

Section 7. Technical Specifications

IFT NO. PD.2312/399-MECD/TM/RE.

TURBINE METER

1. GENERAL :

1.1 Type of Meter : Turbine type gas meter for custody transfer according to OIML R 137-1&2(2012(E)) / AGA 7 /EN 12261/MID/ISO 9951.

1.2 Certification

: 1.2.1 Type approval

Offered meter shall be approved for custody transfer application of natural gas by NMI/PTB/CEESI/SWRI /Measurement Canada under the provision of AGA 7/ OIML R 137-1&2(2012(E)) / EN 12261/ MID/ ISO 9951. The bidder must attach valid and complete **Type Test** certificate along with the offer. The **Type Test** must be on the same design; otherwise the offer shall be treated as **non-responsive**.

1.2.2. Quality Assurance: ISO 9001

1.2.3. Environmental system: ISO 14001 &

1.2.4. Occupational Health & Safety: OHSAS 18001

Current and valid certificates of the Meter manufacturer must be submitted with the offer.

1.2.5. Factory Calibration Certificate

As per ISO 9951/ AGA 7/ OIML R-137-1&2-2012(E)/ EN 12261/ MID. Calibration certificates must be supplied with each meter.

1.3 Warranty : 1(one) year Manufacturer's warranty from the date of supply.

1.4 Proven Track Record : 5(five) years proven experience record evidencing supply and satisfactory performance certificate of the offered meters in at least a single country other than manufacturer's own country. Copy of such documents like work order, LC and end user certificate must be submitted with offer, otherwise the offer shall be treated as **non-responsive**.

2. OPERATING CONDITIONS:

2.1 Type of Gas : Natural Gas (non-corrosive) with Specific gravity = 0.57 ~ 0.6 (air =1.0) and water content not more than 7 lbs/MMSCF and condensate not more than 2 US gallons per MMSCF.

2.2 Pressure rating : As mentioned against each item in the Material Schedule

2.3 Operating Temperature : 0° C ~ 60° C

2.4 Humidity : 98% maximum, non-condensing

3. DESIGN AND MATERIAL REQUIREMENTS:

- 3.1 Body : Ductile iron or Steel.
- 3.2 Turbine wheel : Aluminum.
- 3.3 Flow conditioner & Straightening Vane/
Multistage Flow conditioner : Built-in (made of Aluminum/Aluminum Alloy/
Stainless Steel/ Bronze/ reinforced
material/RPTFE or equivalent) to be fitted
directly at the meter inlet for eliminating
turbulence, swirl or asymmetric flow profile.
- 3.4 Index head cover : Made of aluminum alloy/stainless steel/any
suitable material.
- 3.5 Shaft & Bearing Block : Stainless Steel.
- 3.6 Gear : Stainless steel/Aluminum

4. CONSTRUCTION :

- 4.1 Meter length : 3 x Nominal Diameter.
- 4.2 Installation : Meters will operate properly on Horizontal and Vertical position
up to DN 12" and Horizontal position only for above DN 12".
- 4.3 Connection Type : Flanged, RF.
- 4.4 Connection size &
Capacity : As per Material Schedule.
- 4.5 Mechanical Index : Direct reading in cubic meter as per EN 12261 / OIML R 137-
1&2-2012(E) /AGA 7/ISO 9951 recommendation, odometer
type, 8(eight)/ 9(nine) digits(non-resettable) and fitted with low
frequency(LF) pulse output. Index head to be dust and water
proof enclosure suitable for outdoor installation according to
Protection class IP 65 as a minimum.
- 4.6 Lubrication : Meter to be equipped with lubrication pump made of chrome
plated brass or steel. Sufficient quantity of specified lubricant
should be supplied for each Meter.
- 4.7 Sealing : i)Index and other parts of the meter shall be properly sealed with
lead or other suitable metal embossed with distinct
manufacturer's trade mark to avoid any unauthorized tampering.
ii) Any pressure test point or tapping connection shall be sealed.
- 4.8 EVC installation : Meter index/body shall have incorporated with LF pulse
connecting port, pressure & Temperature sensing port for
connectivity with EVC as necessary.
- 4.9 LF/HF Pulse Sensor : Each meter must be fitted with LF sensor. All Turbine meters for
Bulk customer RMS/CGS/TBS shall be supplied with LF sensor
and HF sensor (if mentioned in the material schedule).

5. PRESSURE AND OVER LOADING TESTING:

Strength Test, Meter Leakage Test and Over loading Test shall be done as per ISO 9951/OIML R-137-1&2-2012(E)/ EN 12261.

6. PERFORMANCE CHARACTERISTICS:

- 6.1 Rangeability : 20:1 (Min)
- 6.2 Error of Indication : i) $Q_{\min} \sim 0.2Q_{\max} = \pm 2\%$ (Max)
ii) $0.2Q_{\max} \sim Q_{\max} = \pm 1\%$ (Max)
- 6.3 Repeatability : $\pm .1\%$ (Max)

7. MARKING:

Marking of data plate, direction of flow, pressure tapping, temperature tapping and pulse generator shall be as per OIML R-137-1&2-2012(E).

8. DOCUMENTS TO BE SUPPLIED WITH THE OFFER:

Without these the offer shall be treated as technically **non-responsive**.

- 8.1 Type Test Approval certificate as per clause-1.2.
- 8.2 Intrinsic safety approval certificate as per EEx ib IIC T4/T5/T6.
- 8.3 ISO 9001/ISO14001/OHSAS 18001 certificates as per clause-1.2.
- 8.4 Proven track record as per clause 1.4.
- 8.5 Authorization letter for bidder other than manufacturer.

9. DOCUMENTS TO BE SUPPLIED WITH EACH METER:

Without these the supplied meter **shall not be accepted**.

- 9.1 Factory calibration certificate as per clause 1.2
- 9.2 Certificate of conformity
- 9.3 Inspection certificate
- 9.4 Installation, Operation and Maintenance Manual (IOM) including lubrication and safety instructions.
- 9.5 Electrical Connection Scheme.

ELECTRONIC VOLUME CORRECTOR (EVC)

1. GENERAL:

1.1 Certification

: 1. Type Approval

Offered EVC shall be certified for custody transfer application of natural gas as per provision of EN12405-1/OIML R 140/ MID. Type Test must be issued by NMI/PTB/SWRI/CEESI/ Measurement Canada. Vendor must submit valid type test certificate along with the offer. The type test must be on the same design.

2. Quality Assurance: ISO 9001

3. Environmental system: ISO 14001 &

4. Occupational Health & Safety: OHSAS
18001

Current and valid certificates of the Meter manufacturer must be submitted with the offer.

5. Factory Calibration Certificate

Factory Test Certificate shall be supplied with each EVC.

Calibrated EVC should be supplied along with Calibration Certificate.

1.2 Warranty : 5(five) year's Manufacturer's warranty.

1.3 Proven Track Record : 5(Five) years proven experience record evidencing supply and satisfactory performance certificate of the offered EVC in at least a single country other than manufacturer's own country. Copy of such documents like work order, LC and end user certificate must be submitted with offer; otherwise the offer shall be treated as non-responsive.

2. OPERATING CONDITIONS:

2.1 Minimum Pressure Range: 0.9–5 bar (abs)/2-10 bar (abs), 4-20 bar (abs) for ANSI 150 Class

(as per requirement) 6-30 bar(abs) for ANSI 300 Class.

14 ~70 bar (abs) for ANSI 600

2.2 Measuring Temp Range: 0°C to + 60°C.

2.3 Specific Gravity : 0.56 - 0.6 (Air=1)

2.4 Base Condition : EVC should be configured at the following base conditions:

i) Base Pressure : 14.73 psia/1.0155 bara

ii) Base Temperature : 15°C

iii) Atmospheric Pressure : 14.73 psia/1.0155 bara

- 2.5 Humidity : 98% maximum, non-condensing.
2.6 Ambient Temperature : 0~60°C.
2.7 Hazardous Area : Zone 1 or Class 1, div 1, Temp. T4/T5/T6.

3. FUNCTIONAL CHARACTERISTICS:

- 3.1 Function: i) EVC shall be able to measure the Corrected volume, Uncorrected volume, Correction factor and Super compressibility factor with high accuracy by using Low Frequency (LF) pulse [Reed, Cyble, Wiegand, Absolute Encoder, 1R10 sensor], Pressure & Temperature inputs from the meter.
ii) EVC shall be tamper-proof.
- 3.2 Programme : Each EVC shall be loaded with suitable programme(s) to enter or retrieve data by Windows based Laptop/PC and Pocket/Handheld Computer.
- 3.3 Storage Unit : The EVC shall have sufficient memory to store measurement results (clause-3.6) until their use or to keep a trace of commercial transaction, proving proof in case of dispute. Report format shall be as per annexure A (A.1 and A.2).
- 3.4: Reliability and Protection : The medium on which data are stored must have sufficient permanency to ensure that the data are not corrupted under normal storage condition in field and memorization shall be tamper proof.
- 3.5 Calculation : EVC will calculate corrected flow by using turbine meter pulse, temperature, pressure, etc. inputs from the meter based on AGA7 (Turbine meter) and AGA8 (compressibility) calculation (Detail Calculation). Vendor must specify which *averaging technique* is incorporated in the implemented program of EVC.
- 3.6 Logging : i) Facility to store minimum 47500 logs at a time interval of 1(one) hour of 9 (Nine) different parameters (Refer to Annexure A) with time and date of the log which approximates to 180(one hundred eighty) days.
ii) Here 1(one) log means 1(one) parameter and log of 1(one) record means logs of 9 (Nine) parameters [mentioned in 3.6(i)] together with time and date.
iii) All display and logging functions are to be selectable by the user.
iv) Vendor must attach documentary evidence explaining how much memory is required for 1 log and what will be the total memory size of EVC to store the above mentioned

logs without bottlenecking of data flow and measurement under any condition.

- 3.7 Cumulative Totals: i) Standard volume cumulative counters which shall give cumulative volume since installation and configuration of EVC. This counter should be reset-proof.
ii) Measurement volume cumulative counters which shall give measurement volume since installation and configuration of EVC. This should be reset-proof.
- 3.8 Exhausted Storage Capacity : When storage is full, it is permitted to delete/over-write stored data automatically in the same order as the recording order and rules established for particular application are respected.
- 3.9 Event Log : i) any change in metrological data
ii) ID of user who changes the value with date and time stamp.
iii) Changed parameters/data/value with previous one.
iv) Other events as specified in this specification
v) 200 events for 90 days

4. CONSTRUCTION:

4.1 General: All the constituent elements of EVC shall be constructed of materials having appropriate quality to withstand the influence factors and disturbances defined in clause 12 and 13.

4.1.1 The EVC shall be constructed in such a way that any intervention, liable to influence the results of measurement, shall cause permanently visible damage to the EVC or its protective seals, and set an alarm which shall be memorized in the event register. The seals shall be visibly fixed, and easily accessible. Electronic seals shall comply with the following requirements:

- a. Access shall only be obtained by using a password or a code
- b. The last intervention, at least, shall be registered in the memory, including date and time of intervention and a specific element to identify the intervention.
- c. It shall be possible to have access to the intervention(s) registered in memory.
- d. For EVC, where the given inputs may be dismantled or replaced, all connections and interfaces between the calculator and transducers or meter should be protected by separate seals to avoid the breaking of the main metrological seal in case of component replacement. Access to parameters which take part in the determination of the measured results or to the measured results themselves shall not be possible through the disconnected points.

4.1.2 The conversion factor shall be recalculated at intervals not exceeding 15 sec. However, when no volume pulse signal/pulse has been received from the gas meter over 15 second, no calculation is required until a next signal/pulse is received.

- 4.1.3 Any interfaces and connections fitted within the EVC allowing the connection of complementary devices (Laptop/Palmtop/Handheld Computer) shall not corrupt the metrological behavior of EVC.
- 4.1.4 The interconnection and any interfaces between the calculator and the transducers are integral part of EVC.
- 4.1.5 Vendor shall specify the length and characteristics of the interconnections and of any interfaces where these may affect the accuracy of measurement of the device.
- 4.1.6 Equipment used in hazardous areas shall meet the electrical requirements specified in appropriate standards: EN50015, EN50017, EN50020, EN60079 and prEN50039.
- 4.1.7 All constituent elements of EVC shall be constructed in such way that the compatibility of electromagnetic disturbances conform the requirements specified in EN55011.
- 4.1.8 Casing shall meet the requirements concerning the security of the equipment as specified in EN60950-1.
- 4.2 Casings:** The casing of all constituent elements of EVC shall have ingress protection IP65 as specified in EN60529 (as minimum).
- 4.3 Indications/Display:** Alpha-numeric LCD display with minimum 04 nos. action keys (Enter, Esc, Up, Down) and two lines of display.
- 4.3.1 The EVC shall be fitted with a display that indicates:
- The incremented Volume at base/standard condition V_b .
 - The incremented total base/standard Volume (Normal+Alarm Condition) V_{bTotal} .
 - The incremented volume at measurement condition V_m
 - The incremented total measurement volume (Normal+Alarm Condition) V_{mTotal} .
 - The conversion factor C
 - The parameter measured by the transducers (e.g. pressure P in bara and temperature T in °C or as per user defined)
 - The correction factor Cr if applicable
 - The entered data which affect the metrological result
 - Gas properties used in Z computation
 - The serial number of the transducers as appropriate.
 - The upper and lower limit of measured pressure and temperature
 - The value of one volumetric pulse at measurement condition in the form:

$$_1 \text{ imp} = _ m^3$$

$$_1 m^3 = _ \text{ imp}$$
 - The parameters for gas meter error correction curve if applicable
 - The indication of the end of battery-life defined in clause-5.4
 - Alarms indications those defined in clause-6.0

4.3.2 The volume at base condition shall be preferentially displayed.

4.3.3 The method by which the quantities described in 4.3.1 may be displayed on the display of the EVC shall take either of the following forms:

- a. by means of direct operator input e.g. depression of action keys of EVC. If after 225s there has been no operator input, the display shall revert to showing the volume at base condition.
- b. by means of automatic and sequential scrolling through the quantities that may be continuous, or initiated by an operator input. In this case the display shall show each parameter for 10 seconds and the volume at base conditions shall be shown every 15 second.

4.3.4 The identification and the unit of each quantity or parameter shall be clearly shown next to display unit.

Example: Volume at base conditions, Vb---- Sm3

4.3.5 The indicating device shall have at least 4 significant digits after decimal.

4.3.6 Display module of EVC

4.3.6.1 The device indicating the volume and other parameters shall be provided with means for checking to ensure that the display is operating correctly.

4.3.6.2 When all the digits of indicating device are not used for the indication of volume, every unused digit to the left of significant digit shall indicate zero.

4.3.2.5 The display when not required to be seen shall go into sleep-mode (power safe mode). A push key or button or any key depression shall reinitialize the display.

4.3.2.6 The scrolling of data on display should be configurable.

4.4 Pressure Sensor/Transducer:

Pressure Sensor should be selected and installed to cover the whole individual operating pressure range. The pressure transducer shall be sealed in such a way that the sensor element cannot be changed or tempered without breaking the sealing.

4.4.1 Accuracy: 0.2% of measured value.

4.4.2 Pressure Range: To be mentioned in material schedule.

4.4.3 Each pressure sensor shall be permanently marked at least with the following information in legible and visible characters:

- a. Type approved mark and number
- b. The identification mark and name of manufacturer
- c. Serial number and year of manufacture
- d. Transducer denomination (General purpose or specific).
- e. Measurement Range.
- f. The hazardous area classification of the transducer
- g. The indication of reference to the standard it complies with.

4.5 Temperature Transducer/Element (PRT):

Temperature element/ transducer shall be protected from corrosion, the ingress of moisture, mechanical and thermal stress. The PRT is preferably fitted with 4 leads. The cable resistance which influences the metrological behavior of temperature measurement shall be taken.

4.5.1 Accuracy: 0.1% of measured value

- 4.5.2 Range: 0~60°C
- 4.5.3 The insulation resistance shall be at least 100 MΩ
- 4.5.4 The heat dissipation shall be less than or equal to 0.1mW.
- 4.5.5 The nominal resistance R_o of PRT at 0°C shall not be less than 100Ω/500Ω/1000Ω.
- 4.5.6 Each PRT shall bear the following markings in the protective sheath or on a label attached to it.
 - a. Type designation
 - b. Serial number and year of manufacture
 - c. Nominal resistance at 0°C
 - d. Range of operating temperature
 - e. EVC Class/Type
 - f. Manufacturer Trade mark
 - g. Identification of lead.

4.6 Inputs for volume conversion

- 4.6.1 The EVC shall have an input that shall be able to process pulse signal from associated gas meter. The input shall respond to every pulse in such a manner that no pulses are gained or lost by EVC.
- 4.6.2 The vendor shall specify the pulse input characteristics of EVC and the maximum frequency.
- 4.6.3 The interfaces between calculator/CPU unit and the transducer shall be specified in terms of all parameters that may influence that measurement.
- 4.6.4 The pulse pickup cables shall be connected to a suitable connector with following as minimum:
 - 4.6.4.1 Shall be shielded, IP66, double seal and explosion proof.
 - 4.6.4.2 Excellent 360° EMI shielding.
 - 4.6.4.3 Straight or right angle connector.
- 4.7 All cabling (with braided metal shielded cover) shall be approved for the class of service and installed according to standard. All cabling shall be shielded from environmental elements and from outside electrical interference.
- 4.8 Meters can often be the subject to considerable periods of time where there is no flow. During such periods, conventional LF pulse output will, in effect, be operating at 0 Hz. Conversely, at maximum flow rate, a typical meter's LF output could rise to 4 Hz or above. Any Pulse input circuitry in EVC will have to be capable of dealing with such frequency ranges.

5. POWER/BATTERY:

- 5.1 All the constituent elements of the conversion device powered by replaceable battery (ies) shall work for a minimum of 05 years without replacing the battery (ies) under the following conditions:
 - Maximum of all frequency inputs(LF):

- $T_{amb.min}$
 - P_{max} and T_{min} .
 - Volume update, calculation and scan of input @10 second and log @60 minute
- 5.2 Vendor shall specify the type of the battery and whether the battery can be changed in a hazardous area and if so, under which conditions.
 - 5.3 The battery compartment shall be protected to prevent unauthorized access. Batteries shall be replaced only after the breaking of a seal different from the metrological seal.
 - 5.4 An indication shall be provided when 10%, of the life, or estimated life of the battery is remaining. When the estimated life is calculated, the calculation shall be done taking into account the actual operating conditions specified by the purchaser.
 - 5.6 During the battery exchange the following information shall be retained:
 - a. The volume at base condition
 - b. The volume at measurement condition
 - c. The alarm indication
 - d. The entered data which affect the metrological result
 - e. The last intervention
 - 5.7 Provision for back up battery (ies) to support during replacement of the main battery(ies) in the field.

6. **SECURITY DEVICES AND ALARM:**

- 6.1 The device shall be capable of detecting:
 - a. if any of the measured or calculated values is outside the specified measurement range
 - b. if the instrument operates outside the limits of validity of the computing algorithm.
 - c. If any of the electrical signals are outside the range of inputs of EVC
 - d. An expiring battery
- 6.2 With the exception of an expiring battery, as long as such a defective operation is detected by EVC, any further increase of the volume at base condition shall not be permitted. The recording of volume at measurement conditions and base condition shall be stored in separate memory/register for audit/bill purpose.
- 6.3 The base volume under Pressure and Temperature Alarm Condition shall be calculated considering the following reference pressure and temperature:
 - (a) Pressure Backup Value/Substitute Value/Keypad Value/Fall back Value/Fixed Value= Pressure Sensor Lower Threshold Value/Pressure Sensor Lower Limit.
 - (b) Temperature Backup Value/Substitute Value/Keypad Value/Fall back Value/Fixed Value= 15°C
 - (c) The function describing under 6.3 (a) and 6.3 (b) shall be kept active and to be factory set as default.

- 6.4 Data Calculation, Storage and co-coordinating shall follow the below set of rules provided that it applies clause 6.2-6.3.

Parameter	Normal Condition	Alarm Condition
Uncorrected Volume (Normal)	Increase	Stop
Uncorrected Volume (Alarm)	Stop	Increase
Corrected Volume (Normal)	Increase	Stop
Corrected Volume (Alarm)	Stop	Increase
Total Uncorrected Volume = Uncorrected Volume (Normal)+ Uncorrected Volume(Alarm)	Increase	Increase
Total Corrected Volume= Corrected Volume (Normal)+ Corrected Volume (Alarm)	Increase	Increase

7. **OTHERS FEATURE OF EVC:**

- 7.1 Parameters and programmed constant shall be stored in EEPROM/non-volatile memory.
- 7.2 Facility to enter and access LIVE and stored data and configuration through external laptop/PC with different levels of password.
- 7.3 Gas composition can be entered from Keypad as well as Laptop.
- 7.4 EVC must be fitted with de-bouncing circuit in order to nullify the bouncing signal that might come from reed contact of turbine meter.
- 7.5 Without proper password and breaking metrological seal none can change or alter setting/data of EVC (Art-7.11) which directly influences the metrology.
- 7.6 Whenever anybody logs in EVC, the incident shall be stored as event log with password level, date and time stamping.
- 7.7 The EVC must be able to continue calculation on PRESET/KEYPAD/FALL BACK/FIXED/DEFAULT value in case of pressure and/or temperature sensor failure but calculated value will be stored in separate counter under alarm condition.
- 7.8 The EVC shall continue to work up to the moment when the battery is fully discharged.
- 7.9 EVC must be able to continue flow measurement even when downloading/ uploading of data is going on.
- 7.10 EVC shall be compatible for automatic meter reading or data acquisition through GSM/GPRS/PSTN or lease line (AMR/AMI).
- 7.11 The following parameter/constant shall be protected under Calibration/ Metrological seal which can be configured by user in field/Test lab.
 - a. Contact Hour
 - b. K-Factor/Pulse factor
 - c. Base Pressure and Temperature (none should be able to change in field)

- d. Keypad/ Preset value
 - e. Volume Adjustment
 - f. Display Configuration
 - g. Memory Reset
 - h. Compressibility selection
 - i. Gas composition used in Z factor calculation
 - j. Meter number
- 7.12 User Lock: Under user lock following parameters shall be under user lock:
- a. Date & Time Adjustment
 - b. Customize Name, Address, Customer No., Meter No., etc.
- 7.13 Alarm Reset: The alarm can be reset either through Keypad or laptop and 'alarm reset' action is allowed according to data access right only.
- 7.14 Instantaneous uncorrected/measurement value shown by EVC shall be same as the reading of mechanical index of turbine meter at that particular instant with the provision of volume adjustment.
- 7.15 The EVC must allow the user to access archive/measurement data or configuration data other than the manufacturer's data under any condition either normal or alarm condition with proper password.
- 7.16 Port: The EVC shall have provision of minimum 2(two) ports as follows:
- i) One infrared (Optical) communication port for data retrieval from the EVC by Pocket computer /handheld computer/Laptop Computer/Palmtop Computer.
 - ii) One RS-232/485 port for Remote data retrieval from the EVC through GPRS/GSM/PSTN or lease line.

8. HOUSING

Dust and water proof enclosure suitable for outdoor installation according to protection class IP65 as a minimum.

9. MOUNTING :

- i) EVC firmly fixed/mounted on the top of the Mechanical index of the meter and to be easily removable whenever necessary.
- ii) All the sensor lines/port (LF pulse, pressure and Temperature) of EVC shall be fitted with the meter body and shall be supplied in a complete set.

10. DATA PLATE:

Each EVC shall bear, in a group, as a data plate, at least the following information:

- a. Type approval mark and number.
- b. Manufacturer's trade mark and/or trade name.
- c. The serial number of the EVC and year of manufacture.
- d. Accuracy:
- e. The working pressure:
- f. The working temperature:

- g. Density range:
- h. Voltage:
- i. Calculation Method:
- j. Software/Firmware version:
- i. The number of standard it complies with:
- k. Area condition: Class1, Division-1, T5.
- l. Base Pressure and Temperature.

11. ACCESSORIES:

- 11.1 Manuals & CD : i) The Installation, Operating, Commissioning and Maintenance manuals to be supplied with each EVC.
ii) All software manuals to be supplied with each EVC.
- 11.2 Data Cables : i) Infrared (optical) communication cables with interface/converter (if required) units shall be supplied to upload software to the EVC and to download data from/to Laptop/ PC/ Pocket Computer. The PC end of the data cable shall be USB (3.0) compatible and EVC end is vendor standard. **The quantity shall be as per requirement.**
ii) RS-232/485 Communication cable shall be supplied with each EVC for remote data retrieval (AMR/AMI) through GPRS/GSM/PSTN or lease line. **The quantity shall be as per requirement.**
- 11.3 Software : Original Windows Win7 and above based operating software of EVC for configuration, diagnostic, down loading and reporting of data. The EVC software shall be run on windows 7 and above based software operating system. No DEMO software is acceptable. **The quantity shall be as per requirement.**

12. INFLUENCE FACTORS:

- 12.1 Ambient temperature (dry heat and cold)-Ref documents: EN60068-2-1 to 60068-3-1
- 12.2 Damp heat, steady state- Ref documents: EN60068-2-78.
- 12.3 Cyclic damp heat- Reference Documents: EN60068-2-30.
- 12.4 Electrical power variation-Reference documents: EN61000-4-11/Test Bench Standard.
- 12.5 Effect of vibration-Reference documents: EN60068-2-64, Severity Level-2.
- 12.6 Effects of shock (mechanical) - Reference Documents: EN60068-2-31, Severity Level-2.

13. DISTURBANCE FACTORS:

13.1 Short time power reduction-Reference Documents: EN61000-4-11, Severity Level-2.

13.2 Electrical burst- Reference Documents: EN61000-4-4.

13.3 Electromagnetic susceptibility-Reference Documents: EN61000-4-3,SeverityLevel-3.

13.4 Electrostatic discharge-Reference Documents: EN61000-4-4, 6, Severity Level-4.

13.5 Overload of pressure- Test Bench Standard.

13.6 Overload of pressure (mechanical) - Test Bench Standard.

ANNEXURE A

REPORT FORMAT

A.1 Daily Data Report @ hourly flow

Customer Name: XY, Location: xxxxxx, Customer ID: xxxxxxxx

Meter number: xxxxxxxx EVC Number: xxxxxxxx

Pulse Factor: x pulse/m3

Date: dd/mm/yyyy Period: dd/mm/yyyy 08:00 to dd/mm/yyyy 08:00.

Date	Time	V _m (m3)	V _{mAlarm} (m3)	V _{mTotal} (m3)	V _b (Sm3)	V _{bAlarm} (Sm3)	V _{bTotal} (Sm3)	Pavg.Hr bara	Tavg.Hr °C
01.01.2010	08:00	--	--	--	--	--	--		
01.01.2010	09:00	--	--	--	--	--	--		
01.01.2010	10:00	--	--	--	--	--	--		
----	----	--	--	--	--	--	--		
01.02.2010	08:00	--	--	--	--	--	--		

A.2 Monthly Data Report@ daily flow

Customer Name: XY, Location: xxxxxx, Customer ID: xxxxxxxx

Meter number: xxxxxxxx EVC Number: xxxxxxxx

Pulse Factor: x pulse/m3

Date: dd/mm/yyyy Period: dd/mm/yyyy 08:00- dd/mm/yyyy 08:00.

Date	Time	V _m (m3)	V _{mAlarm} (m3)	V _{mTotal} (m3)	V _b (Sm3)	V _{bAlarm} (Sm3)	V _{bTotal} (Sm3)	Pavg.Day bara	Tavg.Day °C
01.01.2010	08:00	--	--	--	--	--	--	--	--
02.01.2010	08:00	---	--	--	--	--	--	--	--
----	----	--	--	--	--	--	--	--	--
01.02.2010	08:00	--	--	--	--	--	--	--	--

Here,

V_m = Uncorrected Volume under normal operation;

V_{mAlarm} = Uncorrected Volume under alarm operation;

V_{mTotal} = Total Uncorrected Volume = V_m + V_{mAlarm};

V_b = Corrected Volume under normal operation;

V_{bAlarm} = Corrected Volume under alarm operation;

V_{bTotal} = Total Corrected Volume = V_b + V_{bAlarm};

Pavg = Average Pressure;

Tavg = Average Temperature;

Special Note:

1. The following clauses shall be checked for preliminary technical evaluation of the bid/offer and the bidder shall comply with the same as minimum:

- a. For Turbine meter: Clause-1, Clause-2, Clause-3, clause-4, clause-9.
- b. For EVC: Clause-1, Clause-2, Clause-3.1~3.6, 3.9, Clause-4.2,4.3,4.3.4, 4.8, Clause 6, Clause-7.1~7.10, 7.15.

2. After primary technical evaluations, all eligible/technically qualified bidders shall be invited to conduct a demonstration on the offered Turbine Meter and EVC. In demo session, any device fails to comply with the technical specifications (Turbine Meter & EVC) shall be liable for rejection/ technically non-responsiveness without opening their financial offer. In demo session, while one bidder will conduct the session the other invited bidders (if any) will be present to witness the session along with the Technical/Tender Committee. The other bidder has the every right to raise question if they find any anomaly in the demo session of other with respect to technical specifications.