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Measurement of gas flow by means of critical flow Venturi nozzles

Mesure de débit de gaz au moyen de Venturi-tuyères en régime critique

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 9300 was prepared by Technical Committee ISO/TC 30, *Measurement of fluid flow in closed conduits*, Subcommittee SC 2, *Pressure differential devices*.

This second edition cancels and replaces the first edition (ISO 9300:1990), which has been technically revised.

Measurement of gas flow by means of critical flow Venturi nozzles

1 Scope

This International Standard specifies the geometry and method of use (installation in a system and operating conditions) of critical flow Venturi nozzles (CFVN) used to determine the mass flow-rate of a gas flowing through a system. It also gives the information necessary for calculating the flow-rate and its associated uncertainty.

It is applicable to Venturi nozzles in which the gas flow accelerates to the critical velocity at the throat (this being equal to the local sonic velocity), and only where there is steady flow of single-phase gases. At the critical velocity, the mass flow-rate of the gas flowing through the Venturi nozzle is the maximum possible for the existing upstream conditions while CFVN can only be used within specified limits, e.g. limits for the nozzle throat to inlet diameter ratio and throat Reynolds number. This International Standard deals with CFVN for which direct calibration experiments have been made in sufficient number to enable the resulting coefficients to be used with certain predictable limits of uncertainty.

Information is given for cases where the pipeline upstream of the CFVN is of circular cross-section, or it can be assumed that there is a large space upstream of the CFVN or upstream of a set of CFVN mounted in a cluster. The cluster configuration offers the possibility of installing CFVN in parallel, thereby achieving high flow-rates.

For high-accuracy measurement, accurately machined Venturi nozzles are described for low Reynolds number applications.

2 Terms and definitions

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

2.1 Pressure measurement

2.1.1
wall pressure tapping
hole drilled in the wall of a conduit in such a way that the edge of the hole is flush with the internal surface of the conduit

NOTE The tapping is achieved such that the pressure within the hole is the static pressure at that point in the conduit.

2.1.2
static pressure of a gas
actual pressure of the flowing gas which can be measured by connecting a pressure gauge to a wall pressure tapping

NOTE Only the value of the absolute static pressure is used in this International Standard.

2.1.3
stagnation pressure
pressure which would exist in a gas in a flowing gas stream if the stream were brought to rest by an isentropic process

NOTE Only the value of the absolute stagnation pressure is used in this International Standard.