TECHNICAL PROCUREMENT SPECIFICATION	32654-14-PS-001
	PAGE 1 OF 1 | R1

TPS No.	32654-14-PS-001
STATUS	■ ENQUIRY ☐ COMMITMENT
ORIGINATING DEPT.	INSTRUMENTATION
P.O. / W.O. No.	
PROJECT	Construction of additional Ammonia Barge
LOCATION	KOCHI
CLIENT	M/s FACT-CD
PURCHASER	M/s FACT-CD
VENDOR	

ITEM : Control valves (Shut down valve)

REV.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
3					
2					
1	08.09.21	FOR ENQUIRY	AB	MKZ	MS
0	09.10.20	FOR ENQUIRY	DCK	MKZ	MS

00FT010/00

FACT ENGINEERING AND DESIGN ORGANISATION

TECHNICAL PROCUREMENT SPECIFICATION	**ATTACHMENTS**	32654-14-PS-001 PAGE 1 OF 1 R0

TPS No. 32654-14-PS-001

Sl. No.	Doc. No.	Description	No. of pages	Rev. No. with issue			
				1	2	3	4
1	32654-14-PS-001 IS	Equipment/ items to be supplied	1	0	0		
2	32654-14-PS-001 INS	Scope of inspection and tests	2	0	0		
3	00 ES 001/03	Vendor data submission procedure	3	-	0		
4	32654-14-PS-001 VDR	Vendor data requirements	2	0	1		
5	32654-14-PS-001 VDI	Vendor data index	1	-	0		
6	32654-14-PS-001 SPL	Special requirement of the project	3	0	0		
7	32654-14-DA-00001	Data sheet for control valves	1	0	0		
8	32654-14-DA-00002	Data sheet for SOV	1	0	0		
9	14ES002/94	Engineering Specification for Control Valve	6	-	0		
10	14ES003/94	Engineering Specification for SOV	1	-	0		
11	32654-14-PS-001 SPR	Spares	1	0	0		

Note : 1. The receipt of all attachments shall be checked and ascertained.

2. All attachments of this TPS shall be retained since only revised sheets, if any, shall be issued.

REV.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
3					
2					
1					
0	08.09.21	FOR ENQUIRY	AB	MKZ	MS

00FT011/00

FACT ENGINEERING AND DESIGN ORGANISATION

FACT FEDO

TECHNICAL PROCUREMENT SPECIFICATION	**EQUIPMENT / ITEMS TO BE SUPPLIED**	32654-14-PS-001 IS PAGE 1 OF 1 R0

TPS NO. 32654-14-PS-001

Sl. No.	Eqpt. No. / Tag No.	Description	Qty.	Remarks
A	**-**	**Liquid ammonia service valves-80 NB as per data sheet (32654-14-DA-0001,326554-14-DA-00002,32654-14-PS-001 SPL INST)**		
1	XPV-301A	Shutdown Valve with accessories	1 Set	
2	XPV-301B	Shutdown Valve with accessories	1 Set	
3	XPV-302A	Shutdown Valve with accessories	1 Set	
4	XPV-302B	Shutdown Valve with accessories	1 Set	
5	XPV-303A	Shutdown Valve with accessories	1 Set	
6	XPV-303B	Shutdown Valve with accessories	1 Set	
7	XPV-304A	Shutdown Valve with accessories	1 Set	
8	XPV-304B	Shutdown Valve with accessories	1 Set	
B	**-**	**Vapour ammonia service valves-80 NB as per data sheet (32654-14-DA-0001,326554-14-DA-00002,32654-14-PS-001 SPL INST)**		
	XPV-301C	Shutdown Valve with accessories	1 Set	
	XPV-302C	Shutdown Valve with accessories	1 Set	
	XPV-303C	Shutdown Valve with accessories	1 Set	
	XPV-304C	Shutdown Valve with accessories	1 Set	
C	**-**	**Spares**		
1	-	Spares for Liquid ammonia service valves As per 32654-14-PS-001 SPR-INST	1 Lot	
2	-	Spares for Vapour ammonia service valves As per 32654-14-PS-001 SPR-INST	1 Lot	

REV.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
3					
2					
1					
0	09.10.20	FOR ENQUIRY	DCK	MKZ	MS

FACT ENGINEERING AND DESIGN ORGANISATION

00FT012/00

INSTRUMENTATION DEPARTMENT	SCOPE OF INSPECTION AND TESTS	32654-14-PS-001 SIT INST	
		Page 1 of 2	R0

PROJECT: Construction of additional Ammonia Barge

ITEM : Shutdown valve and accessories

EQPT NO.

The following inspection and test shall be conducted and records to be submitted

Sl.No	Description	Inspection. Required	Witness Reqd	Remarks
	INSTRUMENT VALVES (CONTROL AND ON-OFF)			
1.0	Visual inspection for valve assembly	$	$	
2.0	Dimensional inspection for valves and accessories	$ $		
3.0	Material test certificate for valve(and accessories if applicable)	$	*	
4.0	Hydraulic test 100% (Shell test, seat leakage test etc)	$ $		
5.0	Certificate for electrical code (SOV, ~~positioner,~~ Limit switches, cable glands, inbuilt junction boxes, ~~intrinsic safe certificate for any barriers in case of Namur sensors etc~~)	$	*	
6.0	Weather proof certificate (SOV, positioner, Limit switch Cable glands, junction boxes if any etc)	$	*	
7.0	Functional test (SOV, ~~positioner~~, limit switches~~, partial stroking, Position transmitter~~, other contacts if any etc)	$ $		
8.0	Bought out item test certificates- (Solenoid valve, ~~positioner~~, air filter regulator etc) from OEM	$	*	
~~9.0~~	~~IBR Test certificate for steam service~~	~~$~~	~~*~~	
	AIR FILTER REGULATORS			
1.0	Visual inspection	$	$	
2.0	Performance test accuracy	$	$	
	INSTRUMENT TUBES/ PIPES/ FITTINGS			
1.0	Visual inspection	$	$	
2.0	Dimensional inspection (Note 1)	$	$	
3.0	Material test certificate	$	*	
4.0	Hydraulic/ pneumatic test report (Note 2)	$	*	

REV	DATE	DESCRIPTION	PRPD	CHKD	APPRD
0	09/10/20	FOR ENQUIRY	DCK	MKZ	MS

FACT ENGINEERING AND DESIGN ORGANISATION

14FT942/15

Sl.No	Description	Inspection. Required	Witness Reqd	Remarks
Note –1	ID of ferrule by GO/NOGO gauge, pipe thread by plug and ring gauge, interchangeability of ferrule nut.			
Note-2	Also ferrule tightening test to be carried out.			

$ - Manufacturer shall conduct their standard inspec tion as part of their 'quality assurance' program and shall fur nish inspection reports for review. If requ ired, witness inspection will be conducted by purchaser's representative.

*Report review

General notes

Witnessed inspections at the factory for each instrument shall be as follows:

a) Inspection method for all instruments shal l be in acc ordance with client/consultant approved QAP.
b) Verify that the instruments comply wit h the approved sp ecification(s) and datasheet(s).
c) Visual ins pection shall include checki ng of labels and nameplates, painting, connection sizes, general workmanship etc as applicable.
d) Pressure test shall be carried out by M anufacturer according to t he des ign pressure indicated on the specification data sheets and codes requirements.
e) Pressure test certificat es shall be made available by the Ven dor at the time of equipment inspection and delivery.

INSTRUMENTATION DEPARTMENT	VENDOR DATA REQUIREMENTS	32654-14-PS-001 VDR INST	
		Page 1 of 2	R1

PROJECT:	Construction of additional Ammonia Barge
CLIENT:	FACT
ITEM:	Control valves (Shut down valve)
STATUS ENQUIRY/	~~COMMITMENT~~
PO NUMBER	

SL NO.	GRP. CODE	DESCRIPTION	OFFER	AFTER COMMITMENT				FINAL
			QTY	QTY	Lead Time In Weeks*			QTY
					Reqd	Prop	Agrd	
1	B	Manufactures catalogues with detailed technical specification, material etc for valve and all accessories	3P	1P+1S	4			3P+1S
2	B	List of deviations	3P					
3	B	Recommended spare parts list (BOM)	3P	1P+1S	4			3P+1S
4	B	Quality plan for valve and accessories (Bought out items)	3P	1P+1S	6			3P+1S
5	B	Production program	3P	1P+1S	6			3P+1S
6	B	Control valve specification data sheet	3P	1P+1S	6			3P+1S
7	B	Bought out item specification data sheet, OEM catalog, drawings etc	3P	1P+1S	8			3P+1S
8	A, B	Instrument air consumption details	3P	1P+1S	8			3P+1S
9	A,C	Dimensional outline drawings of valve and accessories	3P	1P+1S	8			3P+1S
10	A,B, C	Schematic wiring and termination drawings	3P	1P+1S	8			3P+1S
11	A, B	Air piping hookup drawings	3P	1P+1S	8			3P+1S
12	A, B	Electrical hookup drawings (For solenoid valve, electro hydraulic actuator etc)	3P	1P+1S	8			3P+1S
~~13~~	A, ~~B~~	~~Details of Power requirement (For electro hydraulic actuators)~~	1P+1S	~~———~~	~~8~~			~~3P+1S~~
14	B,C	Performance/ calibration test, Hydraulic, seat leakage test, functional test certificates, NDE/ NDT reports	1P+1S		2BDM			3P+1S
15	B,C	Material test report		1P+1S	2BDM			3P+1S

REV	DATE	DESCRIPTION	PRPD	CHKD	APPRD
1	08/09/21	REVISED FOR ENQUIRY	AB	MKZ	MS
0	09/10/20	FOR ENQUIRY	DCK	MKZ	MS

FACT ENGINEERING AND DESIGN ORGANISATION

14FT913/15

16	C	Detailed spare parts list for future requirement	1P+1S		8			3P+1S
17	C	Installation, operation, commissioning and maintenance manual	1P+1S		(1)			3P+1S
18	C	Third party certificate CCOE, ~~IBR, SIL, Fire safe design for valve etc~~	1P+1S					3P+1S
19	B,C	Control valve capacity (Cv) calculation, noise calculation actuator sizing calculations, Inlet/ outlet velocity etc	1P+1S		8			3P+1S
20	B	Inspection and test procedure	3P	1P+1S	8			3P+1S
~~21~~	~~C~~	~~All documents and drawings in CD~~	1S	~~—~~	~~(1)~~			~~2S~~

Group code:

A- For review and detailed engineering,
B- For review,
C- For information and record document type:
R- Reproducible,
P- Print,
M- Microfilm
S- Soft (CD/DVD)

Notes:

@ Vendor shall fill in proposed lead-time if different from the required lead-time.
@@ Each set of final documents shall be submitted in a folder. Two such folders shall be packed and dispatched with the equipment
(1)-dispatched along with instrument/ system
BDM- Before dispatch of material
*To be optimized to supply the items as per the time schedule in NIT.

1.0.0. SCOPE

1.1.0. This document together with "VENDOR DATA REQUIREMENTS (VDR)" defines FEDO's requirements for vendor drawing and data for any enquiry, work order or purchase order.

1.2.0. Bidders unable to comply with these requirements must detail all exceptions in their proposal. The timely delivery of quality drawings and data is as crucial as delivery of the equipment itself and hence the same shall be strictly adhered to after commitment.

1.3.0. Failure to provide adequate preliminary data / drawing may render a proposal non-responsive and hence may be rejected. After commitment failure to provide documents as per purchase order may delay progressive payments and adversely affect future invitation to bids.

2.0.0. VENDOR DATA REQUIREMENTS (VDR)

2.1.0. FEDO will provide a partially completed VDR form along with each enquiry. This form explains group code of the document, quantity of each document required and lead time for submission. Columns are available for the vendor to fill in his deviations, if any, from FEDO's requirements.

2.2.0. The vendor shall forward a filled-in VDR form along with his offer, if he has got any deviation from FEDO's requirements. In the absence of a filled-in VDR form along with the offer, it will be presumed that the vendor is accepting FEDO's requirements specified in the VDR.

3.0.0. CLASSIFICATION OF DOUCMENTS

3.1.0. Documents are classified based on their status and nature of content.

3.1.1. Status of documents:

1. Preliminary documents required along with the offer.
2. Documents to be submitted after commitment.
3. Final documents.

3.2.0. The documents are further classified into Groups A,B and C, depending on the nature of the documents as explained below.

3.2.1. Group A requirements

These documents are urgent in nature and contains information that are required for proceeding with the detailed engineering of surrounding/down stream equipments in the plant and hence are to be submitted on priority basis.

3.2.2. Group B requirements

These documents are to be reviewed by FEDO for compliance with the purchase order / work order specifications but are not essential for other engineering activities of FEDO.

3.2.3. Group C requirements

Documents in this group contains data / information / records which are final in nature and that are required for the equipment user and need not be reviewed by FEDO.

4.0.0. VENDOR DATA INDEX (VDI)

4.1.0. Vendor shall forward a filled up and updated VDI along with each vendor data transmittal. VDI shall list out all documents that are being prepared for the particular order, their current revision status and indicate the documents included in the present transmittal. A blank VDI is attached along with this document which shall be used for this purpose.

5.0.0. QUALITY OF VENDOR DRAWINGS

5.1.0. vendor drawing and data shall be supplied in full size drawings, reproducibles and CDs as specified in the VDR.

5.2.0. All drawings / documents shall be clear, legible, right reading and made out of originals prepared in black ink. English language and metric units shall be used for the preparation of all documents.

5.3.0. The documents shall be prepared n any of the following standard sizes.

5.3.1. A1: 594 mm x 840 mm
5.3.2. A2: 420 mm x 594 mm
5.3.3. A3: 297 mm x 420 mm
5.3.4. A4; 210 mm x 297 mm

5.4.0. All documents submitted to FEDO shall be folded into A4 size (210 x 297 mm) except originals/ reproducibles which may be rolled. All reproducibles shall be in high quality polyester films. Soft copies shall be furnished in CD for final drawings/documents.
5.5.0. Each drawing / document shall have a title block at the right hand bottom corner with the following information.
5.5.1. Name of Vendor.
5.5.2. Name of Project, Owner and location.
5.5.3. Name of Consultant: FEDO
5.5.4. FEDO Purchase Order Number.
5.5.5. Equipment name and number.
5.5.6. Drawing title.
5.5.7. Drawing number, revision and page number.

5.6.0. All drawings shall be drawn to some standard scales only and the same shall be indicated in the drawing.
5.7.0. The status of the document like "PRELIMINARY, FINAL, FOR REVIEW" etc. shall be stamped on all copies forwarded to FEDO.
5.8.0. All documents shall have a block of 100 mm x 100 mm space left vacant for FEDO to put their stamp after review.
5.9.0. All drawing/document shall have a revision block explaining revision number, revision description, data of revision, revision authorization etc. When the revised drawings are submitted all currently revised area shall be clearly demarcated by clouding. Any revisions made on other parts of the documenting will not be reviewed by FEDO.
5.10.0. When drawings are received back from FEDO with comments, vendor shall incorporate all the comments and resubmit the same. If the vendor is not in a position to incorporate certain comment made by FEDO, then the reason for such deviation shall be highlighted in the forwarding letter to FEDO.

5.11.0 The respective engineering specification and other purchase order spec. will explain the minimum data / details required in various drawings. In the absence of any such information in the purchase order documents, vendor shall follow the standard good engineering practices in detailing the drawing.

6.0.0. CONDITIONS OF FEDO REVIEW

6.1.0. FEDO and / or its client reserve the right to review the vendor documents. FEDO's REVIEW WITH OR WITHOUT COMMENTS OF THE VENDOR DOCUMENTS SHALL NOT RELIEVE THE VENDOR OF RESPONSIBILITY TO COMPLY WITH ALL PURCHASE ORDER TERMS AND CONDITIONS, including all implied requirements relating to fitness for service and good engineering practices. Approval or acceptance does not imply or infer any determination relating to compliance by the vendor with its full responsibilities under the purchase order.

6.2.0. FEDO's comments are limited to identifying requirements within the scope of the purchase order or failure by the vendor to comply with the requirements of purchase order, as revealed by the limited review. Oversights in the above limited review cannot be taken as approval for the vendor to deviate from the purchase order conditions. FEDO reserve the right to point out any such deviations at any stage of the order execution. The vendor shall comply with all such requirements without any price / delivery implications.

6.3.0. FEDO review will be authorized by an official stamp as given below, properly filled and signed by the concerned. Comments if any will be indicated in red ink or clouded in the case of copies of commented drawings.

Appropriate comment in the 'comments' column and 'status of review' column will be marked.

Comment	Status of Review
As noted	Revise and resubmit for review
No comments	Proceed as noted and submit revised docs. For records
Not reviewed	No further review required
	Forward final docs. as per P.O.

6.4.0. All documents received in FEDO shall be dispatched after review within 15 days from the date of receipt. Vendor shall notify FEDO of non receipt of reviewed documents in time immediately, to take corrective actions.

6.5.0. The delivery of the equipment shall in no case be linked with the review of the vendor drawings and data by FEDO. It is the sole responsibility of the vendor to execute the job as per the purchase order conditions. If required the vendor shall depute his technical personnel to FEDO after submission of documents for timely finalisation of documents.

TECHNICAL PROCUREMENT SPECIFICATION	**VENDOR DATA INDEX**	32654-14-PS-001 VDI PAGE 1 OF 1 | R0

PROJECT : Construction of additional Ammonia Barge PROJCT No. : 32654 VENDOR :

ITEM : CONTROL VALVE AND ACCESSORIES P.O. No. :

Sl. No.	Doc. / Drawing No.	Description	Rev. 0 / Date	Rev. 1 / Date	Rev. 2 / Date	Rev. 3 / Date	Rev. 4 / Date	Rev. 5 / Date	Relevent to this issue

ISSUE No.										
DATE										
SIGNATURE										

00FT020/00

FACT ENGINEERING AND DESIGN ORGANISATION

1.0 The Following requirements apply for t he shutdown v alves (SDV) indicated in data sheet no. 32654-14-DA-00001.

2.0 Vendor s hall fill the "Vendor conf irmation colum n' against each of the requirements and submit for revi ew of PM C/ OWNER before finalizing the order for SDV. Further, vendor s hall strike out clauses whic h are not complied or not applicable wherever possible against each of the requirements mentioned below.

3.0 All s imilar items (ie valves, actuator s and sub components) shall be from same OEM to reduce the inventory spares.

4.0 The vendor shall confirm submission of QAP for the assembly as well as for components from OE M for review and appr oval of PM C. Sample inspection and test requirements are specified in 32654-14-PS-001 SIT INST.

5.0 Vendor shall submit a ll documents and dr awings as mentioned in document 32654-14-PS-001 VDR INST.

6.0 Vendor shall supply spares as per document 32654-14-PS-001 SPR INST.

7.0 These shutdown valv es are intended for operation in both directions du ring loading and unloadin g situation. The proc ess data is given below for diff erent operating modes. Vendor shall c heck and confirm the suitability of the valve in al l the cases.

Parameter		Units	Case 1 Loading (Forward flow)	Case 2 Unloading (Reverse flow)	Case 3 Depressurizatio n (Forward Flow)	Case 4 Transportation (No Flow)
Liquid Service Valves	Upstream Pressure	kg/cm^2 (G)	2.0 6		6	1
	Sizing Pressure Drop	kg/cm^2	0.2 0.2		-	-
	Temperature	^oC	(-)33 to 40	(-)33 to 40	(-)33 to 40	(-)33 to 40
	Shutoff Pressure	kg/cm^2 (G)	9.52 22.97		6 (Valve under Closed state)	22.84 (Valve under Closed state)
Vapor Service Valves	Upstream Pressure	kg/cm^2 (G)	1.0	6	1 to 6	1
	Sizing Pressure Drop	kg/cm^2	0.2 0.2		0.2	-
	Temperature	^oC	(-)33 to 40	(-)33 to 40	40	(-)33 to 40
	Shutoff Pressure	kg/cm^2 (G)	9.52 22.97		6	22.84 (Valve under Closed state)

8.0 All the Valves shall be su itable for bidirectional s ervice since the f low is reversed in different operating modes.

9.0 SDVs shall be supplied in completely factory assembled and tubed condition with all accessories.

10.0 The open and close limit switches of the valve shall be terminated in a housing attached permanently with the valve actuator. The housing shall be suitable for the hazardous area indicated. The housing shall have cable entry (2no) one with cable gland and other one plugged. The MOC of cable gland shall be SS304.

11.0 The valve shall have local indication for quickly identifying the open and close position of the valve.

12.0 The actuator shall have sufficient extension from the body of the valve to accommodate cold insulation (80mm thick) on pipe as well as valve body.

13.0 Valve actuator (Piston/ cylinder) orientation shall be parallel to the pipe line.

14.0 Actuator shall be selected at full differential pressure and with 30% factor of safety. Actuator selection/ torque calculation to be furnished.

15.0 Stroke time of valves shall not exceed 30Sec. If this criterion is not met alone by venting through the solenoid valve, an additional quick exhaust valve shall be installed in the pneumatic circuit without any additional implications to owner.

16.0 Name plate shall be provided on all components and on valve indicating the tag number, permanently attached. Tag numbers are given below:
Liquid service valves: Total 8 nos

Valve Tag numbers	Solenoid Valve Tag numbers
XPV-301A USY-301	A
XPV-301B USY-301	B
XPV-302A USY-302	A
XPV-302B USY-302	B
XPV-303A USY-303	A
XPV-303B USY-303	B
XPV-304A USY-304	A
XPV-304B USY-304	B

Vapour service valves: Total 4 nos

Valve Tag numbers	Solenoid Valve Tag numbers
XPV-301C USY-301	C
XPV-302C USY-302	C
XPV-303C USY-303	C
XPV-304C USY-304	C

17.0 Additional specifications are mentioned below:

SL NO	DESCRIPTION	Vendor confirmation
1.	Tubing : SS316 6mm OD 1mm thick wall	
2.	Fittings : MOC SS316	
3.	Painting/ Colour : Red	
A.	Accessories with actuator	

SL NO	DESCRIPTION	Vendor confirmation
1. Mounting bracket		
2.	Hand wheel for manual override (LEVER)	
3.	Air Filter regulator -2” pressu re gauge with 0-10kg/cm2, 1/4" NPTF air supply connection, Manual drain, SS body, 5 micrometer sintered bronze filter, Mounting on actuator bracket	
4.	Solenoid valve : 3 Way universal type with freewheeling diode across coil.	
5.	Limit switches: Separate open and close micr o swit ch r equired (2 no for each valve), SPDT gold plated contact, 24V 2A contact rating,	

DATA SHEET	CONTROL VALVE (SHUTDOWN VALVE)							32654-14-DA-00001 PAGE 1 OF 1 R0		
Units	Flow: liq.(1) kg/hr (2) ~~m^3/hr~~, Gas- Nm^3/hr			Steam-kg/hr	Pressure - kg/cm^2g		Density-kg/m^3			0
General	Tag number			*	*					1
	Line size &schedule/ material			80NB&Sch 40/A333Gr1	80NB&Sch 40/A333Gr1					2
	Quantity (nos.)			8	4					3
	Service			Liquid Ammonia	Vapor Ammonia					4
	P&ID ref drawing			32654-11-PD-001	32654-11-PD-001					5
	Fluid & state			Anhydrous ammonia	Liquid	Anhydrous ammonia	Vapour			6
	Area classification			IEC Zone 1 Gr IIA T1	IEC Zone 1 Gr IIA T1			IEC Zone Gr T		7
Process data	Flow	Min	Max Design	33761 (nor) /40513/	198.65 (Nor)/238.38/			/	/	8
	Inlet pre.	Min	Max Design	/ * /	/ * /			/	/	9
	Outlet	Min	Max Design	/ * /	/ * /			/	/	10
	Temp. °C	Min	Max Design	-33 / /	/ 40 /			/	/	11
	ΔP sizing	Δ P shut off		0.2	*	0.2	*			12
	Density	Cmp.factor	Mol.wt	683 /	/17.03	472 /	/17.03	/	/	13
	Flash %	Op.visc.c P		-	0.291	-	0.0089			14
	°C of superheat	% solids		-	-	-	-			15
	Vap.pr. kg/cm^2a	Crit. Press								16
	Cv.	nor.	max. valve	MTS/ MTS /MTS		MTS/ MTS /MTS		/	/	17
	Noise level to be < 90 dBA			Required		Required				18
	Velocity	Inlet	Outlet	MTS	MTS	MTS	MTS			19
Body	Type of valve			Ball		Ball				20
	Body size	Port size		80 NB	Full bore	80 NB	Full bore			21
	Guiding	No.of ports		Top	1	Top	1			22
	End connection ANSI			300# Small Grove		300# Small Grove				23
	Body material			A352Gr LCB		A352Gr LCB				24
	Bonnet type			Mfr Std		Mfr Std				25
	Packing material			Teflon		Teflon				26
	Trim form	Trim type		On off	-	On off	-			27
	Trim material - plug & seat			A351Gr CF8M, RPTFE		A351Gr CF8M, RPTFE				28
	Tight shut off class			FCI 70.2 Class…VI		FCI 70.2 Class…VI		FCI 70.2 Class…		29
	Flow tending to			-		-				30
	%opening @min/nor/max flow			- / - /-		- / - /-		/	/	31
Actuator	Type			Piston With Rack &Pinion		Piston With Rack &Pinior				32
	Close at	Open at		MTS	MTS	MTS	MTS			33
	Fail position			Close		Close				34
	Handwheel & location			Yes	Mfr Std	Yes	Std			35
Positioner	Air supply pressure			3.5 Kg/Cm2 (Min)		3.5 Kg/Cm2 (Min)				36
	Input	Output		-	-	-	-			37
	Bypass Gauges			-	-	-	-			38
	Partial stroke test feature			-	-	-	-			39
I/P	Input	Output		-	-	-	-			40
Options	Solenoid valve	Limit switch		Yes	Open&Close	Yes	Open&Close			41
	Airset,gauge,filt	Air lock relay		Yes	-	Yes	-			42
	Tracing Jacketting			-	-	-	-			43
	Quick exhaust valve			-	-	-	-			44
Certifica	IBR	Calibration		-	Required	-	Required			45
	Material test	Hydro test		Required	Required	Required	Required			46
	Fire safe desigr	W/p, E/P		No	Required	No	Required			47
Model	Valve	Actuator		MTS	MTS	MTS	MTS			48
	Positioner	I/P tranaducer		-	NA	-	NA			49
	Quick exhaust v	Sol. Valve		-	MTS		MTS			50

MTS- Mfr to specify

* Refer 32654-14-PS-001 SPL INST for tag nmbers and additional requirements

3					PROJECT	Construction of additional Ammonia barge
2						
1					CLIENT	FACT
0	09-10-2020	DCK	MKZ	MS	P.O. NO	
REV	DATE	PRPD	CHKD	APPRD	VENDOR	

FACT ENGINEERING AND DESIGN ORGANISATION

14FT051/15

DATA SHEET	SOLENOID VALVE	32654-14-DA-00002 PAGE 1 OF 1 R0

General	Coil voltage	☐ 110 V AC ☐ 230 V AC ☐ 110V DC ■ 24VDC		1
	Tolerance in voltage	☐ +/-15% ■ +/-10%		2
	Tolerance in Frequency	☐ +/-3 %		3
	Max. ambient temperature range	■ 15-60 °C		4
	Temp. class of coil insulation	☐ A (105°C) ☐ B (130°C) ■ F(155°C) ☐ H (180°C)		5
		☐ E (120°C)		6
	Coil construction	■ Epoxy encapsulated ☐ Non-moulded type		7
	Area classification	☐ Non Hazardous		8
		■ Hazardous as per IEC Zone 1 Gr IIA T1		9
	Weather Protection	■ Weather proof IP 65		10
	Explosion protection	☐ Intrinsic safe Exi ■ Flameproof Exd		11
	Duty	■ Continuous ☐ Intermittent		12
	Duty Cycle	☐ MFR to specify (If intermittent)		13
	Connection- Cable / Air	■ 1/2" NPTF / ■ 1/4" NPTF		14
	Cable gland/ plug material	☐ Cd-Ni plated brass ■ SS316		15
	Local reset	■ Required ☐ Not required		16
	Reference standard	■ IS8935		17
Process data	Tag no.	*		18
	Service	Air		19
	Fluid & state	Air & Gas		20
	Flow maximum			21
	Press. min / nor / max kg/cm^2	/ /	/ /	22
	Differential press. min/max kg/cm^2	/ /	/ /	23
	Temp. nor / max Deg C	/	/	24
	Fluid density Kg/m3 / sp gravity	/	/	25
	Viscocity cP			26
	Allowable pressure drop			27
	Valve Cv / orifice size	MTS		28
Material	Body	■ 316 SS ☐ Brass	☐ 316 SS ☐ Brass	29
	Seat	■ 316 SS ☐	☐ 316 SS ☐	30
	Disc	■ Teflon ☐ Buna N	☐ Teflon ☐ Buna N	31
	Seal	■ Teflon ☐ Buna N	☐ Teflon ☐ Buna N	32
	Core tube			33
	Core and plug nut			34
	Core spring			35
Others	Port type	☐ 2 way ■ 3 way	☐ 2 way ☐ 3 way	36
	No. of coil	■ Single ☐ Double	☐ Single ☐ Double	37
	Valve action			38
	Response time			39
	Pneumatic / process ports			40
	Electrical			41
	Marking	As per IS8935	As per IS8935	42
	Accessories			43
	Make / model no.	MTS		44
	Quantity	12 nos		45
Certifica	Weather protection	■ Required	☐ Required	46
	Explosion protection	■ Required (FM/ CMRI)	☐ Required (FM/ CMRI)	47
	Test certtificate	■ Required (IS8935)	☐ Required (IS8935)	48

Notes: *Refer 32654-14PS-001 SPL for Tag nimbers

1 The vent port shall be bug proofed.

2 Flying leads are not acceptable for the connections.

REV	DATE	PRPD	CHKD	APPRD		
3					PROJECT	Construction of additional Ammonia barge
2						
1					CLIENT	FACT
0	09-10-2020	DCK	MKZ	MS	P.O.NO.	
REV	DATE	PRPD	CHKD	APPRD	VENDOR	

053/15

CONTENTS

1.0 SCOPE
2.0 CONTROL VALVE REQUIREMENTS
3.0 VALVE CAPACITY
4.0 VALVE CONSTRUCTION
5.0 ANNEXURE

1.0 SCOPE

1.1 This technical specification together with project specification, data sheet etc. covers the requirements for design, manufacture, testing and supply of instrument operated control valves.

1.2 No variation from data sheet and this specification are permitted unless approved in writing by FEDO.

1.3 Materials specified shall comply with the latest edition of ANSI, API and ASTM codes for control valve materials.

1.4 The related standards referred here and mentioned below shall be of the latest editions prior to the date of the purchaser's enquiry.

- ANSI/FCI 70.2
- API 607
- ASME B16.34
- ASNI B16.37
- ASNI/ISA 75.01.01
- IS 10189-1
- IS 10189-2.1, 2.2
- ISA 75.17
- ISO 5208
- ISO 5209
- ISO 10497

2.0 CONTROL VALVE REQUIREMENTS

2.1 Copper, lead or their alloys shall not be used for any part in contact with the process fluid.

2.2 Enclosures for electro pneumatic positioners, limit switches, solenoid valve etc. shall be in accordance with the area classification mentioned in the data sheets. Electro-pneumatic positioners shall be used instead of I/P converter followed by pneumatic positioner combination.

2.3 For quick acting valves the openings or closing time shall be as indicated in the data sheet..

2.4 All the valves including accessories shall be painted with one base coat of anticorrosive paint and 2 coats of epoxy paint. The color shall be as specified in Para 4.3.12 in this specification.

3.0 VALVE CAPACITY

3.1 Generally valves shall be selected to have 1.8 times the Cv required for the normal design conditions.

3.2 The maximum flow shall be between 60 to 80% of the full stroke for equal percent trims and 50 to 80% for linear trims.

3.3 When Cv is calculated using maximum flow conditions then valve Cv selected shall be at least 1.3 times the calculated Cv.

3.4 Three-way valve shall be sized to pass maximum flow at the full opening. No factor shall be used for this purpose.

3.5 Butterfly valve shall be sized for maximum allowable opening of the manufacture's recommendation; generally it is 60° for regulating applications.

3.6 Vendor shall submit valve-sizing calculations along with their offers.

4.0 VALVE CONSTRUCTION

4.1.0 BODY:

4.1.1 Materials for sour service shall conform to the requirements of NACE international standard MR0103/ISO15156.

4.1.2 Casting shall be free from injurious blow holes, porosity shrinkage faults, cracks or other defects, castings with defects that were plugged, welded, or impregnated are not acceptable. Wall thickness shall meet or exceed minimum requirements of applicable codes.

4.1.3 Bonnets and blind heads shall be of the same material as the valve body and of integral or bolted type construction with fully retained gaskets. Threaded bonnets are not acceptable.

4.1.4 All ESD and valves shall be metal-seated fire safe design.

4.1.5 Butterfly valve blade shall be of same materials as the valve body and integral or bolted type, construction with fully retained gaskets. Threaded bonnets are not acceptable

4.1.6 Angle valves shall have side inlets and bottom outlets unless otherwise specified and shall have full venturi throat.

4.1.7 The direction of flow shall be clearly marked, while casting the valve body. Punching the direction flow on flanges is not acceptable

4.1.8 All valves in hydrogen or hydrogen effluent service, toxic service or volatile organic compound service, shall have bonnet flange and lower blind flange fitted with retained metallic gaskets suitable for this service. Bellow seal at gland packing is also required.

4.1.9 Maximum error allowed due to hysteresis is 3% of spring range when positioner is not used and 1% of spring range when positioner is used.

4.1.10 Maximum deviation from linearity allowed shall be 5% of spring range when positioner is not used and 1% of spring range when positioners is used.

4.1.11 The valve travel at a minimum flow rate during normal operation shall be not less than 25%. However this can be relaxed on the basis of required turndown in consulting with FEDO.

4.1.12 Minimum body size: the valve size shall in general be one size lower than process piping. However the following shall be the minimum body size acceptable.

a. Pipe size is greater than or equal to 25NB: min. 25NB
b. Pipe size less than 25 NB: 20 NB.
c. The following body sizes shall not be used 32NB, 65NB, 90NB, 125NB, 175NB.
d. Body size shall not be less than half the nominal pipe size in which it is installed.

4.1.13 Vendor shall indicate the stroke length for the control valve along with the offer

4.1.14 Bonnet bolt materials of all control valve shall be 316SS.

4.1.15 The requirement of cooling/radiating fins (For services at temperature below zero and above 230 Deg C.), and bonnet extensions shall be as indicated in the data sheet. However manufacturer shall check and confirm such requirements in all cases. The use of cooling/radiating fins shall be discouraged as it is not effective and extended bonnet shall be used instead.

4.1.16 The shut off pressure is likely to vary slightly and hence the manufacturer shall indicate the maximum pressure for which the actuator is designed.

4.1.17 When split body valve are specified, they shall be three-bolted construction. Body flanges shall have either ring type joint or fully retained gaskets. Body gaskets shall be filled Monel or non-corrugated solid Monel. All bolts and nuts etc. shall be of the same material of the body.

4.1.18 Valve maximum exit velocity shall be less than or equal to 0.33 Mach.

4.1.19 If the valve size required as per the calculated Cv, increases due to over sizing factors specified in clause no 3.1, 3.3, the over sizing factor shall be relaxed to 1.6 and 1.2 respectively.

4.2.0 PLUG, STEM AND GUIDE

4.2.1 The plug form shall be countered, tapered or solid 'V' ported and shall have the specified characteristic in the data sheet.

4.2.2 Three way plugs specified for diverting service shall seat from outer side of the inlet chamber. Plugs specified for mixing service shall seat from inner side of the outlet chamber. All valves shall have removable seat rings and plugs.

4.2.3 Plug stem shall be super finished in microns as per the manufacturer's standard tolerance. Plug stems shall have adequate strength to withstand maximum developed thrust of actuator. Separate plugs and stem shall be pinned

4.2.4 Rotary stem valves (Butterfly, Ball) etc. shall have suitable guiding to prevent excessive shaft deflection due to maximum differential pressure or actuator thrust.

4.2.5 The seat leakage shall be within the allowable limits as specified in annexure –1.

4.3.0 ACTUATOR

4.3.1 The actuator shall be sized such that the rate of change of spring force is greater than twice the rate change of stem force from zero lift to maximum lift

4.3.2 Yokes shall be of suitable rigid material for open type construction and heavy duty.

4.3.3 All the valves shall be equipped with valve stem travel indicator where so feasible. The indicator on the valves having non-linear flow characteristic shall show percent of maximum capacity for corresponding percent of travel.

4.3.4 Lever and float type actuators shall have reversible linkage system designed for minimum friction.

4.3.5 The enclosure of diaphragm type actuators shall be steel construction with suitable corrosion protection for chemical atmosphere. The diaphragm shall be of moulded, age resistant material suitable for withstanding the pressure and chemical properties of the operating medium over a wide range of ambient temperatures.

4.3.6 The diaphragm effective area shall remain essentially constant throughout the full stroke. The required thrust to stroke the valve shall be accomplished by applying 0.2-1kg/cm2 air signal to this effective area. When the vendor's largest diaphragm area available does not produce sufficient thrust with 0.2 to 1 Kg/cm2 signal, multiple higher range may be used.

4.3.7 Whenever pneumatic piston type actuators are specified they should be provided with integral mounted force balance positioners and shall be fail safe as noted in data sheets on air failure. Vendor may quote for backup air cylinders and accessories required for critical systems.

4.3.8 Electric motor actuators with gear trains are not acceptable except for on-off service and only where clearly stated in specifications/ data sheets. The use of MOVs shall exclude ESD services.

4.3.9 Hand wheels shall be of non-rising type with fine pitch threads for precise valve plug positioning. These hand wheels shall be side-mounted type mounted on the down stream side of the valve superstructure. Continuous manual operations of the valve in either direction with full or no air pressure in the diaphragm and diaphragm replacement (If required) shall be possible with hand wheel operation.

4.3.10 Lifting lugs shall be provided (80mmNB or larger size) to enable valve to be lifted and supported vertically during installation.

4.3.11 The air supply pressure available is 4 to 6 kg/cm2. Maximum usable air pressure is 4 kg/cm2.

4.3.12 Colour (glossy finish)

A. Standard Type

Part	FC*	FO*
Actuator	Yellow	Red
Yoke	Yellow	Red
Body	Grey	Grey

B. Emergency use (Control valve with SOV)

Part	FC*	FO*
Actuator	Yellow	Red
Yoke	Yellow	Red
Body	Red	Red

*FC-Fail to close

*FO-Fail to open.

Valve tag number shall be painted in black on the actuator. (Letter size-25 mm)

4.3.13 The air filter regulators shall be provided with output gauges of SS material (50 mm dial). The filter shall be 5 microns size.

4.3.14 The SOV vent shall be fitted with bug screens.

4.3.15 Reference standards (i) flange standards: ANSI B 16.5 (ii) pipe thread: ANSI B 2.1 (iii) ASME boiler and pressure vessel code: as per section VIII pressure vessel division-1

4.3.16 All control valve accessories, to be installed in hazardous area, shall be approved by CCOE Nagpur or an internationally approved agency such as ATEX/FM/IEC.

4.4.0 NOISE LEVEL

4.4.1 If the noise level generated by the operating valve as measured one meter downstream of the valve within one meter from the pipe outside diameter exceeds 90dBA(decibels absolute), then the vendor shall submit an alternate proposal to FEDO for approval. Path treatment methods shall be considered if source treatment methods alone are not effective.

4.5.0 PACKING, LUBRICATION AND TRIM MATERIALS

4.5.1 Packing and lubrication.
The stuffing box packing shall be PTFE suspensive Teflon-V rings upto 200°C. For Application above 250°C the packing material shall be heat resistant graphite and a lubricator and isolating valve shall be provided along with one box of proper lubricant. Vendor may suggest suitable alternate packing material for the service specified.

4.5.2 Materials of construction for valve trim shall be SS304 or SS316 as minimum grade.

4.5.3 Wherever hardened trim is specified, only material such as no.6 stellite.no.6 Colmony, heat-treated stainless alloy (17-4PH), AISI 440B stainless may be used. However the vendor shall suggest alternate suitable material to meet the higher-pressure drop, corrosive conditions of the fluid and other process conditions.

4.6.0 ACCESSORIES

4.6.1 Accessories like solenoid valve, air set, limit switches, position transmitters, positioners etc wherever specified, shall be suitable for yoke mounting and the interconnecting tubing between these accessories should also be done by the vendor. Vendor to dispatch the control valve in completely assembled condition with all the accessories.

4.6.2 Positioners shall be provided wherever mentioned in the data sheets.

4.6.3 Positioners shall be possible to easily convert from direct acting to reverse acting.

4.6.4 Pneumatic positioners (except for spring less actuators those with an output other than 0.2-1.0kg/cm2 or those of the split ranged type) shall be provided with integral bypass valve so that the controlling pressure can be applied directly to the actuator during servicing and adjusting the positioner mechanism.

4.6.5 Positioners shall be capable of providing full stroke of control valve in either direction in not more than 5 to 6 seconds, or as specified in the data sheet.

4.6.6 All linkages in the positioners, E/P converters etc. shall be SS304/SS316.

4.6.7 Whenever electro-pneumatic positioners are mentioned they shall be dynamically balanced and have a linearity of 1% of full scale. Necessary temperature compensated coils shall be used to maintain linearity.

4.6.8 The input impedance shall be suitable for operation with electronic controller.

4.6.9 The air connection shall be ¼"NPT for air set and for SOV and electrical connection shall be ½"NPT.

4.6.10 All valve positioners shall be provided with integrally mounted pressure gauges of minimum 40mm nominal diameter for supply air, controlling air and positioners output air pressure. Unless otherwise specified the dial shall be calibrated in terms of kg/cm2.

4.6.11 Whenever an independent air consuming device such as positioners, transducers, multiplying relay, pressure controlling unit are mentioned vendor shall include an air filter regulator set designed for 3 to 7kg/cm2g inlet pressure.

4.6.12 Whenever I/P transducer are specified in the data sheets, they should be dynamically balanced with a linearity of 1% of full scale and with impedance less than the controller output impedance and shall have 1/2'" NPT electrical connection and ¼"NPT air connection.

4.6.13 Limit switches when specified shall be hermetically sealed switches for mounting on the valve. They shall not be affected mechanically or functionally due to any vibration when mounted so. Magnetically operated (or non-contact proximity type) switches are preferred, mechanical switches generally are not acceptable and shall not be used without approval from FEDO.

4.6.14 For ON/OFF valves of SIL 2 or higher, partial valve stroking mechanisms shall be provided with a SMART positioner.

4.6.15 Whenever solenoid valves are specified they shall be suitable for mounting on the yoke. The interconnection tubing between SOV and the actuator diaphragm shall be of 6mmOD size with SOV air connection as ¼"NPT.

4.6.16 All tubes and fittings used for interconnecting the accessories shall be 6mm OD, SS304.

4.6.17 Volume boosters shall not have input air of 0.2 to 1.0kg/cm2 unless otherwise specified. Output shall have1:1 relation to air input. Volume boosters shall be capable of providing full stroke of control valve in either direction in not more than 5 to 8 seconds.

4.6.18 Explanation of the terms used in control valve data sheets:

Short form	Abbreviation
IP or I/P	Current to pneumatic converter
E/P	Electro-pneumatic positioner
AS	Air set
HW	Hand wheel
SV	Solenoid valve
LS	Limit switch

4.6.19 The output of air set shall be adjustable and provided with a knob. An output gauge shall also be fitted on the air set.

4.6.20 The inlet pressures are to be taken as the maximum pressure drop when valve is closed and are to be used for actuator sizing. But as this pressure is likely to vary slightly, manufacturer shall indicate the maximum pressure with the selected actuator

4.7.0 VALVE MARKING

4.7.1 Valve name plate

Each valve shall have stainless steel nameplate permanently fastened to the valve superstructure, which shall be visible when the valve is in service and fully insulated. This nameplate shall include the following information

a. Manufacturer's name or trade mark
b. Manufacturer's serial number.
c. Tag number of the valve as specified in data sheet.
d. Maximum valve body pressure rating.
e. Valve body material and nominal body size.
f. Stem travel in mm.
g. Valve action and operating signal characteristics.
h. Valve Cv, port size and actuator model etc.

4.7.2 Metal tagging

A metal plate shall be fastened with SS wire to the valve giving its identification number, valve packing and the type of lubrication (if used)

4.8.0 DRAWINGS AND DATA

4.8.1 Vendor shall submit the required number of copies of the drawings and documents as mentioned in vendor data requirement list attached with the specifications.

4.9.0 INSPECTION

4.9.1 The vendor shall conduct as part of his usual business practice an established routine quality control program that can assure that all variable affecting the requirements for the reliability of the end item have been considered, evaluated and controlled. Said program shall, at purchaser's option be subjected to review by FEDO or any other agency as specified in the purchase order. The tests shall include the following types:

a. Raw material inspection- To assure that the raw material used for the fabrication is of good quality.
b. Brought out item inspection-All brought out items from sub-vendors which are assembled by the valve vendor (E.g Actuator, valve accessories etc) shall be subjected to inspection and tests as the item demands.
c. Process inspection- The entire process of manufacturing shall be monitored with sufficient records. The purchaser at any time shall have access to vendor's shop/factory to witness the manufacturing process.
d. Final inspection- This is to assure that when the valve is installed in its prescribed service

will function as specified. This shall include hydro and pneumatic tests, functional tests etc.

4.9.2 Manufacturer shall produce copies of the materials test and other control tests such as leakage test, functional test, hydraulic test for body pressure relating linearity/valve performance test and other visual and dimensional tests if any for inspectors review and records.

4.9.3 Inspector may witness the various tests fully /partially for various sizes of valves as per the inspection items list attached with the data sheets.

4.10.0 PACKING

4.10.1 All the items shall be packed and protected from damage during shipment and prolonged storage in asbestose roofed sheds. All the accessories and gauges shall be duly covered with thermocole rubber pads or any other suitable materials so that they shall be used to prevent water entering into the casing.

4.10.2 Wooden blind flanges bolted to the main flanges shall protect flanged ends. The whole valve with accessories shall be packed in wooden crates and nailed with metal strips. For other dispatch details purchase conditions may be referred.

5.0 **Annexure**

Table-1:SEAT LEAKAGE CLASSIFICATIONS(In accordance with ANSI/FCI 70-2)

Class	Max allowable leakage.	Testing		
		Medium	Pressure	Procedure
I	-	-	-	No test required if user & supplier agrees.
II	0.5% Of rated capacity	Air/water at 10 to 52°C (50 to 125°F)	45 to 60 psig (3 to 4kg/cm2g) or maximum operating differential whichever is lower.	Pressure applied to valve inlet with outlet open to atmosphere or connected to low head loss measuring device, full normal closing thrust provided by actuator
III	0.1% of rated capacity	As above	As above	As above
IV	0.01% of rated capacity.	As above	As above	As above
V	0.0005 ml per min. of water per inch of port dia per psi differential.	Water at 10 to 52°C (50 to 125 °F)	Max. Service pressure Drop across valve not to exceed ANSI body rating (100-psi press. Drop min)	Press. Applied to valve inlet after filling entire body cavity & connected piping with water & stroking valve plug closed. Use net specified max actuator thrust but no more even if available during test. Allow time for leakage flow to stabilize
VI	Not to exceed amounts shown in table –2 below based on port dia.	Air/ nitrogen at 10to52°C (50 to 125°F)	50 psig (3.5 bar) or max. Rated. Differential press. Across valve plug, whichever is lower.	Actuator should be adjusted to operating conditions specified with full normal closing thrust applied to valve plug seat. Allow time for leakage flow to stabilize& use suitable measuring device.

Table 2:

Nominal port dia		Leakage rate	
mm	Inches	Ml per min	Bubbles per min. (note)
25	1	0.15	1
40	1 1/2	0.30	2
50	2	0.45	3
65	2 1/2	0.60	4
80	3	0.90	6
100	4	1.70	11
150	6	4.00	27
200	8	6.75	45

Note:

1. Bubbles per minute as tabulated are an easily measured suggested alternative based on a suitably calibrated measuring device such as 6mm OD X0.8 mm thick wall tube submerged in water to depth of 3mm to 6m.
2. The tube end shall be cut square and smooth with no chamfers or burrs and the tube axis shall be perpendicular to the surface of the water.
3. Other apparatus may be considered and the number of bubbles per minute may vary from these shown as long as they correctly indicate the flow in ml. Per minute.

CONTENTS

1.0 SCOPE
2.0 SOLENOID VALVES-REQUIREMENTS

1.0.0 SCOPE

1.1.0 The general specification together with the data sheet attached covers the requirements for the design, manufacture, testing and supply of solenoid valves.

1.2.0 The related standards mentioned below shall be of the latest editions prior to the date of the purchaser's enquiry.

ANSI B 2.1
NEC 500
NEMA 3 and 7
IS 8935

1.3.0 In the event of any conflict between these specifications, data sheets related standards, codes etc the vendor should refer the matter to the purchaser for clarification and only after obtaining the same should proceed with the manufacture of the items.

1.4.0 Purchaser data sheets indicate the materials for the body, trim etc of the valve. However this does not absolve the vendor of the responsibility for proper selection of material for various parts of the valve and its accessories, so as to be compatible with the fluid and its operating conditions. (The direct use of solenoid valves on process lines shall be discouraged as practical as possible.)

1.5.0 Vendor's quotation shall include a detailed specification sheet for each solenoid valve wherein shall be provided all the details regarding type, construction materials for various parts, body and port size etc. vendor shall also provide all the calculations and graphs used to estimate orifice size and valve capacity.

1.6.0 All the units for various items in the vendor's specification sheets shall be the same as in purchaser's data sheets.

1.7.0 All the material specification for various parts in the vendor's specification shall be to the same standards as those followed in the purchaser's data sheets e.g. ASTM, BS, JIS, etc.

1.8.0 Vendor shall list out solenoid valves tag number wise summing up all the deviations from the purchasers data sheets and general specifications if there are any. Also vendor should provide reasons for these deviations whenever possible

1.9.0 Vendor shall enclose technical catalog specifying the "HOLD ON TIME" for each type of solenoid valve covered in the bid.

1.10.0 Vendor's quotation, catalogs, drawings, operating and maintenance manuals etc. shall be in English language. Metric system shall be used for units.

1.11.0 Vendor shall quote for 2 years operational spares for each type of solenoid valves. Spare quantity offered shall be 10% subject to a minimum of one number each.

1.12.0 The purchaser in vendor data requirement sheets indicates detailed drawings, data, catalogs and manuals required from the vendor. The required number of reproducible and prints should be dispatched to the purchaser, adhering to the time schedule indicated.

2.0.0 SOLENOID VALVE REQUIREMENTS

2.1.0 BODY AND TRIM

2.2.0 The valve body shall be SS316.

2.3.0 All the solenoid valves shall be of the pack less type.

2.4.0 Three-way body valves used in pneumatic service shall be of the universal type design with interchangeable ports and vent port fitted with bug screens.

2.5.0 All solenoid valves used in pneumatic service shall have soft seats providing tight shut off.

2.6.0 COIL AND HOUSING

2.6.1 The construction and tests shall be as per IS-8935. Certificate for tests shall be supplied by the vendor.

2.6.2 Solenoid coils shall be of the moulded type design meant for continuous duty and shall be epoxy encapsulated.

2.6.3 Vendors shall take precautions to protect the coil from inrush current on AC voltage. The coil of the solenoid valve shall be class 'H' insulated.

2.6.4 Unless otherwise mentioned, upon power input, the solenoid coil characteristics shall not be affected up

to a temperature of 100 ^{o}C as a minimum.

2.6.5 The solenoid coil shall operate the valve even when the supply voltage drops down by 15% or goes up by 10%.

2.6.6 The coil shall be wired to a terminal block located inside the housing. Flying leads are not acceptable.

2.6.7 SIL 3 approved SOVs are preferred for ESD and emergency depressurization duty.

2.6.8 Electrical cable entries shall be threaded to ½" NPT.

2.6.9 Where specified, weather proof housings shall confirm to NEMA 3 (IP 65 min) and explosion proof housing shall conform to NEMA 7.

Sl. No.	Description	Quantity	Unit price	Total price
a.	Solenoid valve	2 Nos		
b.	Air filter regulator with pressure gauge	2 Nos		
c.	Limit switch (On and Off)	2 Set		
d.	Piston O ring, Packing etc (For each size/ type)	2 Set of each type		
e.	Quick exhaust valve (If applicable)	2 Nos		

Notes:

1. The above indicated spares are loose items to be handed over to client along with the supply of valves.
2. ~~Next rounded figure to be considered wherever % is specified (Example: For to tal 11 nos. instruments with 10% spares basis, 2 Nos. spares shall be provided)~~
3. ~~Wherever complete instrument/set is considered as spare, spare quantity shall never exceed ordered/ purchased quantity (for example, if ordered quantity is 1 and mandatory spare philosophy is 20% or min 2, in such cases mandatory spares quantity shall be 1 and not 2)~~

REV.	DATE	DESCRIPTION	PREPARED	CHECKED	APPRVD
0	09/10/20	FOR ENQUIRY	DCK	MKZ	MS

FACT ENGINEERING AND DESIGN ORGANISATION

FEDO

ATTENTION

THE TECHNICAL OFFER MUST BE BASED ONLY ON A PHOTOCOPY OF THE ENQUIRY TECHNICAL PROCUREMENT SPECIFICATION (TPS) INCLUDING OTHER ATTACHED TECHNICAL DATA SHEETS. BIDDERS SHOULD NOT SUBMIT A TECHNICAL BID IN ANY OTHER FORM / DESCRIPTION.

TECHNICAL BID IN ANY OTHER FORMAT WILL BE REJECTED.

THE BIDDER SHOULD TICK THE ITEMS OFFERED, AND MARK DEVIATIONS , IF ANY, ON THE ABOVE MENTIONED PHOTOCOPY OF THE TECHNICAL SHEETS AND EACH SHEET OF THE SAME SHALL BE DULY STAMPED AND SIGNED.

ITEMS NOT OFFERED SHOULD BE HIGHLIGHTED WITH THE WORD " REGRETTED " IN THE TECHNICAL DATA SHEETS WHERE QUANTITY IS INDICATED.

WHERE THE NATURE OF DEVIATION REQUIRES ADDITIONAL SHEETS, THE ENQUIRY ITEM SERIAL NO. INDICATED IN THE DATA SHEET MUST BE CALLED OUT WHILE LISTING THE DEVIATIONS.

A COPY OF THE COMPLIANCE STATEMENT ATTACHED TO THE ENQUIRY SHALL BE DULY FILLED-IN TO COVER TECHNICAL ASPECTS, STAMPED & SIGNED, AND SHALL FORM PART OF THE TECHNICAL BID BEING SUBMITTED BY THE BIDDER.

PLEASE NOTE TECHNICAL DATA IN THE TECHNICAL BID ALONE WILL BE CONSIDERED. THE BIDDER IS CAUTIONED AGAINST REPETITION OF TECHNICAL DATA IN THE COMMERCIAL BID.ENQUIRY ITEM SERIAL NO. ALONE NEED BE CALLED OUT IN THE COMMERCIAL BID. IN CASE OF A CONFLICT, THE DATA IN THE TECHNICAL BID ALONE WILL BE CONSIDERED AS VALID.