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Measurement of fluid flow in closed conduits — Guidance to the selection, installation and use of Coriolis flowmeters (mass flow, density and volume flow measurements)

Mesure de débit des fluides dans les conduites fermées — Lignes directrices pour la sélection, l'installation et l'utilisation des mesureurs à effet Coriolis (mesurages de débit-masse, masse volumique et débit-volume)



Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 30, *Measurement of fluid flow in closed conduits*, Subcommittee SC 5, *Velocity and mass methods*.

This third edition cancels and replaces the second edition (ISO 10790:1999), which has been technically revised. It also incorporates the Amendment ISO 10790:1999/Amd 1:2003.

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Introduction

This International Standard has been prepared as a guide for those concerned with the selection, testing, inspection, operation, and calibration of Coriolis flowmeters (Coriolis flowmeter assemblies). A list of related International Standards is in the Bibliography.

This International Standard provides the following:

a) description of the Coriolis operating principle;

b) guideline to expected performance characteristics of Coriolis flowmeters;

c) description of calibration, verification, and checking procedures;

d) description of potential error sources;

e) common set of terminology, symbols, definitions, and specifications.

The next paragraphs contain an explanation of when to use the measurement terminology, uncertainty, and accuracy.

The VIM definition (see 3.2) of accuracy: closeness of agreement between a measured quantity value and a "true quantity value" of a measurand. Per the VIM, accuracy is a quality and should not be given a numerical value.

To understand the preceding paragraph, one needs to understand that a "true quantity value" does not exist. The best that can be done is to determine the measured quantity value with measurement instrumentation calibrated with a very good but imperfect reference. Therefore, the measurement is an estimate. Uncertainty is used to define these measurement estimates (see 3.2.2).

Many Coriolis manufacturers use accuracy and zero stability as part of their published performance specifications. The manufacturer's accuracy specification includes repeatability, hysteresis, and linearity but can also include other items that might be different for each manufacturer.

This International Standard will use uncertainty to quantify the results of a flow measurement system. This International Standard will only use accuracy when it is very clear that it is referring to or using all or part of the manufacturers published specifications.

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Measurement of fluid flow in closed conduits — Guidance to the selection, installation and use of Coriolis flowmeters (mass flow, density and volume flow measurements)

1 Scope

This International Standard gives guidelines for the selection, installation, calibration, performance, and operation of Coriolis flowmeters for the measurement of mass flow and density. This International Standard also gives appropriate considerations regarding the type of fluids measured, as well as guidance in the determination of volume flow and other related fluid parameters.

NOTE Fluids defined as air, natural gas, water, oil, LPG, LNG, manufactured gases, mixtures, slurries, etc.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5168, *Measurement of fluid flow — Procedures for the evaluation of uncertainties*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

ISO/IEC Guide 99:2007 (JCGM 200:2012), *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

3 Terms and definitions

3.1 Definitions specific to this Coriolis flowmeter standard

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

3.1.1
Coriolis flowmeter
device consisting of a flow sensor (primary device) and a transmitter (secondary device) which measures mass flow and density by means of the interaction between a flowing fluid and the oscillation of a tube or tubes

Note 1 to entry: This can also provide measurement of the tube(s) temperature.

3.1.2
flow sensor (primary device)
mechanical assembly consisting of an oscillating tube(s), drive system, measurement sensor(s), supporting structure, and housing

3.1.3
transmitter (secondary device)
electronic control system providing the drive electrical supply and transforming the signals from the flow sensor to give output(s) of measured and inferred parameters

Note 1 to entry: It also provides corrections derived from parameters such as temperature.

Note 2 to entry: The transmitter (secondary device) is either integrally mounted (compact device) on the flow sensor (primary device) or remotely installed away from the primary device and connected by a cable.

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