Bid Number: GEM/2021/B/1256370
Dated: 03-06-2021

Bid Document

Bid Details	
Bid End Date/Time	24-06-2021 11:00:00
Bid Opening Date/Time	24-06-2021 11:30:00
Bid Life Cycle (From Publish Date)	90 (Days)
Bid Offer Validity (From End Date)	60 (Days)
Ministry/State Name	Ministry Of Petroleum And Natural Gas
Department Name	Oil India Limited
Organisation Name	Oil India Limited
Office Name	Oil India Limited
Total Quantity	1
Item Category	Ultrasonic Flowmeter
Minimum Average Annual Turnover of the Bidder	25 Lakh (s)
Years of Past Experience required	3 Year (s)
MSE Exemption for Years of Experience and Turnover	No
Startup Exemption for Years of Experience and Turnover	No
Document required from seller	Experience Criteria,Past Performance,Bidder Turnover,OEM Authorization Certificate *In case any bidder is seeking exemption from Experience / Turnover Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer
Past Performance	50 %
Bid to RA enabled	No
Time allowed for Technical Clarifications during technical evaluation	7 Days
Inspection Required (By Empanelled Inspection Authority / Agencies pre-registered with GeM)	No
Evaluation Method	Total value wise evaluation

EMD Detail

Required	No

ePBG Detail

Advisory Bank	AXIS BANK LTD
ePBG Percentage(%)	3.00
Duration of ePBG required (Months).	21

(a). EMD & Performance security should be in favour of Beneficiary, wherever it is applicable.

Beneficiary:
CHIEF MANAGER
Oil India Limited, OIL INDIA Limited, OIL INDIA Limited, Ministry of Petroleum and Natural Gas
(Balen Bharali)

Splitting

Bid splitting not applied.

MII Purchase Preference

MII Purchase Preference	No

Competent Authority Approval for not opting Make In India Preference : View Document

MSE Purchase Preference

MSE Purchase Preference	Yes

1. The minimum average annual financial turnover of the bidder during the last three years, ending on 31st March of the previous financial year, should be as indicated above in the bid document. Documentary evidence in the form of certified Audited Balance Sheets of relevant periods or a certificate from the Chartered Accountant / Cost Accountant indicating the turnover details for the relevant period shall be uploaded with the bid. In case the date of constitution / incorporation of the bidder is less than 3-year-old, the average turnover in respect of the completed financial years after the date of constitution shall be taken into account for this criteria.
2. Experience Criteria: In respect of the filter applied for experience criteria, the Bidder or its OEM {themselves or through reseller(s)} should have regularly, manufactured and supplied same or similar Category Products to any Central / State Govt Organization / PSU / Public Listed Company for number of Financial years as indicated above in the bid document before the bid opening date. Copies of relevant contracts to be submitted along with bid in support of having supplied some quantity during each of the Financial year. In case of bunch bids, the category of primary product having highest value should meet this criterion.
3. Purchase preference to Micro and Small Enterprises (MSEs): Purchase preference will be given to MSEs as defined in Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 dated 23.03.2012 issued by Ministry of Micro, Small and Medium Enterprises and its subsequent Orders/Notifications issued by concerned Ministry. If the bidder wants to avail the Purchase preference, the bidder must be the manufacturer of the offered product in case of bid for supply of goods. Traders are excluded from the purview of Public Procurement Policy for Micro and Small Enterprises. In respect of bid for Services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence in this regard shall be uploaded along with the bid in respect of the offered product or service. If L-1 is not an MSE and MSE Seller (s) has/have quoted price within L-1+ 15% (Selected by Buyer)of margin of purchase preference /price band defined in relevant policy, such Seller shall be given opportunity to match L-1 price and contract will be awarded for 100%(selected by Buyer) percentage of total QUANTITY.
4. Past Performance: The Bidder or its OEM {themselves or through re-seller(s)} should have supplied same or similar Category Products for 50% of bid quantity, in at least one of the last three Financial years before the bid opening date to any Central / State Govt Organization / PSU / Public Listed Company. Copies of relevant contracts (proving supply of cumulative order quantity in any one financial year) to be submitted along with bid in support of quantity supplied in the relevant Financial year. In case of bunch bids, the category related to primary product having highest bid value should meet this criterion.

Ultrasonic Flowmeter (1 pieces)

Brand Type	Unbranded

Technical Specifications

Buyer Specification Document	Download

Consignees/Reporting Officer and Quantity

S.No.	Consignee/Reporting Officer	Address	Quantity	Delivery Days
1	Diganta Kumar Gogoi	786602,PUMP STATION -1, OIL INDIA LIMITED, P.O. DULIAJAN -786602, DIST. DIBRUGARH, ASSAM	1	120

Buyer added Bid Specific Additional Scope of Work

S.No.	Document Title	Description	Applicable i.r.o. Items
1	Additional BEC and BRC View	Additional BEC and BRC	Ultrasonic Flowmeter(1)

The uploaded document only contains Buyer specific Additional Scope of Work and / or Drawings for the bid items added with due approval of Buyer's competent authority. Buyer has certified that these additional scope and drawings are generalized and would not lead to any restrictive bidding.

Buyer Added Bid Specific Additional Terms and Conditions

1. Scope of supply (Bid price to include all cost components) : Supply Installation Testing Commissioning of Goods and Training of operators and providing Statutory Clearances required (if any)

Disclaimer

The additional terms and conditions have been incorporated by the Buyer after approval of the Competent Authority in Buyer Organization. Buyer organization is solely responsible for the impact of these clauses on the bidding process, its outcome and consequences thereof including any eccentricity / restriction arising in the bidding process due to these ATCs and due to modification of technical specification and / or terms and conditions governing the bid. Any clause incorporated by the Buyer such as demanding Tender Sample, incorporating any clause against the MSME policy and Preference to make in India Policy, mandating any Brand names or Foreign Certification, changing the default time period for Acceptance of material or payment timeline governed by OM of Department of Expenditure shall be null and void and would not be considered part of bid. Further any reference of conditions published on any external site or reference to external documents / clauses shall also be null and void. If any seller has any objection / grievance against these additional clauses or otherwise on any aspect of this bid, they can raise their representation against the same by using the Representation window provided in the bid details field in Seller dashboard after logging in as a seller within 4 days of bid publication on GeM. Buyer is duty bound to reply to all such representations and would not be allowed to open bids if he fails to reply to such representations.

This Bid is also governed by the General Terms and Conditions

In terms of GeM GTC clause 26 regarding Restrictions on procurement from a bidder of a country which shares a land border with India, any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority. While participating in bid, Bidder has to undertake compliance of this and any false declaration and non-compliance of this would be a ground for immediate termination of the contract and further legal action in accordance with the laws.

---Thank You---

ANNEXURE

ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

Procurement of Ultrasonic Flowmeter and its accessories including engineering, assembly, integration, installation and commissioning, site testing, FAT, SAT.

CONTENTS

Procurement of Ultrasonic Flowmeter and its accessories including engineering, assembly, integration, installation and commissioning, site testing, FAT, SAT.

A. INTRODUCTION

Oil India Limited, a Public Sector Undertaking of Govt. of India, engaged in exploration, production and transportation of hydrocarbon materials in India and abroad, is proposing to procure new Ultrasonic Flowmeter for PS-1 Branchline as redundant metering system.

A.1 DESIGN OBJECTIVES AND GUIDE LINES

A.1.1 SYSTEM AVAILABILITY: The System availability shall be greater than 99 % excluding logistics (i.e. availability of power supply and signal cable).

A.1.2 STANDARDS APPLICABLE: The equipment and the system provided shall conform to the latest editions of standards like API, IEC, ISO, EIA, OISD, PESO etc. In case of any conflict between the above standards and the specifications, the specifications given in this document shall proceed, however in case of further confusion; the matter shall be referred to OIL. Decision of OIL shall be final and binding.

A.1.3 ENVIRONMENTAL SPECIFICATIONS: All equipment, test instruments, special tools and tackles, etc shall be capable of maintaining the guaranteed performance with operational lifetime of 10 years minimum when operating continuously under the following environmental conditions:

a) Operating Temperature: 0 deg C to 60 deg C guaranteed and
b) Humidity: At any relative humidity upto 95% within the temperature range
   Of 0 deg C to 50 deg C.
c) Altitude: At any altitude upto 600 m above sea level.
d) Sand and Dust:
   With a build-up of dust on operational surface to a level such as may occur because of imperfections in the sealing of equipment, housing and conditions prevailing in sub-tropical desert conditions.
e) Shock and vibration:
   Shall withstand transportation and handling by air, sea and road under packed conditions.
f) Electromagnetic Compatibility: Shall meet the requirements as per IEC standard

A.2 POWER SUPPLY SYSTEM

a) Necessary AC to DC (230 V AC 50 Hz to 24 V DC +/- 10% variation) converter of required rating shall be provided by the bidder. This converter shall be installed in the control room and the 230 V, 50 Hz supply shall be provided from OIL's UPS. Space for installation of the same shall be provided by M/S OIL.
b) All equipment shall be provided with Over-voltage, Under-voltage protection.
c) All equipment shall be provided with Short-Circuit and reverse power protection.
d) The installations shall be provided with lightning strike arrestors, suitable to divert the resultant transients/ surges safely to earth thereby protecting the electronic component and the system itself.

A.3 BIDDER TO OBTAIN OWN INFORMATION

1. In their own interest, bidders may visit the sites, prior to submission of BID, to acquaint himself with the site data, availability of facilities etc.
2. During such visit, bidder shall interact with the OIL engineer and obtain information regarding exact requirement of proposed system.
3. During such visit following may be contacted: -

i. Partha Proteem Roy
Dy. CE (T) I PHQ
Oil India Limited, Guwahati
Phone: 7002137268

ii. Diganta Kr. Gogoi
DGM(T) PS-1
Oil India Limited, Duliajan

B. GENERAL INFORMATION

B.1 SCOPE

B.1.1 This specification, together with the data sheets covers the requirements for the design, materials, nameplate marking, inspection, testing and shipping of Ultrasonic Flow meters and their accessories.

B 16.47-B Large Diameter Steel Flanges EN European Standard 60947-5-6 Pulse generator requirements
10204 Inspection documents for metallic products
IS/IEC Indian Standards/International Electro-Technical Commission
IS/IEC 60079 Electrical Apparatus for Explosive Gas Atmospheres.
IS/IEC60529 Degree of Protection Provided by Enclosures (IP Code).
IEC61000-4 Electronic compatibility for Industrial Process Measurement and Control Equipment
ISO International Organisation for Standardisation 2186 Fluid Flow in Closed Conduits - Connections for Pressure
Signal Transmissions between Primary and Secondary Elements 5168 Measurement of Fluid Flow: Estimation of Uncertainty of Ultrasonic Flow meters
6551 Cabled transmissions of electric and/or electronic pulse data
12765 Measurement of Fluid Flow in Closed Conduits — Methods using Transit Time Ultrasonic Flow meters
OIML International Organisation of Legal Metrology R 117 Measurement systems for liquids other than water

B.1.3 In the event of any conflict between this specification, data sheets, related standards, codes etc., the following order of priority shall govern:
a) Statutory Regulations
b) Job Specifications/Data sheets
c) Standard specifications
d) Codes and Standards

B.1.4 In addition to compliance to purchaser's specification in totality, bidder's extent of responsibility includes the following:
a) Purchaser's data sheets indicate the minimum acceptable materials of construction for body, trim and accessories of the Ultrasonic flow meter. Alternative superior material of construction shall also be acceptable provided bidder assumes complete responsibility for proper selection of offered materials for their compatibility with the process fluid and its operating and design conditions specified in the data sheets.
b) Sizing of the Ultrasonic flow meter and its accessories.
c) Coordination and approvals from statutory authorities like weights and measures etc, wherever required.

B.1.5 ALL the relevant terminology used in Purchaser's data sheets and job specifications are as per API MPMS for Liquid application.

B.2 BIDS

B.2.1 Bidder's quotation shall be strictly as per the tender document.

B.2.2 Whenever a detailed technical offer for each item is specifically indicated, bidder's quotation shall include the following:

a) Compliance to the specifications as in the Technical Checklist.

b) A detailed specification sheet for the ultrasonic flow meter, which shall provide information, described as under. ALL the material specifications and units of measurement for various parts in the bidder's specification sheet shall be to the same standards as those indicated in the purchaser's data sheets.

i) Details regarding type, material of construction etc., for various parts of the Ultrasonic flow meter, meter runs, flow conditioner and its accessories.

ii) Meter capacity with recommended minimum and maximum flow rates at operating conditions within the specified performance requirements, transmitter output and calibrated range.

iii) All the design characteristics and performance characteristics including meter accuracy and repeatability.

iv) Specification and type of cabling required between the meter and its associated flow computer including the maximum permissible cable length.

v) Hazardous area certification suitable for the area classification mentioned in the datasheet.

vi) Maximum pressure Loss through the meter and meter runs at maximum flow rate.

vii) Upstream and downstream straight pipe length requirement for installation.

c) Proven references for the offered model in line with clause B.2.3 of this specification.

d) Overall dimensions in millimetres of the Ultrasonic flow meter, meter runs and its accessories.

e) Type test certificate from accredited laboratory.

f) Certificate from regulatory authority for custody transfer application

g) A copy of approval from Local statutory authority, as applicable, such as Petroleum and Explosives Safety Organisation (PESO) in India, for the electronic instruments installed in electrically hazardous area along with

i) Test certificate from recognised test house like Central Institute of Mining & Fuel research(CIMFR)/Electronics Regional Testing Laboratory(ERTL) etc. for flame proof enclosure and/or intrinsic safety, as specified in the datasheets, as per relevant Indian Standard for all Indian manufactured equipment or for items requiring PESO approval.

ii) Certificate of conformity from agencies like Laboratorie Central Des Industries Electriques(LCIE), British Approval Service for Electrical Equipment in Flammable Atmospheres(Baseefa) etc. for compliance to ATEX directives or other equivalent standards for all equipment manufactured outside India.

h) Deviations on technical requirements shall not be entertained. In case bidder has any valid technical reason, they may include a list of deviations tag number wise, summing up all the deviations from the purchaser's data sheets and other technical specifications along with the technical reason for each of these deviations.

i) Catalogues in English giving detailed technical specifications; model decoding details and other information for the type of ultrasonic flow meter and its accessories covered in the bid.

B.2.3 All items, as offered, shall be field proven and should have completed trouble free satisfactory operation for a period of minimum 4000 hours on the bid due date in similar application with the process conditions similar to those as specified in the purchaser's datasheets. Items with prototype design or items not meeting provenness criteria specified above shall not be offered.

B.2.4 Bidder to provide warranty/guarantee of the items supplied for 12 months from the date of commissioning or 18 months from the date of supply at site, whichever is earlier.

B.2.5 Bidder shall also quote for the following:

a) Any special tools needed for maintenance work on the Ultrasonic flow meter and its accessories. Bidder must confirm in their offer if no special tools are needed for maintenance of the offered Ultrasonic flow meter.

b) Installation and commissioning of Ultrasonic flow meter, as per job specifications.

c) Any Start-up and Commissioning spares, if required, as recommended by bidder.

B.3 DRAWINGS AND DATA

B.3.1 Detailed drawings, data, catalogues and manuals required from the bidder are indicated by the Purchaser in bidder data requirement sheets. The required number of prints and soft copies should be despatched to the address mentioned, adhering to the time limits indicated.

B.3.2 Final documentation consisting of design data, installation manual, operational and maintenance manual etc., submitted by the bidder after placement of purchase order, shall include the following, as a minimum:

a) Specification sheet for the Ultrasonic flow meter, Meter Run including flow conditioner, if required, Meter electronics and its accessories

b) Weight in kilograms of the Ultrasonic flow meter and its accessories, meter run with flow conditioners, if required, etc.

c) Certified drawings for the Ultrasonic flow meter, meter runs with flow conditioner, if required, etc., which shall provide dimensional details, internal construction details, material of construction etc.

d) Copy of type test certificates.

e) Proving procedure

f) Detailed wiring diagrams

g) Copy of test certificates for all tests in clause 4.0 of this specification

h) Installation procedure with supports requirement.

i) Calibration, maintenance procedure including replacement of its internal parts wherever applicable

j) Graphs of correction factors such as pressure, temperature, density, viscosity.

Item	Documents and Data	Along with the Bid	Upon Placement of PO for Owner's Approval (Within 2 weeks)	After Inspection for Despatch Clearance	Along with Material (2 sets)
1.	Technical proposal in conformity with the specifications as mentioned in clause **B.2.2**	1 set			
2	Model and Make of offered instrument and Deviation statement.	1 set			
3	BOM as per proposed system, Catalogues, References, Complete Product Literature and List of accessories envisaged to be associated with the system as per clause **B.2.2**	1 set			
4.	Technical Checklist as provided in section **Appendix 2**	1 set			
5	Proven track record for the same as per clause **B 2.3.**	1 set			
6.	Valid Hazardous Area certification as per **B.2.2 f)**	1 set			
7	Functional Design Specification after completion of Engineering. This comprises of the following but not limited to: - 1. Detailed GAD 2. P&ID 3. Instrument Details 4. Interconnection diagram 5. Detailed installation diagram for offered system. 6. Foundation diagram of the offered system. 7. Bill of Materials considering the clause **H.1 in section H.** 8. Material of conformity		2 sets		Also to be included in the final technical document.

	9. Details of all the ancillary electrical items.				
8.	Inspection & Test reports. Inspection Release Note			2 Sets	
9	Guarantee and Warranty Certificates				2 Sets
10	Calibration Report				2 Sets
11	Material Test Certificate				2 Sets
12	QAP of all Mechanical & Instrumentation item.		1 Set		
13	Approved Drawing				2 Sets
14	Maintenance and operating manuals.				2 Sets
15	Packing/shipping list with weights and dimensions.				2 Sets
11	FAT as in **clause F.6** & SAT procedure as in **clause H.3**		1 Set for approval from Owner.		
12	Final technical file				2 Sets

NOTES:
1. Durations are 2 weeks after Purchase Order date for approval.
2. Final technical file 2 copies to be handed over after completion of SAT and FAT.

Bidder shall provide test certificates for all tests indicated in clause E of this specification. In addition, bidder shall also provide the certificate of compliance to purchaser's specification as per clause EN 10204

C. SCOPE OF SUPPLY

C.1 Detailed Engineering, Manufacture, Procurement of material and bought out components, assembly at shop, system engineering, integration, internal testing, FAT, Packing including the supply & delivery of material of material at sites, installation and commissioning, Site Acceptance Test, warranty, extended warranty and detailed documentation as per specifications for Ultrasonic Flow-meter System mentioned in Tender document.

C.2 Scope Matrix:

Station Duliajan

Sr. No	Equipment	Contractor's Scope of work	Free issue items/ OIL /Other Scopes
1.	Ultrasonic Flow-meter and its accessories	Supply & commissioning of Ultrasonic Flow-meter along with required accessories. Supply of Flow computer, cables (Power, signals, control and communication) from system instruments to junction box and junction box to cabinet including cable glands. Integration with PLC /RTU. Installation & Commissioning shall include all activities except cable laying from field JB to control room. Supply of 10 D and 5 D straightener Supply of PT and RTD. Supervision of installation work: Installation of all the system instruments including laying of cable from system instrument to junction box. Providing the	1. Space for AC /DC converter inside the cabinet installed at control room at NDT. 2. UPS supply (230 V, 50Hz) up to the input of AC/DC converter. 3. Physical cable laying job from field JB to control room(only laying part)

		all required information, documents and technical supports while integration	

C.3 Bidder is requested to carefully examine and understand the specifications and seek clarification, if required, to ensure that they have understood the specifications. The authorized representative of the prospective bidders shall be able to visit the sites for initial assessment so that they can submit a detail offer.

C.4 DETAILED SCOPE OF SUPPLY AND SERVICES

Detailed scope of supply and services shall include but not be limited to the following:

1. Gathering of information for complete system design and detailed engineering to meet the overall system availability objectives.
2. Supply and installation of all items as required for Ultrasonic Flow-meter System are required at Duliajan for monitoring process flow-rate at the particular station. The Ultrasonic Flow-meter shall be provided at location as per following details:

Station Name	**Control Room**	**No. of Ultrasonic Flow-meter System**	**Principle of Ultrasonic Flow-meter System**
PS-1 Duliajan	Metering Shed	01	**4 Beam or better with Size and Rating: 4" ANSI, 150#**

3. At PS-1 Duliajan the Ultrasonic Flowmeter reading to be connected to the existing SCADA system in the respective control room
4. Bidder's scope shall include supply, and installation of the Ultrasonic Flowmeter and its associated accessories. The cable laying and the civil job for the system location will be under the scope of M/S OIL LTD.
5. Bidder shall provide onsite training to OIL personnel for the operation and maintenance of the USM system.
6. The supply of power and instrument cable is under the scope of the bidder
7. The bidder to visit the sites to access the location and for detailed engineering of the system.
8. Bidder's scope shall include any software up gradation (providing the software including installation, testing of software etc. all complete) till warranty period, free of charge.
9. Carrying out the Factory Acceptance Tests of the overall system, various subsystems, equipment as per the approved specifications and procedures in the presence of OIL's representatives.
10. Supply of the technical literature, drawings, software & licenses and documentation for the complete system.
11. Bidder shall Provide Commissioning spares, if required. The bidder shall utilize their spares of all the equipment that may be required during commissioning and warranty period separately. Any other spares required within warranty period shall be in bidder's scope.
12. Quality assurance, Site Acceptance Testing, trial run & commissioning of the complete system at site to the complete satisfaction of OIL.
13. **Proneness Requirements:** The system/sub-system/bought out items and services offered should have been supplied and working satisfactorily for a period of minimum one (01) year on the bid due date for similar application.
14. **Certificate for Logistic Supports:** Bidder shall provide back-up engineering, maintenance support and spare parts for a period of ten (10) years for the system, sub-system, bought out items and services offered, being supplied. Logistic support certificates shall be furnished by bidder for providing necessary support services as per format attached with the bid document. Certificates from sub-bidders (if any) for items shall be furnished.

CERTIFICATE FOR LOGISTICS SUPPORT

(To be signed by Manufacturer's corporate level signatory on company's letterhead)
I, on behalf of M/s_____ confirm that the _____Model No._____ for quoted by M/s_____ for M/s OIL shall continue to be supported by us for a period of minimum 10 years. The quoted system shall not be withdrawn from Indian market as a matter of our corporate policy.
I further confirm that in case of placement of order by OIL on us, we shall continue to support OIL in providing back-up engineering, maintenance support and spare part support for a period of 10 years from the date of placement of order.
SIGNATURE WITH SEAL
AUTHOURIZED, SENIORMANAGEMENT LEVEL SIGNATORY.

D. DESIGN AND CONTRUCTION

D.1 FLOW METER BODY AND TRIM
1. The Ultrasonic flow meter shall be based on transit time technology. The principle of operation used shall be simple in implementation and shall avoid analytical complexity associated with development of information, which is extraneous to the application.
2. The design used shall provide maximum reliability, maximum on-line performance and minimum maintenance. It shall be immune to other impurities in the fluid stream.
3. The flow meter transducers shall be energized by the integral electronics to transmit and receive ultrasonic waves.
4. The meter design shall have the facility to remove /replace the transducers in situ under line operating condition. Failure or removal of one pair of transducers shall not cause the meter to lose all measurement function. Failure of any path shall generate an alarm identifying the affected path. Also transducers ports shall be designed in a way to reduce the possibility of liquid or solid accumulation.
5. It shall be possible to replace transducers without a change in meter performance. After replacement of transducers and a possible change of the associated software constants, the resulting shift in the meter's performance should not be more than the allowable repeatability of the meter.
6. The bidder shall comprehensively advise the impact of transducer failure on the performance and accuracy of the Ultrasonic flow meter.
7. Ultrasonic flow meters and the meter runs/flow conditioners shall be rated for the maximum design pressure as indicated in the data sheets.
8. Ultrasonic flow meter spool inside diameter (ID) shall meet the specified pipe ID and internal surface roughness shall be as per API standard.
9. The meter shall be suitable for horizontal & vertical mounting. However, the flow direction shall be clearly stamped or cast on the body.

D.1.2 END CONNECTIONS:
1. Spool piece type Ultrasonic flow meters shall have flanged end connections. Weld joints, if any, shall be of radiographic quality.
2. Unless otherwise mentioned, end connection details shall be as below:
a) Threaded end connections shall be to NPT as per ASME B 1.20.1
b) Flanged end connections shall be as per ASME B 16.5
c) Grooves of ring type joint flanges shall be octagonal as per ASME B 16.20 and groove finish shall be as follows:
63 AARH: 32 to 63 micro inch AARH
d) Flanges are Raised Face (RF) type, the face finish shall be as per ASME B 16.5 and shall be as follows:
125 AARH: 125 to 250 micro inch AARH
B.4.11 The material of construction of Ultrasonic flow meter internals/wetted parts and body shall

be as specified in the respective data sheets.

D.1.3 METER SIZING:

1. Overall pressure loss across the meter assembly including meter runs shall be within the permissible pressure loss specified in data sheet. Pressure drop calculation across the meter shall be furnished.
2. Unless otherwise specified in the data sheets, bidder to ensure the velocity in the Ultrasonic flow meter and meter run shall not exceed maximum permissible velocity.
3. Bidder shall indicate the range of viscosities over which the measurement accuracy remains within limits.

D.2 METERS IN CUSTODY TRANSFER APPLICATIONS

1. The design, construction and operation of Ultrasonic flow meters in Custody transfer applications shall conform to API standard (latest version) for Measurement of liquid Hydrocarbon by Ultrasonic flow meters using transit time technology.
2. The average velocity of the fluid shall be measured along four acoustic paths as a minimum.
Numerical calculation techniques shall then be used to compute the average axial flow velocity and volume flow rate at operating conditions through the meter.
3. Temperature and Pressure sensing devices shall be installed immediately downstream of the meter run to accurately represent the actual metering conditions and any calculation required for compensation of varying density.

D.3 METER RUNS:

FLOW CONDITIONERS:

a) Type of flow conditioner (tube or vane type or Flow profiler etc.) shall be as recommended by bidder best suitable for the application. All Ultrasonic flow meters shall be provided with meter run and flow conditioner as per purchaser's datasheet. Minimum upstream and downstream run lengths shall be 10D and 5D respectively, where D is the inside diameter of the run.
b) The straightening element shall be made out of a thin walled tube or light gauge metal vane. However, the design shall be rugged enough to resist the forward thrust due to high flows. The element shall have smooth leading and trailing edges.
c) For tube type flow straightener, the length to diameter ratio of each tube shall be at least 10:1.

D.3.1 METERS IN PROCESS/FLARE APPLICATIONS

1. The ultrasonic flow meters shall be supplied in completely assembled condition with all the probes (sensor/transducer), nozzles for installation of these probes ready for installation on a pipeline or duly mounted on a spool piece as mentioned in the purchaser's datasheets.
2. Whenever the sensor / receiver probes are insertion type:
a) The material of construction of all the wetted portions of probe shall be suitable for the specified process conditions.
b) The probes shall be inserted through flanged nozzles of suitable size to ensure insertion and removal of probes. Threaded nozzles for insertion shall not be acceptable.
c) It shall be possible to insert or retract the probes on-line without process interruption. Suitable retraction assembly shall be supplied for insertion and removal of probes on-line. In case of Flare meters, Bidder shall mandatorily provide full bore ball valve, for isolation, with each probe. The location of probes shall be selected to avoid fouling.
3. For high temperature application, suitable arrangement shall be provided to protect the sensor from high temperature. Any additional mounting accessory, if necessary shall be supplied by bidder.
4. Bidder to select the frequency of signal based on the application. Accordingly, bidder to select proper piezo-crystal probes meeting the specified requirements.

D.4 METER ELECTRONICS

1. Ultrasonic flow meter's electronics system including power supplies, microcomputer, signal processing components and ultrasonic transducer excitation circuits, may be housed in one or more enclosures

mounted Locally or remotely to the meter and is referred to as the Signal Processing Unit (Transmitter). It shall be designed and installed to meet the specified hazardous area classification.
2. The transmitter/ signal processing unit shall be microprocessor-based electronics suitable for installation in the field under the ambient condition specified. Meter electronics shall be Weather proof to IP 65 and flameproof certified suitable to install in area classification. All field mounted items shall have enclosures suitable for the area classification indicated in purchaser's data sheets.
3. The transmitter/ signal processing shall have extensive diagnostic capability. Self-diagnostic feature should include monitoring the health of the transducers and signal quality. Meter parameters and factors set into the meter electronics shall be retained in non-volatile memory and shall be secured with password such that un-authorized changes are prohibited. Configuration software and firmware shall be provided.
4. For meter electronics, bidder shall ensure that the input/output signals and performance characteristics of individual instruments are compatible with each other.
5. The transmitters shall accept inputs from probes either directly or through pre-amplifier. The number of inputs shall be based on the number of paths selected for particular application.
6. The flow transmitter shall also accept inputs from pressure, temperature and/or density transmitters for accurate measurement at operating conditions (as applicable).
7. The cable entry sizes between the transmitter/ signal processing unit and preamplifier/ transducers shall be decided by bidder. All interconnecting cables and the WP & flameproof cable glands to be supplied accordingly.
8. Meter output signals from the meter electronics shall be without flying leads. No. of cable entries and their sizes for the output signals shall be as per purchaser's datasheets.
9. Meter electronics shall be capable of providing the following output signals (as applicable):
a) Individual 4-20 mA outputs for Mass flow rate (Kg/h), Volumetric flow rate (m3/h or Nm3/h), Pressure (Kg/cm2a), Temperature (°C), molecular weight, sound speed (m/s) as per the requirements mentioned in the purchaser's datasheets.
b) High-resolution dual pulse outputs to flow computers configurable for flow rate signals and shall be user selectable to be either same outputs or one signal dedicated to each direction of flow. The transmitters shall comply with the principles of ISO 6551 cabled transmissions of electric and/or electronic pulse data. At least security Level B as defined by ISO 6551 shall be provided and the checking facility shall be of type P.
c) Digital discrete outputs for direction of flow, trouble alarm and output data validation.
d) RS-485/422 communication port with MODBUS protocol for communicating with the control room mounted flow computer for measured data, meter diagnostics, test and health data. Bidder shall supply the signal interconnection cables as per purchaser's datasheets for Pulse Outputs and RS 485 serial link (armoured cables) including connectors at both ends against each tag for communication between flow meter in field and flow computers mounted on control panel located at respective control room.
10. Whenever smart transmitters or field bus based transmitters are mentioned in purchaser's datasheets, the following features must be ensured:
a) It shall allow multi master (primary and secondary) for configuration, calibration, diagnosis and maintenance. The primary could be the control system or host computer, and the secondary could be the hand held communicator.
b) It should be capable of implementing universal command.
11. In addition to the requirements specified above, field bus based transmitter, wherever specified in the purchaser's data Sheet, shall meet the following requirements:
a) All instruments must satisfy the requirements of the field bus registration laboratory with applicable checkmark like foundation field bus, profibus Nut Reorganisation e.v (PNO), or as specified in the purchaser's data sheets.
b) All instruments shall have one analog input blocks, as a minimum. In addition, when specified the transmitter shall also have PID controller block.
c) All instruments must be interoperable and shall have valid interoperability test clearance like ITK latest version for foundation field bus or equivalent for profibus PA, as applicable.
d) The field bus instruments shall support peer-to-peer communication.
e) All instruments shall be polarity insensitive. Also transmitter shall be LAS capable.

f) The field bus instruments in hazardous area shall be certified as per entity concept or shall be FISCO approved as per the requirements specified in the purchaser's specification.
g) All instruments shall support EDDL or FDT/DTM requirements, as specified in data sheets.
h) Internal Software shall be configured by the bidder including the following information.
- Serial Number
- Device Tag (Tag No.)
- Process Description
i) All instruments shall be capable of supporting incremental Device Descriptor (DD) for extra functionality and/or software revisions in Device Memory.
12. Meter electronics shall operate on 110/240 V AC ± 10°A, 50 Hz ± 3Hz UPS or 24 VDC and shall be protected from overload and from transients. Low power consumption is desired. Supply voltage fluctuation of ± 10 percent from the specified value and supply frequency fluctuation of ± 3 Hz from the specified value shall not affect the meter performance.
13. The design of electronic instruments shall be in compliance with the electromagnetic compatibility requirements as per IEC61000-4.
14. The meter transducers shall be intrinsically safe certified suitable for the specified area classification and weather proof to IP65 and bidder shall supply necessary isolating barriers between the transducers and preamplifier/transmitter. However, the transducer/sensor housing can be flameproof (Ex d) certified suitable for the specified area classification instead of intrinsically safe.
15. The transmitter's enclosure housing the electrical parts shall be suitable for the area classification indicated in the purchaser's data sheets. Unless otherwise specified, the enclosure shall conform to the following standards:
Weather proof housing - IP 65 as per IS/IEC 60529
Flame proof housing - EX (d) as per IS/IEC 60079
Flameproof housing shall also be made weather proof.

D.5 PERFORMANCE REQUIREMENTS
Bidder shall meet the accuracy requirements mentioned herein, and indicate the same in the offer with sizing calculations and back-up documentation. The minimum no. of paths, as defined for the application, shall be ensured.
For Custody Transfer and Pipeline Applications:
a) Liquids
a. Accuracy ±0.15% of reading
b. Repeatability 0.02% of reading
D.6 CERTIFICATION AND FLOW CALIBRATION OF ULTRASONIC METERS
1. METERS IN PROCESS/FLARE APPLICATIONS:
The ultrasonic flow meter in process applications shall be flow calibrated at manufacturer's works for a minimum four points and test reports shall be furnished. For flow meters in Flare applications, test reports to check the functioning of the probes shall be furnished.
2. METERS IN CUSTODY TRANSFER AND PIPELINE APPLICATIONS:
1. Liquid ultrasonic flow meters used for custody transfer application shall be certified by a suitable authority of the country of origin such as NMI, PTB etc, for use in custody transfer application.
2. Bidder shall furnish the regulations of the certifying authority considered by him for custody transfer approval. If other instruments of metering system are required to be certified as per the regulation the same shall be complied.
3. The Ultrasonic flow meter in custody transfer application shall have calibration certificate, duly signed by weights and measure authority or authorised representative of accredited flow calibration laboratory or a NIST traceable flow Calibration labs of international repute.
4. The meter proving system to be used by bidder shall be traceable to international standards and bidder shall furnish certificate indicating the uncertainty of the Meter proving system used for meter flow calibration.
5. The Liquid Ultrasonic flow meter shall be flow calibrated as follows:
a. Bidder shall calibrate the liquid Ultrasonic flow meter with water at his shop using preferably the mechanical displacement meter prover as detailed out in API MPMS. The proving conditions shall simulate

the actual operating conditions as nearly as possible. ALL the precautions mentioned under paragraph 5.2 of ISA RP 31.1 shall be observed during proving.

b. Bidder shall carryout performance test and certify the meter in combination with its companion electronics. A recognized test facility with traceable reference measurements shall be used. Flow test data at six points covering the minimum to the maximum flow rate shall be obtained for ascertaining the meter linearity and repeatability within the specified limits and error curve shall be obtained. The testing medium shall be water. Flow calibration of the Ultrasonic flow meter shall include the associated upstream meter run with flow conditioner and downstream meter run being supplied with the meter

D.7 NAMEPLATE

The Ultrasonic flow meter and its accessory shall have a SS nameplate attached firmly to it at a visible place, famishing the following information:

a) Tag number as per purchaser's data sheet.
b) Manufacturers serial no. and model no.
c) Manufacturer's name/trade mark.
d) Nominal end connection size and rating in ASME B16.5 class.
e) Meter Body and Probe material.
f) Calibrated range & units of measurement of flow.
g) Area classification in which the equipment can be used.
h) Hazardous area certification number and marking.

E. DATASHEETS

E.1 DATA SHEET OF ULTRASONIC FLOWMETER

ULTRASONIC FLOW METER			
UNITS: Flow -> Liquid - m^3/Hr Pressure ->Kg/cm^2g Temperature-> °C length -> mm			
GENERAL	1	Tag No.	001-FE/FT1502B
	2	Line No.	As per attached P&ID
	3	Line Size &Thk./Sch.	10" / 8.7mm Thickness
	4	Service	Metering for SCADA APPS
	5	Type	TRANSIT TIME MULTIPATH (Minimum four path)
	6	End Conn.:-Size & Rating	4" ANSI, 150#
	7	Facing & Finish	RF, 125 AARH
Meter/ Transducer	8	Material - Meter Body	Carbon Steel
	9	Material - Meter End Connection	Flanged-Carbon Steel
	10	Material - Transducer	Mfr Standard
	11	Material-Transducer Housing/	Stainless steel
	12	Accuracy	±0.15% of MV for 10:1 flow range
	13	Repeatability	±0.02% OF MV
Pre-Amp cum Transmitter	14	PRE-AMPLIFIER:	
		Location	FIELD MOUNTED near Meter
		Intrinsically Safe| Ex-proof	FLAME PROOF (Ex d)
		Power Supply	LOOP POWERED FROM TRANSMITTER
		Enclosure	WP TO IP65/NEMA-4X
	15	TRANSMITTER :	
		Power Supply ¦ Cable Entry	24V DC | 3/4"NPTF
		Output	RS485, Pulse output and (4-20) mA
		Enclosure	WP TO IP65/NEMA-4X
		Intrinsically Safe| Ex-proof	FLAME PROOF (Ex d)
		Mounting	Integral/ Remote Mounted near meter
Options	16	Flow conditioner/ Straightening vane	Required at inlet Run
	17	Meter runs	Required, Inlet Run 10D & Outlet Run 5D.
	18	Flow computer	Required
	19	Interconnecting cables : -	
		Transducer to transmitter	Required
		Transmitter to Flow Computer	Required
		PT & TE to Flow Computer	Required
		Flow calibration	Required
Service Conditions	20	Fluid and State	Crude Oil Liquid
	21	Flow min/ Flow max	50 / 145
	22	Flow Nominal (m^3/hr)	95
	23	Pressure - Oper. ¦ Max.	8/19
	24	Temp. °C-Min ¦ Oper.¦ Max	25/40/65
	25	Oper. S.G. ¦ Oper. Visc. mPa/s(cP)	/ 1.86-15.54 CP
	26	Max. Allowable Pressure Drop	Minimum (Less than 0.02 kg/cm2g in the total system including , flow conditioner/straightening vane)
	27	Liquid Density kg/m^3	795-895
Meter/Manufacturer	28	Area Classification-IEC	ZONE-2,GR.IIA/ IIB, T3
	29	Manufacturer	To be furnished by bidder
	30	Model No. - Meter	
	31	Model No.-Transmitter	
	32	Model No- Flow Computer	

Note:

- Bidder to confirm the meter size.

- Transmitter shall be provided with separate cable entries for power supply, frequency pulse/output & serial RS485 meter output. Cable entries shall be to NPT standard.
- Total no. of paths to be decided by bidder to meet the accuracy and repeatability requirement specified. However minimum four paths are required.
- Flow computer shall be as per attached the Section
- Meter Run shall be as per the Section.
- For supply of Interconnection cable by bidder between transmitter (signal processing unit) PT/TE in field and flow computer in control room.
- Pressure transmitter & Temperature Element shall be supplied by bidder along with the meter for pressure & temperature compensation. Refer corresponding datasheets of PT & TE for tag no. & specifications of PT & TE.
- All mounting accessories shall be supplied by bidder.
- Testing requirements shall be as per instructions to Bidder.
- Corrosive constituents present in the process liquid: Sulphur:0.34% W/W.

E.2 DATA SHEET OF FLOW COMPUTER

1. **TYPE:** Microprocessor based, with alphanumeric digital backlit LCD display, integral data entry key board and LED alarm indication for status information. Flow computer electronics shall be protected from industrial interferences; shock and vibration proof and have low power supply consumption.

2. **MOUNTING:** Flush panel mounting Flow computer shall be mounted on the existing metering panel.

3. **ENCLOSURE:** General Purpose
4. **POWER SUPPLY:** 240 V A.C. +/- 10%, 50 Hz +/- 3%, 1 P, UPS
5. INPUT SIGNAL CAPABILITY:
   a) RS-485 serial input signal from Ultrasonic Flow-meter representing uncompensated volume flow rate.
   b) Pulse input signal from the Ultrasonic Flow-meter representing uncompensated volume flow rate.
   c) Signal from 3or 4 wire RTD.
   d) 4-20 mA signal superimposed with digital signal (HART Protocol) (2 wire smart pressure transmitter).
   e) (c) above shall be part of intrinsically safe circuits. Transmitters shall have a load driving capability of 600 ohms at 24 VDC. Bidder to note this while choosing the precision resistor inside the flow computer for converting 4-20 mA signal to voltage signal. Maximum value of this resistor shall not exceed 250 ohms.
   f) Receive input signals from associated external pressure and temperature (4-20 mA) transmitters, Density inputs (4-20mA) signal from density transmitter and receiver 3 or 4 wire PT-100 temperature built in temperature sensor of density meter.
   g) Shall be configurable to NTP server for clock synchronization with that of MCS/SMCS system clock.
   h) Other standard inputs.

6. **KEY BOARD CAPABILITY:**
   The data entry keyboard shall have provision to enter the following:

   a) Pressure and Temperature base factor
   b) Liquid Density and Scaling Factor

c) Flow, pressure, temperature and density values and give compensated flow for any external conditions including at 15 deg C.
d) Flow computer shall have the facility to enter report headings, frequency timings and parameters to be printed. The printout shall be provided in the network printer for flow rates, integrated flows, alarms and also for the various parameters to which the flow computer has access.
e) Provide print out of reports to the Network printer.
f) The flow computer shall have provision to enter default values of all inputs, low/high alarms for all inputs and shall be user configurable. The flow computer shall use the default values in case of any input goes beyond low/high limit.
g) Other standard features available

7. OUTPUT CAPABILITY

a) Flow computer outputs shall be isolated. Outputs shall be galvanically isolated otherwise suitable barrier/ active isolators/ relays shall be provided for the output to be mounted in Metering Control panel. Following minimum outputs shall be provided: -
   - Four 4-20 mA isolated signal outputs for corrected volume flow rate, mass flow rate, density and temperature.
   - Pulse output for totalized volume and totalized mass flow rate.
   - One 4-20 mA isolated signal outputs for corrected volume flow rate

b) Flow computer shall have following minimum communication ports:
   - Dual Redundant LAN port connection utilizing MODBUS TCP/IP protocol. All measured and calculated flow computer data shall be made available in the in Purchaser's RTU/PLC for monitoring & control via TCP/IP link.
   - One number spare serial link RS485 with MODBUS RTU protocol

c) Contact alarms output for unit malfunction, process alarm etc. (minimum 3 nos.).

8. COMPUTATIONAL CAPABILITY

a) Calculate the stream mass flow, utilizing gross volume flow and density input signal (frequency).
b) Compensate gross stream volume for effect of pressure and temperature, to obtain net stream reporting volume at 15 deg C and 1.01325 bar absolute.
c) Computation of volume flow rate at standard, normal or user defined base conditions.
d) Calculate the operating density utilizing signal from density meter.
e) Compensate density for effect of pressure and temperature, to obtain corrected density at standard conditions at 15 deg C and 1.01325 bar absolute.
f) Computation of density at standard, normal or user defined base conditions.
g) Density analog outputs (4-20mA isolated) signals for corrected and uncorrected density signal for logging, monitoring and control.
h) Liquid meter flow computers shall have calculations for temperature Compensation as per API 2540 and ASTM D-1250, pressure compensation as per API 11-2-1 & API 11- 2-2, and flow computations as per ISO 12765.
i) K- Factor linearization shall be provided for the Stream flow computers and as well as station flow computers.
j) Flow Computers shall have the capability of providing reporting data.
k) Display all measured and calculated variables.
l) Transmit, via MODBUS TCP/IP data link, on demand from Purchaser's control system, selected measured and calculated variables.
m) Permanently display the totalized quantity (corrected volume, mass flow) with sufficient digits to accumulate three months' maximum flow without roll- over.
n) Display on demand the totalized daily flow (reset to zero daily).
o) Watchdog timer to monitor internal circuits and to signal to Operator Workstation and engineering cum operator workstation & station control system DCS via hardwiring, when a fault is detected. This shall enable the station control system to deduce when a stream flow computer data link is faulty and enable it to take appropriate action.

p) Store in memory the applicable tables detailed in ASTM D1250 (or the appropriate formula and procedures), for use in compensated volume during normal throughput flow.
q) Generate an alarm when flow counting is detected but the meter stream is not selected. (i.e. Off-line).
r) Downloading of meter calibration factors should be time stamped. The flow computer should also hold the previous meter calibration factor used.
s) Compile flow data in agreed format for generation of standard and user defined reports and provide print-out in Network printer.
t) Data from density meter shall be used as live input to the flow computers. However, it shall be possible to enter set parameters and default value to the flow computer in case of density meter failure. Both in-use and measure value shall be available in the metering reports.
u) The Flow Computer shall be configurable to NTP sever for clock synchronization with the system clock of the MCS/SMCS system clock.

9. STANDARDS USED:

For the above, applicable standards are:
(i) API 2540 ASTM D-1250 for Temperature compensation and density correction.
(ii) API MPMS for Pressure correction.
(iii) IP/ IEC 252/ 76 Integrity class A or B for pulse security
(iv) ISO 12765 Liquid hydrocarbons, volumetric measurement by Ultrasonic meter

10. ENGINEERING UNITS:

1. Flow rate - m3/hr
2. Mass Flow rate - kg/hr
3. Pressure - kg/cm^2g
4. Temperature - deg C

11. MEMORY TYPE:

Non Volatile

12. A/D AND D/A CONVERTERS

Calculation accuracy shall be better than +/-0.05% of full scale including linearity, hysteresis, repeatability and resolution. Accuracy for analog inputs to be minimum 0.05% while for analog output, accuracy shall be +/- 0.1% of FSD.

13. Displays and reports shall be configurable type and flow computer shall have following Display capability:
The flow computer shall have the capability to display any two of the following parameters at a time:
(a) Uncorrected volume flow rate
(b) Uncorrected totalized volume
(c) Corrected volume flow rate & corrected totalized volume.
(d) Flow meter factor
(e) Flow weighted meter factor
(f) Observed & standard volume
(d) Mass flow rate
(e) Integrated mass
(f) Density/Specific gravity
(g) Pressure
(h) Temperature
(i) Engineering units as per selected parameter
(j) Data entry
(k) Error codes
(l) Selected parameter codes
(m) Speed of sound

(n) Flow weighted density at Meter temperature
(o) High & Low Flow Alarm
(p) Loss of flow input signal
(q) Density Discrepancy
(r) Computer Failure alarm
(s) Any other alarms (process and systems) including diagnostic message
(t) Other standard displays available

14. DISPLAY TYPE:

(a) Alphanumeric LCD display
(b) LED display for user definable parameters.

15. DIAGNOSTICS:

Flow computers shall have elaborate and sufficient on-line diagnostics to ascertain accurate and proper functioning of the flow computer. Results of diagnostics/ checking shall be displayed. Facility for easy testing of the accuracy shall be provided. Provision for high and low limit check for the input, sensor break, saturation and alarms shall be provided.

16. METER FACTOR OF THE FLOW COMPUTER:

a) The flow computer shall have meter-proving capability with K factor (meter factor) adjustment, from the keyboard as per the API guidelines.
b) Flow computer shall have provision to have different K factors for a product.
c) Flow computer shall automatically change the K factor, depending on the density of the product for calculations. The different K factor for different products can be entered manually from the flow computer keyboard.
d) Flow computer shall have K factor locking facility with sealing for custody transfer approval.
e) Flow computer shall have audit trail feature for the detailed historical records of the changes done in the flow computer parameter. Audit trail shall be accessible through higher-level password only.
f) Six points calibration for 10% to 100% of meter maximum at normal pressure shall be configured in the flow computer for the respective flow meter as per the calibration at time of supply.
g) During detail engineering bidder shall furnish flow computer engineering/ configuration data sheets for EIL review. Bidder shall furnish engineering ranges, pulse count etc. for the flow computer as applicable for corresponding Ultrasonic Flow meter.

17. SCAN PROCESSING TIME:

a) The interval between computer readings of Process variables shall not exceed 1 sec.
b) The interval between each cycle for computation of instantaneous flow rate and totalized flow shall be less than 1 sec.
c) Algorithm and rounding off error for computation shall be with in ± 0.001% of computed value.

18. INTERFACE ELCTRONICS AND ACCESSORIES:

Bidder shall supply all interface electronics, as required. i.e. interface isolating barriers, relays, isolators etc. for all the signals connected to the Flow Computer. Interface electronics shall be suitable for DIN rail mounting inside existing Metering control panel.

19. In addition to the above the flow computer shall have the following features:
    a) Flow computers shall have online “configuration software” and the calibration method will be software driven.
    b) Flow computers shall be having stored report and data for archiving.
    c) Flow computers shall have capability of providing print outs of metering reports for billing from Operator console/ engineering cum operator console.

d) Flow computers shall have multi point (Min. 6 points) meter linearization.
e) Flow computers shall have built in proving function in EPROM
f) Flow computers shall have set up for minimum six batch tags, product number and size.

20. Bidder shall furnish FAT procedure for checking of functionality and configuration of the flow computer.
21. **CONFIGURATION AND DIAGNOSTIC SOFTWARE:**
The bidder to provide the configuration and diagnostic software along with the flow computer which will be capable of performing following functions not limited to: -
a) MODBUS mapping
b) Change of Parameters and assignment of IO points as per requirements.
c) Diagnostic and configuration of the flow computer.
d) Synchronization of Clock with the MCS/SMCS system clock.
e) Address assignments of various parameters for MODBUS communication.
f) Change of IP address.

E.3. DATASHEET FOR UPSTREAM AND DOWNSTREAM METER RUN (ULTRASONIC):

SL	DESCRIPTION	
1	Meter runs and Flow straightener/conditioner at the inlet and outlet of the Ultrasonic flow meter shall be designed as per API MPMS chapter 5, section 8or in accordance with ISO 12765	
2	Flow straighteners type shall be (tube, vane or flow profile etc) as recommended by the Metering system bidder best suitable for the application. Flow Straightener shall be flanged type for easy removal for cleaning and maintenance.	
3	Meter run Pipe Material	As per design conditions
4	Size and schedule	Size shall be same as corresponding Ultrasonic meter
5	Meter run Length	Minimum 10D with flow conditioner for upstream meter run. Minimum 5D for downstream meter-run.
6	End Connections	Flanged (Both the inlet and outlet side of upstream meter run shall be flanged. Also both the inlet and outlet side of downstream meter run shall be flanged.
7	Flange Size, Rating/Face Finish	Size shall be same as corresponding Ultrasonic meter. Rating/Face finish shall be as per process design condition.
8	Nut Material	A194 Gr.2H
9	Bolt Material	A 193 Gr.B7
10	Gasket Material	As per B-16.20-ANSI B16.5
11	Flow Straightener/ conditioner material	SS316

Note: Bidder to note that Sl. No..5 above specifies the minimum straight length of upstream & downstream meter run required to be supplied by bidder. However, in case, bidder recommends straight length more than the specified one, the same shall be supplied by bidder.

E.4 DATASHEET OF PRESSURE TRANSMITTER

General	**Function**	Transmit and Indicate
	Type	Electronic Smart
	Case	Shall be metallic as per Manufacturer Standard
	Mounting	Yoke (2" NB pipe)
	Enclosure	Weatherproof to IP 66 and above
	Electrical Area Class	IEC Zone2 Gr IIA/IIB T3
	Intrinsic Safety	ATEX / IEC Ex
	Power Supply	24 VDC two wire
	Cable Entry	1/2"" NPTF Two Nos.
	Accuracy	+/- 0.1% or better of span (for remote seal type)
	Max. Pressure	20 kg/cm^2
	Max. Temperature	65 Degree C
	Ambient Temperature	(-) 30 degC to 80 degC
	Load Impedance	550 ohms or better at 24 V DC
Transmitter	**Output Type**	Analog (4-20)mA
	Range	0 to 16 kg/cm^2
	Driving Voltage	24 V DC (On Two Wire)
	Protocol	HART
	Turn Down Ratio	100:1
	Response Time	200 millisecond or better (Documentary evidence supporting the same should be submitted)
	Measuring Unit	Kg/cm^2
	Service	Gauge Pressure
	Element Type	Diaphragm
	Body Material	**SS 316**
	Element Material	**SS 316**
	Over-range Protection	Required
	Process Connection :	**1/2"" NPTF**
Diaphragm Seal	**Type**	**Remote**
	Wetted Part Material	**SS316 L**
	Other Material	**SS**
Process Connection	**Size and Rating**	**1 ½ inch 150 class**
	Facing & Finish	**RF 125AARH**
	Capillary Material	**SS 316**
	Armour Type	**Flexible**
	Capillary Material	**SS 304**
	Capillary Length	**5 metres**
	Capillary Filling Material	**Silicon Oil (DC-200) or equivalent**
Accessories	**2 In. SST Pipe Mounting Bracket**	
	2 Way SS 316 Valve Manifold (For Standard Pressure Transmitter) SS Plug for spare cable entry	
	Additional Lighting/ Surge Protector	

NOTES TO BIDDER:

1. **The pressure transmitter shall be connected to the spool piece which shall be supplied along with the Ultrasonic Flow-meter.**

2. Additional Points to be followed

(i) Flange material shall be ASTM A105. Flange dimensions shall be as per ASME B16.5.
(ii) The transmitter shall be of remote seal type with integral flange.
(iii) The Pressure transmitter can be calibrated with standard /universal HART calibrator of all reputed make.
(iv) Integral intrinsic safe output meter (LCD Type) shall be provided.
(v) Original product catalogue must be attached along with the bid.
(vi) Surge, Transient, short circuit and reverse polarity protection shall be in built in the transmitter.
(vii) External ground (with screw) must be present on the body of the transmitter.
(viii) The Transmitter and process flange must be supported with TESTCERTIFICATE / REPORT from accredited third party /laboratory.
(ix) The transmitter must have Flameproof housing: Flameproof/ Ex(d) as per IS/IEC-60079
(x) The stability of the transmitters shall be equal to or better than+/-0.13% of span for a period of minimum 5 years, as a minimum.
(xi) In the transmitter, the 'WRITE' option shall be protected through password.
(xii) Transmitter Shall have ATEX/IEC explosion Proof/ Intrinsic Safe approvals. A copy of approval from statutory authority, Petroleum &Explosives Safety Organization (PESO)is required.
(xiii) Proper mounting bracket & 'U' Bolt shall be supplied along with the equipment for installation on 2"" pipe.
(xiv) Tag Plate: SS Tag Plate to be Provided.
(xv) Warranty: Standard 12 months from commissioning or 18 months from invoice date.
(xvi) Certified to SIL2 with single use as per IEC61508.
(xvii) The Transmitter shall be leak tested and calibrated together before supply. Calibration & test certificates to be attached.

E.5 DATA SHEET OF RESISTANCE TEMPERATURE DETECTOR

ELEMENT	**No. of Element**	Duplex
	Calibration	As per IEC-60751
	Element Material	Platinum
	Resistance at 0° C	**100 ohms**
	Leads	Standard
	Sheath OD	**10 mm**
	Sheath Material	SS-316
	Nipple and Union Size	0.5 inch
	Nipple and Union Material	Zn Plated Carbon Steel
	No. Of Wires	Four Wire, Class A type
HEAD	**Head Cover Type**	Screwed Cap and Chain
	Material	Cast Aluminium
	Cable Entry	1/2" NPTF
	No. of Entries	Dual
	Enclosure Type	Weather-proof to IP 65 as per IS/IEC60529
THERMOWELL	**Thermowell**	Shall be fitted and compatible to the spool piece supplied along with the Ultrasonic Flowmeter
	Material	SS 316
	Construction	Tapered, Drilled Barstock
	Process Conn	1 1/2" Flanged
	Inst. Conn	1/2" NPT
	Options	Extra Nipple Extension
	Tag No.	001-TE-1502B
	Temperature Range	(25-40) degC
	Max. Temperature	65 degC
	Element Length	Bidder to Mention
	Make and Model	Bidder to Mention

	Well Dimension	U -320 mm T – 45 mm
	Flange Material	ASTM A105
	Flange Rating, Facing, Finish	150# RF , R125AARH

Notes for Bidder

1.Sheath O.D to suit thermowell I.D.
2.One no. cable entry shall be provided with weatherproof metallic plug.
3.Electrical area classification shall be IEC Zone 2 GrIIA/IIB,T3.
4.The spool piece supplied by the bidder shall have arrangement to fit the RTD.
5.Testing requirements shall be as per SIV & Piping Material Specification.
6. Supply of Interconnecting cable between temperature element & Flow computer shall be in bidder's scope
7. RTD shall be 4 wire, class A type

E.6 DATASHEET OF INSTRUMENT CABLE

S/N	Parameter	Requirement
1	Make	Bidder has to clearly mention
2	Model	Bidder has to clearly mention
3	Type of cable	FRLS armored screened2 pair copper cable
4	Voltage Rating	Upto and including1100 volts
5	Construction	Multi stranded annealed bare electrolytic grade copper conductor Core size: As per scope of supply
6	Primary insulation	Extruded PVC compound as per IS5831 type C
7	Inner Sheath	Extruded PVC compound type ST2
8	Outer Sheath	Extruded PVC compound, type ST2
9	Armor over inner sheath	Galvanized steel wire for UAD less than 13 mm, Galvanized steel strip for UAD greater than13mmDimensions as per table 5 of IS-1554PartI
10	Core Identification	2 Pairs
11	Drum Schedule	200 metres 1)Tolerance on individual drum length = +/- 2 % 2) Tolerance on overall quantity = +/- 3% Payment shall be made against the quantity determined at site. Where delivered quantity = quantity ordered +/- quantity as per tolerance mentioned in 1) and 2)

E.7 DATASHEET OF POWERCABLE

S/N	Parameter	Requirement
1	Make	Bidder has to clearly mention
2	Model	Bidder has to clearly mention
3	Type of cable	FRLS armored copper cable
4	Voltage Rating	Upto and including 1100volts

5	Construction	Multi stranded annealed bare electrolytic grade copper conductor Core size: As per scope of supply
6	Primary insulation	Extruded PVC compound as per IS5831 type C
7	Inner Sheath	Extruded PVC compound type ST2
8	Outer Sheath	Extruded PVC compound, type ST2
9	Armor over inner sheath	Galvanized steel wire for UAD less than 13 mm, Galvanized steel strip for UAD greater than 13mm Dimensions as per table 5 of IS1554PartI
10	Core Identification	3 Cores: Red, Yellow & Blue
11	Drum Schedule	200 Metres 1)Tolerance on individual drum length = +/- 2 % 2) Tolerance on overall quantity = +/- 3% Payment shall be made against the quantity determined at site. Where delivered quantity = quantity ordered +/- quantity as per tolerance mentioned in 1) and 2)

E.8 DATASHEET OF EXPLOSION PROOF JUNCTION BOX

The bidder to supply Junction Box for two locations as per the following specification: -

S/N	Parameter	Requirement
1	Make	Bidder has to clearly mention
2	Model	Bidder has to clearly mention
3	Cable entry	Minimum 8 nos. ½"NPTasperrequirement
4	Ex. Proof are a classification	Zone-1& 2,Gas Group II C
5	Size	To be mentioned
6	Accessories	
7	Certification	Valid Ex certification required.

E.9 DATASHEET OF DC Power Supply

1	Make	Bidder has to clearly mention
2	Model	Bidder has to clearly mention
3	Type	Single Gang shuttered
	Material	ABS / UL 94 V-0
	No. of ports	One/Two
	Compliance	ROHS/ELV Compliant

F. INSPECTION AND TESTING

1. Unless otherwise specified, purchaser reserves the right to test and inspect all items at bidder' s works.
2. Supplier shall perform the usual standard tests to maintain quality control procedures. These test certificates shall be submitted for review before starting inspection by Purchaser. Supplier shall be responsible for testing and complete integration of the system. Detailed procedures of test and inspection shall be submitted by the supplier for purchaser's review and mutually agreed upon.
3. Bidder shall submit following test certificates and test reports for purchaser's review:
   a) Material test certificates as per EN 10204 clause 3.1B for Ultrasonic flow meter and its accessories.
   b) Certificates of radiography/X-ray for welded joints. Dye penetration test certificate shall be provided where radiography/X-ray is not possible.

c) Hydrostatic test report as per paragraph 4.4of this specification.
d) Certificate from statutory body for intrinsically safe, flameproof enclosure for meter electronics.
e) Type test reports for weatherproof meter electronics and transmitter housing.
f) Calibration report for the Ultrasonic flow meter over entire range.
g) Dimensional test reports for the Ultrasonic flow meter and its accessories.

4. Hydrostatic Test: the ultrasonic flow meter and its accessories shall be subjected to hydrostatic test. The hydrostatic test pressure shall be 1.5 times the maximum allowable working pressure.

5. Witness Inspection: All Ultrasonic flow meters and their accessories shall be offered for pre-despatch inspection for the following as a minimum:
a) Physical/ dimensional checks and workmanship.
b) Calibration, including establishing accuracy and repeatability over the entire range, on representative samples.
c) Review of all certificates and test reports as indicated in clause 3 of this specification.
d) In the event of not witnessed by purchaser, all the tests shall anyway be completed by the bidder and documents for same shall be submitted for scrutiny.

6. Shipping:
a) A11 threaded and flanged openings shall be suitably protected to prevent entry of foreign material.
b) The ultrasonic flow meter and accessories shall be packed separately.

7. Rejection:
a) Bidder shall prepare their offer strictly as per clause 2 of this specification and shall attach only those documents, which are specifically indicated in the material requisition.
b) Any offer not conforming to the above requirements, shall be summarily rejected

F.1 TEST CATEGORIES

The following tests (in the same sequence) shall be conducted for acceptance of the equipment and the system before final acceptance of the system:

1. Factory Acceptance Testing (FAT)
2. Pre-commissioning test (after installation) for total integrated system
3. Site Acceptance testing (SAT)
4. Trial Run

1.1 These tests shall be carried out on all equipment supplied by Bidder including those supplied by sub-bidders, if any.

1.2 Bidder shall arrange all necessary test instruments, manpower, test-gear, accessories, etc.

1.3 All technical personnel assigned by Bidder shall be fully conversant with the system specifications and requirements. They shall have the specific capability to make the system operative quickly and efficiently. They shall also have the capability to incorporate any minor modifications/suggestions put forward by OIL without any cost implication to OIL.

1.4 Power supply and any temporary commissioning facility including communication system required for installation/testing/commissioning shall be arranged by the Bidder.

F.2 TEST PLAN

Bidder shall submit to OIL `Test Plans' well in advance of commencement of actual testing in each of the above mentioned test categories. The plans shall include:

1.1 System, Equipment functional and performance description (in short) and Tests to be conducted and purpose of test.

1.2 Test procedures (including time schedule for the tests) and identification of test inputs details and desired test results.

F.3 TEST REPORT

The observations and test results obtained during various tests conducted shall be compiled and documented to produce Test Reports by Bidder. The Test Reports shall be given for each equipment/item and system as a whole. The report shall contain the following information to a minimum:

1.3 Test results

1.4 Comparison of test results with anticipated (as per specifications) test result as given in test plans and reasons for deviations if any.

1.5 The data furnished shall prove convincingly that:

a) The system meets the guaranteed performance objectives.
b) Mechanical and Electrical limits were not exceeded.
c) Failure profiles of the equipment during the tests are well within the specified limits.

F.4 FAILURE OF COMPONENTS

- Till the system is accepted by OIL, a log of each and every failure of components shall be maintained. It shall give the date and time of failure, description of failed component, circuit, module, component designation, effect of failure of component on the system/equipment, cause of failure, date and time of repair, mean time to repair etc. Repair/modification done at any point of time at one site shall be carried out by bidder at all the sites. Detailed documentation for the same shall be submitted to OIL for future reference.
- If the malfunctions and/or failures of a unit/module/sub-system/ equipment repeat during a test, the test shall be terminated and Bidder shall replace the necessary component or module to correct the deficiency. Thereafter, the tests shall commence all over again from the start.
- If after the replacement the equipment still fails to meet the specifications, Bidder shall replace the equipment with a new one and tests shall begin all over again. If a unit/subsystem/module has failed during the test, the test shall be suspended and restarted all over again only after the Bidder has placed the Equipment back into acceptable operation. OIL's approval shall be obtained for any allowable logistics time required to replace the failed component/unit/module/sub-system.

F.5 TRAINING

Training shall have to be provided by the bidder to OIL personnel as per following details:

1. Training at site: Client's personnel shall be fully associated during Engineering, Installation, Testing and commissioning activities and bidder shall impart on-the-job training to OIL personnel on the following activities: -
   a) Installation and commissioning
   b) Configuration of the Flowmeter system (Ultrasonic Flowmeter and the flow computer) and its electronics card(s).
   c) Replacement of any faulty module(s).
   d) Troubleshooting
   e) Use of the configuration software including uploading and downloading the same in the central electronics processor unit of the flowmeter meter system.
   f) General maintenance of the Skids and accessories.
   g) Calibration of the flowmeter meter system.
2. Training at OEM's facility: Bidder shall train personnel of OIL in all aspect of Flowmeter system at OEM's facility for two days. Number of owner's personnel shall be 03 (Three) engineers for training to be conducted. Bidder shall mention the date, time and place of training for the batch. Bidder shall quote the training charges separately. Charges like transport, accommodation etc. shall be borne by OIL.
3. Bidder shall provide documentation, course material, manuals, literature etc. as required for proper training of personnel. The training at OEM's facility shall cover the following not limited to:
   a) Basic functioning of hardware and software of the Flowmeter system.
   b) General Operation and maintenance of the Flowmeter system.
   c) Calibration of flowmeter system.
   d) Configuration of flowmeter system.
   e) Modification of any settings related to the operation of flowmeter system.
   f) Upgradation of service pack in respect of software/firmware supplied with the item.

F.6 FACTORY ACCEPTANCE TEST

1. Factory acceptance tests shall be carried out after review and approval of FAT procedures / documents / Engineering drawings, etc as per bid requirements. FAT

procedures/documents/Engineering drawings etc. shall be submitted to OIL at least 30 (thirty) days prior to FAT date.

2. Bidder shall invite OIL, at least 30 days in advance, of the date at which system shall be ready for Inspection and Testing.
3. Two nos. of OIL engineers shall visit OEM's site for the inspection.
4. Factory Acceptance Test shall be conducted in the presence of the OIL personnel.
5. The FAT shall include but not be limited to System Integration Testing. Functional and performance test should be conducted for the complete system including the equipment supplied by sub-bidders, simulating the complete network. All equipment shall be connected using the same cables (interfaces/components) as will be used during final installation so that the system can be tested in its final configuration. This testing shall be conducted at the manufacturing facility of the main equipment. All instruments and test gadgets shall be made available by the supplier during this inspection.
6. The equipment, system and sub-systems shall be cleared for dispatch only after it is found to have met with the various technical specifications and requirements. After successful completion of FAT, OIL shall approve material for dispatch and factory acceptance certificates shall be issued. The factory tests shall include but not be limited to:
   a) Mechanical checks to the equipment for dimensions, inner and outer supports, finishing, welds, hinges, terminal boards, connectors, cables, painting etc.
   b) Electrical checks including internal wiring, external connections to other equipment etc.
   c) Check for assuring compliance with standards mentioned in the specifications.
   d) Individual check on each/module/sub-assembly in accordance with the modes and diagnostics programs of the bidder.
   e) Checks on power consumption and heat dissipation characteristics of equipment.
   f) Environmental testing
   g) Functional tests
   h) Any other test not included in FAT document but relevant to the project as desired by OIL at the time of factory acceptance testing.

G. INSTALLATION AND COMMISSIONING

1.1 The whole project is required to be completed on Turn-Key basis. Accordingly, supplier is understood to have assessed and quoted for all the items required for successful completion of the Project. It will be the responsibility of the bidder to provide such items free of charge, not quoted in the bid, but otherwise required to have been provided at the time of installation for completion and successful commissioning of the project.

1.2 The systems shall be installed & commissioned in the following stations of Pipeline Department of Oil India Limited in the state of Assam:

Sl. No.	Name of Station	Station Jurisdiction	Location/State
1	PS-1	Duliajan	Assam

1.3 After successful completion of Factory Acceptance Testing, equipment shall be sent to site for installation. Equipment without factory acceptance certificates shall not be acceptable at site.

1.4 Prior to installation, all equipment shall be checked for completeness as per the specifications of equipment required for a particular station. Installation shall be carried out in accordance with the installation manuals and approved installation drawings in the best workmanship.

1.5 Bidder shall indicate the number of teams and the list of equipment for each team to be deployed for installation of the total system in order to complete the work within the stipulated time frame.

1.6 Bidder shall engage installation experts to take up the job of installation of all equipment at various stations.

1.7 Interconnection of various equipment including tubing, piping accessories pertaining to USM, electrical barriers, lightning protectors shall be done as per scope of work.

1.8 Bidder shall bring all installation tools, accessories, special tools, test gears, spares parts etc at his own cost as required for the successful completion of the job. A list of all such items, equipment wise shall be submitted to OIL for review.

1.9 If during installation and commissioning any repairs are undertaken, the maintenance spares supplied with the equipment shall not be used for the repair. Bidder shall arrange its own spare parts for such activities till such time the system has been finally accepted by OIL. A detailed report & log of all such repairs shall be made available by the bidder to OIL and shall include cause of faults and repair details, within 2 weeks of fault occurrence.

1.10 A detailed time schedule for these activities shall be submitted by Bidder to OIL to enable their representatives to be associated with the job.

1.11 Bidder shall include all installation materials required for proper installation of the equipment. These shall include but not be limited to, all connectors, inter-bay and inter equipment cables, power supply cables and connectors, power distribution boxes, anchoring bolts, nuts, screws, junction boxes etc.

1.12 The installation of equipment shall be done as to present neat and clean appearance in accordance with approved installation document. All inter bay, power supply and other cables shall be routed through wall mounted cable trays. No cable shall be visible. All through wall openings, trenches, etc. shall be properly sealed to prevent the entry of rodents, insects and foreign materials.

1.13 Scope of Work:

SL.No	Equipment/Packages	Bidder's Scope of work	Scope of OIL
1.	Ultrasonic Flow Meter System: Scope of work shall comprise of System Design, Detail Engineering, Procurement of Materials, manufacturing or fabrication, Supply, Inspection & Factory Acceptance Testing (total Equipment & System Integration) & Testing of system, Packaging, forwarding, Insurance, Shipping related all formalities, Inland Transportation to site, and Supply of all related goods including commissioning spares, supply of all type of erection items, supervision of erection and installation activity, site engineering, Testing, Trial Run, Commissioning, Training, support and Warranty & documentation of total system, testing certificates, calibration certificates of equipment required to complete in all respect.	Supply & commissioning of USM System along with the flow computer and all other required accessories as per tender specification. Supply of cables (Power, signals, control and communication) from system instruments to junction box and junction box to cabinet including cable glands. Installation & Commissioning shall include following activities. Configuring the flow computer and establishing the communication between the USM and the flow computer. Installation & commissioning of the system: Installation and commissioning of the system **including Supervision** shall be the responsibility of the bidder. Required technical assistance in installation of the system as detailed in 3rd column shall be OIL's scope. **Bidder is not required to pay anything for works done by OIL.**	1. Installation of AC /DC converter inside the cabinet installed at control room at PS- 2. UPS supply (230 V, 50Hz) up to the input of AC/DC converter. 3. Laying of cable and glanding. 4. Grouting of System at site as per final approved detailed diagram provided by bidder. All the associated civil works shall be carried out in presence of the bidder's supervision after receiving the final foundation arrangement drawings. 5. Fitting of the Flow computer in the existing metering panel.

		Detailed CA and GA diagrams for installation inside the cabinet shall be provided by the bidder. Detailed installation diagram and GA drawings at field to be provided by the bidder.	

H. SPARES

H.2.1. COMMISSIONING AND WARRANTY SPARES AND CONSUMABLES

1. The Bidder shall provide all the commissioning and warranty spares and consumables, if required, as part of Lump sum quote. It is bidder's responsibility to ensure the adequacy & completeness of the commissioning and warranty spares & consumables and supply the spares & consumables as required during the commissioning and warranty period.
2. The spares & consumables shall be arranged by the bidder to cater to the requirement during installation, pre-commissioning, site acceptance testing, trial-run, and commissioning and warranty. It shall be obligatory on the part of bidder to modify/ upgrade, rectify any hardware problems in the system or replace any hardware component in the supplied equipments during installation and commissioning and operation & maintenance of the system during warranty. The spares and consumables shall be readily available with the bidder and the bidder shall build-up the cost for spares & consumables required for complete system as part of initial bid itself and no separate list of these spares is required to be provided as part of their proposal.

3. The consumables during installation & commissioning and warranty shall be adequate and complete.
4. These spares are different from mandatory spares and bidder shall not use mandatory spares as commissioning and warranty spares.

H.3 SITE ACCEPTANCE TESTING (SAT)

On completion of Pre-commissioning, Site Acceptance Testing shall be conducted on the system as per the approved SAT procedures and its constituents by the bidder under the presence of OIL personnel. SAT procedure shall be submitted to OIL for approval minimum ten (10) days prior to SAT. The tests shall include, but not be limited to the following:

1. Checks for proper installation as per the approved installation procedure for each equipment/item and system as a whole.
2. Guaranteed performance specifications of individual equipment/item
3. Self-diagnostics test on individual equipment
4. System tests END TO END for the system, all complete.
5. The complete record of site acceptance tests results shall be maintained by the Bidder. The records shall be maintained in a logical form and shall contain all the relevant information and provided to OIL by the bidder in hardcopy. The test reports shall be signed by the testing engineer and the engineer witnessing the tests. A field test report to be produced by the bidder with a standard format. The format to be cleared by OIL before field acceptance starts.

H.4 TRIAL RUN

1. As last leg of the site acceptance testing the Bidder shall keep the facilities **up** for 30 days for `TRIAL RUN'. During this period Bidder shall provide all specialist Engineers & Technicians including experts to maintain the total log, incidents, failures & for assisting site engineer & for total co-ordination. However, the normal operation and maintenance of the system shall be performed by the personnel of OIL trained for the purpose.
2. If during `Trial Run' any defect is noted in the system, the Bidder shall rectify, replace the same to the satisfaction of OIL. The decision to repeat the final test or restart the `Trial' shall be of OIL, depending upon the severity of the defect.
3. During trial run, if any fault occurs to any equipment or system, bidder shall identify and rectify the same and provide report, history of all faults to OIL.
4. Ideally, during the `Trial Run', no shutdown of the system due to failure of equipment, power supply etc. should happen. A record of all failures shall be kept for each manned/unmanned station and the availability of the system shall be calculated accordingly and results submitted to OIL.
5. If the system fails to come up to the guaranteed performance, the Bidder, within a period of thirty (30) days shall take any and all corrective measures and resubmit the system for another `Trial Run' of trial period. All modifications, changes, corrective measures, labour etc shall be at the cost of the Bidder. In case the date of completion for the second trial run exceeds the time schedule for the project, he shall be liable to pay liquidated damages. If the system fails to reach the guaranteed performance even after the second trial run, OIL shall be free to take any action as deem fit against the Bidder and to bring the system to the guaranteed performance with the help of a third party at the expense of the bidder.

H.5 FINAL ACCEPTANCE OF THE SYSTEM

a. Upon successful completion of the `TRIAL RUN', any shortfalls when compared to the contract shall be made good by the Bidder. After this, OIL shall notify the Bidder in writing within reasonable time, pre-warrantee acceptance of the system.

b. Nothing herein provided above, inclusive of the `Pre-Warrantee Acceptance Certificate; shall absolve bidder of his full liabilities under the contract inclusive of and relative to the system performance and material Warranty.

I. SHIPPING

1. All threaded and flanged openings shall be suitably protected to prevent entry of foreign material.

2. All equipment shall be individually packed in suitable containers/crates designed to avoid damage to the equipment during transit and storage in accordance with best commercial practice and with the requirements of applicable specifications. The materials used for packaging, wrapping, sealing, moisture resistant barriers, corrosion preventers, etc shall be of recognized brands and shall conform to best standards in the areas in which the articles are packaged. The packing shall protect the equipment from impact, vibration, rough handling, rain, dust, dampness, insects, rodents, etc. Each container/crate shall be subjected to impact, vibration and other mechanical tests. Each container shall be clearly marked with the following information at prominent places (provided as sample):

OWNER: M/s OIL
PROJECT: USM SYSTEM
DESCRIPTION:
SERIAL NO. OF EQUIPMENT:
ADDRESS (Location): (Station Name)
Location wise distribution list shall be provided by OIL to the successful bidder.

3. All equipment shall be tested for damage after their receipt at respective sites by bidder. If any equipment, part, subsystem, component, accessory is found to be damaged during the transit, the same shall be replaced by the Bidder, free of all costs to OIL. The bidder shall replace such item as shall be found damaged by bidder or as indicated to bidder, within 30 days of receipt of intimation.

J. QUALITY ASSURANCE

Contractor shall be fully responsible for their Quality Assurance and associated Quality Control process. Unless otherwise agreed by the PURCHASER, the Contractor's quality system shall meet the requirements of ISO 9001:2015 Quality System and shall be accredited by a recognized authority Contractor is required to establish an acceptable Quality Plan, inclusive of quality manual and procedures that cover all activities of the order, in order to comply with the Quality System requirements.

Contractor shall be responsible for arranging/liaising with the Third Party Inspection Agency and other agencies for design appraisal, inspection, survey and certification requirements as required by the specification/requisition.

When required, waiver and acceptance of non-conformances shall be subjected to Third Party Inspection. Agency approval before COMPANY endorsement. These concession records shall be included in the Manufacturer's Final Documentation.

K. WARRANTY

Warranty period shall be of 18 months from the date of supply or 12 months from the date of successful completion of SAT whichever is earlier.

K.2. SCOPE OF WORK DURING WARRANTY PERIOD

1. Any software, firmware supplied under this tender shall be covered in the Scope of Preventive and Breakdown maintenance during warranty period. Bidder to provide support in case of any upgradation of software and firmware related to the supplied Ultrasonic Flowmeter system.
2. Routine check and maintenance of the accessories pertaining to the Ultrasonic Flowmeter system shall be carried out.
3. Competent maintenance Engineer of Bidder shall carry the required tools, programming diagnostic terminal (PDT), equipment, software. During the visits to PS-1 as per requirement. Replacement of any faulty modules is under the scope of the bidder during the warranty period.
4. Mandatory periodical preventive maintenance one visit per year. Periodical preventive maintenance works shall be carried out once in a year accordance to a planned schedule drawn in

consultation with M/s OIL authorities as per their convenience. During the periodical preventive maintenance, competent/experienced maintenance engineer shall carry out the following jobs:

- Verification of electrical connections for their tightness, verification of earthing connections for their tightness in the equipment including verification of voltages for healthiness at various equipment end, carrying out general housekeeping/cleaning of the panels/equipment, checking all the displays, checking all the fuses, checking healthiness of all the contactors/relays, checking the printed circuit board for any discolouration /abnormal smell.
- Checking of mechanical parts of Ultrasonic Flowmeter system for their functionalities.
- Updating of firmware / software as per requirements.
- Issue of calibration certificate with time validity as per requirement, along with a copy of Traceability of Master used by Bidder.

5. Breakdown maintenance (As and when necessary):
   - For any breakdown of Ultrasonic Flowmeter Meter system at any site Bidder has to send competent maintenance engineer to attend breakdown maintenance calls a within 48 hrs from the time it is reported. The maintenance engineer shall visit the site along with necessary items to rectify the fault and make the system operational.
   - In case of replacement of the any faulty module(s), bidder to provide the replacement spares for the faulty modules.
6. All the services or replacement of modules shall be free of cost; no extra payment shall be made separately for providing the warranty services during the warranty period.

L. Bid Rejection and Bid Evaluation Criteria

BEC/BRC (TECHNICAL):

L.1 BID EVALUATION CRITERIA (BEC)

1. Bidder's Eligibility:

1.1. The bidder shall be an Original Equipment Manufacturer (OEM) of the tendered item(s)
OR

1.2. An authorized agent / dealer / distributor / supply house of an OEM of the tendered item(s) having valid authorization letter / dealership certificate with warranty/ guarantee back up from the principal (OEM). Copy of authorization letter / dealership certificate with warranty/ guarantee back up from the principal (OEM) must be submitted along with the technical bid and should have experience of supplying the tendered item(s).

a. Bidder's Experience:

b. Bidder must have experience of supplying and installing Ultrasonic Flow-meter System for crude oil pipeline in India transporting namely Crude Oil, in previous 5 (five) years from the bid closing date of the tender.

c. The bidder must have experience of successfully executing at least 1(one) order for supply and installation of atleast one number of compact Ultrasonic Flowmeter system for Crude Oil pipeline in India transporting namely crude oil, in preceding 5(five) years from original bid closing date of the tender.

d. The bidder to provide certificate from the end user stating the satisfactory performance of the Ultrasonic Flowmeter, as offered, shall be field proven and should have completed trouble free satisfactory operation for a period of minimum 4000 hours on the bid due date in similar application with the process conditions similar to those as specified in the purchaser's datasheets. Items with prototype design or items not meeting provenness criteria specified above shall not be offered.

Documentary evidence needs to be submitted in order to substantiate above two clauses, clause 1.2(a). 1.2(b) and 1.2 (c). The bidder shall the submit following documentary evidence in support of his previous supply experience as applicable under clause 1.2 a), 1.2 b), 1.2 c) above-

(i) Copy) of Purchase Order(s) /Contract document(s),

And

(ii) Any one or combination of the following documents that confirms the successful execution of the purchase order(s) / contract(s) -

- Completion report / performance certificate from the clients,
- Bill of landing,
- Delivery challan / invoice etc.

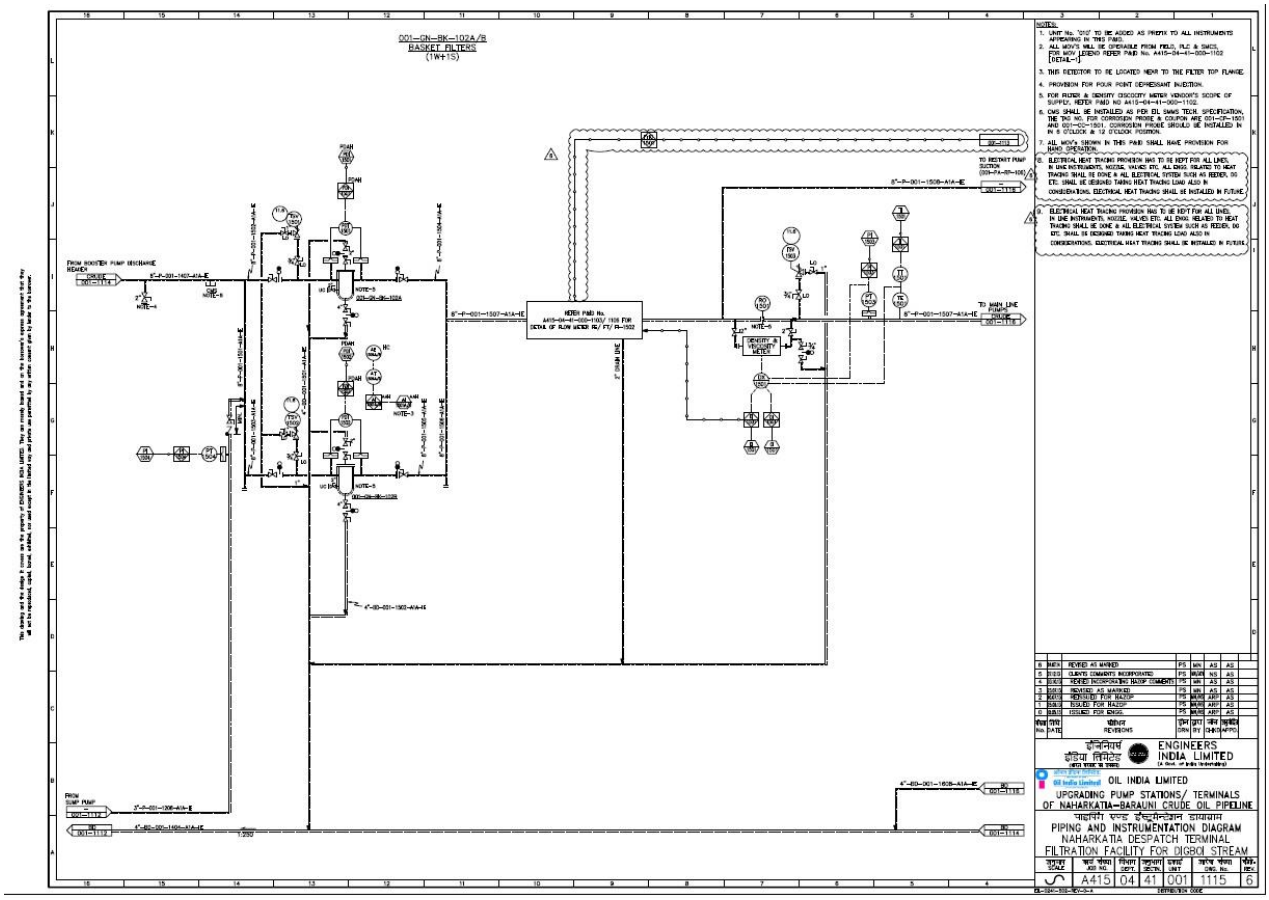
- Any other documentary evidence that can substantiate the successful execution of each of the Purchase Order(s) / contract(s) cited above.

BID REJECTION CRITERIA(BRC):

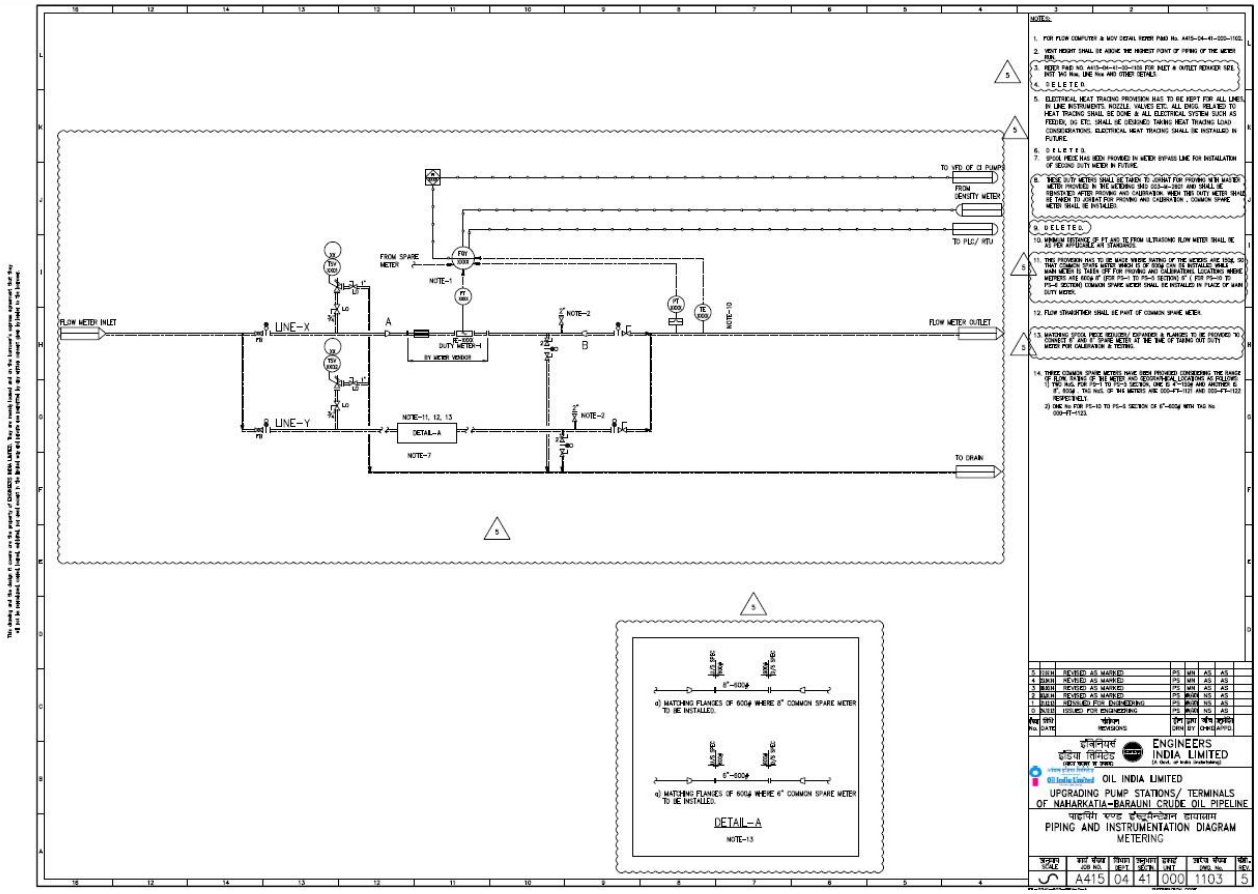
The bidder should categorically confirm in the technical bid that the tendered items will be supplied within the delivery period, if mentioned in the tender, without which the bid will be rejected."

APPENDIX-1

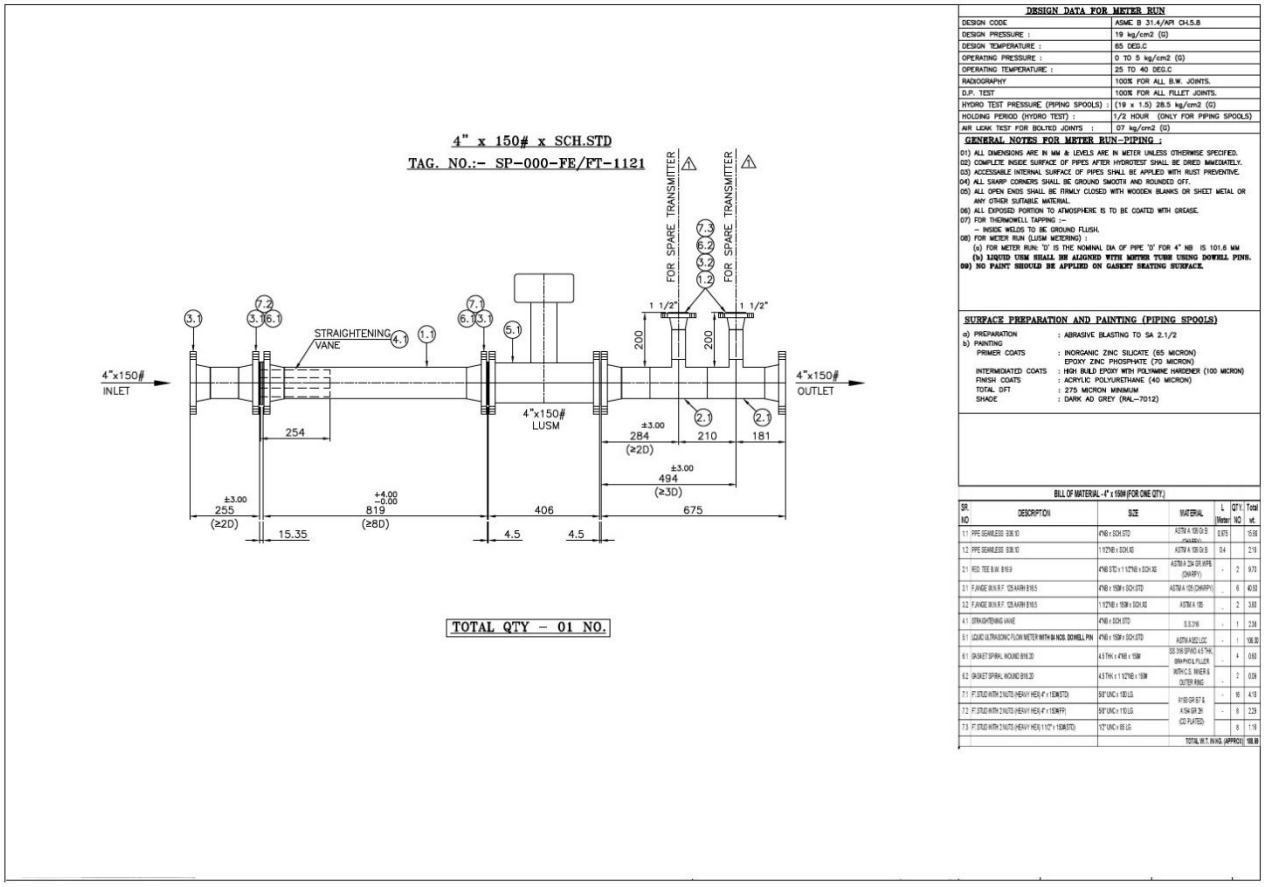
1.1 P&ID FOR DIGBOI STREAM AT PS-1



1.2 P&ID OF METERING SYSTEM



1.3 GA DIAGRAM OF EXISTING USM



DESIGN DATA FOR METER RUN	
DESIGN CODE	ASME B 31.4/API CH.5.8
DESIGN PRESSURE :	19 kg/cm2 (G)
DESIGN TEMPERATURE :	65 DEG.C
OPERATING PRESSURE :	0 TO 5 kg/cm2 (G)
OPERATING TEMPERATURE :	25 TO 40 DEG.C
RADIOGRAPHY	100% FOR ALL B.W. JOINTS.
D.P. TEST	100% FOR ALL FILLET JOINTS.
HYDRO TEST PRESSURE (PIPING SPOOLS) :	(19 x 1.5) 28.5 kg/cm2 (G)
HOLDING PERIOD (HYDRO TEST) :	1/2 HOUR (ONLY FOR PIPING SPOOLS)
AIR LEAK TEST FOR BOLTED JOINTS :	07 kg/cm2 (G)

GENERAL NOTES FOR METER RUN-PIPING :

01) ALL DIMENSIONS ARE IN MM & LEVELS ARE IN METER UNLESS OTHERWISE SPECIFIED.
02) COMPLETE INSIDE SURFACE OF PIPES AFTER HYDROTEST SHALL BE DRIED IMMEDIATELY.
03) ACCESSABLE INTERNAL SURFACE OF PIPES SHALL BE APPLIED WITH RUST PREVENTIVE.
04) ALL SHARP CORNERS SHALL BE GROUND SMOOTH AND ROUNDED OFF.
05) ALL OPEN ENDS SHALL BE FIRMLY CLOSED WITH WOODEN BLANKS OR SHEET METAL OR ANY OTHER SUITABLE MATERIAL.
06) ALL EXPOSED PORTION TO ATMOSPHERE IS TO BE COATED WITH GREASE.
07) FOR THERMOWELL TAPPING :-
- INSIDE WELDS TO BE GROUND FLUSH.
08) FOR METER RUN (LUSM METERING) :
(a) FOR METER RUN: 'D' IS THE NOMINAL DIA OF PIPE 'D' FOR 4" NB IS 101.6 MM
(b) LIQUID USM SHALL BE ALIGNED WITH METER TUBE USING DOWEL PINS.
09) NO PAINT SHOULD BE APPLIED ON GASKET SEATING SURFACE.

SURFACE PREPARATION AND PAINTING (PIPING SPOOLS)

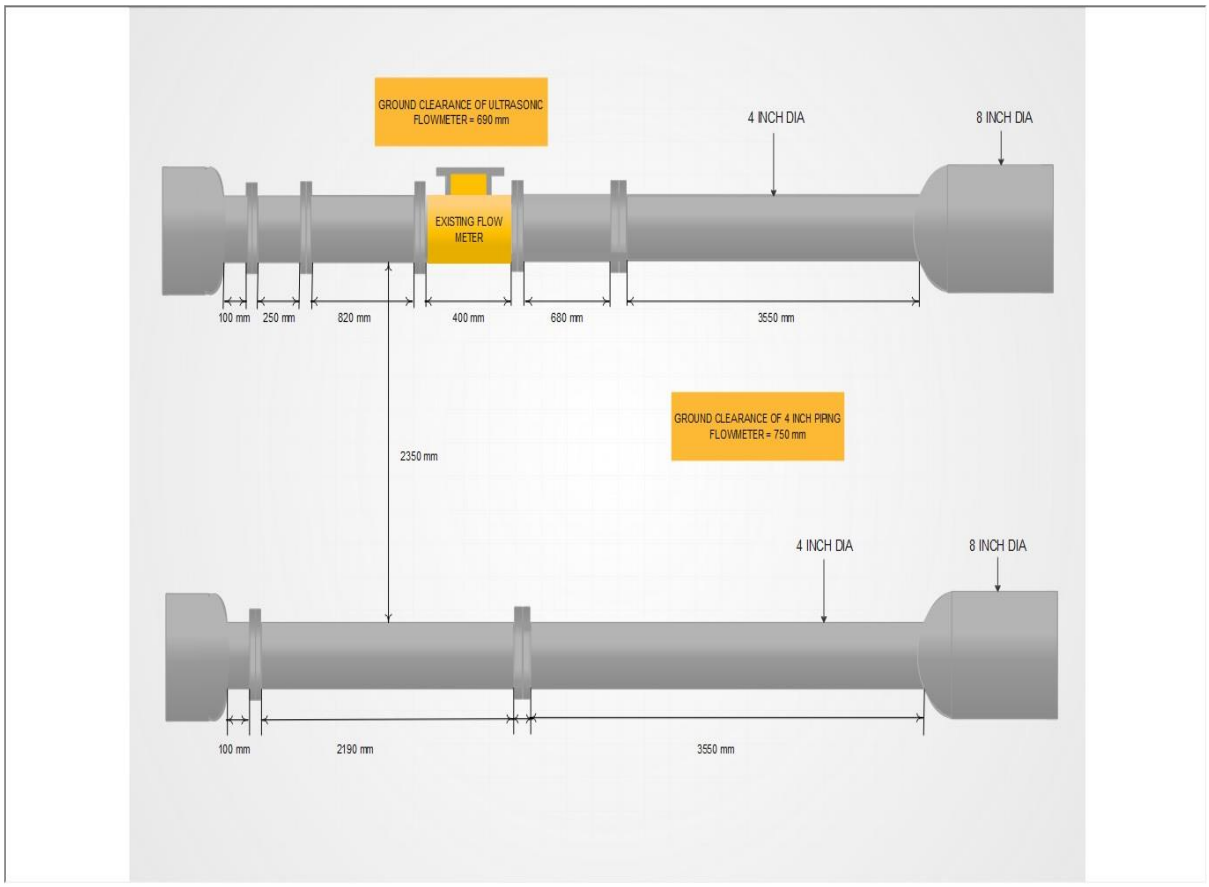
a) PREPARATION	: ABRASIVE BLASTING TO SA 2.1/2
b) PAINTING	
PRIMER COATS	: INORGANIC ZINC SILICATE (65 MICRON) EPOXY ZINC PHOSPHATE (70 MICRON)
INTERMEDIATE COATS	: HIGH BUILD EPOXY WITH POLYAMINE HARDENER (100 MICRON)
FINISH COATS	: ACRYLIC POLYURETHANE (40 MICRON)
TOTAL DFT	: 275 MICRON MINIMUM
SHADE	: DARK AD GREY (RAL-7012)

BILL OF MATERIAL -4" x 150# (FOR ONE QTY.)

SR NO.	DESCRIPTION	SIZE	MATERIAL	L (Meter)	QTY NO	Total wt.
1.1	PIPE SEAMLESS SCH.10	4"NB x SCH.STD	ASTM A 106 Gr.B	0.973	-	15.00
1.2	PIPE SEAMLESS SCH.10	1 1/2"NB x SCH.XS	ASTM A 106 Gr.B	0.4	-	2.10
2.1	RED. TEE B.W. B16.9	4"NB STD x 1 1/2"NB x SCH.XS	ASTM A 234 GR.WPB (SMLS*)	-	2	9.70
2.1	FLANGE WN R.F. 125 AARH B16.5	4"NB x 150# x SCH.STD	ASTM A 105 (SMLS*)	-	6	40.50
2.2	FLANGE WN R.F. 125 AARH B16.5	1 1/2"NB x 150# x SCH.XS	ASTM A 105	-	2	3.60
4.1	STRAIGHTENING VANE	4"NB x SCH.STD	S.S.316	-	1	2.30
5.1	LIQUID ULTRASONIC FLOW METER WITH 8x NOS. DOWELL PIN	4"NB x 150# x SCH.STD	ASTM A351 CF3	-	1	100.00
6.1	GASKET SPIRAL WOUND B16.20	4.5 THK x 4"NB x 150#	SS 316 SPIRO 4.5 THK. SWG PACK FILLER WITH C.S. INNER & OUTER RING	-	4	0.60
6.2	GASKET SPIRAL WOUND B16.20	4.5 THK x 1 1/2"NB x 150#		-	2	0.20
7.1	FT STUD WITH 2 NUTS (HEAVY HEX) 4" x 150#(STD)	5/8" UNC x 150 LG.	A193 GR B7 & A194 GR 2H (CD PLATED)	-	16	4.16
7.2	FT STUD WITH 2 NUTS (HEAVY HEX) 4" x 150#(FF)	5/8" UNC x 110 LG.		-	8	2.29
7.3	FT STUD WITH 2 NUTS (HEAVY HEX) 1 1/2" x 150#(STD)	1/2" UNC x 85 LG.		-	8	1.19
					TOTAL WT. IN KG. (APPROX)	180.80

1.4 PIPING ARRANGEMENT

FIGURE 1: DETAILED INSTALLATION ARRAGNEMENT OF THE ULTRASONIC FLOW METER



APPENDIX 2

TECHNICAL CHECKLISTS OF ULTRASONIC FLOWMETERING SYSTEM

SL NO	TECHNICAL CHECKLIST	BIDDER'S REMARK	
		YES/NO	DEVIATION IF ANY
1	Line Size &Thk./Sch.: 10" / 8.7mm Thickness		
2	Service: Metering for SCADA APPS		
3	Type: Transit Time Multipath (Minimum four path)		
4	End Connection: 4" ANSI, 150#		
5	Facing & Finish: RF, 125 AARH		
6	Material of Meter Body: Carbon Steel		
7	Material of Transducer Housing: Stainless Steel		
8	Accuracy: ±0.15% of MV for 10:1 flow range		
9	Repeatability: ±0.02% OF MV		
10	**Pre- Amplifier** Location: Field Mounted near Meter		
11	**Pre- Amplifier** Intrinsically Safe Ex-proof : Flame Proof (Exd)		
12	**Pre- Amplifier** Power Supply: Loop Powered from the transmitter		
13	**Pre- Amplifier** Enclosure: WP TO IP65/NEMA-4X		
14	**Transmitter** Power Supply and Cable Entry: 24V DC | 3/4"NPTF		
15	**Transmitter Output:** RS485, Pulse output and (4-20) mA.		
16	**Transmitter Mounting:** Integral/ Remote Mounted near meter		
17	**Flow conditioner/ Straightening Vane :** Required at inlet run		
18	**Meter runs:** Required, Inlet Run 10D & Outlet Run 5D.		
19	**Flowcomputer:** Required		
20	**Interconnecting cables: -** **Transducer to transmitter: Required** **Transmitter to Flow Computer: Required** **PT & TE to Flow Computer: Required** **Flow calibration : Required**		
21	**Fluid and State: Crude Oil Liquid**		
22	**Flow min / Flow max (m^3/hr): 50 / 145**		
23	**Flow Nominal (m^3/hr): 95**		
24	**Pressure - Oper. ¦ Max (kg/cm^2g): 8/19**		
25	**Oper. S.G. ¦ Oper. Visc. mPa/s(cP): / 1.86-15.54 CP**		
26	**Max. Allowable Pressure Drop: Minimum (Less than 0.02 kg/cm^2g in the total system including , flow conditioner/straightening vane)**		
27	**Liquid Density kg/m^3: 795-895**		
28	**Area Classification-IEC: ZONE-2,GR.IIA/ IIB, T3**		
29	**Valid Certification for Custody Transfer : Required**		
30	**Comply to all the Datasheets from E.8 to E.16**		

APPENDIX 3

PRICE SCHEDULE:

Sr No	Description	INR
1.	SUPPLIES	
1.1	Engineering, Manufacture, Procurement of material and bought out components, assembly at shop, system engineering, integration, internal testing, FAT, Packing including the supply of material including mandatory spares, warranty, detailed documentation as per tender specification	
2.0	Training As per Clause no G.5 of Section G	
2.1	Lump sum price as per tender	
	a) At bidder's site	
	b) At site	
3.0	Installation and commissioning as per tender document section H of tender document including SAT	
4	Any other items that is required not mentioned above.	