INDRADHANUSH GAS GRID LIMITED (IGGL)
(Joint Venture of IOCL, ONGC, GAIL, OIL and NRL)
GUWAHATI, ASSAM

NORTH -EAST GAS GRID PIPELINE PROJECT

BID DOCUMENT FOR

PROCUREMENT OF BALL VALVES & PLUG VALVES FOR FEEDER LINES

OPEN DOMESTIC COMPETITIVE BIDDING

Tender Ref. No.: 05/51/23VC/IGGL/002B

VOLUME – II OF II

PREPARED AND ISSUED BY
MECON LIMITED
(A Govt. of India Undertaking)
Delhi, India

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1.0 SCOPE OF SUPPLY

The scope of supply includes Ball & Plug valves conforming to design standard as specified in Table - 1 and meeting other technical requirements as specified in bid document (i.e. as per MR, Data Sheets & Technical Specifications), getting approvals from Purchaser/ Consultant, procurement of raw material, manufacturing, testing & inspection, packing & forwarding & transportation, unloading to north eastern states as per tender terms & conditions. The details of valves to be supplied are in Table 1 below:

Table – 1

Group-A: BALL VALVES as per Design Standard API 6D, MECON's specification no. MEC/TS/05/21/002, Rev-1, Ed.1 and data sheet nos. given below:										
MR Item No	**Size**	**Body**	**Bore**	**Ends**	**Class**	**Datasheet No.**	**Stem Extension**	**Qty**	**Valve operator**	**Remarks**
1.	600 (24")	Fully Welded Body	FB	BW	600#	MEC/23UU/05/28/ M/001/DS/BV/01	Yes	01	AV	REMOTE OPERATED
2.	300 (12")	Fully Welded Body	FB	BW	600 #	MEC/23UU/05/28/ M/001/DS/BV/02	No	11	Manual	-----
3.	300 (12")	Fully Welded Body	RB	BW	600 #	MEC/23UU/05/28/ M/001/DS/BV/03	No	5	Manual	-----
4.	300 (12")	Fully Welded Body	RB	BW	600#	MEC/23UU/05/28/ M/001/DS/BV/04	No	12	AV	3 no. valve with Auto closure facility
5.	200 (8")	Fully Welded Body	RB	BW	600#	MEC/23UU/05/28/ M/001/DS/BV/04	No	12	AV	-----
6.	200 (8")	Fully Welded Body	RB	BW	600#	MEC/23UU/05/28/ M/001/DS/BV/05	Yes	02	Manual	-----
7.	200 (8")	Fully Welded Body	RB	BW	600#	MEC/23UU/05/28/ M/001/DS/BV/03	No	25	Manual	-----
8.	100 (4")	Fully Welded Body	RB	BW	600#	MEC/23UU/05/28/ M/001/DS/BV/03	No	36	Manual	-----
9.	100 (4")	Either Welded Body or 2/3 Piece Bolted	RB	FE	600#	MEC/23UU/05/28/ M/001/DS/BV/06	No	10	Manual	-----

10.	50 (2")	Fully Welded Body	FB	BW	600#	MEC/23UU/05/28/ M/001/DS/BV/02	No	124	Manual	-----
11.	50 (2")	Fully Welded Body	FB	BW	600#	MEC/23UU/05/28/ M/001/DS/BV/07	No	10	Manual	LTCS
12.	20 (3/4")	Fully Welded Body	FB	SW	800#	MEC/23UU/05/28/ M/001/DS/BV/08	No	126	Manual	-----
13.	20 (3/4")	Fully Welded Body	FB	SW	800#	MEC/23UU/05/28/ M/001/DS/BV/09	No	20	Manual	LTCS

Group-B: PLUG VALVES as per Design Standard API 6D, MECON's specification no. MEC/TS/05/62/003, Rev-1 and data sheet nos. given below:

MR Item No	Size	Pattern	Ends	Class	Datasheet No.	Stem Extension	Qty	Valve operator	Remarks
14.	200 (8")	REGULAR	BW	600#	MEC/23VC/05/28 /M/001/DS/PV/01	No	01	Manual	LTCS
15.	100 (4")	REGULAR	RF	600#	MEC/23VC/05/28 /M/001/DS/PV/02	No	06	Manual	LTCS
16.	50 (2")	REGULAR	BW	600#	MEC/23VC/05/28 /M/001/DS/PV/03	No	28	Manual	-----
17.	50 (2")	REGULAR	BW	600#	MEC/23VC/05/28 /M/001/DS/PV/01	No	10	Manual	LTCS

NOTE: Bidder to fill records of their purchase orders and IRN / Dispatch clearance in the attached format

LEGEND

FB = Full Bore

RB = Reduced Bore

BW = Butt Welded

FE = Raised Face (Flanged)

LTCS = Low Temperature Service Valves

Ext. Stem = Extended stem

AV = Remote Operated Gas-Powered Actuated Valve

2.0 DOCUMENTS & DATA REQUIREMENTS

2.1 The table here under specifies the quantities and the nature of the documents to be submitted by the Package Contractor to Purchaser.

2.1.1 The documents required at the inquiry stage and to be included in the bid are listed under column A of clause 2.6 below.

2.1.2 The documents required after award of the Contract and subject to the written approval of the Purchaser are listed under column B of clause 2.6 below.

2.1.3 The final and certified documents are listed under column C of clause 2.6 below.

2.2 Any document, even when preliminary, shall be binding and therefore duly identified and signed by the Vendor. It shall bear the Purchaser's Project reference, the Material Requisition number and the identification number.

2.3 The drawings/documents shall be reviewed, checked, approved and duly signed/stamped by successful Bidder/supplier before submission. Revision number shall be changed during submission of the revised successful Bidder/supplier documents and all revisions shall be highlighted by clouds. Whenever the successful Bidder/supplier require any sub-supplier drawings to be reviewed by MECON, the same shall be submitted by the supplier after duly reviewed, approved and stamped by the successful Bidder/supplier. Direct submission of the sub-supplier's drawings without contractor's approval shall not be entertained.

2.4 Review/Approval of the successful Bidder/supplier drawings by MECON would be only to review the compatibility with basic designs and concepts and in no way absolve the successful Bidder/supplier of his responsibility/contractual obligation to comply with tender requirements, applicable codes, specifications and statutory rules/regulations. Any error/deficiency noticed during any stage of manufacturing/execution/installation shall be promptly corrected by the successful Bidder/supplier without any extra cost or time, whether or not comments on the same were received from MECON during the drawing review stage.

2.5 The successful Bidder/ Supplier shall submit a prerecorded Training pen drive and it shall comprise the basic theories and fundamentals, related standards, design parameters, scanned copies of approved drgs./docs., manufacturing & inspection methods, operating & maintenance instructions and other relevant details. The pen drive shall have to be self-contained, user-friendly using animation/videos and other multimedia techniques.

2.6 THE DOCUMENTS ARE FULLY PART OF THE SUPPLY WHICH SHALL BE COMPLETE ONLY IF AND WHEN THE DOCUMENTS COMPLYING FULLY WITH THE TENDER REQUIREMENTS ARE RECEIVED BY THE PURCHASER.

Item	Documents & Data	A	B		C	
		No. of Copies	No. of Copies	Required Date (from FOI)	No. of Copies	Required Date (before Dispatch)
1.	Completed Data Sheets	3	3	2 Weeks	3	2 Weeks (With final technical file)
2.	Drawing / Data Submittal list / schedule	-	3	2 Weeks + monthly	3	2 Weeks
3.	Fabrication, test and delivery schedule (per item)	3	3	2 Weeks + monthly	3	2 Weeks
4.	Fire Safe certificate as per API 6FA & API 607	3	-	-	-	-
5.	Progress Report	-	3	2 Weeks + monthly	3	2 Weeks
6.	Catalogues / References	3	-	-	3	With final technical file
7.	GA drawings + Sectional drawings + Material specification + Unit weight. + Unit volume + Package dimensions per unit (All above per valve and actuator)	3	3	2 Weeks	3	With final technical file
8.	"Way of Shipping" as per Notes to Material Requisition	-	3	7 days	-	-
9.	Packing / shipping list with weights and dimensions	-	3	2 Weeks before shipping	3	2 Weeks (With final technical file)
10.	Design calculations for pressure containing parts	-	3	2 Weeks	3	2 Weeks (With final technical file)
11.	Welding details for the pups	-	3	2 Weeks	3	2 Weeks (With final technical file)
12.	Torque curves + Torque calculations	3	3	2 Weeks	3	2 Weeks (With final technical file)
13.	Bill of materials (on drawings)	-	3	2 Weeks	3	2 Weeks (With final technical file)
14.	Recommended spare parts list (for erection and commissioning)	3	-	-	3	2 Weeks (With final technical file)
15.	Recommended spares parts list (for 2 years operation)	3	-	-	3	2 Weeks (With final technical file)

16.	Welding procedure specification and records WPS / PQR	-	3	2 Weeks	3	2 Weeks (With final technical file)
17.	QA / QC program	3	3	2 Weeks	3	2 Weeks (With final technical file)
18.	Inspection and Test Procedures along with Quality Assurance Plan	3	3	2 Weeks	3	2 Weeks (With final technical file)
19.	Test Reports	-	-	-	3	2 Weeks (With final technical file)
20.	NDE / NDT Reports	-	-	-	3	2 Weeks (With final technical file)
21.	Heat Treatment Reports	-	-	-	3	2 Weeks (With final technical file)
22.	Hydrotest and air test report	-	-	-	3	2 Weeks (With final technical file)
23.	Maintenance and operating manuals	-	-	-	3	2 Weeks (With final technical file)
24.	Installation instructions & Site inspection procedure	-	-	-	3	2 Weeks (With final technical file)
25.	Material certificate as per EN 10204 - 3.2	-	-	-	3	2 Weeks (With final technical file)
26.	Painting system description & procedure	3	3	2 weeks	3	2 Weeks (With final technical file)
27.	List of sub-vendors with their scope	3	3	2 weeks		
28.	Training pen drive covering design, operation & maintenance	-	-	-	3	2 Weeks (With final technical file)
29.	Final technical file, preliminary copy for approval (in soft & hardcopy)	-	3	2 weeks before dispatch/ shipping	-	-
30.	Final technical file (hardcopy)	-	-	-	3	Before shipping
31.	Final technical file (softcopy – .pdf - Acrobat files in pen drive)	-	-	-	6	

NOTES

1) In case of e-bids, only single copy of documents / drawings / data under column A need be uploaded.

2) Durations in column B (required date) are weeks after FOI or as indicated in Table.

3) Durations in column C (required date) are weeks after document approval or as indicated in Table. Due date of each document may be proposed.

4) The above documents & data requirements shall also be supplemented by all requirements of clause 10.0 of MECON's T.S. No. MEC/TS/05/28/002.

5) For documents & data requirements of gas-powered valve actuators refer clause no. 9.0 of specification no. MEC/TS/05/E5/002A (Technical specification for gas powered valve actuators).

Summary of PTR Documents

1.	2.	3.	4.
MR Sl. No.	Purchase Order no. & dtd. supplied in past 7 years from Bid Due Date (Enclose copy of the same)	Corresponding IRN / Completion letter /Dispatch Clearance / Proof of supply with document no. & dtd. (Enclose copy of the same)	Maximum Size along with corresponding highest Rating Supplied
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

1.0 Introduction

INDRADHANUSH GAS GRID LIMITED intends to procure ball and plug valve for feeder line for NORTH EAST GAS GRID PIPELINE PROJECT as listed in the MR.

2.0 Price Evaluation Basis: As per Bidder's Eligibility Criteria (BEC)

3.0 Compliance with Specification: The Vendor shall be completely responsible for the design, materials, manufacture & fabrication, testing, inspection, preparation for shipment and transport of the above equipment strictly in accordance with the MR and all attachments thereto. Minimum all pressure containing and pressure controlling parts of Valves and Actuators shall be provided with EN 10204-3.2 certificates.

4.0 Vendor's Scope: Vendor scope of work includes the equipment with all internals and accessories shown on the datasheets, specifications and all unmentioned parts necessary for a satisfactory operation and testing, except those which are indicated to be out of the vendor's supply.

5.0 Inspection:

Inspection shall be in accordance with EN 10204 3.2 certification shall be issued for each dispatched valve. Vendor shall appoint anyone of the TPIA for inspection purpose. Vendor has to intimate the TPIA name from below listed agencies to IGGL / MECON prior to perform any inspection activity.

i. Det Norske Veritas (DNV)
ii. Germanischer Lloyd
iii. Bureau Veritas
iv. Moody International
v. SGS
vi. Certification Engineer International Ltd (CEIL)
vii. Technische Ulierwachungs Verein (TUV)
viii. Velosi
ix. American Bureau Services (ABS)
x. AB-Vincotte
xi. Lloyd Register of Industrial Services
xii. VCS Quality Services Private Limited
xiii. Meenar Global

6.0 For all valves to be used in Gaseous Hydrocarbons service, impact & hardness tests / values as per clause 3.4, 3.5 & 3.6 of specification no. MEC/TS/05/21/002 shall be applicable.

7.0 Vendor shall quote separately spares for two years normal operation for valves & actuators as per price schedule Performa. List of spares quoted shall be furnished as per attached Format.

8.0 Vendor to include the start up and commissioning spares for valves & actuators (if applicable) in the quoted price for the valves. However, list of spares (start up and commissioning) to be made available without prices as per attached Format.

9.0 Vendor to indicate in his offer the gross weight (in kg or Metric Tonne) per unit, volume (in m3) per unit and dimensions (L x B x H) of package (wooden box, etc.) to accommodate unit quantity or number of quantities (as applicable).

10.0 Vendor must submit duly filled up & signed data sheets, check list and forms along with his offer.

11.0 Vendor shall establish the equivalence/superiority of any material proposed (With justification of material properties and availability) other than that specified in Datasheet. Vendor shall also indicate the ASTM equivalent of his proposed material as well as of all the AISI designated materials specified in datasheets.

12.0 Vendors to note that for minimum inspection and testing requirement of the valves shall be governed by attached QAP with this MR. However, vendor shall submit their QAP for approval covering the requirement specified in attached QAP.

13.0 Bidders to note that all the documents/drawings submitted by them as a part of bid shall be considered only to assess Bidder's technical capability and shall in no way absolve them from complying with all the requirements of the Tender. All items to be supplied by the Bidder shall be strictly in accordance with tender requirements.

14.0 In the event of Conflict/inconsistency among the documents attached/ referred, the following order of precedence generally shall govern in interpretation of various requirements / data.

- Material / Purchase Requisition & Notes to MR
- Datasheets
- Technical Specification
- Codes and Standards
- Vendor's Standards

However, Owner/Consultant reserves the right to consider most stringent requirement among the document attached / referred.

15.0 Bidder/supplier shall submit hard copies of all documents/ drawings to MECON, as listed in columns B & C of table for document and data requirement under Clause 2.0 of MR and also in all technical specifications. The date of receipt of these documents/ drawings at MECON shall be deemed as the date of submission. If any documents/ drawings require re-submission due to any error/ deficiency noticed during review/ approval stage, in that event the additional time required by the bidder/supplier to get the revised document/ drawing reviewed/approved by MECON shall be solely to bidder's/supplier's account and in no case the bidder/ supplier shall be entitled for any time or cost benefit.

16.0 Bidders to note that the valves supplied by them shall be capable to withstand the field hydro test pressure (i.e. 1.5 times of design pressure) for 6 to 24 hours test holding duration under field / site conditions. The valve's ball / plug (BALL VALVES / PLUG VALVES) shall be kept in either partial or full open condition for entire test duration and test medium will be non-corrosive water. The vendor shall be liable for repair/ replacement of valve if found faulty during site hydro test at his risk & cost. All cost for associated activities like packaging, transportation etc. in connection to repair / replacement of valve shall be borne by the bidder. No claim shall be entertained by the Owner / Purchaser in this regard.

17.0 Vendors to note that packing & transportation of the valves shall be done strictly as per attached technical specification for handling and transportation.

18.0 Vendors to note that the entire ordered quantity shall be offered for MECON inspection as per following table. In case no. of visits of MECON engineer become more than as specified in table below for complete order quantity, vendor shall bear the touring expenditure of MECON/IGGL engineers as per company rules.
IGGL/MECON reserves the right to waive off this requirement in case of project exigencies.

S.No.	Size	Minimum Quantity for one lot
1	30" and higher	Upto 5 valves
2	16" to 28"	Upto 8 valves
3	8" to 14"	Upto 20 valves
4	¾" to 6"	Upto 200 valves

In case of any multiple of the ordered quantity the no. of valves shall be divided by quantity specified for one lot in above mentioned table to arrive at the no. of lots. No. of lots shall be determined by rounding off to next integer.

19.0 Vendors to note that TPI inspection is either to be conducted before MECON inspection or in parallel. In no case TPI inspection shall be permitted after MECON inspection. For the valves where MECON inspection extent is 100% witness, TPI inspection maybe allowed in parallel with MECON. However, for valves requiring 10% MECON witness

inspection, vendor has to finish TPI inspection before raising call and upload TPI inspection report in Inspection Management System of MECON.

20.0 Extent of MECON witness during final inspection shall be as follows:

Sl. No.	Size range	Class	Mecon Inspection extent
1.	2" to 8"	150	10% random witness and document review for 100% valves.
2.	10" and more	150	100% witness.
3.	2" to 6"	300 and higher	10% random witness and document review for 100% valves.
4.	8" and more	300 and higher	100% witness.
5.	Below 2"	All classes	10% random witness and document review for 100% valves.

21.0 Strip Test: Vendor need to demonstrate strip test of bolted body valves. For this test one valve of each ordered size and rating shall be selected at random after successful hydro and pneumatic tests by TPI & MECON inspector. The valve shall be dismantled completely. Alloy steel parts shall be checked for compliance to relevant material code using Positive material identification technique. Selected valve(s) shall then be re-assembled after replacing sacrificial parts like gasket & O-rings and complete final inspection as per approved QAP shall be carried out once again to ensure the repeatability of body seals and seats.

22.0 For Trunnion Mounted Ball Valves, where ever, DIB-1 seats are specified in datasheets, Self – relieving seats are not applicable as per cl. 4.8 of TS no. MEC/TS/05/21/002.

STANDARD TECHNICAL SPECIFICATION FOR BALL VALVES

SPECIFICATION NO.: MEC/TS/05/21/002

(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092

PREPARED BY:	CHECKED BY:	APPROVED BY:	ISSUE DATE :

AMENDMENT STATUS

Sl. No.	Clause / Paragraph / Annexure / Exhibit / Drawing Amended	Page No.	Rev.	Date	By		Verified	
					Name	Sig.	Name	Sig.
1.	Cl. No. 4.6	4	1	April 09	Gurdeep Singh		K.K. De	
2.	Overall Revision	All	1	July 20	K.P. Singh		A.K. Tyagi	

Abbreviations :

ASME	:	American Society of Mechanical Engineers
ASTM	:	American Society for Testing and Materials
API	:	American Petroleum Institute
BHN	:	Brinell hardness number
DN	:	Nominal Size
HAZ	:	Heat Affected Zone
LC	:	Lock Close (valve locked in full close position)
LO	:	Lock Open (valve locked in full open position)
MSS-SP	:	Manufacturers Standardization Society – Standard Practice
NDT	:	Non Destructive Testing
NPS	:	Nominal Pipe Size
RTJ	:	Ring Type Joint
SSPC	:	Steel Structures Painting Council

CONTENTS

1.0 **SCOPE**

This specification covers the minimum requirements for design, manufacture, testing and supply of carbon steel ball valves of size DN 50 mm (2") and above and ANSI pressure rating class 150 to 900 to be used in on-shore pipeline systems handling non-sour hydrocarbons in liquid or gaseous phase, including Liquefied Petroleum Gas (LPG).

This specification does not cover ball valves for sour hydrocarbon (liquid / gas) service as defined in NACE standard MR-01-75.

2.0 **REFERENCE DOCUMENTS**

2.1 All valves shall be manufactured and supplied in accordance with the latest edition of American Petroleum Institute (API) Specification 6D / ISO 14313, with additions and modifications as indicated in the following sections of this specification.

2.2 Reference has also been made in this specification to the latest edition of the following Codes, Standards and Specifications:

ASME B 16.5	:	Pipe flanges and flanged fittings
ASMEB 16.10	:	Face-to-face and end-to-end dimensions of valves
ASME B 16.25	:	Butt welding ends
ASME B 16.34	:	Valves – flanged, threaded and welding ends
ASME B16.47	:	Large diameter steel flanges
ASME B 31.3	:	Process piping
ASME B 31.4	:	Pipeline transportation systems for liquid hydrocarbons and other liquids
ASME B 31.8	:	Gas transmission and distribution piping systems
ASME Sec VIII	:	Boiler and pressure vessel code - Rules for construction of pressure vessels
ASME Sec IX	:	Boiler and pressure vessel code - Welding and brazing qualifications
ASTM A 370	:	Standard test methods and definitions for mechanical testing of steel products
ASTM B 733	:	Autocatalytic nickel phosphorous coating on metals
API 6FA	:	Fire test for valves

API 607	:	Fire test for soft-seated quarter-turn valves
API 1104	:	Welding of pipelines and related facilities
BS EN ISO 10497	:	Testing of valves – Fire type-testing requirements
MSS-SP-6	:	Standard finishes for contact faces of pipe flanges and connecting-end flanges of valves and fittings
MSS-SP-44	:	Steel pipeline flanges
SSPC-VIS-1	:	Steel structures painting council-visual standard

2.3 **In case of conflict** between the requirements of this specification, API 6D and the Codes, Standards and Specifications referred in clause 2.2 above, the requirements of this specification shall govern. Order of precedence shall be as follows :

- Valve Data Sheets
- Material Requisition
- This Specification
- API 6D Specification
- Other Referred Codes & Standards
- Manufacturer's Standard

3.0 MATERIALS

3.1 Material for major components of the valves shall be as indicated in Valve Data Sheet. Other components shall be as per Manufacturer's standard (suitable for the service conditions indicated in Data Sheet) and shall be subject to approval by Purchaser. In addition, the material shall also meet the requirements specified hereinafter.

3.2 Carbon steel used for the manufacture of valves shall be fully killed.

3.3 The Carbon Equivalent (CE) of valve end connections which are subject to further field welding by Purchaser, shall not exceed 0.43% (as calculated by the following formula) on check analysis for each heat of steel used:

$$CE = \%C + \frac{\%Mn}{6} + \frac{\%Cr + \%Mo + \%V}{5} + \frac{\%Ni + \%Cu}{15}$$

3.4 For Valves specified to be used for Gas service or LPG service, Charpy V-notch test, on each heat of base material shall be conducted as per API 6D Clause 8.5, for all pressure containing parts such as body, end flanges and welding ends as well as bolting material for pressure containing parts. Unless stated otherwise, the Charpy V-notch test shall be conducted at 0 °C. Test procedure shall conform to ASTM A370. The average absorbed energy value of three full sized specimens shall be 27 J. The

minimum impact energy value for any one specimen of the three specimens analysed as above, shall not be less than 22 J.

When Low Temperature Carbon Steel (LTCS) materials are specified in Valve Data Sheet or offered by Manufacturer, the Charpy V-notch test requirements of applicable material standard shall be complied with.

3.5 For all such valves where carbon steel is used as ball material, the ball shall have 75 micrometer (0.003 inch) thick Electroless Nickel Plating (ENP) as per ASTM B733 with following classification : SC2, Type II, Class 2. The hardness of plating shall be minimum 50 RC.

3.6 For valves specified to be used for Gas service or LPG service, hardness test shall be carried out as per ASTM A370 for each method of manufacture and each heat of steel used in the manufacture of valves. A full thickness cross-section shall be taken for this purpose and the maximum hardness of the materials of valve components shall not exceed 248 HV_{10} .

3.7 All process-wetted parts, metallic and non-metallic, shall be suitable for the fluids and service specified by the Purchaser. The service gas composition shall be as given elsewhere in the Material Requisition. In addition, Manufacturer shall confirm that all wetted parts are suitable for treated water / seawater environment, which may be used during field testing.

3.8 Non-metallic parts of the valves (including O-rings, soft seal etc.) intended for hydrocarbon gas service at pressures of PN 100 (600 #) and above shall be resistant to explosive decompression.

4.0 DESIGN AND CONSTRUCTION

4.1 Valve design shall meet the requirements of API 6D and other referred codes and shall be suitable for the service conditions indicated in Valve Data Sheet. The ASME Boiler & Pressure Vessel Code, Section VIII, Division 1, may be used to design the valve body. Allowable stress requirements shall comply with the provisions of ASME B31.3. In addition, corrosion allowance indicated in Valve Data Sheet shall be considered in valve design. However, the minimum wall thickness shall not be less than the minimum requirement of ASME B16.34. The Manufacturer shall have a valid license to use API 6D monogram for manufacture of ball valves.

4.2 For above ground valves, valve body design shall be either fully welded or bolted type, as indicated in Valve Data Sheet. Valve body joints with threads are not permitted.

For buried valves, valve body design shall be fully welded type only. Valve body joints with bolts or threads are not permitted.

4.3 Ball shall be of single piece, solid type construction.

4.4 Valves shall be Full Opening (FO) or Reduced Opening (RO) as indicated in Valve Data Sheet. FO valves shall be suitable for the passage of all types of pipeline scraper and inspection pigs on regular basis without causing damage to either the valve component or the pig. The FO valve shall provide an unobstructed profile for pigging operations in either direction. FO valves shall be designed to minimize accumulation of debris in the seat ring region to ensure that valve movement is not impeded.

The opening size of RO valves shall be corresponding to that of a FO valve of smaller nominal diameter as indicated in table below. For sizes of a particular rating not covered in API 6D, the opening sizes of the RO valve shall be as per Manufacturer's standard.

Nominal Valve Size	Nominal Valve Size for Reduced Opening	Nominal Valve Size	Nominal Valve Size for Reduced Opening
DN $_{mm}$ (NPS $_{inches}$)	DN $_{mm}$ (NPS $_{inches}$)	DN $_{mm}$ (NPS $_{inches}$)	DN $_{mm}$ (NPS $_{inches}$)
50 (2)	50 (2)	600 (24)	500 (20)
80 (3)	50 (2)	650 (26)	550 (22)
100 (4)	80 (3)	700 (28)	600 (24)
150 (6)	100 (4)	750 (30)	600 (24)
200 (8)	150 (6)	800 (32)	650 (26)
250 (10)	200 (8)	850 (34)	700 (28)
300 (12)	250 (10)	900 (36)	750 (30)
350 (14)	250 (10)	950 (38)	800 (32)
400 (16)	300 (12)	1000 (40)	850 (34)
450 (18)	350 (14)	1050 (42)	900 (36)
500 (20)	400 (16)	1200 (48)	1050 (42)
550 (22)	450 (18)		

4.5 Ball mounting shall be trunnion / pivot type or as indicated in Valve Data Sheet. Ball mounting, either trunnion or floating, unless otherwise specified, shall be as follows.

Sl. No.	ANSI Pressure Rating	Nominal Valve Size (NPS $_{inches}$)	
		Floating Ball	Trunnion Mounted
1.	150#	$\leq$ 8"	> 8"
2.	300#	$\leq$ 4"	> 4"
3.	600#	Nil	$\geq$ 2"

Valve design shall minimize the possibility of debris ingress into the trunnion as far as practicable.

4.6 Valve seats shall have metal to metal contact. O-rings or other seals, if used for drip tight sealing, shall be encased in a suitable groove in such a manner that it can not be removed from seat ring and there is no extrusion during opening or closing operation of valve at maximum differential pressure corresponding to valve class rating. The seat rings shall be so designed as to ensure sealing at low as well as high differential pressures.

4.7 Valves shall have double block and bleed feature to facilitate complete flushing, draining and venting of the valve body cavity.

4.8 For valves to be used in liquid service, the body cavity over-pressure shall be prevented by self relieving seat rings / assemblies. A pressure relief hole in the ball is not permitted. Self relieving seat rings shall relieve at a body cavity differential pressure not exceeding 50% of the valve class rating pressure.

4.9 Valves shall be designed to withstand a sustained internal vacuum of at least 1 (one) milli-bar in both open and closed positions.

4.10 FO valves of nominal size DN 200 mm (8”) & above and RO valves of nominal size DN 250 mm (10”) & above shall have provision for secondary sealant injection under full line pressure for seat and stem seals. All sealant injection connections shall be provided with a needle valve, a grease fitting and non-return valve. Valve design shall have a provision to replace the sealant injection fitting under full line pressure. Location and arrangement of sealant points shall be as per Figure-1.

4.11 Valves shall be provided with vent and drain connections. Location and arrangement of vents and drains shall be as per Figure-1. Body vent and drain shall be provided with valves (ball or plug type). Number and size shall be as per Figure-1.

4.12 Valve design shall ensure repair of stem seals / packing under full line pressure.

4.13 a) Valve ends shall be either flanged or butt welded or one end flanged and one end butt welded as indicated in Valve Data Sheet. Flanges of the flanged end cast/ forged body valves shall be integrally cast / forged with the body of valve. Face-to-face/ end-to-end dimensions shall conform to API 6D. Face-to-face and end-to-end dimensions for valve sizes not specified in API 6D shall be in accordance with ASME B 16.10. Face-to-face and end-to-end dimensions not shown in API 6D or in ASME B 16.10 shall be as per Manufacturer Standard and shall be subject to approval by Purchaser.

b) Flanged ends shall have flanges as per ASME B16.5 for valve sizes up to DN 600 mm (24 inches) excluding DN 550 mm (22 inches) and as per MSS-SP-44 / ASME B 16.47 series A for valve sizes DN 550 mm (22 inches) & for DN 650 mm (26 inches) and above. Flange face shall be either raised face or ring joint type (RTJ) as indicated in Valve Data Sheet. Flange face finish shall be serrated or smooth as indicated in Valve Data Sheet. Smooth finish when specified shall be 125 to 200 microinches AARH. In case of RTJ flanges, the groove hardness shall be minimum 140 BHN.

c) Butt weld end preparation shall be as per ASME B16.25. The thickness of the pipe to which the valve has to be welded shall be as indicated in Valve Data Sheet. Valves shall be without transition pups, unless otherwise specified in Valve Data sheet. In case significant difference exists between thickness of welding ends of valve and connecting pipe, the welding ends of valve shall have bevel preparation as per ASME B31.4 or ASME B31.8, as applicable.

4.14 Design of weld end valves shall be such that during field welding operations, the soft seals or plastic components of the valve (where ever used) are not liable to be damaged. The Manufacturer shall furnish necessary field welding instructions and post-weld test procedure to demonstrate integrity and leak-tightness of valves after field welding operations.

4.15 Valves shall be provided with ball position indicator and stops of rugged construction at the fully open and fully closed positions.

4.16 FO valves of nominal size ≥ DN 200 mm (8”) and RO valves of nominal size ≥ DN 250 mm (10”) shall be equipped with support foot and lifting lugs. Tapped holes and eye bolts shall not be used for lifting lugs. Height of support foot shall be kept a minimum. The location and size of support foot / lifting lugs shall ensure unrestrictive operation of vent / drain valves.

4.17 Valve design shall be such as to avoid bimetallic corrosion between carbon steel and high alloy steel components. Suitable insulation shall be provided as required.

4.18 Valves shall be of fire resistant design as per API 607/BS EN ISO 10497/API 6FA, as indicated in Valve Data Sheet.

4.19 Valves shall be provided with anti-static devices to ensure electrical continuity between stem / ball and valve body.

4.20 Valves shall be suitable for either buried or above ground installation as indicated in Valve Data Sheet.

4.21 When stem extension requirement is indicated in Valve Data Sheet, the valves shall have the following provisions :

a) Valves provided with stem extension shall have water proof outer casing. Length of stem extension shall be as indicated in Valve Data Sheet. The length indicated corresponds to the distance between centerline of the valve opening and the top of mounting flange for valve operating device (gear operator / power actuator as applicable).

b) Vent and drain connections and sealant injection lines shall be terminated adjacent to the valve operator by means of suitable piping anchored to the valve body. Pipe used shall be API 5L Gr. B / ASTM A 106 Gr. B, with Sch. 80. Fittings shall be ASTM A 105 / ASTM 234 Gr. WPB, Socket Welded, ANSI class 6000.

c) Stem extension and stem housing design shall be such that the complete assembly will form a rigid unit giving a positive drive under all conditions with no possibility of free movement between valve body, stem extension or its operator.

d) Outer casing of stem extension shall have 3/8" or ½" NPT plugs at the top and bottom, for draining and filling with oil to prevent internal corrosion.

4.22 **Operating Devices**

a) Valves shall have a power actuator or manual operator as indicated in Valve Data Sheet. In case of manual operator, valve sizes $\leq$ DN 100 mm (4 inches) shall be wrench operated and valve sizes $\geq$ DN 150 mm (6 inches) shall be gear operated. Each wrench – operated valve shall be supplied with wrench. Valve design shall be such that damage due to malfunctioning of the operator or its controls will only occur in the operator gear train or power cylinder and that damaged parts can be replaced without the valve cover being removed.

b) The power actuator shall be in accordance with the Purchaser specification issued for the purpose and as indicated in Valve and Actuator Data Sheet. Operating time shall be as indicated in Valve Data Sheet. Valve operating time shall correspond to full close to full open/full open to full close under maximum differential pressure corresponding to the valve rating. For actuated valves, the actuator torque output shall be 1.25 times the break torque required to operate the ball valve under the maximum differential pressure corresponding to the valve class rating.

c) For manual operator of all valves, the diameter of the hand wheel or the length of operating wrench shall conform to API 6D requirements and be such that under maximum differential pressure, the total force required to operate the valve does not exceed 350 N. Manufacturer shall also indicate the number of turns of hand wheel (in case of gear operators) required for operating the valve from full open to full close position.

d) Direction of operation of hand wheel or wrench shall be in clock-wise direction while closing the valve. Hand wheels shall not have protruding spokes.

e) Gear operators, when provided, shall have a self locking provision and shall be fully encased, in water proof/ splash proof/ dust proof/ weather proof enclosure and shall be filled with suitable grease.

f) Operating devices shall be designed for easy operation of the valve under maximum differential pressure corresponding to the valve rating.

4.23 All welds shall be made by welders and welding procedures qualified in accordance with the provisions of ASME Section IX. The procedure qualification shall include impact test and hardness test and shall meet the requirements of clauses 3.4 and 3.6 of this specification, respectively.

4.24 All welds shall be stress relieved in accordance with ASME Section VIII.

4.25 Repair by welding is not permitted for fabricated and forged body valves. However, repair by welding as per ASME B16.34 is permitted for cast body valves. Such repairs shall be carried out at casting supplier's care only. Repair shall be carried out before any heat treatment of casting is done. Repair welding procedure qualification shall also include impact test and hardness test and shall meet the requirements of clauses 3.4 & 3.6 of this specification, respectively.

4.26 The tolerance on internal diameter and out of roundness at the ends for welded end valves shall be as per applicable connected pipe specification as indicated in Valve Data Sheet.

4.27 When indicated in Material Requisition, valves shall have locking device to lock the valve either in full open (LO) or full close (LC) positions. Locking devices shall be permanently attached to the valve operator and shall not interfere with operation of the valve.

4.28 Valve stem shall be capable of withstanding the maximum operating torque required to operate the valve against the maximum differential pressure corresponding to applicable class rating. The combined stress shall not exceed the maximum allowable stresses specified in ASME Section VIII, Division I. In case of power actuated valves, the valve stem shall be designed for maximum output torque of the selected power actuator (including gear box, if any) at valve stem.

5.0 INSPECTION AND TESTS

5.1 The Manufacturer shall perform all inspection and tests as per the requirements of this specification and the relevant codes, prior to shipment, at his works. Such inspection and tests shall be, but not limited to, the following:

5.1.1 All valves shall be visually inspected. The internal and external surfaces of the valves shall be free from any strikes, gouges and other detrimental defects. The surfaces shall be thoroughly cleaned and free from dirt, rust and scales.

5.1.2 Dimensional check on all valves shall be carried out as per the Purchaser approved drawings.

5.1.3 Chemical composition and mechanical properties shall be checked as per relevant material standards and this specification, for each heat of steel used.

5.1.4 Non-destructive examination of individual valve material and components consisting of, but not limited to castings, forgings, plate and assembly welds shall be carried out by the Manufacturer.

a) Body castings of all valves shall be radiographically examined on 100% of the surface of critical areas as per ASME B16.34. Procedure and acceptance criteria shall be as per ASME B16.34. The extent of radiography shall be as follows:

ANSI Pressure Rating	Valve Size	Extent of Radiography
150 #	All sizes	Nil
300 #	≤ DN 400mm (16") ≥ DN 450mm (18")	Nil 100%
≥ 600 #	All sizes	100%

All castings shall be wet magnetic particle inspected 100% of the internal surfaces. Method and acceptance shall comply with ASME B.16.34.

b) All valves, with body fabricated from plates or made by forgings, shall be ultrasonically examined in accordance with the procedure and acceptance standard of Annexure E of ASME B16.34.

All forgings shall be wet magnetic particle inspected 100% of the internal surfaces. Method and acceptance shall comply with ASME B 16.34

c) Bodies and bonnets made by welded assembly of segments of castings, forgings, plates or combinations thereof shall be examined, as applicable, by methods of clause 5.1.4 a) for cast components or clause 5.1.4 b) for forged components and plates.

5.1.5 Full inspection by radiography shall be carried out on all welds of pressure containing parts. Acceptance criteria shall be as per ASME B 31.4 or ASME B31.8, as applicable, and API 1104.

5.1.6 Welds, which in Purchaser's opinion cannot be inspected by radiographic methods, shall be checked by ultrasonic or magnetic particle methods and acceptance criteria shall be as per ASME Section VIII, Division 1, Appendix 12 and Appendix 6, respectively.

5.1.7 a) All finished wrought weld ends subject to welding in field shall be 100% ultrasonically tested for lamination type defects for a distance of 50mm from the end. Laminations shall not be acceptable.

b) Weld ends of all cast valves subject to welding in field shall be 100% radiographically examined and acceptance criteria shall be as per ASME B16.34.

c) After final machining, all bevel surfaces shall be inspected by dye penetrant or wet magnetic particle methods. All defects longer than 6.35 mm are rejected, as are defects between 6.35 mm and 1.59mm that are separated by a distance less than 50 times their greatest length. Rejectable defects must be removed. Weld repair of bevel surface is not permitted.

5.1.8 All valves shall be tested in compliance with the requirements of API 6D. During pressure testing, valves shall not have sealant lines and other cavities filled with sealant, grease or other foreign material. The drain, vent and sealant lines shall be

either included in the hydrostatic shell test or tested independently. Test pressure shall be held for at least 30 minutes. No leakage is permissible during hydrostatic testing. The body cavity self-relieving feature meeting the requirements of clause 4.8 of this specification shall also be checked.

5.1.9 A supplementary air seat test as per API 6D (Annex B, Clause B.3.3, Type II) shall be carried out for all valves. A bubble tight seal is required without the use of any sealant. No leakage is allowed. Test pressure shall be held for at least 15 minutes.

5.1.10 Manufacturer who intends bidding, must submit at bid stage, certificate and report for successful fire type-tests for valves in accordance with API-607/ BS EN ISO 10497 / API 6FA, as applicable in Valve Data Sheet.

Failure to comply with this requirement shall be a cause of rejection of the Bidder's offer.

5.1.11 Valves shall be subjected to Operational Torque Test as per API 6D (Annex B, Clause B.6) under hydraulic pressure equal to maximum differential pressure corresponding to the valve pressure class rating.

For manual operator of all valves, it shall be established that the force required to operate the valve does not exceed the requirements stated in clause 4.22(c) of this specification.

5.1.12 Power actuated valves shall be tested after assembly of the valve and actuator at the valve Manufacturer's works. At least five Open-Close-Open cycles without internal pressure and five Open-Close-Open cycles with maximum differential pressure shall be performed on the valve actuator assembly. The time for Full Open to Full close shall be recorded during testing. If required, the actuator shall be adjusted to ensure that the opening and closing times are within the limits stated in Actuator Data Sheet issued for the purpose.

Hand operator provided on the actuator shall also be checked after above testing, for satisfactory manual over-ride performance.

These tests shall be conducted on minimum one valve out of a lot of five (5) valves of the same size, rating and the actuator model / type. In case the tests do not meet the requirements, retesting / rejection of the lot shall be decided by Purchaser's Inspector.

5.1.13 Subsequent to successful testing as specified in clause 5.1.11 and 5.1.12 above, one (1) valve out of the total ordered quantity shall be randomly selected by the Purchaser's Representative for cyclic testing as mentioned below :

a) The valve shall be subjected to at least 100 Open-Close-Open cycles with maximum differential pressure corresponding to the valve rating.

b) Subsequent to the above, the valve shall be subjected to hydrostatic test and supplementary air seat test in accordance with clause 5.1.8 and 5.1.9.

In case this valve fails to pass these tests, the valve shall be rejected and two more valves shall be selected randomly and subjected to testing as indicated above. If both valves pass these tests, all valves manufactured for the order (except the valve that failed) shall be deemed acceptable. If either of the two valves fails to pass these tests, all valves shall be rejected or each valve shall be tested at the option of Manufacturer.

Previously carried out test of similar nature shall be considered acceptable if the same has been carried out by Manufacturer in last two years. Valves of two sizes below and two sizes above the size of valve previously tested, and rating similar or one rating lower of valve tested previously, shall be qualified.

5.1.14 Checks shall be carried out to demonstrate that the dissimilar metal used in the valves are successfully insulated as per the requirement of clause 4.17 of this specification.

5.1.15 When indicated in Valve Data Sheet, valves shall be subjected to anti-static testing as per supplementary test requirement of API 6D (Annex B, Clause B.5).

5.2 Purchaser reserves the right to perform stage-wise inspection and witness tests as indicated in clause 5.1 above at Manufacturer's works prior to shipment. Manufacturer shall give reasonable access and facilities required for inspection to the Purchaser's Inspector.

Purchaser reserves the right to require additional testing at any time to confirm or further investigate a suspected fault. The cost incurred shall be to Manufacturer's account.

In no case shall any action of Purchaser or his Inspector relieve the Manufacturer of his responsibility for material, design, quality or operation of valves.

Inspection and tests performed/ witnessed by the Purchaser's Inspector shall in no way relieve the Manufacturer's obligation to perform the required inspection and tests.

6.0 EXTENT OF INSPECTION & TESTING

6.1 Purchaser's Inspector shall perform inspection and witness tests on all valves or as indicated in the Quality Assurance Plan (QAP) attached with this specification.

6.2 The hydrostatic testing and cyclic opening and closing of the valves with the operator shall be witnessed by Purchaser's Inspector.

7.0 TEST CERTIFICATES

7.1 Manufacturer shall submit the following certificates:

a) Mill test certificates relevant to the chemical analysis and mechanical properties of the materials used for valve construction as per the relevant standards.

b) Test certificates of hydrostatic and pneumatic tests complete with records of timing and pressure of each test.

c) Test reports on radiograph and ultrasonic inspection.

d) Test report on operation of valves conforming to clause 5.1.11, 5.1.12 and 5.1.13 of this specification.

e) All other test reports and certificates as required by API 6D and this specification.

The certificates shall be valid only when signed by Purchaser's Inspector. Only those valves which have been certified by Purchaser's Inspector shall be despatched from Manufacturer's works.

8.0 PAINTING, MARKING & SHIPMENT

8.1 Valve surface shall be thoroughly cleaned, freed from rust and grease and applied with sufficient coats of corrosion resistant paint. Surface preparation shall be carried out by shot blasting to SP-6 in accordance with "Steel Structures Painting Council – Visual Standard SSPC-VIS-1". For valves to be installed underground, when indicated in Valve Data Sheet, the external surfaces of the buried portion of valves shall be painted with three coats of suitable coal tar epoxy resin with a minimum dry film thickness of 300 microns.

8.2 Manufacturer shall indicate the type of corrosion resistant paint used, in the drawings submitted for approval.

8.3 All valves shall be marked as per API 6D. The units of marking shall be metric except Nominal Diameter which shall be in inches. Marking shall be done by die-stamping on the bonnet or on the housing. However, for buried valves, the marking shall be done on the above ground portion of the stem housing only.

8.4 Valve ends shall be suitably protected to avoid any damage during transit. All threaded and machined surfaces subject to corrosion shall be well protected by a coat of grease or other suitable material. All valves shall be provided with suitable protectors, for flange faces, securely attached to the valves. Bevel ends shall be protected with metallic or high impact plastic bevel protectors.

8.5 All sealant lines and other cavities of the valve shall be filled with sealant before shipment.

8.6 Packaging and shipping instructions shall be as per API 6D.

8.7 On packages, following shall be marked legibly with suitable marking ink :

a) Order Number
b) Manufacturer's Name
c) Valve Size and Rating
d) Tag Number
e) Serial Number

9.0 SPARES & ACCESSORIES

9.1 Manufacturer shall furnish list of recommended spares and accessories for valves required during start-up and commissioning and supply of such spares shall be included in the price quoted by Manufacturer.

9.2 Manufacturer shall furnish list of recommended spares and accessories required for two years of normal operation and maintenance of valves and price for such spares shall be quoted separately.

9.3 Manufacturer shall quote for spares & accessories as per Material Requisition.

10.0 DOCUMENTATION

10.1 At the time of bidding, Manufacturer shall submit the following documents:

a) General arrangement / assembly drawings showing all features and relative positions and sizes of vents, drains, gear operator / actuator, painting, coating and other external parts together with overall dimensions as well as weights of valve & actuator.

b) Sectional drawing showing major parts with reference numbers and material specification. In particular, a blow-up drawing of ball-seat assembly shall be furnished complying the requirement of clause 4.6 of this specification.

c) Reference list of similar ball valves manufactured and supplied in last five years indicating all relevant details including project, year, client, location, size, rating, service, etc.

d) Torque curves for the power actuated valves along with the break torque and maximum allowable stem torque. In addition, sizing criteria and torque calculations shall also be submitted for power actuated valves.

e) Descriptive technical catalogues of the Manufacturer.

f) Copy of valid API 6D certificate.

g) Details of support foot, including dimensions and distance from valve centre line to bottom of support foot.

h) Quality Assurance Plan enclosed with this tender duly signed, stamped and accepted.

i) List of recommended spares required during start-up and commissioning.

j) List of recommended spares required for 2 years of normal operation and maintenance.

k) Other documents / drawings / data as per Material Requisition.

10.2 Within two weeks of placement of order, the Manufacturer shall submit six copies of, but not limited to, the following drawings, documents and specifications for Purchaser's final approval :

a) Detailed sectional arrangement drawings showing all parts with reference numbers and material specifications as referred to in clause 10.1 above.

b) Assembly drawings with overall dimensions and features. Drawing shall also indicate the number of turns of hand wheel (in case of gear operators) required for operating the valve from full open to full close position and the painting scheme. Complete dimensional details of support foot (where applicable) shall be indicated in these drawings as referred to in clause 10.1 above.

c) Welding, heat treatment and testing procedures.

d) Procedure for cyclic testing.

e) Details of corrosion resistant paint to be applied on the valves.

f) Design calculation for pressure containing parts.

g) Other documents / drawings / data as per Material Requisition.

Manufacture of valves shall commence only after approval of the documents indicated in clause 10.2a) to 10.2c) above. Once approval has been given by Purchaser, any changes in design, material and method of manufacture shall be notified to Purchaser whose approval in writing of all changes shall be obtained before the valve is manufactured.

10.3 Within 2 weeks from the approval date, Manufacturer shall submit to Purchaser six copies of the approved drawings, documents and specifications as listed in clause 10.2 above.

10.4 Prior to shipment, Manufacturer shall submit six hard copies and six soft copies (on CD-ROMs) of the following:

a) Test certificates as per clause 7.0 of this specification.

b) Manual for installation, erection, maintenance and operation instructions, including a list of recommended spares for the valves.

c) Other documents / drawings / data as per Material Requisition.

10.5 All documents shall be in English language.

10.6 **The above documents & data requirements shall also be supplemented by all requirements of clause 2.0 of the Material Requisition.**

11.0 GUARANTEE

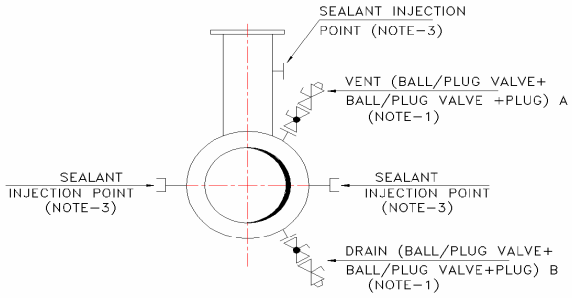
11.1 Manufacturer shall guarantee that the materials and machining of valves and fittings comply with the requirements in this specification and in the Purchase Order.

11.2 Manufacturer is bound to replace or repair all valve parts which should result defective due to inadequate engineering or to the quality of materials and machining.

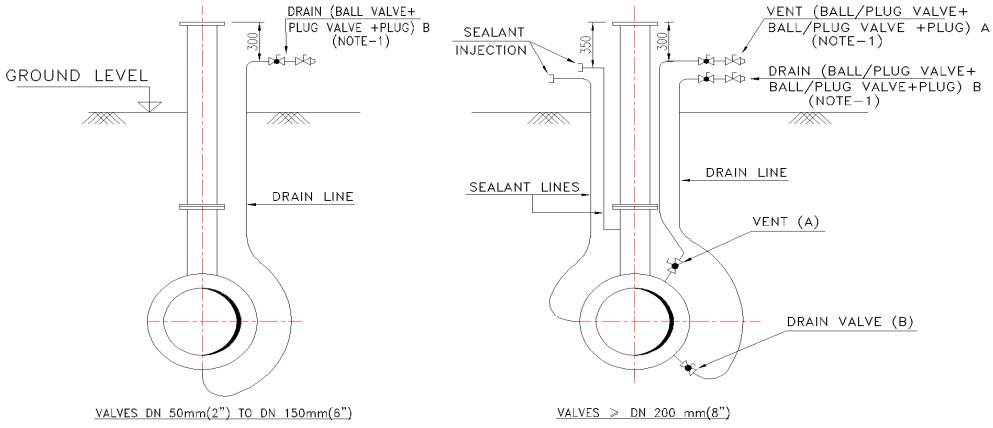
11.3 If valve defect or malfunctioning cannot be eliminated, Manufacturer shall replace the valve without delay,

11.4 Any defect occurring during the period of Guarantee shall be attended to by making all necessary modifications and repair of defective parts free of charge to the Purchaser as per the relevant clause of the bid document.

11.5 All expenses shall be to Manufacturer's account.



ABOVE GROUND INSTALLATION



UNDERGROUND INSTALLATION

SIZES OF VENT & DRAIN CONNECTIONS		
NOM. VALVE SIZE	A, DN(mm)	B, DN(mm)
50 TO 150	–	15
200 TO 600	15	25
750 & ABOVE	15	50 (REFER NOTE-2)

LEGEND:
- BALL VALVE
- PLUG VALVE
- PLUG

NOTES:
1. ALL VALVES (BALL OR PLUG) AND PLUGS FOR A AND B SHALL BE APPROVED BY THE PURCHASER.
2. VALVES OF SIZE 50mm SHALL BE MANUFACTURED AS PER API-6D.
3. SEALANT INJECTION POINTS SHALL BE PROVIDED FOR FULL OPENING VALVES OF NOMINAL VALVE SIZE 200mm (8") & ABOVE AND REDUCED OPENING VALVES OF NOMINAL VALVE SIZE, DN 250mm (10") AND ABOVE ONLY.
3. IN BURIED SECTION, ALL VENT & DRAIN CONNECTION SHALL BE OF WELDED CONSTRUCTION.

FIGURE-1

VENT, DRAIN & SEALANT INJECTION DETAILS

PROCESS & PIPING DESIGN SECTION
MECON LIMITED

DELHI - 110 092

TECHNICAL SPECIFICATION
FOR
PLUG VALVES
(NB ≥ 2")

SPECIFICATION NO.: MEC/TS/05/62/003, Rev-2

CONTENTS

1.0 **SCOPE**

This specification covers the minimum requirements for design, manufacture and supply of carbon steel plug valves of size DN 50mm (2") and above and ANSI Class 150# thru 900# for use in onshore pipeline systems handling non sour hydrocarbons in liquid phase or gaseous phase including Liquefied Petroleum Gas (LPG).

2.0 **REFERENCE DOCUMENTS**

2.1 All valves shall be manufactured and supplied in accordance with the Twenty Second Edition, January, 2002, or the latest edition of American Petroleum Institute (API) Specification 6D, twenty first edition, 1994 including supplement 1 & 2 thereof with additions and modifications as indicated in the following sections of this specification.

2.2 Reference has also been made in this specification to the latest edition of the following Codes, Standards and Specifications :

ASME B 16.5	:	Pipe flanges and flanged fittings
ASME B 16.25	:	Buttwelding ends
ASME B 16.34	:	Valves – Flanged, threaded and welding end
ASME B16.47	:	Large diameter steel flanges
ASME B 31.3	:	Chemical & process plant piping system
ASME B 31.4	:	Liquid transportation systems for hydrocarbons and other liquids
ASME B 31.8	:	Gas transmission and distribution piping systems
ASME Sec.VIII	:	Boiler and pressure vessel code
ASTM A 370	:	Standard test methods and definitions for mechanical testing of steel products
ASTM B 733	:	Autocatalytic nickel phosphorous coating on metals
API 6FA	:	Fire test for valves
API 1104	:	Welding of pipelines and related facilities
BS:6755 (Part-II)	:	Testing of valves – Specification for fire type - testing requirements
MSS-SP-6	:	Standard finishes for contact faces of pipe flanges and connecting-end flanges of valves and fittings

MSS-SP-44 : Steel pipeline flanges

SSPC-VIS-1 : Steel structures painting council-visual standard

2.3 **In case of conflict** between the requirements of this specification, API 6D and the Codes, Standards and Specifications referred in clause 2.2 above, the requirements of this specification shall govern. Order of precedence shall be as follows :

- Data Sheets
- This Specification
- API 6D Specification
- Other Referred Codes & Standards
- Manufacturer's Standard

3.0 MATERIALS & TEST PROCEDURES

3.1 Material for major components of the valves shall be as indicated in Valve Data Sheet. Other components shall be as per Manufacturer's standard which will be subject to approval by Purchaser.

3.2 Carbon steel used for the manufacture of valves shall be fully killed.

3.3 Chemical composition (check analysis) of valve end connection which are subject to further welding by Purchaser shall meet the following requirements for each heat of steel used:

a) Carbon : 0.22% (max.)
b) Manganese : 1.70 % (max.)
c) Silicon : 0.55 % (max.)
d) Phosphorus : 0.030 % (max.)
e) Sulphur : 0.030 % (max.)

Total percentage of Vanadium, Niobium and Titanium shall not exceed 0.20. Residual elements shall not exceed the following limits :

a) Nitrogen : 0.019 %
b) Nickel : 0.30 %
c) Copper : 0.20 %
d) Aluminum : 0.070 %
e) Chromium : 0.15 %
f) Molybdenum : 0.05 %

Carbon equivalent (CE) as calculated by the following shall not exceed 0.45%.

$$CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

3.4 For valves specified for Gas Service or high vapour pressure liquid service, charpy V-Notch test on each heat of base material shall be conducted as per API 6D, for all pressure containing parts such as body, end flanges and welding ends as well as the bolting material for pressure containing parts. Unless specified otherwise in Valve Data Sheets, the Charpy impact test shall be conducted at 0°C. The Charpy impact test specimen shall be taken in the direction of principal grain flow and notched perpendicular to the original surface of plate or forging.

Unless specified otherwise in Valve Data Sheets, the minimum average absorbed energy per set of three specimens shall be 27 J with an individual minimum per specimen of 22 J.

3.5 For valves specified for Gas Service or high vapour pressure liquid service, the hardness of base material of body and principal parts of the valve such as plug, stem, etc., shall not exceed 22 RC.

3.6 Plug for valve size DN 200mm (8") and above or as specified in Valve Data Sheets shall have Electroless Nickel Plating (ENP) or equivalent. The hardness of plating shall be minimum 50 RC. Manufacturer shall ensure that the adhesive strength of plating is sufficient so as to prevent peeling of plating during operation of the valve.

3.7 All process-wetted parts, metallic and non-metallic, shall be suitable for the fluids and service specified by the Purchaser. The service gas composition when applicable shall be as given in Annexure-I.

4.0 DESIGN & CONSTRUCTION

4.1 The Manufacturer shall have a valid license to use API 6D monogram for manufacture of Plug Valves.

4.2 Valve pattern shall be short, regular or venturi as specified in the following table:

Class	Size Range, NB mm (inch)	Pattern
150	50-100 (2-4)	Short
	150-300 (6-12)	Regular
	350 (14) & above	Venturi
300	50-100 (2-4)	Short
	150-250 (6-10)	Regular
	300 (12) & above	Venturi
600	50-250 (2-10)	Regular
	300 (12) & above	Venturi
900	50-250 (2-10)	Regular
	300 (12) & above	Venturi

4.3 Valve shall have an inherent feature using line pressure to ensure that the line pressure cannot cause taper locking of the plug/ plug movement into taper i.e. valves shall be of pressure balanced design.

4.4 Cover shall be bolted to the body and screwed connections are not acceptable.

4.5 Soft seats to achieve a seal between plug and body are not permitted.

4.6 All valves shall have provisions for secondary sealant injection under full line pressure for seat and stem seals. Sealant injection points shall be provided with a ball type check valve or needle valve to replace the sealant injection fitting under full line pressure.

4.7 Valves shall have vent and drain connections as per API 6D.

4.8 When specified in the Valve Data Sheet, valves shall be designed to withstand a sustained internal vacuum of at least one milli-bar in both open and closed position.

4.9 Valve design shall ensure repair of gland packing under full line pressure.

4.10 a) Valve ends shall be either flanged or butt welded or one end flanged and one end butt welded as indicated in Valve Data Sheet. Flanges of the flanged end cast/ forged body valves shall be integrally cast/forged with the body of valve. Face-to-face/ end-to-end dimensions shall conform to API 6D.

b) Flanged end shall have dimensions as per ASME B16.5 for valve sizes upto DN 600mm (24 inches) excluding DN 550mm (22 inches) and as per MSS-SP-44 for valve sizes DN 550mm (22 inches) & for DN 650mm (26 inches) and above. Flange face shall be either raised face or ring joint type as indicated in Valve Data Sheet. Flange face finish shall be serrated or smooth as indicated in Valve Data Sheet. Smooth finish when specified shall be 125 to 200 AARH. In case of RTJ flanges, the groove hardness shall be minimum 140 BHN.

c) Butt weld end preparation shall be as per ASME B16.25. The thickness of the pipe to which the valve has to be welded shall be as indicated in Valve Data Sheet. Valves shall be without transition pups. In case significant difference exists between thickness of welding ends of valve and connecting pipe, the welding ends of valve shall have bevel preparation as per ASME B31.4 or ASME B31.8, as applicable.

4.11 Valves shall be provided with position indicator and stops at the fully open and fully closed positions.

4.12 Valves of size DN 200mm (8") and above shall be equipped with lifting lugs. Tapped holes and eye bolts shall not be used for lifting lugs.

4.13 Valves shall have locking devices to be locked either in full open or full close position when indicated in the Valve Data Sheets. Locking devices shall be permanently attached to the valve operator and shall not interfere with operation of the valve.

4.14 Valves shall be of fire safe design as per BS:6755 (Part-II)/ API 6FA, if indicated in Valve Data Sheet.

4.15 Valves shall be suitable for either buried or above ground installation as indicated in the Valve Data Sheet.

4.16 Valves with stem extension, when indicated in Valve Data Sheet shall have following provisions :

a) Valves provided with stem extension shall have water proof outer casing. Length of stem extension shall be as indicated in the Valve Data Sheet. The length indicated corresponds to the distance between the centreline of the valve opening and the top of the mounting flange for valve operating device (gear operator/ power actuator as applicable).

b) Vent and drain connections shall be terminated adjacent to the valve operator by means of suitable piping anchored to the valve body. Pipe used shall be API 5L Gr. B/ ASTM A106 Gr. B, with Sch. 160. Fittings shall be ASTM A105/ ASTM A 234 Gr. WPB, Socket Welded, ANSI class 6000.

c) Sealant injection lines shall be extended and terminated adjacent to the valve operator in manner as indicated in (b) above.

d) Stem extension and stem housing design shall be such that the complete assembly will form a rigid unit giving a positive drive under all conditions with no possibility of free movements between valve body stem extension or its operator.

e) Outer casing of stem extension shall have 3/8" or ½" NPT plugs at the top and bottom, for draining and filling with oil to prevent internal corrosion.

4.17 **Operating Devices**

a) Valves shall have a power actuator or manual operator as indicated in the Valve Data Sheet. Manual operated valves of size $\leq$ DN 100mm (4") shall be wrench operated and valves of sizes $\geq$ DN 150mm (6") shall be gear operated. Each wrench operated valve shall be supplied with wrench. Valve design shall be such that damage due to malfunctioning of the operator or its controls will only occur in the operator gear train or power cylinder and damaged parts can be replaced without the bonnet being removed.

b) The power actuator shall be in accordance with the specification issued for the purpose and as indicated in the valve and actuator data sheet. Operating time shall be as indicated in valve data sheet. Valve operating time shall correspond to full close to full open / full open to full close under maximum differential pressure corresponding to the valve rating. For actuated valves, the actuator torque shall be atleast 1.25 times the maximum torque required to operate the valve under maximum differential pressure corresponding to the valve class rating.

c) Operating device shall be designed for easy operation of valve under maximum differential pressure corresponding to the valve rating.

d) For manual operation of all valves, the diameter of the hand wheel or the length of operating lever shall be such that under the maximum differential pressure, the total force required to operate the valve does not exceed 350 N. Manufacturer shall also indicate the number of turns of hand wheel (in case of gear operator), required to operate the valve from full open to full close position.

e) Direction of operation of hand wheel or wrench shall be in clock-wise direction while closing the valve. Hand wheels shall not have protruding spokes.

f) Gear operators, if specified, shall have a self locking provision and shall be fully encased in waterproof/ dustproof/ weatherproof/ splashproof enclosure and shall be filled with suitable grease.

4.18 Repair by welding is not permitted for fabricated and forged body valves. However repair by welding as per ASME B16.34 is permitted for cast body valves. Repair shall be carried out before any heat treatment of casting is done. Repair welding procedure qualification shall also include impact test and hardness test when required as per Clause 3.4 and 3.6 of this specification and shall meet the requirements as specified therein.

4.19 The tolerance on internal diameter and out of roundness at the ends for welded ends valves shall be as per connected pipe specification as indicated in the Valve Data Sheet.

4.20 Valve stem shall be capable of withstanding the maximum operating torque required to operate the valve against the maximum differential pressure corresponding to applicable class rating. The combined stress shall not exceed the maximum allowable stresses specified in ASME section VIII, Division-1.

For Power Actuated Valves, the valve stem shall be designed for maximum output torque of the selected power actuator (including gear box, if any) at the valves stem.

5.0 INSPECTION & TESTS

5.1 The Manufacturer shall perform all inspection and tests as per the requirements of this specification and the relevant codes, prior to shipment at his works. Such inspection and tests shall be, but not limited to, the following :

5.1.1 All valves shall be visually inspected.

5.1.2 Dimensional check shall be carried out as per the Purchaser approved drawings.

5.1.3 Chemical composition and mechanical properties shall be checked as per relevant material standards and this specification, for each heat of steel used.

5.1.4 a) Non-destructive examination of individual valve material and component consisting of but not limited to castings, forgings, plates and assembly welds shall be carried out by the Manufacturer.

b) Valves castings shall be radiographically examined at the cover and body portion, seat location, flanged body ends and circumference of ends to be field welded. Procedure and acceptance criteria shall be as per ASME B16.34. The extent of radiography shall be as follows :

ANSI Class 150-	All Sizes	-	Nil
ANSI Class 300-	≤ DN 400mm (16")	-	Nil
	≥ DN 450mm (18")	-	100%
ANSI Class 600- and above	All Sizes	-	100%

All castings shall be wet magnetic particle inspected 100 % of the internal surfaces. Method and acceptance shall comply with ASME B16.34.

c) Valve forgings shall be examined by ultrasonic method. Inspection procedure and acceptance criteria shall be as per Annexure E of ASME B16.34.

5.1.5 Areas which, in Purchaser's Inspector's opinion, cannot be inspected by radiographic methods shall be checked by ultrasonic or magnetic particle methods and acceptance criteria shall be as per ASME Sec-VIII, Division I, Appendix 12 and Appendix 6 respectively.

5.1.6 a) Weld ends of all cast valves shall be 100% radiographically examined and acceptance criteria shall be as per ASME B16.34.

b) After final machining all bevel surfaces shall be inspected by dye penetrant, or wet magnetic particle methods. Any defects longer than 6.35mm shall be rejected and also defects between 6.35mm and 1.59mm that are separated by a distance less than 50 times their greatest length. Weld repair of bevel surface is not permitted. Rejectable defects must be removed.

c) All finished wrought weld ends subject to welding in the field shall be 100% ultrasonically tested for lamination type defects for a distance of 50mm from the end. Laminations shall not be acceptable.

5.1.7 All valves shall be tested in compliance with the requirements of API 6D. Hydrostatic shell testing shall ensure that the whole of the shell is subjected to the test pressure. If necessary, the empty shell shall be pressure tested prior to assembly of the plug. The drain, vent and sealant lines shall be either included in the hydrostatic shell test or tested independently. No leakage is permissible during hydrostatic testing.

5.1.8 A supplementary air seat test as per API 6D shall be carried out for all valves. No leakage is allowed. Test pressure shall be held for at least 15 minutes.

5.1.9 Manufacturer who intends bidding must submit at bid stage, certificate and report for successful fire safe tests for all types of valves in accordance with BS:6755 (Part-II)/ API 6FA, as applicable in Valve Data Sheet.

Failure to comply with the requirement shall be a cause of rejection of the offer.

5.1.10 Valve shall be subjected to Operational Torque Test as per supplementary test requirement of API 6D under hydraulic pressure equal to the maximum differential pressure corresponding to the valve rating. The maximum handwheel force shall not exceed 350 N.

5.1.11 Power actuated valves shall be tested after assembly at the valve Manufacturer's works. Actuator shall be capable to allow minimum five consecutive "opening" and "closing" cycles. To achieve this, the Manufacturer shall provide "closing" and "opening" operations. This test shall be conducted on one valve out of a lot of five valves of the same size, rating and actuator type. In case the test result dose not meet the requirements, retesting/ rejection of the lot shall be as decided by Purchaser's Inspector.

The actuator shall be adjusted to ensure that opening and closing time is within the limits stated in Actuator Data Sheet issued for the purpose.

The hand operator installed on the actuator shall also be checked after the cyclic testing, for satisfactory manual over-ride performance.

5.2 Purchaser reserves the right to perform stagewise inspection and witness tests as indicated in para 5.1 at Manufacturer's works prior to shipment. Manufacturer shall give reasonable access and facilities required for inspection to Purchaser's Inspector.

Purchaser reserves the right to request additional testing at any time to confirm or further investigate a suspected fault. If the suspected fault is confirmed, the cost incurred shall be to Manufacturer's account.

In no case shall any action of Purchaser or his representative relieve the Manufacturer of his responsibility for material, design, quality or operation of valves.

Inspection and tests performed/ witnessed by the Purchaser's Inspector shall in no way relieve the Manufacturer's obligation to perform the required inspection and tests.

6.0 EXTENT OF INSPECTION & TESTING

6.1 Purchaser's Inspector shall perform inspection and witness test on all valves as indicated in the Quality Assurance Plan (QAP) attached with this specification.

6.2 The hydrostatic testing and cyclic opening and closing of the valves with the operator shall be witnessed by Purchaser's Inspector.

7.0 **TEST CERTIFICATES**

7.1 Manufacturer shall submit the following certificates :

a) Mill test certificates relevant to the chemical analysis and mechanical properties of the materials used for valve construction as per the relevant standards.

b) Test certificates on hydrostatic and pneumatic test complete with records of timing and pressure of each test.

c) Test reports conforming to clause 5.1.9 of this specification, if applicable.

d) Test reports on radiographic and ultrasonic inspection.

e) Test reports on operation of valves conforming to clause 5.1.10 and 5.1.11 of this specification.

f) All other test reports and certificates as required by API 6D and this specification.

The certificates shall be valid only when signed by Purchaser's Inspector. Only those valves which have been certified by Purchaser's Inspector shall be dispatched from Manufacturer's works.

8.0 **PAINTING, MARKING & SHIPMENT**

8.1 Valve surface shall be thoroughly cleaned, freed from rust and grease and applied with sufficient coats of corrosion resistant paint. Surface preparation shall be carried out by shot blasting to SP 6 in accordance with "Steel Structures Painting Council - Visual Standard - SSPC-VIS-1". For the valves to be installed underground, when indicated in Valve Data Sheet, external surfaces of the buried portion of valves shall be painted with three coats of suitable coal tar epoxy resin with a minimum dry film thickness of 300 microns.

8.2 Manufacturer shall indicate the type of corrosion resistant paint used, in the drawings submitted for approval.

8.3 All valves shall be marked as per API 6D. The units of marking shall be metric except Nominal Diameter which shall be in inches. Marking shall be done by die-stamping on the bonnet or on the housing. However for buried valves the marking shall be done on the above ground portion of the stem housing only.

8.4 Valve ends shall be suitably protected to avoid any damage during transit. All threaded and machined surfaces subject to corrosion shall be well protected by a coat of grease or other suitable material. All valves shall be provided with suitable protectors, for flange faces, securely attached to the valves. Bevel ends shall be protected with metallic bevel protectors.

8.5 All sealant lines and other cavities of the valves shall be filled with sealant before shipment.

8.6 Packaging and shipping instructions shall be as per API 6D.

8.7 Packages shall be marked legibly, with suitable marking ink, the following.

a) Order Number
b) Manufacturer's Name
c) Valve Size and Rating
d) Tag Number
e) Serial Number

9.0 SPARES & ACCESSORIES

9.1 Manufacturer shall recommend and quote separately the spares for valves required for commissioning and two years of normal operation. List of such spares without price shall be indicated alongwith technical bid and separately with price.

9.2 Manufacturer shall recommend and quote unit price separately for the accessories (like wrench, sealant injector, etc.), sealant and special tools required for maintenance of valves.

10.0 DOCUMENTATION

10.1 At the time of bidding, the bidder shall submit the following documents :

a) General arrangement/ assembly drawings showing all features and relative positions & sizes of vents, drains, gear box & other external parts together with overall dimensions.

b) Sectional drawing showing major parts with reference numbers and material specification.

c) Reference list of similar plug valves manufactured and supplied in last five years, indicating all relevant details including project, year, client, location, size rating, service, etc.

d) Torque curves for the power actuated valves alongwith break torque and maximum allowable stem torque. In addition, sizing criteria and torque calculations shall also be submitted for power actuated valves.

e) Descriptive technical catalogues of the Manufacturer.

f) Copy of valid API 6D certificate, wherever applicable.

g) Details of support foot, including dimensions and distance from valve centre line to bottom of support foot.

h) Quality Assurance Plan enclosed with this tender duly signed, stamped and accepted.

IMPORTANT

The drawings to be submitted alongwith the bid shall be in total compliance with the requirement of technical specification and data sheets of the valves with no exception & deviation.

10.2 Within two weeks of placement of order, the manufacturer shall submit six copies of, but not limited to, the following drawings, documents and specifications for approval :

a) Design drawings and relevant calculations for pressure containing parts and other principle parts.

b) Detailed sectional arrangement drawing showing all parts with reference numbers and materials specification.

c) Assembly drawings with overall dimensions & clearances required and showing all features. Drawing shall also indicate the numbers of turns of handwheel (in case of gear operator) required for operating the valve from full open to full close position and the painting scheme.

d) Welding, heat treatment, testing and quality control procedures.

e) Details of corrosion resistant paint to be applied on the valves.

f) Design calculation for pressure containing parts.

Manufacture of valves shall commence only after approval of the above documents. Once approval has been given by Purchaser, any change in design, material and method of manufacture shall be notified to the Purchaser, whose approval in writing for all changes shall be obtained before the valves are manufactured.

10.3 Within 30 days from the approval date, Manufacturer shall submit one reproducible and six copies of the approved drawings, documents and specification as listed in clause 10.2 of this specification.

10.4 Prior to shipment, Manufacturer shall submit one reproducible and six copies of following :-

a) Test certificates as listed in clause 7.0 of this specification.
b) Manual for installation, erection instructions, maintenance and operation instructions, including a list of recommended spares for the valves.

10.5 All documents shall be in English Language.

11.0 GUARANTEE

11.1 Manufacturer shall guarantee that the materials and machining of valves and fittings comply with the requirements in this specification and in the Purchase Order.

11.2 Manufacturer is bound to replace or repair all valve parts which should result defective due to inadequate engineering or to the quality of materials and machining.

11.3 If valve defect or malfunctioning cannot be eliminated, Manufacturer shall replace the valve without delay.

11.4 Any defect occurring during the period of Guarantee shall be attended to by making all necessary modifications and repair of defective parts free of charge to the Purchaser as per the relevant clause of the bid document.

11.5 All expenses shall be to Manufacturer's account.

Rev. : 0
Edition : 1

TECHNICAL SPECIFICATION

FOR

GAS POWERED VALVE ACTUATORS

SPECIFICATION NO.: MEC/ TS / 05 / E5 / 002A

ELECTRICAL & INSTRUMENTATION
(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092

03.01.2015	Lakshi	Ajain	Shukla
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Date	Prepared By	Checked By	Approved By

CONTENTS

1.0 SCOPE

1.1 This specification, together with the applicable data sheet, covers the minimum requirements for the design, manufacture, inspection, testing and shipping of valve actuators complete with accessories for quarter turn ball/ plug valves.

1.2 This specification indicates the minimum supply requirements and does not relieve the vendor from his responsibilities concerning the design and the safe operation of the supplied equipment.

1.3 The valve manufacturer shall also be responsible for proper operation of the actuator that shall develop a torque or a thrust sufficient to conveniently open and close the valve always with in the limits established by the resistance of the mechanical elements of the valve itself.

1.4 Valve and actuator shall be supplied as a single assembly complete in all respect and ready for installation at site.

2.0 REFERENCE DOCUMENTS

Reference is made in this specification to the latest edition of the following codes, standards and specifications:

Codes and Standards

ASME B31.8	:	Gas Transmission and Distribution Piping Systems
ASME B16.5	:	Steel Pipe Flanges and Flanged Fittings
ASME Sec. VIII	:	Boiler and Pressure Vessels, Code.
ANSI B2.1	:	Pipe Threads, General Purpose
NEC	:	National Electric Code
IEC	:	International Electro-technical Commission
NEMA	:	National Electrical Manufacturers Association

In case of conflict between the requirements of this specification and above referred documents, the requirements of this specification shall govern.

3.0 ACTUATOR SIZING

3.1 For sizing the actuator, valve manufacturer shall furnish to the actuator manufacturer the following information:

a) The maximum break - away torque or thrust required at the valve stem with manual/ remote operation to open and close a valve at the shut off pressure in the line. The actuator shall be sized at pressure indicated in Table-2 of datasheet and meeting the safety factor of 1.25 as required by the valve operation at the shut-off pressure in the line.

b) The temperature correction factor.

c) The pressure correction factor.

d) As a result of points (a) to (c) the minimum required torque or thrust output of the actuator.

e) Maximum allowable torque or thrust output of the actuator depending on the type and size of valve.

3.2 The maximum time required to open and close a ball valve shall be as indicated in the data sheet.

3.3 Actuator manufacturer shall provide the complete model no. decoding for actuators, limit switches and solenoid valves.

3.4 Complete details of Gas/ Hydraulic circuit with complete sequencing of port from open to close and close to open position shall be furnished in the offer for review.

3.5 Manufacturer shall furnish the detailed calculation for actuator sizing after placement of order. The calculation so furnished by manufacturer shall satisfy the sizing criteria as per above clauses. Manufacturer shall agree to upgrade the actuators offered to meet the sizing criteria without any price and schedule impact.

4.0 DESIGN FEATURES

4.1 The actuators shall be powered by Natural Gas from the main pipeline. The gas powered actuator shall operate at pressure indicated in Table-2 of datasheet. A typical scheme for tapping the gas from mainline with pressure reduction is shown in Sketch-1. Actuator electrical/ hydraulic circuit shall be developed as per the Sketch-2 enclosed.

4.2 Actuator shall be direct gas operated scotch yoke type with manual hydraulic override. The actuator shall be provided with a hydraulic pump for manual operation. If there is no gas pressure available to actuator it shall be possible to actuate Direct Pneumatic Actuator by means of Nitrogen bottles or similar pressure source. Actuator manufacturer shall furnish the capacity and set pressure of nitrogen bottle for at least two opening and two closing strokes of the actuator.

4.3 The actuator shall be suitable for gas operating conditions and ambient temperature as specified in data sheets. The presence of methanol in the gas shall not affect the service of the Actuator.

4.4 All materials in contact with natural gas shall be suitable for the gas composition attached with this specification.

4.5 The actuator and its accessories shall be suitable; for outdoor installation and have weatherproof enclosure as per NEMA 4 or equivalent.

All compartments and housing containing electrical devices such as switches, contactors, relay, fuses, terminal box etc. shall be explosion proof suitable for NEC Class 1 Div. 2 Gr. C & D, T3 or equivalent. The cable glands shall be 1" NPT thread. The unused cable entries must be plugged off with solid metal plugs.

Solenoid valves shall be of explosion proof design certified for NEC Class 1 Div. 2 Gr. C & D, T3 or equivalent with moulded continuous duty coils and stainless steel valve body.

4.6 All pressure containing parts shall be designed to ASME Section VIII.

4.7 a) The actuator shall be suitable for direct mounting to the valve without changing the standard top works of the valve and shall have the capability to be mounted or removed from the valve when the valve is in service. The actuator shall be flanged and bolted directly on the valve body or extension. The connection between actuator and the valve or between the operators, the outer casing of the extension and the valve shall be such that there is no movement between these connections when the valve is actuated by the actuator under any load.

b) Actuator shall be suitable for installation on a vertical stem unless otherwise specified in the data sheet.

4.8 Provision shall be made to prevent accidental pressure build up in the actuator.

4.9 The construction of the actuator and its controls shall be such that proper manual operation and maintenance can be carried out by skilled personnel without the risk of being injured by moving parts.

4.10 A position indicator on the actuator shall show the valve in the open, closed or partially open positions.

4.11 Bearings shall be factory packed with grease and shall not require additional lubrication for the life of the actuator.

4.12 Unless specified otherwise in the data sheet, the actuator shall be equipped with limit valves, which immediately shut off the gas supply to actuator when the valve reaches one of its end positions.

4.13 Actuator shall be provided with pressure gauges for pneumatic and hydraulic systems. The pressure gauges for the hydraulic system shall be in circuit with the pressure relief system.

4.14 In selection of pressure regulator due consideration shall be given to the effect of cooling of gas at the regulator and its down stream section.

4.15 A high pressure dehydrating filter cartridge shall be provided to remove condensate, moisture, foreign particles and any corrosive contaminants from pipeline gas.

4.16 The sound level of the gas escaping into the atmosphere when the actuator is in operation shall not exceed 90 dBA, measured at a distance of 10 meters.

4.17 The actuator shall be operated by either of the following two methods:

a) For the remote control, the actuator shall have a solenoid valve, limit switches, relays, etc. and shall be suitable for remote and local operation as per description in the attached Actuator Data Sheet(s). Electrical signal supplied is a momentary type with 1 sec duration signal, Actuator shall have a self retaining system of the above signal in its control circuit.

b) For the local-control the actuator shall be suitable for local operation with line gas feed lines or through nitrogen bottles. The devices and accessories, which do not require the electricity for their operation, shall be provided in the actuators as per this specification. The actuators shall have a hand pump in conjunction with the oil circuit to achieve local control with hydraulic shock functionality.

4.18 The actuators shall be provided with limit switches for open and close positions. The position of switches shall be adjustable near the valve open and close positions. The limit switches shall be wired up to terminal block and shall be numbered for proper identification. The limit switches shall have 2 sets of contacts for each open and close position. The contact rating shall be as specified in the data sheet. The power to solenoid valves shall be cut-off when the actuator has travelled to extreme positions (close and open).

4.19 The limit switches shall be wired in the actuator control circuit by the vendor so as to cut off power to the actuator once the end positions of the valve are reached. This is required to de-energize the solenoid valves in the steady state condition and failure of electrical power will not affect the valve position.

4.20 The stroke of the Actuator shall be easily adjustable in steps of maximum 0.5° for Ball/ Plug Valves.

4.21 Speed control nozzles for adjusting the valve speed over a wide range shall be provided.

4.22 If remote control is required, a local/ remote switch shall be installed to prevent remote control during maintenance work. This switch shall be provided with a hole 12 mm in diameter for locking with pad lock in either position. This local/ remote switch shall be wired up to the junction box as per circuit diagram.

All control accessories, pneumatic and hydraulic, shall be mounted in an enclosure and shall be fully wired and tubed. The enclosure shall be weatherproof as per NEMA-4 or equivalent.

4.23 All bleed and vent connections wherever required shall be piped outside the actuator cabinet so as to prevent gas pocketing inside the actuator cabinet. The actuator shall be of an automatic self purging design such that any gas pocket in the actuator will be eliminated.

4.24 Vendor shall be responsible for integrating the potential free NO or NC contacts of Remote Telemetry Unit (RTU's) for open and close command in interlock circuit. These commands will be of momentary type with 1 sec duration.

4.25 All mounting accessories needed for installing the actuator, tanks etc. are in manufacturer's scope of supply.

4.26 The interconnecting cabling, interconnecting pipe work between the actuator and the valve, adapters, tubing, cable glands, junction box are in manufacturer's scope of supply.

4.27 The actuator shall be supplied totally self-contained, wired, tubed and mounted on ball valve. In case of a separate control box, wiring and tubing between control box and actuator is in the vendor's scope. Three meters of ¾" tubing set including all connectors between the actuator and the control box and three meters of interconnecting piping work upstream & downstream of the valve and the control box be provided. Owner shall provide 20mm (3/4") SW tapping on process main line for line gas tapping.

4.28 Threading connections shall be NPT as per ANSI B2.1 and flange connection as per ANSI B16.5. The tubing, fittings and valves shall be stainless steel with Swage Lock

fittings or equivalent.

5.0 COATING

The actuator, including gear boxes and piping, shall be coated as described below :

5.1 Removal of all rust by means of emery cloth or wire brush.

5.2 Short blast as per Swedish Standard No. SIS 055900 latest edition SA 2.5 one layer Primer Epoxy – Polyamide DFT 75 microns intermediate layer Epoxy – Polyamide DFT 25 microns, final layer Epoxy – Polyamide DFT 75 microns. Total DFT 175 microns and colour RAL 5012 (light blue).

6.0 INSPECTION AND TESTS

6.1 Test at the Actuator Manufacturer's Shop

a) Electrical and mechanical operating tests.

b) Seal test of hydraulic circuits.

c) Check of required functions.

d) Check of operating time control.

e) Check of limiting device operation.

f) Check of actuator torque or thrust.

6.2 Test at the Valve Manufacturer's Shop

a) Test and check covered by point 6.1 after assembly with ball/ plug valve.

b) No load test (DP=0) or load (DP max) Operations with the minimum required feeding pressure (pressure indicated in Table-2 of datasheet).

c) Check of the limiting device operation.

d) Various tests on the valve according to provisions of specific documentation.

e) Testing shall conform to actual field operating conditions.

6.3 All actuators shall be visually inspected.

6.4 Dimensional check on actuators shall be carried out as per the Purchaser approved

drawings.

6.5 Purchaser reserves the right to perform inspection as indicated above at Manufacturer's works prior to shipment. Manufacturer shall give reasonable access and facilities required for inspection to the Purchaser's Inspector.

In no case shall any action of Purchaser or his inspector relieve the Manufacturer of his responsibility for material, design, quality or operation of actuators.

7.0 NAME PLATE

Actuator shall have a SS name plate attached firmly to it at a visible place and reporting the following information :

a) Instrument tag number as per Purchaser's data sheets.

b) Manufacturer's model, trade mark, serial no etc.

c) Max. allowable operating pressure or voltage.

d) Area classification in which the equipment can be used.

e) Actuator characteristics data.

f) Inspection agency name or logo.

8.0 SHIPPING

8.1 All threaded and flanged opening shall be suitably protected to prevent entry of foreign material.

8.2 The actuator shall be supplied pre-assembled except piping/ tubing, actuator, actuator control unit, tanks and other accessories shall be packed separately.

8.3 Protective grease oil coating shall be applied on the surface to protect them from rusting.

8.4 Package shall be marked legibly with suitable marking ink the following :

a) Order number
b) Package number
c) Manufacturer's name
d) Model no. & Thrust
e) Tag number
f) Inspection agency name or logo

9.0 DOCUMENTATION

9.1 At the time of vendor drawing approval the manufacturer shall submit the following documents in accordance with EN102043.1C.

a) A detailed specification sheet for valve actuator providing all the details regarding type, materials of construction for various parts etc.

b) Schematic diagrams showing the complete actuator control circuit.

c) A detailed dimensional drawing.

d) Installation drawing complete with valve assembly.

e) Actuator sizing calculations including relation between required torque of valve and actuator output torque.

f) Information asked for vide section 3.0 of this specification and actuator sizing as per Actuator Data Sheet.

g) Drawing showing connections by Purchaser (piping, electrical etc.)

h) Wiring diagram (actuator electrical circuitry) incorporating latching of momentary signals, remote/ local switch, limit switches.

i) Junction box terminal block nos. for I/O signals.

j) Parts list.

k) Recommended spare parts with prices.

l) Assembly details (Valve & Actuator).

m) Clause wise list of deviations from this specification, if any.

n) Information regarding the past experience on similar actuators including (a) Size (b) Numbers (c) Name of Installation (d) Owner (e) Name of Contact Person (f) Date of Installation.

o) Technical Catalogue giving detailed Technical Specification. and other information for each type of actuator and its accessories covered in the bid.

9.2 Within 30 days from the date of Purchase Order manufacturer shall submit copes of the following for Purchaser's review and approval.

a) Documents and specifications as listed in clause 9.1 of this specification.

b) Test certificates and certificates from statutory bodies.

c) Manual for installation, erection instructions, maintenance and operation instructions.

d) Complete assembly drawing of the ball valve matching with the actuator offered.

The approval of these drawings/ documents will not absolve vendor of the responsibility with respect to correct operation of the actuator. Manufacturer's quotation, catalogues, drawings, operating and maintenance manuals etc. shall be in English language.

10.0 SPARES AND ACCESSORIES

Vendor shall quote for two years operational spares, commissioning spares, and any special tools needed for maintenance work on the actuator and its accessories.

DATASHEET FOR GAS POWERED ACTUATORS FOR BALL VALVES

1.	Actuator Manufacturer	:	By vendor
2.	Specification for Gas Powered Actuator	:	MEC/ TS / 05 / E5 / 002A
3.	Actuator Type	:	On-Off
4.	Tag No.	:	As per the Table-1
5.	Line No.	:	As per the Table-1
6.	Service	:	Natural Gas
7.	Vendor to furnish, after sizing the actuator, the filled in torque table no-2		
8.	Actuator Shut-off Pressure	:	As per the Table-1
6.	Process Conditions		
	Power Gas	:	Natural Gas
	Gas Temperature	:	As per the Table-1
	Line Gas Pressure	:	As per the Table-1
	Molecular Weight	:	As per gas composition
	Cp/Cv	:	As per gas composition
	Compressibility Factor	:	As per gas composition
10.	Power Gas Feed Connection from main line	:	3/4" SW
11.	Actuator remote operation (for open and close)	:	Required
12.	Actuator Feed Gas	:	a) Line gas b) N_2 Bottles
13.	Valve Position Limit Switch	:	Required (SPDT contact for open and SPDT contact for close position separately)

14.	Local/ Remote selector switch and its status contact	:	Required (shall be wired up to junction box as per circuit diagram)
15.	Pneumatic limit valves and solenoid, pilot valves to shut-off gas supply to actuator when valve reaches one of its end positions	:	Required
16.	Self retaining system for retaining momentary open or close signals in the control circuit	:	Required
17.	Electrical conduit connection (cable entries to junction box for purchaser's cable)	:	1" NPT
18.	Operating voltage for a) Solenoid Valves b) Relays	:	24V D.C. ± 10%
19.	Contact rating for a) Limit Switches b) L/R Switch (Status)	:	2A at 24V D.C.
20.	Pad lock with L/R Switch	:	Required
21.	Enclosure for		
	a) Actuator	:	Certified weatherproof as per IP-55
	b) Electrical items like solenoid valves, junction boxes, relays, cable glands	:	Certified weatherproof toIP55 & Explosion proof certified for Class 1 Div. 2 Gr. C & D T3
22.	Area Classification	:	NEC (Class 1,Div. 2,Gr. C & D,T3)/equiv
23.	Material of construction for all tubing, valves, piping and fittings etc.	:	SS 316
24.	Make & Model No. of Actuator	:	By vendor
25.	Accessories Required	:	Required as per Specification
26.	Manual/ Hydraulic Override	:	Required as per Specification
27.	Time required for full opening/ Closing of the ball valve	:	2–3 sec. per inch. Nominal valve port Dia.

TABLE-1

ITEM : GAS POWERED BALL VALVE ACTUATORS

S. No.	Size	Class	Type of Valve	Line No.	Gas Temp (°C)		Line Gas Pressure (kg/cm^2g)		Delta P Shut Off (kg/cm^2g)	Remarks
					Inlet	Max	Nor.	Max		

TABLE-2

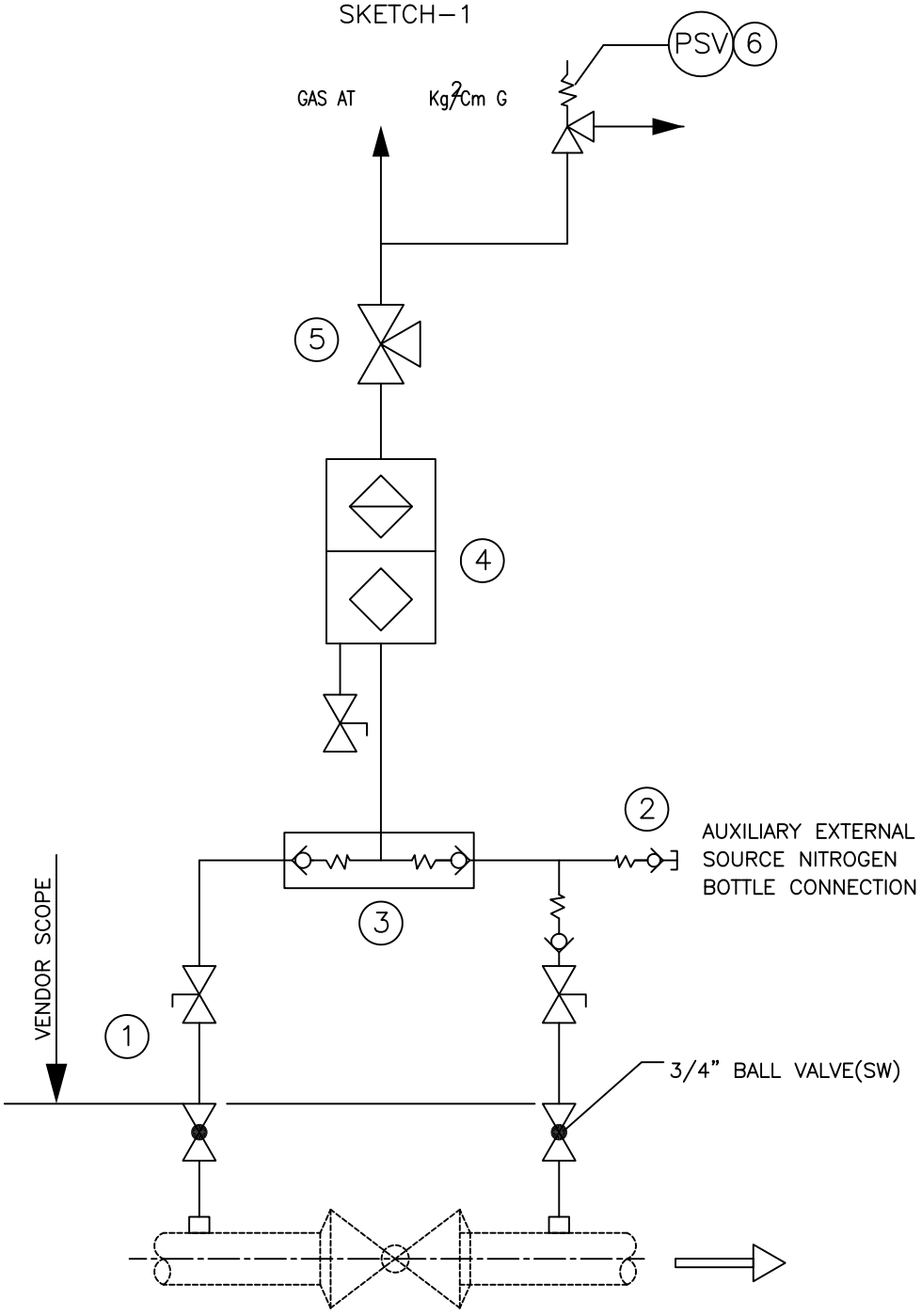
ITEM : GAS POWERED BALL VALVE ACTUATORS

Sl. No.	MR Item No., Valve Size & rating, Qty.	Data from Ball Valve Vendor for (@ Max. Diff. Press.)			Ball Valve Torque Figure with a safety Factor of 1.25		Actuator Generated Torque at regulated pressure (Note-1,3)		Model Selected
		Break Torque (Nm)	Running Torque (Nm)	Max Allowable Valve Stem Torque (Nm)	Break Torque (Nm)	Running Torque (Nm)	Break Torque (Nm)	Running Torque (Nm)	

NOTE :

1. THESE FIGURES SHALL BE USED AS BASIS FOR TESTING THE ACTUATOR PERFORMANCE DURING FACTORY TESTING. THE ACTUATOR ACCEPTANCE WOULD BE CARRIED OUT AFTER VERIFYING SUCCESSFUL TESTING COMPLETE BALL VALVE WITH ACTUATOR ASSEMBLY.
2. ALL TORQUE FIGURES MUST BE IN Nm.
3. Opening / Closing time shall be achieved at max. Design Differential pressure across the valve & actuator regulated pressure max. 24 kg/cm2(g) (approx.). However, the actuator shall open/close the valve at actuator regulated pressure of 10 kg/cm2(g) at max. Design Differential pressure and without timing restriction.

SKETCH – 1



NOTES:–

1. THIS SCHEME SHOWS OUTLINE OF POWER GAS FEEDING SYSTEM.
2. VENDOR SHALL DEVELOP AND SUPPLY THE SUITABLE SYSTEM IN ACCORDANCE WITH THE SPCIFICATION.

1. STOP VALVE (3/4" NPT)
2. CHECK VALVE
3. HIGH PRESSURE SHUTTLE VALVE
4. FILTER SEPARATOR & GAS DEHYDRATOR
5. SELF ACTUATED PRESSURE REGULATOR
6. SEFETY RELIEF VALVE

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD		
REVISIONS						REFERENCES	DRG. NO.

SECTION	ELECT.(INST.) NEW DELHI		
	NAME	SIG.	DATE
DSGN.			
DRWN			
CHKD. & VERIFIED			
APPROVED			

SPECIFICATION FOR GAS/ INSTRUMENT AIR POWERED VALVE ACTUATORS

मेकॉन लिमिटेड

MECON LIMITED

SCALE : N.T.S

DRG.NO. MEC/05/26/SD/002

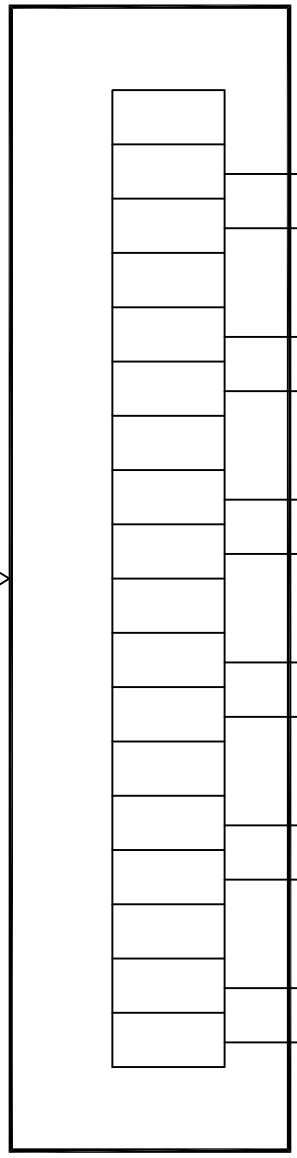
REV 0

VENDOR TO DEVELOP ACTUATOR ELECTRICAL/HYDRAULIC CIRCUIT AS PER SKETCH BELOW AND PROVIDE JUNCTION BOX HOUSING TERMINAL BLOCKS FOR CUSTOMER CABLE TERMINATION

SKETCH–2

ACTUATOR ELECTRICAL/HYDRAULIC CIRCUIT TO BE DEVELOPED BY ACTUATOR/ BALL VALVE SUPPLIER WHICH SHALL INCLUDE RELAYS. LIMIT SWITCHES, SOLENOID VALVES, LOCAL/REMOTE SWITCH, HYDRAULIC SHOCK ABSORBER WITH PUMP UNIT CONTROL AND MANUAL OPERATOR ETC.

ALL CABRING THROUGH GLANDS BY SUPPLIER



VALVE OPEN STATUS
VALVE CLOSED STATUS
R/L SWITCH STATUS
⊔/⊓ CLOSED COMMAND
⊓ OPEN COMMAND
POWER SUPPLY

MULTICORE CABLE ENTRY (1" NPT)

VALVE OPEN COMMAND : POSITIVE PULSE(POTENTIAL FREE) FOR 1 SEC.

VALVE CLOSED COMMAND :

I NEGATIVE PULSE (POTENTIAL FREE) FOR 1. SEC. FOR ESD VALVES

II OTHERWISE POSITIVE PULSE FOR OTHER VALVES

CONTACT STATUS :

1. CONTACT TO CLOSE ON VALVE OPEN FOR OPEN LIMIT SWITCH.
2. CONTACT TO CLOSE ON VALVE CLOSE FOR CLOSE LIMIT SWITCH.
3. L/R SWITCH CONTACT TO CLOSE WHEN VALVE IS ON REMOTE.

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
			REVISIONS				

SECTION	ELECT.(INST.) NEW DELHI		
	NAME	SIG.	DATE
DSGN.			
DRWN			
CHKD. & VERIFIED	--		
APPROVED	--		

SPECIFICATION FOR GAS/ INSTRUMENT AIR POWERED VALVE ACTUATORS

मैकॉन लिमिटेड

MECON LIMITED

SCALE : N.T.S

DRG.NO. MEC/05/26/D/001

REV 0

PHILOSOPHY FOR AUTO-CLOSURE OF VALVES

The valve shall be designed with Auto closure facility in case of pressure drops below specified value in order to prevent gas leakage due to damage in pipeline.

Three nos. Pressure switches shall be provided and the valve shall close in event of pressure drop indication by 2 out of 3 Pressure Switch.

On auto-closure, valve needs to be opened manually at site.

The set point of pressure for auto-closure shall be communicated during detailed engineering. However, it shall be field adjustable.

Facility for bypassing the auto closure (through manual valve) at site shall be provided. In that case, valve shall operate as a normal on-off remote operated valve.

The range of pressure switch shall be communicated during detailed engineering. However, it may cover entire pipeline operating pressure range.

Note : The above philosophy is applicable to valve actuators having auto closure facility and as indicated against respective MR item nos.

STANDARD TECHNICAL SPECIFICATION FOR PACKING, TRANSPORTATION AND HANDLING OF VALVES

SPECIFICATION NO.: MEC/TS/05/21/061

(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092

PREPARED BY:	CHECKED BY:	APPROVED BY:	ISSUE DATE :
(ASHISH MATHUR) SDE	(HARSH KUMAR) MGR	(A. K. GUPTA) DGM	11.09.2018

AMENDMENT STATUS

Sl. No.	Clause / Paragraph / Annexure / Exhibit / Drawing Amended	Page No.	Rev.	Date	BY		Verified	
					Name	Sig.	Name	Sig.

TABLE OF CONTENTS

1.0 SCOPE

This specification covers the minimum requirements for Packing, Handling & transportation of valves and actuators. Though this specification covers the minimum requirement for packing, handling and transportation of valves, it is to be noted that any defect/ damage arising out of improper packing, handling & transportation shall be the responsibility of vendor. The delay due to rectification of such faults shall be to vendor's account. The date of delivery of material at site shall be considered as the day on which last such rectified material is delivered/ rectified at designated store.

2.0 PACKING

2.1 All valves shall be completely drained of test fluid and thoroughly dried after hydrotesting. The machined surfaces shall be coated with a light film of high viscosity rust inhibiting oil which will not become fluid and run off at temperatures below 80°C.

2.2 Flanged valves NPS 6" and smaller in Class 150 and Class 300 shall be fitted with UV resistant plastic covers. For other sizes, valve end flanges shall be fitted with plywood covers. The cover diameter shall be the same as the outside diameter of the flange and shall be at least 10 mm thick for valves up to NPS 24" and 12 mm thick for valves NPS 26" and larger. The cover shall be attached by machine bolts with a nut and washer fitted on the inside of the flange. There shall be minimum four (4) bolts on valves up to NPS 24" nominal size and eight (8) bolts on valves NPS 26 inch and larger. The bolts diameter shall not be less than ¼ the size of the flange bolt hole.

2.3 In addition to the above, all flange facings (ring joint, raised and flat) shall be covered with NBR (based) rubber Self-Adhesive protection (see fig below) that meets the following:

- Oil, ozone and weather resistant
- Minimum thickness of 1.5 mm
- Withstand temperatures up to 75°C
- Non deforming, loosening or detaching
- Proof against sand blasting
- No glue residue
- Chloride free

2.4 Buttweld end valves shall be blanked on each end by high impact plastic bevel protectors, so that bevels are protected from possible mechanical damage during transportation.

2.5 The ends of threaded and socket weld end valves shall be protected with tight fitting plastic caps.

2.6 Packing shall be strong and sturdy such that it can withstand loading/unloading, pushing and crane lifting etc. All packaging shall be done in such a manner as to reduce volume and weight as much as possible without jeopardizing the safety of the material. All packing materials shall be new.

2.7 Stacking of multiple valves in single box is permitted upto 4" NB. However, in such case suitable partitions are to be made inside packing box.

2.8 Where height limitations restrict transportation of valve with actuator in assembled condition, actuator should be dismantled after successful testing at shop. However, the same need to be proposed by valve manufacturer during inspection of said valves and take the approval for Client/ PMC.

2.9 When valve, extended stem and actuators are transported in dismantled condition, the same shall be reassembled after fitment of valve at site. Valve vendor to deploy their representative within 3 days once the intimation is sent from site. Any delay beyond 3 days shall be to supplier's account.

2.10 Valve manufacturers to note that the safe transportation of assembled valve with actuator is in their scope of work. It is therefore required that the valve manufacturer should order actuator meeting the packing guidelines given in this specification. No claim shall be entertained on account of actuator manufacturer's non compliance of requirements specified in this specification, and the valve with actuator shall leave manufacturer's workshop after meeting the terms given in this specification.

2.11 Valves shall not be packed in poly wrap irrespective of the increase in shipping/ transport volume. Box of wood/ ply board etc. shall only be used to pack the valves with/ without actuator irrespective of the size/ rating of the valve.

2.12 The packing shall have suitable lifting arrangement to enable the lifting of valve with the packing. Suitable provisions/ supports shall be provided from support foot/ lifting lugs to enable to lift the valve with packing.

2.13 Where it is required to transport valve and actuator separately, above clauses shall be individually applicable for valve and actuator.

2.14 Assembled Valves shall be properly secured inside packing in order to avoid any contact with packing material during transport.

2.15 For extended stem valves, it is permissible to dismantle stem extension and actuator and as such the valve may be transported in three parts, each part complying individually the requirements of this specification.

2.16 Actuators shall be packed in wooden box with proper cushioning of damage prone parts like sockets, tubing, panel boxes etc.

2.17 Actuator cylinders shall be mounted on base with the help of metallic U-clamps/ welding on reinforcement plate. Metallic U-clamps to be used with double bolts on either side of U clamp.

2.18 Actuator components layout shall be such that to minimize packing volume. Back-up tank shall be put in horizontal position only, wherever feasible.

2.19 The manufacturer shall exhibit the packing meeting to the requirement of this specification during inspection and take clearance.

3.0 HANDLING

3.1 Manufacturer to ensure that during lifting hooks for assembly are attached to body/ end piece casting/ forging only and not on the pup piece. Any pup piece having hook attachment mark may be rejected.

3.2 Assmebled valves, at all times, shall be lifted through lifting lugs only and not from the pup pieces.

3.3 Support foot shall be provided on body only in bolted design. In no case, the support foot shall be fastened in body bolting.

3.4 Lifting Lugs shall be provided on body/ tail piece in bolted design. In no case, the lifting lugs shall be fastened in body bolting.

3.5 Valve vendor to work in close coordination with actuator vendor to ensure that the sling put in lifting lug of valve do not interfere with the actuator/ tubing during lifting at site. Any breakage during site lifting due to fouling of tubing/

actuator components during site lifting shall be in supplier' account.

3.6 Extended Stem valves shall have placement of lifting lugs to ensure the lifting of valve in stem vertical condition only. Under no condition the valve is to be lifted in Stem horizontal/ inclined position.

4.0 TRANSPORTATION

4.1 If the valve and actuator in assembled condition can be accommodated on low bed trailer, low bed trailer shall only be used for inland transportation. Dismantling of valve and actuator shall not be permitted under such case.

4.2 Valve shall be secured on trailer/ truck bed with ropes suitably attached with valve boxes. Type of rope selection shall depend upon weight of valve.

4.3 Tack welds on trailer/ truck bed shall not be used as a fastening method.

4.4 Bolting may be used to securely fasten the valve base on trailer if the provision is available. No. and diameter of bolts shall be suitably chosen as per weight of valve to ensure that bolts do not shear off during transportation.

4.5 For large size valves, Loading shall be done preferably by hanging the valve in position and moving the vehicle to valve sitting position.

4.6 Since unloading of valves is under valve manufacturer's scope, it is to be ensured that valve manufacturer's representative shall be available at designated store to facilitate the same. Valve manufacturer has to keep the track of vehicle movement accordingly. If due to project exigency/ time constraint the unloading has to be done during manufacturer's representative's absence, any damage during such unloading shall be attributable to manufacturer only.

DATA SHEET FOR BALL VALVES

MR Item no. : 1

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch) : 600 (24") ANSI RATING : 600# Design Standard : **API 6D**

3.0 MECON's Technical Specification No.: **MEC/TS/05/21/002, Rev-1, Ed-1**

4.0 Design Pressure : **92 kg/cm2 (g)** Design Temperature, °C : **-29°C to + 65°C**

5.0	Connecting Pipe Specification:	DN 600 (24")
5.1	Material	API 5L Gr. X-70, PSL 2
5.2	Diameter (OD)	610mm
5.3	Thickness	12.7mm

6.0 **Valve Construction Design**

6.1. Configuration : Reduced Bore [ ] Full Bore [√]

6.2. End Connections : Flanged as per ASME B16.5 [ ] Butt Welded as per ASME B16.25 [√]

6.3. Flanges (wherever applicable) : a) RF [ ] RT [ ] NA [√]

b) Serrated [ ] Smooth (125 to 200 microinches AARH) [ ] NA [√]

6.4 Ball Mounting : Trunnion mounted

6.5 Valve body type : Fully Welded

6.6 500 mm pup piece (integrally welded to the valve on each side) : Yes [√] No [ ]
(Material,Outer Diameter and Thickness of pup piece to be same as that of the connecting pipe mentioned above)

7.0 **Valve Material Specification**

	Part	Specified Material	Material Offered (Equivalent or superior)
7.1	Body	**A 216 Gr. WCB**	
7.2	Ball	**A 216 Gr.WCB +75 µENP coating**	
7.3	Body Seat Rings (No Casting)	**AISI 4140 + 75 micron ENP coating**	
7.4	Seat Seal	**As per Fire Safe Certificate of valve manufacturer**	
7.5	Stem (No casting)	**AISI 4140 + 75 micron ENP coating**	
7.6	Stem Seals	**As per Fire Safe Certificate of valve manufacturer**	
7.7	Trunnion	**A 216 Gr. WCB**	
7.8	Stud Bolts/ Nuts	**ASTM A 193 Gr. B7/ A194 Gr. 2H**	

8.0 Corrosion Allowance : **1.5 mm** Service : **Natural Gas**

9.0 Stem extension YES

10.0 Operator AV operated As per attached technical specifcation of Gas Powered Actuator
Gear Operated for 24" (REMOTE OPERATED)

11.0 Fire Resistant Design Requirement **: Type test as per API 6 FA/607**

12.0 **Valve Testing Requirement**

			Test Pressure (min.), $kg/cm^2(g)$	Minimum Duration (minutes)
12.1	Hydrostatic Test	Body	**157**	**As per API 6D**
		Seat	**114**	**As per API 6D**
12.2	Air Test		**5.6 - 7**	**As per API 6D**

13.0 Anti-Static Testing Requirement : **As per Standard API 6D (Latest Ed.)**

14.0 **Valve Painting Specification**

14.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 900.

14.2 For above ground installation-Three coats of corrosion resistant paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron). Colour of paint shade shall be RAL-7038, however any change in colour shall be finalized during drawing approval stage.

15.0 Lock Open Requirement : **NA**

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/21/002,Rev 1 ,Ed. 1
2. Minimum thickness of valve body / adapter shall not be less than as per ASME B16.34 + 1.5 mm CA
3. Inspection and Testing shall be as per approved QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
4. Stops shall be provided for positive alignment of ball with ports and ensure proper installation of handle.
5. Short pattern valves (as per API 6D or otherwise) are not permitted. Only long pattern valves are to be supplied.
6. Charpy V-notch & Hardness test for body, body adaptor, end flanges, ball, body seat rings, stem & studs / nuts shall be conducted as per Cl. 3.4 & 3.6 of TS respectively or as per relevant material code.
7. Compressed asbestos fibre (CAF) shall not be used for body sealing / gasket materials.
8. For welding end, the out of roundness (i.e. difference between maximum and minimum ID at pipe end) shall not be more than 0.5% of pipe OD.
9. Valves shall be inspected and approved by Purchaser before despatch.
10. Support foot & lifting lugs shall be provided as per Cl. 4.16 of the TS for Ball Valves.
11. Bidder shall clearly write valves material (equivalent or superior) offered by them against each part/material of valve in the space provided for. Wherever bidder agrees with valves material as mentioned above in MECON's data sheet, bidder shall clearly indicate "AGREED".
12. Valve seat design shall conform to DIB-1 design .

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD
			REVISIONS		

REFERENCES DRG. NO.

SECTION Oil & Gas

	PREPARED	CHECKED	APPROVED
NAME	VK	AM	HK
DATE	27.03.2025	27.03.2025	27.03.2025
SIGN			

CLIENT : INDRADHANUSH GAS GRID LIMITED

PROJECT: NORTH -EAST NATURAL GAS PIPELINE GRID PROJECT

MECON LIMITED

SCALE :

DATA SHEET NO.: MEC/23UU/05/28/M/001/DS/BV/01

REV 0

DATA SHEET FOR BALL VALVES (NB ≥ 2")

DATA SHEET FOR BALL VALVES

MR Item no. : 2 & 10

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch) : 300 (12") & 50 (2") ANSI RATING : 600# Design Standard : **API 6D**

3.0 MECON's Technical Specification No.: **MEC/TS/05/21/002, Rev-1, Ed-1**

4.0 Design Pressure : **92 kg/cm2 (g)** Design Temperature, °C : **-29°C to + 65°C**

		DN 300 (12")	DN 50 (2")
5.0	Connecting Pipe Specification:		
5.1	Material	API 5L Gr. X-52, PSL 2	ASTM A106 GR. B
5.2	Diameter (OD)	323.9 mm	60.3
5.3	Thickness	14.27mm	S80

6.0 **Valve Construction Design**

6.1. Configuration : Reduced Bore [ ] Full Bore [√]

6.2. End Connections : Flanged as per ASME B16.5 [ ] Butt Welded as per ASME B16.25 [√]

6.3. Flanges (wherever applicable) : a) RF [ ] RT [ ] NA [√]

b) Serrated [ ] Smooth (125 to 200 microinches AARH) [ ] NA [√]

6.4 Ball Mounting : Trunnion mounted

6.5 Valve body type : Fully Welded

6.6 500 mm pup piece (integrally welded to the valve on each side) : Yes [√] No [ ]
(Material,Outer Diameter and Thickness of pup piece to be same as that of the connecting pipe mentioned above)

7.0 **Valve Material Specification**

	Part	Specified Material	Material Offered (Equivalent or superior)
7.1	Body	**A 216 Gr. WCB**	
7.2	Ball	**A 216 Gr.WCB +75 µENP coating**	
7.3	Body Seat Rings (No Casting)	**AISI 4140 + 75 micron ENP coating**	
7.4	Seat Seal	**As per Fire Safe Certificate of valve manufacturer**	
7.5	Stem (No casting)	**AISI 4140 + 75 micron ENP coating**	
7.6	Stem Seals	**As per Fire Safe Certificate of valve manufacturer**	
7.7	Trunnion	**A 216 Gr. WCB**	
7.8	Stud Bolts/ Nuts	**ASTM A 193 Gr. B7/ A194 Gr. 2H**	

8.0 Corrosion Allowance : **1.5 mm** Service : **Natural Gas**

9.0 Stem extension : NA

10.0 Operator : Gear operated for 12" and Lever operated for 2" Size

11.0 Fire Resistant Design Requirement : **Type test as per API 6 FA/607**

12.0 **Valve Testing Requirement**

			Test Pressure (min.), $kg/cm^2(g)$	Minimum Duration (minutes)
12.1	Hydrostatic Test	Body	**157**	**As per API 6D**
		Seat	**114**	**As per API 6D**
12.2	Air Test		**5.6 - 7**	**As per API 6D**

13.0 Anti-Static Testing Requirement : **As per Standard API 6D (Latest Ed.)**

14.0 **Valve Painting Specification**

14.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 900.

14.2 For above ground installation-Three coats of corrosion resistant paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron). Colour of paint shade shall be RAL-7038, however any change in colour shall be finalized during drawing approval stage.

15.0 Lock Open Requirement : **NA**

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/21/002,Rev 1 ,Ed. 1
2. Minimum thickness of valve body / adapter shall not be less than as per ASME B16.34 + 1.5 mm CA
3. Inspection and Testing shall be as per approved QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
4. Stops shall be provided for positive alignment of ball with ports and ensure proper installation of handle.
5. Short pattern valves (as per API 6D or otherwise) are not permitted. Only long pattern valves are to be supplied.
6. Charpy V-notch & Hardness test for body, body adaptor, end flanges, ball, body seat rings, stem & studs / nuts shall be conducted as per Cl. 3.4 & 3.6 of TS respectively or as per relevant material code.
7. Compressed asbestos fibre (CAF) shall not be used for body sealing / gasket materials.
8. For welding end, the out of roundness (i.e. difference between maximum and minimum ID at pipe end) shall not be more than 0.5% of pipe OD.
9. Valves shall be inspected and approved by Purchaser before despatch.
10. Support foot & lifting lugs shall be provided as per Cl. 4.16 of the TS for Ball Valves.
11. Bidder shall clearly write valves material (equivalent or superior) offered by them against each part/material of valve in the space provided for. Wherever bidder agrees with valves material as mentioned above in MECON's data sheet, bidder shall clearly indicate "AGREED".
12. Valve seat design shall conform to DIB-1 design .

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD
			REVISIONS		

REFERENCES DRG. NO.

SECTION Oil & Gas

	PREPARED	CHECKED	APPROVED
NAME	VKS	AM	HK
DATE	27.03.2025	27.03.2025	27.03.2025
SIGN			

CLIENT : INDRADHANUSH GAS GRID LIMITED

PROJECT: NORTH -EAST NATURAL GAS PIPELINE GRID PROJECT

MECON LIMITED

SCALE :

DATA SHEET FOR BALL VALVES (NB ≥ 2")

DATA SHEET NO.: MEC/23UU/05/28/M/001/DS/BV/02

REV 0

DATA SHEET FOR BALL VALVES

MR Item no. : 3,7 & 8

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch) : 300 (12"),200 (8"),100(4") ANSI RATING : 600# Design Standard : **API 6D**

3.0 MECON's Technical Specification No.: **MEC/TS/05/21/002, Rev-1, Ed-1**

4.0 Design Pressure : **92 kg/cm2 (g)** Design Temperature, °C : **-29°C to + 65°C**

		DN 300 (12")	DN 200 (8")	DN 100 (4")
5.0	Connecting Pipe Specification:			
5.1	Material	API 5L Gr. X-52, PSL 2	API 5L Gr.B PSL 2	ASTM A106 GR. B
5.2	Diameter (OD)	323.9 mm	219.07	114.3
5.3	Thickness	14.27mm	14.3mm	XS

6.0 **Valve Construction Design**

6.1. Configuration : Reduced Bore [√] Full Bore [ ]

6.2. End Connections : Flanged as per ASME B16.5 [ ] Butt Welded as per ASME B16.25 [√]

6.3. Flanges (wherever applicable) : a) RF [ ] RT [ ] NA [√]

b) Serrated [ ] Smooth (125 to 200 microinches AARH) [ ] NA [√]

6.4 Ball Mounting : Trunnion mounted

6.5 Valve body type : Fully Welded

6.6 500 mm pup piece (integrally welded to the valve on each side) : Yes [√] No [ ]
(Material,Outer Diameter and Thickness of pup piece to be same as that of the connecting pipe mentioned above)

7.0 **Valve Material Specification**

	Part	Specified Material	Material Offered (Equivalent or superior)
7.1	Body	**A 216 Gr. WCB**	
7.2	Ball	**A 216 Gr.WCB +75 µENP coating**	
7.3	Body Seat Rings (No Casting)	**AISI 4140 + 75 micron ENP coating**	
7.4	Seat Seal	**As per Fire Safe Certificate of valve manufacturer**	
7.5	Stem (No casting)	**AISI 4140 + 75 micron ENP coating**	
7.6	Stem Seals	**As per Fire Safe Certificate of valve manufacturer**	
7.7	Trunnion	**A 216 Gr. WCB**	
7.8	Stud Bolts/ Nuts	**ASTM A 193 Gr. B7/ A194 Gr. 2H**	

8.0 Corrosion Allowance : **1.5 mm** Service : **Natural Gas**

9.0 Stem extension : NA

10.0 Operator : Gear Operated for 12" & 8" and Lever operated for 4" Size

11.0 Fire Resistant Design Requirement : **Type test as per API 6 FA/607**

12.0 **Valve Testing Requirement**

			Test Pressure (min.), $kg/cm^2(g)$	Minimum Duration (minutes)
12.1	Hydrostatic Test	Body	**157**	**As per API 6D**
		Seat	**114**	**As per API 6D**
12.2	Air Test		**5.6 - 7**	**As per API 6D**

13.0 Anti-Static Testing Requirement : **As per Standard API 6D (Latest Ed.)**

14.0 **Valve Painting Specification**

14.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 900.

14.2 For above ground installation-Three coats of corrosion resistant paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron). Colour of paint shade shall be RAL-7038, however any change in colour shall be finalized during drawing approval stage.

15.0 Lock Open Requirement : **NA**

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/21/002,Rev 1 ,Ed. 1
2. Minimum thickness of valve body / adapter shall not be less than as per ASME B16.34 + 1.5 mm CA
3. Inspection and Testing shall be as per approved QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
4. Stops shall be provided for positive alignment of ball with ports and ensure proper installation of handle.
5. Short pattern valves (as per API 6D or otherwise) are not permitted. Only long pattern valves are to be supplied.
6. Charpy V-notch & Hardness test for body, body adaptor, end flanges, ball, body seat rings, stem & studs / nuts shall be conducted as per Cl. 3.4 & 3.6 of TS respectively or as per relevant material code.
7. Compressed asbestos fibre (CAF) shall not be used for body sealing / gasket materials.
8. For welding end, the out of roundness (i.e. difference between maximum and minimum ID at pipe end) shall not be more than 0.5% of pipe OD.
9. Valves shall be inspected and approved by Purchaser before despatch.
10. Support foot & lifting lugs shall be provided as per Cl. 4.16 of the TS for Ball Valves.
11. Bidder shall clearly write valves material (equivalent or superior) offered by them against each part/material of valve in the space provided for. Wherever bidder agrees with valves material as mentioned above in MECON's data sheet, bidder shall clearly indicate "AGREED".
12. Valve seat design shall conform to DIB-1 design .

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD
			REVISIONS		

REFERENCES DRG. NO.

SECTION Oil & Gas

	PREPARED	CHECKED	APPROVED
NAME	VKS	AM	HK
DATE	27.03.2025	27.03.2025	27.03.2025
SIGN			

CLIENT : INDRADHANUSH GAS GRID LIMITED

PROJECT: NORTH -EAST NATURAL GAS PIPELINE GRID PROJECT

MECON LIMITED

SCALE :

DATA SHEET FOR BALL VALVES (NB ≥ 2")

DATA SHEET NO.: MEC/23UU/05/28/M/001/DS/BV/03

REV 0

DATA SHEET FOR BALL VALVES

MR Item no. : 4 & 5

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch) : 300 (12"), 200 (8") ANSI RATING : 600# Design Standard : **API 6D**

3.0 MECON's Technical Specification No.: **MEC/TS/05/21/002, Rev-1, Ed-1**

4.0 Design Pressure : **92 kg/cm2 (g)** Design Temperature, °C : **-29°C to + 65°C**

		DN 300 (12")	DN 200 (8")
5.0	Connecting Pipe Specification:		
5.1	Material	API 5L Gr. X-52, PSL 2	API 5L Gr.B PSL 2
5.2	Diameter (OD)	323.9 mm	219.07mm
5.3	Thickness	14.27mm	14.3mm

6.0 **Valve Construction Design**

6.1. Configuration : Reduced Bore [√] Full Bore [ ]

6.2. End Connections : Flanged as per ASME B16.5 [ ] Butt Welded as per ASME B16.25 [√]

6.3. Flanges (wherever applicable) : a) RF [ ] RT [ ] NA [√]

b) Serrated [ ] Smooth (125 to 200 microinches AARH) [ ] NA [√]

6.4 Ball Mounting : Trunnion mounted

6.5 Valve body type : Fully Welded

6.6 500 mm pup piece (integrally welded to the valve on each side) : [√] No [ ]
(Material,Outer Diameter and Thickness of pup piece to be same as that of the connecting pipe mentioned above)

7.0 **Valve Material Specification**

	Part	Specified Material	Material Offered (Equivalent or superior)
7.1	Body	**A 216 Gr. WCB**	
7.2	Ball	**A 216 Gr.WCB +75 µENP coating**	
7.3	Body Seat Rings (No Casting)	**AISI 4140 + 75 micron ENP coating**	
7.4	Seat Seal	**As per Fire Safe Certificate of valve manufacturer**	
7.5	Stem (No casting)	**AISI 4140 + 75 micron ENP coating**	
7.6	Stem Seals	**As per Fire Safe Certificate of valve manufacturer**	
7.7	Trunnion	**A 216 Gr. WCB**	
7.8	Stud Bolts/ Nuts	**ASTM A 193 Gr. B7/ A194 Gr. 2H**	

8.0 Corrosion Allowance : **1.5 mm** Service : **Natural Gas**

9.0 Stem extension : NA

10.0 Operator : AV operated As per attached technical specifcation of Gas Powered Actuator

: 3 nos valve with auto closure facility Gear operated for 12" & 8" Size

11.0 Fire Resistant Design Requirement **: Type test as per API 6 FA/607**

12.0 **Valve Testing Requirement**

			Test Pressure (min.), $kg/cm^2(g)$	Minimum Duration (minutes)
12.1	Hydrostatic Test	Body	**157**	**As per API 6D**
		Seat	**114**	**As per API 6D**
12.2	Air Test		**5.6 - 7**	**As per API 6D**

13.0 Anti-Static Testing Requirement : **As per Standard API 6D (Latest Ed.)**

14.0 **Valve Painting Specification**

14.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.

14.2 For above ground installation-Three coats of corrosion resistant paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron). Colour of paint shade shall be RAL-7038, however any change in colour shall be finalized during drawing approval stage.

15.0 Lock Open Requirement : **NA**

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/21/002,Rev 1 ,Ed. 1
2. Minimum thickness of valve body / adapter shall not be less than as per ASME B16.34 + 1.5 mm CA
3. Inspection and Testing shall be as per approved QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
4. Stops shall be provided for positive alignment of ball with ports and ensure proper installation of handle.
5. Short pattern valves (as per API 6D or otherwise) are not permitted. Only long pattern valves are to be supplied.
6. Charpy V-notch & Hardness test for body, body adaptor, end flanges, ball, body seat rings, stem & studs / nuts shall be conducted as per Cl. 3.4 & 3.6 of TS respectively or as per relevant material code.
7. Compressed asbestos fibre (CAF) shall not be used for body sealing / gasket materials.
8. For welding end, the out of roundness (i.e. difference between maximum and minimum ID at pipe end) shall not be more than 0.5% of pipe OD.
9. Valves shall be inspected and approved by Purchaser before despatch.
10. Support foot & lifting lugs shall be provided as per Cl. 4.16 of the TS for Ball Valves.
11. Bidder shall clearly write valves material (equivalent or superior) offered by them against each part/material of valve in the space provided for. Wherever bidder agrees with valves material as mentioned above in MECON's data sheet, bidder shall clearly indicate "AGREED".
12. Valve seat design shall conform to DIB-1 design .

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD
			REVISIONS		

REFERENCES DRG. NO.

SECTION Oil & Gas

	PREPARED	CHECKED	APPROVED
NAME	VKS	AM	HK
DATE	27.03.2025	27.03.2025	27.03.2025
SIGN			

CLIENT : INDRADHANUSH GAS GRID LIMITED

PROJECT: NORTH -EAST NATURAL GAS PIPELINE GRID PROJECT

MECON LIMITED

SCALE :

DATA SHEET FOR BALL VALVES (NB ≥ 2")

DATA SHEET NO.: MEC/23UU/05/28/M/001/DS/BV/04

REV 0

DATA SHEET FOR BALL VALVES

MR Item no. : 6

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch) : 200 (8") ANSI RATING : 600# Design Standard : **API 6D**

3.0 MECON's Technical Specification No.: **MEC/TS/05/21/002, Rev-1, Ed-1**

4.0 Design Pressure : **92 kg/cm2 (g)** Design Temperature, °C : **-29°C to + 65°C**

5.0	Connecting Pipe Specification:	DN 200 (8")
5.1	Material	API 5L Gr.B PSL 2
5.2	Diameter (OD)	219.6
5.3	Thickness	14.3mm

6.0 **Valve Construction Design**

6.1. Configuration : Reduced Bore [√] Full Bore [ ]

6.2. End Connections : Flanged as per ASME B16.5 [ ] Butt Welded as per ASME B16.25 [√]

6.3. Flanges (wherever applicable) : a) RF [ ] RT [ ] NA [√]

b) Serrated [ ] Smooth (125 to 200 microinches AARH) [ ] NA [√]

6.4 Ball Mounting : Trunnion mounted

6.5 Valve body type : Fully Welded

6.6 500 mm pup piece (integrally welded to the valve on each side) : Yes [√] No [ ]

(Material,Outer Diameter and Thickness of pup piece to be same as that of the connecting pipe mentioned above)

7.0 **Valve Material Specification**

	Part	Specified Material	Material Offered (Equivalent or superior)
7.1	Body	**A 216 Gr. WCB**	
7.2	Ball	**A 216 Gr.WCB +75 µENP coating**	
7.3	Body Seat Rings (No Casting)	**AISI 4140 + 75 micron ENP coating**	
7.4	Seat Seal	**As per Fire Safe Certificate of valve manufacturer**	
7.5	Stem (No casting)	**AISI 4140 + 75 micron ENP coating**	
7.6	Stem Seals	**As per Fire Safe Certificate of valve manufacturer**	
7.7	Trunnion	**A 216 Gr. WCB**	
7.8	Stud Bolts/ Nuts	**ASTM A 193 Gr. B7/ A194 Gr. 2H**	

8.0 Corrosion Allowance : **1.5 mm** Service : **Natural Gas**

9.0 Stem extension : YES

10.0 Operator : Gear operated for 8" Size

11.0 Fire Resistant Design Requirement : **Type test as per API 6 FA/607**

12.0 **Valve Testing Requirement**

			Test Pressure (min.), $kg/cm^2(g)$	Minimum Duration (minutes)
12.1	Hydrostatic Test	Body	**157**	**As per API 6D**
		Seat	**114**	**As per API 6D**
12.2	Air Test		**5.6 - 7**	**As per API 6D**

13.0 Anti-Static Testing Requirement : **As per Standard API 6D (Latest Ed.)**

14.0 **Valve Painting Specification**

14.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 900.

14.2 For above ground installation-Three coats of corrosion resistant paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron). Colour of paint shade shall be RAL-7038, however any change in colour shall be finalized during drawing approval stage.

15.0 Lock Open Requirement : **NA**

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/21/002,Rev 1 ,Ed. 1
2. Minimum thickness of valve body / adapter shall not be less than as per ASME B16.34 + 1.5 mm CA
3. Inspection and Testing shall be as per approved QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
4. Stops shall be provided for positive alignment of ball with ports and ensure proper installation of handle.
5. Short pattern valves (as per API 6D or otherwise) are not permitted. Only long pattern valves are to be supplied.
6. Charpy V-notch & Hardness test for body, body adaptor, end flanges, ball, body seat rings, stem & studs / nuts shall be conducted as per Cl. 3.4 & 3.6 of TS respectively or as per relevant material code.
7. Compressed asbestos fibre (CAF) shall not be used for body sealing / gasket materials.
8. For welding end, the out of roundness (i.e. difference between maximum and minimum ID at pipe end) shall not be more than 0.5% of pipe OD.
9. Valves shall be inspected and approved by Purchaser before despatch.
10. Support foot & lifting lugs shall be provided as per Cl. 4.16 of the TS for Ball Valves.
11. Bidder shall clearly write valves material (equivalent or superior) offered by them against each part/material of valve in the space provided for. Wherever bidder agrees with valves material as mentioned above in MECON's data sheet, bidder shall clearly indicate "AGREED".
12. Valve seat design shall conform to DIB-1 design .

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD
REVISIONS					

REFERENCES DRG. NO.

SECTION Oil & Gas

	PREPARED	CHECKED	APPROVED
NAME	VKS	AM	HK
DATE	27.03.2025	27.03.2025	27.03.2025
SIGN			

CLIENT : INDRADHANUSH GAS GRID LIMITED

PROJECT: NORTH -EAST NATURAL GAS PIPELINE GRID PROJECT

MECON LIMITED

SCALE :

DATA SHEET FOR BALL VALVES (NB ≥ 2")

DATA SHEET NO.: MEC/23UU/05/28/M/001/DS/BV/05

REV 0

DATA SHEET FOR BALL VALVES

MR Item no. : 9

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch) : 100 (4") ANSI RATING : 600# Design Standard : **API 6D**

3.0 MECON's Technical Specification No.: **MEC/TS/05/21/002, Rev-1, Ed-1**

4.0 Design Pressure : **92 kg/cm2 (g)** Design Temperature, °C : **-29°C to + 65°C**

5.0 Connecting Pipe Specification:

5.1 Material

5.2 Diameter (OD)

5.3 Thickness

6.0 **Valve Construction Design**

6.1. Configuration : Reduced Bore [√] Full Bore [ ]

6.2. End Connections : Flanged as per ASME B16.5 [√] Butt Welded as per ASME B16.25 [ ]

6.3. Flanges (wherever applicable) : a) RF [√] RT [ ] NA [ ]
b) Serrated [ ] Smooth (125 to 200 microinches AARH) [√] NA [ ]

6.4 Ball Mounting : Trunnion mounted

6.5 Valve body type : Fully Welded [ ] Two/Three Piece Bolted [ ] Either [√]

6.6 500 mm pup piece (integrally welded to the valve on each side) : Yes [ ] No [√]
(Material,Outer Diameter and Thickness of pup piece to be same as that of the connecting pipe mentioned above)

7.0 **Valve Material Specification**

	Part	Specified Material	Material Offered (Equivalent or superior)
7.1	Body	**A 216 Gr. WCB**	
7.2	Ball	**A 216 Gr.WCB +75 µENP coating**	
7.3	Body Seat Rings (No Casting)	**AISI 4140 + 75 micron ENP coating**	
7.4	Seat Seal	**As per Fire Safe Certificate of valve manufacturer**	
7.5	Stem (No casting)	**AISI 4140 + 75 micron ENP coating**	
7.6	Stem Seals	**As per Fire Safe Certificate of valve manufacturer**	
7.7	Trunnion	**A 216 Gr. WCB**	
7.8	Stud Bolts/ Nuts	**ASTM A 193 Gr. B7/ A194 Gr. 2H**	

8.0 Corrosion Allowance : **1.5 mm** Service : **Natural Gas**

9.0 Stem extension : NA

10.0 Operator : Lever operated for 4" size

11.0 Fire Resistant Design Requirement : **Type test as per API 6 FA/607**

12.0 **Valve Testing Requirement**

			Test Pressure (min.), $kg/cm^2(g)$	Minimum Duration (minutes)
12.1	Hydrostatic Test	Body	**157**	**As per API 6D**
		Seat	**114**	**As per API 6D**
12.2	Air Test		**5.6 - 7**	**As per API 6D**

13.0 Anti-Static Testing Requirement : **As per Standard API 6D (Latest Ed.)**

14.0 **Valve Painting Specification**

14.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 900.

14.2 For above ground installation-Three coats of corrosion resistant paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron). Colour of paint shade shall be RAL-7038, however any change in colour shall be finalized during drawing approval stage.

15.0 Lock Open Requirement : **NA**

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/21/002,Rev 1 ,Ed. 1
2. Minimum thickness of valve body / adapter shall not be less than as per ASME B16.34 + 1.5 mm CA
3. Inspection and Testing shall be as per approved QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
4. Stops shall be provided for positive alignment of ball with ports and ensure proper installation of handle.
5. Short pattern valves (as per API 6D or otherwise) are not permitted. Only long pattern valves are to be supplied.
6. Charpy V-notch & Hardness test for body, body adaptor, end flanges, ball, body seat rings, stem & studs / nuts shall be conducted as per Cl. 3.4 & 3.6 of TS respectively or as per relevant material code.
7. Compressed asbestos fibre (CAF) shall not be used for body sealing / gasket materials.
8. For welding end, the out of roundness (i.e. difference between maximum and minimum ID at pipe end) shall not be more than 0.5% of pipe OD.
9. Valves shall be inspected and approved by Purchaser before despatch.
10. Support foot & lifting lugs shall be provided as per Cl. 4.16 of the TS for Ball Valves.
11. Bidder shall clearly write valves material (equivalent or superior) offered by them against each part/material of valve in the space provided for. Wherever bidder agrees with valves material as mentioned above in MECON's data sheet, bidder shall clearly indicate "AGREED".
12. Valve seat design shall conform to DIB-1 design .

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD

REVISIONS

REFERENCES DRG. NO.

SECTION Oil & Gas

	PREPARED	CHECKED	APPROVED
NAME	VKS	AM	HK
DATE	27.03.2025	27.03.2025	27.03.2025
SIGN			

CLIENT : INDRADHANUSH GAS GRID LIMITED

PROJECT: NORTH -EAST NATURAL GAS PIPELINE GRID PROJECT

DATA SHEET FOR BALL VALVES (NB ≥ 2")

MECON LIMITED

SCALE :

DATA SHEET NO.: MEC/23UU/05/28/M/001/DS/BV/06

REV 0

DATA SHEET FOR LOW TEMPERATURE BALL VALVES

MR Item no. : 11

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch) : 50 (2") ANSI RATING : 600# Design Standard : **API 6D**

3.0 MECON's Technical Specification No.: **MEC/TS/05/21/002, Rev-1, Ed-1**

4.0 Design Pressure : **92 kg/cm2 (g)** Design Temperature, °C : **-29°C to + 65°C**

5.0	Connecting Pipe Specification:	DN 50 (2")
5.1	Material	ASTM A106 GR. B
5.2	Diameter (OD)	60.3mm
5.3	Thickness	XS

6.0 **Valve Construction Design**

6.1. Configuration : Reduced Bore [ ] Full Bore [√]

6.2. End Connections : Flanged as per ASME B16.5 [ ] Butt Welded as per ASME B16.25 [√]

6.3. Flanges (wherever applicable) : a) RF [ ] RT [ ] NA [√]

b) Serrated [ ] Smooth (125 to 200 microinches AARH) [ ] NA [√]

6.4 Ball Mounting : Trunnion mounted

6.5 Valve body type : Fully Welded

6.6 500 mm pup piece (integrally welded to the valve on each side) : Yes [√] No [ ]
(Material,Outer Diameter and Thickness of pup piece to be same as that of the connecting pipe mentioned above)

7.0 **Valve Material Specification**

	Part	Specified Material	Material Offered (Equivalent or superior)
7.1	Body	**A 352 Gr.LCB/ A350 Gr.LF2**	
7.2	Ball	**(A 352 Gr.LCB/ A350 Gr.LF2) +75 µENP coating**	
7.3	Body Seat Rings (No Casting)	**A 350 Gr.LF2+ 75 micron ENP coating**	
7.4	Seat Seal	**As per Fire Safe Certificate of valve manufacturer**	
7.5	Stem (No casting)	**A 350 Gr.LF2**	
7.6	Stem Seals	**As per Fire Safe Certificate of valve manufacturer**	
7.7	Trunnion	**A 352 Gr.LCB/ A350 Gr.LF2**	
7.8	Stud Bolts/ Nuts	**ASTM A 193 Gr. B7/ A194 Gr. 2H**	

8.0 Corrosion Allowance : **1.5 mm** Service : **Natural Gas**

9.0 Stem extension : NA

10.0 Operator : Lever operated for 2" size

11.0 Fire Resistant Design Requirement : **Type test as per API 6 FA/607**

12.0 **Valve Testing Requirement**

			Test Pressure (min.), $kg/cm^2(g)$	Minimum Duration (minutes)
12.1	Hydrostatic Test	Body	**157**	**As per API 6D**
		Seat	**114**	**As per API 6D**
12.2	Air Test		**5.6 - 7**	**As per API 6D**

13.0 Anti-Static Testing Requirement : **As per Standard API 6D (Latest Ed.)**

14.0 **Valve Painting Specification**

14.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 900.

14.2 For above ground installation-Three coats of corrosion resistant paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron). Colour of paint shade shall be RAL-7038, however any change in colour shall be finalized during drawing approval stage.

15.0 Lock Open Requirement : **NA**

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/21/002,Rev 1 ,Ed. 1
2. Minimum thickness of valve body / adapter shall not be less than as per ASME B16.34 + 1.5 mm CA
3. Inspection and Testing shall be as per approved QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
4. Stops shall be provided for positive alignment of ball with ports and ensure proper installation of handle.
5. Short pattern valves (as per API 6D or otherwise) are not permitted. Only long pattern valves are to be supplied.
6. Charpy V-notch & Hardness test for body, body adaptor, end flanges, ball, body seat rings, stem & studs / nuts shall be conducted as per Cl. 3.4 & 3.6 of TS respectively or as per relevant material code.
7. Compressed asbestos fibre (CAF) shall not be used for body sealing / gasket materials.
8. For welding end, the out of roundness (i.e. difference between maximum and minimum ID at pipe end) shall not be more than 0.5% of pipe OD.
9. Valves shall be inspected and approved by Purchaser before despatch.
10. Support foot & lifting lugs shall be provided as per Cl. 4.16 of the TS for Ball Valves.
11. Bidder shall clearly write valves material (equivalent or superior) offered by them against each part/material of valve in the space provided for. Wherever bidder agrees with valves material as mentioned above in MECON's data sheet, bidder shall clearly indicate "AGREED".
12. Valve seat design shall conform to DIB-1 design .

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD
			REVISIONS		

REFERENCES DRG. NO.

SECTION Oil & Gas

	PREPARED	CHECKED	APPROVED
NAME	VKS	AM	HK
DATE	27.03.2025	27.03.2025	27.03.2025
SIGN			

CLIENT : INDRADHANUSH GAS GRID LIMITED

PROJECT: NORTH -EAST NATURAL GAS PIPELINE GRID PROJECT

DATA SHEET FOR BALL VALVES (NB ≥ 2")

MECON LIMITED

SCALE :

DATA SHEET NO.: MEC/23UU/05/28/M/001/DS/BV/07

REV 0

DATA SHEET FOR BALL VALVES

MR Item nos. :12

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch) : ¾ " ANSI RATING : 600# Design Standard **: ISO 17292**

3.0 MECON's Technical Specification No.: **MEC/TS/05/21/002, Rev-1, Ed-1**

4.0 Design Pressure : **92 kg/cm2 (g)** Design Temperature, °C : **-29°C to + 65°C**

5.0	Connecting Pipe Specification:	DN 20 (3/4")
5.1	size	ASTM A 106 GR.B
5.2	Diameter (OD)	26.7mm
5.3	Thickness	S160

6.0 **Valve Construction Design**

6.1. Configuration : Reduced Bore [ ] Full Bore [√]

6.2. End Connections **Socket Welded as per ASME B16.11**
100mm Extension Pups in ASTM A106 Gr.B (Sch. 160) for 3/4"

6.3. Flanges (wherever applicable) : a) RF [ ] RT [ ] NA [√]
b) Serrated [ ] Smooth (125 to 200 microinches AARH) [ ] NA [√]

6.4 Ball Mounting : Floating Ball Type

6.5 Valve body type : Bolted body

7.0 **Valve Material Specification**

	Part	Specified Material	Material Offered (Equivalent or superior)
7.1	Body	**ASTM A105**	
7.2	Ball	**13% Cr Steel**	
7.3	Body Seat	**As per Fire Safe Certificate of valve manufacturer**	
7.4	Gland	**13% Cr Steel**	
7.5	Stem (No Casting)	**13% Cr Steel**	
7.6	Stem Seal	**As per Fire Safe Certificate of valve manufacturer**	
7.7	Body Studs/Nuts	**ASTM A193 Gr. B7/ A194 Gr. 2H**	

8.0 Corrosion Allowance : **1.5 mm** Service : **Natural Gas**

9.0 Stem extension : NA

10.0 Operator : Lever operated

11.0 Fire Resistant Design Requirement **: Type test as per API 6 FA/607**

12.0 **Valve Testing Requirement**

			Test Pressure (min.), $kg/cm^2(g)$	Minimum Duration, minutes
12.1	Hydrostatic Test	Body	**157**	**As per ISO 17292**
		Seat	**114**	**As per ISO 17292**
12.2	Air Test		**5.6 - 7**	**As per ISO 17292**

13.0 Anti-Static Testing Requirement :**As per ISO 17292**

14.0 Valve Painting Specification

14.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 900.

14.2 For above ground installation-Three coats of corrosion resistant paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron). Colour of paint shade shall be RAL-7038, however any change in colour shall be finalized during drawing approval stage.

15.0 Lock Open/ Lock Close/Normally Close Requirement : **NA**

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/21/002,Rev 1 ,Ed. 1
2. Minimum thickness of valve body / adapter shall not be less than that specified in ISO 17292 plus 1.5 mm corrosion allowance specified in this datasheet .
3. Charpy V-notch test for body, ball, body seat, gland, stem & studs/nuts shall be conducted as per A370. The test shall be conducted at 0°C. The minimum average absorbed energy per set of three specimen shall be 27 J with an individual minimum per specimen of 22 J.
4. Material test certificates and hydrostatic test reports shall be furnished prior to despatch.
5. Detailed dimensional drawings showing cross-section with part numbers and materials shall be submitted for Purchaser's approval prior to manufacture of the valves.
6. All tests shall be as per BS EN 12266.
7. Valves shall have ball position indicator.
8. Stops shall be provided for positive alignment of ball with ports and ensure proper installation of handle.
9. Each valve shall be provided with a wrench.
10. Valves shall be inspected and approved by Purchaser before dispatch.
11. Gland packing assembly shall permit repair of gland packing under full line pressure.
12. Bidder shall clearly write valves material (equivalent or superior) offered by them against each part/material of valve in the space provided for. Wherever bidder agrees with valves material as mentioned above in MECON's data sheet, bidder shall clearly indicate **"AGREED".**

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD

REVISIONS

REFERENCES DRG. NO.

SECTION Oil & Gas	PREPARED	CHECKED	APPROVED
NAME	VKS	AM	HK
DATE	27.03.2025	27.03.2025	27.03.2025
SIGN			

CLIENT : INDRADHANUSH GAS GRID LIMITED

Project: NORTH -EAST NATURAL GAS PIPELINE GRID PROJECT

MECON LIMITED

SCALE :

DATA SHEET FOR BALL VALVES (NB < 2")

DATA SHEET NO.:MEC/23UU/05/28/M/001/DS/BV/08

REV 0

DATA SHEET FOR LOW TEMPERATRE BALL VALVES

MR Item nos. : 13

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch) : 3/4" ANSI RATING : 600# Design Standard : **ISO 17292**

3.0 MECON's Technical Specification No.: **MEC/TS/05/21/002, Rev-1, Ed-1**

4.0 Design Pressure : **92 kg/cm2 (g)** Design Temperature, °C : **-46°C to + 65°C**

5.0	Connecting Pipe Specification:	DN 20 (3/4")
5.1	Material	ASTM A106 Gr.B
5.2	Diameter (OD)	26.7 mm
5.3	Thickness	S160

6.0 **Valve Construction Design**

6.1. Configuration : Reduced Bore [ ] Full Bore [√]

6.2 End Connections **: Socket Welded as per ASME B16.11** [√]
100 mm Extension Pups of ASTM A333 Gr.6 (Sch XS for 1" and Sch. 160 for 3/4") at both ends

6.3. Flanges (wherever applicable) : a) RF [ ] RT [ ] NA [√]
b) Serrated [ ] Smooth (125 to 200 microinches AARH) [ ] NA [√]

6.4 Ball Mounting : **Floating Ball type**

6.5 Valve body type : Bolted body

7.0 **Valve Material Specification**

	Part	Specified Material	Material Offered (Equivalent or superior)
7.1	Body	**ASTM A350 Gr. LF2**	
7.2	Ball	**(SS316 /ASTM A350 Gr. LF2)+ 75µENP coating**	
7.3	Body Seat	**As per Fire Safe Certificate of valve manufacturer**	
7.4	Gland	**SS316**	
7.5	Stem (No Casting)	**SS316 (No Casting) /ASTM A350 Gr. LF2**	
7.6	Body Seal	**As per Fire Safe Certificate of valve manufacturer**	
7.7	Stem Seal	**As per Fire Safe Certificate of valve manufacturer**	
7.8	Body Studs/Nuts	**ASTM A320 Gr.L7/ ASTM A194 Gr.4**	

8.0 Corrosion Allowance : **1.5 mm** Service : **Natural Gas**

9.0 Stem extension : NA

10.0 Operator : Lever operated

11.0 Fire Resistant Design Requirement **: Type test as per API 6 FA/607**

12.0 **Valve Testing Requirement**

			Test Pressure (min.), kg/cm^2(g)	Minimum Duration (minutes)
12.1	Hydrostatic Test	Body	**157**	**As per ISO 17292**
		Seat	**114**	**As per ISO 17292**
12.2	Air Test		**5.6 - 7**	**As per ISO 17292**

13.0 Anti-Static Testing Requirement : **As per Standard API 6D (Latest Ed.)**

14.0 **Valve Painting Specification**

14.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.

14.2 For above ground installation-Three coats of corrosion resistant paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron). Colour of paint shade shall be RAL-7038, however any change in colour shall be finalized during drawing approval stage.

15.0 Lock Open Requirement : **N.A.**

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/21/002,Rev 1 ,Ed. 1
2. Minimum thickness of valve body / adapter shall not be less than that specified in ISO 17292 plus 1.5 mm corrosion allowance specified in this datasheet .
3. Charpy V-notch test for body, ball, body seat, gland, stem & studs/nuts shall be conducted as per A370. The test shall be conducted at -46°C. The minimum average absorbed energy per set of three specimen shall be 27 J with an individual minimum per specimen of 22 J.
4. Material test certificates and hydrostatic test reports shall be furnished prior to despatch.
5. Detailed dimensional drawings showing cross-section with part numbers and materials shall be submitted for Purchaser's approval prior to manufacture of the valves. prior to manufacture of the valves.
6. All tests shall be as per BS EN 12266.
7. Valves shall have ball position indicator.
8. Stops shall be provided for positive alignment of ball with ports and ensure proper installation of handle.
9. Each valve shall be provided with a wrench.
10. Valves shall be inspected and approved by Purchaser before dispatch.
11. Gland packing assembly shall permit repair of gland packing under full line pressure.
12. Bidder shall clearly write valves material (equivalent or superior) offered by them against each part/material of valve in the space provided for. Wherever bidder agrees with valves material as mentioned above in MECON's data sheet, bidder shall clearly indicate **"AGREED".**

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD
			REVISIONS		

REFERENCES DRG. NO.

SECTION Oil & Gas

	PREPARED	CHECKED	APPROVED
NAME	VKS	AM	HK
DATE	27.03.2025	27.03.2025	27.03.2025
SIGN			

CLIENT : INDRADHANUSH GAS GRID LIMITED

PROJECT: NORTH -EAST NATURAL GAS PIPELINE GRID PROJECT

MECON LIMITED

DATA SHEET FOR BALL VALVES (NB < 2")

SCALE :

DATA SHEET NO.: MEC/23UU/05/28/M/001/DS/BV/09

REV 0

DATA SHEET FOR LTCS PLUG VALVE

MR Item nos: 14 & 17

1.0 Valve Manufacturer :

2.0 Valve Size DN (inch): DN 200 (8"),DN 50 (2") ANSI Rating : 600# Design Standard : API 6D

3.0 MECON's Technical Specification No.: MEC/TS/05/62/003, Rev-2

4.0 Connecting Pipeline Design Pressure: 92 Kg/cm2(g) Design Temperature, °C : -46°C to 65°C

			DN 200 (8")	DN 50 (2")
5.0	**Connecting Pipe Specification**			
5.1	Material	:	API 5L Gr.B PSL 2	ASTM A106 GR. B
5.2	Diameter (OD), mm	:	219.1	60.3
5.3	Thickness (mm) / Schedule	:	14.3mm	S80

6.0 **Valve Construction Design**

6.1.	Pattern	:	Short		Regular	√	Venturi
6.2.	End Connections	:	Flanged both ends				Flanged as per ASME B 16.5
		:	Butt Weld both ends			√	Butt Weld as per ASME B16.25
		:	Flanged one end, butt weld other end				
		:	Socket weld both ends				Socket Weld as per ASME B16.11

6.3. Flanges : a) RF FF RTJ NA √

b) Serrated pth (125 to 200 microinches AARH) NA √

7.0 **Valve Material Specification**

	Part	Material	Material Offered (Equivalent or Superior)
7.1	Body	A 352 Gr. LCB/A 350 Gr. LF2	
7.2	Plug	(SS316/ A 352 Gr.LCB/A 350 Gr. LF2) with 75 µENP coating	
7.3	Cover	ASTM A350 Gr. LF2/ A352 Gr. LCB	
7.4	Stem	SS 316 (No casting) / A 350 Gr. LF2	
7.5	Stem Seal	PTFE/Graphite	
7.6	Stud Bolts/ Nuts	ASTM A320 Gr.L7 / ASTM A194 Gr.4	

8.0 Corrosion Allowance : **1.5 mm** Service : **Natural Gas**

9.0	Location	:	Above Ground √	Buried		
10.0	Stem Extension Requirement	:	Yes	No √		
11.0	Gear Operator Requirement	:	Yes	No √		Gear operated for 8"
12.0	Actuator Requirement	:	Yes	No √		Lever operated for 2"

13.0 Fire Resistant Design Requirement : **Type-Test as per Standard API 6FA/ API 607**

14.0 **Valve Testing Requirement**

	Hydrostatic Test	Min. Test Pressure kg/cm2(g)	Minimum Duration, minutes
14.1	Body	**157**	**As per API 6D**
	Seat	**114**	**As per API 6D**
14.2	Air Test	**5.6 - 7**	**As per API 6D**

15.0 **Valve Painting Specification**

15.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.

15.2 For above ground installation-Three coats of corrosion resistant paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron). Colour of paint shade shall be RAL-7038, however any change in colour shall be finalized during drawing approval stage.

16.0 Lock Open/ Lock Close Requirement : N.A.

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/62/003, Rev2
2. Inspection and Testing shall be as per attached QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
3. Stops shall be provided for positive alignment of plug with ports and ensure proper installation of handle.
4. Charpy V- notch & Hardness test for body, plug, cover, stem & studs/nuts shall be conducted as per Clause No.: 3.4 & 3.5 of TS respectively.
5. Compressed asbestos fibre (CAF) shall not be used for body sealing / gasket materials.
6. Minimum all pressure containing and controlling parts of the valve shall be provided with EN 10204-3.2 certificate.
7. For welding end, the out of roundness (i. e. difference between maximum and minimum ID at pipe end) shall not be more than 0.5% of pipe OD.
8. Bidder shall clearly write valves material (equivalent or superior) offered by them against each part/material of valve in the space provided for. Wherever bidder agrees with valves material as mentioned above in MECON's data sheet, bidder shall clearly indicate **"AGREED".**
9. Minimum thickness of valve body / adapter / cover shall not be less than that specified in ASME B16.34.

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SIGN			

SECTION Oil & Gas

CLIENT : INDRADHANUSH GAS GRID LIMITED

PROJECT: NORTH -EAST NATURAL GAS PIPELINE GRID (PHASE- I & II) PROJECT

(NB ≥ 2")

REFERENCES DRG. NO.

MECON LIMITED

DATA SHEET NO.: MEC/23VC/05/28/M/001/DS/PV/01 REV 0

DATA SHEET FOR LTCS PLUG VALVE

MR Item nos.15

1.0 Valve Manufacturer :

2.0 Valve Size DN (inch): DN100 (4") ANSI Rating : 600# Design Standard : API 6D

3.0 MECON's Technical Specification No.: MEC/TS/05/62/003, Rev-2

4.0 Connecting Pipeline Design Pressure: 92 Kg/cm2(g) Design Temperature, °C : -29°C to 65°C

5.0 **Connecting Pipe Specification**
5.1 Material :
5.2 Diameter (OD), mm :
5.3 Thickness (mm) / Schedule :

6.0 **Valve Construction Design**

6.1.	Pattern	: Short		Regular	√	Venturi	
6.2.	End Connections	: Flanged both ends			√	Flanged as per ASME B 16.5	
		: Butt Weld both ends				Butt Weld as per ASME B16.25	
		: Flanged one end, butt weld other end					
		: Socket weld both ends				Socket Weld as per ASME B16.11	
6.3.	Flanges	: a) RF	√	FF		RTJ		NA	
		b) Serrated		Smooth (125 to 200 microinches AARH)		√	NA	

7.0 **Valve Material Specification**

	Part	Material	Material Offered (Equivalent or Superior)
7.1	Body	A 352 Gr.LCB/ A350 Gr.LF2	
7.2	Plug	(SS316 /A 352 Gr.LCB/ A 350 Gr.LF2) with 75microns ENP Coating	
7.3	Cover	A 352 Gr.LCB/ A350 Gr.LF2	
7.4	Stem	SS 316 (No casting) / A350 Gr. LF2	
7.5	Stem Seal	PTFE/Graphite	
7.6	Stud Bolts/ Nuts	ASTM A320 Gr.L7/ ASTM A194.Gr.4	

8.0 Corrosion Allowance : **1.5 mm** Service : **Natural Gas**

9.0 Location : Above Ground √ Buried
10.0 Stem Extension Requirement : Yes No √
11.0 Gear Operator Requirement : Yes No √
12.0 Actuator Requirement : Yes No √ Lever operated for 4" size)

13.0 Fire Resistant Design Requirement : **Type-Test as per Standard API 6FA/ API 607**

14.0 **Valve Testing Requirement**

14.1

Hydrostatic Test	Min. Test Pressure kg/cm2(g)	Minimum Duration, minutes
Body	**157**	**As per API 6D**
Seat	**114**	**As per API 6D**

14.2 Air Test **5.6 - 7** **As per API 6D**

15.0 **Valve Painting Specification**
15.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.
15.2 For above ground installation-Three coats of corrosion resistant paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron). Colour of paint shade shall be RAL-7038, however any change in colour shall be finalized during drawing approval stage.

16.0 Lock Open/ Lock Close Requirement : N.A.

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/62/003, Rev2
2. Inspection and Testing shall be as per attached QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
3. Stops shall be provided for positive alignment of plug with ports and ensure proper installation of handle.
4. Charpy V- notch & Hardness test for body, plug, cover, stem & studs/nuts shall be conducted as per Clause No.: 3.4 & 3.5 of TS respectively.
5. Compressed asbestos fibre (CAF) shall not be used for body sealing / gasket materials.
6. Minimum all pressure containing and controlling parts of the valve shall be provided with EN 10204-3.2 certificate.
7. For welding end, the out of roundness (i. e. difference between maximum and ı 3 **NA**
8. Bidder shall clearly write valves material (equivalent or superior) offered by them against each part/material of valve in the space provided for. Wherever bidder agrees with valves material as mentioned above in MECON's data sheet, bidder shall clearly indicate **"AGREED".**
9. Minimum thickness of valve body / adapter / cover shall not be less than that specified in ASME B16.34.

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD
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SECTION Oil & Gas	PREPARED	CHECKED	APPROVED
NAME	VKS	AM	HK
DATE	27.03.2025	27.03.2025	27.03.2025
SIGN			

CLIENT : INDRADHANUSH GAS GRID LIMITED

PROJECT: NORTH -EAST NATURAL GAS PIPELINE GRID (PHASE- I & II) PROJECT

(NB ≥ 2")

REFERENCES DRG. NO.

MECON LIMITED

DATA SHEET NO.: MEC/23VC/05/28/M/001/DS/PV/02 REV 0

DATA SHEET FOR PLUG VALVE

MR Item nos: 16

1.0 Valve Manufacturer :

2.0 Valve Size DN (inch): DN50(2") ANSI Rating : 600# Design Standard : API 6D

3.0 MECON's Technical Specification No.: MEC/TS/05/62/003, Rev-2

4.0 Connecting Pipeline Design Pressure: 92 Kg/cm2(g) Design Temperature, °C : -29°C to 65°C

5.0	**Connecting Pipe Specification**		DN 50 (2")
5.1	Material	:	ASTM A106 GR. B
5.2	Diameter (OD), mm	:	60.3
5.3	Thickness (mm) / Schedule	:	S80

6.0 **Valve Construction Design**

6.1.	Pattern	:	Short		Regular	√	Venturi
6.2.	End Connections	:	Flanged both ends				Flanged as per ASME B 16.5
		:	Butt Weld both ends			√	Butt Weld as per ASME B16.25
		:	Flanged one end, butt weld other end				
		:	Socket weld both ends				Socket Weld as per ASME B16.11

6.3. Flanges : a) RF FF RTJ NA √

b) Serrated Smooth (125 to 200 microinches AARH) NA √

7.0 **Valve Material Specification**

	Part	Material	Material Offered (Equivalent or Superior)
7.1	Body	ASTM A216 Gr. WCB/ A234 Gr. WPB	
7.2	Plug	(ASTM A216 Gr. WCB/ A234 Gr. WPB) + 75 microns ENP Coating	
7.3	Cover	ASTM A216 Gr. WCB/ A234 Gr. WPB	
7.4	Stem	(AISI 4140 + 75 microns ENP Coating)/ AISI 410	
7.5	Stem Seal	PTFE/Graphite	
7.6	Stud Bolts/ Nuts	ASTM A193 Gr. B7/ A194 Gr. 2H	

8.0 Corrosion Allowance : **1.5 mm** Service : **Natural Gas**

9.0	Location	:	Above Ground √	Buried		
10.0	Stem Extension Requirement	:	Yes	No √		
11.0	Gear Operator Requirement	:	Yes	No √		
12.0	Actuator Requirement	:	Yes	No √	Lever operated for 2"	

13.0 Fire Resistant Design Requirement : **Type-Test as per Standard API 6FA/ API 607**

14.0 **Valve Testing Requirement**

14.1

Hydrostatic Test	Min. Test Pressure kg/cm2(g)	Minimum Duration, minutes
Body	**157**	**As per API 6D**
Seat	**114**	**As per API 6D**

14.2 Air Test **5.6 - 7** **As per API 6D**

15.0 **Valve Painting Specification**

15.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.

15.2 For above ground installation-Three coats of corrosion resistant paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron). Colour of paint shade shall be RAL-7038, however any change in colour shall be finalized during drawing approval stage.

16.0 Lock Open/ Lock Close Requirement : N.A.

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/62/003, Rev2
2. Inspection and Testing shall be as per attached QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
3. Stops shall be provided for positive alignment of plug with ports and ensure proper installation of handle.
4. Charpy V- notch & Hardness test for body, plug, cover, stem & studs/nuts shall be conducted as per Clause No.: 3.4 & 3.5 of TS respectively.
5. Compressed asbestos fibre (CAF) shall not be used for body sealing / gasket materials.
6. Minimum all pressure containing and controlling parts of the valve shall be provided with EN 10204-3.2 certificate.
7. For welding end, the out of roundness (i. e. difference between maximum and minimum ID at pipe end) shall not be more than 0.5% of pipe OD.
8. Bidder shall clearly write valves material (equivalent or superior) offered by them against each part/material of valve in the space provided for. Wherever bidder agrees with valves material as mentioned above in MECON's data sheet, bidder shall clearly indicate **"AGREED".**
9. Minimum thickness of valve body / adapter / cover shall not be less than that specified in ASME B16.34.

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD
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REFERENCES DRG. NO.

SECTION Oil & Gas

	PREPARED	CHECKED	APPROVED
NAME	VKS	AM	HK
DATE	27.03.2025	27.03.2025	27.03.2025
SIGN			

CLIENT : INDRADHANUSH GAS GRID LIMITED

PROJECT: NORTH -EAST NATURAL GAS PIPELINE GRID (PHASE- I & II) PROJECT

(NB ≥ 2")

MECON LIMITED

DATA SHEET NO.: MEC/23VC/05/28/M/001/DS/PV/03 REV 0

LIST OF COMMISSIONING SPARES AND ACCESSORIES FOR START-UP & COMMISSIONING FOR VALVE & ACTUATOR

Sl. No.	Item No.	Description	Quantity
1.		Sealant Gun	One No.
2.		Sealant	One lot
3.			
4.			
5.			

NOTES:

1. Bidder to include the start-up and commissioning spares for valves & actuators in the quoted price for Ball Valves.
2. Vendor shall provide sufficient amount of sealant to cater one filling of all the ordered valves.
3. Each successful bidder shall supply above mentioned commissioning spares subject to applicability of secondary sealant injection as defined in Cl. 4.10 of TS.

To be filled, signed and stamped by Bidder.

Bidder's Seal **Signature of Bidder**

LIST OF SPARES AND ACCESSORIES FOR TWO YEARS OF NORMAL OPERATION FOR VALVE

Sl. No.	Item No.	Description	Quantity
1.			
2.			
3.			
4.			
5.			

NOTE:

Bidder shall quote separately spares for two years normal operation for valves as per price schedule performa.

To be filled, signed and stamped by Bidder.

Bidder's Seal **Signature of Bidder**

MECON ISO 9001 Company	CONTRACTOR		**QUALITY ASSURANCE PLAN FOR** STRUCTURAL AND MECHANICAL EQUIPMENT	PROJECT : NORTH -EAST NATURAL GAS PIPELINE GRID PROJECT
	ORDER NO. & DATE			PACKAGE NO.:05/51/23UU/IGGL/002A
	SUB-CONTRACTOR			PACKAGE NAME : BALL VALVE AND PLUG VALVE
	ORDER NO. & DATE			

INSTRUCTIONS FOR FILLING UP :

1. QAP shall be submitted for each of the equipment separately with break up of assembly/sub-assembly & part/component or for group of equipment having same specification.
2. Use numerical codes as indicated for extent of inspection & tests and submission of test certificates & documents. Additional codes & description for extent of inspection & tests may be added as applicable for the plant and equipment
3. Separate identification number with quantity for equipment shall be indicated wherever equipment having same specifications belonging to different facilities are grouped together.
4. Weight in kilograms must be indicated under Column-5 for each item. Estimated weights may be indicated wherever actual weights are not available.

ABBREVIATIONS USED :

SV : SUB VENDOR
MFR : MANUFACTURER
TPI : DESIGNATED THIRD PARTY INSPECTION AGENCY
H : HOLD
R : REVIEW
W : WITNESS

KEY TO SYMBOLS :

* : TO BE FILLED BY VENDOR
** : TEST TO BE PERFORMED, IF APPLICABLE

CODES FOR EXTENT OF INSPECTION, TESTS, TEST CERTIFICATES & DOCUMENTS :

Code	*Description*
1.	Visual
2.	Dimensional
3.	Fitment & Alignment
4.	Physical Test (Sample)
5.	Chemical Test (Sample)
6.	Ultrasonic Test
7.	Magnetic Particle Test (MPI)
8.	Radiography Test
9.	Dye Penetration Test
10.	Metallographic Exam.
11.	Welder's Qualification & Weld Procedure Test
12.	Approval of Test and Repair Procedure
13.	Heat Treatment
14.	Pressure Test
15.	Leakage Test
16.	Balancing
17.	Vibration Test
18.	Amplitude Test
19.	Sponge Test
20.	Dust/ Water Ingress Test
21.	Friction Factor Test
22.	Adhesion Test
23.	Performance Test/Characteristic Curve
24.	No Load/ Free Running Test
25.	Load/ Overload Test
26.	Measurement of Speeds
27.	Accoustical Test
28.	Geometrical Accuracy
29.	Repeatability and Positioning Accuracy
30.	Proving Test
31.	Surface Preparation
32.	Manufacturer's Test Certificates for bought-out items
33.	IBR/ Other Statutory agencies compliance certificate
34.	Internal Inspection Report
35.	Hardness Test
36.	Spark Test for Lining
37.	Calibration
38.	Safety Device Test
39.	Ease of Maintenance
40.	Fire Test (Type Test)
41.	Charpy V-Notch Test
42.	Operational Torque Test
43.	ENP (Electroless Nickel Plating) Execution
44.	Painting
45.	Anti-Static Test
46.	Hydrostatic DIB-1
47.	Functional Test
48.	Pneumatic DIB-1
49.	Cyclic Test
50.	Strip test

Code	*DOCUMENTS:*
D1.	Approved GA drawings
D2.	Information and other reference drg/ stamped drgs released for mfg.
D3.	Relevant catalogues
D4.	Bill of matl./Item no./ Identification
D5.	Matchmarks details
D6.	Line/ Layout diagram
D7.	Approved erection procedures
D8.	Unpriced sub P.O. with specification and amend-ments, if any
D9.	Calibration Certificate of all measuring instruments and gauges
D10.	X-Ray Reports

EQUIPMENT DETAILS							INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	REMARKS/ SAMPLING PLAN
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No. (MR Item No.)	Quantity No./M	Unit Weight (Kg)	Manufacturer's Name and Address	Expected Schedule of Final Inspn.	Raw Material and In-Process Stage Inspection			Final Inspection/ Test by					
							MFR/SV	TPI	MECON	MFR/SV	TPI	MECON			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.0	Ball and Plug Valves	A.1 to A.14 & A.15 to A.18	Refer MR/SOR	*	*	*	As per attached sheet 2 to 10								

For MECON (Stamp & Signature)

For CONTRACTOR/ SUB-CONTRACTOR (Stamp & Signature)

QAP NO. MEC/23UU/05/28/M/001/QAP-002A

REV **0**

SHEET 1 OF 10

EQUIPMENT DETAILS					INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	Inspection Codes & Sampling Plan			REMARKS
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No.	Quantity No./M	Unit Weight (Kg)	Raw Material and In-Process stage inspection			Final Inspection/ Test by					MFR/SV	TPI	MECON	
					MFR/SV	TPI	MECON	MFR/SV	TPI	MECON						
1	2	3	4	5	8	9	10	11	12	13	14	15	16A	16B	16C	
1.01	Body	Material As per MR/ Alternate Material accepted by MECON			1,2	-	-	-	-	-	1. D1 2. Report	1. D1 2. Relevant Material Standard 3. Manufacturer's Specification	H	R	R	
					4	4	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's D.S.	H	H	R	
					5	5	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					6 **	6 **	-	-	-	-	Test Report	1. ASME B16.34, Appendix-IV 2. MECON's T.S.	H	W	R	Forgings, welds, wrought weld ends
					7 **	7 **	-	-	-	-	Test Report	1. ASME B16.34, Appendix-II 2. MECON's T.S.	H	W	R	Wet MPI for 100% of internal surfaces of all castings & forgings & bevel surfaces (MPI/ DP)
					8 **	8 **	-	-	-	-	Test Report	1. ASME B16.34, Appendix-I 2. MECON's T.S.	H	W	R	All castings as per clause 5.1.4 b) of T.S., all welds, weld ends of all cast valves
					9**	9**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-III 2. MECON's T.S.	H	W	R	Bevel Surfaces (by MPI/ DP)
					13	13	-	-	-	-	Report/ Material Test Certificates	1. Relevant Material Standard	H	R	R	
					35	35	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					41	41	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	

EQUIPMENT DETAILS					INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	Inspection Codes & Sampling Plan			REMARKS
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No.	Quantity No./M	Unit Weight (Kg)	Raw Material and In-Process stage inspection			Final Inspection/ Test by								
					MFR/SV	TPI	MECON	MFR/SV	TPI	MECON			MFR/SV	TPI	MECON	
1	2	3	4	5	8	9	10	11	12	13	14	15	16A	16B	16C	
1.02	Closure/ Body Adapter/ Tail Piece	Material Manufacturer to indicate (to be approved by MECON)			1,2	-	-	-	-	-	1. D1 2. Report	1. D1 2. Relevant Material Standard 3. Manufacturer's Specification	H	R	R	
					4	4	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's D.S.	H	H	R	
					5	5	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					6**	6**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-IV 2. MECON's T.S.	H	W	R	Forgings, welds, wrought weld ends
					7**	7**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-II 2. MECON's T.S.	H	W	R	Wet MPI for 100% of internal surfaces of all castings & forgings & bevel surfaces (MPI/ DP)
					8**	8**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-I 2. MECON's T.S.	H	W	R	All castings as per clause 5.1.4 b) of T.S., all welds, weld ends of all cast valves
					9**	9**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-III 2. MECON's T.S.	H	W	R	Bevel Surfaces (by MPI/ DP)
					13	13	-	-	-	-	Report/ Material Test Certificates	1. Relevant Material Standard	H	R	R	
					35	35	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					41	41	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	

EQUIPMENT DETAILS					INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	Inspection Codes & Sampling Plan			REMARKS
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No.	Quantity No./M	Unit Weight (Kg)	Raw Material and In-Process stage inspection			Final Inspection/ Test by								
					MFR/SV	TPI	MECON	MFR/SV	TPI	MECON			MFR/SV	TPI	MECON	
1	2	3	4	5	8	9	10	11	12	13	14	15	16A	16B	16C	
1.03	Top Cover	Material Manufacturer to indicate (to be approved by MECON)			1,2	-	-	-	-	-	1. D1 2. Report	1. D1 2. Relevant Material Standard 3. Manufacturer's Specification	H	R	R	
					4	4	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's D.S.	H	H	R	
					5	5	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					6 **	6 **	-	-	-	-	Test Report	1. ASME B16.34, Annex-E 2. MECON's T.S.	H	W	R	Forgings, welds, wrought weld ends
					7 **	7 **	-	-	-	-	Test Report	1. ASME B16.34, Annex-C 2. MECON's T.S.	H	W	R	Wet MPI for 100% of internal surfaces of all castings & forgings & bevel surfaces (MPI/ DP)
					8 **	8 **	-	-	-	-	Test Report	1. ASME B16.34 Annex-B 2. MECON's T.S.	H	W	R	All castings as per clause 5.1.4 b) of T.S., all welds, weld ends of all cast valves
					13	13	-	-	-	-	Report/ Material Test Certificates	1. Relevant Material Standard	R	R	R	
					35	35	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					41	41	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	R	H	R	

EQUIPMENT DETAILS					INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	Inspection Codes & Sampling Plan			REMARKS
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No.	Quantity No./M	Unit Weight (Kg)	Raw Material and In-Process stage inspection			Final Inspection/ Test by								
					MFR/SV	TPI	MECON	MFR/SV	TPI	MECON			MFR/SV	TPI	MECON	
1	2	3	4	5	8	9	10	11	12	13	14	15	16A	16B	16C	
1.04	Trunnion (for Trunnion Mounted Valves)	Material Manufacturer to indicate (to be approved by MECON)			1,2	1,2	-	-	-	-	1. D1 2. Report	1. D1 2. Relevant Material Standard 3. Manufacturer's Specification	H	R	R	
					4	4	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's D.S.	H	H	R	
					5	5	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					13	13	-	-	-	-	Report/ Material Test Certificates	1. Relevant Material Standard	H	R	R	
					43 **	43 **	-	-	-	-	1. Test Report 2. Material Test Certificates for composition, hardness, thickness & integrity	1. MECON's T.S. 2. MECON's D.S. 3. ASTM B733 Std. 4. Manufacturer's Specification	H	H	R	
1.05	Ball	Material As per MR/ Alternate Material accepted by MECON			1,2	1,2	-	-	-	-	1. D1 2. Report	1. D1 2. Relevant Material Standard 3. Manufacturer's Specification	H	R	R	
					4	4	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's D.S.	H	H	R	
					5	5	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					6**	6**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-IV 2. MECON's T.S.	H	W	R	Forgings, welds, wrought weld ends
					7**	7**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-II 2. MECON's T.S.	H	W	R	Wet MPI for 100% of internal surfaces of all castings & forgings & bevel
					8**	8**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-I 2. MECON's T.S.	H	W	R	All castings as per clause 5.1.4 b) of T.S., all welds, weld ends of all cast valves

EQUIPMENT DETAILS					INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	Inspection Codes & Sampling Plan			REMARKS
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No.	Quantity No./M	Unit Weight (Kg)	Raw Material and In-Process stage inspection			Final Inspection/ Test by								
					MFR/SV	TPI	MECON	MFR/SV	TPI	MECON			MFR/SV	TPI	MECON	
1	2	3	4	5	8	9	10	11	12	13	14	15	16A	16B	16C	
					9**	9**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-III 2. MECON's T.S.	H	W	R	Bevel Surfaces (by MPI/ DP)
					13	13	-	-	-	-	Report/ Material Test Certificates	1. Relevant Material Standard	H	R	R	
					35	35	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					41	41	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					43	43	-	-	-	-	1. Test Report 2. Material Test Certificates for composition, hardness, thickness & integrity	1. MECON's T.S. 2. MECON's D.S. 3. ASTM B733 Std. 4. Manufacturer's Specification	H	H	R	
1.06	Stem	Material As per MR/ Alternate Material accepted by MECON			1,2	1,2	-	-	-	-	1. D1 2. Report	1. D1 2. Relevant Material Standard 3. Manufacturer's Specification	H	R	R	
					4	4	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's D.S.	H	H	R	
					5	5	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					6**	6**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-IV 2. MECON's T.S.	H	W	R	Forgings, welds, wrought weld ends
					7**	7**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-II 2. MECON's T.S.	H	W	R	Wet MPI for 100% of internal surfaces of all castings & forgings & bevel
					8**	8**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-I 2. MECON's T.S.	H	W	R	All castings as per clause 5.1.4 b) of T.S., all welds, weld ends of all cast valves

EQUIPMENT DETAILS					INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	Inspection Codes & Sampling Plan			REMARKS
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No.	Quantity No./M	Unit Weight (Kg)	Raw Material and In-Process stage inspection			Final Inspection/ Test by					MFR/SV	TPI	MECON	
					MFR/SV	TPI	MECON	MFR/SV	TPI	MECON						
1	2	3	4	5	8	9	10	11	12	13	14	15	16A	16B	16C	
					9**	9**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-III 2. MECON's T.S.	H	W	R	Bevel Surfaces (by MPI/ DP)
					13	13	-	-	-	-	Report/ Material Test Certificates	1. Relevant Material Standard	H	R	R	
					35	35	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					41	41	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					43	43	-	-	-	-	1. Test Report 2. Material Test Certificates for composition, hardness, thickness & integrity	1. MECON's T.S. 2. MECON's D.S. 3. ASTM B733 Std. 4. Manufacturer's Specification	H	H	R	
1.07	Seats	Material As per MR/ Alternate Material accepted by MECON			1,2	1,2	-	-	-	-	1. D1 2. Report	1. D1 2. Relevant Material Standard 3. Manufacturer's Specification	H	R	R	
					4	4	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's D.S.	H	H	R	
					5	5	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					6**	6**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-IV 2. MECON's T.S.	H	W	R	Forgings, welds, wrought weld ends
					7**	7**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-II 2. MECON's T.S.	H	W	R	Wet MPI for 100% of internal surfaces of all castings & forgings & bevel surfaces (MPI/ DP)

EQUIPMENT DETAILS					INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	Inspection Codes & Sampling Plan			REMARKS
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No.	Quantity No./M	Unit Weight (Kg)	Raw Material and In-Process stage inspection			Final Inspection/ Test by								
					MFR/SV	TPI	MECON	MFR/SV	TPI	MECON			MFR/SV	TPI	MECON	
1	2	3	4	5	8	9	10	11	12	13	14	15	16A	16B	16C	
					8**	8**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-I 2. MECON's T.S.	H	W	R	All castings as per clause 5.1.4 b) of T.S., all welds, weld ends of all cast valves
					9**	9**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-III 2. MECON's T.S.	H	W	R	Bevel Surfaces (by MPI/ DP)
					13	13	-	-	-	-	Report/ Material Test Certificates	1. Relevant Material Standard	H	R	R	
					35	35	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					41	41	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					43	43	-	-	-	-	1. Test Report 2. Material Test Certificates for composition, hardness, thickness & integrity	1. MECON's T.S. 2. MECON's D.S. 3. ASTM B733 Std. 4. Manufacturer's Specification	H	H	R	
1.08	Bolting Material (Studs & Nuts)	Material As per MR/ Alternate Material accepted by MECON			1,2	1,2	-	-	-	-	1. D1 2. Report	1. D1 2. Relevant Material Standard 3. Manufacturer's Specification	H	R	R	Alongwith thickness measurement for ENP Coating.
					4	4	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's D.S.	H	H	R	
					5	5	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
					6**	6**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-IV 2. MECON's T.S.	H	W	R	Forgings, welds, wrought weld ends

EQUIPMENT DETAILS					INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	Inspection Codes & Sampling Plan			REMARKS
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No.	Quantity No./M	Unit Weight (Kg)	Raw Material and In-Process stage inspection			Final Inspection/ Test by								
					MFR/SV	TPI	MECON	MFR/SV	TPI	MECON			MFR/SV	TPI	MECON	
1	2	3	4	5	8	9	10	11	12	13	14	15	16A	16B	16C	
					7**	7**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-II 2. MECON's T.S.	H	W	R	Wet MPI for 100% of internal surfaces of all castings & forgings & bevel surfaces (MPI/ DP)
					8**	8**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-I 2. MECON's T.S.	H	W	R	All castings as per clause 5.1.4 b) of T.S., all welds, weld ends of all cast valves
					9**	9**	-	-	-	-	Test Report	1. ASME B16.34, Appendix-III 2. MECON's T.S.	H	W	R	Bevel Surfaces (by MPI/ DP)
					13	13	-	-	-	-	Report/ Material Test Certificates	1. Relevant Material Standard	H	R	R	
					41	41	-	-	-	-	Material Test Certificates	1. Relevant Material Standard 2. MECON's T.S. 3. MECON's D.S.	H	H	R	
1.09	Assembled Valves				-	-	-	1,2	1,2	1,2	Report	1. D1 2. MECON's T.S.	H	H	W	
					-	-	-	3	3	3	Report		H	H	W	
					-	-	-	14	14	14	1. Report 2. Test Certificates	1. D1 2. MECON's T.S. 3. MECON's D.S. 4. API 6D Std./ BS EN 12266 (as applicable)	H	H	W	
					-	-	-	15	15	15	1. Report 2. Test Certificates	1. D1 2. MECON's T.S. 3. MECON's D.S. 4. API 6D Std./ BS EN 12266 (as applicable)	H	H	W	
								40	40	40	1. Report 2. Test Certificates	1. API 607/ API 6FA / BS EN ISO 10497 (as applicable) 2. MECON's T.S. 3. MECON's D.S.	R	R	R	
								42	42	42	1. Report 2. Test Certificates	1. MECON's T.S. 2. MECON's D.S. 3. API 6D Std. (as applicable)	H	H	W	
					-	-	-	37	37	37	Certificates		-	R	R	
					-	-	-	44	44	44	1. Report 2. Test Certificates	1. MECON's T.S. 2. MECON's D.S. 3. Manufacturer's Specification	H	W	R / W	

EQUIPMENT DETAILS					INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	Inspection Codes & Sampling Plan			REMARKS
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No.	Quantity No./M	Unit Weight (Kg)	Raw Material and In-Process stage inspection			Final Inspection/ Test by								
					MFR/SV	TPI	MECON	MFR/SV	TPI	MECON			MFR/SV	TPI	MECON	
1	2	3	4	5	8	9	10	11	12	13	14	15	16A	16B	16C	
					-	-	-	45	45	45	1. Report 2. Test Certificates	1. MECON's T.S. 2. MECON's D.S. 3. API 6D Std. / BS EN ISO 17292 (as applicable)	H	H	W	
					-	-	-	46	46	46	1. Report 2. Test Certificates	1. MECON's T.S. 2. API 6D Std. (as applicable)	H	H	W	Applicable for TMBV
					-	-	-	47	47	47	1. Report 2. Test Certificates	1. MECON's T.S. 2. API 6D Std. / BS EN ISO 17292 (as applicable)	H	H	W	Refer Note 3 of Table 2 of TS no. MEC/ TS / 05 / E5 / 002A
					-	-	-	48	48	48	1. Report 2. Test Certificates	1. MECON's T.S. 2. API 6D Std. (as applicable)	H	H	W	Applicable for TMBV
					-	-	-	49	49	49	1. Report 2. Test Certificates	1. MECON's T.S. 2. MECON's D.S.	H	H	W	
					-	-	-	50	50	50	1. Report 2. Test Certificates	1. MECON's T.S. 2. MECON's D.S.	H	H	W	Refer cl 21.0 of notes to MR
1.10	Complete documentation check and compilation							3	3	3	1. Final Report 2. Final Certificates	1. MECON's T.S. 2. API 6D Std. / BS EN ISO 17292 (as applicable)	H	H	-	
1.11	Complete and compiled documentation check and dispatch clearance				-	-	-	3	3	3	1. Final Report 2. Final Certificates	1. MECON's T.S. 2. API 6D Std. / BS EN ISO 17292 (as applicable)	H	-	H	
1.12	Actuator Tests				**As per Actuator Quality Assurance Plan (to be submitted by vendor for approval)**											

1) VENDOR shall establish approved WPS-PQR-WPQ for the weldings duly witnessed by TPIA .
2) Vendor shall do RT for Body adapter to PUP piece welding and RT report shall be reviewed by MECON & TPIA
3) Vendor shall do UT/RT for Bodt to Body adapter welding witnessed by TPIA

For MECON (Stamp & Signature)		For CONTRACTOR/ SUB-CONTRACTOR		QAP NO.: MEC/23UU/05/28/M/001/QAP-002A	REV **0**

	CONTRACTOR		QUALITY ASSURANCE PLAN FOR INSTRUMENTATION EQUIPMENT	PROJECT :
	ORDER NO. & DATE			PACKAGE NO. :
	SUB-CONTRACTOR			PACKAGE NAME :
	ORDER NO. & DATE			ITEM NAME : GAS POWERED ACTUATOR

INSTRUCTIONS FOR FILLING UP :

1. QAP shall be submitted for each of the equipment separately with break up of assembly/sub-assembly & part/component or for group of equipment having same specification.
2. Use numerical codes as indicated for extent of inspection & tests and submission of test certificates & documents. Additional codes & description for extent of inspection & tests may be added as applicable for the plant and equipment
3. Separate identification number with quantity for equipment shall be indicated wherever equipment having same specifications belonging to different facilities are grouped together.
4. Weight in kilograms must be indicated under Column-5 for each item. Estimated weights may be indicated wherever actual weights are not available.

ABBREVIATIONS USED :

CONTR : CONTRACTOR
MFR : MANUFACTURER
H : HOLD
R : REVIEW
W : WITNESS
P : PERFORM

KEY TO SYMBOLS :

* : MFR/ CONTRACTOR - AS APPLICABLE
** : TEST TO BE PERFORMED, IF APPLICABLE

CODES FOR EXTENT OF INSPECTION, TESTS, TEST CERTIFICATES & DOCUMENTS

Code	Description	Code	Description	Code	Description	Code	DOCUMENTS:
1.	Visual	18.	Amplitude Test	34.	Internal Inspection Report by Contractor	D1.	Approved GA drawings
2.	Dimensional	19.	Sponge Test			D2.	Information and other reference drg/ stamped drgs released for mfg.
3.	Fitment & Alignment	20.	Dust/ Water Ingress Test	35.	Hardness Test		
4.	Physical Test (Sample)	21.	Friction Factor Test	36.	Spark Test for Lining		
5.	Chemical Test (Sample)	22.	Adhesion Test	37.	Calibration	D3.	Relevant catalogues
6.	Ultrasonic Test	23.	Performance Test/Characteristic Curve	38.	Safety Device Test	D4.	Bill of matl./Item no./ Identification
7.	Magnetic Particle Test (MPI)			39.	Ease of Maintenance		
8.	Radiography Test	24.	No Load/ Free Running Test	40.	Fire Test (Type Test)	D5.	Matchmarks details
9.	Dye Penetration Test	25.	Load/ Overload Test	41.	Charpy V-Notch Test	D6.	Line/ Layout diagram
10.	Metallographic Exam.	26.	Measurement of Speeds	42.	Operational Torque Test	D7.	Approved erection procedures
11.	Welder's Qualification & Weld Procedure Test	27.	Accoustical Test	43.	ENP (Electroless Nickel Plating) Execution	D8.	Unpriced sub P.O. with specification and amend-ments, if any
		28.	Geometrical Accuracy				
12.	Approval of Test and Repair Procedure	29.	Repeatability and Positioning Accuracy	44.	Painting		
				45.	Anti-Static Test		
13.	Heat Treatment	30.	Proving Test	46.	Hydrostatic Double Block & Bleed Test	D9.	Calibration Certificate of all measuring instruments
14.	Pressure Test	31.	Surface Preparation				
15.	Leakage Test a) Piston Seal b) Pneumatic Connection			47.	Functional Test : a) Electrical and pneumatic functional test. b) Insulation Test of Electrical components. c) Check of operating time control. d) Check of limiting device operation. e) No load test (DP=0) & load (DP max) Operations with the minimum required feeding pressure. f) Manual Override functional test.		
		32.	Manufacturer's Test Certificates for bought-out items				and gauges
16.	Balancing			48.	Pneumatic Double Block & Bleed Test	D10.	X-Ray Reports
17.	Vibration Test	33.	IBR/ Other Statutory agencies compliance certificate				

EQUIPMENT DETAILS							INSPECTION AND TESTS										Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	REMARKS/ SAMPLING PLAN
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No. (As per MR)	Quantity No./M	Unit Weight (Kg)	Manufacturer's Name and Address	Expected Schedule of Final Inspn.	Raw Material and In-Process Stage Inspection					Final Inspection/ Test by								
							MFR		TPI		MECON	MFR		TPI		MECON				
1	2	3	4	5	6	7	8		9		10	11		12		13		14	15	16
	GAS POWERED ACTUATOR		As per PO	-			5,6/7/8/9*,14,15(a),42,23	P	6/7/8/9*, 14,15(a), 42,23	W#	-	1,2,3,15(b),31,44,47	P	1,2,3,15(b),44,47	W	1,2,3,15(b),44,47	R	1,2,3,5,6,7,8,9,14,15(a),15(b),23	D2,D3,D4,D6, MECON TS	100%
									5	R		32,33	R	31,32,33	R	31,32,33	R	31,32,33,42,44,47		

*Tests as applicable shall be carried out on storage tank & actuator cylinder.
#Tests shall be witnessed for storage tank & actuator cylinder.
NOTE :- 3.2 Inspection Report shall be provided.

For MECON (Stamp & Signature)

For CONTRACTOR/ SUB-CONTRACTOR (Stamp & Signature)

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