



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

**NORTH -EAST GAS GRID PIPELINE PROJECT (PHASE-1)
PIPELINE SECTION 1, 2, 3, 5 & 9**

**BID DOCUMENT FOR PROCUREMENT
OF**

FLOW TEES

OPEN DOMESTIC COMPETITIVE BIDDING

Tender No.: 05/51/23VC/IGGL/011

VOLUME – II OF II

**Visit: www.tenderwizard.com/MECON
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PREPARED AND ISSUED BY

MECON LIMITED
(A Govt. of India Undertaking)
Delhi, India

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OIL & GAS SBU, DELHI

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Client :
INDRADHANUS
H GAS GRID
LIMITED

Project : NORTH -EAST NATURAL
GAS GRID PIPELINE PROJECT
(SECTIONS – 1, 2, 3, 5 & 9)

Document No. :
MEC/23VC/05/28/M/000/S011/CONT

Rev. No.
0

MATERIAL REQUISITION

MATERIAL REQUISITION – FLOW TEE**OIL & GAS SBU, DELHI**

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MATERIAL REQUISITION

MR DOCUMENT NO. : MEC/23VC/05/28/M/000/S011, Rev. 0
 PROJECT : NORTH -EAST NATURAL GAS GRID PIPELINE PROJECT
 (SECTIONS – 1, 2, 3, 5 & 9)
 CLIENT : INDRADHANUSH GAS GRID LIMITED
 ITEM : FLOW TEE
 TENDER DOC. NO. : 05/51/23VC/IGGL/011

1. SCOPE OF SUPPLY

The scope of supply includes but not limited to Design, Engineering and Procurement of Materials and bought out components, Manufacture & Fabrication, assembly at shop, inspection, testing at manufacturer's works, preparation of shipment / packing, transport / delivery unloading and stacking at owner's store in the states of Assam, Arunachal & Tripura as per tender terms & conditions of Tender. FLOW TEEs shall be suitable for passing intelligent pigs & other cleaning / displacement / gauging pigs. Scope of supply shall include supply of all documentation as per the Material Requisition, Notes to Material Requisition, Data sheet, MECON's Standard specifications etc. and other codes and standards attached or referred.

Table-1

| Item No. | Mainline Size NB, Mm (Inches) | Branch Size NB, Mm (Inches) | ANSI Rating | Data Sheet No. | Total Qty. (Nos.) | *Section-wise Qty. (Nos.) | | | | |
|----------|-------------------------------|-----------------------------|-------------|--------------------------------|-------------------|---------------------------|-----------|-----------|-----------|-----------|
| | | | | | | Section-1 | Section-2 | Section-3 | Section-5 | Section-9 |
| 1. | 600 (24") | 600 (24") | 600# | MEC/23VC/05/21/M/000/DS-011/01 | 08 | 08 | 0 | 0 | 0 | 0 |
| 2. | 600 (24") | 300 (12") | 600# | MEC/23VC/05/21/M/000/DS-011/02 | 16 | 16 | 0 | 0 | 0 | 0 |
| 3. | 600 (24") | 250 (10") | 600# | MEC/23VC/05/21/M/000/DS-011/03 | 32 | 32 | 0 | 0 | 0 | 0 |
| 4. | 450 (18") | 450 (18") | 600# | MEC/23VC/05/21/M/000/DS-011/04 | 01 | 0 | 0 | 01 | 0 | 0 |

| | | | |
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|-----|--------------|--------------|------|--|-----------|---|----|----|----|----|
| 5. | 450 (18") | 300 (12") | 600# | MEC/23VC/ 05/21/M/000 /DS-011/05 | 07 | 0 | 0 | 07 | 0 | 0 |
| 6. | 450 (18") | 250 (10") | 600# | MEC/23VC/ 05/21/M/000 /DS-011/06 | 10 | 0 | 0 | 10 | 0 | 0 |
| 7. | 300 (12") | 300 (12") | 600# | MEC/23VC/ 05/21/M/000 /DS-011/07 | 06 | 0 | 0 | 0 | 04 | 02 |
| 8. | 300 (12") | 200 (8") | 600# | MEC/23VC/ 05/21/M/000 /DS-011/08 | 05 | 0 | 0 | 0 | 05 | 0 |
| 9. | 300 (12") | 150 (6") | 600# | MEC/23VC/ 05/21/M/000 /DS-011/09 | 12 | 0 | 0 | 0 | 12 | 0 |
| 10. | 200 (8") | 200 (8") | 600# | MEC/23VC/ 05/21/M/000 /DS-011/10 | 03 | 0 | 03 | 0 | 0 | 0 |
| 11. | 200 (8") | 150 (6") | 600# | MEC/23VC/ 05/21/M/000 /DS-011/11 | 02 | 0 | 02 | 0 | 0 | 0 |

***Delivery Locations (States):**

- Section-1: Assam
- Section-2: Assam/ Arunachal Pradesh
- Section-3: Assam/ Tripura
- Section-5: Tripura
- Section-9: Tripura

Exact Delivery Location / Destination for each section in respective states shall be provided to the successful bidder.

Notes:

1. **Material Delivery Requirements:** The finished material are to be delivered by the supplier at the designated store as stated above.
The supplier shall be responsible for all handling and transportation from their production plant to the designated delivery point including unloading and stacking at owner's store in accordance with this specification.
2. **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 attachment thereto. Flow Tees shall be provided with EN 10204-3.2 certificates.

| | | | |
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3. **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.

4. **Inspection:**

"The Successful Vendor shall propose minimum four (4) nos. of TPIA's from the below listed TPIA's along with QAP submission. IGGL/MECON shall approve any one TPIA out of the four (4) nos. proposed TPIA's. The Successful Vendor shall appoint the approved TPIA for inspection purpose and mention name of the approved TPIA in QAP.

- 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. Meenar Global
- xiii. VCS Quality Services Private Limited

Apart from inspection by TPIA, inspection shall also be performed by MECON / IGGL's delegate, as set out and specified in the codes and particular documents forming this MR.

Vendor must note that stage wise inspection for complete fabrication, testing including the raw material inspection to be carried out.

5.0 **DOCUMENTS & DATA REQUIREMENTS**

5.1 The table hereunder specifies the quantities and the nature of the documents to be submitted by the Vendor to Purchaser.

| | | | |
|--|---|---|--------------|
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- 5.1.1 The documents required at the inquiry stage and to be included in the bid are listed under column A of table below under note no. 5.6.
- 5.1.2 The documents required after award of the Contract and subject to the written approval of the Purchaser are listed under column B of table below under note no. 5.6.
- 5.1.3 The final and certified documents are listed under column C of table below under note no. 5.6.
- 5.2 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.
- 5.3 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.
- 5.4 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 PR 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.
- 5.5 The successful Bidder/ Supplier shall submit a prerecorded Training CDs/DVDs and it shall comprise the basic theories and fundamentals, related standards, design parameters, manufacturing & inspection methods, operating & maintenance instructions and other relevant details. The CDs/DVDs shall have to be self-contained, user-friendly using animation/videos and other multimedia techniques.
- 5.6 **THE DOCUMENTS ARE FULLY PART OF THE SUPPLY WHICH SHALL BE COMPLETE ONLY IF AND WHEN THE DOCUMENTS COMPLYING FULLY WITH THE MATERIAL REQUISITION REQUIREMENTS ARE RECEIVED BY THE PURCHASER.**

| | | | |
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| 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 | 1 Week | 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. | Progress Report | - | 3 | 2 Weeks + monthly | 3 | 2 Weeks | |
| 5. | Catalogues / References | 3 | - | - | 3 | With final technical file | |
| 6. | GA drawings + Sectional drawings + Material specification (all above for each size of quoted FLOW TEE) | 3 | 3 | 2 Weeks | 3 | With final technical file | |
| 7. | Packing / shipping list with weights and dimensions | 3 | 3 | 2 Weeks before shipping | 3 | 2 Weeks (with final technical file) | |
| 8. | Design calculations for pressure containing parts | 3 | 3 | 1 Week | 3 | 2 Weeks (with final technical file) | |
| 9. | Bill of materials (on drawings) | - | 3 | 1 Week | 3 | 2 Weeks (with final technical file) | |
| 10. | Welding procedure specification and records WPS / PQR | - | 3 | 1 Week | 3 | 2 Weeks (with final technical file) | |
| 11. | Inspection and Test Procedures along with Quality Assurance Plan | 3 | 3 | 1 Week | 3 | 2 Weeks (with final technical file) | |
| 12. | Test Reports | - | - | - | 3 | 2 Weeks (with final technical file) | |
| 13. | NDE / NDT Reports | - | - | - | 3 | 2 Weeks (with final technical file) | |

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| Item | Documents & Data | A | | | B | | C | |
|------|--|---------------|---------------|-----------------------------------|---------------|-------------------------------------|---|--|
| | | No. of Copies | No. of Copies | Required Date (from FOI) | No. of Copies | Required Date (before Dispatch) | | |
| 14. | Heat Treatment Reports | - | - | - | 3 | 2 Weeks (with final technical file) | | |
| 15. | Hydrotest and air test report | - | - | - | 3 | 2 Weeks (with final technical file) | | |
| 16. | Maintenance and operating manuals | - | - | - | 3 | 2 Weeks (with final technical file) | | |
| 17. | Installation instructions & Site inspection procedure | - | - | - | 3 | 2 Weeks (with final technical file) | | |
| 18. | Material certificate as per EN 10204 - 3.2 | - | - | - | 3 | 2 Weeks (with final technical file) | | |
| 19. | Painting system description & procedure | - | 3 | 1 week | 3 | 2 Weeks (with final technical file) | | |
| 20. | List of sub-vendors with their scope | 3 | 3 | 1 week | - | - | | |
| 21. | Training CDs/DVDs covering design, operation & maintenance | - | - | - | 3 | 2 Weeks (with final technical file) | | |
| 22. | Final technical file, preliminary copy for approval (in soft & hardcopy) | - | 3 | 2 weeks before Dispatch/ shipping | - | - | | |
| 23. | Final technical file (in soft & hardcopy) | - | - | - | 3 | Before shipping | | |

NOTES

- I. In case of e-bids, only single copy of documents / drawings / data under column A need be uploaded.
- II. Durations in column B (required date) are weeks after FOI/FOA or as indicated in Table.

| | | | |
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- a. Durations in column C (required date) are weeks after document approval or as indicated in Table.
- b. Due date of each document may be proposed.
- III. Final technical file shall be supplied in hard copy as indicated and in electronic format (.pdf Acrobat files) on six (3) CD-ROMs & Hard Drive.
- IV. **The above documents & data requirements shall also be supplemented by all requirements of clause 10.0 of MECON's T.S. No. MEC/TS/05/21/011, R-0. Edition-1.**
6. Bidder / Supplier shall submit hard copies of all documents / drawings to MECON as listed in column B & C of table for document and data requirement under clause 5.0 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 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.
7. **Packaging & Transport:**
- 7.1 Welding ends of Flow Tees shall be blanked on each end by high impact plastic bevel protectors, so that bevels are protected from possible mechanical damage during transportation.
- 7.2 Flow Tees shall be packed and transported in boxes of wood/plywood only. 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.
- 7.3 Stacking of multiple Flow Tees in single box is permitted up to 4" NB. However, in such case suitable partitions are to be made inside packing box. Each box shall be clearly marked with the identification of Flow Tees packed in that box.
- 7.4 Boxes shall be suitably fastened to the truck/trailer bed by means of ropes, tapes etc. Lifting location shall be clearly marked on each box.
- 7.5 It is sole responsibility of the vendor to pack, transport and load/unload the Flow Tees to the designated locations safely and as per the transport regulations. No claim shall be entertained by the owner on account of any damage to the Flow Tees during transport and loading/unloading.

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8. 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.
9. Vendors to note that for minimum inspection and testing requirement of the supplied item shall be governed by attached QAP with this MR. However; Vendor shall submit their QAP for Approval covering the requirement specified in attached QAP.
10. 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.
11. 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
 - Datasheets
 - Technical Specification
 - Codes and Standards
 - Vendor's StandardsHowever, Owner/Consultant reserves the right to consider most stringent requirement among the document attached / referred.
12. Bidders to note that the Flow Tee 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 Flow Tees shall be kept for entire test duration and test medium will be non-corrosive water. The vendor shall be liable for replacement of Flow Tee if found faulty during site hydro test at his risk & cost. All cost for associated activities like packaging, transportation, etc. in connection to replacement of Flow Tee shall be borne by the bidder. No claim shall be entertained by the Owner/Purchaser in this regard.
13. Successful Bidder shall submit reinforcement calculation for extruded header in case of non-standard sizes (i.e. sizes not available in ASME B16.9) of Tees used for making Flow Tees as per applicable code.

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TECHNICAL SPECIFICATION

SPECIFICATION FOR FLOW TEES

SPECIFICATION NO.: MEC/TS/05/21/011




**(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092**

| | | | |
|--|----------------------------------|----------------------------------|---|
| MECON LIMITED REGD. OFF: RANCHI 834002 | STANDARD TECHNICAL SPECIFICATION | |  |
| | OIL & GAS SBU, DELHI | | |
| TITLE | FLOW TEES | DOCUMENT NO. MEC/TS/05/21/011 | Page 1 of 1 |
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| 3.0 | MANUFACTURER'S QUALIFICATION |
| 4.0 | MATERIALS |
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| 6.0 | INSPECTION AND TESTS |
| 7.0 | TEST CERTIFICATES |
| 8.0 | PAINTING, MARKING AND SHIPMENT |
| 9.0 | WARRANTY |
| 10.0 | DOCUMENTATION |

| | | | |
|----------------|--------------|--------------|--------------|
| PREPARED BY: | CHECKED BY: | APPROVED BY: | ISSUE DATE : |
| (Amit Lavania) | (A.K. Gupta) | (A.K. Johri) | Oct. 2008 |

| | | | |
|--|----------------------------------|----------------------------------|---|
| MECON LIMITED REGD. OFF: RANCHI 834002 | STANDARD TECHNICAL SPECIFICATION | |  मेकॉन ISO 9001:2000 Company |
| | OIL & GAS SBU, DELHI | | |
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AMENDMENT STATUS

| Sl. No. | Clause / Paragraph / Annexure / Exhibit / Drawing Amended | Page No. | Revision | Date | By (Name) | Verified (Name) |
|---------|---|----------|----------|------|-----------|-----------------|
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1.0 SCOPE

This specification covers the basic requirements for the design, manufacture and supply of carbon steel flow tees to be installed in pipeline system for handling hydrocarbons in liquid or gaseous phase.

2.0 REFERENCE DOCUMENTS


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

- | | | | |
|----|----------------|---|---|
| a) | ASME B 31.4 | : | Liquid Transportation Systems for Hydrocarbons, Liquid Petroleum Gas, Anhydrous Ammonia and Alcohols. |
| b) | ASME B 31.8 | : | Gas Transmission and Distribution Piping System |
| c) | ASME B 16.9 | : | Factory made wrought steel butt welding fittings. |
| d) | ASME Sec. VIII | : | Boiler & Pressure Vessels Code-Rules for the construction of pressure vessels. |
| e) | ASME Sec. IX | : | Boiler & Pressure Vessel Code-Welding & Brazing Qualifications. |
| f) | ASTM A 370 | : | Mechanical Testing of Steel Products |
| g) | MSS-SP-53 | : | Quality Standard for Steel Castings and Forgings for Valves, Flanges and fittings and other Piping components and - Magnetic Particle Examination Method. |
| h) | MSS-SP-75 | : | Specification for High Test Wrought Butt Welding Fittings |
| i) | API 1104 | : | Specification for Welding Pipeline and Related Facilities |
| j) | SSPC-VIS-1 | : | Steel Structures Painting Council |

2.2 In case of conflict between the requirements of this specification and any code, Standard and Specification referred in Clause 2.1 above. Order of precedence shall be as follows :

- Data Sheets
- This Specification
- Other Referred Codes & Standards
- Manufacturer's Standard.

3.0 MANUFACTURER'S QUALIFICATION

| | | | |
|--|----------------------------------|----------------------------------|--|
| MECON LIMITED REGD. OFF: RANCHI 834002 | STANDARD TECHNICAL SPECIFICATION | |  |
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Manufacturer who intend bidding for flow tees must possess the records of a successful proof test for tees used in the fabrication of flow tees, in accordance with the provisions of ASME B16.9/ MSS-SP-75. These records shall be submitted at the time of bidding.

4.0 **MATERIALS**

4.1 Material for the pressure containing parts of the flow tees shall be indicated in the data sheet. Other parts shall be as per manufacturer's standard suitable for the service conditions indicated in data sheet and shall be subjected to approval by Purchaser.

4.2 Fully killed Carbon steel shall be used in the manufacture of flow tees.

4.3 Each heat of steel used for the manufacture of pressure containing parts of the flow tees shall have carbon equivalent (CE) not greater than 0.45 calculated from the check analysis in accordance with the following formula.

$$CE = C + Mn/6 + (Cr+Mo+V)/5 + (Ni +Cu)/15$$

4.4 When specified in Data sheet, Charpy V-notch test shall be conducted for each heat of steel used in manufacture of pressure containing parts of flow tee. Test shall conform to the provisions of MSS-SP-75 / ASTM A-370 and at a temperature of 0°C for pressure containing parts material. The Charpy impact test specimen shall be taken in the direction of principal grain flow and notched perpendicular to the original surface of the plate or forging. The average impact energy values of full sized three specimens shall be as follows, unless indicated otherwise in the data sheets:

| Diameter (inches) | Base Metal (joules) | Weld Metal and HAZ (joules) |
|----------------------|------------------------|--------------------------------|
| For all sizes | 27 | 27 |


Minimum impact energy value of any one specimen shall not be less than 80% of the above average values.

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

4.5 When specified in the data sheet, hardness test shall be carried out as per ASTM A 370 for each heat of steel used. The maximum hardness of base metal, weld metal and HAZ of all pressure containing parts shall be 248 HV₁₀, unless otherwise specified.

5.0 **DESIGN AND CONSTRUCTION REQUIREMENTS**

5.1 Flow tees shall be designed and manufactured in accordance with the provisions of codes and standards referred in Section 2.0 of this specification. Design factor and corrosion allowance indicated in data sheet shall be taken into account for design of

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flow-tees.

5.2 Flow tees shall generally conform to the figure shown in the data sheet and shall meet following requirements as minimum:

- a) An internal pipe having the same diameter as the connecting pipeline allowing the passage of scraper/ instrumented pigs, provided with holes/slots located in the centre line of the branch. The holes shall be oriented at 45° angle. The holes shall be designed to prevent the pig getting stuck or damaged without affecting the flow through the branch line. The area of the holes/slots shall be atleast equal to the internal area of branch size.
- b) A forged / submerged arc welded `tee' as per ASME B 16.9/ MSS-SP-75 enclosing the internal pipe fixed to it by suitably shaped forged steel rings. Machined steel rings shall not be used. The centre-to-end dimension of the outlet shall meet the minimum recommended dimension of the referred standard. Circumferential welding on the branch outlet is not acceptable. Pup shall not be provided either at the run or at the branch.
- c) Tees used for fabrication of flow tees shall be seamless type for run sizes DN ≤ 350 mm (14") and shall be either welded or seamless type for run sizes DN ≥ 400 mm (16"). Tees shall conform to ASME B16.9 for run size up to DN 350(14"). For run sine DN ≥ 400 mm (16"), the tees shall confirm to MSS-SP-75/ASME B16.9.

5.3 Butt weld ends shall be beveled as per MSS-SP-75.


5.4 All flow tees shall be completely stress relieved as per MSS-SP-75.

5.5 Stub-in or pipe to pipe connection shall not be used in the manufacture of flow tees. Flow tees shall be manufactured by forging or extrusion methods. In case flow tees are manufactured using welded tees, the longitudinal weld seam shall be at least 90° to the branch connection.

5.6 All welds shall be made by welders and welding procedures qualified in accordance with ASME Section-IX. The welding procedure qualification test shall include charpy impact test and hardness test and shall meet the requirements of clause 4.4 and 4.5 of this specification respectively.

5.7 Repair by welding on parent metal is not allowed. Repair of welds shall be carried out only after specific approval by Purchaser's Representative for each repair. The repair welding shall be carried out by the welders and welding procedures duly qualified as per ASME Section-IX and records for each repair shall be maintained. Repair welding procedure qualification shall include all test, which are applicable for regular production welding procedure qualification.

6.0 **INSPECTION AND TESTS**

| | | | |
|--|----------------------------------|----------------------------------|--|
| MECON LIMITED REGD. OFF: RANCHI 834002 | STANDARD TECHNICAL SPECIFICATION | |  |
| | OIL & GAS SBU, DELHI | | |
| TITLE | FLOW TEES | DOCUMENT NO. MEC/TS/05/21/011 | Page 4 of 6 |
| | | | REVISION : 0 |
| | | | EDITION : 1 |

6.1 The manufacturer shall perform all inspections 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 :

6.1.1 All flow tees shall be visually inspected. The internal & external surfaces of the flow tees shall be free from any strikes, gauges & other detrimental defects.

6.1.2 Dimensional checks shall be carried out as per the approved drawing.

6.1.3 Chemical composition and Mechanical properties shall be checked as per MSS-SP-75 and this specification for each heat of steel used.

6.1.4 Non destructive examination of individual flow tees shall be performed as given below:

a) 100% inspection by radiography shall be carried out on all butt welds of pressure containing parts. Acceptance limits shall be as per API 1104.

b) Welds which in Purchaser's Representative's opinion cannot be inspected by radiographic methods shall be checked by ultrasonic or magnetic particle methods. Acceptance criteria shall be as per ASME Section VIII Appendix-12 and Appendix-6 respectively.

c) Magnetic particle or liquid penetrant examination shall be performed on cold formed butt welding tees with extruded outlets that are subjected to an extreme fiber elongation of greater than 5%. The examination shall be carried out as per the supplementary Requirement SR 3 of MSS-SP-75.

d) All finished wrought weld ends shall be 100% ultrasonically tested for lamination type defects for a distance of 25mm from the end. Any lamination larger than 6.35mm shall not be acceptance.

e) All forgings shall be wet magnetic particle examined on 100% of the forged surfaces. Method and acceptance shall comply with MSS-SP-53.


6.2 Purchaser's Representative shall also perform stage wise inspection and witness tests as indicated in clause 6.1 at manufacturer's works prior to shipment. Manufacturer shall give reasonable notice of time and shall provide without charge reasonable access and facilities required for inspection, to the Purchaser's Representative.

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

7.0 **TEST CERTIFICATES**

7.1 Manufacturer shall submit following certificates to Purchaser's Representative :

a) Test certificates relevant to the chemical analysis and mechanical properties of the materials used for construction as per this specification and relevant

| | | | |
|--|----------------------------------|----------------------------------|--|
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| TITLE | FLOW TEES | DOCUMENT NO. MEC/TS/05/21/011 | Page 5 of 6 |
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standards.

- b) Test reports on radiographic, ultrasonic inspection & wet magnetic particle examination.
- c) Certificates for each flow tee stating that it is capable of withstanding without leakage for a test duration of 15 minutes and test pressure which results in a hoop stress equivalent to 95% of the specified minimum yield strength and for the pipe with which the flow tee is to be attached without impairing its serviceability.
- d) Test reports on heat treatment carried out.
- e) Welding Procedures & Welders qualification reports.

8.0 **PAINTING, MARKING AND SHIPMENT**

8.1 Flow tees entire surface shall be thoroughly cleaned, freed from rust and grease and applied with sufficient coats of standard mill coating / corrosion resistant paint, after all the required tests have been performed and accepted by Purchaser's Representative. The surface preparation shall be carried out by shot blasting to SP 6 in accordance with "Steel Structures Painting Council - Visual Standard - SSPC-VIS-1".

8.2 Manufacturer shall indicate the type & recommended coats of standard mill coating / corrosion resistant paint used, in the drawing submitted for approval.

8.3 Flow tees shall be marked with indelible paint with the following data :


- a) Manufacturer's Name
- b) Nominal diameter in inches D1 x D2
- c) End thickness in mm T1 x T2
- d) Material
- e) Tag numbers

8.4 Flow tees shall be suitably protected to avoid any damage during transit. Metallic or high impact plastic bevel protectors shall be provided for weld ends.

9.0 **WARRANTY**

Purchaser will be reimbursed by Manufacturer for any flow tee furnished to this specification which fails under field hydrostatic testing or does not perform satisfactory during the pigging operation and if such failure or non-performance is caused by a defect in the flow tees which is outside the acceptance limits of this specification. The reimbursement cost shall include cost of flow tee, labour and equipment rental for finding, excavating, cutting, and installation of replaced flow tee in position.

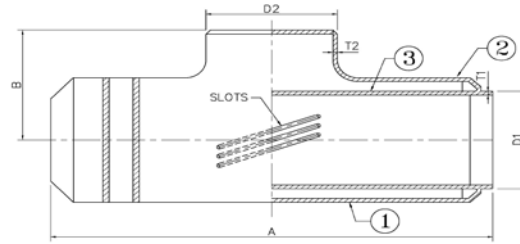
10.0 **DOCUMENTATION**

| | | | |
|--|----------------------------------|----------------------------------|--|
| MECON LIMITED REGD. OFF: RANCHI 834002 | STANDARD TECHNICAL SPECIFICATION | |  |
| | OIL & GAS SBU, DELHI | | |
| TITLE | FLOW TEES | DOCUMENT NO. MEC/TS/05/21/011 | Page 6 of 6 |
| | | | REVISION : 0 |
| | | | EDITION : 1 |

- 10.1 At the time of bidding, bidder shall submit the following documents :-
- General arrangement drawing of flow tees with overall dimensions and details of internal sleeve and cross sectional drawings.
 - Reference list of previous supplies of flow tees of similar specification with relevant details viz Project, Year of supply, Client, size, Rating and service for the last five years.
 - Clausewise list of deviation from this specification, if any.
 - Records of successful proof test for tees used for fabrication of flow tees, qualifying the range of sizes quoted.
 - Brief description of the manufacturing, heat treatment and quality control facilities of the manufacturer's work.
- 10.2 Within two weeks of placement of order, the manufacturer shall submit four copies, of but not limited to, the following drawings, documents and specifications for approval.
- Fabrication drawings and relevant calculations for pressure containing parts.
 - Calculation for the holes/slots sizes/ flow area.
 - Method of manufacture, welding procedure and heat treatment details.
 - Quality control Manual & Quality Control Plan.
 - Type of mill coating / anti-corrosion paint / anti-fouling paint.
- Once the approval has been given by Purchaser, any change in design, material method of manufacture shall be notified to Purchaser whose approval in writing of all changes shall be obtained before the flow tees are manufactured.
- 10.3 Within four weeks from the approval date Manufacturer shall submit one reproducible and six copies of the approved drawings, documents and specification as stated in clause 10.2 of this specification.
- 10.4 Prior to shipment, Manufacturer shall submit one reproducible and six copies of test certificates as listed in clause 7.0 of this specification.
- 10.5 All documents shall be in English Language.

DATASHEETS OF FLOW TEES

DATA SHEET FOR FLOW TEES



MR Item no. 1


1. FLOW TEE MFR. :
2. PURCHASER'S SPECIFICATION NO. : MEC/TS/05/21/011
3. RATING : 600#
4. DESIGN PRESSURE : 92 Kg/cm2(g)
5. DESIGN TEMPERATURE : -29°C to 65°C
6. SERVICE : NATURAL GAS / RLNG
7. CORROSION ALLOWANCE : 3.0 MM
8. SIZE NB MM(INCHES) : 600 X 600 X 600 (24" X 24" X 24")
9. END CONNECTION : BUTT-WELD AT BOTH ENDS
10. DESIGN CODE : ASME B31.8
11. DESIGN FACTOR : 0.5
12. HYDROSTATIC TEST PRESSURE : 138 Kg/cm2(g)
13. CHARPY TEST (TEES, END PIECES) : REQUIRED AS PER SPECIFICATION & ASTM- A370
14. HARDNESS TEST : REQUIRED AS PER SPECIFICATION & ASTM- A370
15. SUITABILITY OF FLOW TEE : FOR INTELLIGENT PIGS
16. FLOW DIRECTION : BI - DIRECTIONAL
17. MATERIALS SPECIFICATION (EQUIVALENT OR SUPERIOR)
 - 1) TEE : MSS - SP - 75 Gr. WPHY 70
 - 2) END PIECES : ASTM A 694 Gr. F - 70
 - 3) INTERNAL SLEEVE : API 5L Gr. X-56, PSL-2
18. CONNECTING PIPE SPECIFICATION

| Sl. No. | Tag No. | Run Pipe Details | | | Branch Pipe Details | | | Qty. |
|---------|---------|------------------|------------|------------------------|---------------------|------------|------------------------|------|
| | | Dia | Thk (Min.) | Materials | Dia | Thk (Min.) | Materials | |
| | | NB (Inch) | (mm) | | NB (Inch) | (mm) | | |
| 1 | * | 24 | 14.27 | API 5L Gr. X-70, PSL-2 | 24 | 19.1 | API 5L Gr. X-52, PSL-2 | 08 |

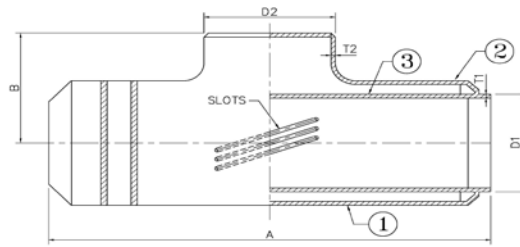
* Tag nos. shall be provided to the successful bidder.

19. SPECIAL REQUIREMENTS : FLOW TEE SHALL BE SUITABLE FOR ABOVE GROUND INSTALLATION

- NOTE:
- 1 MANUFACTURE TO INDICATE DIMENSIONS MARKED A & B IN THE SKETCH ABOVE.
 - 2 MANUFACTURER TO FURNISH DETAILS OF THE SLOTS IN INTERNAL SLEEVE. THE AREA OF THE SLOTS SHALL BE MINIMUM EQUAL TO THE INTERNAL AREA OF THE BRANCH PIPE. RELEVANT CALCULATIONS TO THIS EXTENT SHALL BE FURNISHED.
 - 3 **MANUFACTURER SHALL ENSURE THAT THE WALL THICKNESS (W.T) OF ALL PARTS OF FLOW TEE SHALL BE ADEQUATE TO SUSTAIN DESIGN PRESSURE AND THE THICKNESS OF RUN SIZE ENDS (T1) & BRANCH SIZE END (T2) OF FLOW TEE SHALL BE SAME AS CONNECTING RUN PIPE AND BRANCH PIPE W.T. AS INDICATED ABOVE.**

| REV. NO. | DATE | ZONE | DESCRIPTIONS | BY | APPRD | REFERENCES | DRG. NO. | |
|-------------------|--------|------------------------|---|--------------------------------|----------|---|---------------|--|
| REVISIONS | | | | | |  | MECON LIMITED | |
| SECTION OIL & GAS | | | CLIENT : INDRADHANUSH GAS GRID LIMITED | | | | | |
| DSGN | SACHIN | 23.10.20 | CHKD | HARSH | 23.10.20 | | | PROJECT : NORTH -EAST NATURAL GAS GRID PIPELINE PROJECT (SECTIONS - 1, 2, 3, 5 & 9) |
| DRWN | | | | | | | | |
| APPROVED | | INDRANIL SEN Sr. GM | | DATA SHEET FOR FLOW TEE | | | SCALE : | REV |
| | | | | | | Data Sheet No.: | 0 | |
| | | | | | | MEC/23VC/05/21/M/000/DS-011/01 | | |
| | | | | | | 23 of 42 | | |

DATA SHEET FOR FLOW TEES



MR Item no. 2

1. FLOW TEE MFR. :
2. PURCHASER'S SPECIFICATION NO. : MEC/TS/05/21/011
3. RATING : 600#
4. DESIGN PRESSURE : 92 Kg/cm2(g)
5. DESIGN TEMPERATURE : -29°C to 65°C
6. SERVICE : NATURAL GAS / RLNG
7. CORROSION ALLOWANCE : 3.0 MM
8. SIZE NB MM(INCHES) : 600 X 600 X 300 (24" X 24" X 12")
9. END CONNECTION : BUTT-WELD AT BOTH ENDS
10. DESIGN CODE : ASME B31.8
11. DESIGN FACTOR : 0.5
12. HYDROSTATIC TEST PRESSURE : 138 Kg/cm2(g)
13. CHARPY TEST(TEES, END PIECES) : REQUIRED AS PER SPECIFICATION & ASTM- A370
14. HARDNESS TEST : REQUIRED AS PER SPECIFICATION & ASTM- A370
15. SUITABILITY OF FLOW TEE : FOR INTELLIGENT PIGS
16. FLOW DIRECTION : BI - DIRECTIONAL
17. MATERIALS SPECIFICATION (EQUIVALENT OR SUPERIOR)
 - 1) TEE : MSS - SP - 75 Gr. WPHY 70
 - 2) END PIECES : ASTM A694 Gr. F - 70
 - 3) INTERNAL SLEEVE : API 5L Gr. X-56, PSL-2

18. CONNECTING PIPE SPECIFICATION

| Sl. No. | Tag No. | Run Pipe Details | | | Branch Pipe Details | | | Qty. |
|---------|---------|------------------|------------|------------------------|---------------------|------------|------------------------|------|
| | | Dia | Thk (Min.) | Materials | Dia | Thk (Min.) | Materials | |
| | | NB (Inch) | (mm) | | NB (Inch) | (mm) | | |
| 1 | * | 24 | 14.27 | API 5L Gr. X-70, PSL-2 | 12 | 14.27 | API 5L Gr. X-52, PSL-2 | 16 |

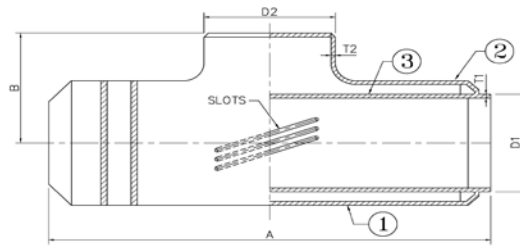
* Tag nos. shall be provided to the successful bidder.

19. SPECIAL REQUIREMENTS : FLOW TEE SHALL BE SUITABLE FOR ABOVE GROUND INSTALLATION

- NOTE:
- 1 MANUFACTURE TO INDICATE DIMENSIONS MARKED A & B IN THE SKETCH ABOVE.
 - 2 MANUFACTURER TO FURNISH DETAILS OF THE SLOTS IN INTERNAL SLEEVE. THE AREA OF THE SLOTS SHALL BE MINIMUM EQUAL TO THE INTERNAL AREA OF THE BRANCH PIPE. RELEVANT CALCULATIONS TO THIS EXTENT SHALL BE FURNISHED.
 - 3 **MANUFACTURER SHALL ENSURE THAT THE WALL THICKNESS (W.T) OF ALL PARTS OF FLOW TEE SHALL BE ADEQUATE TO SUSTAIN DESIGN PRESSURE AND THE THICKNESS OF RUN SIZE ENDS (T1) & BRANCH SIZE END(T2) OF FLOW TEE SHALL BE SAME AS CONNECTING RUN PIPE AND BRANCH PIPE W.T. AS INDICATED ABOVE.**

| REV. NO. | DATE | ZONE | DESCRIPTIONS | BY | APPRD | |
|--------------------------------|--------|----------|------------------------|--------------------------------|---|--|
| REVISIONS | | | | | | |
| SECTION OIL & GAS | | | | | CLIENT : INDRADHANUSH GAS GRID LIMITED PROJECT : NORTH -EAST NATURAL GAS GRID PIPELINE PROJECT (SECTIONS – 1, 2, 3, 5 & 9) | REFERENCES MECON LIMITED |
| DSGN | SACHIN | 23.10.20 | CHKD | HARSH | 23.10.20 | |
| DRWN | | | | | | |
| APPROVED | | | INDRANIL SEN Sr. GM | DATA SHEET FOR FLOW TEE | | |
| SCALE : | | | | | REV | |
| Data Sheet No.: | | | | | 0 | |
| MEC/23VC/05/21/M/000/DS-011/02 | | | | | | |

DATA SHEET FOR FLOW TEES



MR Item no. 3

1. FLOW TEE MFR. :
2. PURCHASER'S SPECIFICATION NO. : MEC/TS/05/21/011
3. RATING : 600#
4. DESIGN PRESSURE : 92 Kg/cm²(g)
5. DESIGN TEMPERATURE : -29°C to 65°C
6. SERVICE : NATURAL GAS / RLNG
7. CORROSION ALLOWANCE : 3.0 MM
8. SIZE NB MM(INCHES) : 600 X 600 X 250 (24" X 24" X 10")
9. END CONNECTION : BUTT-WELD AT BOTH ENDS
10. DESIGN CODE : ASME B31.8
11. DESIGN FACTOR : 0.5
12. HYDROSTATIC TEST PRESSURE : 138 Kg/cm²(g)
13. CHARPY TEST(TEES, END PIECES) : REQUIRED AS PER SPECIFICATION & ASTM- A370
14. HARDNESS TEST : REQUIRED AS PER SPECIFICATION & ASTM- A370.
15. SUITABILITY OF FLOW TEE : FOR INTELLIGENT PIGS
16. FLOW DIRECTION : BI - DIRECTIONAL
17. MATERIALS SPECIFICATION (EQUIVALENT OR SUPERIOR)
 - 1) TEE : MSS - SP - 75 Gr. WPHY 70
 - 2) END PIECES : ASTM A 694 Gr. F - 70
 - 3) INTERNAL SLEEVE : API 5L Gr. X-56, PSL-2
18. CONNECTING PIPE SPECIFICATION

| Sl. No. | Tag No. | Run Pipe Details | | | Branch Pipe Details | | | Qty. |
|---------|---------|------------------|------------|------------------------|---------------------|------------|------------------------|------|
| | | Dia | Thk (Min.) | Materials | Dia | Thk (Min.) | Materials | |
| | | NB (Inch) | (mm) | | NB (Inch) | (mm) | | |
| 1 | * | 24 | 14.27 | API 5L Gr. X-70, PSL-2 | 10 | 12.7 | API 5L Gr. X-52, PSL-2 | 32 |

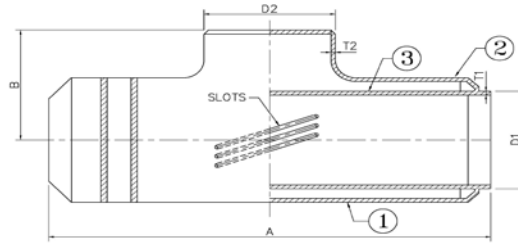
* Tag nos. shall be provided to the successful bidder.

19. SPECIAL REQUIREMENTS : FLOW TEE SHALL BE SUITABLE FOR ABOVE GROUND INSTALLATION

- NOTE:
- 1 MANUFACTURE TO INDICATE DIMENSIONS MARKED A & B IN THE SKETCH ABOVE.
 - 2 MANUFACTURER TO FURNISH DETAILS OF THE SLOTS IN INTERNAL SLEEVE. THE AREA OF THE SLOTS SHALL BE MINIMUM EQUAL TO THE INTERNAL AREA OF THE BRANCH PIPE. RELEVANT CALCULATIONS TO THIS EXTENT SHALL BE FURNISHED.
 - 3 MANUFACTURER SHALL ENSURE THAT THE WALL THICKNESS(W.T) OF ALL PARTS OF FLOW TEE SHALL BE ADEQUATE TO SUSTAIN DESIGN PRESSURE AND THE THICKNESS OF RUN SIZE ENDS (T1) & BRANCH SIZE END(T2) OF FLOW TEE SHALL BE SAME AS CONNECTING RUN PIPE AND BRANCH PIPE W.T. AS INDICATED ABOVE.

| REV. NO. | DATE | ZONE | DESCRIPTIONS | BY | APPRD | REFERENC ES | DRG. NO. | | |
|-------------------|--------|----------|---|----------|--|--------------------------------|----------|--|----------|
| REVISIONS | | | | | | MECON LIMITED | | | |
| SECTION OIL & GAS | | | CLIENT : INDRADHANUSH GAS GRID LIMITED | | | | | | |
| DSGN | SACHIN | 23.10.20 | HARSH | 23.10.20 | PROJECT : NORTH -EAST NATURAL GAS GRID PIPELINE PROJECT (SECTIONS – 1, 2, 3, 5 & 9) | | | | |
| DRWN | | | | | | | | | |
| APPROVED | | | INDRANIL SEN Sr. GM | | | DATA SHEET FOR FLOW TEE | | SCALE : Data Sheet No.: MEC/23VC/05/21/M/000/DS-011/03 | REV 0 |

DATA SHEET FOR FLOW TEES



MR Item no. 4


1. FLOW TEE MFR. :
2. PURCHASER'S SPECIFICATION NO. : MEC/TS/05/21/011
3. RATING : 600#
4. DESIGN PRESSURE : 92 Kg/cm²(g)
5. DESIGN TEMPERATURE : -29°C to 65°C
6. SERVICE : NATURAL GAS / RLNG
7. CORROSION ALLOWANCE : 3.0 MM
8. SIZE NB MM(INCHES) : 450 X 450 X 450 (18" X 18" X 18")
9. END CONNECTION : BUTT-WELD AT BOTH ENDS
10. DESIGN CODE : ASME B31.8
11. DESIGN FACTOR : 0.5
12. HYDROSTATIC TEST PRESSURE : 138 Kg/cm²(g)
13. CHARPY TEST(TEES, END PIECES) : REQUIRED AS PER SPECIFICATION & ASTM- A370
14. HARDNESS TEST : REQUIRED AS PER SPECIFICATION & ASTM- A370
15. SUITABILITY OF FLOW TEE : FOR INTELLIGENT PIGS
16. FLOW DIRECTION : BI - DIRECTIONAL
17. MATERIALS SPECIFICATION (EQUIVALENT OR SUPERIOR)
 - 1) TEE : MSS - SP - 75 Gr. WPHY 70
 - 2) END PIECES : ASTM A - 694 F - 70
 - 3) INTERNAL SLEEVE : API 5L Gr. X-56, PSL-2
18. CONNECTING PIPE SPECIFICATION

| Sl. No. | Tag No. | Run Pipe Details | | | Branch Pipe Details | | | Qty. |
|---------|---------|------------------|------------|------------------------|---------------------|------------|------------------------|------|
| | | Dia | Thk (Min.) | Materials | Dia | Thk (Min.) | Materials | |
| | | NB (Inch) | (mm) | | NB (Inch) | (mm) | | |
| 1 | * | 18 | 10.31 | API 5L Gr. X-70, PSL-2 | 18 | 19.05 | API 5L Gr. X-52, PSL-2 | 01 |

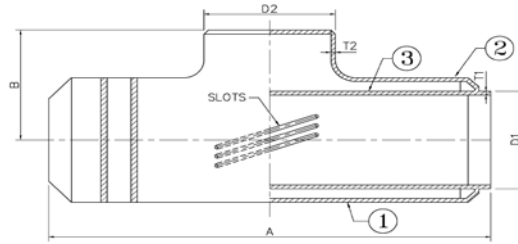
* Tag nos. shall be provided to the successful bidder.

19. SPECIAL REQUIREMENTS : FLOW TEE SHALL BE SUITABLE FOR ABOVE GROUND INSTALLATION

- NOTE:
- 1 MANUFACTURE TO INDICATE DIMENSIONS MARKED A & B IN THE SKETCH ABOVE.
 - 2 MANUFACTURER TO FURNISH DETAILS OF THE SLOTS IN INTERNAL SLEEVE. THE AREA OF THE SLOTS SHALL BE MINIMUM EQUAL TO THE INTERNAL AREA OF THE BRANCH PIPE. RELEVANT CALCULATIONS TO THIS EXTENT SHALL BE FURNISHED.
 - 3 MANUFACTURER SHALL ENSURE THAT THE WALL THICKNESS(W.T) OF ALL PARTS OF FLOW TEE SHALL BE ADEQUATE TO SUSTAIN DESIGN PRESSURE AND THE THICKNESS OF RUN SIZE ENDS (T1) & BRANCH SIZE END(T2) OF FLOW TEE SHALL BE SAME AS CONNECTING RUN PIPE AND BRANCH PIPE W.T. AS INDICATED ABOVE.

| REV. NO. | DATE | ZONE | DESCRIPTIONS | BY | APPRD | REFERENCES | DRG. NO. | |
|-------------------|--------|----------|------------------------|----------|---|------------|---|----------------------|
| REVISIONS | | | | | | | | |
| SECTION OIL & GAS | | | | | CLIENT : INDRADHANUSH GAS GRID LIMITED PROJECT : NORTH -EAST NATURAL GAS GRID PIPELINE PROJECT (SECTIONS – 1, 2, 3, 5 & 9) | |  | MECON LIMITED |
| | NAME | DATE | CHKD | DATE | | | | |
| DSGN | SACHIN | 23.10.20 | HARSH | 23.10.20 | | | | |
| DRWN | | | | | | | | |
| APPROVED | | | INDRANIL SEN Sr. GM | | DATA SHEET FOR FLOW TEE | | SCALE : Data Sheet No.: MEC/23VC/05/21/M/000/DS-011/04 | REV 0 |

DATA SHEET FOR FLOW TEES



MR Item no. 5


- 1. FLOW TEE MFR. :
- 2. PURCHASER'S SPECIFICATION NO. : MEC/TS/05/21/011
- 3. RATING : 600#
- 4. DESIGN PRESSURE : 92 Kg/cm²(g)
- 5. DESIGN TEMPERATURE : -29°C to 65°C
- 6. SERVICE : NATURAL GAS / RLNG
- 7. CORROSION ALLOWANCE : 3.0 MM
- 8. SIZE NB MM(INCHES) : 450 X 450 X 300 (18" X 18" X 12")
- 9. END CONNECTION : BUTT-WELD AT BOTH ENDS
- 10. DESIGN CODE : ASME B31.8
- 11. DESIGN FACTOR : 0.5
- 12. HYDROSTATIC TEST PRESSURE : 138 Kg/cm²(g)
- 13. CHARPY TEST(TEES, END PIECES) : REQUIRED AS PER SPECIFICATION & ASTM- A370
- 14. HARDNESS TEST : REQUIRED AS PER SPECIFICATION & ASTM- A370
- 15. SUITABILITY OF FLOW TEE : FOR INTELLIGENT PIGS
- 16. FLOW DIRECTION : BI - DIRECTIONAL
- 17. MATERIALS SPECIFICATION (EQUIVALENT OR SUPERIOR)
 - 1) TEE : MSS - SP - 75 Gr. WPHY 70
 - 2) END PIECES : ASTM A - 694 F - 70
 - 3) INTERNAL SLEEVE : API 5L Gr. 56, PSL-2
- 18. CONNECTING PIPE SPECIFICATION

| Sl. No. | Tag No. | Run Pipe Details | | | Branch Pipe Details | | | Qty. |
|---------|---------|------------------|------------|------------------------|---------------------|------------|------------------------|------|
| | | Dia | Thk (Min.) | Materials | Dia | Thk (Min.) | Materials | |
| | | NB (Inch) | (mm) | | NB (Inch) | (mm) | | |
| 1 | * | 18 | 10.31 | API 5L Gr. X-70, PSL-2 | 12 | 14.27 | API 5L Gr. X-52, PSL-2 | 07 |

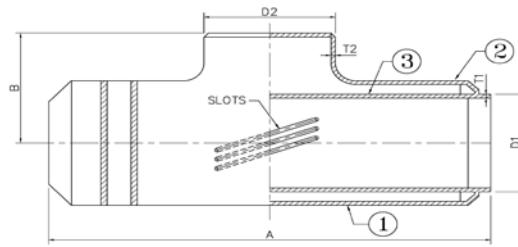
* Tag nos. shall be provided to the successful bidder.

- 19. SPECIAL REQUIREMENTS : FLOW TEE SHALL BE SUITABLE FOR ABOVE GROUND INSTALLATION

- NOTE:
- 1 MANUFACTURE TO INDICATE DIMENSIONS MARKED A & B IN THE SKETCH ABOVE.
 - 2 MANUFACTURER TO FURNISH DETAILS OF THE SLOTS IN INTERNAL SLEEVE. THE AREA OF THE SLOTS SHALL BE MINIMUM EQUAL TO THE INTERNAL AREA OF THE BRANCH PIPE. RELEVANT CALCULATIONS TO THIS EXTENT SHALL BE FURNISHED.
 - 3 **MANUFACTURER SHALL ENSURE THAT THE WALL THICKNESS(W.T) OF ALL PARTS OF FLOW TEE SHALL BE ADEQUATE TO SUSTAIN DESIGN PRESSURE AND THE THICKNESS OF RUN SIZE ENDS (T1) & BRANCH SIZE END(T2) OF FLOW TEE SHALL BE SAME AS CONNECTING RUN PIPE AND BRANCH PIPE W.T. AS INDICATED ABOVE.**

| REV. NO. | DATE | ZONE | DESCRIPTIONS | BY | APPRD | REFERENCES | DRG. NO. | |
|-------------------|--------|----------|---|--------------------------------|--|---|--|----------|
| REVISIONS | | | | | |  MECON LIMITED | MECON LIMITED | |
| SECTION OIL & GAS | | | CLIENT : INDRADHANUSH GAS GRID LIMITED | | | | | |
| DSGN | SACHIN | 23.10.20 | HARSH | 23.10.20 | PROJECT : NORTH -EAST NATURAL GAS GRID PIPELINE PROJECT (SECTIONS – 1, 2, 3, 5 & 9) | | | |
| DRWN | | | | | | | | |
| APPROVED | | | INDRANIL SEN Sr. GM | DATA SHEET FOR FLOW TEE | | | SCALE : Data Sheet No.: MEC/23VC/05/21/M/000/DS-011/05 | REV 0 |

DATA SHEET FOR FLOW TEES



MR Item no. 6


1. FLOW TEE MFR. :
2. PURCHASER'S SPECIFICATION NO. : MEC/TS/05/21/011
3. RATING : 600#
4. DESIGN PRESSURE : 92 Kg/cm²(g)
5. DESIGN TEMPERATURE : -29°C to 65°C
6. SERVICE : NATURAL GAS / RLNG
7. CORROSION ALLOWANCE : 3.0 MM
8. SIZE NB MM(INCHES) : 450 X 450 X 250 (18" X 18" X 10")
9. END CONNECTION : BUTT-WELD AT BOTH ENDS
10. DESIGN CODE : ASME B31.8
11. DESIGN FACTOR : 0.5
12. HYDROSTATIC TEST PRESSURE : 138 Kg/cm²(g)
13. CHARPY TEST(TEES, END PIECES) : REQUIRED AS PER SPECIFICATION & ASTM- A370
14. HARDNESS TEST : REQUIRED AS PER SPECIFICATION & ASTM- A370
15. SUITABILITY OF FLOW TEE : FOR INTELLIGENT PIGS
16. FLOW DIRECTION : BI - DIRECTIONAL
17. MATERIALS SPECIFICATION (EQUIVALENT OR SUPERIOR)
 - 1) TEE : MSS - SP - 75 Gr. WPHY 70
 - 2) END PIECES : ASTM A - 694 F - 70
 - 3) INTERNAL SLEEVE : API 5L Gr. 56, PSL-2
18. CONNECTING PIPE SPECIFICATION

| Sl. No. | Tag No. | Run Pipe Details | | | Branch Pipe Details | | | Qty. |
|---------|---------|------------------|------------|------------------------|---------------------|------------|------------------------|------|
| | | Dia | Thk (Min.) | Materials | Dia | Thk (Min.) | Materials | |
| | | NB (Inch) | (mm) | | NB (Inch) | (mm) | | |
| 1 | * | 18 | 10.31 | API 5L Gr. X-70, PSL-2 | 10 | 12.7 | API 5L Gr. X-52, PSL-2 | 10 |

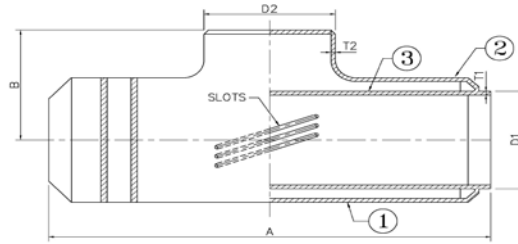
* Tag nos. shall be provided to the successful bidder.

19. SPECIAL REQUIREMENTS : FLOW TEE SHALL BE SUITABLE FOR ABOVE GROUND INSTALLATION

- NOTE:
- 1 MANUFACTURE TO INDICATE DIMENSIONS MARKED A & B IN THE SKETCH ABOVE.
 - 2 MANUFACTURER TO FURNISH DETAILS OF THE SLOTS IN INTERNAL SLEEVE. THE AREA OF THE SLOTS SHALL BE MINIMUM EQUAL TO THE INTERNAL AREA OF THE BRANCH PIPE. RELEVANT CALCULATIONS TO THIS EXTENT SHALL BE FURNISHED.
 - 3 **MANUFACTURER SHALL ENSURE THAT THE WALL THICKNESS(W.T) OF ALL PARTS OF FLOW TEE SHALL BE ADEQUATE TO SUSTAIN DESIGN PRESSURE AND THE THICKNESS OF RUN SIZE ENDS (T1) & BRANCH SIZE END(T2) OF FLOW TEE SHALL BE SAME AS CONNECTING RUN PIPE AND BRANCH PIPE W.T. AS INDICATED ABOVE.**

| REV. NO. | DATE | ZONE | DESCRIPTIONS | BY | APPRD | REFERENCES | DRG. NO. | |
|--------------------------------|------|------|---|------|--|---|----------------------|---|
| REVISIONS | | | | | |  MECON LIMITED | MECON LIMITED | |
| SECTION OIL & GAS | | | CLIENT : INDRADHANUSH GAS GRID LIMITED | | | | | |
| DSGN | NAME | DATE | CHKD | DATE | PROJECT : NORTH -EAST NATURAL GAS GRID PIPELINE PROJECT (SECTIONS – 1, 2, 3, 5 & 9) | | | |
| DRWN | | | | | | SCALE : | REV | |
| APPROVED | | | INDRANIL SEN Sr. GM | | | Data Sheet No.: MEC/23VC/05/21/M/000/DS-011/06 | | 0 |
| DATA SHEET FOR FLOW TEE | | | | | | | | |

DATA SHEET FOR FLOW TEES



MR Item no. 7


1. FLOW TEE MFR. :
2. PURCHASER'S SPECIFICATION NO. : MEC/TS/05/21/011
3. RATING : 600#
4. DESIGN PRESSURE : 92 Kg/cm2(g)
5. DESIGN TEMPERATURE : -29°C to 65°C
6. SERVICE : NATURAL GAS / RLNG
7. CORROSION ALLOWANCE : 3.0 MM
8. SIZE NB MM(INCHES) : 300 X 300 X 300 (12" X 12" X 12")
9. END CONNECTION : BUTT-WELD AT BOTH ENDS
10. DESIGN CODE : ASME B31.8
11. DESIGN FACTOR : 0.5
12. HYDROSTATIC TEST PRESSURE : 138 Kg/cm2(g)
13. CHARPY TEST(TEES, END PIECES) : REQUIRED AS PER SPECIFICATION & ASTM- A370
14. HARDNESS TEST : REQUIRED AS PER SPECIFICATION & ASTM- A370
15. SUITABILITY OF FLOW TEE : FOR INTELLIGENT PIGS
16. FLOW DIRECTION : BI - DIRECTIONAL
17. MATERIALS SPECIFICATION (EQUIVALENT OR SUPERIOR)
 - 1) TEE : MSS - SP - 75 Gr. WPHY 70
 - 2) END PIECES : ASTM A - 694 F - 70
 - 3) INTERNAL SLEEVE : API 5L Gr. 56, PSL-2
18. CONNECTING PIPE SPECIFICATION

| Sl. No. | Tag No. | Run Pipe Details | | | Branch Pipe Details | | | Qty. |
|---------|---------|------------------|------------|------------------------|---------------------|------------|------------------------|------|
| | | Dia | Thk (Min.) | Materials | Dia | Thk (Min.) | Materials | |
| | | NB (Inch) | (mm) | | NB (Inch) | (mm) | | |
| 1 | * | 12 | 9.53 | API 5L Gr. X-70, PSL-2 | 12 | 14.27 | API 5L Gr. X-52, PSL-2 | 06 |

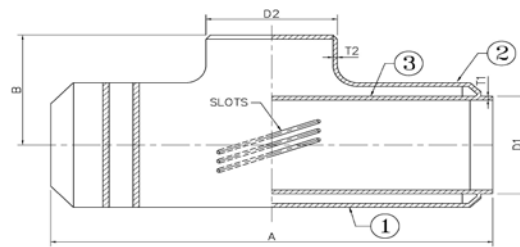
* Tag nos. shall be provided to the successful bidder.

19. SPECIAL REQUIREMENTS : FLOW TEE SHALL BE SUITABLE FOR ABOVE GROUND INSTALLATION

- NOTE:
- 1 MANUFACTURE TO INDICATE DIMENSIONS MARKED A & B IN THE SKETCH ABOVE.
 - 2 MANUFACTURER TO FURNISH DETAILS OF THE SLOTS IN INTERNAL SLEEVE. THE AREA OF THE SLOTS SHALL BE MINIMUM EQUAL TO THE INTERNAL AREA OF THE BRANCH PIPE. RELEVANT CALCULATIONS TO THIS EXTENT SHALL BE FURNISHED.
 - 3 MANUFACTURER SHALL ENSURE THAT THE WALL THICKNESS(W.T) OF ALL PARTS OF FLOW TEE SHALL BE ADEQUATE TO SUSTAIN DESIGN PRESSURE AND THE THICKNESS OF RUN SIZE ENDS (T1) & BRANCH SIZE END(T2) OF FLOW TEE SHALL BE SAME AS CONNECTING RUN PIPE AND BRANCH PIPE W.T. AS INDICATED ABOVE.

| REV. NO. | DATE | ZONE | DESCRIPTIONS | BY | APPRD | REFERENCES | DRG. NO. | | |
|--------------------------------|--------|----------|---|-------|----------|---|----------|---|--|
| REVISIONS | | | | | | | | | |
| SECTION OIL & GAS | | | CLIENT : INDRADHANUSH GAS GRID LIMITED | | |  MECON LIMITED | | | |
| DSGN | SACHIN | 23.10.20 | CHKD | HARSH | 23.10.20 | | | PROJECT : NORTH -EAST NATURAL GAS GRID PIPELINE PROJECT (SECTIONS – 1, 2, 3, 5 & 9) | |
| DRWN | | | | | | | | | |
| APPROVED | | | INDRANIL SEN Sr. GM | | | SCALE : Data Sheet No.: MEC/23VC/05/21/M/000/DS-011/07 | | REV 0 | |
| DATA SHEET FOR FLOW TEE | | | | | | | | | |

DATA SHEET FOR FLOW TEES



MR Item no. 8


1. FLOW TEE MFR. :
2. PURCHASER'S SPECIFICATION NO. : MEC/TS/05/21/011
3. RATING : 600#
4. DESIGN PRESSURE : 92 Kg/cm2(g)
5. DESIGN TEMPERATURE : -29°C to 65°C
6. SERVICE : NATURAL GAS / RLNG
7. CORROSION ALLOWANCE : 3.0 MM
8. SIZE NB MM(INCHES) : 300 X 300 X 200 (12" X 12" X 8")
9. END CONNECTION : BUTT-WELD AT BOTH ENDS
10. DESIGN CODE : ASME B31.8
11. DESIGN FACTOR : 0.5
12. HYDROSTATIC TEST PRESSURE : 138 Kg/cm2(g)
13. CHARPY TEST(TEES, END PIECES) : REQUIRED AS PER SPECIFICATION & ASTM- A370
14. HARDNESS TEST : REQUIRED AS PER SPECIFICATION & ASTM- A370
15. SUITABILITY OF FLOW TEE : FOR INTELLIGENT PIGS
16. FLOW DIRECTION : BI - DIRECTIONAL
17. MATERIALS SPECIFICATION (EQUIVALENT OR SUPERIOR)
 - 1) TEE : MSS - SP - 75 Gr. WPHY 70
 - 2) END PIECES : ASTM A - 694 F - 70
 - 3) INTERNAL SLEEVE : API 5L Gr. 56, PSL-2
18. CONNECTING PIPE SPECIFICATION

| Sl. No. | Tag No. | Run Pipe Details | | | Branch Pipe Details | | | Qty. |
|---------|---------|------------------|------------|------------------------|---------------------|------------|---------------------|------|
| | | Dia | Thk (Min.) | Materials | Dia | Thk (Min.) | Materials | |
| | | NB (Inch) | (mm) | | NB (Inch) | (mm) | | |
| 1 | * | 12 | 9.53 | API 5L Gr. X-52, PSL-2 | 8 | 14.27 | API 5L Gr. B, PSL-2 | 05 |

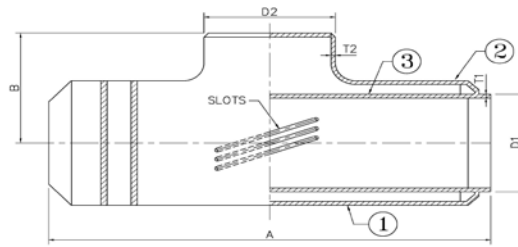
* Tag nos. shall be provided to the successful bidder.

19. SPECIAL REQUIREMENTS : FLOW TEE SHALL BE SUITABLE FOR ABOVE GROUND INSTALLATION

- NOTE:
- 1 MANUFACTURE TO INDICATE DIMENSIONS MARKED A & B IN THE SKETCH ABOVE.
 - 2 MANUFACTURER TO FURNISH DETAILS OF THE SLOTS IN INTERNAL SLEEVE. THE AREA OF THE SLOTS SHALL BE MINIMUM EQUAL TO THE INTERNAL AREA OF THE BRANCH PIPE. RELEVANT CALCULATIONS TO THIS EXTENT SHALL BE FURNISHED.
 - 3 **MANUFACTURER SHALL ENSURE THAT THE WALL THICKNESS(W.T) OF ALL PARTS OF FLOW TEE SHALL BE ADEQUATE TO SUSTAIN DESIGN PRESSURE AND THE THICKNESS OF RUN SIZE ENDS (T1) & BRANCH SIZE END(T2) OF FLOW TEE SHALL BE SAME AS CONNECTING RUN PIPE AND BRANCH PIPE W.T. AS INDICATED ABOVE.**

| REV. NO. | DATE | ZONE | DESCRIPTIONS | BY | APPRD | REFERENCES | DRG. NO. |
|-------------------|--------|----------|---|----|-------|---|----------------------|
| REVISIONS | | | | | | | |
| SECTION OIL & GAS | | | CLIENT : INDRADHANUSH GAS GRID LIMITED | | |  | MECON LIMITED |
| DSGN | SACHIN | 23.10.20 | | | | | |
| DRWN | | | | | | | |
| APPROVED | | | INDRANIL SEN Sr. GM | | | DATA SHEET FOR FLOW TEE | |
| | | | | | | SCALE : | REV |
| | | | | | | Data Sheet No.: | 0 |
| | | | | | | MEC/23VC/05/21/M/000/DS-011/08 | |

DATA SHEET FOR FLOW TEES



MR Item no. 9

1. FLOW TEE MFR. :
2. PURCHASER'S SPECIFICATION NO. : MEC/TS/05/21/011
3. RATING : 600#
4. DESIGN PRESSURE : 92 Kg/cm2(g)
5. DESIGN TEMPERATURE : -29°C to 65°C
6. SERVICE : NATURAL GAS / RLNG
7. CORROSION ALLOWANCE : 3.0 MM
8. SIZE NB MM(INCHES) : 300 X 300 X 150 (12" X 12" X 6")
9. END CONNECTION : BUTT-WELD AT BOTH ENDS
10. DESIGN CODE : ASME B31.8
11. DESIGN FACTOR : 0.5
12. HYDROSTATIC TEST PRESSURE : 138 Kg/cm2(g)
13. CHARPY TEST(TEES, END PIECES) : REQUIRED AS PER SPECIFICATION & ASTM- A370
14. HARDNESS TEST : REQUIRED AS PER SPECIFICATION & ASTM- A370
15. SUITABILITY OF FLOW TEE : FOR INTELLIGENT PIGS
16. FLOW DIRECTION : BI - DIRECTIONAL
17. MATERIALS SPECIFICATION (EQUIVALENT OR SUPERIOR)
 - 1) TEE : MSS - SP - 75 Gr. WPHY 70
 - 2) END PIECES : ASTM A - 694 F - 70
 - 3) INTERNAL SLEEVE : API 5L Gr. 56, PSL-2
18. CONNECTING PIPE SPECIFICATION

| Sl. No. | Tag No. | Run Pipe Details | | | Branch Pipe Details | | | Qty. |
|---------|---------|------------------|------------|------------------------|---------------------|------------|-------------------------|------|
| | | Dia | Thk (Min.) | Materials | Dia | Thk (Min.) | Materials | |
| | | NB (Inch) | (mm) | | NB (Inch) | (mm) | | |
| 1 | * | 12 | 9.53 | API 5L Gr. X-70, PSL-2 | 6 | 10.97 | ASTM A106 Gr.B (Charpy) | 12 |

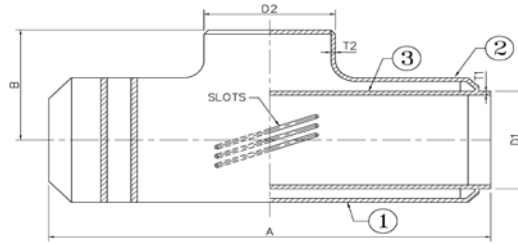
* Tag nos. shall be provided to the successful bidder.

19. SPECIAL REQUIREMENTS : FLOW TEE SHALL BE SUITABLE FOR ABOVE GROUND INSTALLATION

- NOTE:
- 1 MANUFACTURE TO INDICATE DIMENSIONS MARKED A & B IN THE SKETCH ABOVE.
 - 2 MANUFACTURER TO FURNISH DETAILS OF THE SLOTS IN INTERNAL SLEEVE. THE AREA OF THE SLOTS SHALL BE MINIMUM EQUAL TO THE INTERNAL AREA OF THE BRANCH PIPE. RELEVANT CALCULATIONS TO THIS EXTENT SHALL BE FURNISHED.
 - 3 MANUFACTURER SHALL ENSURE THAT THE WALL THICKNESS(W.T) OF ALL PARTS OF FLOW TEE SHALL BE ADEQUATE TO SUSTAIN DESIGN PRESSURE AND THE THICKNESS OF RUN SIZE ENDS (T1) & BRANCH SIZE END(T2) OF FLOW TEE SHALL BE SAME AS CONNECTING RUN PIPE AND BRANCH PIPE W.T. AS INDICATED ABOVE.

| REV. NO. | DATE | ZONE | DESCRIPTIONS | BY | APPRD | REFERENCES | DRG. NO. | | | | |
|--------------------------------|--------|----------|---|----|-------|--|----------|------|-------|------|----------|
| REVISIONS | | | | | | | | | | | |
| SECTION OIL & GAS | | | CLIENT : INDRADHANUSH GAS GRID LIMITED PROJECT : NORTH -EAST NATURAL GAS GRID PIPELINE PROJECT (SECTIONS – 1, 2, 3, 5 & 9) | | | MECON LIMITED | | | | | |
| DSGN | SACHIN | 23.10.20 | | | | | | CHKD | HARSH | DATE | 23.10.20 |
| DRWN | | | | | | | | | | | |
| APPROVED | | | INDRANIL SEN Sr. GM | | | SCALE : Data Sheet No.: MEC/23VC/05/21/M/000/DS-011/09 | | | | | |
| DATA SHEET FOR FLOW TEE | | | | | | REV | 0 | | | | |

DATA SHEET FOR FLOW TEES



MR Item no. 10


1. FLOW TEE MFR. :
2. PURCHASER'S SPECIFICATION NO. : MEC/TS/05/21/011
3. RATING : 600#
4. DESIGN PRESSURE : 92 Kg/cm2(g)
5. DESIGN TEMPERATURE : -29°C to 65°C
6. SERVICE : NATURAL GAS / RLNG
7. CORROSION ALLOWANCE : 3.0 MM
8. SIZE NB MM(INCHES) : 200 X 200 X 200 (8" X 8" X 8")
9. END CONNECTION : BUTT-WELD AT BOTH ENDS
10. DESIGN CODE : ASME B31.8
11. DESIGN FACTOR : 0.5
12. HYDROSTATIC TEST PRESSURE : 138 Kg/cm2(g)
13. CHARPY TEST(TEES, END PIECES) : REQUIRED AS PER SPECIFICATION & ASTM- A370
14. HARDNESS TEST : REQUIRED AS PER SPECIFICATION & ASTM- A370
15. SUITABILITY OF FLOW TEE : FOR INTELLIGENT PIGS
16. FLOW DIRECTION : BI - DIRECTIONAL
17. MATERIALS SPECIFICATION (EQUIVALENT OR SUPERIOR)
 - 1) TEE : MSS - SP - 75 Gr. WPHY 56
 - 2) END PIECES : ASTM A - 694 F - 56
 - 3) INTERNAL SLEEVE : API 5L Gr. 46, PSL-2
18. CONNECTING PIPE SPECIFICATION

| Sl. No. | Tag No. | Run Pipe Details | | | Branch Pipe Details | | | Qty. |
|---------|---------|------------------|------------|------------------------|---------------------|------------|-------------------------|------|
| | | Dia | Thk (Min.) | Materials | Dia | Thk (Min.) | Materials | |
| | | NB (Inch) | (mm) | | NB (Inch) | (mm) | | |
| 1 | * | 8 | 7.92 | API 5L Gr. X-56, PSL-2 | 8 | 14.27 | ASTM A106 Gr.B (Charpy) | 03 |

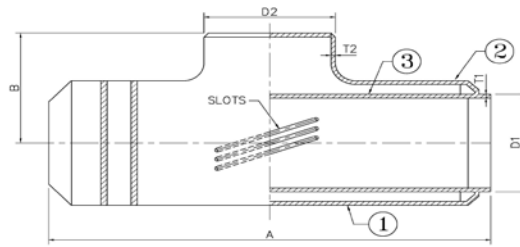
* Tag nos. shall be provided to the successful bidder.

19. SPECIAL REQUIREMENTS : FLOW TEE SHALL BE SUITABLE FOR ABOVE GROUND INSTALLATION

- NOTE:
- 1 MANUFACTURE TO INDICATE DIMENSIONS MARKED A & B IN THE SKETCH ABOVE.
 - 2 MANUFACTURER TO FURNISH DETAILS OF THE SLOTS IN INTERNAL SLEEVE. THE AREA OF THE SLOTS SHALL BE MINIMUM EQUAL TO THE INTERNAL AREA OF THE BRANCH PIPE. RELEVANT CALCULATIONS TO THIS EXTENT SHALL BE FURNISHED.
 - 3 MANUFACTURER SHALL ENSURE THAT THE WALL THICKNESS(W.T) OF ALL PARTS OF FLOW TEE SHALL BE ADEQUATE TO SUSTAIN DESIGN PRESSURE AND THE THICKNESS OF RUN SIZE ENDS (T1) & BRANCH SIZE END(T2) OF FLOW TEE SHALL BE SAME AS CONNECTING RUN PIPE AND BRANCH PIPE W.T. AS INDICATED ABOVE.

| REV. NO. | DATE | ZONE | DESCRIPTIONS | BY | APPRD | REFERENCES | DRG. NO. | | |
|--------------------------------|--------|----------|---|-------|----------|---|----------|--|--|
| REVISIONS | | | | | | REFERENCES | | | |
| SECTION OIL & GAS | | | CLIENT : INDRADHANUSH GAS GRID LIMITED | | |  MECON LIMITED | | | |
| DSGN | SACHIN | 23.10.20 | CHKD | HARSH | 23.10.20 | | | PROJECT : NORTH -EAST NATURAL GAS GRID PIPELINE PROJECT (SECTIONS – 1, 2, 3, 5 & 9) | |
| DRWN | | | | | | | | | |
| APPROVED | | | INDRANIL SEN Sr. GM | | | SCALE : Data Sheet No.: MEC/23VC/05/21/M/000/DS-011/10 | | REV 0 | |
| DATA SHEET FOR FLOW TEE | | | | | | | | | |

DATA SHEET FOR FLOW TEES



MR Item no. 11


1. FLOW TEE MFR. :
2. PURCHASER'S SPECIFICATION NO. : MEC/TS/05/21/011
3. RATING : 600#
4. DESIGN PRESSURE : 92 Kg/cm²(g)
5. DESIGN TEMPERATURE : -29°C to 65°C
6. SERVICE : NATURAL GAS / RLNG
7. CORROSION ALLOWANCE : 3.0 MM
8. SIZE NB MM(INCHES) : 200 X 200 X 150 (8" X 8" X 6")
9. END CONNECTION : BUTT-WELD AT BOTH ENDS
10. DESIGN CODE : ASME B31.8
11. DESIGN FACTOR : 0.5
12. HYDROSTATIC TEST PRESSURE : 138 Kg/cm²(g)
13. CHARPY TEST(TEES, END PIECES) : REQUIRED AS PER SPECIFICATION & ASTM- A370
14. HARDNESS TEST : REQUIRED AS PER SPECIFICATION & ASTM- A370
15. SUITABILITY OF FLOW TEE : FOR INTELLIGENT PIGS
16. FLOW DIRECTION : BI - DIRECTIONAL
17. MATERIALS SPECIFICATION (EQUIVALENT OR SUPERIOR)
 - 1) TEE : MSS - SP - 75 Gr. WPHY 56
 - 2) END PIECES : ASTM A - 694 F - 56
 - 3) INTERNAL SLEEVE : API 5L Gr. 46, PSL-2
18. CONNECTING PIPE SPECIFICATION

| Sl. No. | Tag No. | Run Pipe Details | | | Branch Pipe Details | | | Qty. |
|---------|---------|------------------|-----------------|------------------------|---------------------|-----------------|-------------------------|------|
| | | Dia NB (Inch) | Thk (Min.) (mm) | Materials | Dia NB (Inch) | Thk (Min.) (mm) | Materials | |
| 1 | * | 8 | 7.92 | API 5L Gr. X-56, PSL-2 | 6 | 10.97 | ASTM A106 Gr.B (Charpy) | 02 |

* Tag nos. shall be provided to the successful bidder.

19. SPECIAL REQUIREMENTS : FLOW TEE SHALL BE SUITABLE FOR ABOVE GROUND INSTALLATION

- NOTE:
- 1 MANUFACTURE TO INDICATE DIMENSIONS MARKED A & B IN THE SKETCH ABOVE.
 - 2 MANUFACTURER TO FURNISH DETAILS OF THE SLOTS IN INTERNAL SLEEVE. THE AREA OF THE SLOTS SHALL BE MINIMUM EQUAL TO THE INTERNAL AREA OF THE BRANCH PIPE. RELEVANT CALCULATIONS TO THIS EXTENT SHALL BE FURNISHED.
 - 3 MANUFACTURER SHALL ENSURE THAT THE WALL THICKNESS(W.T) OF ALL PARTS OF FLOW TEE SHALL BE ADEQUATE TO SUSTAIN DESIGN PRESSURE AND THE THICKNESS OF RUN SIZE ENDS (T1) & BRANCH SIZE END(T2) OF FLOW TEE SHALL BE SAME AS CONNECTING RUN PIPE AND BRANCH PIPE W.T. AS INDICATED ABOVE.

| REV. NO. | DATE | ZONE | DESCRIPTIONS | BY | APPRD | REFERENCES | DRG. NO. |
|-------------------|--------|----------|---|-------|----------|---|---------------|
| REVISIONS | | | | | | | |
| SECTION OIL & GAS | | | CLIENT : INDRADHANUSH GAS GRID LIMITED | | |  | MECON LIMITED |
| DSGN | SACHIN | 23.10.20 | CHKD | HARSH | 23.10.20 | | |
| DRWN | | | | | | | |
| APPROVED | | | INDRANIL SEN Sr. GM | | | DATA SHEET FOR FLOW TEE | |
| | | | | | | SCALE : | REV |
| | | | | | | Data Sheet No.: | 0 |
| | | | | | | MEC/23VC/05/21/M/000/DS-011/11 | |

QAP FOR MANUFACTURING OF FLOW TEES



MECON Limited
(A Govt. of India Enterprise)

**QUALITY ASSURANCE PLAN
FOR
FLOW TEES**

**PROJECT : NORTH -EAST NATURAL GAS GRID PIPELINE PROJECT
(SECTIONS – 1, 2, 3, 5 & 9)
PACKAGE NO. : 05/51/23VC/IGGL/011
PACKAGE NAME : FLOW TEES
MR NO.: MEC/23VC/05/21/M/000/S011
SPEC. NO.: MEC/TS/05/21/011
QAP NO.: MEC/23VC/05/28/M/000/QAP-011**

Page 1 of 8

**QUALITY ASSURANCE PLAN
FOR
FLOW TEES**

| Rev. No. | Date | Purpose | Prepared by | Checked by | Approved by |
|----------|------------|---------------------------|--------------|-------------|-------------|
| 0 | 24.05.2017 | ISSUED FOR IMPLEMENTATION | Sachin Kumar | Harsh Kumar | Anil Kumar |



MECON Limited
(A Govt. of India Enterprise)

**QUALITY ASSURANCE PLAN
FOR
FLOW TEES**

**PROJECT : NORTH -EAST NATURAL GAS GRID PIPELINE PROJECT
(SECTIONS – 1, 2, 3, 5 & 9)
PACKAGE NO. : 05/51/23VC/IGGL/011
PACKAGE NAME : FLOW TEES
MR NO.: MEC/23VC/05/21/M/000/S011
SPEC. NO.: MEC/TS/05/21/011
QAP NO.: MEC/23VC/05/28/M/000/QAP-011**
Page 2 of 8

| APPLICABLE CODES AND SPECIFICATIONS : MEC/TS/05/21/011, R-0 WITH AMENDMENTS | | | | | | | | SCOPE OF INSPECTION | | | |
|---|--------------------------------|--|--|--|------------------|--|--------|---------------------|--------|----------------------|------------|
| SL. NO. | STAGE | COMPONENT | CHARACTERISTICS | METHOD OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENTS & ACCEPTANCE NORMS | RECORD | Sub Vendor | Vendor | Vendor appointed TPI | MECON / GL |
| 1. | RAW MATERIAL INSPECTION | | | | | | | | | | |
| 2. | Material | EQUAL/ UNEQUAL TEE AS PER EN 10204,3.2 | Visual, Dimension, Finish, Mechanical Properties(Tensile, Impact (-0 Degree C) Hardness & Others, Chemical Properties, Supply condition(Heat Treatment), Deoxidation (As per applicable specification) | Visual, dimensions verification of markings with MTC, Review MTC | 100% | Applicable Material Specification, MECON specification, Approved Drawing | MTC | - | W | W | R |
| 3. | Material | EQUAL/UNEQUAL TEE AS PER EN 10204,3.2 | Soundness of Tee(NDT) | Ultrasonic test of entire surface | 100% | Applicable Material specification,MECON specification, Approved Drawing | MTC | - | W | W | R |
| 4. | Material | END COVER/FORGED RINGS | Visual, Dimension, Finish, Mechanical Properties(Tensile, | Visual, dimensions verification of markings with MTC, | 100% | Applicable Material specification,MECON specification | MTC | - | W | W | R |

Format No. : 05/21/FT/001



MECON Limited
(A Govt. of India Enterprise)

**QUALITY ASSURANCE PLAN
FOR
FLOW TEES**

**PROJECT : NORTH -EAST NATURAL GAS GRID PIPELINE PROJECT
(SECTIONS – 1, 2, 3, 5 & 9)
PACKAGE NO. : 05/51/23VC/IGGL/011
PACKAGE NAME : FLOW TEES
MR NO.: MEC/23VC/05/21/M/000/S011
SPEC. NO.: MEC/TS/05/21/011
QAP NO.: MEC/23VC/05/28/M/000/QAP-011**

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| APPLICABLE CODES AND SPECIFICATIONS : MEC/TS/05/21/011, R-0 WITH AMENDMENTS | | | | | | | | SCOPE OF INSPECTION | | | |
|---|-----------------------------------|---|--|--|------------------|--|------------|---------------------|--------|----------------------|--------------|
| SL. No. | STAGE | COMPONENT | CHARACTERISTICS | METHOD OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENTS & ACCEPTANCE NORMS | RECORD | Sub Vendor | Vendor | Vendor appointed TPI | MECON / IGGL |
| | | AS PER EN 10204,3.2 | Impact (-20 Degree C) Hardness & Others, Chemical Properties, Supply condition(Heat Treatment) | Review MTC | | ,Approved Drawing | | | | | |
| 5. | Material | END COVER/ FORGED RINGS AS PER EN 10204,3.2 | Soundness of End cover/Forged Rings(NDT) | Review of Magnetic particle test reports Or Ultrasonic test of entire surface | 100% | Applicable Material specification,MECON specification ,Approved Drawing | MTC | - | W | W | R |
| 6. | Material | INTERNAL SLEEVE | Visual, Dimension, Physical & Chemical properties | Review MTC | 100% | Applicable Material specification,MECON specification ,Approved Drawing | MTC | - | W | R/W | R |
| 7. | IN PROCESS QUALITY CONTROL | | | | | | | | | | |
| 8. | IN | Welding procedure | Welding parameters | Verification of parameters & | 100% | ASME SECIX | ASME SECIX | - | P | Review of existing | R |



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| | Process | Specification (WPS) | | Mechanical testing /Review of establish WPS | | | & Addenda | | | WPS/PQR/WQR by TPIA if suitable, In the non suitability of established WPS/PQR shall be witness by TPIA | |
| 9. | IN Process | Welding procedure Qualification Record | Mechanical Testing & Welding parameters | Verification of parameters & Mechanical testing /Review of establish PQR | 100% | ASME SECIX | ASME SECIX & Addenda | - | P | Same as SI No.8 | R |
| 10. | IN Process | Welder performance qualification | Welder's ability weld soundness radiography | Verification of Parameters & Mechanical testing/ Review of established WPS | 100% | ASME SECIX | ASME SECIX & Addenda | - | P | Same as SI No.8 | R |



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| S. NO | STAGE | COMPONENT | CHARACTERISTICS | METHOD OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENTS & ACCEPTANCE NORMS | RECORD | Sub Vendor | Vendor | Vendor appointed TPI | MECON / IGGL |
| 11. | IN Process | Fit up of Circ. Seam Joints | Visual dimension set up | Visual,dimensions.DP at edges | 100% | Approved Drawings,ASME/ANSI B31.8 | IIR | - | P | W | R |
| 12. | IN Process | Internal Sleeve Weld | Soundness of weld | UT/MPI | 100% | ASME SEC V & ASME SEC VIII,Div I | IIR | - | P | W | R |
| 13. | IN Process | Butt Welds(Tee to forged ends) | Soundness of weld | Radiography | 100% | ASME SEC V & ASME SEC VIII,Div IAPI 1104 | RT report | - | P | W | R |
| 14. | IN Process | Bevel Ends | Lamination & other defects | MPI | 100% | ASME SEC V & ASME SEC VIII,Div I | MPI report | - | P | W | R |
| 15. | IN Process | Post weld Heat Treatment | - | Review of Heat Treatment chart | 100% | ASME SEC VIII,Div I /Apppd procedure | H.T.Chart | - | P | W | R |
| 16. | FINAL INSPECTION /TESTING | | | | | | | | | | |
| 16. | Final Inspection | Hardness at body, weld & HAZ | Hardness | Measurement | 100% | Approved Drawing/Specification | Inspection Report | - | W | W | W/R |

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| 17. | Final Inspection | Product | Completeness & dimensional Visual | Visual & Measurement | 100% | Approved Drawing/Specification | Inspection Report | - | W | W | W/R |
| 18. | Final Inspection | Finished Weld ends of Flow Tee | Lamination | Ultrasonic testing(with D meter) | 100% | Approved Drawing/Specification | Inspection Report | - | W | W | W/R |
| 19. | Hydro Testing | Product | Soundness of Flow Tee | - | 100% | Approved Drawing/Specification | Issue a certificate for each Flow Tee capable of withstanding without leakage at least 15 minutes on cal. Pressure. | - | - | - | - |



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| 20. | FINISHING & PAINTING | | | | | | | | | | |
| 21. | Finishing | Product surface preparation | Surface cleaning | Visual | 100 % | Approved Drawing/Specification | IIR | - | P | W | R |
| 22. | Finishing | product | Painting | Visual & Measurement | 100 % | Approved Drawing/Specification | IIR | - | P | W | R |
| 23. | FINAL DOCUMENTATION AS PER EN 10204-3.2 | | | | | | | | | | |
| 24. | FINAL DOCUMENTATION AS PER EN 10204-3.2 | | RECORD | CHECK | 100 % | Approved Drawing/Specification | IIR | - | P | C | H |
| 25. | Release Note | | | | | | EN 10204-3.2 certificate | - | H | - | P |



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NOTE: 1.All items shall be provided with EN 10204-3.2 certificates

Legends : H – Hold (Offer for Witness & obtain clearance), W – Witness, P-Perform, R – Review ,C- CERTIFICATION – Information, X – Submit, PO – Purchase Order, PR – Purchase Requisition, N-Normalizing, N&T – Normalizing & Tempering, SA – Solution annealing, N & SR – Normalizing & Stress relieving.

All the NDT / Leak Testing / Heat Treatment / Special manufacturing procedures have to be specially approved or only previously approved procedures have to be used. In case of conflict between purchase specification, contract documents and ITP more stringent conditions shall be applicable. The document describes generally the requirements pertaining to all types of Flow Tees. Requirements specific to the item are only applicable.

For CONTRACTOR/ SUB-CONTRACTOR

(Stamp & Signature)

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