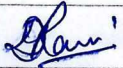


	Bharat Heavy Electricals Ltd Boiler Auxiliaries Plant Ranipet-632 406			FLUE GAS DESULPHURISATION DEPT TECHNICAL SPECIFICATION		
						
00	25-05-2020	Fresh Release	Diwakar Kumar Ravi		 Ashish Kushwaha	 V. Kesavan
REV	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED	
Clause No.	Requirement	Butterfly Valve (Wafer Type)				Vendor's Acceptance /Comments
1	Eligibility	Vendors having manufacturing facility in India are only eligible to quote for the offer.				
2	Scope of Supply	1) Manually Operated Butterfly valve with manual lever / gear box as applicable				
		2) Electrically Actuated Butterfly Valve with electric actuator- SIL2, Non-Intrusive, Integral Starter & with Profibus compatibility / Integral Starter & without Profibus compatibility – (Refer Tender) .				
		3) Pneumatically Actuated Butterfly Valve with Pneumatic actuator with equalizing valve + flow control valve +Air Lock Relay+ filter regulator with auto drain, metallic bowl +Check valve +JB +2 coil 5/2 solenoid valve+2nos DPDT limit switch +tubing & fitting + wiring + exhaust silencer + 1/4 "NPT (F) Ball Valve				
3	Application and Actuator selection	a) The valves are used in the slurry pipe of Wet Limestone based Flue Gas Desulphurization plant.				
		b)The property of flowing fluid are given below Specific gravity – 1.215; Viscosity – 0.03Pa.S; Concentration – 30 wt%; Max solid particle size - 150 mesh (140 micron); Normal solid particle size,d50 - 325 mesh (43 micron); Hardness - 5-7(Mho scale)				
		c)Hence Actuator to be selected 2.5 times the valve torque requirement				
4	Design Standards	1)Valve Design shall be as per EN593/API 609/ BS5155/ASME B16.34 Class 150				
		2) Valves testing as per EN12266 Rate A (No visible weeping or formation of drops or bubbles).				
		3) Valve flanges shall conform to ANSI B 16.5 CL 150 (EPDM lining to be extended to face of the flange).				
		4) Valve shall accommodate any actuator (manual gear box, pneumatic Or electric). Vendor to design the valve with actuator mounting flange dimension as per ISO 5211/ ISO5210 .				
5	Design	1) The valves as well as all accessories shall be designed for easy disassembly and maintenance.				
		2) For all types of valves, the design with shaft eccentric to the disc is preferred. Centric is also acceptable.				
		3) The shaft shall be solid type and shall pivot on bushings. Bushings/sleeve type bearings shall be provided in the hub of valve body.				

		4) At site Valves will be mounted in the open space, fasteners shall be atmospheric corrosion material						
		5) The bearing shall be self-lubricated type with low coefficient of friction and should not have any harmful effect on water and on valve components. Bearing should not be exposed to slurry medium.						
		6) All valves should have adjustable mechanical stop limiting devices to prevent over travel of valve disc in open/close position-vendor to confirm						
		7) In case of Pneumatic and Electric Actuated Valves, Clutching/Declutching arrangement to be provided for Manual override and same to be shown in the GA drawing. - Vendor to confirm						
		8) Lifting lugs shall be provided for all valves above NB150 size (6 inches).						
		9) For Manual operation, locking arrangement to be shown clearly in the drawing. Vendor to confirm						
		10) Disc Pin sizing and selection calculation to be submitted.						
		11) Valve Torque (VT) Calculation to be provided considering the following Bearing Torque, Centre of gravity Torque, Dynamic Torque, Hydrostatic Torque, Shaft off-set or eccentricity Torque, Packing and Hub Torque, Seating Torque, Unseating Torque, Total Opening and Closing Torque to be provided						
		12) Considering the slurry property (refer clause and factor of safety (FST) torque shall be be 2 times as that of VT (ie $FST=2 \times VT$)						
		13) The Actuator Torque (AT) finally selected shall deliver minimum 1.5 times as that of FST (ie $AT=1.5 \times FST$ or $AT=2.5 \times VT$)						
6	Provision for Manual Override	1) For Manually operated Valve: (i) handle will be sufficient for valve dia. upto 150mm, (ii) worm and worm wheel type gear box unit is required for 200mm and above						
		2) For Electrically operated valve: All valve shall be provided with worm & worm wheel (which would be default feature of electric actuator)						
		3) For Pneumatic valve: Upto 150mm hand lever & 200 and above, Worm and worm wheel. While operating hand lever, clutching arrangement should allow to rotate valve disc only and piston should be in same position.						
7	Valve & Actuator Mounting Position	1) Most of the valve are mounted in the Horizontal Direction in horizontal pipe. For horizontal mounting, Support Bearing to be provided in both Drive and Stub shaft (apart from thrust Bearing). 2) Actuator also mounted in the valve stem by 360 degree rotation – vendor to specify						
8	Locking Device	Provision for mechanical locking is required both in the open/close Position of the valve with fine adjustment.						
9	Design temperature	The valve is to be designed to withstand maximum 70°C						
10	Hydro test and Leakage rate	1) Valve working pressure 20 Bar						
		2) Body Test pressure 30 Bar and duration as per EN12266						
		3) Seat Leakage Test pressure: 22 Bar & duration as per EN12266 Rate A						
11	Material Of Construction	Fluid	Body	disc	Stem	Body Lining*	Valve shaft Seals	
		Gypsum Slurry	IS210 FG220	A182-F44 or CK3MCuN (or) CD3MWN -7A	Super Duplex2507	EPDM	Viton	
		Lime Slurry	IS210 FG220	A182-F60 or A995-CD3MN(4A)	Duplex2205	EPDM	Viton	

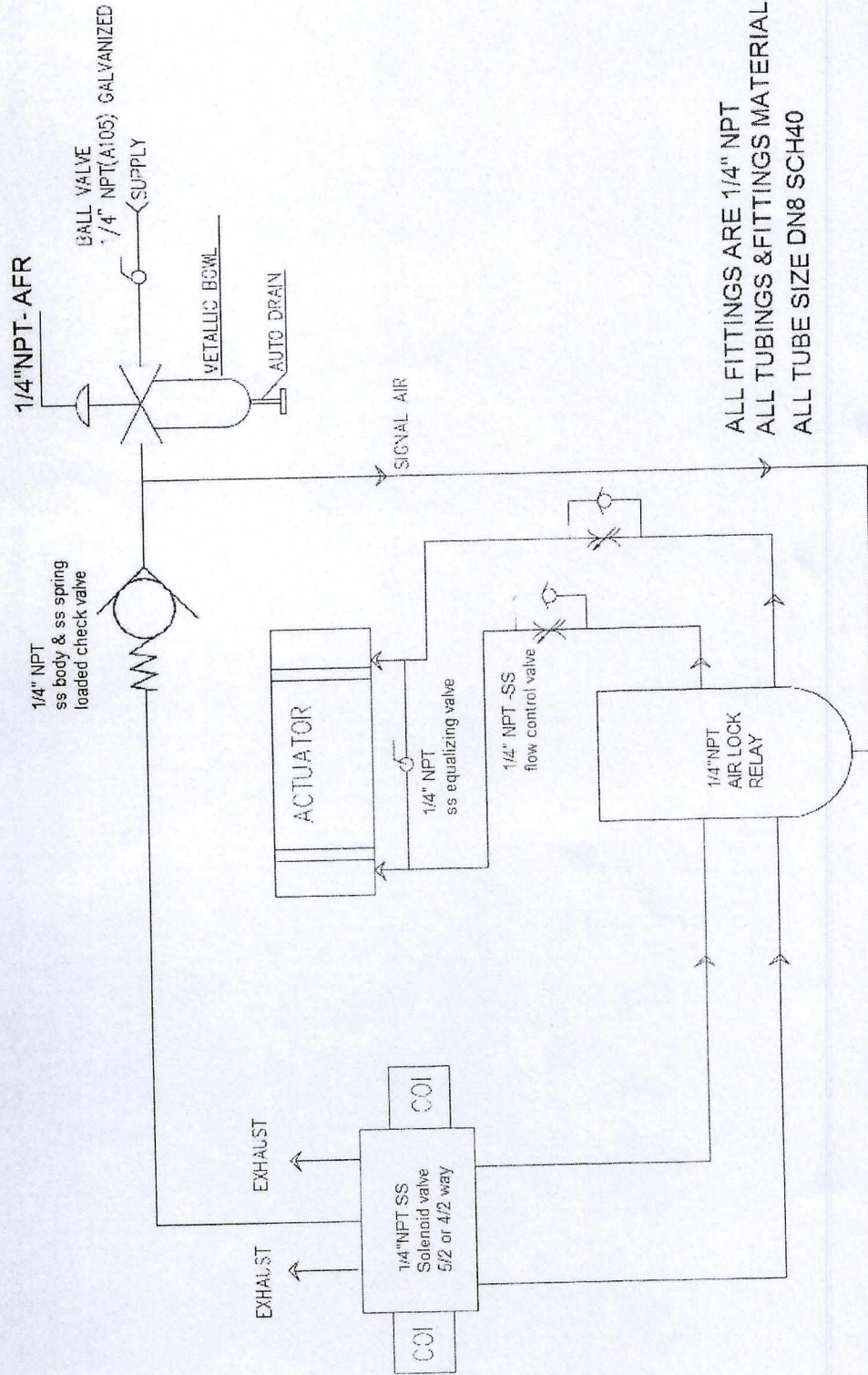
		Water/ Air	A216 WCB	13CR	13CR	EPDM	Viton	
		* EPDM lining for Valve upto NB150 shall be integrally moulded with body. For valve NB200 and above integral moulded lining is preferable , however vendor can offer replaceable cartridge type seat seal also						
		All connecting pin, fasteners in the flow path are similar to disc material.						
12	Depth of the valve	Face to Face dimension (depth of the valve) including body lining will be furnished by the vendor for each valve size. It should be as per API609 table 2						
13	Pneumatic Actuator specification	1a) Quarter turn, Pneumatic Double acting cylinder actuator to be designed considering the following						
		1b) One step higher sized cylinder to be selected considering internal resistance of piston sliding friction and rack & pinion/scotch yoke. It is assumed as 0.5kg/sqcm – vendor to indicate the internal resistance pressure						
		1c) The cylinder to be designed considering the instrument air pressure of 4 kg/sqcm						
		1d) The actuator selection shall be as per this specification clause 5 of SIno 11,12 & 13. – vendor to furnish the actuator torque selection calculation for each valve size along with offer						
		1e) The Actuator model along with catalogue to be furnished with exploded view highlighted with recommended seal kit and repair kit.						
		1f) Piton diameter and pinion or Yoke radius to be furnished along with offer – vendor to furnish for each valve size						
		(2) Two independent external travel stops permit easy and precise adjustment of +/- 5 deg in both directions.- vendor to confirm						
		3) Make :Rotex/Electro matic/Virgo/flowserve/Bray/Any renowned make subject to approval of BHEL/NTPC- Make to be specified during technical offer itself.						
		4) Drive mechanism Rack & Pinion/ Scotch yoke- vendor to specify						
		5) Air Tubing : DN8 SC40 –stainless steel (SS304) OD - 13.72mm, Wall Thickness – 2.235mm . Vendor to follow this tube size and confirm						
		6) Material of all Pneumatic Fitting shall be of SS 304/316 only.						
		7) All valves should have Local Position Indicator- vendor to confirm						
		8)All valves should have Manual Override and hand lever operated <=150 valve, and 200 and above should have declutchable gear operator provision- Vendor to confirm						
		9) Power Failure Position : Stay Put- vendor to confirm						
		10) Air Failure Position : Stay Put – vendor to confirm						
		11) Actuator Travel Time : Less than 10 seconds						
		12)Actuator Protection Class: IP-65 (Min.)						
		13)Mechanical seals of Pneumatic Actuator cylinder should be of "VITON" (Piston packing, Piston seal, Rod Packing, wipers & cushioning etc.)- vendor to confirm and same to be ensured in the drawing approval stage.						
		14)Wear Strip of Pneumatic Actuator piston should be of EPDM- vendor to confirm.						
		15) 2nos of DPDT (2 NO + 2NC) limit switch are to be provided, 1 for open and 1 for close position, Protection class : Weather Proof IP65, Rating: 24VDC / 230V AC, minimum 5A for 24V DC						
		16) ¼" NPT SS Flow control Valve : 2nos. (renowned make only)- vendor to specify the make and model						
		17)¼"NPT SS equalizing Valve vendor to specify the make and model no						

		18) 1/4" NPT- Air Lock relay (Double acting)-vendor to specify the make & model	
		19) 1/4" NPT (F) Ball Valve in pneumatic circuit before AFR	
		20) 1/4" NPT – SS body& SS spring loaded check valve(valve opening 0.1kg/cm2- vendor to confirm	
		21) 1/4" NPT Solenoid Valve: 5/2, Double Coil-Solenoid valve 24V DC.	
		22) Solenoidal Valves Body: SS 304/316 material.	
		23) Solenoidal valve should of renowned make –Avcon, Rotex, Asco. Any other make shall be subjected to BHEL/NTPC approval for which sample valve to be supplied to BHEL. If sample is not meeting the requirements of BHEL, then vendor to choose any one of the above make.	
		24) Cable from Solenoid to junction box: 3C X 1.5sqmm unarmoured HR PVC with FRLS property & with Al Mylar taped insulation required.	
		25) Limit switch cable: OD of the cable 4PX0.5sqmm shall be 10.5 ± 2mm unarmoured HR PVC with FRLS property & with Al Mylar taped insulation required.	
		26) 1/4" NPT Air Filter Regulator: Auto Drain AFR with Suitably sized Metallic bowl with sintered bronze filter element to be provided – vendor to specify make/model no	
		27) Filter regulator to be adjusted to any position as per the site requirement so that drain should be in downward direction.	
		28) Actuator axis shall be perpendicular to flow pipe axis.	
		29) Valve Open / Close position Locking arrangement required – so that valve will be in same position whenever actuator is taken for maintenance	
		30) All threading shall be "NPT".	
		31) All ferrules shall be of SS 304 material only.	
14	Junction Box (For Pneumatic operated valve only)	32) Lot of piping are coming side by side there is limited space, hence All Pneumatic accessories to be compactly arrange along with PN actuator. General arrangement drawing in 3D along with valve & pneumatic fittings with all accessories to be provided during the technical offer.	
		1) FRP junction box(JB) Wall thickness 4mm(min) – vendor to confirm	
		2)JB with 2x12 terminals (600V grade) with proper lugs and ferrule – vendor to confirm	
		3) Double compression metallic cable glands- 4NOS OF 4 PAIR X 0.5 and 3 nos. of 3 coreX1.5sqmm (totally 7 nos)	
		4) In the JB, all glands are mounted such that water should not enter (cable bottom entry & glands face downward)	
		5) Cable: All Wirings from limit switches, solenoid valve to JB with proper cable gland shall be pre-assembled at vendor works.	
		6) Working voltage: 24V DC, 110 or 240V AC	
15	Electrical Actuator	7) Protection Class: Finally wired JB has to meet IP 55.	
		a) Electrical Actuator with SIL2, Non-Intrusive, Integral Starter & with Profibus compatibility as per TECI:NTPC:ELEC-ACT:OCIS Rev00 – refer Indent /Enquiry	
		b) Electrical Actuator with Integral starter & without profibus compatibility as per TDA:STD:DAE:OCIS REV04 –refer Indent/Enquiry	
		c)Depending on the customer requirement (a) or (b) - order will be placed- vendor to quote for both option as per indent/Enquiry	

16	Documents to be submitted during technical offer	1) Point wise acceptance and deviations (if any) of this specification.	
		2) Vendor to submit duly filled, sealed & signed all pages & applicable datasheets as below (enclosed in this specification): a) Manual Datasheet : BFV-MAO-DSH REV00 b) Pneumatic Datasheet : BFV-PNO-DSH REV00 c) SIL2 Electrical Datasheet : BFV-ELO-DSH REV00 d) Integral Starter Electrical Datasheet : BFV-INT-STR-ELO-DSH REV00	
		3) Previously supplied BFV reference list for the offered models with PO copies	
		4) Valve Torque (VT) Calculation to be provided considering the following: Bearing Torque, Centre of gravity Torque, Dynamic Torque, Hydrostatic Torque, Shaft off-set or eccentricity Torque, Packing and Hub Torque, Seating Torque, Unseating Torque, Total Opening and Closing Torque to be provided otherwise offer will not be considered.	
		5) Actuator torque calculation & selection basis to be provided.	
		6) GA drawing showing all accessories with BOM & cross sectional view along with actuator, manual override & valve locking arrangement. otherwise offer will not be considered. And also General arrangement drawing in 3D along with valve & pneumatic fittings with all accessories to be provided.	
		7) Electric Actuator Data sheets with wiring diagram as per tender specification format	
		8) Valve Regulation Characteristic Curve & CV calculations.	
		9) Pneumatic circuit diagram comprising of all pneumatic accessories and electrical wiring diagram consisting of Limit switch+ solenoid+ JB for Pneumatically operated Valve	
		10) POD Test Certificate for all offered sizes of valve to be submitted, in the absence of which actual P.O.D. test shall be conducted by the bidder in the presence of Employer's representative.	
		11) compliance to BHEL SQP by vendor's seal and signature	
		12) List of Commissioning spares required & its make and model number. Its cost to be included in the main offer	
		13) Latest Valve catalogue	
17	Documents to be approved before manufacturing	a) GA drawing showing all accessories with BOM & cross sectional view along with actuator, manual override & valve locking arrangement –for BHEL/NTPC Approval	
		b)Valve Actuator Data sheet with wiring diagram - for electrically actuated valves - for BHEL/NTPC approval	
		c)Junction box drawing with TB and double compression cable gland - for BHEL/NTPC approval	
		d)Pneumatic circuit diagram & Electric wiring diagram – for Pneumatically operated valves - for BHEL/NTPC approval	
18	Name plate	Name plate has to contain the following details. 1) Tag Numbers____ 2) MOC: Disc____ and stem_____ 3) BFV size____ and Rating_____ 4) Torque requirement_____ 5) BHEL material code (Indent No / P.O.Ref.) 6) Manufactures details :vendor Name____Batch no____Val.SINo	

		7) Approximate weight including actuator (as applicable) in kgs	
19	Inspection	Inspection shall be as per the approved BHEL's standard quality plan SQP NO: FGD: 707 REV03 and will be carried out by Customer/BHEL/BHEL's authorized agency at vendor works.	
20	Painting Procedure	i)Surface preparation– Power tool cleaning to St3 (SSPC-SP3). ii)Primer- two coat of Red Oxide Zinc Phosphate Primer to IS: 12744 DFT-25μ/coat iii)Intermediate:One coat of Synthetic Enamel undercoat to IS:2932-30μ iv)Finish paint- Two coats of Synthetic Enamel to IS 2932 Shade: Grey white RAL 9002 DFT- 35μ/ coat Total DFT=150 micron.	
		a) Any change in the Painting scheme will be informed to vendor during Addendum release stage/Drawing approval stage. Vendor to confirm	
		b) Note: Painting not required for SS parts, GI parts (GI bolts if used shall be 40 micron and above , Any other parts made up of GI, zinc coating thickness shall be more than 85 micron)	
21	Packing	Valve assembly shall be wrapped in polythene bag and packed in a strong rigid wooden box. Rain water should not enter into the packing of actuators during storage in the outer yard of power plant.	
22	Outside the box	PO number, vendor name, item size, material code, model number, Quantity inside the box to be mentioned.	
23	General Instruction	1) All Necessary material test certificates to be produced at the time of inspection for Valve body, Disc, stem, seals, Viton seals, Limit switch, Air Filter regulator, Air cylinder or Electric Motor, Solenoid valve etc .	
		2) Only latest revision shall be referred for all the Standards specified.	
		3) After the receipt of offer, All vendors will be assessed by BHEL team and further processing of offer is based on the team's reports and recommendation. This is mandatory for all vendors	

PNEUMATIC CIRCUIT DIAGRAM



ALL FITTINGS ARE 1/4" NPT
ALL TUBINGS & FITTINGS MATERIALS ARE SS304
ALL TUBE SIZE DN8 SCH40

Artish Kushwaha
(BHEL)

Dilwan Kumbhar
(BHEL)

V. K. Sharma
(BHEL)

