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

Part 8: Multifunctional controls

Dispositifs de commande et de sécurité pour les brûleurs et les appareils à gaz — Exigences particulières —

Partie 8: Equipements multifonctionnels

Reference number
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Foreword

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The committee responsible for this document is ISO/TC 161, *Control and protective devices for gas and/or oil burners and 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 and semi-automatic valves*

— *Part 2: Pressure regulators*

— *Part 3: Gas/air ratio controls, pneumatic type*

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

— *Part 5: Manual gas valves*

— *Part 6: Thermoelectric flame supervision controls*

— *Part 8: Multifunctional controls*

— *Part 9: Mechanical gas thermostats*

— *Part 10: Vent valves*

Introduction

This part of ISO 23551 is designed to be used in combination with ISO 23550. Together, they establish the full requirements as they apply to multifunctional controls. This part of ISO 23551 adapts ISO 23550, where needed, by stating “with the following modification”, “with the following addition”, “is replaced by the following” or “is not applicable” in the corresponding clauses. In order to identify specific requirements that are particular to this part of ISO 23551 that are not already covered by ISO 23550, this part of ISO 23551 may contain clauses or subclauses that are additional to the structure of ISO 23550. These clauses are numbered starting from 101 or, in the case of an Annex, are designated AA, BB, CC, etc.

It has been necessary to take into consideration the differing requirements resulting from practical experience and installation practices in various regions of the world and to recognize the variation in basic infrastructure associated with gas and/or oil controls and appliances. This part of ISO 23551 provides a basic framework of requirements that recognize these differences.

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

Part 8: Multifunctional controls

1 Scope

This part of ISO 23551 specifies the safety, construction and performance requirements for multifunctional controls intended for use with gas burners, gas appliances and similar use, hereafter referred to as "MFC".

This part of ISO 23551 is applicable to MFC with declared maximum inlet pressures up to, and including, 50 kPa (500 mbar) of nominal connection sizes up to, and including, DN 150 for use with one or more fuel gases.

MFC consist of two or more functions, at least one of which is a mechanical control, as specified in the relevant control standards.

2 Normative references

The following referenced 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.

ISO 23550:2011, *Safety and control devices for gas burners and gas-burning appliances — General requirements*

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

ISO 23551-2, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 2: Pressure regulators*

ISO 23551-3, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 3: Gas/air ratio controls, pneumatic type*

ISO 23551-4, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 4: Valve-proving systems for automatic shut-off valves*

ISO 23551-5, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 5: Manual gas valves*

ISO 23551-6, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 6: Thermoelectric flame supervision controls*

ISO 23551-9, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 9: Mechanical gas thermostats*

ISO 23552-1, *Safety and control devices for gas and/or oil burners and gas and/or oil appliances — Particular requirements — Part 1: Fuel/air ratio controls, electronic type*

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

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 23550:2011 and the following apply.

3.101
multifunctional control
combination of two or more controls, at least one of this is a mechanical control, whereby the functional parts cannot operate if separated

3.102
closing mechanism
part of the actuating mechanism that operates the closure member to the closed position guaranteeing the gas shut-off function with the required tightness

3.103
water operated gas valve
device that uses flow of water to control the flow of gas

4 Classes of control

4.1 Classes of controls

Shall be according to ISO 23550:2011, 4.1.

4.2 Groups of controls

Shall be according to ISO 23550:2011, 4.2.

5 Test conditions

Shall be according to ISO 23550:2011, Clause 5.

6 Construction

ISO 23550:2011, Clause 6 is replaced by the following.

6.101 General

MFC consist of a combination of controls according to 6.102.

Requirements for construction of the controls incorporated in the MFC are covered in the relevant control standards. Where no control standard is available, the requirements of ISO 23550:2011 are applicable.

In addition, this part of ISO 23551 covers in 6.102.2 requirements for the safety related interactions between the different functions of the MFC.

Where there are no requirements for these interactions between two or more controls, a risk assessment shall be performed. MFCs shall be designed such that access to internal parts requires the use of tools.

6.102 MFC based on combination of controls

6.102.1 General

MFC are based on a combination of the functionality provided by the controls as given by the following list:

— automatic shut-off valves according to ISO 23551-1;

— pressure regulators according to ISO 23551-2;

— pneumatic gas/air ratio controls according to ISO 23551-3;

— valve proving systems according to ISO 23551-4;

— manual gas valves according to ISO 23551-5;

— thermo electric flame supervision devices according to ISO 23551-6;

— mechanical gas thermostats according to ISO 23551-9;

— electronic fuel/air ratio controls according to ISO 23552-1;

— automatic electrical burner control system according to IEC 60730-2-5;

— water operated gas valves according to Annex AA.

6.102.2 Interaction between Controls

6.102.2.1 Closing mechanism for closure member

Each automatic shut-off valve shall consist of a separate, independent closing mechanism controlling only one closure member. A check of internal leak-tightness shall be possible on each of the automatic shut-off valves. If two or more closure members are controlled by one closing mechanism, the valve is considered as one automatic shut-off valve.

6.102.2.2 Interactions between functions

The interactions between the functions of the MFC shall not interfere with the safety of the individual functions. Mechanical functions shall not affect the safety of electronic functions and vice versa.

7 Performance

ISO 23550:2011, Clause 7 is replaced by the following.

7.101 General

Requirements for performance of MFC are covered in the relevant control standards (see list in 6.102.1). Where no control standard is available, the requirements of ISO 23550:2011 are applicable.

7.102 External leak-tightness of MFC

MFC shall be leak-tight in accordance with the leakage rate given in Table 1. The test is performed according to ISO 23550:2011, 7.2.2.1 and 7.2.2.2.

Table 1 — External leakage rate

Nominal inlet size DN	External leakage rates cm^3/h of air
DN < 10	60
10 ≤ DN	120

7.103 Mechanical thermostat function

If the MFC incorporates an independent mechanical thermostat function and a pressure regulator, the pressure regulator shall be put out of action for the tests of the thermostat function.

7.104 Internal leak tightness of MFC

The leak-tightness of the closure member(s) of each function shall be tested independently.

7.105 Endurance test for combined functions

For MFC which uses a single closure member to perform more than one function, the test conditions and number of cycles for endurance testing shall be applied by the function having the most severe combination.

8 EMC/electrical requirements

Shall be according to ISO 23550:2011, Clause 8.

9 Marking, installation and operating instructions

9.1 Marking

ISO 23550:2011, 9.1 is replaced by the following.

Marking of MFC are covered in the relevant control standards as listed under 6.101 and 6.102.1.

9.2 Installation and operating instructions

Shall be according to ISO 23550:2011, 9.2 with the following addition.

Instructions of MFC are covered in the relevant control standards as listed under 6.102.1.

They shall include all the information of the relevant control standard on use, installation, operation and servicing. Furthermore, they shall also include the following:

a) gas, and if applicable, water connection(s);

b) a statement to the effect that the functions of the MFC have to be verified as being suitable for their application;

c) if applicable, maximum water pressure (see AA.2);

d) if applicable, water flow to open and to close the water operated gas valve;

9.3 Warning notice

Shall be according to ISO 23550:2011, 9.3.

Annex AA
(normative)

Water operated gas valves

AA.1 General

This Annex is applicable to the specific requirements of an MFC that incorporates a water operated gas valve function. MFC that incorporates a water operated gas valve shall comply with the additional requirements given under AA.2.

Only the affected subclauses are mentioned in this Annex, hence, the numbering is non-consecutive.

AA.2 Additional requirements

AA.6.101 Construction

The water operated gas valve shall subordinate the admission of gas to the gas outlet to the water flow through it.

In the event of leakage at the joint sealing of the water circuit, it shall not be possible for water to penetrate into the gas circuit. To this end, there shall be a space between the gas carrying and water carrying parts of the water-operated gas valve. This space shall provide drainage with an opening having an area of at least 19 mm^2. It may consist of one or more orifices of which the smallest transverse dimension shall not be less than 3,5 mm.

AA.6.102 Tightness of the gas circuit

AA.6.102.1 Requirement

The gas circuit shall be leak-tight. If, due to the design of the water-operated gas valve, the water pressure can have an influence on the tightness, the following tests are carried out without water in the control and at the maximum water pressure.

Tightness is ensured if the leakage of air does not exceed the values of ISO 23550:2011, 7.2.1 with test methods of 7.2.2.1 and 7.2.2.3.

AA.6.102.2 Low temperature test

The water inlet is connected to a water supply at the maximum pressure as described by the installation and operating instructions without water flow.

The ambient temperature of air around the water flow sensing device is lowered at approximately 1 °C/min down to a temperature of –10 °C during a time sufficient to obtain the freezing of the device.

In the case where after thaw the water circuit does not have any visible damage, internal and external leakage test are carried out (see ISO 23550:2011, 7.2).

This test does not need to be performed if the water supply compartment is separate from the gas carrying compartment.

AA.7.6.101Performance requirements

AA.7.6.101.1 Water pressure pulse test

AA.7.6.101.1.1 Requirement

The following is intended to prevent unexpected opening of the gas passage due to water pressure impulses. The air leakage shall not exceed 40 cm^3/h when the closing mechanism of the water operated gas valve is subjected to a pressure of 15 kPa.

AA.7.6.101.1.2 Test

The closing mechanisms are first operated twice. In the de-energized position, the valves are supplied with air in such a way that the air pressure opposes the closing direction of the closure member. The air pressure is increased at a rate not exceeding 1 mbar/s.

As soon as a pressure of 15 kPa is obtained, the leakage rate is measured.

AA.7.6.101.2 Opening and closing function

When tested according to the manufacturer instructions, the water flow to open the gas valve and to close it shall be according to the values specified by the manufacturer.

AA.7.7.101 Endurance

AA.7.7.101.1 Requirement

The water operated gas valve shall be subjected to an endurance test of 50 000 cycles.

At the end of the test, the water operated gas valve shall remain satisfactory and shall comply with the conditions stated in AA.6.102.1 and in AA.7.6.101.1.1.

AA.7.7.101.2 Test

The gas circuit is supplied with air at ambient temperature.

The water circuit is supplied with water at ambient temperature in the direction of flow at a pressure and rate such that the water operated gas valve is fully opened.

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