



# SLOVENSKI STANDARD

## SIST EN 1643:2014

01-julij-2014

Nadomešča:  
SIST EN 1643:2002

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### Varnostne in nadzorne naprave za plinske gorilnike in plinske aparate - Sistemi za preskušanje samodejnih zapornih ventilov

Safety and control devices for gas burners and gas burning appliances - Valve proving systems for automatic shut-off valves

Sicherheits-, Regel- und Steuereinrichtungen für Gasbrenner und Gasgeräte - Ventilüberwachungssysteme für automatische Absperrventile

Systèmes de contrôle d'étanchéité pour robinets automatiques de sectionnement pour brûleurs et appareils à gaz

Ta slovenski standard je istoveten z: **EN 1643:2014**

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#### **ICS:**

23.060.40	Tlačni regulatorji	Pressure regulators
27.060.20	Plinski gorilniki	Gas fuel burners

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## Safety and control devices for gas burners and gas burning appliances - Valve proving systems for automatic shut-off valves

Systèmes de contrôle d'étanchéité pour robinets automatiques de sectionnement pour brûleurs et appareils à gaz

Sicherheits-, Regel- und Steuereinrichtungen für Gasbrenner und Gasgeräte - Ventilüberwachungssysteme für automatische Absperrventile

This European Standard was approved by CEN on 27 December 2013.

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## Foreword

This document (EN 1643:2014) 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of an identical text or by endorsement, at the latest by September 2014, and conflicting national standards shall be withdrawn at the latest by March 2017.

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

This document supersedes EN 1643:2000.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2009/142/EC.

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

This document refers to clauses of EN 13611:2007+A2:2011 or adapts it 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 sub-clauses to the structure of EN 13611:2007+A2:2011 which are particular to this standard, i.e. sub-clauses or annexes which are additional to those in EN 13611 are numbered starting from 101 or are designated as Annex AA, BB, CC etc. It should be noted that these clauses and sub-clauses are not indicated as an addition. If by reference to EN 13611 the term “control” is given, this term should be read as valve-proving systems.

Note that the following provides details of significant technical changes between this document and the previous edition: <https://standards.iteh.ai/catalog/standards/sist/23b097cb-b13d-4f7f-9475-7fa0d055db7e/sist-en-1643-2014>

- a) Alignment with EN 13611:2007+A2:2011;
- b) Integration of the requirements from ISO 23551-4.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

**EN 1643:2014 (E)****1 Scope**

This European Standard specifies safety, constructional and performance requirements of valve-proving systems, hereafter referred to as VPS, intended for use with gas burners and gas-burning appliances. It also describes the test procedures for checking compliance with these requirements and provides information necessary for the purchaser and user.

This European Standard applies to all types of VPS which are used for the automatic detection of leakage in a gas burner section having at least two valves designed in accordance with EN 161 and which give a signal if the leakage of one of the valves exceeds the detection limit.

This European Standard applies to VPSs with a maximum working pressure up to and including 500 kPa for use in systems using fuel gases of the 1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup> families.

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

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

Provisions for production control are not part of this European Standard.

**2 Normative references**

The following 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.

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

<https://standards.iteh.ai/catalog/standards/sist/23b097cb-b13d-4f7f-9475-51f049554b7c/en-161-2011>

EN 1854, *Pressure sensing devices for gas burners and gas burning appliances*

EN 13611:2007+A2:2011, *Safety and control devices for gas burners and gas burning appliances - General requirements*

EN 14459:2007, *Control functions in electronic systems for gas burners and gas burning appliances - Methods for classification and assessment*

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN 60730-1:2011, *Automatic electrical controls for household and similar use — Part 1: General requirements (IEC 60730-1:2010, modified)*

EN 60730-2-5:2002, *Automatic electrical controls for household and similar use — Part 2-5: Particular requirements for automatic electrical burner control systems (IEC 60730-2-5:2000, modified)*

EN 60947-5-1:2004, *Low-voltage switchgear and controlgear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices (IEC 60947-5-1:2003)*

EN 61810-1, *Electromechanical elementary relays — Part 1: General requirements (IEC 61810-1)*

**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 13611:2007+A2:2011 and the following apply.



**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

EXAMPLE 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**

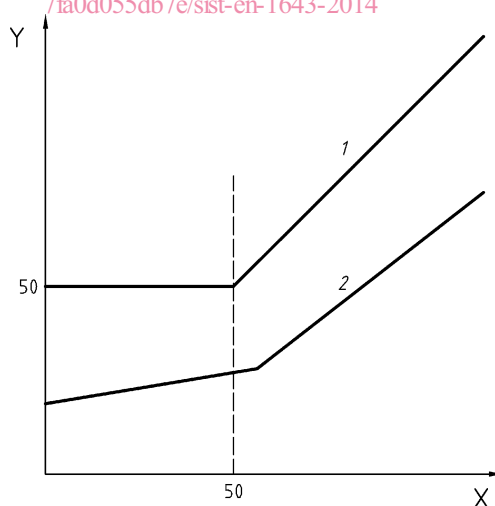
maximum amount of leakage that can occur before the VPS is required to give a signal

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. <http://standards.iteh.ai/catalog/standards/sist/23b097cb-b13d-4f7f-9475-7fa0d055db7e/sist-en-1643-2014>

**Key**

- X burner heat, gas flow, expressed in  $\text{m}^3/\text{h}$
- Y detected leakage rate, expressed in  $\text{dm}^3/\text{h}$
- 1 detection limit, see 3.105
- 2 detection setting, see 3.106

**Figure 1 — Illustration of detection limit and detection setting**

**EN 1643:2014 (E)****3.107****leakage testing time**

time in which the VPS monitors a gas valve for leakage

**3.108****safety shut-down**

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

**3.109****volatile lock-out**

safety shut-down condition of the system where a restart can only be accomplished by either the manual reset of the system, or an interruption of the main power and its subsequent restoration

**3.110****non-volatile lock-out**

safety shut-down condition of the system, where a restart can only be accomplished by the manual reset of the system and by no other means

**4 Classification****4.1 Classes of control**

EN 13611:2007+A2:2011, 4.1 is not applicable.

**4.2 Groups of control**

Shall be according to EN 13611:2007+A2:2011, 4.2.

**4.3 Classes of control functions**

Shall be according to EN 13611:2007+A2:2011, 4.3 with the following addition:

The valve proving system for automatic shut-off valves is a Class C control function.

**5 Units of measurement and test conditions****5.1 Dimensions**

Shall be according to EN 13611:2007+A2:2011, 5.1.

**5.2 Pressures**

Shall be according to EN 13611:2007+A2:2011, 5.2.

**5.3 Bending moments and torques**

EN 13611:2007+A2:2011, 5.3 is not applicable.

**5.4 Test conditions and measurement tolerances**

Shall be according to EN 13611:2007+A2:2011, 5.4 with the following addition:

All tests are performed in the order written in this European Standard (i.e. EN 1643) except for that of 6.6 and 7.10.

## 6 Construction requirements

### 6.1 General

EN 13611:2007+A2:2011, 6.1, applies, 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 system continuing to function in accordance with this European Standard. 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 European Standard shall be such that they do not degrade the safe and correct operation.

Where components are used to complete the VPS, these components shall comply with the relevant harmonized European controls Standard. Valves (e.g. for pressurising and relieving the test section) integrated into the VPS functional sequence shall comply with EN 161 Class A, if not otherwise specified by a relevant appliance standard, and pressure-sensing devices, with EN 1854.

### 6.2 Mechanical parts of the control

Shall be according to EN 13611:2007+A2:2011, 6.2

### 6.3 Materials

Shall be according to EN 13611:2007+A2:2011, 6.3

### 6.4 Gas connections

Shall be according to EN 13611:2007+A2:2011, 6.4

### 6.5 Electronic parts of the control

#### 6.5.1 General

Shall be according to EN 13611:2007+A2:2011, 6.5.1 with the following addition:

The construction of any additional functions included in the valve proving system, programming unit or flame detector device for which no provisions exist in this standard, shall be such that they do not degrade the safe and correct operation of the valve proving system.

Measures shall be taken to protect against failure of two (or more) switching elements, due to a common cause, by an external short circuit that would prevent the valve proving system from performing a safety shutdown.

Acceptable methods are current limitation, overcurrent protection device or internal fault detecting functions.

The suitability of measures to maintain the capability to interrupt the energisation 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 the following test.

The shut-off valve terminals of the valve proving system are connected to a switch that is intended to switch the short circuit current. With this switch opened, the valve proving system is connected as described in EN 60730-1:2011, H.27.1.1.2 with the outputs energised to simulate normal operation (contacts of the internal switching elements closed).

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Where overcurrent protection device are used as the protective measure the power supply to the valve proving system shall have the capability of supplying an inrush current of at least 500 A. Where current limitation techniques are used the power supply to the valve proving system shall not limit the current.

A short-circuit is applied between the shut-off valve terminals of the valve proving system by closing the switch.

The test is terminated if there is no current flow through the switch, or after one hour.

If an overcurrent protection device is replaceable and has operated during the test it shall be replaced and the test is repeated two more times by attempting to restart the valve proving system keeping the switch closed.

A second test procedure is conducted in the same way, with the switch closed prior to the first start-up sequence; a second test sample can be used for this second test procedure.

If an internal fault detecting function of the valve proving system either opens the switching elements or initiates a safety shut-down the test is repeated two times while maintaining the external short circuit by attempting to restart the valve proving system.

Compliance is checked in accordance with EN 60730-1:2011, H.27.1.1.3 and Clause 15.

After the test at least one switching element of the valve proving system shall be able to de-energize the shut-off valve terminals, or a non-replaceable overcurrent protection device has permanently interrupted the supply to the shut-off valve terminals.

Designs where at least two relays are used as switching elements with independent contacts and in series with a non-replaceable fuse (see Table E.1 h) with  $I_N < 0,6 \cdot I_e$ , are considered to comply with the requirements for prevention of common cause error, without further testing.

NOTE  $I_N$  values for the fuse (see EN 60127-1:2006, 3.16).  
 $I_e$ : rated operational current of the contact (see EN 60947-1:2007, 4.3.2.3).

**6.5.2 Protection provided by the enclosure**

EN 13611:2007+A2:2011, 6.5.2 is replaced by the following:

The class of protection for a system with its own enclosure shall be a minimum of IP 40 as specified in EN 60529:1991 when installed in accordance with the installation and operating instructions. For systems used in the open air, the protection shall conform to at least IP 54 when installed in accordance with the installation and operating instructions. For systems without enclosure, equivalent protection shall be provided by the appliance in which it is installed.

**6.5.3 Electrical components**

Shall be according to EN 13611:2007+A2:2011, 6.5.3.

**6.6 Protection against internal faults for the purpose of functional safety****6.6.1 Design and construction requirements****6.6.1.1 Fault avoidance and fault tolerance**

Shall be according to EN 13611:2007+A2:2011, 6.6.1.1.

**6.6.1.2 Reset device**

Shall be according to EN 13611:2007+A2:2011, 6.6.1.2 with the following modification:

The last paragraph shall be substituted by:

For remote reset functions EN 14459:2007, Annex J applies.

### 6.6.1.3 Documentation

Shall be according to EN 13611:2007+A2:2011, 6.6.1.3.

### 6.6.2 Class A

EN 13611:2007+A2:2011, 6.6.2 is not applicable.

### 6.6.3 Class B

EN 13611:2007+A2:2011, 6.6.3 is not applicable.

### 6.6.4 Class C

#### 6.6.4.1 Design and construction requirements

Shall be according to EN 13611:2007+A2:2011, 6.6.4.1 with the following modification:

Replace the second and third paragraph by the following:

At least the following states are defined as unsafe states:

- a) if during burner shut-down, 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;
- c) overriding the VPS sequence control of the safety shut-off valves by the burner control unit, 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 mentioned in above shall be executed every 3 s.

For this type of VPS system, 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 systems that are powered during stand-by or running state of the appliance shall comply with the following:

- reaction time to detect the first faults leading to one of the unsafe states as mentioned in above are  $\leq 3$  s;
- reaction time to detect second independent fault  $\leq 24$  h.

Software shall conform to software Class C of EN 60730-2-5:

The VPS shall be fail-safe. Systems which meet the requirements of this clause and, if applicable, 6.6.1.1 are considered to be inherently fail-safe.