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

Part 1:
Automatic and semi-automatic valves

Dispositifs de commande et de sécurité pour brûleurs à combustible liquide et pour appareils à combustible liquide — Exigences particulières —

Partie 1: Robinets automatiques et semi-automatiques

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 161, *Controls and protective devices for gas and/or oil,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 47, *Atomizing oil burners and their components — Function — Safety — Testing,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 23553-1:2014), which has been technically revised.

The main changes compared to the previous edition are as follows:

— relevant references have been updated to ISO 23550 wherever possible;

— relevant references have been updated to IEC 60730-1:2013, modified + COR1:2014;

— references have been dated, where applicable.

A list of all parts in the ISO 23553 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document is designed to be used as a stand-alone standard and no longer in combination with ISO 23550.

Whereas the previous edition referred to specific sections in ISO 23550, these have now been included directly in this document. Compared to the previous edition (ISO 23553-1:2014) no technical changes have been done and no further technical requirements have been added. For the same reason, reference to IEC 60730-1 is maintained. It will be updated in the next edition.

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

Part 1: Automatic and semi-automatic valves

1 Scope

This document specifies safety, constructional and performance requirements and testing of automatic and semi-automatic valves for oil.

It applies to automatic and semi-automatic valves which are:

— normally closed;

— used in combustion plants to interrupt the oil flow with or without delay on closing;

— for use with oil types (e.g. middle distillate fuel oil, crude oil, heavy fuel oil or kerosene) without gasoline;

NOTE 1 For other oil types (e.g. oil emulsions), additional test methods can be agreed between the manufacturer and the test authority.

NOTE 2 Oil types from petroleum refining processes are classified ISO-F-D in ISO 8216-99 and 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 automatic and semi-automatic valves, i.e. those parts which are necessary for the closing function.

— for use on burners or in appliances using oil;

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

— fitted with or without closed-position indicator switches.

This document covers type testing only.

2 Normative references

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.

ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 65, *Carbon steel tubes suitable for screwing in accordance with ISO 7-1*

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

ISO 262, *ISO general purpose metric screw threads — Selected sizes for screws, bolts and nuts*

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 10763, *Hydraulic fluid power - Plain-end, seamless and welded precision steel tubes - Dimensions and nominal working pressures*

IEC 60529, *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*

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

IEC 60730-1:2010, *Automatic electrical controls for household and similar use — Part 1: General Requirements*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) — Part 4-2: Testing and measuring techniques — Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) — Part 4-3: Testing and measurement techniques — Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) — Part 4-4: Testing and measurement techniques — Electrical fast transient/burst immunity test*

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

IEC 61000-4-6, *Electromagnetic compatibility (EMC) — Part 4-6: Testing and measurement techniques — Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) — Part 4-8: Testing and measurement techniques — Power frequency magnetic field immunity test*

IEC 61058-1, *Switches for appliances — Part 1: General requirements*

3 Terms and definitions

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

ISO and IEC maintain terminological 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/

3.1
closure member
movable part of the *valve* (3.16) which shuts off the oil flow

3.2
control
device which directly or indirectly controls the oil flow and/or provides a safety function within an oil burner or oil-burning appliance

3.3
external leak-tightness
leak-tightness of an oil-carrying compartment with respect to the atmosphere

3.4
group 1 control
controls (3.2) with connection sizes up to and including DN 25, for use in an appliance where they are not subjected to bending stresses imposed by installation pipe work or in an installation if used with rigid adjacent supports

Note 1 to entry: In Canada, Japan and the USA, group 1 controls are not used.

3.5
group 2 control
controls (3.2) for use in any situation, either internal or external to the appliance, typically without support

Note 1 to entry: *Controls* (3.2) which meet the requirements of group 2 control also meet the requirements of *group 1 control* (3.4).

3.6
internal leak-tightness
leak-tightness of the *closure member* (3.1) (in the closed position) sealing an oil-carrying compartment with respect to another compartment or to the outlet of the *control* (3.2)

3.7
pressure difference
difference between the pressure at the inlet of the control and outlet of the control

3.8
maximum operation pressure
highest inlet pressure declared by the manufacturer at which the *control* (3.2) may be operated

3.9
minimum operation pressure
lowest inlet pressure declared by the manufacturer at which the *control* (3.2) may be operated

3.10
flow rate
volume flowing through the *control* (3.2) divided by time

3.11
maximum ambient temperature
highest temperature of the surrounding air declared by the manufacturer at which the *control* (3.2) may be operated

3.12
minimum ambient temperature
lowest temperature of the surrounding air declared by the manufacturer at which the *control* (3.2) may be operated

3.13
mounting position
position declared by the manufacturer for mounting the *control* (3.2)

Note 1 to entry: Mounting positions are, for example, as follows:

— upright: single position on a horizontal axis with respect to the inlet connection, as specified by the manufacturer;

— horizontal: any position on a horizontal axis with respect to the inlet connection;

— vertical: any position on a vertical axis with respect to the inlet connection;

— limited horizontal: any position from upright to 90° (1,57 rad) from upright on a horizontal axis with respect to the inlet connection;

— multi poise: any position on a horizontal, vertical or intermediate axis with respect to the inlet connection.

3.14
diameter nominal
DN
nominal size
alphanumeric designation of size for components of a pipework system, which is used for reference purposes, comprising the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections

Note 1 to entry: The number following the letters DN does not represent a measurable value and should not be used for calculation purposes except where specified in the relevant standard.

Note 2 to entry: In standards which use the DN designation system, any relationship between DN and component dimensions should be given, e.g. DN/OD or DN/ID.

[SOURCE: ISO 6708:1995, 2.1, modified — The two sentences have been merged into one.]

3.15
nominal pressure
PN
numerical designation relating to pressure that is a convenient round number for reference purposes

[SOURCE: ISO 7268:1983, Clause 2]

3.16
valve
device consisting essentially of a valve body, *closure member* (3.1), and *actuator* (3.24) that controls the oil flow

Note 1 to entry: The *actuator* (3.24) can be actuated by electrical or mechanical means.

Note 2 to entry: The actuation can be done by oil pressure, electrical, hydraulic or pneumatic energy.

3.17
normally closed valve
nc
valve (3.16) which is in closed position when no actuating energy is applied

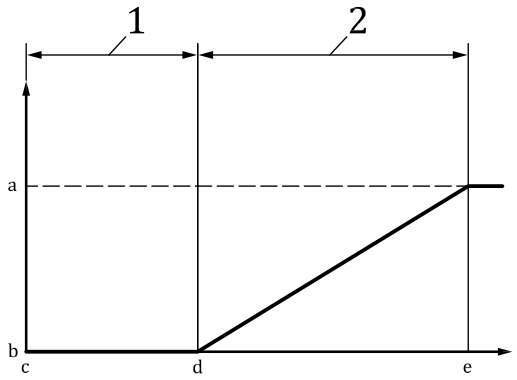
3.18
automatic valve
normally closed valve (3.17) that closes on removal of the actuating energy

3.19
semi-automatic valve
normally closed valve (3.17) that is actuated manually and returns to the closed position upon removal of the actuating energy

3.20
safety shut-off valve
normally closed valve (3.17), automatic or semi-automatic, that prevents the oil flow completely when de-energized

3.21
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

Note 1 to entry: See Figure 1.



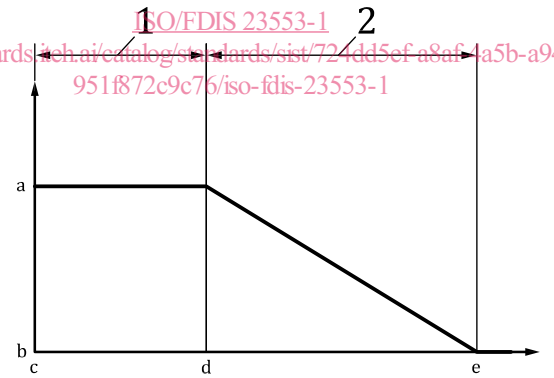
Key

1	delay time	c	Signal for opening.
2	opening time	d	Start of period of change in position.
a	Open.	e	End of period of change in position.
b	Closed.		

Figure 1 — Response time of *closure member* (3.1) during opening

3.22
closing time
time from the beginning until the end of the change in position of the *closure member* (3.1) from the open to the closed position

Note 1 to entry: See Figure 2.



Key

1	delay time	c	Signal for closing.
2	closing time	d	Start of period of change in position.
a	Open.	e	End of period of change in position.
b	Closed.		

Figure 2 — Response time of *closure member* (3.1) during closing

3.23
closing force
force which effects the closing of the *closure member* (3.1) in the case of failure or interruption of the externally applied actuating energy, such as spring force, independent of any force provided by oil pressure

3.24
actuator
part effecting the movement of the *closure member* (3.1)

Note 1 to entry: Media can also effect the movement.

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* (3.25) during actuation of the moving parts

3.27
control valve
valve (3.16) which controls the hydraulic or pneumatic means supplied to the actuating mechanism

[SOURCE: ISO 23551-1:2012, 3.115]

4 Classification

4.1 Classes of control

Automatic and semi-automatic oil control valves are not classified.

4.2 Groups of control

Controls for use in any situation, either internal or external to the appliance and regardless of the kind of support, the listed torque and bending moment in Table 5, shall be fulfilled (see 7.3.4.4).

4.3 Types of DC supplied controls

DC supplied controls are classified in one of the three following types:

— type A: stand-alone battery systems;

— type B: battery systems for non-stationary applications (i.e. applications which are changing location or in motion);

— type C: systems which are intended to be connected to DC supply networks.

5 Test conditions

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

Controls which can be converted for use with another oil by exchanging components are additionally tested with the conversion components.

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.

NOTE 1 These tests are specified in the specific control standard.

NOTE 2 Specific regional requirements are given in D.2.1.

6 Construction

6.1 General

Controls 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.

In general, conformity with the requirements given in this document is verified by the test methods given herein or in the specific control standard, or by using the construction materials specified by the requirements. Alternative materials may be used if they provide performance at least equivalent to the materials specified.

6.2 Construction requirements

6.2.1 Appearance

Controls shall be free from sharp edges and corners which can cause damage, injury or incorrect operation. All parts shall be clean internally and externally.

6.2.2 Holes

Holes for screws, pins, etc., which are used for the assembly of parts or used to install the valve shall not penetrate oil passageways.

Holes necessary in manufacture which connect oil passageways to the atmosphere, but which do not affect the function of the valve, shall be permanently sealed by metallic means. Suitable jointing compounds may additionally be used.

6.2.3 Flexible diaphragm, bellows or similar construction

Valves which utilize a flexible diaphragm, bellows, or similar construction as the only oil seal against atmospheric pressure, shall have:

— the atmospheric side enclosed in a casing to limit external leakage in the event of diaphragm or bellows rupture; or

— provisions for connection of pipe or tubing to carry away the occurring leakage.

Compliance is checked by rupturing the diaphragm or bellows and measuring the leakage according to 7.2.1.1. During this test, the connection ports for pipes or tubing shall be blocked.

Leakage through an unthreaded vent opening is included. Leakage through a vent opening which has provision for connection of pipe or tubing is not included.

The installation of suitable pipe or tubing shall be declared by the manufacturer if the valve employs provisions for pipe or tubing as a measure to protect the environment from leakage occurring because of a damaged flexible diaphragm, bellows or similar.

6.2.4 Screwed fastenings

Screwed fastenings which may be removed for servicing or adjustment shall have metric threads in accordance with ISO 262 unless a different thread is essential for the correct operation or adjustment of the control.

Self-tapping screws which cut a thread and produce swarf (metal residue) shall not be used for connecting oil-carrying parts or parts which may be removed for servicing.

Self-tapping screws which form a thread and do not produce swarf may be used, provided that they can be replaced by metric machine screws conforming to ISO 262.

Specific regional requirements shall be as given in Annex C, C.2.1.

6.2.5 Jointing

Jointing compounds for permanent assemblies shall remain effective under all declared operating conditions.

Soldering or other processes where the jointing material has a melting point below 427 °C after application shall not be used for connecting oil-carrying parts except for additional sealing.

Specific regional requirements shall be as given in Annexes C and D, specifically C.2.2 and D.2.2.

6.2.6 Moving parts

The operation of moving parts (e.g. diaphragms, drive shafts) shall not be impaired by other parts. There shall be no exposed moving parts which can adversely affect the operation of controls.

6.2.7 Sealing caps

Sealing caps shall be capable of being removed and replaced using commonly available tools and sealed (e.g. by lacquer). A sealing cap shall not hinder adjustment within the whole range declared by the manufacturer.

6.2.8 Dismantling and reassembling for servicing and/or adjustment

6.2.8.1 General

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 test points, which may 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.

Closure parts not intended to be dismantled shall be either sealed by means which can show evidence of interference (e.g. lacquer), or fixed by fasteners requiring tools that are not commonly available.

Adjustment means shall be secured by means providing protection against access by uninstructed persons or shall be declared as requiring such protection in the application.

NOTE For example, these means can be:

a) sealed with a material suitable for the temperature range of the valve such that tampering is apparent;

b) accessible only with the use of special purpose tools; or

c) accompanied by instructions requiring the equipment manufacturer to mount the valve such that the adjustment means is inaccessible.

6.2.8.2 Test of adjustment means

Compliance is checked by inspection. Where sealing is used, inspection is done before and after the endurance tests.

6.2.8.3 Maintaining of adjustments

Suitable means for maintaining all adjustments shall be provided.

NOTE Lock nuts or adjusting nuts held by springs or compression are acceptable unless their adjustment can be accidentally disturbed.

6.2.8.4 Field adjustments

Necessary field adjustments shall be capped or otherwise protected in such a manner as to resist tampering or accidental change.

6.2.8.5 Dismantling

If a valve can be partially or completely disassembled without the use of special tools, construction shall be such that either:

a) parts of the valve cannot be readily reassembled improperly in a manner which can result in an unsafe condition; or

b) threaded fasteners are covered with a sealing means to discourage disassembly. The sealing means shall be suitable for exposure to the minimum and maximum ambient temperatures declared for the valve.

This subclause does not apply to parts of a valve intended for field replacement or servicing.

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

Oil valves shall be designed for pressures of 1,5 times the maximum operation pressure. The mechanical strength for devices above PN 16 or above DN 80 shall be proven.

Manually adjustable packing glands are not permitted.

6.2.11 Connections

The connections shall be designed in such a way that the valves can be installed in the oil lines by welding, brazing, with flanges using suitable gasket, union joints, compression fittings or by threads.

6.3 Materials

6.3.1 General material requirements

The quality of materials, the dimensions used and the method of assembling the various parts shall be such that construction and performance characteristics are safe. Performance characteristics shall not alter significantly during a reasonable lifetime when installed and used according to the manufacturer's instructions. Under these circumstances, all components shall withstand any mechanical, chemical and thermal conditions to which they can be subjected during service.

Specific regional requirements shall be as given in Annex C, C.2.3.