CERT.	2	2	1		
2.2	MACHINING OF ALL COMPONENTS	1.DIMENSIONS	MA	MEASUREMENT	100%	MFG.DRG.	MFG.DRG.	LOG BOOK	2	2	-		
		2.SURFACE & SUB-SURFACE DEFECTS	CR	PT	100%	ASTME-165	NO DEFECTS	INSPN. REPORT	2	2	-		
2.3	DISC. AND BODY SEAT RING ASSEMBLY	1. LAPPING	CR	BLUE MATCHING	100%	UNIFORM METAL TO METAL CONTACT	APPD. DRG. / TECH.SPEC.	TEST CERT.	2	2	-		
3.0	TESTING BODY	1. DIMENSIONS (overall dimensions)	MA	MEASUREMENT	100%	APPD. DRG. / TECH.SPEC.	APPD. DRG. / TECH.SPEC.	INSPN. REPORT	2	2			
4.0	SEAT	1. LEAK TIGHTNESS	CR	HYDRAULIC TEST	100%*	APPD. DRG. / TECH.SPEC.	NO LEAKAGE	TEST CERT.	2	2,1	-		
4.1		1. LEAK TIGHTNESS	CR	HYDRAULIC TEST	100%*	-DO-	-DO-	-DO-	2	2,1	-		
4.2		1. DIMENSIONS, VALVE TAG NOS	MA	MEASUREMENT/ VISUAL	100%*	APPD. DRG. / RELEVANT STANDARD	APPD. DRG. / RELEVANT STANDARD	-DO-	2	2,1	-		
5.0	END CONNECTION DETAILS												
6.0	PACKING	1. AS PER BHEL TECH. SPEC.	MA	VISUAL	100%	-DO-	-DO-	SOFT COPY OF PHOTOGRA PH	2	2	-		PHOTOGRAPH OF WOODEN CASES HAVING DULY PACKED VALVES TO BE FURNISHED TO BHEL-PEM FOR VERIFICATION TO OBTAIN MDCC.

BHEL	PARTICULARS	BIDDER/VENDOR
Ground for movie 	NAME	
	SIGNATURE	
	DATE	
		BIDDER'S/ VENDOR'S COMPANY SEAL

QUALITY PLAN			CUSTOMER:		PROJECT: FRAMEWORK AGREEMENT			SPEC. NO. : PE-TS-020-100-M001			
SHEET 1 OF 2			BIDDER/VENDOR:		QP NO: PE-QP-020-100-M005B			REV.0, DT.06.09.17			
SYSTEM: LP PIPING (WATER SYSTEM)			ITEM: DUPLES SS/CSS NON RETURN VALVES (ABOVE 50NB SIZE)			SECTION VOLUME					
S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE- GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P W V	REMARKS	
1.0	MATERIALS										
1.1	BODY, COVER, BODY, SEAT RING, DISC, HINGE, HINGE PIN	1. PHYSICAL, CHEMICAL PROPS. 2. HEAT TREATMENT 3. SURFACE DEFECTS	MA	PHYS. CHEM. TESTS	1/HEAT	APPD. DRG./ TECH. SPEC.	APPD. DRG./ TECH. SPEC	T.C.	3/2	1	CORRELATION REQD. FOR BODY & COVER. SOLUTION ANNEALING FOR STAINLESS STEEL
1.2	BODY, COVER, HINGE & DISC	a) CASTINGS 1. SUB-SURFACE DEFECTS	CR	REVIEW OF HT CHART RECORDS VISUAL RT / UT	100%	-DO- MSS-SP-55 ANSI B-16.34/ TECH. SPEC.	-DO- MSS-SP-55 ANSI B-16.34/ TECH. SPEC.	HT INTERNAL INSPN. RECORDS INSPN. REPORT T.C.	3/2	2 2 2 2	RT ON CHANGE OF SECTION (RT FILM REVIEW BY BHEL)
2.0	IN PROCESS										
2.1	SS/STELLITE DEPO-SIT ON BODY SEAT RING, DISC/SEAT	2. SURFACE DEFECTS b) FORGINGS 1. SURFACE DEFECTS 2. SUB-SURFACE DEFECTS	CR	PT 1. PT 2. UT	100%	ASTME 165/ ASTME 709. ANSI B16.34/ TECH. SPEC. -DO-	-DO- ASTME 165/ ASTME 709. ANSI B16.34/ TECH. SPEC. -DO-	T.C. INSPN REPORT -DO-	3/2	1 1 1	
2.2	MACHINING OF ALL COMPONENTS INCLUDING BW ENDS	1. SURFACE DEFECTS 2. HARDNESS	CR	PENETRANT TEST MEASUREMENT	100%	ASTME-165 APPD. DRG	NO DEFECTS APPD. DRG/ ANSI B16.34	TEST CERT. TEST CERT.	3/2	1 1	
2.3	DISC. AND BODY SEAT RING	1. DIMENSIONS 2. SURFACE & SUB-SURFACE DEFECTS 3. SUB SURFACE DEFECTS (HINGE PIN, BODY & DISC SEAT RINGS)	MA CR CR	MEASUREMENT 1. PT 2. MPI (ACCESSIBLE AREA OF BODY & BONNET) UT	100%	MFG.DRG. ASTME-165 ANSI B16.34 AND TECH. SPEC./	MFG.DRG. NO DEFECTS ANSI B16.34 AND TECH. SPEC./	LOG BOOK INSPN. REPORT TEST CERT.	3/2	- 2 2	1. IF DIATHK IS EQUAL OR GREATER THAN 40 mm. 2. IF DIATHK IS LESS THAN 40 mm. THICKNESS EQUAL OR GREATER THAN 25 MM
2.3	DISC. AND BODY SEAT RING	1. LAPPING	CR	BLUE MATCHING	100%	UNIFORM METAL TO METAL CONTACT	TEST CERT.	TEST CERT.	3/2	--	2,1
BHEL											
PARTICULARS											
NAME											
SIGNATURE											
DATE											
BIDDER/VENDOR'S COMPANY SEAL											

QUALITY PLAN				CUSTOMER:		PROJECT: FRAMEWORK AGREEMENT		SPEC. NO. PE-TS-020-100-M001	
SHEET 2 OF 2				BIDDER/VENDOR:		QP NO: PE-QP-020-100-M005B REV.0, DT: 06.09.17		SPEC. TITLE	
SYSTEM: LP PIPING (WATER SYSTEM)				ITEM: DUPLES SS/CSS NON RETURN VALVES (ABOVE 50NB SIZE)		REFERENCE DOCUMENT		ACCEPTANCE NORMS	
S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE- GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	APPD. DRG. / TECH.SPEC.	APPD. DRG. / TECH.SPEC.	INSPN. REPORT	AGENCY
									P W V
3.0	ASSEMBLY	1. DIMENSIONS	MA	1. MEASUREMENT	100%	APPD. DRG. / TECH.SPEC.	APPD. DRG. / TECH.SPEC.	INSPN. REPORT	2
4.0	TESTING	1. LEAK TIGHTNESS	CR	HYDRAULIC TEST	100%	APPD. DRG. / TECH.SPEC.	NO LEAKAGE	TEST CERT.	-
4.1	BODY								2,1
4.2	SEAT	1. LEAK TIGHTNESS	CR	HYDRAULIC TEST 1. AT SPECIFIED PRESSURE 2. AT 25% OF SEAT TEST PRESSURE	100%	APPD. DRG. / TECH.SPEC.	-DO-	-DO-	2,1
4.3	COMPLETE VALVE	PERFORMANCE	CR	TEST PRESSURE OPERATION OF FLAP	100%	TECH. SPEC.	TECH. SPEC.	INSPN. REPORT	2,1
5.0	END CONNECTION DETAILS	1. DIMENSIONS, VALVE TAG NOS	MA	MEASUREMENT/ VISUAL	100%	APPD. DRG. / RELEVANT STANDARD TECH. SPEC.	APPD. DRG. / RELEVANT STANDARD TECH. SPEC.	INSPN. REPORT -DO-	2,1
6.0	PAINTING	1. QUALITY AND THICKNESS OF PAINT	MA	VISUAL AND MEASUREMENT	100%	TECH. SPEC.	TECH. SPEC.	T.C.	2
7.0	PACKING	1. AS PER BHEL TECH. SPEC.	MA	VISUAL	100%	-DO-	-DO-	SOFT COPY OF PHOTOGRAPH	--
									1
									2,1
									NOT APPLICABLE FOR SS& DSS VALVE
									PHOTOGRAPH OF WOODEN CASES HAVING DULY PACKED VALVES TO BE FURNISHED TO BHEL-PEM FOR VERIFICATION TO OBTAIN MDCC.

ABBREVIATIONS

CR = CRITICAL CHARACTERISTIC P = PERFORMED BY W = WITNESSED BY V = VERIFIED BY
MA = MAJOR CHARACTERISTIC 1 = PURCHASER (BHEL)/TPI 2 = VENDOR 3 = SUB VENDOR OF THE VENDOR

PT= PENETRANT TEST, UT= ULTRASONIC TEST, RT= RADIOGRAPHIC TEST TPI= THIRD PARTY INSPECTOR.

NOTE:

A) IN CASE OF FOREIGN BIDDER, ALL TEST CERTIFICATE SHALL BE FURNISHED BY THE VENDOR DULY WITNESSED/ VERIFIED BY VENDOR'S TPI.

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

	TECHNICAL SPECIFICATION STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-020-100-M001	
		SECTION: II	
		REV. NO.: 00	DATE: 05.09.2017
		SHEET 1 OF 1	

SECTION-II

(ACTUATOR DATA SHEET)

		SPECIFICATION FOR MOTORISED VALVE ACTUATOR STEEL GATE/GLOBE/NRV (WATER SERVICE) FRAMEWORK AGREEMENT (FOR SL. NO.9 OF CAT-B IN DATA SHEET-A)		SPECIFICATION NO.: PE-TS-020-145-1007A	
				SECTION II	
				REV. NO.	DATE:
				SHEET	OF
		01	01.09.2017	1	3
Data Sheet A & B					
DATA SHEET-A (TO BE FILLED BY PURCHASER)				DATA SHEET-B (TO BE FILLED-UP BY BIDDER)	
GENERAL*	* PROJECT	FRAMEWORK AGREEMENT			
	OFFER REFERENCE				
	* TAG NO. SERVICE				
	* DUTY	☒ ON / OFF ☐ INCHING			
	* LINE SIZE (inlet/outlet): MATERIAL	AS PER DATASHEET-A	AS PER DATASHEET-A		
	* VALVE TYPE	☐ GLOBE ☒ GATE ☐ REG. GLOBE ☐ BUTTERFLY			
	* OPENING / CLOSING TIME	AS PER DATASHEET-A	AS PER DATASHEET-A		
	* 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			
	CONSTRUCTION AND SIZING	CONSTRUCTION	TOTALLY ENCLOSED, WEATHER PROOF, IP:68		
MECHANICAL POSITION INDICATOR		TO BE PROVIDED FOR 0-100% TRAVEL			
BEARINGS		DOUBLE SHIELDED, GREASE LUBRICATED ANTI-FRICTION.			
GEAR TRAIN FOR LIMIT SWITCH/TORQUE SWITCH OPERATION		METAL (NOT FIBRE GEARS). SELF-LOCKING TO PREVENT DRIFT UNDER TORQUE SWITCH SPRING PRESSURE WHEN MOTOR IS DE-ENERGIZED.			
SIZING		OPEN/CLOSE AT RATED SPEED AGAINST DESIGNED DIFFERENTIAL PRESSURE AT 85% OF RATED VOLTAGE. FOR ISOLATING SERVICE THREE SUCCESSIVE OPEN-CLOSE OPERATIONS OR 15 MINS. WHICHEVER IS HIGHER. FOR INCHING SERVICE-150 STARTS/HR MINIMUM & FOR REGULATING SERVICE-600 STARTS/HR MINIMUM.			
HANDWHEEL	* REQUIRED	☒ YES ☐ NO			
	* ORIENTATION	☐ TOP MOUNTED ☐ SIDE MOUNTED			
	*TO DISENGAGE AUTOMATICALLY DURING MOTOR OPERATION.				
ELECTRIC ACTUATOR	ACTUATOR MAKE/MODEL	BIDDER TO SPECIFY			
	MOTOR MAKE / MODEL / TYPE / RATING (KW)	BIDDER TO SPECIFY			
	@ MOTOR TYPE	SQUIRREL CAGE INDUCTION MOTOR, STARTING CURRENT LIMITED TO SIX TIMES THE RATED CURRENT-INCLUSIVE OF I.S. TOLERANCE			
	ACTUATOR APPLICABLE WIRING DIAGRAM	☒ ENCLOSED (BIDDER TO CONFIRM) A: ☒ DRG. NO. 3-V-MISC-24227 R00 THE ABOVE WIRING DIAGRAMS ARE TYPICAL. THE TYPE OF WIRING DIAGRAM WOULD BE DECIDED DURING DETAIL ENGINEERING. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.			
	COLOUR SHADE**	☐ BLUE (RAL 5012) ☐			
	PAINT TYPE (## Refer Notes)	☐ ENAMEL ☒ EPOXY ☐			
	SHAFT RPM	BIDDER TO SPECIFY			
	OLR SET VALUE	BIDDER TO SPECIFY			
	@ STARTING / FULL LOAD CURRENT	BIDDER TO SPECIFY			
	NO. OF REV FOR FULL TRAVEL	BIDDER TO SPECIFY			
	@ PWR SUPP TO MTR / STARTER**	415V, 3PH, AC, 3 WIRE OR 4 WIRE			

■ - THIS MEANS APPLICABLE

**THIS SHALL BE FINALIZED DURING DETAILED ENGG. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.

FORM NO. PEM-5686-0

		SPECIFICATION FOR		SPECIFICATION NO.: PE-TS-020-145-I007A	
		MOTORISED VALVE ACTUATOR		SECTION II	
		STEEL GATE/GLOBE/NRV (WATER SERVICE)		REV. NO.	DATE:
		FRAMEWORK AGREEMENT		01	01.09.2017
(FOR SL. NO.9 OF CAT-B IN DATA SHEET-A)		SHEET	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	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED FROM THE POWER SUPPLY TO THE STARTER ☐ 230 V ☐ 110 V			
	@ ENCLOSURE CLASS OF MOTOR	☒ IP 68 ☐ FLAME PROOF			
	@ INSULATION CLASS	CLASS-F TEMP. RISE LIMITED TO CLASS-B			
	@ WINDING TEMP PROTECTION	☒ THERMOSTAT (3 Nos., 1 IN EACH PHASE) ☐ _____			
	SINGLE PHASE / WRONG PHASE SEQUENCE PROTECTION	REQUIRED			
	INTEGRAL STARTER	☒ REQUIRED ☐ NOT REQUIRED			
	TYPE OF SWITCHING DEVICE	☒ CONTACTORS ☐ THYRISTORS			
	TYPE	☒ CONVENTIONAL ☐ SMART (NON-INTRUSIVE)			
	IF SMART				
	—a) SERIAL LINK INTERFACE	☐ INTEGRAL ☐ FIELD MOUNTED			
	—b) SERIAL LINK PROTOCOL	☐ FOUNDATION FIELD BUS ☐ PROFI BUS ☐ DEVICE NET ☐ _____			
	—c) SERIAL LINK MEDIA	☐ TWISTED PAIR Cu-CBL ☐ CO-AXIAL Cu-CBL ☐ OFC			
	—d) HAND HELD PROGRAMMER	☐ REQUIRED ☐ NOT REQUIRED			
	—e) TYPE OF HAND HELD PROGRAMMER	☐ BLUETOOTH ☐ INFRARED ☐ _____			
	—f) MASTER STATION	☐ REQUIRED ☐ NOT REQUIRED			
	—g) MASTER STN INTRFACE WITH DCS	☐ MODBUS ☐ TCP/IP			
	—h) DETAILS OF SPECIAL CABLE	☐ ENCLOSED ☐ NOT REQUIRED			
	STEP DOWN CONT. TRANSFORMER	☒ REQUIRED			
	OPEN / CLOSE PB	☒ REQUIRED ☐ NOT REQUIRED			
	STOP PB	☒ REQUIRED ☐ NOT REQUIRED			
INDICATING LAMPS	☒ REQUIRED ☐ NOT REQUIRED				
LOCAL REMOTE S/S	☒ REQUIRED ☐ NOT REQUIRED				
STATUS CONTACTS FOR MONITORING	☒ REQUIRED ☐ NOT REQUIRED				
INTEGRAL STARTER DISTURBED SIGNAL	REQUIRED (MOTOR THERMOSTAT TRIP, O/L RELAY OPERATED, CONT./POWER SUPPLY FAILED, PHASE LOSS, S/S IN LOCAL or OFF MODE, STOP PB OPTD, TORQUE OPEN, CLOSE CUTOFF)				
INTERPOSING RELAY/OPTO COUPLER (Applicable for integral Starter)	TYPE OF ISOLATING DEVICE**	☐ INTERPOSING RELAY ☐ OPTO COUPLER ☐ EITHER TO BE DECIDED			
	QUANTITY	☐ 2 NOs.(On/Off), ☐ 3 NOs.(For inching duty drives)			
	DRIVING VOLTAGE	☒ 20.5 – 24V DC ☐ _____ V DC			
	DRIVING CURRENT	☒ 125 mA 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)	MFR & MODEL NO.	BIDDER TO SPECIFY			
	OPEN : INT : CLOSE	☐ 1 No. ☒ 2 Nos. (ADJ.) ☐ 1 No. ☒ 2 Nos.			
	CONTACT TYPE	2 NO + 2 NC			

■ - THIS MEANS APPLICABLE

**THIS SHALL BE FINALIZED DURING DETAILED ENGG. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.

FORM NO. PEM-5656-Q

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR STEEL GATE/GLOBE/NRV (WATER SERVICE) FRAMEWORK AGREEMENT (FOR SL. NO.9 OF CAT-B IN DATA SHEET-A)		SPECIFICATION NO.: PE-TS-020-145-1007A	
	SECTION II			
	REV. NO.	01	DATE:	01.09.2017
	SHEET	3	OF	3

Data Sheet A & B

DATA SHEET-A (TO BE FILLED BY PURCHASER)	DATA SHEET-B (TO BE FILLED-UP BY BIDDER)
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Actuator) (\$\$ Refer Notes)	RATING (AC / DC)	5A 240V AC AND 0.5A 220V DC	
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POSITION TRANSMITTER	POSITION TRANSMITTER (For inching duty & other specific applications)	☐ REQUIRED ☒ NOT REQUIRED	
	MFR & MODEL NO.	BIDDER TO SPECIFY	
	TYPE	☐ ELECTRONIC (2 WIRE) R/I CONVERTER ☐ ELECTRONIC (2 WIRE) CONTACTLESS	
	SUPPLY	☐ 24V DC ☐	
	OUTPUT	☐ 4-20mA	
	ACCURACY	± 1% FS	
SPACE HEATER	@SPACE HEATER	REQUIRED	
	@ POWER SUPPLY (NON-INTEGRAL)	230V AC, 1 PH., 50 Hz	
	@ POWER SUPPLY (INTEGRAL)	BIDDER TO SPECIFY	
	@ RATING		
TERMINAL BOX	ACTUATOR/MOTOR TERMINAL BOX	REQUIRED	
	ENCL CLASS ACTUATOR/MOTOR T.B.	@ ☒ IP 68 @ ☐	
	@ EARTHING TERMINAL	REQUIRED	
	PLUG & SOCKET** (FOR COMMD, LS/TS FEED BACK, PoT)	☐ REQUIRED ☒ NOT REQUIRED ☐ 2 NOS. ☐	
CABLE GLANDS	@ POWER CABLE GLAND	SIZE AND NOS. ARE PROJECT SPECIFIC AND WILL BE INFORMED LATER. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.	
	@ SPACE HEATER CABLE GLAND		
	OTHER CONTROL CABLE GLANDS-1		
	OTHER CONTROL CABLE GLANDS-2		
WEIGHT	TOTAL WEIGHT (ACTUATOR + ACCESSORIES)	BIDDER TO SPECIFY	_____ Kg.

NOTES:

- 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.
- ACTUATOR SHALL HAVE HARDWIRED CONTACTS FOR FOLLOWING SIGNALS (a) ACTUATOR IN LOCAL MODE (b) ACTUATOR IN REMOTE MODE.
- BIDDER TO ENSURE AVAILABILITY OF SPARE 1NO + 1NC LIMIT SWITCH & TORQUE SWITCH.
- SS TAG NAME PLATE SHALL BE PROVIDED.
- TEMPERATURE RISE SHALL BE RESTRICTED TO 70 DEG. C FOR AMBIENT TEMPERATURE OF 50 DEG C.
- CABLE GLANDS OF DOUBLE COMPRESSION TYPE, NI PLATED BRASS MATERIAL SHALL BE PROVIDED.
- THE TORQUE SWITCHES SHALL BE PROVIDED WITH MECHANICAL LATCHING DEVICE TO PREVENT OPERATION WHEN UNSEATING FROM THE END POSITIONS. THE LATCHING DEVICE SHALL UNLATCH AS SOON AS THE VALVE LEAVES THE END POSITION. IF SUCH PROVISION IS NOT POSSIBLE, THE TORQUE SWITCHES SHALL BE BYPASSED BY END-POSITION LIMIT SWITCHES WHICH OPENS ON VALVE LEAVING END POSITION. THESE LIMIT SWITCHES ARE ADDITIONAL TO THE NUMBER OF LIMIT SWITCHES SPECIFIED ELSEWHERE.
- THE MOTOR SHALL OPERATE SATISFACTORILY UNDER THE +/- 10% SUPPLY VOLTAGE VARIATION AT RATED FREQUENCY, -5% TO +3% VARIATION IN FREQUENCY AT RATED SUPPLY VOLTAGE, SIMULTANEOUS VARIATION IN VOLTAGE & FREQUENCY THE SUM OF ABSOLUTE PERCENTAGE NOT EXCEEDING 10%.
- THE MOTOR SHALL BE SUITABLE FOR DIRECT ON LINE STARTING.
- LOCAL DIGITAL POSITION INDICATOR SHALL BE PROVIDED FOR INCHING DUTY DRIVES.
- COMMANDS SHALL BE LATCHED AT INTEGRAL STARTER END.
- ALL SPARE CONTACTS ON SWITCHES SHALL BE TERMINATED IN JB MOUNTED ON ACTUATOR.
- ACTUATORS FOR HAZARDOUS AREA SHALL BE CERTIFIED FLAME PROOF FOR ZONES 1 & 2.
- THE OPERATING SPEED OF VALVE SHALL BE IN LINE WITH SPECIFICATION TO THE EXTENT POSSIBLE.
- ALL LIMIT SWITCHES SHALL CONFIRM TO IEC-60947-5-1.
- TERMINATION BLOCK INTEGRAL TO ACTUATOR WILL BE MEETING CUSTOMER SPECIFICATION REQUIREMENT TO THE EXTENT POSSIBLE.
- BIDDER TO SELECT THE OPTION IP RELAY/OPTOCOUPLER FOR TYPE OF ISOLATING DEVICE. IP RELAY SHALL BE 12V DC/24V DC COIL, 250V AC CONTACTS.
- FINAL VENDOR WIRING DIAGRAM OF ACTUATOR SHALL BE SUBMITTED AFTER ORDERING.

\$\$ TORQUE SWITCH & LIMIT SWITCH SHALL ACT INDEPENDENT OF EACH OTHER. TANDEM OPERATION IS NOT ACCEPTABLE.
 ** EPOXY PAINT IS RECOMMENDED FOR COASTAL AREAS.

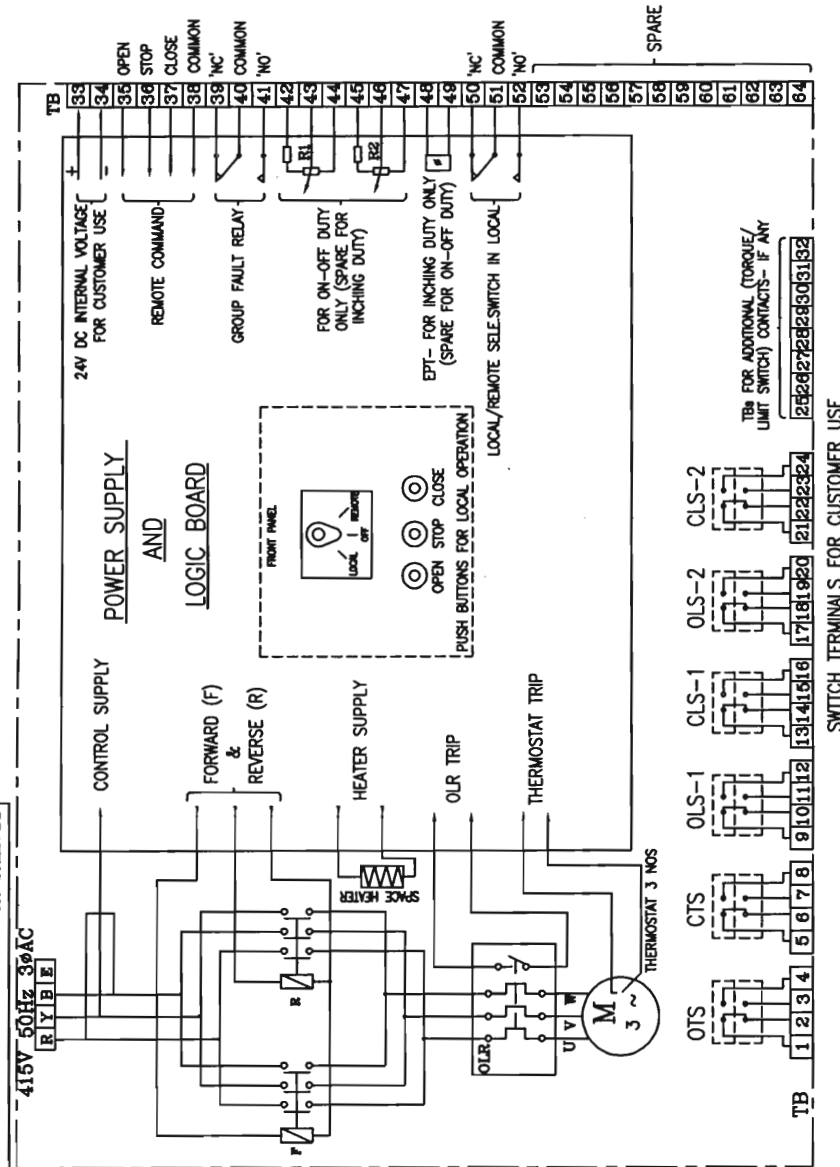
NOTES* = TO BE FILLED BY MPL (LEAD AGENCY). @ = TO BE FILLED BY ES

■ - THIS MEANS APPLICABLE

** THIS SHALL BE FINALIZED DURING DETAILED ENGG. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.

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

22227-V-A-3 ON DRAWING



NOTE:-

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

CONTACT DEVELOPMENT DIAGRAM

OTS	1-2	OPEN AT OVER TORQUE DURING OPENING TRAVEL
CTS	3-4	CLOSE AT OVER TORQUE DURING OPENING TRAVEL
	5-6	OPEN AT OVER TORQUE DURING CLOSING TRAVEL
	7-8	CLOSE AT OVER TORQUE DURING CLOSING TRAVEL
OLS-1	9-10	
OLS-1	11-12	
CLS-1	13-14	
CLS-1	15-16	
OLS-2	17-18	
OLS-2	19-20	
CLS-2	21-22	
CLS-2	23-24	
SWITCH	TERMINAL NO.	VALVE POSITION
		o FULL OPEN
		b INTERMEDIATE
		c FULL CLOSE

INDICATES CONTACT CLOSED
INDICATES CONTACT OPEN

CONTACT RATING: 5A AT 250V AC & 0.5A AT 220V DC

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)				

SPARE

TYPE OF PRODUCT ELECTRICAL VALVE ACTUATORS (AC) WITH INTEGRAL STARTERS
OR NAME OF CUSTOMER/PROJECT (DRAWN FOR INTERMEDIATE POSITION OF VALVES)

BHARAT HEAVY ELECTRICALS LTD. UNIT: HIGH PRESSURE ROILER PLANT. TRICHURAPALLI-680014.	DRN	N.P.ESWAR	SIGN	N.P.	DATE	07.10.04	NO. OF VAR
	CHD	D.DINAKARAN	SIGN	D.D.	DATE	07.10.04	
	APPD	K.ARUNACHALAM	SIGN	K.A.	DATE	07.10.04	
	REFERENCE INFORMATION						
DEPT	VL	SCALE	WEIGHT (KG)		NO. OF TRIMS		
CODE							
TITLE	WIRING DIAGRAM (TERMINAL PLAN)						
FOR ACTUATOR WITH INTEGRAL STARTER				CARD CODE		REV	
				U 01		0	
				DRAWING NO.		3-V-MISC-24227	

Size A3

FORM NO. PEM-5666-0

		SPECIFICATION FOR MOTORISED VALVE ACTUATOR STEEL GATE/GLOBE/NRV (WATER SERVICE) FRAMEWORK AGREEMENT (FOR SL. NO.10 OF CAT- A IN DATA SHEET-A)		SPECIFICATION NO.: PE-TS-020-145-1007B	
				SECTION II	
				REV. NO.	DATE:
				01	01.09.2017
		SHEET	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	FRAMEWORK AGREEMENT			
	OFFER REFERENCE				
	* TAG NO. SERVICE				
	* DUTY	☒ ON / OFF ☐ INCHING			
	* LINE SIZE (inlet/outlet): MATERIAL	AS PER DATASHEET-A	AS PER DATASHEET-A		
	* VALVE TYPE	☒ GLOBE ☐ GATE ☐ REG. GLOBE ☐ BUTTERFLY			
	* OPENING / CLOSING TIME	AS PER DATASHEET-A	AS PER DATASHEET-A		
	* WORKING PRESSURE				
	AMBIENT CONDITION	SHALL BE SUITABLE FOR CONTINUOUS OPERATION UNDER AN AMBIENT TEMP. OF 0-55 DEG C AND RELATIVE HUMIDITY OF 0-95%			
	VALVE SEAT TEST PRESS	BIDDER TO SPECIFY			
	REQUIRED VALVE TORQUE	BIDDER TO SPECIFY			
	ACTUATOR RATED TORQUE	BIDDER TO SPECIFY			
CONSTRUCTION AND SIZING	CONSTRUCTION	TOTALLY ENCLOSED, WEATHER PROOF, IP:68			
	MECHANICAL POSITION INDICATOR	TO BE PROVIDED FOR 0-100% TRAVEL			
	BEARINGS	DOUBLE SHIELDED, GREASE LUBRICATED ANTI-FRICTION.			
	GEAR TRAIN FOR LIMIT SWITCH/TORQUE SWITCH OPERATION	METAL (NOT FIBRE GEARS). SELF-LOCKING TO PREVENT DRIFT UNDER TORQUE SWITCH SPRING PRESSURE WHEN MOTOR IS DE-ENERGIZED.			
	SIZING	OPEN/CLOSE AT RATED SPEED AGAINST DESIGNED DIFFERENTIAL PRESSURE AT 85% OF RATED VOLTAGE. FOR ISOLATING SERVICE THREE SUCCESSIVE OPEN-CLOSE OPERATIONS OR 15 MINS. WHICHEVER IS HIGHER. FOR INCHING SERVICE-150 STARTS/HR MINIMUM & FOR REGULATING SERVICE-600 STARTS/HR MINIMUM.			
HANDWHEEL	* REQUIRED	☒ YES ☐ NO			
	* ORIENTATION	☐ TOP MOUNTED ☐ SIDE MOUNTED			
	*TO DISENGAGE AUTOMATICALLY DURING MOTOR OPERATION.				
ELECTRIC ACTUATOR	ACTUATOR MAKE/MODEL	BIDDER TO SPECIFY			
	MOTOR MAKE / MODEL / TYPE / RATING (KW)	BIDDER TO SPECIFY			
	@ MOTOR TYPE	SQUIRREL CAGE INDUCTION MOTOR, STARTING CURRENT LIMITED TO SIX TIMES THE RATED CURRENT-INCLUSIVE OF I.S. TOLERANCE			
	ACTUATOR APPLICABLE WIRING DIAGRAM	☒ ENCLOSED (BIDDER TO CONFIRM) A: ☒ DRG. NO. 3-V-MISC-24550 R00 THE ABOVE WIRING DIAGRAMS ARE TYPICAL. THE TYPE OF WIRING DIAGRAM WOULD BE DECIDED DURING DETAIL ENGINEERING. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.			
	COLOUR SHADE**	☐ BLUE (RAL 5012) ☐			
	PAINT TYPE (** Refer Notes)	☐ ENAMEL ☐ EPOXY ☐			
	SHAFT RPM	BIDDER TO SPECIFY			
	OLR SET VALUE	BIDDER TO SPECIFY			
	@ STARTING / FULL LOAD CURRENT	BIDDER TO SPECIFY			
	NO. OF REV FOR FULL TRAVEL	BIDDER TO SPECIFY			
	@ PWR SUPP TO MTR / STARTER**	415V, 3PH, AC, 3 WIRE OR 4 WIRE			

■ - THIS MEANS APPLICABLE

** THIS SHALL BE FINALIZE DURING DETAILED ENGG. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.

		SPECIFICATION FOR		SPECIFICATION NO.: PE-TS-020-145-1007B	
		MOTORISED VALVE ACTUATOR		SECTION II	
		STEEL GATE/GLOBE/NRV (WATER SERVICE)		REV. NO.	DATE:
		FRAMEWORK AGREEMENT		01	01.09.2017
(FOR SL. NO.10 OF CAT- A IN DATA SHEET-A)		SHEET	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	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED FROM THE POWER SUPPLY TO THE STARTER ☐ 230 V ☐ 110 V			
	@ ENCLOSURE CLASS OF MOTOR	☒ IP 68 ☐ FLAME PROOF			
	@ INSULATION CLASS	CLASS-F TEMP. RISE LIMITED TO CLASS-B			
	@ WINDING TEMP PROTECTION	☒ THERMOSTAT (3 Nos., 1 IN EACH PHASE) ☐			
	SINGLE PHASE / WRONG PHASE SEQUENCE PROTECTION	REQUIRED			
	INTEGRAL STARTER	☒ REQUIRED ☐ NOT REQUIRED			
	TYPE OF SWITCHING DEVICE	☒ CONTACTORS ☐ THYRISTORS			
	TYPE	☒ CONVENTIONAL ☐ SMART (NON-INTRUSIVE)			
	IF SMART				
	— a) SERIAL LINK INTERFACE	☐ INTEGRAL ☐ FIELD MOUNTED			
	— b) SERIAL LINK PROTOCOL	☐ FOUNDATION FIELD BUS ☐ PROFI-BUS ☐ DEVICE NET ☐			
	— c) SERIAL LINK MEDIA	☐ TWISTED PAIR Cu-CBL ☐ CO-AXIAL Cu-CBL ☐ OFG			
	— d) HAND HELD PROGRAMMER	☐ REQUIRED ☐ NOT REQUIRED			
	— e) TYPE OF HAND HELD PROGRAMMER	☐ BLUETOOTH ☐ INFRARED ☐			
	— f) MASTER STATION	☐ REQUIRED ☐ NOT REQUIRED			
	— g) MASTER STN INTERFACE WITH DCS	☐ MODBUS ☐ TCP/IP			
	— h) DETAILS OF SPECIAL CABLE	☐ ENCLOSED ☐ NOT REQUIRED			
	STEP DOWN CONT. TRANSFORMER	☒ REQUIRED			
	OPEN / CLOSE PB	☒ REQUIRED ☐ NOT REQUIRED			
	STOP PB	☒ REQUIRED ☐ NOT REQUIRED			
INDICATING LAMPS	☒ REQUIRED ☐ NOT REQUIRED				
LOCAL REMOTE S/S	☒ REQUIRED ☐ NOT REQUIRED				
STATUS CONTACTS FOR MONITORING	☒ REQUIRED ☐ NOT REQUIRED				
INTEGRAL STARTER DISTURBED SIGNAL	REQUIRED (O/L RELAY OPERATED, CONT./POWER SUPPLY FAILED, S/S IN LOCAL or OFF MODE/STOP PB OPTD, TORQUE SWITCH OPTD, MID WAY/MOTOR THERMOSTAT TRIP)				
INTERPOSING RELAY/OPTO COUPLER (Applicable for integral Starter)	TYPE OF ISOLATING DEVICE**	☐ INTERPOSING RELAY ☐ OPTO COUPLER ☒ EITHER TO BE DECIDED			
	QUANTITY	☐ 2 NOs.(On/Off), ☐ 3 NOs.(For inching duty drives)			
	DRIVING VOLTAGE	☒ 20.5 – 24V DC ☐ _____ V DC			
	DRIVING CURRENT	☒ 125 mA 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. ☒ 2 Nos.	
	CONTACT TYPE	2 NO + 2 NC			
	RATING (AC / DC)	5A 240V AC AND 0.5A 220V DC			

■ - THIS MEANS APPLICABLE

** THIS SHALL BE FINALIZE DURING DETAILED ENGG. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.

FORM NO. PEM-5686-0

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR STEEL GATE/GLOBE/NRV (WATER SERVICE) FRAMEWORK AGREEMENT (FOR SL. NO.10 OF CAT- A IN DATA SHEET-A)		SPECIFICATION NO.: PE-TS-020-145-1007B	
	SECTION II			
	REV. NO.	01	DATE: 01.09.2017	
	SHEET	3	OF	3

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

POSITION TRANSMITTER	POSITION TRANSMITTER (For inching duty & other specific applications)	☐ REQUIRED ☒ NOT REQUIRED	
	MFR & MODEL NO.	BIDDER TO SPECIFY	
	TYPE	☐ ELECTRONIC (2 WIRE) R/I CONVERTER ☐ ELECTRONIC (2 WIRE) CONTACTLESS	
	SUPPLY	☐ 24V DC ☐	
	OUTPUT	☐ 4-20mA	
	ACCURACY	$\pm 1\%$ FS	
SPACE HEATER	@SPACE HEATER	REQUIRED	
	@ POWER SUPPLY (NON-INTEGRAL)	230V AC, 1 PH., 50 Hz	
	@ POWER SUPPLY (INTEGRAL)	BIDDER TO SPECIFY	
	@ RATING		
TERMINAL BOX	ACTUATOR/MOTOR TERMINAL BOX	REQUIRED	
	ENCL CLASS ACTUATOR/MOTOR T.B.	@ ☒ IP 68 @ ☐	
	@ EARTHING TERMINAL	REQUIRED	
	PLUG & SOCKET** (FOR COMMD, LS/TS FEED BACK, PoT)	☒ REQUIRED ☐ NOT REQUIRED ☒ 2 NOS. ☐	
CABLE GLANDS	@ POWER CABLE GLAND	SIZE AND NOS. ARE PROJECT SPECIFIC AND WILL BE INFORMED LATER. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.	
	@ SPACE HEATER CABLE GLAND		
	OTHER CONTROL CABLE GLANDS-1		
	OTHER CONTROL CABLE GLANDS-2		
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 SHALL BE PROVIDED.
5. THE TORQUE SWITCHES SHALL BE PROVIDED WITH MECHANICAL LATCHING DEVICE TO PREVENT OPERATION WHEN UNSEATING FROM THE END POSITIONS. THE LATCHING DEVICE SHALL UNLATCH AS SOON AS THE VALVE LEAVES THE END POSITION. IF SUCH PROVISION IS NOT POSSIBLE, THE TORQUE SWITCHES SHALL BE BYPASSED BY END-POSITION LIMIT SWITCHES WHICH OPENS ON VALVE LEAVING END POSITION. THESE LIMIT SWITCHES ARE ADDITIONAL TO THE NUMBER OF LIMIT SWITCHES SPECIFIED ELSEWHERE.
6. THE MOTOR SHALL OPERATE SATISFACTORILY UNDER THE +/- 10% SUPPLY VOLTAGE VARIATION AT RATED FREQUENCY, -5% TO +3% VARIATION IN FREQUENCY AT RATED SUPPLY VOLTAGE, SIMULTANEOUS VARIATION IN VOLTAGE & FREQUENCY THE SUM OF ABSOLUTE PERCENTAGE NOT EXCEEDING 10%.
7. THE MOTOR SHALL BE SUITABLE FOR DIRECT ON LINE STARTING.
8. 2 No. OF EARTHING TERMINALS SHALL BE PROVIDED FOR THE MOTOR BODY EARTHING.
9. IN ADDITION TO ABOVE, 2 No. OF CABLE GLANDS (NPT) SHALL BE PROVIDED.
10. LOCAL DIGITAL POSITION INDICATOR SHALL BE PROVIDED FOR INCHING DUTY DRIVES.
11. LED's FOR STATUS ANNUNCIATION SHALL BE PROVIDED LOCALLY FOR
 - a) ACTUATOR IN LOCAL MODE
 - b) ACTUATOR IN REMOTE MODE
 - c) ACTUATOR RUNNING IN OPEN DIRECTION
 - d) ACTUATOR RUNNING IN CLOSE DIRECTION
 - e) LIMIT SWITCH OPEN TRIP
 - f) LIMIT SWITCH CLOSE TRIP
 - g) CONTROL VOLTAGE AVAILABILITY
12. THE FOLLOWING INDIVIDUAL FAULT ANNUNCIATION LED'S RED COLOR SHALL BE PROVIDED LOCALLY FOR
 - a) TORQUE SWITCH OPEN
 - b) TORQUE SWITCH CLOSE
 - c) THERMOSWITCH TRIP
 - d) MOTOR SINGLE PHASING

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

EPOXY PAINT IS RECOMMENDED FOR COASTAL AREAS.

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

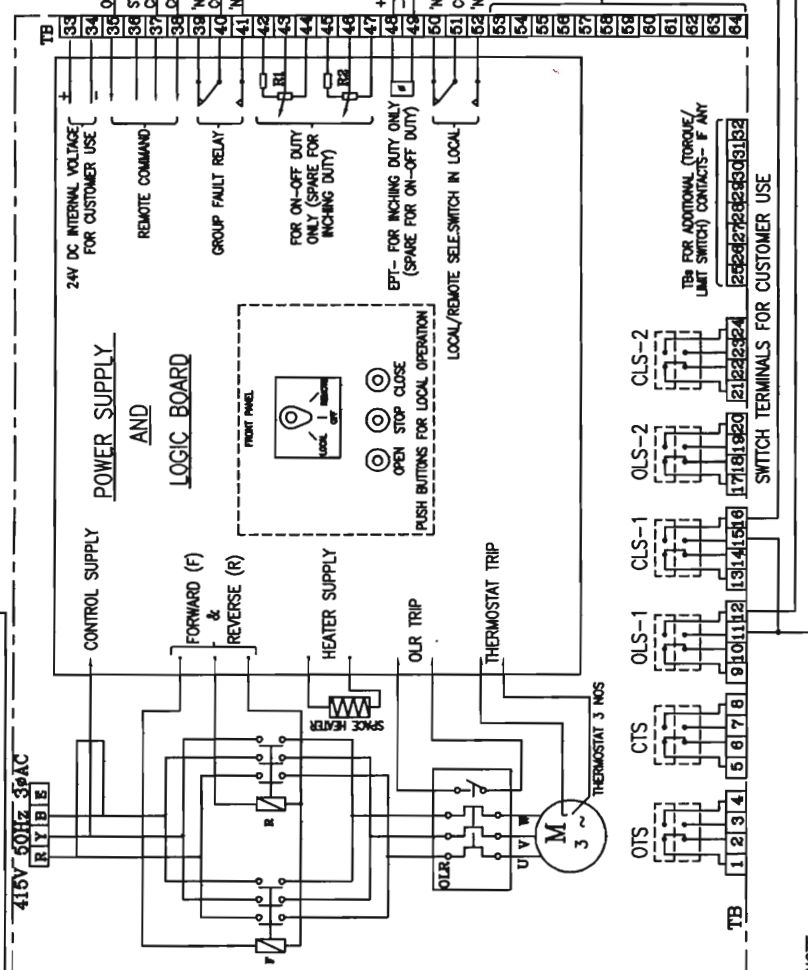
☒ - THIS MEANS APPLICABLE

** THIS SHALL BE FINALIZE DURING DETAILED ENGG. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.

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

3-V-MISC-24550

OK ENCL 17/18



CONTACT DEVELOPMENT DIAGRAM

OTS	1-2	OPEN AT OVER TORQUE DURING OPENING TRAVEL
CTS	3-4	CLOSE AT OVER TORQUE DURING OPENING TRAVEL
	5-6	OPEN AT OVER TORQUE DURING CLOSING TRAVEL
	7-8	CLOSE AT OVER TORQUE DURING CLOSING TRAVEL
OLS-1	9-10	
CLS-1	11-12	
	13-14	
OLS-2	15-16	
CLS-2	17-18	
	19-20	
	21-22	
	23-24	
SWITCH	TERMINAL NO.	VALVE POSITION
	a	INTERMEDIATE
	b	FULL CLOSE

INDICATES CONTACT CLOSED
INDICATES CONTACT OPEN

CONTACT RATING: 5A AT 250V AC & 0.5A AT 220V DC

VALVES	SETTING PROCEDURE OF POSITION LIMIT AND TORQUE SWITCH		
	OPEN	BACK UP	CLOSE
GATE VALVE OF 100 mm AND ABOVE IN 1500 CL AND ABOVE RATINGS	CLS	OTS	CTS
ALL OTHER GATE & GLOBE VALVES	CLS	OTS	CTS

CLS NOT TO BE CONNECTED IN TRIP CIRCUIT
BYPASS OTS FOR INITIAL 5% OF TRAVEL (FOR GATE VALVES ONLY)

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT
ELECTRICAL VALVE ACTUATORS (AC) WITH INTEGRAL STARTERS AND PLUG & SOCKET (DRAWN FOR INTERMEDIATE POSITION OF VALVES)

BHARAT HEAVY ELECTRICALS LTD., UNIT: HIGH PRESSURE BOILER PLANT, THERUGAPALLI-690014.	DRN M.VAJRABHARATHI	SIGN N.P.	DATE 28.02.07	NO. OF VAR.
	CHD D.DINAKARAN		28.02.07	
	APPD K.ARUNACHALAM		28.02.07	
DEPT 365-121	SCALE NTS	WEIGHT (KG)	REFERENCE INFORMATION	
CODE				
TITLE WIRING DIAGRAM (TERMINAL PLAN)	CARD CODE U 01	DRAWING NO. 3-V-MISC-24550	REV 0	

CAUTION: The information of 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.

NOTE:-

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

Size A3

		SPECIFICATION FOR MOTORISED VALVE ACTUATOR STEEL GATE/GLOBE/NRV (WATER SERVICE) FRAMEWORK AGREEMENT (FOR SL. NO.15 OF CAT-B IN DATA SHEET-A)		SPECIFICATION NO.: PE-TS-020-145-1007C	
				SECTION II	
				REV. NO.	DATE:
				01	01.09.2017
		SHEET	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	FRAMEWORK AGREEMENT			
	OFFER REFERENCE				
	* TAG NO. SERVICE				
	* DUTY	☐ ON / OFF ☒ INCHING			
	* LINE SIZE (inlet/outlet): MATERIAL	AS PER DATASHEET-A	AS PER DATASHEET-A		
	* VALVE TYPE	☒ GLOBE ☐ GATE ☐ REG. GLOBE ☐ BUTTERFLY			
	* OPENING / CLOSING TIME	AS PER DATASHEET-A	AS PER DATASHEET-A		
	* WORKING PRESSURE				
	AMBIENT CONDITION	SHALL BE SUITABLE FOR CONTINUOUS OPERATION UNDER AN AMBIENT TEMP. OF 0-55 DEG C AND RELATIVE HUMIDITY OF 0-95%			
	VALVE SEAT TEST PRESS	BIDDER TO SPECIFY			
	REQUIRED VALVE TORQUE	BIDDER TO SPECIFY			
	ACTUATOR RATED TORQUE	BIDDER TO SPECIFY			
CONSTRUCTION AND SIZING	CONSTRUCTION	TOTALLY ENCLOSED, WEATHER PROOF, IP:68			
	MECHANICAL POSITION INDICATOR	TO BE PROVIDED FOR 0-100% TRAVEL			
	BEARINGS	DOUBLE SHIELDED, GREASE LUBRICATED ANTI-FRICTION.			
	GEAR TRAIN FOR LIMIT SWITCH/TORQUE SWITCH OPERATION	METAL (NOT FIBRE GEARS). SELF-LOCKING TO PREVENT DRIFT UNDER TORQUE SWITCH SPRING PRESSURE WHEN MOTOR IS DE-ENERGIZED.			
	SIZING	OPEN/CLOSE AT RATED SPEED AGAINST DESIGNED DIFFERENTIAL PRESSURE AT 85% OF RATED VOLTAGE. FOR ISOLATING SERVICE THREE SUCCESSIVE OPEN-CLOSE OPERATIONS OR 15 MINS. WHICHEVER IS HIGHER. FOR INCHING SERVICE-150 STARTS/HR MINIMUM & FOR REGULATING SERVICE-600 STARTS/HR MINIMUM.			
HANDWHEEL	* REQUIRED	☒ YES ☐ NO			
	* ORIENTATION	☐ TOP MOUNTED ☐ SIDE MOUNTED			
	*TO DISENGAGE AUTOMATICALLY DURING MOTOR OPERATION.				
ELECTRIC ACTUATOR	ACTUATOR MAKE/MODEL	BIDDER TO SPECIFY			
	MOTOR MAKE / MODEL / TYPE / RATING (KW)	BIDDER TO SPECIFY			
	@ MOTOR TYPE	SQUIRREL CAGE INDUCTION MOTOR, STARTING CURRENT LIMITED TO SIX TIMES THE RATED CURRENT-INCLUSIVE OF I.S. TOLERANCE			
	ACTUATOR APPLICABLE WIRING DIAGRAM	☒ ENCLOSED (BIDDER TO CONFIRM) A: ☒ DRG. NO. 3-V-MISC-24550 R00 THE ABOVE WIRING DIAGRAMS ARE TYPICAL. THE TYPE OF WIRING DIAGRAM WOULD BE DECIDED DURING DETAIL ENGINEERING. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.			
	COLOUR SHADE**	☐ BLUE (RAL 5012) ☐			
	PAINT TYPE (** Refer Notes)	☐ ENAMEL ☐ EPOXY ☐			
	SHAFT RPM	BIDDER TO SPECIFY			
	OLR SET VALUE	BIDDER TO SPECIFY			
	@ STARTING / FULL LOAD CURRENT	BIDDER TO SPECIFY			
	NO. OF REV FOR FULL TRAVEL	BIDDER TO SPECIFY			
	@ PWR SUPP TO MTR / STARTER**	415V, 3PH, AC, 3 WIRE OR 4 WIRE			

■ - THIS MEANS APPLICABLE

** THIS SHALL BE FINALIZE DURING DETAIL ENGG. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.

		SPECIFICATION FOR MOTORISED VALVE ACTUATOR STEEL GATE/GLOBE/NRV (WATER SERVICE) FRAMEWORK AGREEMENT (FOR SL. NO.15 OF CAT-B IN DATA SHEET-A)		SPECIFICATION NO.: PE-TS-020-145-I007C	
				SECTION II	
				REV. NO.	DATE:
				01	01.09.2017
		SHEET	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	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED FROM THE POWER SUPPLY TO THE STARTER ☐ 230 V ☐ 110 V			
	@ ENCLOSURE CLASS OF MOTOR	☒ IP 68 ☐ FLAME PROOF			
	@ INSULATION CLASS	CLASS-F TEMP. RISE LIMITED TO CLASS-B			
	@ WINDING TEMP PROTECTION	☒ THERMOSTAT (3 Nos., 1 IN EACH PHASE) ☐			
	SINGLE PHASE / WRONG PHASE SEQUENCE PROTECTION	REQUIRED			
	INTEGRAL STARTER	☒ REQUIRED ☐ NOT REQUIRED			
	TYPE OF SWITCHING DEVICE	☒ CONTACTORS ☐ THYRISTORS			
	TYPE	☒ CONVENTIONAL ☐ SMART (NON-INTRUSIVE)			
	IF SMART				
	— a) SERIAL LINK INTERFACE	☐ INTEGRAL ☐ FIELD MOUNTED			
	— b) SERIAL LINK PROTOCOL	☐ FOUNDATION FIELD BUS ☐ PROFI-BUS ☐ DEVICE NET ☐			
	— c) SERIAL LINK MEDIA	☐ TWISTED PAIR Cu-CBL ☐ CO-AXIAL Cu-CBL ☐ OFC			
	— d) HAND HELD PROGRAMMER	☐ REQUIRED ☐ NOT REQUIRED			
	— e) TYPE OF HAND HELD PROGRAMMER	☐ BLUETOOTH ☐ INFRARED ☐			
	— f) MASTER STATION	☐ REQUIRED ☐ NOT REQUIRED			
	— g) MASTER STN INTERFACE WITH DCS	☐ MODBUS ☐ TCP/IP			
	— h) DETAILS OF SPECIAL CABLE	☐ ENCLOSED ☐ NOT REQUIRED			
	STEP DOWN CONT. TRANSFORMER	☒ REQUIRED			
	OPEN / CLOSE PB	☒ REQUIRED ☐ NOT REQUIRED			
	STOP PB	☒ REQUIRED ☐ NOT REQUIRED			
INDICATING LAMPS	☒ REQUIRED ☐ NOT REQUIRED				
LOCAL REMOTE S/S	☒ REQUIRED ☐ NOT REQUIRED				
STATUS CONTACTS FOR MONITORING	☒ REQUIRED ☐ NOT REQUIRED				
INTEGRAL STARTER DISTURBED SIGNAL	REQUIRED (O/L RELAY OPERATED, CONT./POWER SUPPLY FAILED, S/S IN LOCAL or OFF MODE/STOP PB OPTD, TORQUE SWITCH OPTD, MID WAY/MOTOR THERMOSTAT TRIP)				
INTERPOSING RELAY/OPTO COUPLER (Applicable for integral Starter)	TYPE OF ISOLATING DEVICE**	☐ INTERPOSING RELAY ☐ OPTO COUPLER ☒ EITHER TO BE DECIDED			
	QUANTITY	☐ 2 NOs.(On/Off), ☐ 3 NOs.(For inching duty drives)			
	DRIVING VOLTAGE	☒ 20.5 – 24V DC ☐ _____ V DC			
	DRIVING CURRENT	☒ 125 mA 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. ☒ 2 Nos.	
	CONTACT TYPE	2 NO + 2 NC			
	RATING (AC / DC)	5A 240V AC AND 0.5A 220V DC			

■ - THIS MEANS APPLICABLE

** THIS SHALL BE FINALIZE DURING DETAIL ENGG. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.

FORM NO. PEM-6686-0

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR STEEL GATE/GLOBE/NRV (WATER SERVICE) FRAMEWORK AGREEMENT (FOR SL. NO.15 OF CAT-B IN DATA SHEET-A)		SPECIFICATION NO.: PE-TS-020-145-I007C	
			SECTION II	
			REV. NO. 01	DATE: 01.09.2017
			SHEET 3	OF 3
Data Sheet A & B				
DATA SHEET-A (TO BE FILLED BY PURCHASER)			DATA SHEET-B (TO BE FILLED-UP BY BIDDER)	

POSITION TRANSMITTER	POSITION TRANSMITTER (For inching duty & other specific applications)	☒ REQUIRED ☐ NOT REQUIRED	
	MFR & MODEL NO.	BIDDER TO SPECIFY	
	TYPE	☐ ELECTRONIC (2 WIRE) R/I CONVERTER ☒ ELECTRONIC (2 WIRE) CONTACTLESS	
	SUPPLY	☒ 24V DC ☐	
	OUTPUT	☒ 4-20mA	
	ACCURACY	± 1% FS	
SPACE HEATER	@SPACE HEATER	REQUIRED	
	@ POWER SUPPLY (NON-INTEGRAL)	230V AC, 1 PH., 50 Hz	
	@ POWER SUPPLY (INTEGRAL)	BIDDER TO SPECIFY	
	@ RATING		
TERMINAL BOX	ACTUATOR/MOTOR TERMINAL BOX	REQUIRED	
	ENCL CLASS ACTUATOR/MOTOR T.B.	@ ☒ IP 68 @ ☐	
	@ EARTHING TERMINAL	REQUIRED	
	PLUG & SOCKET** (FOR COMMD, LS/TS FEED BACK, PoT)	☒ REQUIRED ☐ NOT REQUIRED ☒ 2 NOS. ☐	
CABLE GLANDS	@ POWER CABLE GLAND	SIZE AND NOS. ARE PROJECT SPECIFIC AND WILL BE INFORMED LATER. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.	
	@ SPACE HEATER CABLE GLAND		
	OTHER CONTROL CABLE GLANDS-1		
	OTHER CONTROL CABLE GLANDS-2		
WEIGHT	TOTAL WEIGHT (ACTUATOR + ACCESSORIES)	BIDDER TO SPECIFY _____ Kg.	

NOTES:

- SCOPE: DESIGN, MANUFACTURE, INSPECTION, TESTING AND DELIVERY TO SITE OF ELECTRIC ACTUATOR FOR INCHING OR OPEN / CLOSE DUTY.
- CODES & STANDARDS: DESIGN AND MATERIALS USED SHALL COMPLY WITH THE RELEVANT LATEST NATIONAL AND INTERNATIONAL STANDARD. AS A MINIMUM, THE FOLLOWING STANDARDS SHALL BE COMPLIED WITH: IS-9334, IS-2147, IS-2148, IS-325, IS-2959, IS-4691 AND IS-4722.
- TEMPERATURE RISE SHALL BE RESTRICTED TO 70 DEG. C FOR AMBIENT TEMPERATURE OF 50 DEG C.
- CABLE GLANDS OF DOUBLE COMPRESSION TYPE, BRASS MATERIAL SHALL BE PROVIDED.
- THE TORQUE SWITCHES SHALL BE PROVIDED WITH MECHANICAL LATCHING DEVICE TO PREVENT OPERATION WHEN UNSEATING FROM THE END POSITIONS. THE LATCHING DEVICE SHALL UNLATCH AS SOON AS THE VALVE LEAVES THE END POSITION. IF SUCH PROVISION IS NOT POSSIBLE, THE TORQUE SWITCHES SHALL BE BYPASSED BY END-POSITION LIMIT SWITCHES WHICH OPENS ON VALVE LEAVING END POSITION. THESE LIMIT SWITCHES ARE ADDITIONAL TO THE NUMBER OF LIMIT SWITCHES SPECIFIED ELSEWHERE.
- THE MOTOR SHALL OPERATE SATISFACTORILY UNDER THE +/- 10% SUPPLY VOLTAGE VARIATION AT RATED FREQUENCY, -5% TO +3% VARIATION IN FREQUENCY AT RATED SUPPLY VOLTAGE, SIMULTANEOUS VARIATION IN VOLTAGE & FREQUENCY THE SUM OF ABSOLUTE PERCENTAGE NOT EXCEEDING 10%.
- THE MOTOR SHALL BE SUITABLE FOR DIRECT ON LINE STARTING.
- 2 No. OF EARTHING TERMINALS SHALL BE PROVIDED FOR THE MOTOR BODY EARTHING.
- IN ADDITION TO ABOVE, 2 No. OF CABLE GLANDS (NPT) SHALL BE PROVIDED.
- LOCAL DIGITAL POSITION INDICATOR SHALL BE PROVIDED FOR INCHING DUTY DRIVES.
- LED's FOR STATUS ANNUNCIATION SHALL BE PROVIDED LOCALLY FOR
 - ACTUATOR IN LOCAL MODE
 - ACTUATOR IN REMOTE MODE
 - ACTUATOR RUNNING IN OPEN DIRECTION
 - ACTUATOR RUNNING IN CLOSE DIRECTION
 - LIMIT SWITCH OPEN TRIP
 - LIMIT SWITCH CLOSE TRIP
 - CONTROL VOLTAGE AVAILABILITY
- THE FOLLOWING INDIVIDUAL FAULT ANNUNCIATION LED'S RED COLOR SHALL BE PROVIDED LOCALLY FOR
 - TORQUE SWITCH OPEN
 - TORQUE SWITCH CLOSE
 - THERMOSWITCH TRIP
 - MOTOR SINGLE PHASING

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

EPOXY PAINT IS RECOMMENDED FOR COASTAL AREAS.

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

☒ - THIS MEANS APPLICABLE

** THIS SHALL BE FINALIZE DURING DETAIL ENGG. HOWEVER, NO COST IMPLICATION SHALL BE ENTERTAINED.

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

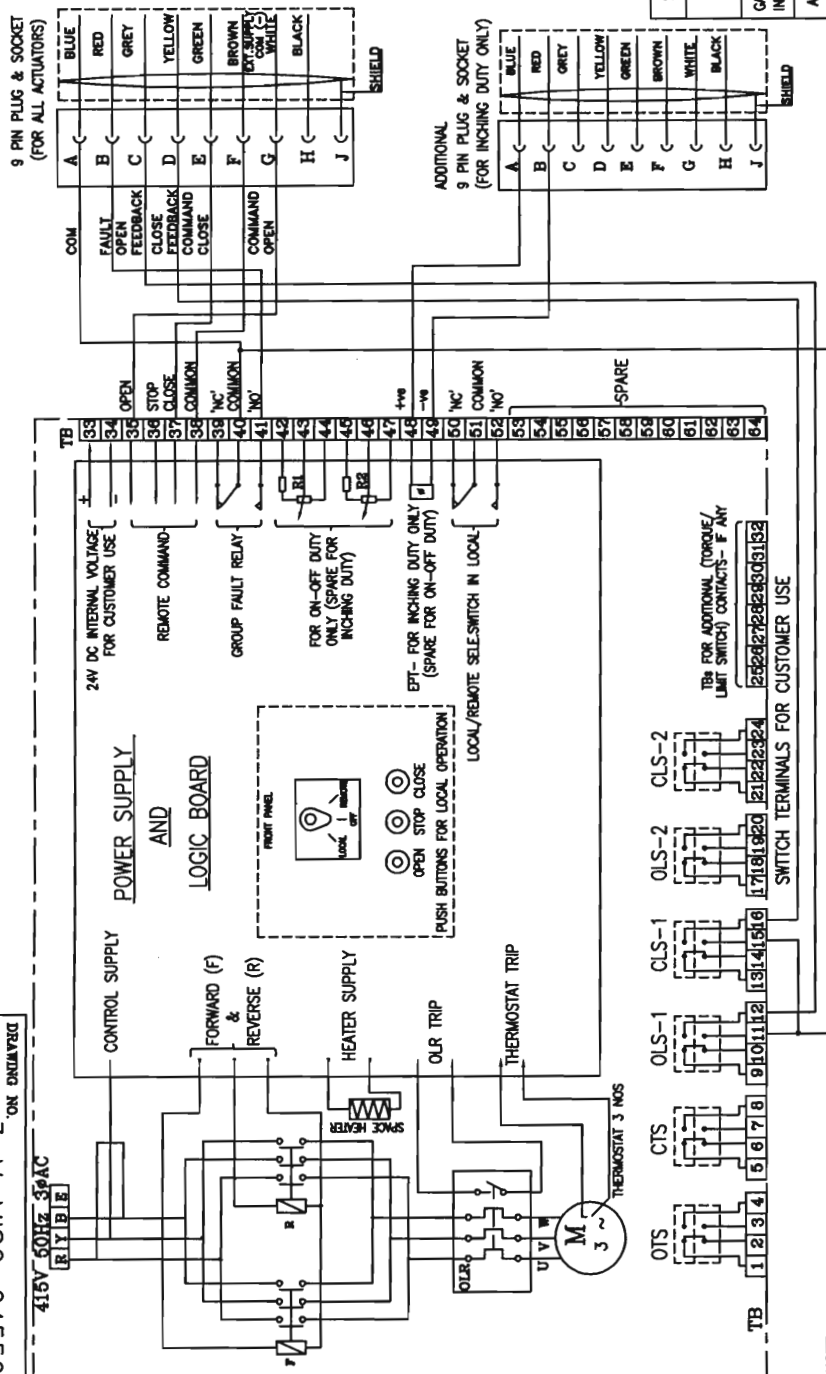
DRAWING NO. 3-V-MISC-24550

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	-----			
OLS-1	13-14	-----			
	15-16	-----			
OLS-2	17-18	-----			
	19-20	-----			
CLS-2	21-22	-----			
	23-24	-----			
SWITCH	TERMINAL NO.	FULL OPEN	VALVE POSITION		FULL CLOSE
			d	INTERMEDIATE	

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	CLS	OTS *	CLS	CTS
ALL OTHER GATE & GLOBE VALVES	CLS	OTS *	CTS	#
# - CLS NOT TO BE CONNECTED IN TRIP CIRCUIT				
* - BYPASS OTS FOR INITIAL 5% OF TRAVEL (FOR GATE VALVES ONLY)				

TYPE OF PRODUCT		ELECTRICAL VALVE ACTUATORS (AC) WITH INTEGRAL STARTERS	
OR NAME OF CUSTOMER/PROJECT		(DRAWN FOR INTERMEDIATE POSITION OF VALVES)	
Bharat Heavy Electricals Ltd.		Bharat Heavy Electricals Ltd.	
UNIT: HIGH PRESSURE BOILERS PLANT.		UNIT: HIGH PRESSURE BOILERS PLANT.	
TBS: 365-121		TBS: 365-121	
DEPT	VL	SCALE	NTS
CODE			
TITLE	WIRING DIAGRAM (TERMINAL PLAN)		
FOR ACTUATOR WITH INTEGRAL STARTER WITH PLUG & SOCKET			
CARD CODE	U 01	DRAWING NO.	3-V-MISC-24550
REV		REV	0

NOTE:-

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

Size A3

	TECHNICAL SPECIFICATION STEEL GATE, GLOBE AND NON RETURN VALVES	SPECIFICATION NO. PE-TS-020-100-M001	
		SECTION: II	
		REV. NO.: 00	DATE: 05.09.2017
		SHEET 1 OF 1	

SECTION-II

(COMPLIANCE SHEET)

	COMPLIANCE SHEET STEEL GATE/GLOBE/NRV- WATER SERVICE	SPECIFICATION NO. PE-TS-020-100-M016	
		SECTION : II	
		REV. NO.: 00	DATE: 06.09.2017
		Sheet 1 of 1	

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

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

B. Bidder to tick whichever is applicable:

Quoted for Category-A items of Data Sheet-A ☐	Quoted for Category-B items of Data Sheet-A ☐	Quoted for both Category- A & B items of Data Sheet-A ☐
--	--	---

C. Specify DUPLEX SS grade for items at Sl. No.3,4,12 of CAT-A and at Sl. No. 5,6,14,16 of CAT-B in Data Sheet-A (as applicable).

Sl.No. (As per Data Sheet-A)	Valve Type	Valve Size (NB)	Valve Material	Material Grade (To be filled by Bidder)
CATEGORY-A				
3	Gate valve (GV)	25	Duplex SS	
4	Gate valve (GV)	50	Duplex SS	
12	SCNRV	50	Duplex SS	
CATEGORY-B				
5	Gate valve (GV)	150	Duplex SS	
6	Gate valve (GV)	200	Duplex SS	
14	Globe valve (GLV)	150	Duplex SS	
16	Globe valve (GLV)	200	Duplex SS	

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

Name of Bidder / Authorized Representative :-

Designation :-

Signature:-

Company Seal :-

Date :-
