INTERNATIONAL STANDARD

ISO 23553-1

First edition
2007-09-15

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

Part 1: Shut-off devices for oil burners

Dispositifs de commande et de sécurité pour brûleurs à fioul et pour appareils à fioul — Exigences particulières —
Partie 1: Dispositifs de coupure pour brûleurs à fioul

Reference number
ISO 23553-1:2007(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

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 23553-1 was prepared by Technical Committee ISO/TC 161, *Control and protective devices for gas and oil burners and gas and oil burning appliances*.

ISO 23553 consists of the following parts, under the general title *Safety and control devices for oil burners and oil-burning appliances — Particular requirements*:

— *Part 1: Shut-off devices for oil burners*

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

Part 1: Shut-off devices for oil burners

1 Scope

This part of ISO 23553 specifies safety, constructional and performance requirements, and testing of safety shut-off devices, for liquid fuels.

This part of ISO 23553 covers type testing only.

It applies to safety shut-off devices which:

— are designed as e.g. automatic valves or fast-closing devices;

— are used in combustion plants to interrupt the flow of liquid fuels with or without delay on closing and with or without delay on opening;

— are for use with fuel oils;

NOTE For other liquid fuels, additional test methods can be agreed between the manufacturer and the test authority.

— form part of a device having other function(s), such as oil pumps. In this case the test methods apply to those parts or components of the device forming the safety shut-off device, i.e. those parts which are necessary for the closing function;

— have declared maximum working pressures up to and including 5 000 kPa, for use on burners or in appliances using liquid fuels;

— are directly or indirectly operated electrically or by mechanical or hydraulic means;

— are fitted with or without closed-position indicator switches.

The methods of test given in this part of ISO 23553 are intended for product type testing.

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

ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 1817:2005, *Rubber, vulcanized — Determination of the effect of liquids*

ISO 7005-1, *Pipe flanges — Part 1: Steel flanges for industrial and general service piping systems*

ISO 7005-2, *Metallic flanges — Part 2: Cast iron flanges*

ISO 7005-3, *Metallic flanges — Part 3: Copper alloy and composite flanges*

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

ISO 23551-1:2006, *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 60534-1, *Industrial-process control valves — Part 1: Control valve terminology and general considerations*

IEC 60534-2-3, *Industrial-process control valves — Part 2-3: Flow capacity — Test procedures*

IEC 60730-1:1999, *Automatic electrical controls for household and similar use — Part 1: General requirements*

EN 1057, *Copper and copper alloys — Seamless, round copper tubes for water and gas in sanitary and heating applications*

3 Terms and definitions

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

3.1
safety shut-off device
device for shutting off the fuel flow in order to avoid dangerous operating conditions in a plant

3.2
closure member
movable part of the control which shuts off the oil flow

3.3
breather hole
orifice which allows atmospheric pressure to be maintained within a compartment of variable volume

3.4
external leak-tightness
leak-tightness of a oil-carrying compartment with respect to the atmosphere

3.5
internal leak-tightness
leak-tightness of the closure member (in the closed position) sealing an oil-carrying compartment with respect to another compartment or to the outlet of the control

3.6
inlet pressure
pressure at the inlet of the safety shut-off device

3.7
outlet pressure
pressure at the outlet of the safety shut-off device

3.8
maximum working pressure
maximum operating pressure
highest inlet pressure declared by the manufacturer at which the safety shut-off devices may be operated

3.9
minimum working pressure
lowest inlet pressure declared by the manufacturer at which the safety shut-off devices may be operated

3.10
flow rate
volume flowing through the safety shut-off devices per unit time

3.11
rated flow rate
air flow rate at a specified pressure difference declared by the manufacturer, corrected to standard conditions

3.12
maximum ambient temperature
highest temperature of the surrounding air declared by the manufacturer at which the control may be operated

3.13
minimum ambient temperature
lowest temperature of the surrounding air declared by the manufacturer at which the control may be operated

3.14
mounting position
position declared by the manufacturer for mounting the safety shut-off devices

3.15
nominal size
DN
numerical designation of size, for reference purposes, loosely related to manufacturing dimensions, common to all components in a piping system

NOTE The abbreviation DN stands for *diamètre nominal*, in French.

3.16
nominal pressure
PN
numerical designation of pressure for reference purposes, related to the maximum working pressure, common to all components in a piping system

NOTE The abbreviation PN stands for *pression nominale*, in French.

3.17
differential pressure
difference between the inlet and outlet pressures

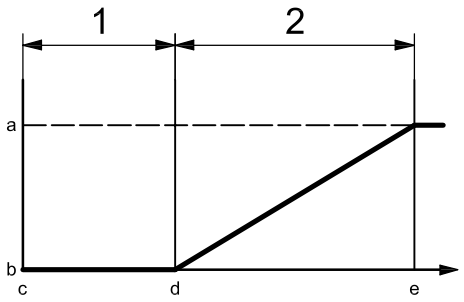
3.18
fast-closing device
safety shut-off device with a predetermined time for the closing process

3.19
response times

3.19.1
opening time
time from the beginning until the end of the change in position of the closure member from the closed to the open position

See Figure 1.

NOTE See also 3.13 of ISO 23551-1:2006.



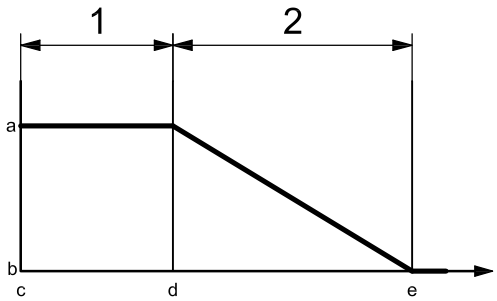
Key
1 delay time
2 opening time
a open
b closed
c signal for opening
d start of period of change in position
e end of period of change in position

Figure 1 — Response time of closure member during opening

3.19.2
closing time
time from the beginning until the end of the change in position of the closure member from the open to the closed position

See Figure 2.

NOTE See also 3.14 of ISO 23551-1:2006.



Key
1 delay time
2 closing time
a open
b closed
c signal for closing
d start of period of change in position
e end of period of change in position

Figure 2 — Response time of closure member during closing

3.19.3
delay time
⟨opening⟩ interval between the signal to open and the point at which the closure member no longer maintains the required tightness according to 7.2.1.2

See Figure 1.

NOTE See also 3.15 of ISO 23551-1:2006.

3.19.4
delay time
⟨closure⟩ the interval between the signal to close and the start of change in position of the closure member

See Figure 2.

3.20
opening force
force which effects the opening of the safety shut-off device

3.21
closing force
force which effects the closing of the closure member in the case of failure or interruption of the externally applied actuating energy, such as spring force, independent of any force provided by fuel oil pressure

3.22
frictional force
largest force required to move the actuating mechanism and the closure member from the open position to the closed position with the closing force removed, independent of any force provided by fuel oil pressure

NOTE Adapted from 3.10 of ISO 23551-1:2006.

3.23
opening [closing] characteristics
curve representing the movement of the closure member against time on opening [closing]

3.24
actuator
part effecting the movement of the closure member

EXAMPLE Valve disc.

3.25
auxiliary medium
medium used for actuating the moving parts of the system (pneumatic or hydraulic)

3.26
auxiliary medium pressure
pressure exerted by the auxiliary medium during actuation of the moving parts

3.27
direct-flow valve
valve in which the medium, in the valve seat, flows in the direction of the closure member for shutting off the flow

4 Classification

4.1 Classes of shut-off device

4.1.1 According to the method of operation

The following three types are in this class:

a) safety shut-off device which is opened by hand, held open by auxiliary energy and closed by interruption or failure of the auxiliary energy;

b) safety shut-off device according to a), which may, however, also be closed by hand;

c) safety shut-off device which is opened and held open by auxiliary energy and closed by interruption or failure of the auxiliary energy.

4.1.2 According to the installation

The following two types are in this class:

a) for indoor use;

b) for outdoor use.

4.2 Control groups

Controls are grouped according to the bending stress which is specified for testing (see 7.3).

a) Group 1 controls

Controls for use in an appliance or installation where they are not subjected to bending stresses imposed by installation pipework (e.g. safety shut-off device being a part of the pump).

b) Group 2 controls

Controls for use in any situation, either internal or external to the appliance, typically without support.

NOTE Controls which meet the requirements of a Group 2 control also meet the requirements of a Group 1 control.

5 Test conditions

Tests shall be carried out at an ambient temperature of (20 ± 5) °C, unless otherwise specified.

Tests shall be carried out in the mounting position declared by the manufacturer. If there are several mounting positions, tests shall be carried out in the least favourable position.

If no specific methods of test are given, conformity with these requirements shall be verified by inspection and/or measurement.

6 Construction

6.1 General

Safety shut-off devices shall be designed, manufactured and assembled so that the various functions operate correctly when installed and used according to the manufacturer's instructions.

All pressurized parts of a control shall withstand the mechanical and thermal stresses to which they are subjected without any deformation affecting safety.

When reference is made in this part of ISO 23553 to ISO 23550, the word “gas” shall be replaced by “oil”.

6.2 Construction requirements

6.2.1 Appearance

The requirements in subclause 6.2.1 of ISO 23550:2004 apply.

6.2.2 Holes

The requirements in subclause 6.2.2 of ISO 23550:2004 apply.

6.2.3 Breather holes

The requirements in subclause 6.2.3 of ISO 23550:2004 do not apply.

6.2.4 Screwed fastenings

The requirements in subclause 6.2.4 of ISO 23550:2004 apply.

6.2.5 Jointing

The requirements in subclause 6.2.5 of ISO 23550:2004 apply.

6.2.6 Moving parts

The requirements in subclause 6.2.6 of ISO 23550:2004 apply.

6.2.7 Sealing caps

The requirements in subclause 6.2.7 of ISO 23550:2004 do not apply.

6.2.8 Dismantling and reassembling for servicing and/or adjustment

Parts which are intended to be dismantled for servicing or adjustment shall be capable of being dismantled and reassembled using commonly available tools. They shall be constructed or marked in such a way that incorrect assembly is impossible when following the manufacturer’s instructions.

Closure parts, including those of measuring and testing points, which can be dismantled for servicing or adjustment, shall be constructed such that leak-tightness is achieved by mechanical means (e.g. metal-to-metal joints, O-rings) without using jointing compounds such as liquids, pastes or tapes.

6.2.9 Auxiliary channels

Blockage of auxiliary channels and orifices shall not adversely affect the operation of the control, otherwise they shall be protected against blockage by suitable means.

6.2.10 Resistance against pressure

The components of safety shut-off devices for fuel oil shall be designed for pressures of 1,5 times the system design pressure, while the safety shut-off device is in the open position, and where the operating pressure has been adjusted to the maximum permissible value.

The mechanical strength for devices above PN 16 or above DN 80 shall be proven.