



CENTRAL UP GAS LIMITED
(CITY GAS PROJECT IN KANPUR, BAREILLY & JHANSI)

**BID DOCUMENT FOR RATE CONTRACT FOR
PROCUREMENT OF COMMERCIAL
DIAPHRAGM METERS FOR INDUSTRIAL &
COMMERCIAL CONNECTIONS FOR CITY
GAS DISTRIBUTION PROJECT OF M/S.
CENTRAL U. P. GAS LIMITED, FOR THE
PERIOD OF 01 YEAR**

BID DOCUMENT NO : CUGL/C&P/TEN2627/11

THROUGH E-TENDERING MODE

OPEN DOMESTIC COMPETITIVE BIDDING

TECHNICAL DOCUMENTATION
TECHNICAL, VOL. II OF II

| Sr. No. | Description | Rev. No. |
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| 3 | INSTRUMENT DATASHEETS | 0 |
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MATERIAL REQUISITION

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1. DESCRIPTION OF GOODS AND / OR SERVICES
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3. LIST OF ATTACHMENTS
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1. DESCRIPTION OF GOODS AND / OR SERVICES

The scope of work shall cover design, engineering, manufacturing, testing, inspection, preparation for shipment and transportation of the Gas Meters, as per technical requirements/specification for City Gas Distribution project in Kanpur, Unnao, Bareilly & Jhansi.

| S.NO | DESCRIPTION | QUANTITY | REMARKS |
|--|-----------------------------|----------|---------|
| GROUP A – Diaphragm Gas Meters with Brass adaptor | | | |
| 1. | Gas Meter, G - 4, 6 m3/hr | 134 | |
| 2. | Gas Meter, G - 6, 10 m3/hr | 117 | |
| 3. | Gas Meter, G - 10, 16 m3/hr | 66 | |
| 4. | Gas Meter, G - 16, 25 m3/hr | 27 | |
| 5. | Gas Meter, G - 25, 40 m3/hr | 12 | |

NOTES:

- Accessories for Meter shall be supplied as specified in the Specifications attached with the material requisition.
- Bidder has to quote full quantity of quoted item mentioned above; partial quotation for the item shall be liable to rejection.

2. REMARKS / COMMENTS

2.1 Supplier's Compliance

Supplier shall submit his bid in full compliance with the requirements of this MR and attachments.

Bidder shall include the following statement in his bid:

We certify that our bid is fully complying with your enquiry datedand referenced, Compliance with this Material Requisition in any instance shall not relieve the Vendor of his responsibility to meet the specified performance.

2.2 Compliance with Specification

The supplier shall be completely responsible for the design, materials, fabrication, testing, and Inspection, preparation for shipment & transfer of above material to nominated delivery point strictly in accordance with the MR & all attachments thereto.

2.3 Supplier's Scope

Supplier's scope of work includes the equipment with all internals & accessories shown on the data sheets, specifications, and all parts necessary for a satisfactory operation & testing except those which are indicated to be out of Supplier's supply.

2.4 Applicable Documents

General descriptions, requirements and information are listed in Annexure "C" of this Material Requisition.

2.5 Supplier's Documents

Supplier shall supply the documentation as listed under Annexure "D" of this Material Requisition. All documents shall be supplied in English language.

3. LIST OF ATTACHMENTS

The table below lists the documents which are integral part of this Material Requisition. The applicable revision index of each document is mentioned in the column below the current Material Requisition revision index.

When the Material Requisition revision index is "A" or "1", all listed documents are attached. For other Material Requisition revision index, only modified or new documents are attached.

| DOCUMENTS | REVISION OF DOCUMENTS | | |
|--|-----------------------|--|--|
| Material Requisition | 0 | | |
| Annexure – 1 | 0 | | |
| Standards Specification for Gas Meters | 0 | | |
| Instrument Datasheets | 0 | | |
| Quality Assurance Plan | 0 | | |

4. DOCUMENTS & DATA REQUIREMENTS

1. The table hereunder specifies the quantities & nature of the documents to be submitted by the Supplier to Company.
2. The documents required at the inquiry stage to be included in the bid are listed under column A.
3. The documents required after award of the agreement and subject to the written approval of the Company are listed under column B.
4. The final & certified documents are listed under column C.

5. Any document even when preliminary shall be binding and therefore duly identified & signed by the Supplier. It shall bear the Company's project reference, the MR number and identification number.
6. The documents are fully part of the Supply which shall be complete only if and when the documents complying fully with the material requisition requirements received by the Engineer.

| Item | Documents and Data | A | B | | C | |
|------|--|------------------|------------------|---------------|------------------|---------------|
| | | Number of copies | Number of copies | Required date | Number of copies | Required date |
| 1. | Data sheet, technical specifications, catalogue, sizing calculations etc. of the offered model | 1 | 2 | 1 week | 2 | 1 week |
| 2. | Detail GA Drawing, of the offered model (domestic & commercial meter) | 1 | 2 | 1 week | 2 | 1 week |
| 3. | Pressure drop calculations, pressure drop curve, accuracy/error curve etc. | 1 | 2 | 1 week | 2 | 1 week |
| 4. | Code compliance certificates | 1 | 2 | 1 week | 2 | 1 week |
| 5. | Detailed QA/QC program | 1 | 2 | 1 week | 2 | 1 week |
| 6. | Meter index format tag/nameplate format | | 2 | 1 week | 2 | 1 week |
| 7. | Material certificate EN 10204, Cert. 3.2 | | 2 | 2 weeks | 2 | 1 week |
| 8. | List of special test equipment/tools required for maintenance | | 2 | 1 week | 2 | 1 week |

| | | | | | | |
|-----|---|---|---|-------------------------|---|--------|
| 9. | Inspection and test procedures | 1 | 2 | 1 week | 2 | 1 week |
| 10. | Test / Calibration/Inspection certificates/reports | | 2 | 1 week after test | 2 | 1 week |
| 11. | Installation, operation and maintenance manuals, catalogues with part list for meters along with software CD and calibration reports. | | 2 | 2 weeks before shipping | 2 | 1 week |
| 12. | Painting system description | 1 | 2 | 1 week | 2 | 1 week |
| 13. | Packing/shipping list w/weights and dimensions. (Note-5) | | 2 | 2 weeks before shipping | 2 | |
| 14. | Final technical file (containing all final drawings and documents listed in column „c“) | | 2 | 2 weeks before shipping | | |
| 15. | Type approval from weights & measures | 1 | 2 | 1 week | 2 | 1 week |
| 16. | ATEX approval certificates | 1 | 2 | 1 week | 2 | 1 week |
| 17. | Importing license for meter/meter parts to be imported | 1 | 2 | 1 week | 2 | 1 week |
| 18. | No deviation certificate | 1 | 2 | 1 week | 2 | 1 week |
| 19. | Copy of the tender document duly signed and stamped | 1 | 2 | 1 week | 2 | 1 week |

NOTES:

1. Duration in column B (required date) are weeks after purchase order date (=T0).
2. Duration in column C (required date) are weeks after document approval.

3. Due date of each document may be proposed.
4. Final technical file shall be supplied in hard copy as indicated, and in electronic format (pdf) on One (1) CD-ROMS.
5. The selected Vendor shall provide Calibration certificates of each meter.
6. The packing boxes for each flow meter (Each Item which is been packed independently) shall carry the item calibration certificate within the packing box.

**ANNEXURE-I
SERIAL NUMBERING FORMAT FOR METERS**

| FIRST 3 ALPHABETS OF VENDOR | | | ITEM SERIAL NUMBER (FROM MANUFACTURER) | | | | | | | | MONTH & YEAR OF MANUFACTURE | | | | |
|-----------------------------|---|---|--|---|---|---|---|---|---|---|-----------------------------|---|---|---|---|
| A | B | C | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | / | M | M | Y | Y |

EXAMPLE

| | | | | | | | | | | | | | | | |
|---|---|---|----------|--|--|--|--|--|--|--|---|---|---|---|---|
| I | T | R | 12345678 | | | | | | | | / | 0 | 7 | 1 | 5 |
|---|---|---|----------|--|--|--|--|--|--|--|---|---|---|---|---|

| |
|--|
| ITRON – ITR RAYCHEM - RAY INEL – INE |
|--|

STANDARD SPECIFICATION

FOR

Commercial Gas Meter

ABBREVIATION

| | |
|-------|--|
| ATEX | Atmospheres Explosible |
| ANSI | American National Standards Institute |
| EVC | Electronic Volume Corrector |
| FAT | Factory acceptance Test |
| IEC | International Electrotechnical Commission |
| ISO | International Organization for Standardization |
| MAOP | Maximum Allowable Operating Pressure |
| MIU | Meter Interface Unit |
| NACE | National Association of Corrosion Engineers |
| NPT | Nominal Pipe Thread |
| OEM | Original Equipment Manufacturer |
| PNGRB | Petroleum and Natural Gas Regulatory Board |
| RO | Restriction Orifice |
| SAT | Site Acceptance Test |
| SS | Stainless Steel |
| TPIA | Third Party Inspection Agency |

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1.0 SCOPE

This Standard Specification, together with the data sheets attached herewith, establishes the minimum technical and functional requirements for design, engineering, materials, fabrication, painting, inspection and testing, documentation, marking, packing and shipping of gas meters used in commercial and industrial applications in CGD industry.

2.0 DEFINITIONS

For the purpose of this document, the words and expressions listed below shall have the meanings assigned to them as follows:

| | |
|-------------------------|---|
| Agreement | Designates the agreement concluded between the Client and the Contractor, under which the latter undertakes to the former the Goods and/or Services according to the stipulations which are agreed and specified in the form of an order. |
| Client | Designates the purchaser of the Goods and/or Services, which are the subject of the agreement. |
| Contractor / Supplier | Designates the individual or legal entity with whom the order has been concluded by the Client. The term "Contractor / Supplier" may be used indifferently for a supplier, a manufacturer, an erection Contractor / Supplier, etc. |
| Days-Weeks-Months | Specify the number of calendar days, weeks or months and not of working days, weeks or months. |
| Client's Representative | Designates the individual or legal entity to which the Client has entrusted various tasks in relation with the carrying out of his Project. |
| Goods and / or Services | Designate, depending on the case, all or part of the drawings or documents, substances, materials, materiel, equipment, structures, plant, tools, machinery, to be studied, designed, manufactured, supplied by the Contractor / Supplier under the agreement, including all the studies, tasks, works and services specified by the order. The Terms Goods or Services may be indifferently used one for the other as required by the context. |
| Project | Designates the aggregate of Goods and/or Services to be provided by one or more Contractor / Supplier. |

3.0 REFERENCE DOCUMENTS

3.1 Codes & Standards

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

| | |
|------------------------|--|
| EN 1359 + A1 Latest | Gas Meters - Diaphragm Meters |
| OIML R137 | Gas Meters |
| ATEX | 94/9/EC Directive |
| EN 12480 | Gas meters - Rotary Displacement Gas Meters |
| AGA Report No.7 | Measurement of Natural Gas by Turbine Meters |
| AGA Report No.8 | Compressibility factor of Natural Gas and other related Hydrocarbon gases |
| ISO 27001 | Information security standards |
| BS 4161 | Specification for diaphragm meters of 6 cubic meters |
| IEC 60529 | Degree of Protection Provided by Enclosures (IP Code) |
| ASME B1.20.1 | Pipe Threads, General Purpose (Inch) |
| ASME B16.5 | Pipe Flanges and Flanged Fittings |
| EN12405-1 + A1 | Electronic Volume Calculator |
| IEC 60529 | Degree of Protection Provided by Enclosures (IP Code) |
| IEC 60079 PNGRB T4S | Electrical apparatus for explosive gas atmospheres PNGRB Technical Standards and Specifications |

3.2 Order of Precedence

In the event of conflict between specifications, data sheets, related standards, codes etc., and the order of precedence shall be as follows:

- a. Data sheets
- b. Job Specifications
- c. Standard Specifications
- d. Codes and Standards

Vendor shall refer the matter to the Purchaser for clarification and only after obtaining the approval in writing, the same should proceed with the manufacture of the items in question.

4.0 DESIGN CRITERIA

4.1 General

All gas meters shall be designed for continuous operation in the given site conditions with the following design criteria:

- Ease of operation and maintenance.
- Suitability for applicable environmental conditions.
- Suitability for operation in the designated classification of hazardous areas.
- State of art proven technology and instrumentation.
- Safety to operating and maintenance personnel.
- Safety to connected equipment.
- High Redundancy with high reliability (high MTBF and low MTTR) and no single point of failure.
- Minimum cost of ownership.

4.2 Environmental Conditions

The equipment considered and the complete installation shall be suitable for continuous operation under the ambient conditions prevailing at site.

4.3 EMC Compliance

All gas meters and accessories shall be immune to Radio Frequency Interference (RFI) and Electro Magnetic Interference (EMI). The design and installation of all electrical / electronic equipment shall meet the RFI/EMI requirements according to IEC 61000, emission (IEC61000-6-4) and immunity (IEC-61000-6-2) requirements for an industrial environment.

4.4 Hazardous Area Certification

Gas meters shall be certified for use in designated areas when installed in hazardous area classified zones as per IEC 60079.

4.5 Ingress Protection

Gas meters shall have ingress protection to IP 54 or better in accordance with IEC 60529.

5.0 TECHNICAL REQUIREMENTS

Gas meters shall be installed at commercial and industrial applications in order to meter the gas consumed by the Customers. Gas meter type shall be decided based on flow capacity, pressure rating and accuracy requirements. These meters shall be designed to operate on clean and dry natural gas. This document specifies all types of gas meters used for commercial and industrial applications in CGD industry. However, the exact requirement shall be as defined in Material Requisition and Datasheets.

5.1 Diaphragm Meter

Diaphragm meter shall be suitable for measurement of low gas flows in domestic and light commercial metering applications.

Diaphragm meter shall be designed in accordance with EN 1359:1999 + A1 Amendment 2006 or latest and shall be suitable for outdoor / indoor installations, tamper proof and corrosion resistance for a life period of 10 years.

Diaphragm meters fall into the positive displacement category as they have well defined measurement compartments that alternately fill and empty as the meter reciprocates or rotates. The meter will indicate volumetric flow based on the gear ratio, number of revolutions and fixed volume displaced in each meter revolution.

Diaphragm meter shall have an accuracy class of 1.5 and rangeability of 150:1 or better. Pressure drop across the meter shall be less than 2 mbar at Q_{max} .

Ingress protection of meter shall be IP 54 or better.

Material of construction of meter shall be steel with suitable coating on inside and outside for corrosion protection of casing. Diaphragm material shall be polyester fabric coated with rubber for an endurance life cycle of 80,000 cum. Meter shall be in accordance with EN 1359.

Diaphragm meter shall have 8-digit mechanical index (As per EN1359 – Units in m^3). Index shall be provided with sealing arrangement to avoid tampering.

Back-run stop is to be provided to prevent the meter from running backwards in case of tampering or back flow condition. Transmission system shall be tamperproof nonmagnetic with transmission rate of $0.01 m^3 / rotation$ for G4 & G6 and $0.10 m^3 / rotation$ for G10 – G16.

Meter shall be provided with a device in the outlet to prevent reverse flow. Overflow protection device (Restriction Orifice) shall be provided at the downstream of meter. Material of construction of restriction orifice shall be PTFE and shall be suitable for natural gas application.

Vendor shall provide brass adaptor with 1" inlet / outlet connection. Washer shall be of PTFE material of construction and provided along with restriction orifice.

The end connection of the meters shall be protected with plastic caps. In case of flange ends, companion flanges with bolts shall be provided in each end. In case the end connections of the meters proposed by the Vendor is not in line with the end connections mentioned in the data sheets, the Vendor shall supply suitable adaptors to suit the desired end connections. Companion flanges with bolts if supplied shall be enclosed within the meter packing box.

Vendor to provide the type approval certification for meter as per EN 1359 and certification from Weights & Measures Department, India with Model & Make details included. Calibration certificate (original + soft copy) shall be provided to Client. One copy of the certificate shall be provided within the packing box of each meter.

5.2 Materials

All the wetted parts including actuating mechanism shall be suitable for the fluid being handled. Material of construction of meter casing shall be either steel or die-cast aluminium with suitable coating on inside and outside for corrosion protection of casing in line with the applicable governing standards.

In case of diaphragm meters, diaphragm material shall be polyester fabric coated with rubber for an endurance life cycle of 80,000 cum. Other Internal parts shall be non – metallic to prevent from tampering like magnet.

Vendor shall use suitable material parts, provide proper surface finish, hardness and clearances, wherever possibilities of galling exists.

For corrosion service, the material selected shall be in compliance with the requirements of NACE MR-0175 / ISO-15156 latest editions.

5.3 Name plate

Each gas meter shall be marked in legible characters, which are permanently visible in accordance with BS EN 1359 / OIML R137 or latest:

- a. Type approval mark and number.
- b. Manufacturer's name and Identification Mark.
- c. Serial Number, Model Name and Model Number.
- d. Flow Rate – Max (Q_{max}) & Min (Q_{min}) - (m³/h)
- e. Maximum Working Pressure P_{max} (bar)
- f. Flow Direction
- g. Nominal value of the cyclic volume, V (dm³)
- h. Number and date of EN Standard
- i. Ambient temperature range (°C)
- j. Gas temperature range (°C)
- k. Accuracy class of the meter, e.g. Class 1.5
- l. Month & Year of Manufacture.

Type approval number shall be issued by Department of Legal Metrology (W&M) (Government of India). ATEX Marking shall be as per directive 94/9/EC on the electrical / electronic device or module certified.

Owner unique serial number shall be marked on the meter as per the standard procedure followed by Owner, which will be communicated to the successful bidder.

6.0 FABRICATION AND PAINTING

Vendor shall obtain approval in writing from the Purchaser before start of fabrication of diaphragm meter. Vendor shall submit the required Specification, drawings & documents for approval. Also Vendor shall refer the relevant codes and standards for manufacturing herein.

Painting shall be such that there is no rust formation on the Meter when exposed continuously to the corrosive atmosphere. All carbon steel bolting shall be hot dip galvanized or cadmium plated and bi-chromated.

Aluminium components shall be anodized then coated with epoxy paint.

The Supplier's painting standard will be considered as an alternative offer provided it meets or exceeds the preceding requirements.

7.0 INSPECTION AND TESTING

Vendor shall perform all inspection and testing as per project specification requirements and as per relevant codes, prior to shipment. The inspection and testing for diaphragm meters shall be carried out as per approved Inspection and Test Plan (ITP).

Verify that all terminals for interconnecting wiring between units are accessible for connecting and checking. Terminal blocks should be numbered and where 2 or more are present, should have block identification. Interconnecting cables shall be color coded or numbered.

All electrical wiring shall be checked for continuity and insulation test.

7.2 Functional Testing

Each gas meter shall be accurately calibrated and tested by the Manufacturer at the normal working conditions specified in the attached data sheet. All test equipment used for testing shall have traceability to national standards.

7.3 Installation, Testing & Commissioning

The Supplier shall assist during erection, testing and commissioning of gas meters at site. The bidders shall indicate separate pricing for this purpose in their offers, if applicable.

7.4 Guarantee / Warranty

Vendor shall guarantee that the complete scope of supply shall be safely and reliably meet all of the requirements of this Company Specification.

Generally, the Vendor shall provide warranty support for a period of 12 months from the date of supply or 18 months from the date of manufacturing. Warranty shall apply to defective material workmanship and facility design. The cost of correction / replacement of any warranty items shall be borne by the Vendor.

The job specifications / data sheets shall be referred for any specific warranty / guarantee.

8.0 MARKING, PACKING AND SHIPMENT

Vendor responsible for gas meter and its accessories shall ensure that all equipment, associated materials and accessories are designed properly packed, and secured for transit to site without damage.

Supplier / Vendor shall provide a detailed packing list for all the items been supplied. Necessary accessories supplied shall be packed in the main package box for which accessories are been supplied.

The calibration certificates of each item shall be enclosed within the package box. Each package box shall be tagged with the Purchase Order number (unique identification is required).

The package box shall be suitable for inland transport or seaworthy (if imported). Necessary precautions and pre-requisites shall be considered by Supplier for package delivery to the concern Client site / location / workshop.

Vendor shall provide and submit his standard "Marking, Packing and Shipping Procedures" for review by Client.

Vendor shall specify any conditions, normal or special, to be verified in intermediate storage and during transport.

Equipment shall be suitably packed including any dismantling, transit fastening and bracing necessary to prevent distortion or damage during transit.

Adequate protection shall be provided to prevent mechanical damage and atmospheric corrosion in transit and at the job site.

Preparation for shipment and packing will be subject to inspection and rejection by Company's inspectors. All costs occasioned by such rejection shall be to account of the Vendor.

9.0 SPARES AND ACCESSORIES

The following spare philosophy shall be followed in case it is not covered in Job Specification.

The Vendor shall include with the bid, recommended spare parts list for start-up, precommissioning and two year operation as per following:

- a. Itemized recommended spare parts list for start-up and pre-commissioning;
- b. Itemized recommended spare parts list for two years operation.

In case of RPD meters, spare gaskets for meter, NRV and RO installation shall be provided by Vendor.

In case of RPD meters, lubricating oil (500 ml) along with feeding accessories shall be supplied with each meter. Lubricating oil bottle (200 ml) shall be included in each meter box packing.

Vendor shall submit recommended accessories and special tools required for operation and maintenance of gas meters for Company's review.

All the spare parts furnished by Vendor shall be wrapped and packaged to preserve an original as-new condition under normal conditions of storage. The same parts shall be properly tagged with stainless steel tags and coded so that later identification as to their intended equipment usage shall be clear.

All items supplied shall be packaged separately and clearly marked as "Spare Parts" and shipped with the equipment.

10.0 DOCUMENTATION

The following documentation requirements shall be fulfilled by the Vendor at various stages of bidding and execution of order.

Whenever Client and/or Client's representative's review and/or approval is requested on a document to be submitted by the Contractor / Supplier or before an action is implemented by the Contractor / Supplier, such review and/or approval shall always be requested in writing by the Contractor / Supplier to the Client and/or the Client's representative before any action subject of this review and/or approval is taken.

Documentation provided by Vendor shall be in English language only.

Client and/or Client's representative approval shall always be given in writing.

10.1 Documentation Required with Technical Bid

During bidding stage, Vendor shall submit in his offer the following documents as a minimum:

- a. Specification, Data Sheets along with sizing calculations
- b. Bill of Materials including Vendor List, Details for third party items
- c. Catalogues and manuals
- d. Quality Assurance Plan
- e. Weights & Measures Approval Certificate

- f. Type approval / Compliance / Examination Certificate confirming to the governing standard
- g. Pressure Drop Calculations
- h. Performance Curves
- i. Deviations from technical specification, if any, with proper justification
- j. Supplies against major orders for natural gas application (PTR).

The Vendor shall provide at the time of tendering a complete detailed engineering package in accordance with the Purchaser's data requirement and shall include but not necessarily be limited to the same.

10.2 Documentation Required for Approval

Upon placement of Purchase Order, Vendor shall submit as a minimum the following drawings, documents and specifications for the Company's approval:

- a. Datasheets of meters and all accessories supplied
- b. Bill of materials including Vendor list, details for third party items
- c. Catalogue and Technical literature of commercial meters in English
- d. Weights & Measures Approval Certificate
- e. Type approval / Compliance / Examination Certificate confirming to the governing standard
- f. Installation, Operation and Maintenance Manual
- g. Sizing Calculations
- h. Assembly drawings with overall dimensions
- i. Detailed sectional drawings showing all parts with reference numbers and material specifications of meters and all accessories supplied
- j. Welding, heat treatment, inspection and testing procedures
- k. Painting Specification
- l. Calibration Certificates
- m. Material Test Certificates
- n. Quality Assurance Plan
- o. Any other documents.

Upon approval and completion of testing, full set of above documentation shall be submitted to Client in 2 sets of hardcopy format and 1 no. of CD in soft copy (PDFs) format.

INSTRUMENT DATA SHEET

| INDEX | | | | Rev. |
|-------|-----------------------------|--------------|---------|------|
| S.NO | ITEM DESCRIPTION | SHEET NUMBER | REMARKS | |
| 1 | Diaphragm Gas Meter Group A | Sheet 1 Of 1 | | |

| Group A - Datasheet for Diaphragm Gas Meter/Smart Meter | | | | Rev. |
|---|----|---------------------------|---|------|
| General | 1 | Meter Type | Gas Meters | |
| | 2 | Quantity | Refer Table below | |
| | 3 | Service | Natural Gas | |
| | 4 | Governing Standard | EN 1359:2000 (or latest) / OIML R137 | |
| | 5 | Approval | Type approval certificate as per Governing Standard | |
| | 6 | Installation | Suitable for outdoor / indoor installations, tamper proof and corrosion resistance for a life period of 10 years. | |
| | 7 | Environment Protection | Mechanical Environment M2 & Electronic Environment E2 | |
| | 8 | | | |
| Process Conditions | 9 | Flow (Min / Max) | Refer Table below | |
| | 10 | Accuracy Class | Class 1.5 | |
| | 11 | Accuracy | $\pm 3\%$ (Qmin to 0.1Qmax) and $\pm 1.5\%$ (0.1Qmax to Qmax) | |
| | 12 | Rangeability | 150:1 or better | |
| | 13 | Cyclic Volume | Minimum* | |
| | 14 | Design Pressure | 500 mbar | |
| | 15 | Pressure Drop | < 2 mbar | |
| | 16 | Operating Temperature | -10° to 55°C | |
| Meter | 17 | Meter Type | Refer table below | |
| | 18 | Body Casing | Steel with suitable coating on inside and outside for corrosion protection of casing. | |
| | 19 | Corrosion Protection | Suitable coating on inside and outside of casing | |
| | 20 | End Connections | Threaded * | |
| | 21 | Centre to Centre Distance | Refer Table below | |
| | 22 | Ingress Protection | IP-54 or better | |

| | | | | |
|--------------|----|-----------------------------|--|--|
| | 23 | Sensor MOC | For Diaphragm Meter : Polyester fabric coated with rubber for an endurance life cycle of 80,000 cum. For other type of Meter : MOC as per OIML R137 | |
| | 24 | Other Internal Parts | All meter internals shall be non – metallic to prevent from tampering like magnet. | |
| | 25 | Back-run Stop | Required to prevent the meter from running backwards in case of tampering or back flow condition. | |
| | 26 | Transmission Rate | For Diaphragm Meter: 0.01 m ³ / rotation for G4 & G6 and 0.10 m ³ / rotation for G10-G25. For other types of Meter: Vendor to specify. | |
| | 27 | Transmission System | Tamperproof | |
| Index | 28 | Max. Index Reading | 8 Digit index with auto reset facility | |
| | 29 | Unit of Measurement | CM (Cubic meter) | |
| | 30 | Ingress Protection | IP-54 or better | |
| Meter | 31 | Reverse Flow Restriction | Meter shall be provided with a device in the outlet to prevent reverse flow. | |
| | 32 | Over-flow Protection Device | For Diaphragm Meter : Restriction Orifice (RO) required at downstream of meter. For other types of Meter : Vendor to specify. | |

| S No. | Meter Type | End Connections * | C-C Distance * | Min / Max. Flow (At Actual Conditions) |
|-------|------------|-------------------|----------------|--|
| 1 | G-4 | DN 20 / 3/4" NPT | 110±2 mm | 0.04 / 6.0 m ³ /hr |
| 2 | G-6 | DN 25 / 1" NPT | 250±2 mm | 0.06 / 10.0 m ³ /hr |
| 3 | G-10 | DN 40 / 1 ½" NPT | 250±2 mm | 0.10 / 16.0 m ³ /hr |
| 4 | G-16 | DN 40 / 1 ½" NPT | 280±2 mm | 0.16 / 25.0 m ³ /hr |
| 5 | G-25 | DN 50 / 2" NPT | 335±2 mm | .25/40.0 m ³ /hr |

Notes:

| | |
|---|---|
| 1 | Vendor to specify. * |
| 2 | Type Approval Certificate and Weights & Measures Certificate along with Model & Make information shall be provided for meters supplied. |
| 3 | Calibration certificate (original + soft copy) shall be provided to CUGL. One copy of the certificate shall be provided within the packing box of each meter. |
| 4 | Meters shall be provided with brass adaptors with free loose nut & PTFE washer (2mm) for converting the port size to 1" NPTM for inlet / outlet end connection. Spare washer (5 pairs) shall be provided with each meter. |

| | | |
|--|--|---|
| | QUALITY ASSURANCE PLAN FOR GAS METERS | Project : City Gas Distribution Project in Kanpur, Unnao, Bareilly & Jhansi |
| | | Client : CUGL |
| | | Consultant : |
| | | QAP. No.: |
| | | Rev No. |
| | | Date 29.11.18 |

| S.No | Components & Operations | Description of Test | Category | Extent of Check | Ref. Doc. & Cl.no. | Acceptance Criteria | Format of Record | Inspection | | Remark |
|------|-------------------------|--------------------------------------|---|-------------------|---------------------|--------------------------|-----------------------|--------------|------|-------------------------------------|
| | | | | | | | | Manufacturer | TPIA | |
| 1 | Body & internal parts | Material of Body & Trim | Physical properties/ Chemical composition | 1 sample per heat | Approved data sheet | Applicable Material std. | Material test Reports | P | R | |
| 2 | Assembly | Dimension-Size,rating,end connection | visual | 100% | Approved drwg/doc | Approved drwg/doc | Inspection Format | P | R | |
| | | Degree of protection | Test | 10% | Approved data sheet | Applicable standard. | Test report | P | R | |
| | | Body Hydro Test | Test | 100% | Approved data sheet | No leakage | Test report | P | R/W | At least 5% to be witnessed by TPIA |
| | | Calibration, accuracy | Test | 100% | Approved data sheet | Approved data sheet | Test report | P | R/W | At least 5% to be witnessed by TPIA |
| | | Functional test | Test | 100% | Approved data sheet | Approved data sheet | Test report | P | R/W | At least 5% to be witnessed by TPIA |

LEGENDS: R - Review, W - Witness, P - Perform, TPIA - Third Party Inspection Agency, R/W-Review and witness

Notes: -

- 1) The above mentioned testing and acceptance criteria are minimum requirements , however , supplier shall ensure that the product also comply to the additional requirements as per technical specifications and data sheets.
- 2) The supplier shall submit their own detailed QAP prepared on the basis of the above for approval of Owner / Owner's representative and TPIA.
- 3) TPIA shall have right to inspect minimum 10% of all manufacturing activities on each day or as apecified above.
- 4) TPIA along with Owner / Owner's representative shall review / approve all the documents related to QAP / Quality manuals Drawings etc. submitted by supplier.
- 5) TPIA shall also review the test certificates submitted by the manufacturer.
- 6) Supplier shall in coordination with sub vendor shall issue detailed production and inspection schedule indicating the dates and the locations to facilitate Owner / Owner's representative to organise Inspection.
- 7) Supplier shall submit their own Detailed QAP and meter index format Duly Signed and Stamped.
- 8) Supplier shall submit their own Detailed meter Nameplate ID/Facia Plate (For CUGL Name & Logo on meter body) format Duly Signed and Stamped.
- 9) TPIA shall review all the reports 100%.