
**Safety and control devices for gas
burners and gas-burning appliances —
Particular requirements —**

Part 4:
**Valve-proving systems for automatic
shut-off valves**

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*Dispositifs de contrôle et de sécurité pour les brûleurs à gaz et pour les
appareils utilisant le gaz — Exigences particulières —*

*Partie 4: Systèmes de contrôle d'étanchéité pour robinets automatiques
de sectionnement*

ISO 23551-4:2005

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 23551-4 was prepared by Technical Committee ISO/TC 161, *Control and protective devices for gas and oil burners and gas and oil burning appliances*.

ISO 23551 consists of the following parts, under the general title *Safety and control devices for gas burners and gas-burning appliances* — *Particular requirements*:

- *Part 1: Automatic valves*
- *Part 2: Pressure governors*
- *Part 3: Gas/air ratio controls, pneumatic type*
- *Part 4: Valve-proving systems for automatic shut-off valves*

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Introduction

This part of ISO 23551 is to be used in conjunction with ISO 23550:2004. This part of ISO 23551 both refers to and modifies clauses of ISO 23550:2004; the latter are indicated by stating that the clause of this part of ISO 23551 includes additions to, modifications of or replacements of the corresponding clause in ISO 23550:2004.

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Safety and control devices for gas burners and gas-burning appliances — Particular requirements —

Part 4: Valve-proving systems for automatic shut-off valves

1 Scope

This part of ISO 23551 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 part of ISO 23551 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 ISO 23551-1 and which give a signal if the leakage of one of the valves exceeds the detection limit.

This part of ISO 23551 applies to VPSs with a declared maximum working pressure up to and including 500 kPa for use in systems using fuel gases.

This part of ISO 23551 does not apply to VPSs for use in explosive atmospheres.

2 Normative references

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

ISO 23550:2004, *Safety and control devices for gas burners and gas-burning appliances — General requirements*

ISO 23551-1:—¹⁾, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 1: Automatic valves*

IEC 60529:2001, *Degrees of protection provided by enclosures (IP Code)*

IEC 60730-1:2003, *Automatic electrical controls for household and similar use — Part 1: General requirements*

IEC 60730-2-5:2004, *Automatic electrical controls for household and similar use — Part 2-5: Particular requirements for automatic electrical burner control systems*

IEC 60730-2-6:1991, *Automatic electrical controls for household and similar use — Part 2: Particular requirements for automatic electrical pressure sensing controls including mechanical requirements*

IEC 61000-4-5:2001, *Electromagnetic compatibility (EMC) — Part 4-5: Testing and measurement techniques — Surge immunity test*

1) To be published.

3 Terms and definitions

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

3.1 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

3.2 VPS programming unit

unit which follows a predetermined sequence of valve proving actions

3.3 detecting device

device for direct or inferential detection of leakage, e. g. by measuring flow or pressure

3.4 VPS operational time

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

3.5 detection limit

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

NOTE See Figure 1.

3.6 detection setting

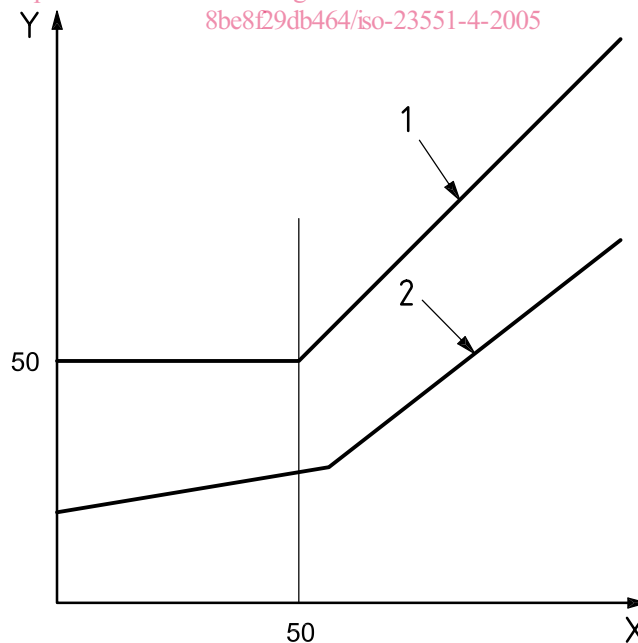
actual leakage rate setting specified by the manufacturer at which the VPS gives a signal

NOTE See Figure 1.

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Key

- X burner heat, gas flow, expressed in cubic metres per hour
- Y detected leakage rate, expressed in cubic decimetres per hour
- 1 detection limit
- 2 detection setting

Figure 1 —Illustration of detection limit and detection setting

3.7**leakage testing time**

time in which the VPS monitors a gas valve for leakage

3.8**volatile lock-out**

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

3.9**non volatile lock-out**

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

4 Classification

There is no classification.

5 Test conditions

ISO 23550:2004, Clause 5, applies, with the following addition.

The error of measurement shall not exceed

— for time measurements: $\pm 0,1$ s

— for temperature measurements: ± 1 K,

— for supply frequency measurements: $\pm 0,1$ Hz,

— for electrical supply measurements: $\pm 0,5$ %.

All measurements shall be made after stable temperature conditions have been achieved.

6 Construction**6.1 General**

ISO 23550:2004, 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 component manufacturer's declared worst case tolerances, including the long-term stability, shall result in the system continuing to function in accordance with this part of ISO 23551. 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 part of ISO 23551 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 component International Standard. Valves (e. g. for pressurizing and relieving the test section) integrated into the VPS functional sequence shall comply with ISO 23551-1:—, class A, and pressure-sensing devices, with IEC 60730-2-6:1991.

6.2 Construction requirements

ISO 23550:2004, 6.2, applies.

6.3 Materials

ISO 23550:2004, 6.3, applies.

6.4 Gas connections

ISO 23550:2004, 6.4, applies.

6.5 Electrical material

6.5.1 Degree of protection

The class of protection for a system with its own enclosure shall be a minimum of IP 40 as specified in IEC 60529:2001 when installed in accordance with the manufacturer's instructions. For systems used in the open air, the protection shall conform to at least IP 54 when installed in accordance with the manufacturer's instructions. For systems without enclosure, equivalent protection shall be provided by the appliance in which it is installed.

6.5.2 Switches

ISO 23551-1:—, 6.5.2, applies.

6.5.3 Power-saving circuit

ISO 23551-1:—, 6.5.4, applies.

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6.6 Additional constructional requirements for VPS systems

6.6.1 Signal for indication

A signal for indication, e.g. optical indication, shall be given when the leakage exceeds the detection limit.

6.6.2 VPS setting

The setting of a detecting device shall require the use of tools. If the VPS is adjustable, the manufacturer shall supply information for its setting, e. g. detection setting.

7 Performance

7.1 General

ISO 23550:2004, 7.1, applies, with the following addition.

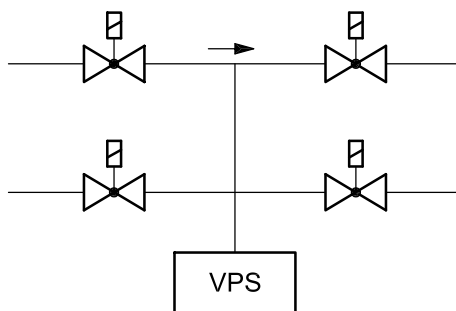
Where components are used to complete the VPS, these components shall comply with the relevant component International Standard.

7.2 Leak-tightness

7.2.1 Criteria

A VPS shall be leaktight. A VPS is considered to be leaktight if no single component of a VPS has an external leakage rate no higher than $60 \text{ cm}^3 \cdot \text{h}^{-1}$, unless a lower value is specified in the relevant component International Standard.

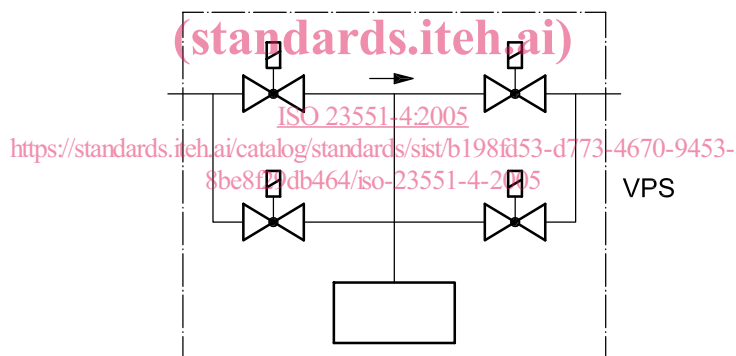
An integrated VPS is considered to be a single component. Integrated VPS shall have a leakage rate no higher than $120 \text{ cm}^3 \cdot \text{h}^{-1}$.



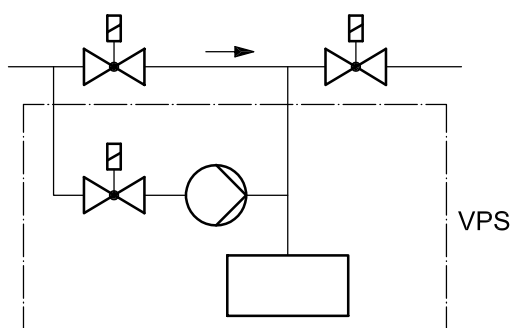
a) External valves supervised by a VPS

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b) VPS with integrated valves



c) VPS with partly integrated valves

Figure 2 — Examples of VPS configurations