



# SLOVENSKI STANDARD SIST EN ISO 5167-3:2004

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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 5167-3:2003)

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Durchflussmessung von Fluiden mit Drosselgeräten in voll durchströmten Leitungen mit Kreisquerschnitt - Teil 3: Düsen und Venturidüsen (ISO 5167-3:2003)

Mesure de débit des fluides au moyen d'appareils déprimogènes insérés dans des conduites en charge de section circulaire - Partie 3: Tuyeres et Venturi-tuyeres (ISO 5167-3:2003)

Ta slovenski standard je istoveten z: EN ISO 5167-3:2003

## ICS:

17.120.10 Pretok v zaprtih vodih Flow in closed conduits

SIST EN ISO 5167-3:2004

en

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO 5167-3**

March 2003

ICS 17.120.10

Together with EN ISO 5167-1:2003,  
EN ISO 5167-2:2003 and EN ISO 5167-4:2003,  
supersedes EN ISO 5167-1:1995

English version

**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 5167-3:2003)**

Mesure de débit des fluides au moyen d'appareils  
déprimogènes insérés dans des conduites en charge de  
section circulaire - Partie 3: Tuyères et Venturi-tuyères  
(ISO 5167-3:2003)

Durchflussmessung von Fluiden mit Drosselgeräten in voll  
durchströmten Leitungen mit Kreisquerschnitt - Teil 3:  
Düsen und Venturidüsen (ISO 5167-3:2003)

This European Standard was approved by CEN on 20 February 2003.

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.

This European Standard exists 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.

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**EN ISO 5167-3:2003 (E)**

<b>CORRECTED 2003-09-03</b>
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**Foreword**

This document (EN ISO 5167-3:2003) has been prepared by Technical Committee ISO/TC 30 "Measurement of fluid flow in closed conduits" in collaboration with CMC.

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of an identical text or by endorsement, at the latest by September 2003, and conflicting national standards shall be withdrawn at the latest by September 2003.

This document, together with EN ISO 5167-1:2003, EN ISO 5167-2:2003 and EN ISO 5167-4:2003, supersedes EN ISO 5167-1:1995.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

**iTeh STANDARD PREVIEW****Endorsement notice**

The text of ISO 5167-3:2003 has been approved by CEN as EN ISO 5167-3:2003 without any modifications.

NOTE Normative references to International Standards are listed in Annex ZA (normative).

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## Annex ZA (normative)

### Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE Where an International Publication has been modified by common modifications, indicated by (mod.), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN</u>	<u>Year</u>
ISO 4006	1991	Measurement of fluid flow in closed conduits - Vocabulary and symbols	EN 24006	1993
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	EN ISO 5167-1	2003

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# INTERNATIONAL STANDARD

**ISO**  
**5167-3**

First edition  
2003-03-01

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

Part 3:

**Nozzles and Venturi nozzles**

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*Mesure de débit des fluides au moyen d'appareils déprimogènes  
insérés dans des conduites en charge de section circulaire —*

*Partie 3: Tuyères et Venturi-tuyères*

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## Contents

Page

Foreword .....	iv
Introduction .....	v
<b>1 Scope.....</b>	<b>1</b>
<b>2 Normative references .....</b>	<b>2</b>
<b>3 Terms and definitions.....</b>	<b>2</b>
<b>4 Principles of the method of measurement and computation.....</b>	<b>2</b>
<b>5 Nozzles and Venturi nozzles .....</b>	<b>3</b>
<b>5.1 ISA 1932 nozzle .....</b>	<b>3</b>
<b>5.2 Long radius nozzles.....</b>	<b>9</b>
<b>5.3 Venturi nozzles.....</b>	<b>13</b>
<b>6 Installation requirements .....</b>	<b>18</b>
<b>6.1 General .....</b>	<b>18</b>
<b>6.2 Minimum upstream and downstream straight lengths for installation between various fittings and the primary device.....</b>	<b>18</b>
<b>6.3 Flow conditioners .....</b>	<b>23</b>
<b>6.4 Circularity and cylindricality of the pipe.....</b>	<b>23</b>
<b>6.5 Location of primary device and carrier rings.....</b>	<b>24</b>
<b>6.6 Method of fixing and gaskets .....</b>	<b>25</b>
<b>Annex A (informative) Tables of discharge coefficients and expansibility [expansion] factors.....</b>	<b>26</b>
<b>Bibliography .....</b>	<b>30</b>

## ISO 5167-3:2003(E)

## 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 5167-2 was prepared by Technical Committee ISO/TC 30, *Measurement of fluid flow in closed conduits*, Subcommittee SC 2, *Pressure differential devices*.

This first edition of ISO 5167-3, together with the second edition of ISO 5167-1 and the first editions of ISO 5167-2 and ISO 5167-4, cancels and replaces the first edition of ISO 5167-1:1991, which has been technically revised, and ISO 5167-1:1991/Amd.1:1998.

ISO 5167 consists of the following parts, under the general title *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*
- Part 3: *Nozzles and Venturi nozzles*
- Part 4: *Venturi tubes*

## 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 (all parts) 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 (all parts) 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 tapplings. All other instruments or devices required for the measurement are known as “secondary devices”. ISO 5167 (all parts) covers primary devices; secondary devices<sup>1)</sup> will be mentioned only occasionally.

ISO 5167 consists of the following four parts.

- a) ISO 5167-1 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 ISO 5167-2, ISO 5167-3 and ISO 5167-4.
- b) ISO 5167-2 specifies orifice plates, which can be used with corner pressure tapplings,  $D$  and  $D/2$  pressure tapplings<sup>2)</sup>, and flange pressure tapplings.
- c) ISO 5167-3 specifies ISA 1932 nozzles<sup>3)</sup>, long radius nozzles and Venturi nozzles, which differ in shape and in the position of the pressure tapplings.
- d) ISO 5167-4 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 tapplings 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.

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

## Part 3: Nozzles and Venturi nozzles

### 1 Scope

This part of ISO 5167 specifies the geometry and method of use (installation and operating conditions) of nozzles and Venturi nozzles when they are inserted in a conduit running full to determine the flowrate of the fluid flowing in the conduit.

This part of ISO 5167 also provides background information for calculating the flowrate and is applicable in conjunction with the requirements given in ISO 5167-1.

This part of ISO 5167 is applicable to nozzles and Venturi nozzles in which the flow remains subsonic throughout the measuring section and where the fluid can be considered as single-phase. In addition, each of the devices can only be used within specified limits of pipe size and Reynolds number. It is not applicable to the measurement of pulsating flow. It does not cover the use of nozzles and Venturi nozzles in pipe sizes less than 50 mm or more than 630 mm, or where the pipe Reynolds numbers are below 10 000.

This part of ISO 5167 deals with

- a) two types of standard nozzles:
  - 1) the ISA<sup>5)</sup> 1932 nozzle;
  - 2) the long radius nozzle<sup>6)</sup>;
- b) the Venturi nozzle.

The two types of standard nozzle are fundamentally different and are described separately in this part of ISO 5167. The Venturi nozzle has the same upstream face as the ISA 1932 nozzle, but has a divergent section and, therefore, a different location for the downstream pressure tapings, and is described separately. This design has a lower pressure loss than a similar nozzle. For both of these nozzles and for the Venturi nozzle 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.

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

6) The long radius nozzle differs from the ISA 1932 nozzle in shape and in the position of the pressure tapings.