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Safety devices for protection against excessive pressure —

Part 3:
Safety valves and bursting disc safety devices in combination

Dispositifs de sécurité pour protection contre les pressions excessives —

Partie 3: Soupapes de sûreté et dispositifs de sûreté à disque de rupture en combinaison

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Contents

Page

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 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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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 4126-3:2006), which has been technically revised.

The main changes compared to the previous edition are as follows:

— Eliminated unnecessary references and definitions throughout the document.

— Clause 5: Inlet line and pressure drop requirements from prior 6.2 were moved to Clause 5 and a reference to ISO 4126-9 was also added.

— Clause 7: Deleted specific references to specific EN standards to refer to the applicable pressure vessel standard to reflect the global nature of this document.

— Clause 9: The restrictions for F_d values less than 0,97 were eliminated.

— Clause 12: Clarified the applicable minimum bursting pressure for which the F_d value can be used for sizes larger than those flow tested.

— Clause 14: Added a requirement for the supplier to provide a test certificate if the F_d being used is a certified combination discharge coefficient.

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.

Introduction

Bursting disc safety devices can be used upstream of safety valves in the following cases:

a) to protect the safety valve against corrosion, fouling or operating conditions which could affect the safety valve performance;

b) to prevent leakage;

c) to prevent total loss of contents from the protected equipment following the bursting of the bursting disc.

The term *combination* is used to describe the close-coupled (i.e. within 5 pipe diameters) assembly of a bursting disc safety device upstream of a safety valve or controlled safety pressure relief systems (CSPRS), as defined by this document. Requirements for other installation arrangements of bursting discs with safety valves or CSPRS are defined in ISO 4126-9.

Safety devices for protection against excessive pressure —

Part 3:
Safety valves and bursting disc safety devices in combination

1 Scope

This document specifies only the requirements for a product assembled from the in-series combination of safety valves or CSPRS (controlled safety pressure relief systems) according to ISO 4126-1, ISO 4126-4 and ISO 4126-5, and bursting disc safety devices, according to ISO 4126-2, installed upstream of the valve within five pipe diameters of the valve inlet. It specifies the design, application and marking requirements for such products, composed of the bursting disc safety device, a safety valve or CSPRS and, where applicable, a connecting pipe or spool piece. In addition, it gives a method for establishing the combination discharge factor used in sizing combinations.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 4126-1:2013, *Safety devices for protection against excessive pressure — Part 1: Safety valves*

ISO 4126-2:2018, *Safety devices for protection against excessive pressure — Part 2: Bursting disc safety devices*

ISO 4126-4:2013, *Safety devices for protection against excessive pressure — Part 4: Pilot operated safety valves*

ISO 4126-5:2013, *Safety devices for protection against excessive pressure — Part 5: Controlled safety pressure relief systems (CSPRS)*

ISO 4126-6:2014, *Safety devices for protection against excessive pressure — Part 6: Application, selection and installation of bursting disc safety devices*

ISO 4126-9:2008, *Safety devices for protection against excessive pressure — Part 9: Application and installation of safety devices excluding stand-alone bursting disc safety devices*

3 Terms and definitions

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

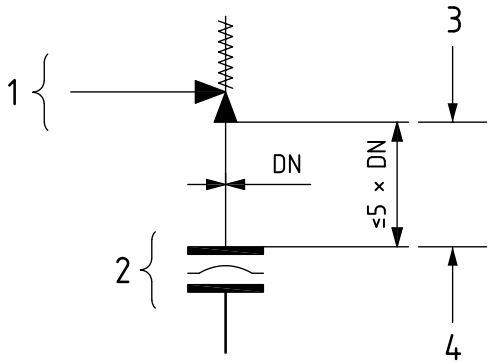
ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
combination
installation which comprises a *bursting disc safety device* (3.3) installed within five pipe diameters (from outlet of *bursting disc holder* (3.6) to inlet of valve) before the inlet of a safety valve or a CSPRS

Note 1 to entry: See Figure 1.



Key
1 safety valve or CSPRS
2 bursting disc safety device
3 safety valve or CSPRS inlet
4 bursting disc safety device outlet

NOTE Other bursting disc safety device configurations used in conjunction with safety valves or CSPRS are specified in ISO 4126-6.

Figure 1 — Diagram of combination showing relative distance

3.2
combination discharge capacity factor
F_d
factor used to determine the discharge capacity of a safety valve or CSPRS when the safety valve or CSPRS is used in combination with a *bursting disc safety device* (3.3) installed upstream of the safety valve or CSPRS

3.3
bursting disc safety device
non-reclosing pressure relief device actuated by differential pressure and designed to function by the bursting of the *bursting disc(s)* (3.5)

Note 1 to entry: It is the complete assembly of installed components including, where appropriate, the *bursting disc holder* (3.6).

3.4
bursting disc assembly
complete assembly of the components installed in the *bursting disc holder* (3.6) to perform the desired function

3.5
bursting disc
pressure-sensitive component(s) of a *bursting disc safety device* (3.3) designed to open by bursting at a *specified bursting pressure* (3.7)

3.6
bursting disc holder
part of a *bursting disc safety device* (3.3) which retains the *bursting disc assembly* (3.4) in position

3.7
specified bursting pressure
bursting pressure (3.13) quoted with a coincident temperature when defining the *bursting disc* (3.5) requirements

Note 1 to entry: It is used in conjunction with a *performance tolerance* (3.10).

3.8
specified maximum bursting pressure
maximum *bursting pressure* (3.13) quoted with the coincident temperature when defining the *bursting disc* (3.5) requirements

Note 1 to entry: It is used in conjunction with a *specified minimum bursting pressure* (3.9).

3.9
specified minimum bursting pressure
minimum *bursting pressure* (3.13) quoted with the coincident temperature when defining the *bursting disc* (3.5) requirements

Note 1 to entry: It is used in conjunction with a *specified maximum bursting pressure* (3.8).

3.10
performance tolerance
range of pressure between the *specified minimum bursting pressure* (3.9) and the *specified maximum bursting pressure* (3.8) or the range of pressure in positive and negative percentages or quantities which is related to the *specified bursting pressure* (3.7)

3.11
relieving pressure
maximum pressure under discharge conditions in the pressurised system

Note 1 to entry: It may differ from the bursting pressure of the *bursting disc* (3.5).

3.12
batch
quantity of bursting discs or *bursting disc safety devices* (3.3) made as a single group of the same type, size, materials and *specified bursting pressure* (3.7) requirements, and where the *bursting discs* (3.5) are manufactured from the same lot of material

3.13
bursting pressure
value of the differential pressure between the upstream side and the downstream side of the *bursting disc* (3.5) when it bursts

3.14
pressure relief system
system intended for the safe relief of fluids from pressure equipment for prevention of excessive pressure

Note 1 to entry: It can consist of equipment nozzle, inlet piping, pressure relief device(s) and discharge piping to atmosphere/collecting vessel/header.

3.15
certified derated coefficient of discharge
K_{dr}
adjusted *coefficient of discharge* (3.16) for the safety valve or CSPRS

Note 1 to entry: See ISO 4126-1, ISO 4126-4, or ISO 4126-5 as applicable.

3.16
coefficient of discharge
K_d
value of actual discharge capacity (from tests) divided by the theoretical discharge capacity (from calculation) of the safety valve or CSPRS.

Note 1 to entry: See ISO 4126-1, ISO 4126-4, or ISO 4126-5 as applicable.

3.17
combination coefficient of discharge
K_{dc}
tested value of actual discharge capacity of the *combination* (3.1) divided by the theoretical discharge capacity of the safety valve or CSPRS

3.18
set pressure
P_{set}
predetermined pressure at which a safety valve or CSPRS under operating conditions commences to open

Note 1 to entry: It is the gauge pressure measured at the valve inlet at which the pressure forces tending to open the valve for the specific service conditions are in equilibrium with the forces retaining the valve disc on its seat.

4 Symbols

A	flow area of a safety valve (not curtain area), in square millimetres
F_d	combination discharge capacity factor
K_d	coefficient of discharge of the safety valve or CSPRS
K_{dc}	combination coefficient of discharge
K_{dr}	certified derated coefficient of discharge for safety valve or CSPRS
P_{set}	set pressure of safety valve or CSPRS

5 Design of combination

Bursting disc safety devices shall comply with ISO 4126-2.

Application and selection of bursting disc safety devices shall be in accordance with ISO 4126-6.

Safety valves shall comply with ISO 4126-1 or ISO 4126-4.

CSPRS shall comply with ISO 4126-5.

Where additional components are used to combine the bursting disc safety device and the safety valve or CSPRS into a combination (e.g. spool piece), these shall comply with the applicable design standard.

The connection from the protected equipment to the safety valve inlet shall be as short as practicable and designed so that the total pressure drop to the safety valve or CSPRS inlet, including the effect of the bursting disc safety device, shall meet the requirements for the inlet line as described in ISO 4126-9. Calculate the total inlet pressure drop (difference of stagnation pressures, i.e. non-recoverable losses) using the actual flowing capacity, which is the capacity of the safety device calculated using the certified coefficient of discharge, divided by the derating factor 0,9 and multiplied by the certified combination discharge capacity factor F_d or a value of F_d = 1,0 if a certified value is not available. Please be aware of