SLOVENSKI STANDARD
SIST EN 14382:2004

01-februar-2004

Varnostne naprave za plinske regulacijske postaje in napeljave - Plinske varnostne zaporne naprave za vstopne tlake do 100 bar

Safety devices for gas pressure regulating stations and installations - Gas safety shut-off devices for inlet pressures up to 100 bar

Sicherheitseinrichtungen für Gas-Druckregelanlagen und -einrichtungen - Sicherheitsabsperreinrichtungen für Betriebsdrücke bis 100 bar

Dispositifs de sécurité pour postes et installations de détente-régulation de pression de gaz - Clapets de sécurité pour pressions de service jusqu' a 100 bar

Ta slovenski standard je istoveten z: **EN 14382:2002**

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English version

Safety devices for gas pressure regulating stations and installations - Gas safety shut-off devices for inlet pressures up to 100 bar

Dispositifs de sécurité pour postes et installations de détente-régulation de pression de gaz - Clapets de sécurité pour pressions amont jusqu' à 100 bar

Sicherheitseinrichtungen für Gas-Druckregelanlagen und -einrichtungen - Gas-Sicherheitsabsperreinrichtungen für Eingangsdrücke bis 100 bar

This European Standard was approved by CEN on 7 November 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This document EN 14382:2002 has been prepared by CEN /TC 235, "Gas pressure regulators and associated safety devices for use in gas transmission and distribution" the secretariat of which is held by UNI.

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 June 2003, and conflicting national standards shall be withdrawn at the latest by June 2003.

At the time of drafting, it has not been decided whether the devices within the scope of this European Standard will fall under the Pressure Equipment Directive 97/23/EC, also there was no network of Notified Bodies under the provisions of the directive itself. Therefore it has been decided to establish the evaluation of conformity according to the CEN “Guidelines for Technical Committees - Requirements in European Standards concerning the evaluation of conformity 1993-01”.

When it is confirmed that pressure SSDs within the scope of this European standard fall under the Pressure Equipment Directive, the Standard will be revised to ensure that it’s clauses conform with the essential requirements and conformity of the Directive.

NOTE Referring to 4.2.2 of this standard it should be noted that at the discussion during its elaboration within WG 1, it was pointed out that in some member countries there is legislation limiting the application of some materials listed in Table 5.

Creep (venting) relief devices built-into gas safety shut-off devices are dealt with in a normative annex to prEN 334 Review.

In this standard the annexes A to I are informative.

This document includes a Bibliography.

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

1 Scope

This European Standard specifies constructional, functional, sizing, and testing requirements, also documentation and marking of gas safety shut-off devices:

— for inlet pressures up to 100 bar and nominal diameters up to DN 400;

— used at an operating temperature range from –20 °C to +60 °C which operate with fuel gases of the 1st and 2nd family according to EN 437 in transmission and distribution networks and industrial installations.

For inlet pressures higher than 100 bar or nominal diameters DN > 400 or operating temperatures outside the range –20 °C to 60 °C, this standard can be considered as a guideline.

Gas safety shut-off devices will hereafter be called SSDs except in titles.

This European Standard considers the following classes of SSD:

a) Temperature classes:

— class 1: operating temperature range from –10 °C to 60 °C;

— class 2: operating temperature range from –20 °C to 60 °C.

b) Functional classes:

— class A: SSDs that close when damage to the pressure sensing element occurs (applicable to overpressure SSDs only) or when external power fails;

— class B: SSDs that do not close when damage to the pressure sensing element occurs or are able to be opened automatically by the pressure control system (applicable to overpressure SSDs only).

NOTE 1 Some countries or purchasers can restrict the use of some of the classes listed above.

NOTE 2 SSDs complying with the requirements of this standard can be declared as “in conformity with EN....“.

The material and functional requirements specified in this standard are applicable to SSDs which use thermal energy or the effects of electrical energy to trip the operation of the closing member. For these SSDs the operational parameters are not specified in this standard.This European Standard is not applicable to:

— SSDs upstream from/on/in domestic gas-consuming appliances which are installed downstream of domestic gas meters;

— shut-off devices only designed for installation in service lines in accordance with EN 12279 that comply with both of the following characteristics:

— volumetric flow rate ≤ 200 m^3/h at normal conditions,

— inlet pressure ≤ 5 bar.

2 Normative references

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

EN 287, *Approval testing of welders - Fusion welding.*

EN 288, *Specification and approval of welding procedures for metallic materials.*

EN 334, *Gas pressure regulators for inlet pressures up to 100 bar.*

EN 970, *Non-destructive examination of fusion welds - Visual examination.*

EN 1349, *Industrial process control valves.*

EN 1418, *Welding personnel - Approval testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials.*

EN 10002-1, *Metallic materials - Tensile testing - Part 1: Method of test at ambient temperature.*

EN 10045-1, *Metallic materials - Charpy impact test - Part 1: Test method.*

EN 10204, *Metallic products - Types of inspection documents.*

EN 12627, *Industrial valves - Butt welding ends for steel valves.*

EN 12732, *Gas supply system - Welding steel pipework - Functional requirements.*

EN 13787, *Elastomers for gas pressure regulators and associated safety devices for inlet pressures up to 100 bar.*

prEN 13906-1, *Cylindrical helical springs made from round wire and bar - Calculation and design - Part 1: Compression springs.*

prEN 13906-2, *Cylindrical helical springs made from round wire and bar - Calculation and design - Part 2: Extension springs.*

EN 60534-1, *Industrial-process control valves - Part 1: Control valve terminology and general considerations (IEC 60534-1:1987).*

EN ISO 175, *Plastics - Methods of test for the determination of the effects of immersion in liquid chemicals (ISO 175:1999).*

EN ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs (ISO 898-1:1999).*

EN ISO 6708, *Pipework components - Definition and selection of DN (nominal size) (ISO 6708:1995).*

EN ISO/IEC 17025:2000, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:1999).*

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads - Part 1: Dimensions, tolerances and designation.*

ISO 1817, *Rubber, vulcanized - Determination of the effect of liquids.*

ISO 5752, *Metal valves for use in flanged pipe systems - Face-to-face and centre-to-face dimensions.*

ISO 7005, *Metallic flanges.*

ANSI/ASME B1.20.1-1983, *Pipe threads, general purpose (inch).*

API spec. 6D, *Pipeline valves (gate, plug, ball and check valves).*

ASME B 16.34-1996, *Valves - Flanged, threaded and welding end.*

ASME VIII div. 1, *Rules for construction of pressure vessels.*

MSS SP 55 – 1985, *Quality standard for steel castings for valves, flanges and fittings and other piping components (Visual method).*

3 Terms and definitions and symbols

3.1 General terminology

For the purposes of this European Standard, the terms and definitions given in EN 60534-1 and the following specific terms and definitions apply.

3.1.1
safety shut-off device
device whose function is to stay in the open position under normal operating conditions and to shut-off the gas flow automatically and completely when the monitored pressure exceeds the pre-set values (over-pressure and/or under-pressure)

3.1.2
main components of a gas safety shut-off device
parts including normally a controller, a trip mechanism, an actuator, a closing member and a relatching device permitting the manual opening of the SSD. All these parts are functionally connected. (see Figures 1, 2 and 3)

3.1.3
closing member
part which shuts off the gas flow completely

3.1.4
trip mechanism
mechanism which releases the closing member when activated by the controller

3.1.5
actuator
device activated by the trip mechanism which shuts the closing member

3.1.6
relatching device
device which enables the complete opening of the SSD

3.1.7
SSD body
part of the SSD which is the main pressure containing envelope. It provides the fluid flow passageway and the pipe end connections

3.1.8
valve seat
corresponding sealing surfaces within an SSD which make full contact only when the closing member is in the closed position

3.1.9
seat ring
part assembled in a component of the SSD to provide a removable seat

3.1.10
controller
device which can include:

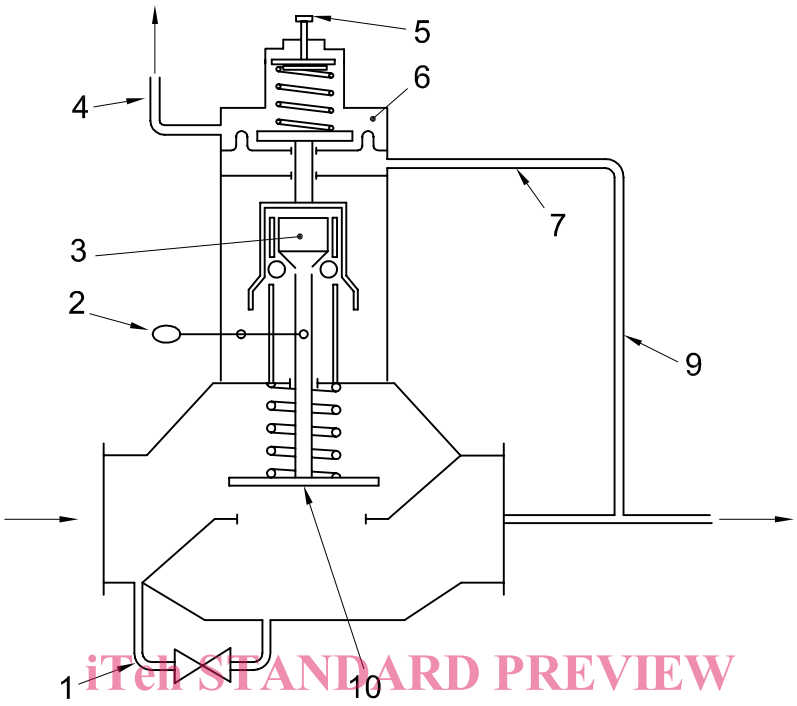
— setting element to adjust the set value of the trip pressure;

— sensing element for the control of the monitored pressure (e.g. a diaphragm);

— unit which compares the set value of the trip pressure with the monitored pressure;

— system which gives the energy to operate the trip mechanism

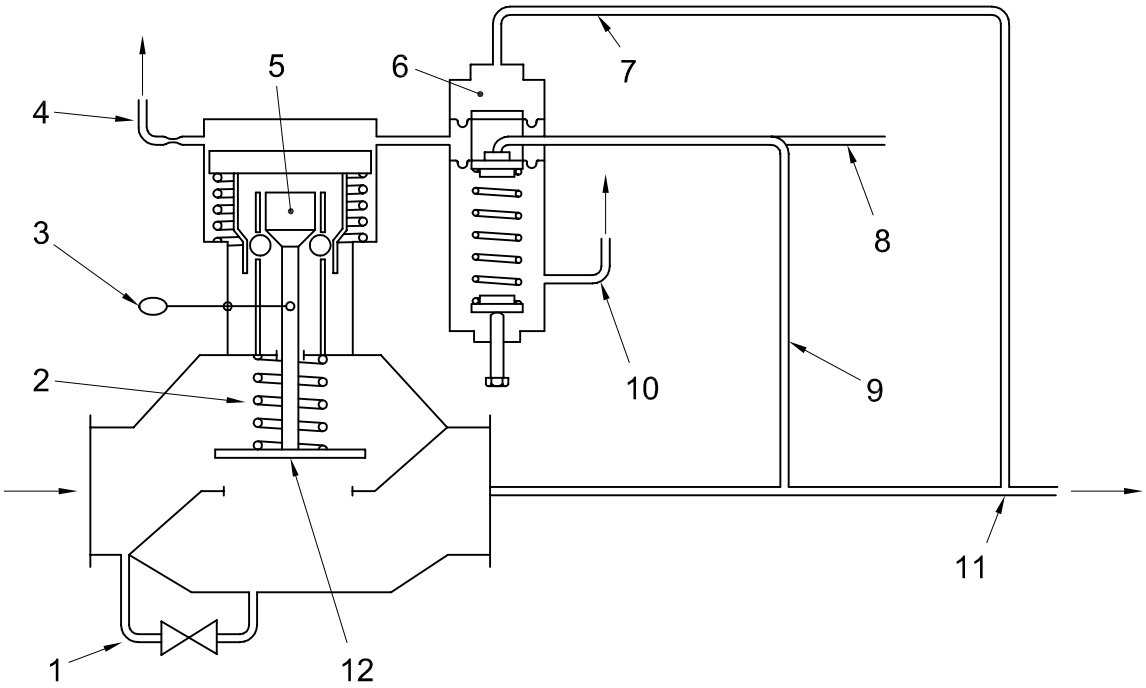
3.1.11
fixtures
devices functionally connected to the main components of the SSD



Key

1 Bypass
2 Relatching device
3 Trip mechanism
4 Breather line
5 Setting element
6 Controller
7 Sensing line
8 Actuator
9 Sensing point
10 Closing member

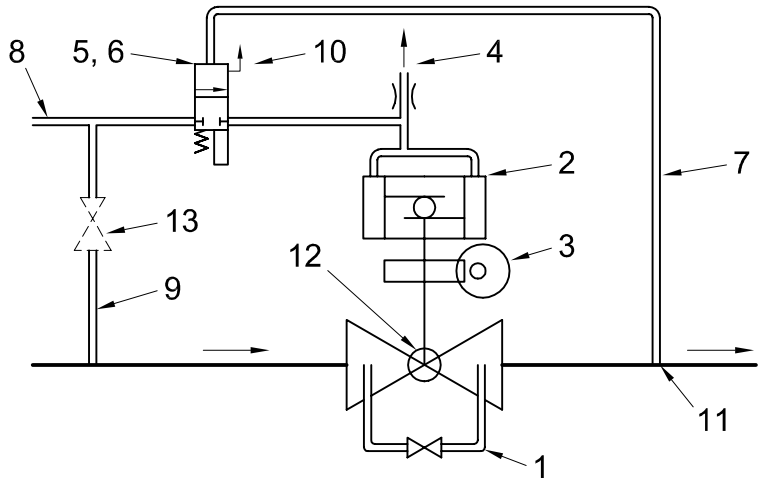
Figure 1 — Example of a direct acting safety shut-off device of the slam-shut type



Key

1 Bypass
2 Actuator
3 Relatching device
4 Exhaust line
5 Trip mechanism
6 Controller
7 Sensing line
8 External loading pressure line
9 Internal loading pressure line
10 Breather/exhaust line
11 Sensing point
12 Closing member

Figure 2 — Example of an indirect acting shut-off device of the slam-shut type



Key

1 Bypass
2 Actuator
3 Relatching device (manually operated)
4 Exhaust line
5 Trip mechanism
6 Controller
7 Sensing line
8 External loading pressure line
9 Internal loading pressure line
10 Breather/exhaust line
11 Sensing point
12 Closing member
13 Pressure reducer (if applicable)

Figure 3 — Example of an indirect acting safety shut-off device of the cut-off type

3.1.12
direct acting shut-off device
SSD in which the sensing element is directly connected to the trip mechanism (see Figure 1)

3.1.13
indirect acting shut-off device
SSD in which the energy required to move the closing member or to operate the controller is supplied by an internal or external power supply (see Figures 2 and 3)

3.1.14
cut-off device
SSD designed to shut off the gas flow which responds slower dynamically than a slam-shut device when the monitored pressure exceeds the pre-set value

EXAMPLE SSD using actuator driven by pipeline gas or external power

3.1.15
slam shut device
SSD designed to quickly shut off the gas flow when the monitored pressure exceeds the pre-set value

EXAMPLE Spring or weight loaded SSD

3.1.16 Accessories of shut-off devices

3.1.16.1
loading pressure line
line connecting the controller and/or actuator with the internal or external power source

3.1.16.2
sensing line
line connecting the sensing point and the controller

3.1.16.3
exhaust line
line connecting the controller and/or actuator of the SSD to atmosphere

3.1.16.4
breather line
line connecting the atmospheric side of the sensing element to atmosphere

3.1.16.5
bypass
device permitting manual equalization of pressure across a closed SSD

3.2 Functional variables

3.2.1 Reference values

3.2.1.1
pressure
all pressures specified in this standard are static gauge pressures

NOTE Pressure is expressed in bar[1)].

3.2.1.2
differential pressure
Δp
the difference between two values of pressure at two different points

3.2.2 Variables in the monitoring process

3.2.2.1
monitored pressure
pressure monitored and safeguarded by the SSD, normally the outlet pressure of the pressure regulating station/installation

3.2.2.2
disturbance variables
variables affecting the functioning of the SSD

EXAMPLES:

— flow rate fluctuations;

— temperature changes;

— mechanical impacts;

— moisture influences;

— influences by gas conditioning agents;

— dust, condensation and others;

— dynamic force on closing member created by gas flow

3.2.2.3
trip pressure
pressure value at which the closing member starts to move

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1) 1 bar = 10^5 Pascal = 1000 mbar = 10^{-1} MPa = 10^5 N/m^2.

3.2.2.3.1
upper trip pressure
p_o
upper limit of the monitored pressure (over-pressure)

3.2.2.3.2
lower trip pressure
p_u
lower limit of the monitored pressure (under-pressure)

3.2.3 Possible values of all variables

3.2.3.1
actual value of the trip pressure
p_{io} (upper trip pressure), p_{iu} (lower trip pressure)
pressure value at which the closing member of an SSD starts to move

3.2.3.2
maximum value
highest value:

— to which any variable can be adjusted or to which it is limited;

— any variable may reach during a series of measurements, or during a certain time.

It is specified by the index “max,” added to the symbol of the variable

3.2.3.3
minimum value
lowest value:

— to which any variable can be adjusted or to which it is limited;

— any variable may reach during a series of measurements or during a certain time.

It is specified by the index “min“ added to the symbol of the variable.

3.2.4 Terms related to the set value of the trip pressure

3.2.4.1
set value of the trip pressure
p_s, p_{so} (for over-pressure), p_{su} (for under-pressure)
desired trip pressure value under specified conditions.

3.2.4.2
set range
W_h, W_{ho} (for over-pressure), W_{hu} (for under-pressure)
whole range of set values which can be obtained from an SSD by adjustment and the replacement of some component (e.g. replacement of the setting or sensing element)

3.2.4.3
specific set range
W_a, W_{ao} (for over-pressure), W_{au} (for under-pressure)
whole range of set values which can be obtained from an SSD by adjustment but with no replacement of its components.

3.2.5 Terms related to the flow

3.2.5.1
normal conditions
absolute pressure of 1,013 25 bar and temperature of 0 °C (273,15 K).

NOTE For calculation purposes a value of 273 K is used in this European Standard.

3.2.5.2
gas volume
volume of gas at normal conditions

NOTE Gas volume is expressed in m^3.

3.2.5.3
volumetric flow rate
Q
volume of gas which flows through the SSD per unit time, at normal conditions.

NOTE Volumetric flow rate is expressed in m^3/h.

3.3 Operating features

3.3.1
trip pressure deviation
the positive or negative deviation of the actual value of the trip pressure from its set value as a percentage of the set value (see Figure 4)

3.3.2
accuracy group
AG
the absolute maximum permissible value of trip pressure deviation

3.3.3
inlet operating pressure range
W_{eAG}
range of inlet operating pressure for which the SSD ensures a given accuracy group

3.3.4
response time
t_a
time interval between attaining the permissible limit value of the trip pressure at the sensing point and complete closure of the closing member

3.3.5
relatching difference
Δp_W
difference between the set value of the trip pressure and the monitored pressure which is required for the correct resetting of the SSD