SLOVENSKI STANDARD
SIST EN 1643:2023

01-februar-2023

Nadomešča:
SIST EN 1643:2014

Varnostne in nadzorne naprave za gorilnike in aparate na plin in/ali tekoča goriva - Sistemi za preskušanje avtomatskih zapornih ventilov

Safety and control devices for burners and appliances burning gaseous and/or liquid fuels - Valve proving systems for automatic shut-off valves

Sicherheits-, Regel- und Steuereinrichtungen für Brenner und Brennstoffgeräte für gasförmige und/oder flüssige Brennstoffe - Ventilüberwachungssysteme für automatische Absperrventile

Dispositifs de commande et de sécurité pour brûleurs à gaz et appareils à gaz - Systèmes de contrôle d'étanchéité pour robinets automatiques de sectionnement

Ta slovenski standard je istoveten z: **EN 1643:2022**

ICS:

23.060.40	Tlačni regulatorji	Pressure regulators
27.060.01	Gorilniki in grelniki vode na splošno	Burners and boilers in general

SIST EN 1643:2023 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1643

November 2022

ICS 23.060.40

Supersedes EN 1643:2014

English Version

Safety and control devices for burners and appliances burning gaseous and/or liquid fuels - Valve proving systems for automatic shut-off valves

Dispositifs de commande et de sécurité pour brûleurs à gaz et appareils à gaz - Systèmes de contrôle d'étanchéité pour robinets automatiques de sectionnement

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This European Standard was approved by CEN on 2 October 2022.

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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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

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

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Ref. No. EN 1643:2022 E

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European foreword

This document (EN 1643:2022) has been prepared by Technical Committee CEN/TC 58 “Safety and control devices for burners and appliances burning gaseous or liquid fuels”, the secretariat of which is held by BSI.

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 May 2023, and conflicting national standards shall be withdrawn at the latest by November 2025.

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

This document supersedes EN 1643:2014.

The following significant changes compared to the previous edition have been incorporated in this document:

a) alignment with EN 13611:2019;

b) modification of the contents of Annex A: “Gas connections in common use in the various countries” replaced by “Abbreviations and Symbols”.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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

Introduction

This document is intended to be used in conjunction with EN 13611:2019.

This document refers to clauses of EN 13611:2019 or adapts clauses by stating “with the following modification”, “with the following addition”, “is replaced by the following” or “is not applicable” in the corresponding clause.

This document adds clauses or subclauses to the structure of EN 13611:2019 which are particular to this document. Subclauses which are additional to those in EN 13611:2019 are numbered starting from 101. Additional Annexes are designated as Annex AA, Annex BB, Annex CC, etc. It should be noted that these clauses, subclauses and Annexes are not indicated as an addition.

If by reference to EN 13611:2019 the term “control” is given, this term should be read as valve-proving system.

EN 1643 compliance for valve-proving systems cannot be claimed based upon SIL classification according to EN 61508.

SIL classification cannot be claimed based upon compliance with this standard only. A supplementary method for SIL determination is specified in EN 13611:2019, Annex J.

1 Scope

EN 13611:2019, Clause 1 is replaced by following:

This document specifies the safety, design, construction and performance requirements, and testing for valve-proving systems, hereafter referred to as "VPS", intended for use with gas burners and gas-burning appliances burning one or more gaseous fuels.

This document applies to all types of VPS used for the automatic detection of leakage in a gas burner section having at least two automatic shut-off valves, and which give a signal if the leakage of one of the valves, the piping in-between the valves or of the VPS itself and its components exceeds the detection limit.

This document applies to VPS for gases with a maximum inlet pressure up to and including 500 kPa.

This document does not apply to VPSs for use in explosive atmospheres.

This document is applicable to *AC* and *DC* supplied VPS (for VPS supplied by stand-alone battery system, battery systems for mobile applications, or VPS which are intended to be connected to *DC* supply networks, see Annex I).

2 Normative references

EN 13611:2019, Clause 2 applies with the following additions:

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.

EN 161:2022, *Automatic shut-off valves for gas burners and gas appliances*

EN 1854:—[1], *Pressure sensing devices for gas burners and gas burning appliances*

EN 13611:2019[2], *Safety and control devices for burners and appliances burning gaseous and/or liquid fuels — General requirements*

EN 60730-1:2016[3], *Automatic electrical controls — Part 1: General requirements (IEC 60730-1:2013, modified)*

EN 60730-2-5:2015[4], *Automatic electrical controls — Part 2-5: Particular requirements for automatic electrical burner control systems (IEC 60730-2-5:2013)*

EN 60947-5-1:2017[5], *Low-voltage switchgear and controlgear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices (IEC 60947-5-1:2016, modified)*

[1] Under preparation. Stage at the time of publication: FprEN 1854:2022.

[2] As impacted by EN 13611:2019/AC:2021.

[3] As impacted by EN 60730-1:2016/A1:2019 and EN 60730-1:2016/A2:2022.

[4] As impacted by EN 60730-2-5:2015/A1:2019 and EN 60730-2-5:2015/A2:2021.

[5] As impacted by EN 60947-5-1:2017/AC:2020-05.

EN 61810-1:2015[6], *Electromechanical elementary relays — Part 1: General and safety requirements (IEC 61810-1:2015)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13611:2019 apply with the following modifications.

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

- ISO Online browsing platform: available at https://www.iso.org/obp
- IEC Electropedia: available at https://www.electropedia.org/

3.23
safety shutdown
EN 13611:2019, 3.23 is replaced by 3.108.

3.101
valve proving system
VPS
system to check the effective closure of automatic shut-off valves by detecting leakage, that often consists of a programming unit, a measuring device, valves and other functional assemblies

3.102
VPS programming unit
unit which follows a predetermined sequence of valve proving actions

3.103
detecting device
device for direct or inferential detection of leakage

Note 1 to entry: Leakage is detected by measuring flow or pressure.

3.104
VPS operational time
time taken by the VPS to perform its entire cycle of operation

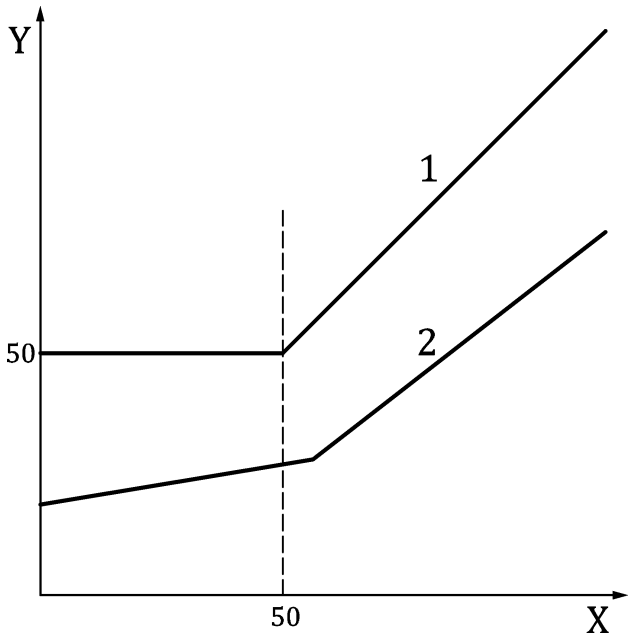
3.105
detection limit
maximum amount of leakage that can occur before the VPS is required to give a signal

Note 1 to entry: See Figure 1.

3.106
detection setting
actual leakage rate at which the VPS gives a signal

Note 1 to entry: See Figure 1.

[6] As impacted by EN 61810-1:2015/AC:2017-07, EN 61810-1:2015/AC:2018-04 and EN 61810-1:2015/A1:2020.



Key

X burner heat input, gas flow, expressed in m^3/h

Y detected leakage rate, expressed in dm^3/h

1 detection limit, see 3.105

2 detection setting, see 3.106

Figure 1 — Illustration of detection limit and detection setting

3.107
leakage testing time
time in which the VPS monitors a gas valve for leakage

3.108
safety shutdown
process which is effected immediately following the detection of a leakage exceeding the detection limit, or detection of an internal fault, disabling energization of the ignition and of the automatic shut-off valves

3.109
volatile lock-out
safety shutdown condition of the VPS where a restart can only be accomplished by either a manual reset of the VPS, or an interruption of the main power and its subsequent restoration

[SOURCE: EN 298:2022, 3.121.2]

3.110
non-volatile lock-out
safety shutdown condition of the VPS, where a restart can only be accomplished by a manual reset of the VPS and by no other means

[SOURCE: EN 298:2022, 3.121.1]

3.111
automatic shut-off valves
valve which opens when energized and closes automatically when de-energized

Note 1 to entry: For further information refer to EN 161.

[SOURCE: EN 161:2022, 3.101]

4 Classification

4.1 Classes of control

EN 13611:2019, 4.1 is not applicable.

4.2 Groups of control

Shall be according to EN 13611:2019, 4.2.

4.3 Classes of control functions

Shall be according to EN 13611:2019, 4.3 with the following addition:

The VPS for automatic shut-off valves is a Class C control function.

4.4 Types of *DC* supplied controls

Shall be according to EN 13611:2019, 4.4.

5 Test conditions and uncertainty of measurements

Shall be according to EN 13611:2019, Clause 5.

6 Design and construction

6.1 General

Shall be according to EN 13611:2019, 6.1 with the following addition:

The VPS shall be designed such that changes in critical circuit component values (such as those affecting timing or sequence) within the worst case tolerances of the components specification, including the long-term stability, shall result in the VPS continuing to function in accordance with this document. Compliance shall be checked by worst-case analysis.

The construction of any additional functions included in the VPS for which no provisions exist in this document shall be such that they do not degrade its safe and correct operation.

Where components are used to complete the VPS, these components shall comply with the relevant standard. Valves (e.g. for pressurizing and relieving the test section) integrated into the VPS functional sequence shall comply with EN 161:2022, Class A, if not otherwise specified by a relevant appliance standard. Pressure-sensing devices shall comply with EN 1854:—[1] for combustible gases.

6.2 Mechanical parts of the control

Shall be according to EN 13611:2019, 6.2.

6.3 Materials

Shall be according to EN 13611:2019, 6.3.

6.4 Gas connections

Shall be according to EN 13611:2019, 6.4.

6.5 Electrical parts of the control

6.5.1 General

Shall be according to EN 13611:2019, 6.5.1.

6.5.2 Switching elements

6.5.2.1 Requirements

Shall be according to EN 13611:2019, 6.5.2.1 with the following addition:

The suitability of measures to maintain the capability to interrupt the energization of the shut-off valve terminals by means of at least one switching element or a non-replaceable overcurrent protection device has been interrupted shall be verified by 6.5.2.2.

6.5.2.2 Tests of protecting measures against failure of switching elements

Shall be according to EN 13611:2019, 6.5.2.2 with the following modifications:

For the purpose of this clause, the terms “safety related output terminals” or “output terminals” are replaced by “shut-off valve terminals”.

Delete in the brackets of the first paragraph the words “contacts of”.

Add the following NOTE:

NOTE A switching element means semiconductors as well as electro-mechanic switching elements.

Add to the end of the 2nd paragraph the following text:

If the valve circuit of the automatic burner control system is always supplied by an integrated power supply, the test shall be applied with this integrated power supply under worst-case conditions for the highest short circuit current.

6.5.3 Electrical components

Shall be according to EN 13611:2019, 6.5.3.

6.6 Protection against internal faults for the purpose of functional safety

6.6.1 Design and construction requirements

Shall be according to EN 13611:2019, 6.6.1.

6.6.2 Class A

EN 13611:2019, 6.6.2 is not applicable.

6.6.3 Class B

EN 13611:2019, 6.6.3 is not applicable.

6.6.4 Class C

6.6.4.1 Design and construction requirements

Shall be according to EN 13611:2019, 6.6.4.1 with the following modification:

Replace the third paragraph by the following:

At least the following states are defined as unsafe states:

a) if during burner shutdown, the gas flow through a valve or by-passing valve is higher than the detection limit value of that valve except for the function of the VPS;

b) if a test for leakage is outside the limits defined in 3.105 or 3.106 (see 6.101.2);

c) overriding the VPS sequence control of the safety shut-off valves by the automatic burner control system, except for the normal function of the VPS;

d) preventing the VPS from going to a defined fault response.

VPS or safety-related (hardware) parts of the VPS that are not powered during the stand-by and the running state of the appliance shall execute all relevant internal tests during powering-up of the VPS. Once the VPS is operational, the required internal test to detect the first faults leading to one of the unsafe states as given in a) to d) shall be executed every 3 s.

For this type of VPS, the second fault shall only be considered to occur when a start-up sequence has been performed between the first and the second fault.

VPS that are powered during stand-by or running state of the appliance shall comply with the following:

— the reaction time to detect the first faults leading to one of the unsafe states as given in a) to d) is ≤ 3 s;

— the reaction time to detect second independent fault is ≤ 24 h.

The VPS shall be fail-safe. VPS which meet the requirements of this clause and EN 13611:2019, 6.6.1.1 are considered to be inherently fail-safe.

The circuitry and the construction of the VPS shall be such that they meet the requirements of 7.101 and shall be appraised according to the requirements of 6.6.4.2, 6.6.4.3 and 6.6.4.4, and under the test conditions and criteria of 6.6.5.

Components shall be dimensioned on the basis of the worst-case conditions which can arise in the VPS, as stated within the design documentation.

6.6.4.2 First fault

EN 13611:2019, 6.6.4.2 is replaced by the following:

Any first fault (see Annex E) in any one component or any one fault together with any other fault arising from that first fault shall result in either:

a) the VPS becoming inoperative with all valve terminals de-energized;

b) the VPS proceeding to safety shutdown within 3 s, followed by a non-volatile or volatile lock-out. The lock-out may be executed by the VPS, or by another safety related control within the appliance preventing the burner start up. During subsequent reset action, the VPS shall not operate any valves or the pressurizing pump belonging to the valve. Subsequent reset from the lock-out condition under the same fault condition results in the VPS returning to the volatile or non-volatile lock-out condition; continue with fault assessment during lock-out or safety shutdown according to 6.6.4.4.3;