



**SLOVENSKI STANDARD
SIST EN ISO 4126-10:2024**

01-junij-2024

Varnostne naprave za zaščito pred prekomernim tlakom - 10. del: Velikosti varnostnih ventilov in varnostne membrane za dvofazni pretok plina/tekočine (ISO 4126-10:2024)

Safety devices for protection against excessive pressure - Part 10: Sizing of safety valves and bursting discs for gas/liquid two-phase flow (ISO 4126-10:2024)

Sicherheitseinrichtungen gegen unzulässigen Überdruck - Teil 10: Auslegung von Sicherheitsventilen und Berstscheiben bei Zweiphasenströmung (flüssig/gas) (ISO 4126-10:2024)

Dispositifs de sécurité pour protection contre les pressions excessives - Partie 10: Dimensionnement des soupapes de sûreté et des disques de rupture pour les débits diphasiques gaz/liquide (ISO 4126-10:2024)

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Ta slovenski standard je istoveten z: EN ISO 4126-10:2024

ICS:

13.240	Varstvo pred previsokim tlakom	Protection against excessive pressure
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SIST EN ISO 4126-10:2024

en,fr,de

EUROPEAN STANDARD

EN ISO 4126-10

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2024

ICS 13.240

English Version

Safety devices for protection against excessive pressure - Part 10: Sizing of safety valves and bursting discs for gas/liquid two-phase flow (ISO 4126-10:2024)

Dispositifs de sécurité pour protection contre les pressions excessives - Partie 10: Dimensionnement des soupapes de sûreté et des disques de rupture pour les débits diphasiques gaz/liquide (ISO 4126-10:2024)

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This European Standard was approved by CEN on 2 October 2023.

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 CEN-CENELEC Management Centre or to any CEN member.

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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN ISO 4126-10:2024) has been prepared by Technical Committee ISO/TC 185 "Safety devices for protection against excessive pressure" in collaboration with Technical Committee CEN/TC 69 "Industrial valves" the secretariat of which is held by AFNOR.

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 October 2024, and conflicting national standards shall be withdrawn at the latest by October 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

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According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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The text of ISO 4126-10:2024 has been approved by CEN as EN ISO 4126-10:2024 without any modification.

Annex ZA (informative)

Relationship between this European Standard and the essential safety requirements of Directive 2014/68/EU (Pressure Equipment Directive) aimed to be covered

This European Standard has been prepared under a Commission's standardization request M/601 to provide one voluntary means of conforming to essential safety requirements of Directive 2014/68/EU on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment.

Once this standard is cited in the Official Journal of the European Union under that Directive 2014/68/EU, compliance with the normative clauses of this standard given in Table ZA.1 and application of the edition of the normatively referenced standards as given in Table ZA.2 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential safety requirements of that Directive 2014/68/EU, and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Annex I of Directive 2014/68/EU

Essential Safety Requirements of Directive 2014/68/EU	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
2.11.2	6.3.3, 6.5.2, 6.5.3, 6.5.4 (except last paragraph), 6.5.6, 6.7 (paragraph 1)	Pressure limiting devices

Table ZA.2 — Applicable Standards to confer presumption of conformity as described in this Annex ZA

Column 1 Reference in Clause 2	Column 2 International Standard Edition	Column 3 Title	Column 4 Corresponding European Standard Edition
ISO 4126-7	ISO 4126-7:2013 ISO 4126-7:2013/Amd 1:2016	Safety devices for protection against excessive pressure - Part 7: Common data	EN ISO 4126-7:2013 EN ISO 4126-7:2013/A1:2016

The documents listed in the Column 1 of Table ZA.2, in whole or in part, are normatively referenced in this document, i.e. are indispensable for its application. The achievement of the presumption of conformity is subject to the application of the edition of Standards as listed in Column 4 or, if no European Standard Edition exists, the International Standard Edition given in Column 2 of Table ZA.2.

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

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International Standard

ISO 4126-10

Safety devices for protection against excessive pressure —

Part 10: Sizing of safety valves and bursting discs for gas/liquid two-phase flow

*Dispositifs de sécurité pour protection contre les pressions
excessives —*

*Partie 10: Dimensionnement des soupapes de sûreté et des
disques de rupture pour les débits diphasiques gaz/liquide*

**Second edition
2024-02**

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Published in Switzerland

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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 document 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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This document was prepared by Technical Committee ISO/TC 185, *Safety devices for protection against excessive pressure*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 69, *Industrial valves*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 4126-10:2010), which has been technically revised.

The main changes are as follows:

- opening of the method for sizing of bursting discs;
- more thorough iteration for the calculation of the flow rate;
- allowing for slip;
- allowing for velocity in the outlet line and pressure losses in front and after the safety device;
- added an example for flow rate to be discharged ([Annex B](#));
- added an example for dischargeable mass flow rate added and method to estimate pressure drop in pipe flow ([Annex C](#));
- various correction.

A list of all parts in the ISO 4126 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

ISO 4126-10:2024(en)

Introduction

Well-established recommendations exist for the sizing of safety valves and bursting discs and the connected inlet and outlet lines for steady-state, single-phase gas/vapour or liquid flow. However, in the case of a two-phase vapour/liquid flow, the required relieving area to protect a system from overpressure is larger than that required for single-phase flow when the same vessel condition and heat release are considered. The requirement for a larger relief area results from the fact that, in two-phase flow, the liquid partially blocks the relieving area for the vapour flow, by which most of the energy is removed by evaporation from the vessel.

This document includes a widely applicable method for the sizing of the most typical safety valves and bursting discs in fluid services encountered in various industrial fields (see [Table 1](#)). It is based on the omega parameter method, which is extended by a thermodynamic non-equilibrium parameter. A balance is attempted between the accuracy of the method and the unavoidable uncertainties in the input and property data under the actual sizing conditions.

In case of two-phase flow, the safety device size can influence the fluid state and, hence, the mass flow rate to be discharged. Furthermore, the two-phase mass flow rate through a safety device essentially depends on the mass flow quality (mass fraction of vapour) of the fluid at the inlet of the device. Because these parameters are, in most cases, not readily at hand during the design procedure of a relief device, this document also includes a comprehensive procedure that covers the determination of the fluid-phase composition at the safety device inlet. This fluid-phase composition depends on a scenario that leads to the pressure increase. Therefore, the recommended sizing procedure starts with the definition of the sizing case and includes a method for the prediction of the mass flow rate required to be discharged and the resulting mass flow quality at the inlet of the safety device.

The formulae of ISO 4126-7:2013/Amd 1:2016 for single-phase flow up to the narrowest flow cross-section are included in this document, modified to SI units, to calculate the flow rates at the limiting conditions of single-phase gas and liquid flow.

In this document, the unit bar for pressures is being used 100 000 Pa = 1 bar.

Table 1 — Possible fluid state at the inlet of the safety valve or bursting disc that can result in two-phase flow

Fluid state at device inlet	Cases	Examples
liquid	subcooled (possibly flashing in the safety device) saturated with dissolved gas	cold water boiling water CO ₂ /water
gas/vapour	near saturated vapour (possibly condensing in the safety device)	steam
gas/liquid	vapour/liquid non-evaporating liquid and non-condensable gas (constant quality) gas/liquid mixture, when gas is desorbed or produced	steam/water air/water