

GENERAL SPECIFICATION

INSTRUMENTATION

GS EP INS 112

Design and supply of gas custody transfer metering units

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1. Scope

This document defines the minimum requirements for the design and supply of gas metering units intended for custody transfer points, for allocation or sale purposes.

This specification applies to continuous transfer (pipeline metering) of single phase gas with no liquid and no solid particles.

Metering design and supply shall also be in accordance with principles and operational metering requirements described in the project metering philosophy document.

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
IEC 60079	Parts related to the Electrical apparatus for explosive gas atmospheres
ISO 17025	General requirements for the competence of testing and calibration laboratories
ISO 17089-1	Measurement of fluid flow in closed conduits-ultrasonic meters for gas - Part 1: Meters for custody transfer and allocation
ISO 5167	Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - Part 1: General principles and requirements - Part 2: Orifice plates
ISO 5168	Measurement of fluid flow - Evaluation of uncertainties
ISO 9951	Measurement of gas in closed conduits. Turbine meters
ISO/CEI guide 98-1	Introduction to the expression of uncertainty in measurement
IML R 137-1	Legal Metrology: Gas meters - Part 1: Requirements

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Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

Reference	Title
GS EP COR 350	External protection of offshore and coastal structures and equipment by painting
GS EP ECP 103	Process sizing criteria
GS EP ELE 079	Electrical apparatus for potentially explosive gas atmospheres
GS EP INS 101	Instrumentation engineering, supply and construction general requirements
GS EP INS 110	Instrumentation for package units
GS EP INS 900	Instrument hook-up diagrams
GS EP PVV 112	Piping material classes
GS EP PVV 142	Valves
GS EP PVV 211	Design and fabrication of pressure vessels according to ASME VIII
GS EP PVV 771	Thermal insulation (hot service)

3. Basis for metering system design

Design of gas custody transfer metering systems shall be performed in compliance with:

- Local regulations
- Contracts and agreement in force
- Uncertainty target
- Process conditions (pressure, temperature, flow rate ranges), pressure drop in the custody transfer metering system, maximum velocity
- Fluid properties and analysis (gas composition, water content, dew point pressure, erosion or deposition risks, etc.)
- Location
- Installation constraints.

4. Standards

ISO shall be used. AGA or API equivalent standards can be used in addition for some specific points or if there are specific requirements due to regulations or agreements. For a better consistency, it is recommended to select for the design of the metering unit either one, or the other standard, without mixing them.

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5. Units and base conditions

ISO units and reference conditions shall generally be used:

- Standard volumes Sm^3 at 15°C and 1.01325 bar abs
- Mass tons
- Energy MJ or GJ

Others units can be used if required by local regulations or specific agreements.

6. Metering system uncertainty for measured quantities

6.1 Quantity measurements

Global uncertainty to be obtained on quantity for the total metering unit shall range between 0.5% maximum for high accuracy systems and 1%.

On a case by case basis, higher uncertainties may be specified and accepted by Company (reference shall be made to specific Metering Philosophy) to comply with economical conditions and financial risks.

The global metering uncertainty on mass, volumes and energy indicated here below should include:

- The uncertainties of the instruments and analysers (that are supposed to be calibrated according to the Manufacturer's specifications)
- The uncertainty caused by flow disturbances
- The uncertainty in the models and the calculations.

Uncertainty calculation of the metering skid shall be compliant with [ISO 5168](#) and [ISO/CEI guide 98-1](#).

6.2 Calorific value

The accuracy shall be better than 0.2%.

In case an ultrasonic meter is used, the calorific value shall not be based on the value provided by the meter, but based on the composition analysis from a gas chromatograph.

7. Flow measurements technology

Metering technologies acceptable for gas custody transfer are:

- Differential pressure measurement using orifices
- Time of flight Ultrasonic flow meter
- Turbine gas meters (refer to the end of this section).

The selection of the raw volume measurement devices shall be made using a unit equipped with orifice plates as a base case.