**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 FOR FEEDER LINES

# OPEN DOMESTIC COMPETITIVE BIDDING

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

## 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, globe and swing check valve 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 various 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| A.1 | 300 (12") | Fully Welded Body | FB | BW | 600 # | MEC/23UU/ 05/28/M/001/ DS/BV/01 | NO | 17 | Manual | |
| A.2 | 300 (12") | Fully Welded Body | RB | BW | 600 # | MEC/23UU/ 05/28/M/001/ DS/BV/02 | No | 6 | Manual | |
| A.3 | 300 (12") | Fully Welded Body | RB | BW | 600# | MEC/23UU/ 05/28/M/001/ DS/BV/03 | No | 15 | AV | 3 no. valve with Auto closure facility |
| A.4 | 300 (12") | Fully Welded Body | FB | BW | 600# | MEC/23UU/ 05/28/M/001/ DS/BV/04 | No | 2 | AV | |
| A.5 | 150 (6") | Fully Welded Body | RB | BW | 600 # | MEC/23UU/ 05/28/M/001/ DS/BV/05 | Yes | **1** | Manual | |
| A.6 | 100 (4") | Fully Welded Body | RB | BW | 600# | MEC/23UU/ 05/28/M/001/ DS/BV/02 | NO | 49 | Manual | |
| A.7 | 100 (4") | Either Welded Body or 2/3 Piece Bolted | RB | FE | 600# | MEC/23UU/ 05/28/M/001/ DS/BV/06 | NO | 8 | Manual | |
| A.8 | 50 (2") | Either Welded Body or 2/3 Piece Bolted | FB | FE | 600# | MEC/23UU/ 05/28/M/001/ DS/BV/06 | NO | 4 | Manual | |
| A.9 | 50 (2") | Fully Welded Body | FB | BW | 600# | MEC/23UU/ 05/28/M/001/ DS/BV/01 | NO | 2 | Manual | Valve With Lock Open |
| A.10 | 50 (2") | Fully Welded Body | FB | BW | 600# | MEC/23UU/ 05/28/M/001/ DS/BV/01 | NO | 70 | Manual | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| A.11 | 25 (1") | Bolted Body | FB | SW | 600# | MEC/23UU/ 05/28/M/001/ DS/BV/08 | NO | 1 | Manual | LTCS |
| A.12 | 20 (3/4") | Bolted Body | FB | SW | 600# | MEC/23UU/ 05/28/M/001/ DS/BV/08 | NO | 1 | Manual | LTCS |
| A.13 | 20 (3/4") | Bolted Body | FB | SW | 600# | MEC/23UU/ 05/28/M/001/ DS/BV/09 | NO | 125 | Manual | |

**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, plug, globe and swing check 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")<br>≥ DN 450mm (18") | Nil<br>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

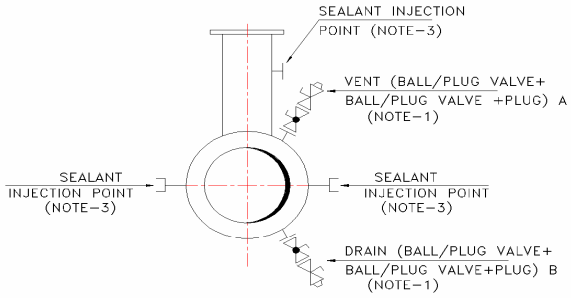
11.1 Manufacturer shall guarantee that the materials and machining of valves and fittings comply with the requirements in this specification and in the Purchase Order.

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.

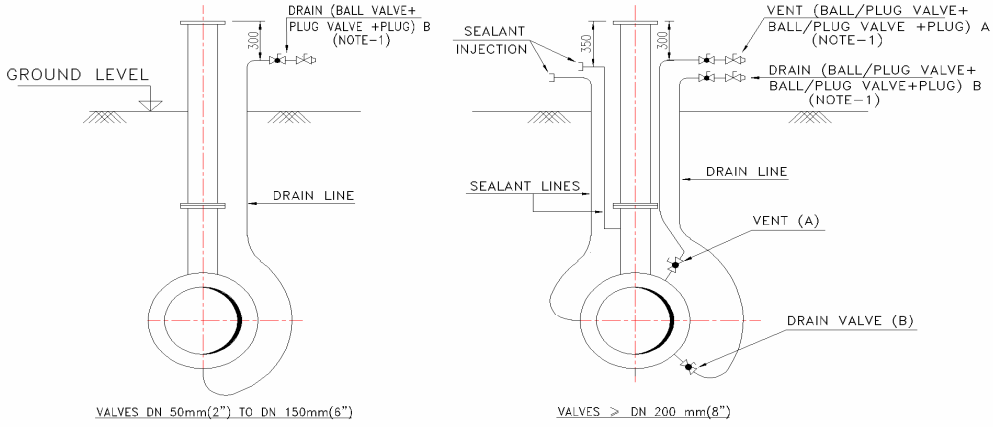
11.3 If valve defect or malfunctioning cannot be eliminated, Manufacturer shall replace the valve without delay,

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

| 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 | Sakshi | Vikas Jain | Rakesh Kr. Shukla |
| Date | Prepared By | Checked By | Approved By |

## C O N T E N T S

## 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<br>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<br>a) Solenoid Valves<br>b) Relays | : | 24V D.C. ± 10% |
| 19. | Contact rating for<br>a) Limit Switches<br>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 | | |
| | | | | | | | | | | |
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# TABLE-2

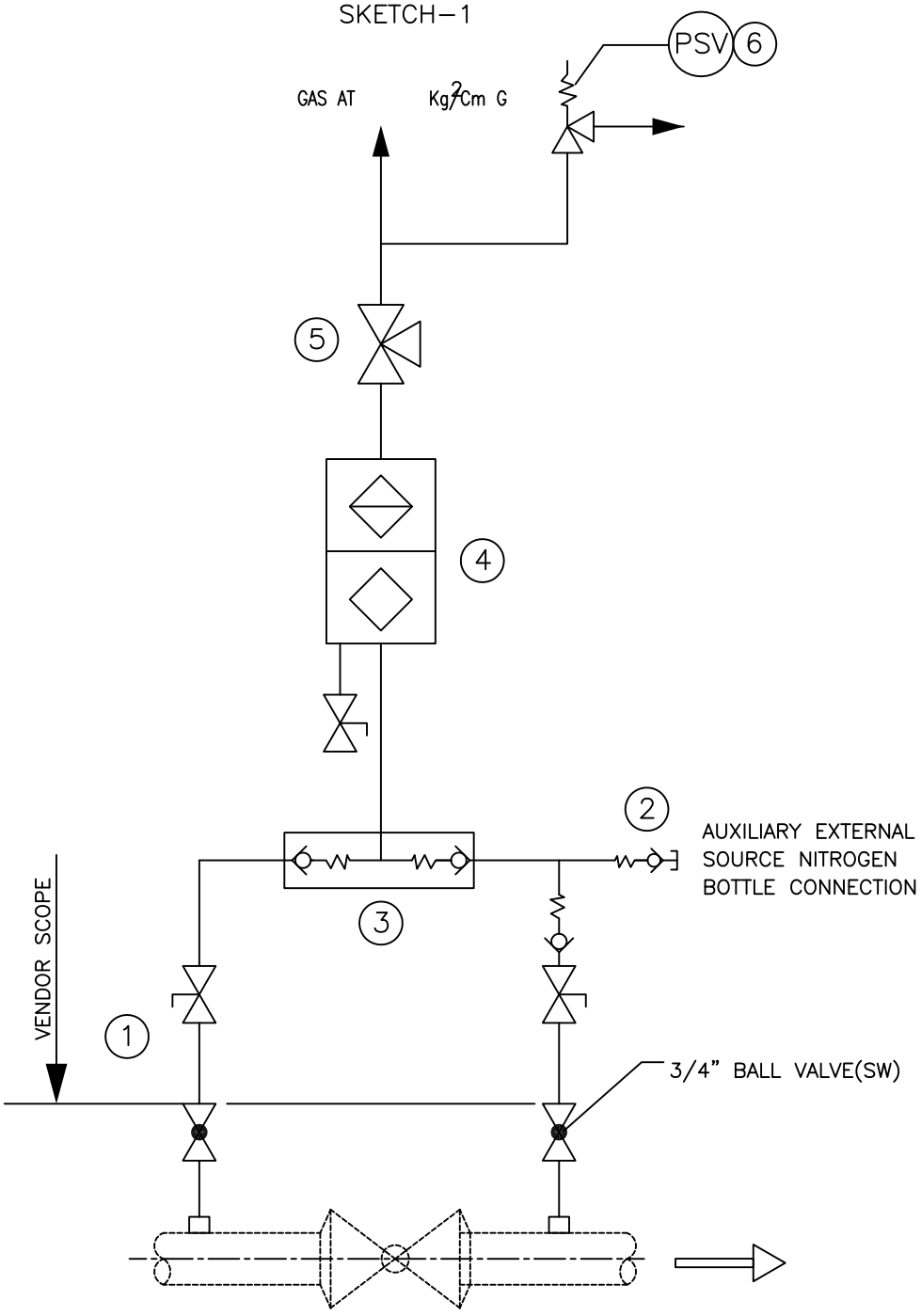
## ITEM : GAS POWERED BALL VALVE ACTUATORS

| 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

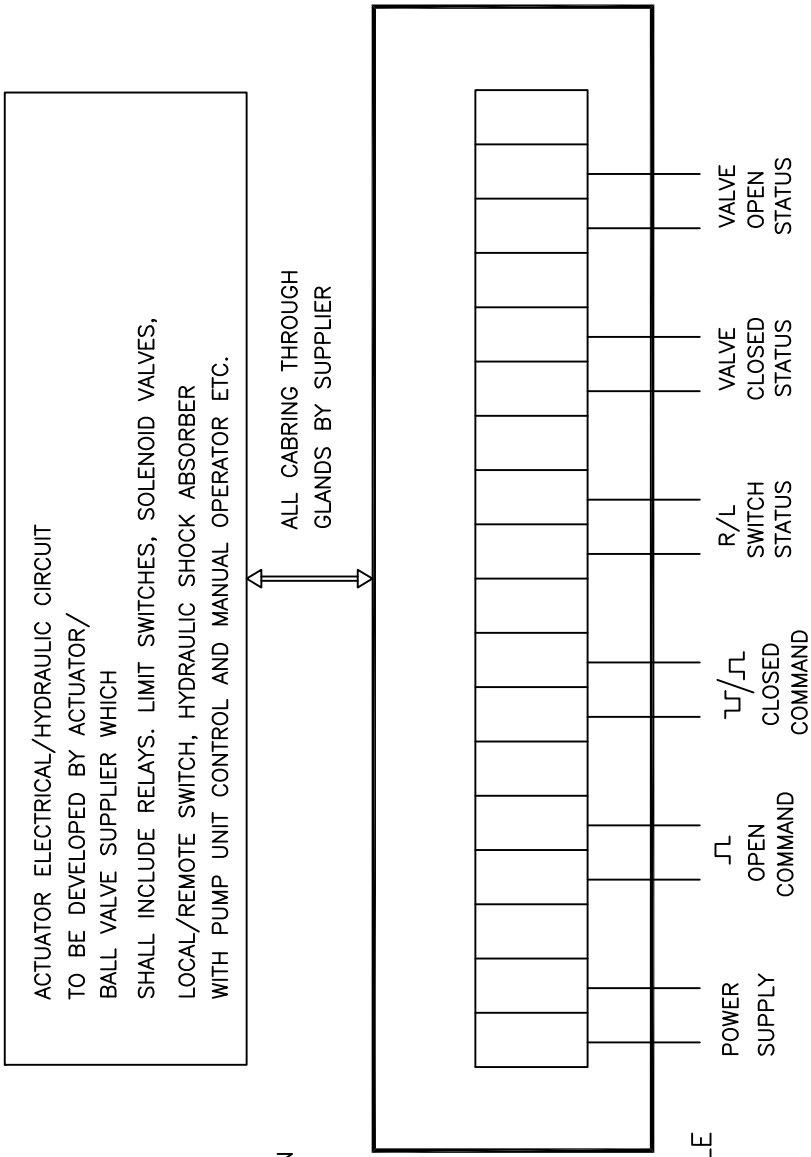
SCALE : N.T.S

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




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.

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

| 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

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)<br>SDE | (HARSH KUMAR)<br>MGR | (A. K. GUPTA)<br>DGM | 11.09.2018 |

## AMENDMENT STATUS

| Sl. No. | Clause / Paragraph / Annexure / Exhibit / Drawing Amended | Page No. | Rev. | Date | BY | | Verified | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Name | Sig. | Name | Sig. |
| | | | | | | | | |
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## 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. : A.1, A.9, A.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-70, PSL 2 | ASTM A106 GR. B |
| 5.2 | Diameter (OD) | 323.9 mm | 60.3 |
| 5.3 | Thickness | 8.38 mm | 5.54 |

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. WCC** | |
| 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" valve

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 : **2 nos Lock open for 2" valve**

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 |
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REFERENCES DRG. NO.

SECTION Oil & Gas

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|---|---|---|---|
| NAME | AM | AM | HK |
| DATE | 12.03.2024 | 12.03.2024 | 12.03.2024 |
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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/23VC/05/28/M/001/DS/BV/01

REV 0

## DATA SHEET FOR BALL VALVES

**MR Item no. : A.2, A.6**

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch) : 300 (12") & 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 100 (4") |
|---|---|---|---|
| 5.0 | Connecting Pipe Specification: | | |
| 5.1 | Material | API 5L Gr. X-52, PSL 2 | ASTM A 106, GR B |
| 5.2 | Diameter (OD) | 323.9 mm | 114.3 |
| 5.3 | Thickness | 14.27 mm | 8.56 |

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**

Stem extension : NA

9.0 Operator : Gear operated for 12" and Lever operated for 4" valve

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

11.0 **Valve Testing Requirement**

| | | | Test Pressure (min.), $kg/cm^2(g)$ | Minimum Duration (minutes) |
|---|---|---|---|---|
| 11.1 | Hydrostatic Test | Body | **157** | **As per API 6D** |
| | | Seat | **114** | **As per API 6D** |
| 11.2 | Air Test | | **5.6 - 7** | **As per API 6D** |

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

13.0 **Valve Painting Specification**

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

13.2 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.

14.0 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 .

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REFERENCES DRG. NO.

SECTION Oil & Gas

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| DATE | 12.03.2024 | 12.03.2024 | 12.03.2024 |
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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/23VC/05/28/M/001/DS/BV/02

REV 0

## DATA SHEET FOR BALL VALVES

**MR Item no. : A.3**

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch) : 300 (12") 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 300 (12") |
| 5.1 | Material | API 5L Gr. X-52, PSL 2 |
| 5.2 | Diameter (OD) | 323.9 mm |
| 5.3 | Thickness | 14.27 mm |

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

**: 3 nos valve with auto closure facility**

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 |
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REFERENCES DRG. NO.

SECTION Oil & Gas

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| DATE | 12.03.2024 | 12.03.2024 | 12.03.2024 |
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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/23VC/05/28/M/001/DS/BV/03

REV 0

## DATA SHEET FOR BALL VALVES

**MR Item no. : A.4**

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch) : 300 (12") 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 300 (12") |
| 5.1 | Material | API 5L Gr. X-70, PSL 2 |
| 5.2 | Diameter (OD) | 323.9 mm |
| 5.3 | Thickness | 8.38 mm |

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. WCC** | |
| 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 specification for Gas Actuated Valve

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 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 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 |
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SECTION Oil & Gas

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CLIENT : INDRADHANUSH GAS GRID LIMITED

PROJECT: NORTH -EAST NATURAL GAS PIPELINE GRID PROJECT

**MECON LIMITED**

SCALE :

REV 0

**DATA SHEET FOR BALL VALVES (NB ≥ 2")**

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

## DATA SHEET FOR BALL VALVES

**MR Item no. : A.5**

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch) : 150 (6") 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 150 (6") |
| 5.1 | Material | ASTM A106 GR. B |
| 5.2 | Diameter (OD) (mm) | 168.3 |
| 5.3 | Thickness (mm) | 10.97 |

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**

Stem extension : Required, Length of stem extension shall be 3000 mm from valve center line.
The length shall be finalized during drawing approval stage.

9 Operator : Gear operated

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

14.0 **Valve Testing Requirement**

| | | | Test Pressure (min.), $kg/cm^2(g)$ | Minimum Duration (minutes) |
|---|---|---|---|---|
| 14.1 | Hydrostatic Test | 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 Anti-Static Testing Requirement : **As per Standard API 6D (Latest Ed.)**

16.0 **Valve Painting Specification**

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

16.2 For underground installation-Three coats of corrosion resistant paint shall be applied with minimum thickness of 600 micron.
Colour of paint shade shall be RAL-7038, however any change in colour shall be finalized during drawing approval stage.

17.0 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 |
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REFERENCES DRG. NO.

SECTION Oil & Gas

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|---|---|---|---|
| NAME | AM | AM | HK |
| DATE | 12.03.2024 | 12.03.2024 | 12.03.2024 |
| SIGN | | | |

CLIENT : INDRADHANUSH GAS GRID LIMITED

PROJECT: NORTH -EAST NATURAL GAS PIPELINE GRID PROJECT

**MECON LIMITED**

SCALE :

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

REV 0

**DATA SHEET FOR BALL VALVES (NB ≥ 2")**

## DATA SHEET FOR BALL VALVES

**MR Item no. : A.7 , A.8**

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch): 4" , 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 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 [√] Full Bore [ ]

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

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

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

6.4 Ball Mounting

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 Service : **Natural Gas**

9.0 Stem extension

10.0 Operator

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 | **157** | **As per API 6D** |
| | | **114** | **As per API 6D** |
| 12.2 | Air Test | **5.6 - 7** | **As per API 6D** |

13.0 Anti-Static Testing Requirement

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 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.**NA**
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 | | BY | APPRD | |
|---|---|---|---|---|---|---|
| | | | | | | REFERENCES DRG. NO. |

| SECTION Oil & Gas | | | | | |
|---|---|---|---|---|---|
| | PREPARED | CHECKED | APPROVED | | |
| NAME | AM | AM | HK | CLIENT : INDRADHANUSH GAS GRID LIMITED | MECON LIMITED |
| DATE | 13.03.2024 | 13.03.2024 | 13.03.2024 | NORTH -EAST NATURAL GAS PIPELINE | |
| SIGN | | | | PROJECT: GRID (PHASE-2) PROJECT | SCALE : REV |
| | | | | DATA SHEET FOR BALL VALVES (NB ≥ 2") | DATA SHEET NO.: MEC/23VC/05/28/M/001/DS/BV/06 0 |

## DATA SHEET FOR LOW TEMPERATRE BALL VALVES

**MR Item nos. : A.11, A.12**

1.0 Valve Manufacturer :

2.0 Valve Size (NB) (inch) : 1", 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**

| | Connecting Pipe Specification: | DN 25 (1") | DN 20 (3/4") |
|---|---|---|---|
| 5.1 | Material | ASTM A333 Gr.6 | ASTM A333 Gr.6 |
| 5.2 | Diameter (OD) | 33.4 mm | 26.7 mm |
| 5.3 | Thickness | 4.55 mm | 5.56 mm |

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 Seat | **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 | | |

| | PREPARED | CHECKED | APPROVED |
|---|---|---|---|
| NAME | AM | AM | HK |
| DATE | 12.03.2024 | 12.03.2024 | 12.03.2024 |
| SIGN | | | |

SECTION Oil & Gas

CLIENT : INDRADHANUSH GAS GRID LIMITED

PROJECT: NORTH -EAST NATURAL GAS PIPELINE GRID PROJECT

**DATA SHEET FOR BALL VALVES (NB < 2")**

REFERENCES DRG. NO.

**MECON LIMITED**

SCALE :

REV 0

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

## DATA SHEET FOR BALL VALVES

**MR Item nos. : A.13**

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:

| | | |
|---|---|---|
| 5.1 | size | DN 20 (3/4") |
| 5.2 | Diameter (OD) | 26.7 mm |
| 5.3 | Thickness | 5.56 mm |

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 | AM | AM | HK |
| DATE | 12.03.2024 | 12.03.2024 | 12.03.2024 |
| 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/23VC/05/28/M/001/DS/BV/09

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**

| | | | | |
|---|---|---|---|---|
| | 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 |
| | 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 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Raw Material and In-Process Stage Inspection | | | Final Inspection/ Test by | | | 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. | 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 Valve | A.1 to A.13 | 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<br>As per MR/ Alternate Material accepted by MECON | | | 1,2 | - | - | - | - | - | 1. D1<br>2. Report | 1. D1<br>2. Relevant Material Standard<br>3. Manufacturer's Specification | H | R | R | |
| | | | | | 4 | 4 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's D.S. | H | H | R | |
| | | | | | 5 | 5 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 6 ** | 6 ** | - | - | - | - | Test Report | 1. ASME B16.34, Appendix-IV<br>2. MECON's T.S. | H | W | R | Forgings, welds, wrought weld ends |
| | | | | | 7 ** | 7 ** | - | - | - | - | Test Report | 1. ASME B16.34, Appendix-II<br>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<br>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<br>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<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 41 | 41 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's T.S.<br>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<br>2. Report | 1. D1<br>2. Relevant Material Standard<br>3. Manufacturer's Specification | H | R | R | |
| | | | | | 4 | 4 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's D.S. | H | H | R | |
| | | | | | 5 | 5 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 6** | 6** | - | - | - | - | Test Report | 1. ASME B16.34, Appendix-IV<br>2. MECON's T.S. | H | W | R | Forgings, welds, wrought weld ends |
| | | | | | 7** | 7** | - | - | - | - | Test Report | 1. ASME B16.34, Appendix-II<br>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<br>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<br>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<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 41 | 41 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's T.S.<br>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<br>2. Report | 1. D1<br>2. Relevant Material Standard<br>3. Manufacturer's Specification | H | R | R | |
| | | | | | 4 | 4 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's D.S. | H | H | R | |
| | | | | | 5 | 5 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 6 ** | 6 ** | - | - | - | - | Test Report | 1. ASME B16.34, Annex-E<br>2. MECON's T.S. | H | W | R | Forgings, welds, wrought weld ends |
| | | | | | 7 ** | 7 ** | - | - | - | - | Test Report | 1. ASME B16.34, Annex-C<br>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<br>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<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 41 | 41 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's T.S.<br>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<br>2. Report | 1. D1<br>2. Relevant Material Standard<br>3. Manufacturer's Specification | H | R | R | |
| | | | | | 4 | 4 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's D.S. | H | H | R | |
| | | | | | 5 | 5 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's T.S.<br>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<br>2. Material Test Certificates for composition, hardness, thickness & integrity | 1. MECON's T.S.<br>2. MECON's D.S.<br>3. ASTM B733 Std.<br>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<br>2. Report | 1. D1<br>2. Relevant Material Standard<br>3. Manufacturer's Specification | H | R | R | |
| | | | | | 4 | 4 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's D.S. | H | H | R | |
| | | | | | 5 | 5 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 6** | 6** | - | - | - | - | Test Report | 1. ASME B16.34, Appendix-IV<br>2. MECON's T.S. | H | W | R | Forgings, welds, wrought weld ends |
| | | | | | 7** | 7** | - | - | - | - | Test Report | 1. ASME B16.34, Appendix-II<br>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<br>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<br>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<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 41 | 41 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 43 | 43 | - | - | - | - | 1. Test Report<br>2. Material Test Certificates for composition, hardness, thickness & integrity | 1. MECON's T.S.<br>2. MECON's D.S.<br>3. ASTM B733 Std.<br>4. Manufacturer's Specification | H | H | R | |
| 1.06 | Stem | Material<br>As per MR/ Alternate Material accepted by MECON | | | 1,2 | 1,2 | - | - | - | - | 1. D1<br>2. Report | 1. D1<br>2. Relevant Material Standard<br>3. Manufacturer's Specification | H | R | R | |
| | | | | | 4 | 4 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's D.S. | H | H | R | |
| | | | | | 5 | 5 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 6** | 6** | - | - | - | - | Test Report | 1. ASME B16.34, Appendix-IV<br>2. MECON's T.S. | H | W | R | Forgings, welds, wrought weld ends |
| | | | | | 7** | 7** | - | - | - | - | Test Report | 1. ASME B16.34, Appendix-II<br>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<br>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<br>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<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 41 | 41 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 43 | 43 | - | - | - | - | 1. Test Report<br>2. Material Test Certificates for composition, hardness, thickness & integrity | 1. MECON's T.S.<br>2. MECON's D.S.<br>3. ASTM B733 Std.<br>4. Manufacturer's Specification | H | H | R | |
| 1.07 | Seats | Material<br>As per MR/ Alternate Material accepted by MECON | | | 1,2 | 1,2 | - | - | - | - | 1. D1<br>2. Report | 1. D1<br>2. Relevant Material Standard<br>3. Manufacturer's Specification | H | R | R | |
| | | | | | 4 | 4 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's D.S. | H | H | R | |
| | | | | | 5 | 5 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 6** | 6** | - | - | - | - | Test Report | 1. ASME B16.34, Appendix-IV<br>2. MECON's T.S. | H | W | R | Forgings, welds, wrought weld ends |
| | | | | | 7** | 7** | - | - | - | - | Test Report | 1. ASME B16.34, Appendix-II<br>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<br>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<br>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<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 41 | 41 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 43 | 43 | - | - | - | - | 1. Test Report<br>2. Material Test Certificates for composition, hardness, thickness & integrity | 1. MECON's T.S.<br>2. MECON's D.S.<br>3. ASTM B733 Std.<br>4. Manufacturer's Specification | H | H | R | |
| 1.08 | Bolting Material (Studs & Nuts) | Material<br>As per MR/ Alternate Material accepted by MECON | | | 1,2 | 1,2 | - | - | - | - | 1. D1<br>2. Report | 1. D1<br>2. Relevant Material Standard<br>3. Manufacturer's Specification | H | R | R | Alongwith thickness measurement for ENP Coating. |
| | | | | | 4 | 4 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's D.S. | H | H | R | |
| | | | | | 5 | 5 | - | - | - | - | Material Test Certificates | 1. Relevant Material Standard<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| | | | | | 6** | 6** | - | - | - | - | Test Report | 1. ASME B16.34, Appendix-IV<br>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<br>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<br>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<br>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<br>2. MECON's T.S.<br>3. MECON's D.S. | H | H | R | |
| 1.09 | Assembled Valves | | | | - | - | - | 1,2 | 1,2 | 1,2 | Report | 1. D1<br>2. MECON's T.S. | H | H | W | |
| | | | | | - | - | - | 3 | 3 | 3 | Report | | H | H | W | |
| | | | | | - | - | - | 14 | 14 | 14 | 1. Report<br>2. Test Certificates | 1. D1<br>2. MECON's T.S.<br>3. MECON's D.S.<br>4. API 6D Std./ BS EN 12266 (as applicable) | H | H | W | |
| | | | | | - | - | - | 15 | 15 | 15 | 1. Report<br>2. Test Certificates | 1. D1<br>2. MECON's T.S.<br>3. MECON's D.S.<br>4. API 6D Std./ BS EN 12266 (as applicable) | H | H | W | |
| | | | | | | | | 40 | 40 | 40 | 1. Report<br>2. Test Certificates | 1. API 607/ API 6FA / BS EN ISO 10497 (as applicable)<br>2. MECON's T.S.<br>3. MECON's D.S. | R | R | R | |
| | | | | | | | | 42 | 42 | 42 | 1. Report<br>2. Test Certificates | 1. MECON's T.S.<br>2. MECON's D.S.<br>3. API 6D Std. (as applicable) | H | H | W | |
| | | | | | - | - | - | 37 | 37 | 37 | Certificates | | - | R | R | |
| | | | | | - | - | - | 44 | 44 | 44 | 1. Report<br>2. Test Certificates | 1. MECON's T.S.<br>2. MECON's D.S.<br>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<br>2. Test Certificates | 1. MECON's T.S.<br>2. MECON's D.S.<br>3. API 6D Std. / BS EN ISO 17292 (as applicable) | H | H | W | |
| | | | | | - | - | - | 46 | 46 | 46 | 1. Report<br>2. Test Certificates | 1. MECON's T.S.<br>2. API 6D Std. (as applicable) | H | H | W | Applicable for TMBV |
| | | | | | - | - | - | 47 | 47 | 47 | 1. Report<br>2. Test Certificates | 1. MECON's T.S.<br>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<br>2. Test Certificates | 1. MECON's T.S.<br>2. API 6D Std. (as applicable) | H | H | W | Applicable for TMBV |
| | | | | | - | - | - | 49 | 49 | 49 | 1. Report<br>2. Test Certificates | 1. MECON's T.S.<br>2. MECON's D.S. | H | H | W | |
| | | | | | - | - | - | 50 | 50 | 50 | 1. Report<br>2. Test Certificates | 1. MECON's T.S.<br>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<br>2. Final Certificates | 1. MECON's T.S.<br>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<br>2. Final Certificates | 1. MECON's T.S.<br>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 | D9. | Calibration Certificate of all measuring instruments |
| | | | | 45. | Anti-Static Test | | |
| 13. | Heat Treatment | 30. | Proving Test | 46. | Hydrostatic Double Block & Bleed Test | | |
| 14. | Pressure Test | 31. | Surface Preparation | | | | |
| 15. | Leakage Test<br>a) Piston Seal<br>b) Pneumatic Connection | | | 47. | Functional Test :<br>a) Electrical and pneumatic functional test.<br>b) Insulation Test of Electrical components.<br>c) Check of operating time control.<br>d) Check of limiting device operation.<br>e) No load test (DP=0) & load (DP max) Operations with the minimum required feeding pressure.<br>f) Manual Override functional test. | | |
| | | 32. | Manufacturer's Test Certificates and gauges | | | | |
| 16. | Balancing | | for bought-out items | 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)

QAP NO. MEC/05/E5/STD./QAP/AV REV 0

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