Manual of Petroleum Measurement Standards Chapter 14.13

Simplified Metering System Design and Performance-based Methodology for Non-custody Gas Measurement

FIRST EDITION, OCTOBER 2022

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This standard, API *MPMS* Ch. 14.13, *Simplified Metering System Design and Performance-based Methodology for Non-custody Gas Measurement*, First Edition, supersedes API Technical Report 2571, *Fuel Gas Measurement*, which is withdrawn.

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Introduction

This document is not intended to be used for custody applications. Other API standards contain more stringent requirements when employing any measurement device for custody measurement applications.

This document provides a simplified performance-based methodology for gas measurement and reporting. Specifically, considerations are provided for measurement device selection, installation, maintenance, calibration, and documentation to achieve a targeted performance.

This document can be used for a single or multiple gas meter system. Techniques are described to assess the uncertainty contribution of individual components and a facility system's total non-custody gas measurement uncertainty.

This document addresses the more common gas measurement devices. This document does not advocate the use of these devices or preclude the utilization of other types of devices, provided the targeted performance is achieved.

This document includes a brief description of the working principles of different types of gas meters and their influence parameters, installation recommendations, a uniform method to ascertain the measurement uncertainty, a recommended method to determine the frequency of maintenance, performance verification or calibration of the meter and secondary instruments, and other relevant and necessary information.

Gas can be measured by different types of flow meters. The selection of a meter typically depends on several factors such as the following:

— desired accuracy for the application;

— desired accuracy verification capability (i.e. calibration, inspection, replacement);

— life expectancy;

— operating conditions and their variability—flow rate, pressure, temperature, gas composition/density, etc.;

— cost of ownership;

— operational requirements;

— regulatory requirements.

Listed below are different flow meters that are typically installed to measure the non-custody gas flows in the industry. The selection of the gas meter by the user may include other types of meters not included in this list:

— differential pressure or head-type flow meters;

— displacement flow meters;

— turbine flow meters;

— thermal dispersion flow meters;

— Coriolis force flow meters;

— ultrasonic flow meters;

— vortex flow meter.

Simplified Metering System Design and Performance-based Methodology for Non-custody Gas Measurement

1 Scope

This document, for single-phase gas measurement, provides guidance in the following areas to allow the user to achieve a targeted uncertainty of measurement:

— selection of flow meter type: differential pressure, displacement, ultrasonic, Coriolis, vortex, turbine, thermal, and others;

— associated instrumentation for measuring fluid properties and flowing conditions, such as pressure and temperature transmitters, densitometers, gas chromatographs;

— obtaining and use of gas composition or other analytical data;

— design and installation requirements of the measurement system;

— inspection, verification, and calibration practices of flow meters and their associated accessory instrumentation;

— simplified uncertainty calculations with examples to illustrate the methodology.

2 Normative References

This document contains no normative references. A list of documents associated with API *MPMS* Ch. 14.13 is included in Bibliography.

3 Terms, Definitions, Acronyms, and Abbreviations

3.1 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1
accuracy
The closeness of agreement between a measured quantity value and a true quantity value of a measurand.

3.1.2
calibration process
The process or procedure of adjusting an instrument so that its indication or registration is in satisfactorily close agreement, within acceptable tolerances, with a reference standard.

3.1.3
carbon content
The fraction of carbon in the fluid expressed as percent by weight.

3.1.4
compensation to a reference condition
The adjustment of the measured value to reference conditions (e.g. pressure compensation).

3.1.5
flowing compressibility
The compressibility of the fluid at actual flowing temperature and pressure.