
**Safety devices for protection against
excessive pressure —**

**Part 6:
Application, selection and installation
of bursting disc safety devices**

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

*Partie 6: Application, sélection et installation des dispositifs de sûreté
à disque de rupture*



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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 documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. 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. www.iso.org/patents

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 185, *Safety devices for protection against excessive pressure*.

This second edition cancels and replaces the first edition (ISO 4126-6:2003), which has been technically revised.

The main technical modifications are:

- a) Revision to [Annex C](#) to refer to Part 7 for capacity calculations;
- b) [Annex D](#) was deleted as this information is found in Part 7;
- c) [Annex E](#) was revised to include methodology for establishing flow resistance values for bursting discs opened in incompressible fluid;
- d) [Annex F](#) was added to include existing and additional guidelines for type testing;
- e) Annex G was added to provide a place for informative information relative to bursting disc tolerances and operating parameters.

ISO 4126 consists of the following parts, under the general title *Safety devices for protection against excessive pressure*:

- *Part 1: Safety valves*
- *Part 2: Bursting disc safety devices*
- *Part 3: Safety valves and bursting disc safety devices in combination*
- *Part 4: Pilot operated safety valves*
- *Part 5: Controlled safety pressure relief systems (CSPRS)*
- *Part 6: Application, selection and installation of bursting disc safety devices*

- *Part 7: Common data*
- *Part 9: Application and installation of safety devices excluding stand-alone bursting disc safety devices*
- *Part 10: Sizing of safety valves for gas/liquid two-phase flow*
- *Part 11: Performance testing*¹⁾

Part 7 contains data, which is common to more than one of the parts of ISO 4126 to avoid unnecessary repetition.

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1) In development.

Introduction

Safety devices for the protection of pressure equipment against excessive pressure include pressure relief devices such as safety valves and bursting disc safety devices which, dependent upon the application, may be used either as the sole pressure relieving devices or in conjunction with each other.

Operating problems frequently arise due to the use of pressure relieving devices not having been properly selected for the intended service or properly selected but whose performance is adversely affected by improper handling, wrong installation or lack of maintenance, any of which may affect the safety of the pressure equipment being protected.

It is important to consider not only the pressure relief devices but also the whole of the pressure relief system so as not to reduce the relieving capacity below that required or adversely affect the proper operation of the pressure relieving devices.

A bursting disc safety device is a non-reclosing pressure relief device which typically comprises a bursting disc, which is a pressure-containing and pressure-sensitive part designed to open by bursting at a predetermined pressure, and a bursting disc holder. There are many different types of bursting disc safety devices manufactured in corrosion resistant materials, both metallic and non-metallic, to cover a wide range of nominal sizes, burst pressures and temperatures. They are used to protect pressure equipment such as vessels, piping, gas cylinders or other enclosures from excessive pressure and/or excessive vacuum.

This standard covers the important considerations necessary in the application, selection and installation of bursting disc safety devices to give the required protection against excessive pressure and/or excessive vacuum.

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Safety devices for protection against excessive pressure —

Part 6:

Application, selection and installation of bursting disc safety devices

1 Scope

This International standard gives guidance on the application, selection and installation of bursting disc safety devices used to protect pressure equipment from excessive pressure and/or excessive vacuum.

[Annex A](#) provides a checklist for the information to be supplied by the purchaser to the manufacturer.

[Annex B](#) gives guidance on the replacement period of a bursting disc.

[Annex C](#) provides guidance for determining the discharge capacity, for single phase fluids, of a pressure relief system that contains a bursting disc safety device.

[Annex D](#) is a non-mandatory procedure for establishing the flow resistance of a burst bursting disc assembly.

[Annex E](#) is a non-mandatory procedure for type testing of bursting disc safety devices.

[Annex F](#) provides typical performance characteristics for various bursting disc safety device types.

The requirements for the manufacture, inspection, testing, marking, certification and packaging of bursting disc safety devices are given in ISO 4126-2.

2 Normative references

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

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

ISO 4126-3, *Safety devices for protection against excessive pressure — Part 3: Safety valves and bursting disc safety devices in combination*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4126-2 and the following apply.

3.1

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), and which is the complete assembly of installed components including, where appropriate, the bursting disc holder

3.2

bursting disc assembly

complete assembly of components, which are installed in the bursting disc holder to perform the desired function

3.3

bursting disc

pressure-containing and pressure-sensitive component of a bursting disc safety device

3.4

bursting disc holder

that part of a bursting disc safety device, which retains the bursting disc assembly in position

3.5

conventional domed bursting disc (also referred to as, forward acting)

bursting disc which is domed in the direction of the bursting pressure (i.e. where the bursting pressure is applied to the concave side of the bursting disc)

Note 1 to entry: See ISO 4126-2:2003, Figure 1).

3.6

slotted lined bursting disc

bursting disc made up of two or more layers, at least one of which is slit or slotted to control the bursting pressure of the bursting disc

3.7

reverse domed bursting disc (also referred to as, reverse acting)

bursting disc which is domed against the direction of the bursting pressure (i.e. where the bursting pressure is applied to the convex side of the bursting disc)

Note 1 to entry: See ISO 4126-2:2003, Figure 2).

3.8

flat bursting disc

bursting disc having one or more layers which is flat when installed. It may be made of a ductile or brittle material

3.9

graphite bursting disc

bursting disc manufactured from graphite, impregnated graphite, flexible graphite or graphite composite and designed to burst due to bending or shearing forces

3.10

specified bursting pressure

bursting pressure quoted with a coincident temperature when defining the bursting disc requirements (used in conjunction with a performance tolerance, see [3.14](#))

3.11

specified maximum bursting pressure

maximum bursting pressure quoted with the coincident temperature when defining the bursting disc requirements (used in conjunction with specified minimum bursting pressure, see [3.12](#))

3.12

specified minimum bursting pressure

minimum bursting pressure quoted with the coincident temperature when defining the bursting disc requirements (used in conjunction with specified maximum bursting pressure, see [3.11](#))

3.13

coincident temperature

temperature of the bursting disc associated with a bursting pressure (see [3.10](#), [3.11](#) and [3.12](#)) and which is the expected temperature of the bursting disc when it is required to burst

3.14**performance tolerance**

range of pressure between the specified minimum bursting pressure and the specified maximum bursting pressure or the range of pressure in positive and negative percentages or quantities which is related to the specified bursting pressure

3.15**operating pressure**

pressure existing at normal operating conditions within the system being protected

3.16**relieving pressure**

maximum pressure under discharge conditions in the pressurized system

Note 1 to entry: It can differ from the bursting pressure of the bursting disc.

3.17**relieving temperature**

temperature under discharge conditions in the pressurized system

Note 1 to entry: It can differ from the coincident temperature specified for the bursting disc.

3.18**differential back pressure**

differential pressure across a bursting disc in the opposite direction to the direction of the bursting pressure, which is the result of pressure in the discharge system from other sources and/or a result of vacuum on the upstream side of the bursting disc

3.19**vent area**

cross-section area available for discharge of fluid as calculated by the manufacturer

Note 1 to entry: The calculated vent area should not exceed the cross-sectional area of the upstream piping, A_1 .

3.20**batch**

quantity of bursting discs or bursting disc safety devices made as a single group of the same type, size, materials and specified bursting pressure requirements where the bursting discs are manufactured from the same lot of material

3.21**bursting pressure**

value of the differential pressure between the upstream side and the downstream side of the bursting disc when it bursts

3.22**stiffening ring**

component of a bursting disc assembly used primarily for reinforcing bursting discs

3.23**back pressure support**

component of a bursting disc safety device, which prevents damage to the bursting disc due to differential back pressure

Note 1 to entry: A back pressure support, which is intended to prevent damage to the bursting disc when the system pressure falls below atmospheric pressure, is sometimes referred to as a vacuum support.

3.24**coating**

layer of metallic or non-metallic material applied to components of a bursting disc safety device by a coating process

3.25

lining

additional sheet or sheets of metallic or non-metallic material forming part of a bursting disc assembly or bursting disc holder

3.26

plating

metal layer applied to a bursting disc or bursting disc holder by a plating process

3.27

temperature shield

device which protects a bursting disc from excessive temperature

3.28

operating ratio

ratio between the operating pressure and the minimum limit of bursting pressure

Note 1 to entry: See [Figure 1](#).

Note 2 to entry: In the case of a pressure system with an operating pressure expressed in bar gauge and atmospheric pressure on the downstream side of the bursting disc:

$$\text{Operating ratio} = \frac{\text{operating pressure (bar)}}{\text{minimum limit of bursting pressure (bar)}}$$

Note 3 to entry: In the case of a pressure system with a back pressure on the downstream side of the bursting disc, the operating ratio is the value of the differential pressure between the upstream side and the downstream side of the bursting disc divided by the minimum limit of bursting pressure expressed as a differential pressure.

3.29

bursting disc safety device discharge capacity

rate at which a bursting disc safety device can discharge fluid after bursting of the bursting disc

3.30

replacement period

time period beginning at the installation of a bursting disc assembly and ending at replacement

3.31

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.

3.32

discharge coefficient

coefficient which determines reduction of theoretical discharge capacity of a pressure relief system by the simplified approach (see [C.2](#)) which incorporates a burst bursting disc, forming part of a bursting disc safety device

Note 1 to entry: It is denoted by the symbol α .

3.33

flow resistance factor

K_R
dimensionless expression of the velocity head loss attributed to the presence of a bursting disc safety device in a piping system

3.33.1**flow resistance factor** K_{RG}

flow resistance of a bursting disc safety device when burst with compressible fluid in contact with the upstream side of the bursting disc

3.33.2**flow resistance factor** K_{RL}

flow resistance of a bursting disc safety device when burst with incompressible fluid in contact with the upstream side of the bursting disc

3.33.3**flow resistance factor** K_{RGL}

flow resistance of a bursting disc safety device when burst with either compressible or incompressible fluid in contact with the upstream side of the bursting disc

3.34**base pressure**

pressure recorded at the pipe inlet of the bursting disc flow test system

3.35**base temperature**

temperature recorded at the pipe inlet of the bursting disc flow test system

3.36**maximum allowable pressure** p_S

maximum pressure for which the equipment is designed, as specified by the manufacturer

3.37**non-fragmenting bursting disc safety device**

bursting disc safety device that is designed to retain the petals produced during activation

4 Symbols and units**Table 1 — Symbols and their descriptions**

Symbol	Description	Units
A_0	Required minimum cross-sectional flow area	mm ²
A_1	Cross-sectional area of upstream piping	mm ²
A_B	Bursting disc safety device vent area	mm ²
C	Function of the isentropic exponent	—
C_{tap}	Sonic velocity at pressure tap	m/s
D	Test system pipework inside diameter	mm
f	Fanning friction for system, pipe	—
G	Mass velocity	kg/(m ² ·h)
k	Isentropic exponent	—
K_b	Theoretical capacity correction factor for subcritical flow	—
K_v	Viscosity correction factor	—
K_R	Flow resistance factor	—
^a	x is expressed as 0,xx.	

Table 1 (continued)

Symbol	Description	Units
K_{tap}	Total resistance factor from pipe inlet of test system to pressure tap	—
M	Molecular mass	kg/kmol
Ma_{tap}	Mach number at pressure tap	—
Ma_1	Mach number at pipe inlet of test system	—
p_1	Test system pipe inlet pressure	bar abs.
p_B	Base pressure	bar abs.
p_b	Back pressure	bar abs.
p_c	Critical pressure	bar abs.
p_o	Relieving pressure	bar abs.
p_{tap}	Pressure at pressure tap	bar abs.
p_r	Reduced pressure	—
Q_m	Mass flow rate	kg/h
R	Universal gas constant	8 314 J·kmol ⁻¹ ·K ⁻¹
Re	Reynolds Number	—
T_B	Base temperature	K
T_o	Relieving temperature	K
T_{tap}	Temperature recorded at pressure tap	K
T_1	Test system pipe inlet temperature	K
v_o	Specific volume at actual relieving pressure and temperature	m ³ /kg
v_{tap}	Specific volume at pressure tap	m ³ /kg
x^a	Dryness of wet steam	—
Y_{tap}	Expansion factor at pressure tap	—
Y_1	Expansion factor at pipe inlet of test system	—
Z_o	Compressibility factor at actual relieving pressure and temperature	—
ρ	Density	kg/m ³
μ	Dynamic viscosity	Pa·s
Δp	Differential pressure on venting across bursting disc safety device	bar abs.
α	Discharge coefficient (see C.2)	—

^a x is expressed as 0.xx.

5 Application

5.1 Subject to the requirements of the relevant standard covering the equipment to be protected, bursting disc safety devices may be used either as the sole pressure relieving device, in conjunction with safety valves or as part of a combination device.

5.2 The discharge capacity of a system including a bursting disc safety device and its maximum limit of bursting pressure (see Figure 1) at the coincident temperature shall be such that the maximum relieving pressure does not exceed the requirements of the protected equipment. Annex C gives methods for determining discharge capacity of pressure relief systems incorporating bursting disc safety devices.

5.3 The use of a bursting disc safety device as the sole pressure relieving device may be preferred in the following cases where:

- a) the rate of increase in pressure may be such that the rate of response of a safety valve would make it unsuitable;
- b) leakage of the fluid cannot be tolerated under operating conditions;
- c) operating conditions may involve deposition, which would make a safety valve inoperative;
- d) the effect of low temperature would prevent a safety valve from operating;
- e) large discharge areas are required.

NOTE A bursting disc safety device is a non-reclosing pressure relieving device, which after bursting could result in the total loss of pressure/contents from the protected equipment.

5.4 For all applications the pressure relief system shall be such that following the bursting of the bursting disc assembly any fragmentation or release of material does not:

- a) cause an unacceptable flow restriction within the pressure relief system;
- b) impair the proper functioning of any other safety device;
- c) affect the certified (discharge) capacity of any other safety device.

5.5 Bursting disc safety devices may be used in association with safety valves, pilot operated safety valves or CSPRS (according to ISO 4126-1, ISO 4126-4 and ISO 4126-5 respectively) as permitted by the relevant standard. The application of the bursting disc safety devices shall not result in excessive pressure in the protected equipment.

5.5.1 Bursting disc safety devices in conjunction with safety valve(s) may be used in the following cases:

- a) in series, to protect the safety valve against corrosion, fouling or operating conditions which may affect the safety valve performance;
- b) in series, to prevent leakage;
- c) in series, to prevent total loss of contents from the protected equipment following the bursting of the bursting disc;
- d) in parallel, as an additional safeguard.

5.5.2 Where a bursting disc safety device is to be installed upstream of a safety valve the following requirements shall be met:

- a) the space between the bursting disc safety device and the safety valve shall be provided with an appropriate means to prevent or detect an unacceptable build up in pressure;
- b) the bursting disc safety device shall be a non-fragmenting design;
- c) the nominal pipe size of the bursting disc safety device shall be not less than the nominal size of the inlet of the safety valve;
- d) where the bursting disc safety device is within 5 pipe diameters, see ISO 4126-3.
- e) where the bursting disc safety device is beyond 5 pipe diameters of the safety valve consult the manufacturer for application guidance.

NOTE Bursting discs, being pressure differential devices, will require a higher pressure in the protected equipment to burst the bursting disc if pressure builds up in the space between the bursting disc and the safety valve which will occur should leakage develop in the bursting disc due to corrosion, or due to back pressure in the discharge piping or other cause.

5.5.3 where a bursting disc safety device is to be installed downstream of the safety valve, the following requirements shall be met:

- a) the bursting disc safety device and discharge piping shall be so designed as not to impair the operating characteristics of the safety valve;
- b) the space between the bursting disc safety device and the safety valve shall be provided with an appropriate means to prevent or detect an unacceptable build up in pressure;
- c) the space between the bursting disc and safety valve shall be large enough to ensure the correct functioning of the bursting disc.

NOTE A spring-loaded safety valve, which is not balanced, cannot open at its set pressure if back pressure builds up in the space between the safety valve and the bursting disc safety device. A particular design of safety valve can be required.

- d) the maximum limit of bursting pressure of the bursting disc at the coincident temperature plus any pressure in the discharge piping shall not exceed the:
 - 1) back pressure limitations of the safety valve;
 - 2) design pressure of any pipe or fitting between the safety valve and the bursting disc safety device;
 - 3) pressure permitted by the relevant standard.

5.5.4 A bursting disc safety device may be installed both upstream and downstream of a safety valve provided that the requirements of [5.5.2](#) and [5.5.3](#) are met.

5.5.5 A bursting disc safety device fitted in parallel with a safety valve as an additional safeguard (e.g. to protect equipment against the consequence of a rapid rise in pressure) shall be specified to burst at a pressure not exceeding the relevant requirements of the protected equipment.

5.6 Where a bursting disc safety device is fitted in series with a second bursting disc safety device, the following requirements shall be met:

- a) a space between the two bursting discs shall be large enough to ensure the correct functioning of the bursting discs;
- b) the space between the bursting disc shall be provided with a means for preventing unacceptable build up in pressure.

NOTE Bursting discs, being pressure differential devices, will require a higher pressure in the protected equipment to burst the bursting disc if pressure builds up in the space between the bursting discs which will occur should leakage develop in the bursting disc due to corrosion or other causes.

6 Selection

6.1 Selection of bursting disc safety devices

6.1.1 The manufacturer's advice should be sought when selecting a bursting disc safety device for a particular application.

6.1.2 Bursting disc safety devices are differential pressure devices and therefore the pressure on both the upstream and the downstream side of the bursting disc shall be taken into consideration.

6.1.3 Consideration needs to be given to the replacement period of the bursting disc assembly. This period depends upon the type and material of the bursting disc assembly, operating conditions and many other factors.

Guidelines for determining the replacement period of a bursting disc are given in [Annex B](#).

6.1.4 Bursting disc safety devices are frequently required to work in corrosive environments where corrosion may cause premature failure of the bursting disc. Materials likely to be affected by corrosion may be protected by coating, plating or lining which shall be supplied only by the manufacturer.

6.1.5 Selection of the appropriate bursting disc material depends upon the chemical and physical conditions that will exist on both the upstream side and the downstream side of the bursting disc safety device when it is in service.

6.1.6 Where there is the possibility of deposition of sublimates or other solids on the upstream side of the bursting disc safety device, consideration shall be given to selecting a type of bursting disc safety device suitable for such conditions.

6.1.7 When selecting the size of bursting disc safety devices, area restricting features shall be taken into account when determining the vent area.

6.1.8 The bursting pressure of a bursting disc according to its material and type may vary with its temperature.

NOTE Data regarding the expected variation of bursting pressure according to the temperature for a batch of bursting discs should be requested from the manufacturer. Generally, in the temperature range 15 °C to 30 °C inclusive, there is no significant variation in the bursting pressure. However, below or above this range a bursting disc may have respectively a higher or lower bursting pressure than that within the range. When a bursting disc safety device is specified with a bursting pressure at a coincident temperature to protect equipment, the bursting disc may not give the necessary protection with regard to the bursting pressure of the bursting disc over the whole temperature range of the protected equipment. The coincident temperature may not be the same as the temperature of the fluid.

The coincident temperature may be determined by the direct measurement or by the calculation using established heat transfer methods.

6.1.9 Bursting discs can be protected from excessive temperature by suitable location, temperature shields or other means. When it is necessary to protect a bursting disc from excessive temperature, the influence of the protection shall be considered when establishing the coincident temperature.

The use of temperature shields shall be evaluated by the manufacturer of the bursting disc safety device.

6.1.10 The type of bursting disc holder and its inlet and outlet connections shall be appropriate to the method of installing the bursting disc safety device and the requirements for the safe discharge of the fluid.

6.1.11 Where a bursting disc safety device is to be installed upstream of a safety valve, so as to form a combination device, the selection shall take into consideration the requirements of ISO 4126-3.

6.1.12 Where a bursting disc safety device is to be selected for installation upstream and/or downstream of a safety valve, both the bursting disc safety device manufacturer and the safety valve manufacturer shall be consulted. In the case of downstream application the effects on the set pressure of the safety valve due to potential leakage across the safety valve seat and/or from the downstream side of the bursting disc safety device need to be considered.

6.2 Selection of the performance tolerance

The performance tolerance is dependent upon a number of factors, including the following:

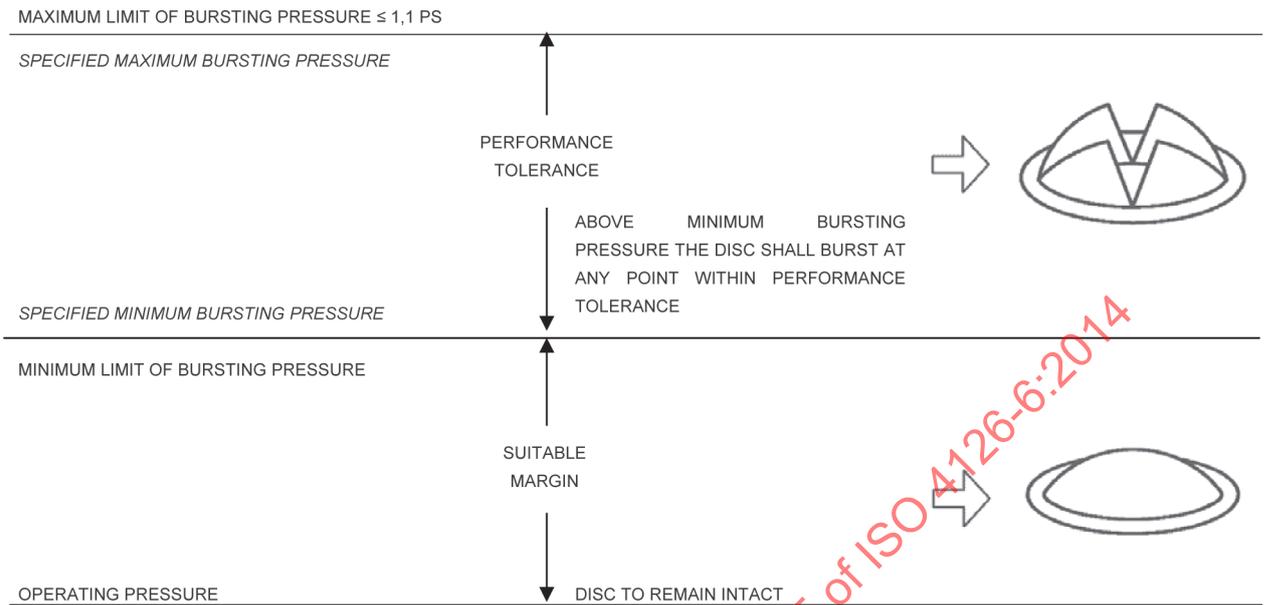
- a) type of bursting disc;
- b) material of the bursting disc;
- c) method of manufacture.

In selecting the performance tolerance for a particular application, consideration shall be given to the above factors and the process conditions. The performance tolerance shall be specified by the manufacturer after consultation with the purchaser using one of the two alternative methods according to ISO 4126-2:2003, Clause 12. Typical performance tolerances are given in [Table F.1](#).

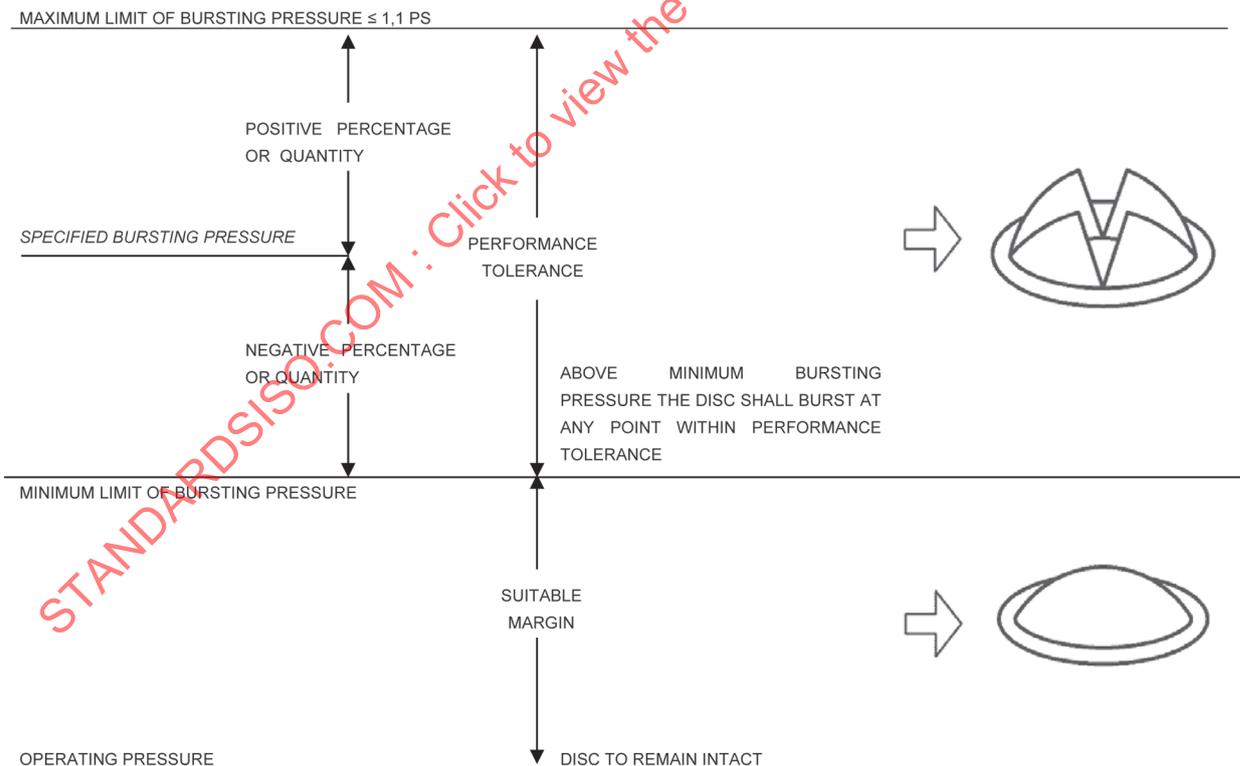
The maximum bursting pressure at the coincident temperature shall never exceed 1,1 times PS and provisions shall be made to ensure that the operating pressure will not permanently exceed PS.

The minimum limit of bursting pressure shall be selected to ensure that there is a suitable margin between it and the operating pressure. Due consideration shall be given to the operating ratio appropriate to the material and type of bursting disc and the process conditions. Typical maximum operating ratios are given in [Table F.2](#).

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a) Specified maximum bursting pressure and specified minimum bursting pressure with a coincident temperature



b) Specified bursting pressure and performance tolerance with a coincident temperature

Figure 1 — Methods for specifying bursting discs

7 Installation

7.1 General

The requirements for the location of bursting disc safety devices within the system which they protect, are specified in 7.2. General requirements for the safe installation of bursting disc safety devices are given in 7.3.

7.2 Location of bursting disc safety devices

7.2.1 A bursting disc safety device shall be placed as close as practicable to the protected equipment, taking into account pressure pulsations, temperature, and other service conditions.

7.2.2 The pressure relief system shall be properly sized, as straight and as short as practicable, terminating in such a way as to avoid dangerous or damaging conditions arising on venting.

7.2.3 The pressure relief system piping shall be properly designed, so that any thermal movement of the protected equipment and the pressure relief system piping does not cause excessive forces on the bursting disc safety device that may lead to incorrect functioning or failure.

7.2.4 Bursting disc safety devices shall be mounted so that they are accessible for replacement and protected from accidental damage.

7.2.5 Provision shall be made to absorb the effect of reaction forces on the protected equipment, which will arise during relieving conditions.

A baffle plate may be fitted downstream of a bursting disc safety device to redirect the discharge fluid and/or reduce recoil providing that it does not reduce the required discharge capacity of the pressure relief system.

7.2.6 In the case of the discharge of a hazardous fluid, the potential danger shall be considered and appropriate measures taken to minimize the risk.

7.2.7 Precautions shall be taken to prevent deposition on the upstream side of the bursting disc safety device and in the part leading to it, of sublimates or other solids that could affect the safe operation of the bursting disc.

Liquid or foreign matter shall be prevented from accumulating within the discharge piping and/or on the downstream side of the bursting disc.

7.2.8 In the case of graphite monobloc bursting discs which are recessed on the inlet side (see ISO 4126-2:2003, Figure 4) the internal diameter of the discharge pipe adjacent to the downstream side of the bursting disc shall be larger than the inside diameter of the recess.

7.2.9 Where plug/screw bursting disc holders are to be installed in a pressure relief system, an additional connection may be required to facilitate the assembly and replacement of the bursting disc assembly.

7.3 Installation of bursting disc safety devices

7.3.1 The bursting disc safety device shall be assembled and installed in accordance with the manufacturer's assembly and installation instructions.

NOTE If the components of a bursting disc safety device are handled, assembled or installed incorrectly, the bursting disc can burst at a pressure higher or lower than the required burst pressure.

7.3.2 The bursting disc safety device or any of its components as supplied shall not be modified in any way except with the approval of the manufacturer.

The application of an additional protective film or coating to a bursting disc is not allowed, except when approved by the manufacturer since this may considerably affect the bursting pressure of the bursting disc.

7.3.3 The bursting disc safety device shall be checked for freedom from visible defects immediately before installation and care taken during installation to avoid damage.

7.3.4 Prior to assembly, the bursting disc holder reference, marked on the bursting disc/bursting disc assembly, shall be checked to ensure that it coincides with that marked on the bursting disc holder.

7.3.5 When assembling the bursting disc safety device components the fitting of any back pressure support shall be checked to ensure that it is correct.

7.3.6 Any directional arrow, bolting torque instructions and reference to the use of gaskets shall be complied with during installation.

7.3.7 The type, material and dimensions of the gaskets used between the bursting disc safety device and the flanges between which it is to be installed shall be suitable for the specified conditions and compatible with the flange facing and finish of the contact faces of the bursting disc safety device and the flanges. The manufacturer's advice should be sought concerning the effect on the performance of the bursting disc safety device of the bolt load required to seat the gasket and maintain a seal under the specified conditions.

7.3.8 To ensure the correct performance of the bursting disc safety device and the effective sealing of the gasket used between the bursting disc safety device and the flanges between which it is installed, the bursting disc safety device shall be located centrally within the flanges.

7.3.9 Where identification marks are not visible when the bursting disc/bursting disc safety device is installed on the protected equipment, the purchaser shall be responsible for attaching to the installation a suitable tag which shall be permanently marked with the same information as that given on the bursting disc/bursting disc safety device or in the package.

Annex A (informative)

Information to be supplied by the purchaser

A.1 General

To assist the manufacturer in specifying a suitable bursting disc safety device for a particular application, each enquiry or order should include the information given in [A.2](#) to [A.6](#).

For repeat orders of replacement bursting discs, only the information given in [A.7](#) should be provided.

A.2 Application details

Description of the vessel, equipment or system to be protected and vessel design code where appropriate.

Intended application of the bursting disc safety device. It should be stated if the device is required to operate for example as the primary relief device, secondary relief device, for safety valve protection or in some other capacity.

Performance specification and relative position of any safety valves or other safety devices fitted to the vessel, equipment or system.

The fluid which may come in contact with any part of the bursting disc safety device; physical properties of the fluid, e.g. gas, vapour, liquid or solid ; wet or dry, at all stages of the process (including venting); chemical properties of the fluid which may affect bursting disc performance.

All conditions of temperature (including that of the bursting disc under normal operating conditions) and pressure (including back pressure) to which the bursting disc safety device may be subjected. Rate and frequency of pressure changes, if applicable.

Expected relieving pressure and relieving temperature.

A.3 Bursting disc safety device operating details

The specified bursting pressure and coincident temperature requirements (see [Figure 1](#)), stating units.

Rate of pressure change to bursting pressure, where appropriate.

Minimum bursting disc safety device discharge area required.

Materials which the purchaser from knowledge of the process regards as suitable for consideration in the selection of the bursting disc safety device material(s).

Materials which may not be used for safety, corrosion or other reasons.

A.4 Installation details

Physical location of the bursting disc safety device in the system, preferably in the form of a sketch.

Method of fitting the bursting disc safety device in the system (e.g. between flanges, direct fitting to one flange, direct weld to outlet).

Inlet pipe diameter to the bursting disc safety device and discharge pipe diameter from the bursting disc safety device, including flange size, rating, type and specification or other fixing details (e.g. thread specification and size).

The type, material and dimensions of the gaskets to be used between the installation flanges and the bursting disc safety device.

Type and preferred material of the bursting disc holder .

Form and finish of the external mating surfaces if required other than to the manufacturer's standard.

A.5 Special details

Inspection and certification requirements additional to those defined in this standard.

Special features required in the bursting disc safety device (e.g. excess flow valve, pressure monitoring device, jacking bolts, lifting rings, baffle plate).

Special features of the application not stated elsewhere.

Leak testing requirements.

Non-destructive examination requirements.

A.6 Language

The language to be used for the marking and instructions should be stated.

A.7 Replacement bursting discs

Quantity.

Manufacturer's model/type reference.

Manufacturer's previous batch reference.

Nominal size designation.

The specified maximum bursting pressure and specified minimum bursting pressure with a coincident temperature, stating units ; or

The specified bursting pressure and related positive and negative percentages or quantities with a coincident temperature, stating units.

Bursting disc holder reference.

Annex B (informative)

Guidelines for determining the replacement period of a bursting disc

NOTE Throughout this annex the term bursting disc includes, where appropriate, bursting disc assembly and integral bursting disc safety device.

B.1 Introduction

It is fundamental to the safety of pressure equipment that any associated pressure relief device/pressure relief system is capable of protecting the equipment from excessive pressure. In order to achieve this it is important for the continuing safe use when in service, to ensure that this capability is maintained.

Under service conditions, the pressure relief device/pressure relief system can be affected such that the original performance is no longer maintained. This can be caused by, for example, corrosion, fouling and/or other service conditions. It can also depend on the design of the pressure relief devices, their materials of construction, the service conditions and the environment to which they are subjected.

It is therefore important to establish the interval between the inspections of the pressure relief device/pressure relief system or the replacement period. In some cases, the interval between inspection will be subject to regulatory requirement. Bursting disc safety devices, dependent upon the application, can require special consideration (see [B.2](#)).

B.2 Bursting disc safety devices

Following completion of the manufacture of a batch of bursting discs a specified number are selected at random from each batch and subjected to burst testing in order to verify that the bursting pressures are in accordance with the specified requirements (see ISO 4126-2).

When put into service and subjected to the service conditions the characteristics of the bursting disc can change until, after a period of time, the bursting disc will no longer function within the specified requirements and may burst under normal operating pressure. For some applications, it can be necessary to determine the likely period of time for this to take place and to establish a replacement period.

The factors that may influence the replacement period are given in [B.3](#) and various methods of establishing the replacement period are given in [B.4](#).

B.3 Replacement period

The replacement period of a bursting disc should not exceed the predicted period of time after which the bursting disc will no longer function within the specified requirements. Once established the replacement period should not be exceeded without further consideration of past experience and all conditions of use.

There can be applications where it is safe to leave the bursting disc in service until it bursts under normal operating pressure.

An appropriate replacement period should be established before a bursting disc is put into service. This can be increased based on satisfactory operating experience or decreased where experience has proved unsatisfactory.

In establishing the replacement period the influence of a number of factors needs to be considered, including the following:

- type of bursting disc;
- materials of construction;
- operating ratio;
- coincident temperature of the bursting disc;
- service conditions to which the bursting disc is subjected.

It is particularly important that the coincident temperature, operating criteria and foreseeable conditions, including pressure and/or temperature cycling are identified by the purchaser and specified to the manufacturer.

Where corrosion, fouling and other service conditions are not known and cannot be predicted with a degree of accuracy the initial replacement period should be such as not to compromise safety.

Of importance is correct handling and installation. Poor installation, incorrect torquing (where relevant) and mechanical damage can have an immediate effect upon the replacement period.

B.4 Methods of determining the replacement period

B.4.1 General

Methods of determining the replacement period for a bursting disc include those given in [B.4.2](#) to [B.4.5](#). It can be appropriate to combine methods, e.g. [B.4.2](#) with [B.4.3](#).

B.4.2 Use of manufacturer's data

Manufacturers are familiar with mechanical loadings, stress levels and operating ratios under different operating conditions and the limitations of their particular designs and materials. They can have data including analytical and test (cyclic, corrosion) and historical records, which can be used.

B.4.3 Use of purchaser's records

The purchaser can be familiar with the use of the particular type and material of bursting disc under comparable service conditions and can have records (operating, inspection, monitoring and historical) which can be used.

B.4.4 Testing of bursting discs after a period of service

After a period of service the bursting disc is carefully removed, properly packaged and returned to the manufacturer for examination and testing.

Dimensional changes, evidence of corrosion, leak-tightness (where appropriate), bursting pressure and any other pertinent details are recorded. By comparison with the original records for the bursting disc, adjustments can be made to the replacement period.

B.4.5 Testing under simulated conditions

A number of bursting discs of the same type, model, size, material and specified bursting requirements as those to be used are tested under conditions which simulate those expected in service. Changes in characteristics over a period of time or the period of time ending in the bursting of the bursting disc are recorded and the data used to establish the replacement period.

Annex C (informative)

Pressure relief system discharge capacity

C.1 General

C.1.1 The discharge capacity of the pressure relief system should be such as to ensure that under relieving conditions the maximum allowable pressure of the protected equipment is not exceeded by more than the permitted accumulation.

C.1.2 This annex gives guidance on the determination of the mass flow rate of a pressure relief system that contains a bursting disc safety device. It relates to single phase flow.

NOTE 1 Alternative methods are available to determine the discharge capacity of a pressure relief system, which are being considered for inclusion in a future version of this standard.

NOTE 2 Rules for sizing where two-phase vapour-liquid flow occurs, either because it is two-phase at the inlet or because some or all of the liquid flashed to vapour on venting, are being considered for inclusion in a future revision of this standard.

C.1.3 Two methods are given:

- [C.2](#) gives a simplified approach, neglecting pressure drops in the inlet piping and in the discharge piping. Therefore, this method is of limited application;
- [C.3](#) gives a comprehensive approach for calculation of pressure relief systems where consideration is given to the changes in pressure throughout the entire pressure relief system.

C.1.4 It is important to ensure that the method selected is relevant to the particular application and is correctly applied by those appropriately qualified and experienced.

C.2 Simplified approach

C.2.1 General

This method should be used where it can be safely assumed that there are only negligible pressure drops in the inlet piping and the discharge piping and is limited to those applications where:

- the bursting disc safety device discharges directly to atmosphere;
- and the bursting disc safety device is installed within eight pipe diameters from the entry to the equipment nozzle;
- and the bursting disc safety device vent area, A_B , is not less than 50 % of the inlet pipe area, A_1 ;
- and the nozzle configurations are as given in [Table C.1](#);
- and the flow is single phase;
- and the length of the discharge pipe following the bursting disc safety device does not exceed five pipe diameters;

- and the nominal pipe diameter of the inlet and discharge piping are equal to, or greater than the nominal size of the bursting disc safety device.

C.2.2 Discharge coefficients

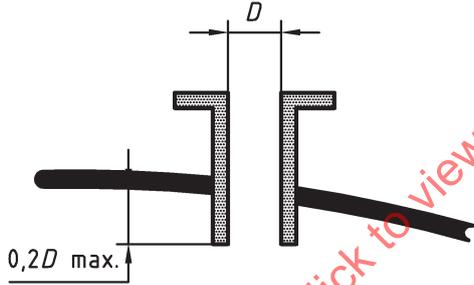
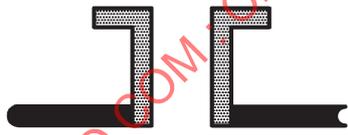
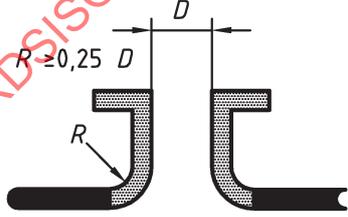
C.2.2.1 Compressible fluids

In this case, the flow rate is controlled by the nozzle entry configuration of the equipment and the bursting disc safety device. A combined discharge coefficient is denoted by α .

The values of the discharge coefficients given in [Table C.1](#) for the nozzle entry configuration and the bursting disc safety device to be used for compressible fluids are based on experimental work. For further information regarding the relative conservatism, if any, of these coefficients relative to A_0/A_1 see reference [3] of the Bibliography.

These discharge coefficients are valid where: $0,5 A_1 \leq A_0 \leq A_1$

Table C.1 — Discharge coefficients, α

Number	Branch/nozzle type	Discharge coefficient α
1		0,68 In the case of an internally protruding branch/nozzle
2		0,73 In the case of a flush branch/nozzle or a block flange whose inlets are not of hydrodynamic configuration
3		0,80 In the case of a branch/nozzle or a block flange of hydrodynamic configuration, e.g. with rounded or chamfered inlets

C.2.2.2 Incompressible fluids

The discharge coefficient is equal to 0,62 or as established in the relevant application standard.

C.2.3 Calculation of capacity

The calculation of capacity of the bursting disc safety device may be performed in accordance with the applicable clause of ISO 4126-7 where discharge coefficient, α , is used in place of discharge coefficient, K_{dr} .

C.2.4 Selection of the bursting disc safety device flow area

The discharge area, A_B , of a bursting disc safety device should be not less than the calculated, A_o .

$$A_B \geq A_o$$

If the cross-sectional flow area of a bursting disc safety device being selected exceeds the inlet pipe flow area A_1 then A_1 instead of A_B is the controlling cross-sectional flow area. A_1 should not be less than A_o .

C.3 Comprehensive approach

C.3.1 General

C.3.1.1 This method takes into consideration the reversible and the irreversible changes in pressure throughout the pressure relief system (e.g. nozzle entry, inlet pipe, bursting disc safety device, discharge pipe, and exit to a downstream vessel or to the atmosphere). For further information, see References [13],[14] and [15].

C.3.1.2 For analysis of the pressure relief system, information relating to the pressure loss after bursting of the bursting disc safety device is required. Recognised fluid flow calculation methods are adequate so long as the net flow area is known or can be verified and the calculations are based on valid assumptions.

C.3.1.3 The flow resistance factor K_R should be applied to venting systems in which turbulent flow conditions are expected. [Annex D](#) gives a procedure for determining the flow resistance coefficient of a bursting disc safety device by flow testing.

NOTE A burst bursting disc cannot usually be considered to be a round, sharp-edged orifice.

C.3.2 Application of K_R values

C.3.2.1 Use K_{RG} when there is compressible fluid against the bursting disc at the time of bursting.

C.3.2.2 Use K_{RL} when there is incompressible fluid against the bursting disc at the time of bursting.

C.3.2.3 Use K_{RGL} when there is either compressible or incompressible fluid against the bursting disc at the time of bursting.

Annex D (informative)

Flow testing of bursting disc safety devices

D.1 Scope

The procedure provides a test method for manufacturer to determining flow resistance in which the test specimen is a burst bursting disc safety device. The test data is used to establish the flow resistance factor K_R for a particular type of model and size of bursting disc safety device for compressible and/or incompressible fluids.

It is important to understand that the flow resistance test and calculation of K_R is the same for compressible and incompressible fluids. What differentiates a K_{RGL} and K_{RL} is whether compressible or incompressible fluid is against the bursting disc at the time of opening.

Other procedures can be used by agreement between the purchaser and the manufacturer provided that the test requirements, test method, test procedure and derivation of the flow resistance factor can be demonstrated as having accuracy and reliability at least equal to the requirements of this procedure.

D.2 Test requirements

D.2.1 General

The general procedure for determining flow resistance factor of burst bursting disc safety devices is as follows:

- a) Burst test the bursting disc safety device in either compressible or incompressible fluid as required.
- b) Perform pre-test flow resistance test rig validation test to confirm the test arrangement meets the operational requirements specified.
- c) Perform flow resistance test on the opened bursting disc safety device.
- d) Post test data analysis for test validity and calculation of K_R .
- e) Post-test flow resistance test rig validation test, when required.

D.2.2 Test system

D.2.2.1 General

A recommended test system configuration for compressible fluids is as shown in [Figure D.1](#). Differential pressure measurement devices should be used between pressure taps A and B, B and C, and C and D. The primary element should be either:

- a) a subsonic inferential meter including orifice plate, flow nozzle and venturi; or
- b) a sonic inferential meter including choked nozzles.

The instrumentation required for each type of meter is as follows.

D.2.2.2 Subsonic inferential meters

Measurement of:

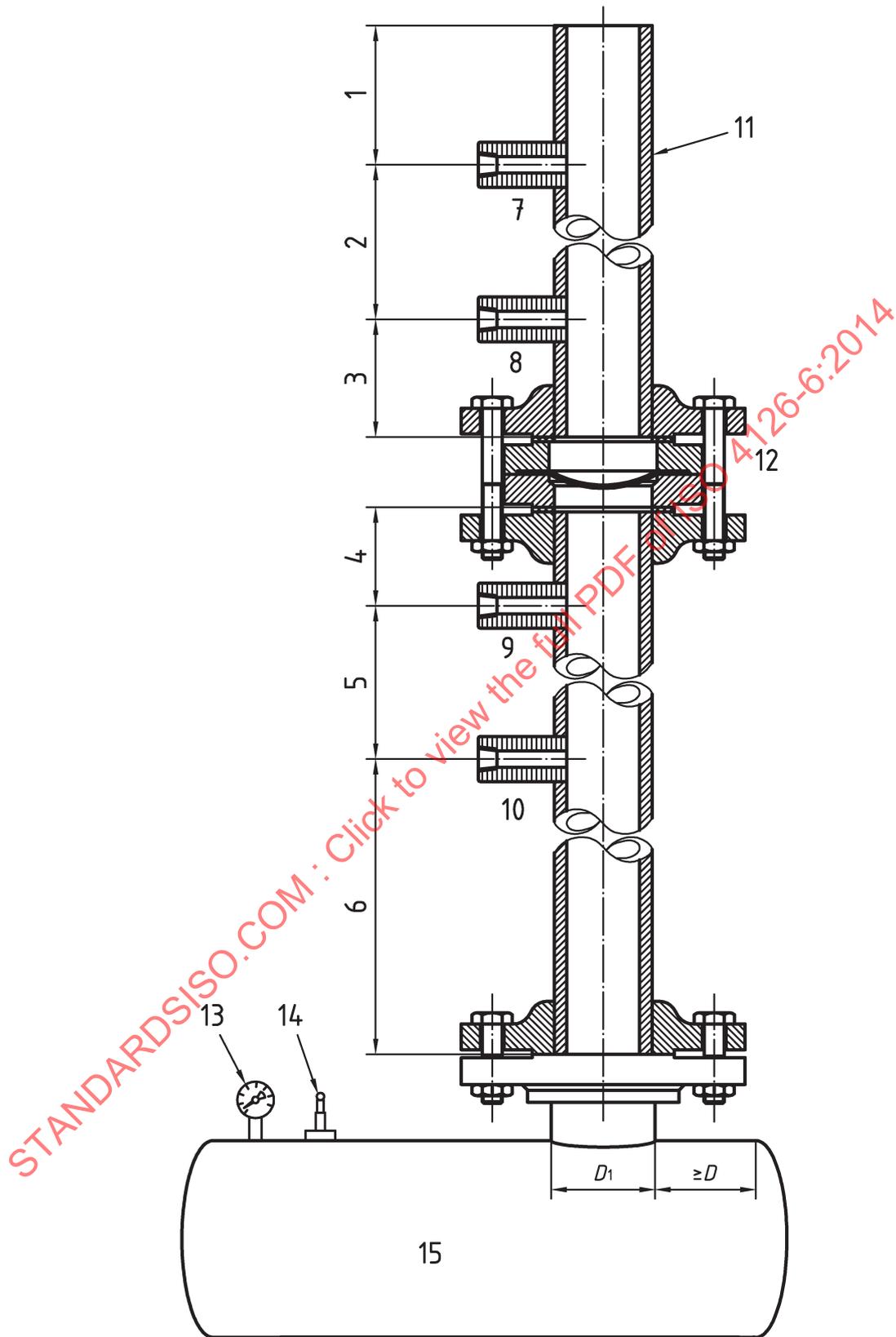
- a) inlet static pressure;
- b) inlet temperature;
- c) differential pressure.

D.2.2.3 Sonic inferential meters

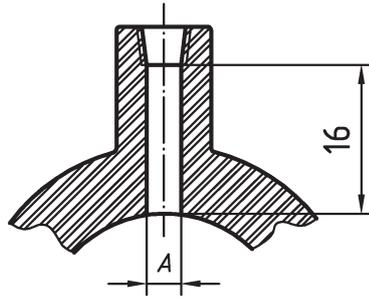
Measurement of:

- inlet total (stagnation) pressure;
- inlet total (stagnation) temperature.

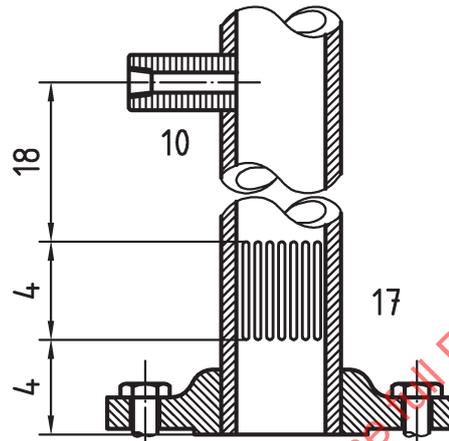
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a) Test system configuration



b) Pressure tap detail



c) Remainder of test rig to be configured as the test rig without straightening vanes

Key

- | | | | |
|---|-------------------|----|--|
| 1 | 15 pipe diameters | 10 | Pressure tap A |
| 2 | 30 pipe diameters | 11 | Standard bore schedule 40 clean commercial pipe
(or as applicable to the device being tested) |
| 3 | 12 pipe diameters | 12 | Bursting disc safety device |
| 4 | 2 pipe diameters | 13 | Pressure gauge |
| 5 | 30 pipe diameters | 14 | Temperature gauge |
| 6 | 60 pipe diameters | 15 | Test vessel |
| 7 | Pressure tap D | 16 | Minimum 2,5A – Recommended 5A |
| 8 | Pressure tap C | 17 | Straightening vanes |
| 9 | Pressure tap B | 18 | 22 pipe diameters |

Figure D.1 — Measurement of K_R — Recommended test system configuration for compressible fluid

NOTE For the determination of A see [Table D.1](#).

Table D.1 — Determination of A

Pressure tap pipe size	A mm	
	Not exceeding	Not less than
DN 50	6	3,2
DN 80	9,5	3,2
DN 100 to DN 200	12,5	3,2
DN 250 ^a	19	3,2

^a Edge of hole should be clean and sharp or slightly rounded free from burrs, wire edges or other irregularities. In no case can any fitting protrude inside the pipe.

D.2.2.4 The test equipment should be such that the uncertainty of the final flow measurement should not exceed $\pm 2,0$ % of the measured value and for individual measurements should not exceed $\pm 0,5$ % of the measured value. The uncertainty of temperature measurements should not exceed ± 1 °C. The determination of these limits should be documented and available for review.

D.2.2.5 The diameter of the test vessel should be at least six times the bursting disc safety device inlet diameter. The discharge pipe should have at least the same nominal size as the bursting disc safety device outlet and should discharge into a system of sufficient size to ensure absence of back pressure.

D.2.2.6 The alignment between the centre of the centre-line of the bursting disc assembly inlet and outlet should be as given in [Table D.2](#). Each gasket should be positioned so that it does not protrude into the flow stream.

Table D.2 — Allowable misalignment

Pipe size	Misalignment
	mm
DN 15 to DN 25	0,8
DN 30 to DN 150	1,6
DN 200 and larger	1 % of nominal inner diameter

D.2.2.7 With no test device installed, conduct 3 flow resistance tests at the smallest, intermediate, and highest test pressures compatible with the test rig. The measured flow resistance, K_R , for each test shall be $0 \pm 0,075$.

D.2.2.8 With no test specimen installed in the system, the difference between the flow resistance factors, determined according to [D.4](#) based on data in accordance with [D.4.1](#), recorded at the minimum pressure and size for the test system, between pressure taps A and B should be within 3 % of the difference between the flow resistance factors of pressure taps C and D.

D.2.3 Test fluids

The test fluids used to determine flow data should be dry air or other dry compressible fluids of known properties. Saturated vapours are not acceptable as test fluids. Care should be taken to avoid internal icing during the test.

D.2.4 Test specimens

D.2.4.1 For each type or model of bursting disc, the manufacturer should submit for test the required bursting disc safety devices in accordance with [D.3](#) together with the cross-section drawings showing the bursting disc safety device design.

D.2.4.2 The bursting disc safety devices tested should be representative of the bursting disc assembly type, or model for which the resistance factor is required, and should be selected from a type test batch of discs of the same size and type and should be marked in accordance with ISO 4126-2.

D.2.4.3 The nominal pipe size dimension of the test system should be the same as that of the bursting disc safety device submitted for testing.

D.2.4.4 The following information should be documented prior to the tests being carried out:

- complete specification of the bursting disc safety device(s) to be tested;
- details of the test system including proposed instrumentation, test and calibration procedures, and demonstration of its limits of uncertainties.

D.2.4.5 For bursting disc safety device designs to be tested, the test specimens should be burst either:

- on the test system immediately prior to flow testing; or
- by the manufacturer in the presence of an independent witness who will certify the burst test specimens to be used for each flow resistance test.

NOTE This method can be used for bursting discs having a coincident temperature outside the range 15 °C to 30 °C.

D.3 Test procedure

D.3.1 General

Each instrument used during the test should be serialised or otherwise positively identified. Depending on the type, each instrument should be calibrated. Records of pertinent instrument calibrations should be available for review.

D.3.2 Incompressible fluid burst test

D.3.2.1 The bursting disc safety device shall be burst using a volume of incompressible fluid under the following conditions for the purpose of determining bursting pressure and opening characteristics.

D.3.2.2 Burst test arrangement.

D.3.2.2.1 Refer to [Figure D.2](#) for typical test arrangement. Other arrangements are permitted as long as the following conditions are met:

D.3.2.2.2 If pressurized air is used as a pressurizing source it shall not exceed 5 % of the volume of the upstream test arrangement at the time of burst.

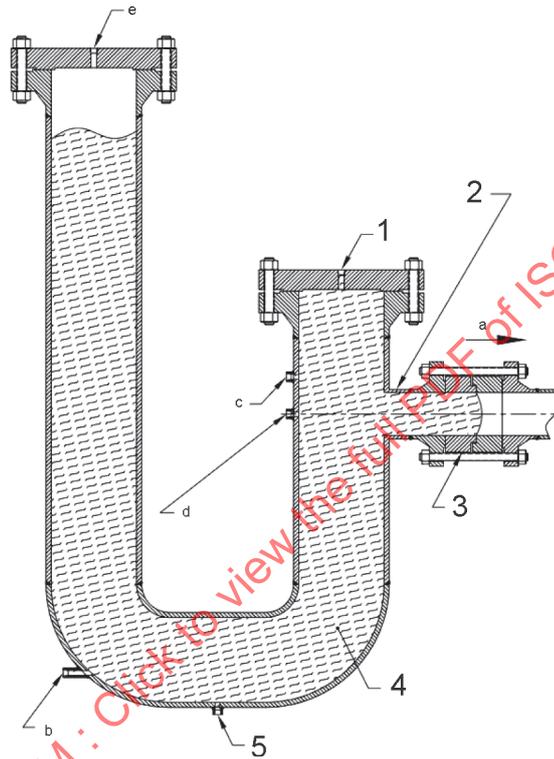
D.3.2.2.3 The fluid against the bursting disc shall be incompressible and remain incompressible during the opening of the bursting disc.

D.3.2.2.4 No pressurized compressible fluid shall pass through the bursting disc during the test.

D.3.2.2.5 The pressure measurement shall be taken along the horizontal axis of the bursting disc device to eliminate induced error from head pressure.

D.3.2.2.6 If a liquid pump is used as the pressurizing mechanism its flowing capacity shall not exceed 5 % of the flowing capacity of the bursting disc device at the rated bursting pressure.

D.3.2.2.7 If any portion of the bursting disc extends beyond the bursting disc holder after opening, the outlet connection shall have the same internal dimensions as the flow resistance test apparatus (see Figure D.1).



Key

- 1 vent
- 2 normal pipe size must be greater than or equal to nominal size of bursting disc device
- 3 bursting disc device
- 4 incompressible fluid
- 5 drain
- a Flow
- b Liquid supply.
- c Temperature probe.
- d Pressure measurement inline with bursting disc device.
- e Vapor supply.

Figure D.2 — Typical Test Apparatus for Incompressible Burst Testing

D.3.2.3 Burst test procedure

D.3.2.3.1 The bursting disc safety device shall be installed in the burst test apparatus in accordance with the manufacturer's instructions.

D.3.2.3.2 Vent any trapped compressible fluid from immediately upstream of the bursting disc.

D.3.2.3.3 The pressure at the inlet shall be increased to 90 per cent of the expected minimum bursting pressure in a time not less than 5 s. Thereafter the pressure at the inlet shall be increased at a linear rate which allows accurate reading pressure, but in not more than 120 s until the bursting disc bursts.

D.3.2.3.4 Record the test fluid temperature and the bursting pressure of the device

D.3.2.3.5 Remove the bursting disc safety device from the burst test apparatus. Do not disturb the opening characteristic of the bursting disc.

D.3.3 Compressible fluid burst test

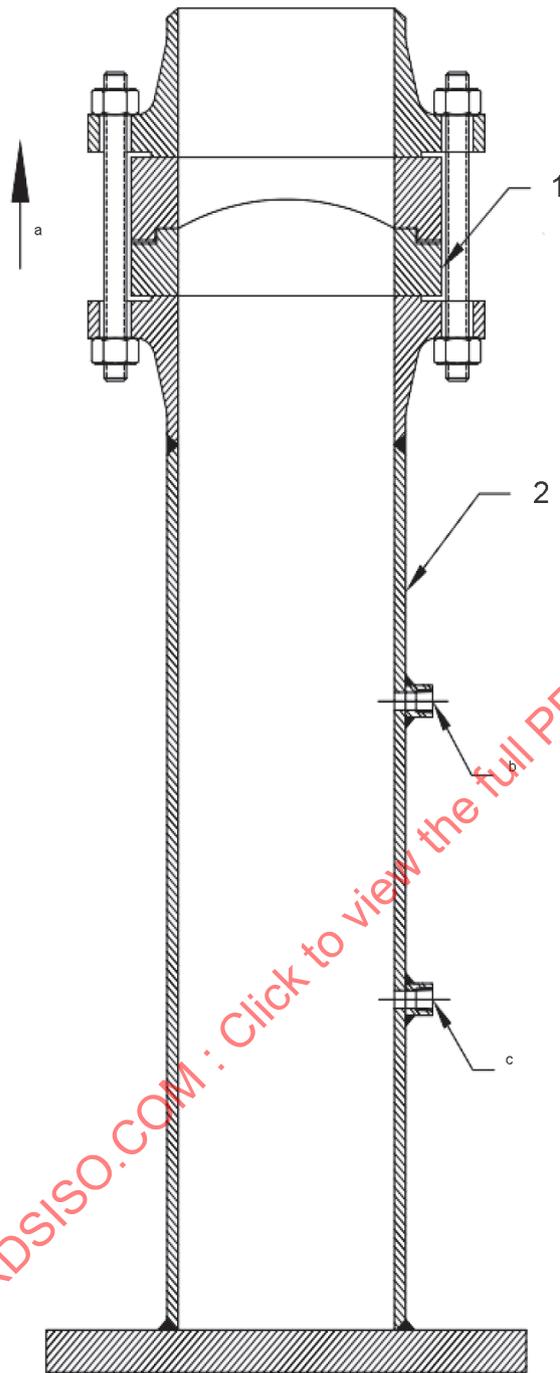
The bursting disc safety device shall be burst using a volume of fluid under the following conditions for the purpose of determining bursting pressure and opening characteristics.

D.3.3.1 Burst test arrangement

D.3.3.1.1 Refer to [Figure D.3](#) for typical test arrangement. Other arrangements are permitted.

D.3.3.1.2 If any portion of the bursting disc extends beyond the bursting disc holder after opening, the outlet connection shall have the same internal dimensions as the flow resistance test apparatus (see [Figure D.1](#)).

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Key

- 1 bursting disc device
- 2 normal pipe size must be greater than or equal to nominal size of bursting disc device
- a Flow.
- b Pressure measurement.
- c Vapour supply.

Figure D.3 — Typical Test Apparatus for Compressible Burst Testing

D.3.3.2 Burst test procedure

D.3.3.2.1 The bursting disc safety device shall be installed in the test apparatus in accordance with the manufacturer's instructions.

D.3.3.2.2 The pressure at the inlet shall be increased to 90 % of the expected minimum bursting pressure in a time not less than 5 s. Thereafter the pressure at the inlet shall be increased at a linear rate which allows accurate reading pressure, but in not more than 120 s until the bursting disc bursts.

D.3.3.2.3 Record the test fluid temperature and the bursting pressure of the device.

D.3.3.2.4 When required, remove the device from the test apparatus taking care not to disturb the opening characteristic of the device.

D.3.4 Flow resistance test

D.3.4.1 Prior to conducting a flow test, a preliminary test should be made without the test specimen to ensure the absence of leaks in the test apparatus and that all differential pressure measurement devices are functioning properly and within their calibrated pressure range.

D.3.4.2 Atmospheric pressure at the test site should be measured to an accuracy of at least $\pm 1,0$ mbar.

D.3.4.3 The test specimen should be installed in accordance with Figure D.1.

D.3.4.4 If the bursting disc safety device is to be burst in the test system, the pressure recorded at the upstream pressure tap B should be increased as specified in D.3.7.2 while maintaining the temperature within the applicable range until the bursting disc bursts. The bursting disc burst pressure and fluid temperature shall be recorded.

D.3.4.5 Flow resistance certification tests shall be conducted at a bursting disc device inlet pressure which does not exceed 110 % of the specified burst pressure. The flow rating pressure should be established and maintained until the flow instruments indicate a steady-state.

D.3.4.6 The following measurements should be simultaneously recorded (it is preferable to use a data acquisition system for these measurements).

D.3.4.7 Using a subsonic inferential meter:

- a) test system pipe inlet pressure;
- b) test system pipe inlet temperature;
- c) flowmeter inlet static pressure;
- d) flowmeter inlet total temperature;
- e) flowmeter differential pressure;
- f) pressure at pressure tap B;
- g) differential pressure between pressure taps A and B;
- h) differential pressure between pressure taps B and C;
- i) differential pressure between pressure taps C and D.

D.3.4.8 Using a sonic inferential meter: