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**Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - Part 1: General principles and requirements**

Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - Part 1: General principles and requirements

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 5167-1:2003 sisaldab Euroopa standardi EN ISO 5167-1:2003 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 06.06.2003 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 5167-1:2003 consists of the English text of the European standard EN ISO 5167-1:2003.</p> <p>This document is endorsed on 06.06.2003 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p><b>Käsitlusala:</b> This part of ISO 5167 defines terms and symbols and establishes the general principles for methods of measurement and computation of the flowrate of fluid flowing in a conduit by means of pressure differential devices when they are inserted into a circular cross-section conduit running full</p>	<p><b>Scope:</b> This part of ISO 5167 defines terms and symbols and establishes the general principles for methods of measurement and computation of the flowrate of fluid flowing in a conduit by means of pressure differential devices when they are inserted into a circular cross-section conduit running full</p>
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**ICS** 17.120.10

**Võtmesõnad:** diaphragms, differential devices, dimensions, flow, flow calculation, flow measurement, flow measurements, flows, fluids, mathematical calculations, measurement, mounting, nozzles, orifice plates, pipelines, specification (approval), specifications, venturi tubes

English version

Measurement of fluid flow by means of pressure  
differential devices inserted in circular cross-section  
conduits running full

Part 1: General principles and requirements  
(ISO 5167-1 : 2003)

Mesure de débit des fluides au  
moyen d'appareils déprimogènes  
insérés dans des conduites en charge  
de section circulaire – Partie 1:  
Principes généraux et exigences  
générales (ISO 5167-1 : 2003)

Durchflussmessung von Fluiden mit  
Drosselgeräten in voll durchströmten  
Leitungen mit Kreisquerschnitt –  
Teil 1: Allgemeine Grundlagen und  
Anforderungen (ISO 5167-1 : 2003)

This European Standard was approved by CEN on 2003-02-20.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, the Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland, and the United Kingdom.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

Management Centre: rue de Stassart 36, B-1050 Brussels

## Foreword

International Standard

ISO 5167-1 : 2003 Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full – Part 1: General principles and requirements,

which was prepared by ISO/TC 30 'Measurement of fluid flow in closed conduits' of the International Organization for Standardization, has been adopted by CMC as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by September 2003 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, the Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland, and the United Kingdom.

## Endorsement notice

The text of the International Standard ISO 5167-1 : 2003 was approved by CEN as a European Standard without any modification.

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## Introduction

ISO 5167, consisting of four parts, covers the geometry and method of use (installation and operating conditions) of orifice plates, nozzles and Venturi tubes when they are inserted in a conduit running full to determine the flowrate of the fluid flowing in the conduit. It also gives necessary information for calculating the flowrate and its associated uncertainty.

ISO 5167 is applicable only to pressure differential devices in which the flow remains subsonic throughout the measuring section and where the fluid can be considered as single-phase, but is not applicable to the measurement of pulsating flow. Furthermore, each of these devices can only be used within specified limits of pipe size and Reynolds number.

ISO 5167 deals with devices for which direct calibration experiments have been made, sufficient in number, spread and quality to enable coherent systems of application to be based on their results and coefficients to be given with certain predictable limits of uncertainty.

The devices introduced into the pipe are called "primary devices". The term primary device also includes the pressure tapings. All other instruments or devices required for the measurement are known as "secondary devices". ISO 5167 covers primary devices; secondary devices<sup>1)</sup> will be mentioned only occasionally.

ISO 5167 consists of the following four parts.

- a) This part of ISO 5167 gives general terms and definitions, symbols, principles and requirements as well as methods of measurement and uncertainty that are to be used in conjunction with Parts 2 to 4 of ISO 5167.
- b) Part 2 of ISO 5167 specifies orifice plates, which can be used with corner pressure tapings,  $D$  and  $D/2$  pressure tapings<sup>2)</sup>, and flange pressure tapings.
- c) Part 3 of ISO 5167 specifies ISA 1932 nozzles<sup>3)</sup>, long radius nozzles and Venturi nozzles, which differ in shape and in the position of the pressure tapings.
- d) Part 4 of ISO 5167 specifies classical Venturi tubes<sup>4)</sup>.

Aspects of safety are not dealt with in Parts 1 to 4 of ISO 5167. It is the responsibility of the user to ensure that the system meets applicable safety regulations.

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1) See ISO 2186:1973, *Fluid flow in closed conduits — Connections for pressure signal transmissions between primary and secondary elements*.

2) Orifice plates with vena contracta pressure tapings are not considered in ISO 5167.

3) ISA is the abbreviation for the International Federation of the National Standardizing Associations, which was succeeded by ISO in 1946.

4) In the USA the classical Venturi tube is sometimes called the Herschel Venturi tube.

## 1 Scope

This part of ISO 5167 defines terms and symbols and establishes the general principles for methods of measurement and computation of the flowrate of fluid flowing in a conduit by means of pressure differential devices (orifice plates, nozzles and Venturi tubes) when they are inserted into a circular cross-section conduit running full. This part of ISO 5167 also specifies the general requirements for methods of measurement, installation and determination of the uncertainty of the measurement of flowrate. It also defines the general specified limits of pipe size and Reynolds number for which these pressure differential devices are to be used.

ISO 5167 (all parts) is applicable only to flow that remains subsonic throughout the measuring section and where the fluid can be considered as single-phase. It is not applicable to the measurement of pulsating flow.

## 2 Normative references

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

ISO 4006:1991, *Measurement of fluid flow in closed conduits — Vocabulary and symbols*

ISO 5167-2:2003, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full — Part 2: Orifice plates*

ISO 5167-3:2003, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full — Part 3: Nozzles and Venturi nozzles*

ISO 5167-4:2003, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full — Part 4: Venturi tubes*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4006 and the following apply.

NOTE The following definitions are given only for terms used in some special sense or for terms for which it seems useful to emphasize the meaning.

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