ICS 17.120.10 SLOVENSKÁ TECHNICKÁ NORMA Október 2022

STN	**Meranie prietoku plynu dýzami s kritickým prúdením (ISO 9300: 2022)**	**STN EN ISO 9300** 99 6805

Measurement of gas flow by means of critical flow nozzles (ISO 9300:2022)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 09/22

Obsahuje: EN ISO 9300:2022, ISO 9300:2022

Oznámením tejto normy sa ruší
STN EN ISO 9300 (99 6805) z marca 2006

135588

Úrad pre normalizáciu, metrológiu a skúšobníctvo Slovenskej republiky, 2022
Slovenská technická norma a technická normalizačná informácia je chránená zákonom č. 60/2018 Z. z. o technickej normalizácii.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 9300

June 2022

ICS 17.120.10

Supersedes EN ISO 9300:2005

English Version

Measurement of gas flow by means of critical flow nozzles (ISO 9300:2022)

Mesurage de débit de gaz au moyen de tuyères en régime critique (ISO 9300:2022)

Durchflussmessung von Gasen mit Venturidüsen bei kritischer Strömung (ISO 9300:2022)

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European foreword

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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of an identical text or by endorsement, at the latest by December 2022, and conflicting national standards shall be withdrawn at the latest by December 2022.

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INTERNATIONAL STANDARD

ISO 9300

Third edition
2022-06

Measurement of gas flow by means of critical flow nozzles

Mesurage de débit de gaz au moyen de tuyères en régime critique

Reference number
ISO 9300:2022(E)

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Published in Switzerland

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Foreword

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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).

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ISO 9300 was prepared by Technical Committee ISO/TC 30, *Measurement of fluid flow in closed conduits*, Subcommittee SC 2, *Pressure differential devices*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/SS F05, *Measuring instruments*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 9300:2005), which has been technically revised.

The main changes are as follows:

— the discharge coefficient curve is given by a single equation each for the toroidal- and cylindrical-throat critical flow nozzles (CFNs) that covers both the laminar and turbulent boundary layer regimes;

— the discharge coefficient curve of the cylindrical-throat CFN is updated based on the recent experimental and theoretical data;

— the quadrant CFN and detachable diffuser are introduced;

— the basic equations used to measure the discharge coefficient are listed;

— the premature unchoking phenomenon is explained to give attention to the unpredictable unchoking at low Reynolds numbers;

— REFPROP is introduced for the calculations of critical flow function and viscosity as well as their fitted curves are given for some pure gases and air;

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— the diameter correction method is introduced to fit the experimental discharge coefficient data to a reference curve;

— the detailed method to match the discharge coefficient curve on an experimental data set is described;

— the background of the specifications is given.

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INTERNATIONAL STANDARD **ISO 9300:2022(E)**

Measurement of gas flow by means of critical flow nozzles

1 Scope

This document specifies the geometry and method of use (installation in a system and operating conditions) of critical flow nozzles (CFNs) used to determine the mass flow rate of a gas flowing through a system basically without the need to calibrate the CFN. It also gives the information necessary for calculating the flow rate and its associated uncertainty.

This document is applicable to nozzles in which the gas flow accelerates to the critical velocity at the minimum flowing section, and only where there is steady flow of single-phase gas. When the critical velocity is attained in the nozzle, the mass flow rate of the gas flowing through the nozzle is the maximum possible for the existing inlet condition, while the CFN can only be used within specified limits, e.g. the CFN throat to inlet diameter ratio and Reynolds number. This document deals with the toroidal- and cylindrical-throat CFNs 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.

2 Normative references

There are no normative references in this document.

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