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

**Part 5:
Manual gas valves**

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

Partie 5: Robinets de gaz manuels

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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. www.iso.org/directives

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword - Supplementary information

The committee responsible for this document is 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 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*

Introduction

This part of ISO 23551 is designed to be used in combination with ISO 23550. This part of ISO 23551 together with ISO 23550 establishes the full requirements as they apply to the product covered by this International Standard. This part 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 Clause. In order to identify specific requirements that are particular to this part, that are not already covered by ISO 23550, this document may contain Clauses or Sub-clauses 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.

In an attempt to develop a full International Standard, 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, some of which are addressed in [Annexes E, F and G](#). This International Standard intends to provide a basic framework of requirements that recognize these differences.

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

Part 5: Manual gas valves

1 Scope

This part of ISO 23551 specifies safety, constructional and performance requirements for manual gas valves intended for use with gas burners and gas-burning appliances, hereafter referred to as 'valves', unless otherwise specified.

This International Standard applies to following types of manual gas valves:

- manual gas shut-off valve;
- gas burner valve;
- appliance connector valve;
- "delta C" valve.

This part of ISO 23551 applies to valves for gas burners and gas-burning appliances of nominal connection size up to and including DN 100 that can be used and tested independently of these appliances using fuel gases, as natural gas, manufactured gas or liquefied petroleum gas (LPG) at inlet pressures up to and including 500 kPa. It is not applicable to corrosive and waste gases.

This International Standard covers type testing only.

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.

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

3 Terms and definitions

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

3.101

manual gas shut-off valve

manually operated valve for the control of the gas flow from an "off" to an "on" position and vice versa

Note 1 to entry: Parts commonly used in manual gas shut-off valves are shown as examples in Figures AA.1 to AA.5.

3.102

"delta C" valve

manual gas valve suitable for use on food service equipment (commercial cooking equipment)

Note 1 to entry: These valves are identified by a "delta C" marking.

3.103

gas burner valve

manual gas valve that requires user initiation of each usage cycle

Note 1 to entry: This type of manual gas valve is intended to be used in Canada and the US between the gas supply piping and the gas burner.

Note 2 to entry: The valve is turned on when the burner operating cycle is initiated and turned off when the burner operating cycle is completed.

3.104

appliance connector valve

manual gas valve having a non-displaceable valve member, a minimum specified capacity and an internal taper pipe thread inlet and an outlet for flared tubing connection

Note 1 to entry: This type of manual gas valve is intended to be used in Canada and the US between the gas supply piping and the appliance connector attached to the appliance.

Note 2 to entry: For minimum capacity see [Table 2](#) and for inlet and outlet connection see [6.102](#).

3.105

flow rate curve

curve which indicates the air flow in relation to the angle of opening

3.106

bearing seal

shortest distance between gas-carrying parts and the atmosphere measured along the length of the sealing surfaces

3.107

plug

tapered valve member of a manual gas valve containing one or more gas flow openings

3.108

non-displaceable valve member

valve member that cannot be moved from its seat by a force applied to the handle, or force applied by a plane surface to any exterior portion of the valve

3.109

safety lock

means in a manual valve that requires a separate action of the user before being able to open the valve

EXAMPLE Pushing on the valve handle to “unlatch” the valve before the valve handle can be rotated to turn on the gas.

Note 1 to entry: A safety lock is also known as “niting arrangement”.

4 Classes of control

4.1 Classes of controls

Shall be according to ISO 23550:2011, 4.1 with the following addition:

Manual gas valves are classified according to the number of operations:

- 1 000 operations (e.g. appliance connector valves);
- 5 000 operations (e.g. central heating);
- 10 000 operations (e.g. space heaters);
- 12 000 operations; and

— 40 000 operations (e.g. domestic cooking).

NOTE Number of operations during the expected life of the appliance.

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

6.1 General

Shall be according to ISO 23550:2011, 6.1.

6.2 Construction requirements

6.2.1 Appearance

Shall be according to ISO 23550:2011, 6.2.1.

6.2.2 Holes

Shall be according to ISO 23550:2011, 6.2.2.

6.2.3 Breather holes

ISO 23550:2011, 6.2.3 is not applicable.

6.2.4 Screwed fastenings

Shall be according to ISO 23550:2011, 6.2.4.

6.2.5 Jointing

Shall be according to ISO 23550:2011, 6.2.5.

6.2.6 Moving parts

Shall be according to ISO 23550:2011, 6.2.6.

6.2.7 Sealing caps

Shall be according to ISO 23550:2011, 6.2.7.

6.2.8 Dismantling and reassembling for servicing and/or adjustment

Shall be according to ISO 23550:2011, 6.2.8.

6.2.9 Auxiliary channels

Shall be according to ISO 23550:2011, 6.2.9.

6.2.101 Operating parts of manual gas valves

Manual gas valves operated by rotation shall be opened by turning the operating device anticlockwise and closed by turning it clockwise, except for valves, which provide more than one burner with gas. Alternate construction is acceptable provided the rotation direction is clearly marked or specified in the operations and in installation instructions. Manual gas valves with 90° rotation do not have to meet these requirements when the construction is such that the lever or tee handle is 90° to the line of flow in the off position and parallel to the line of flow in the on position.

A separable handle, removable without further disassembly of the valve, shall be attached by tamper-resistant means unless removal of the handle does not affect the leak tightness of the valve or the retention of the valve member.

Manual gas shut-off valves shall be operated without the use of tools.

It shall not be possible to exert direct axial pressure (other than spring pressure) on the closure member when the operating spindle is depressed to clear any safety lock.

6.2.102 Seating force

Manual gas valves shall be provided with a means, other than gravity, to maintain a continuous seating force to compensate for manufacturing tolerances, operational variations, or displacement of lubricant(s).

It shall not be possible in normal use to apply such forces to the closure member that it is lifted out of its seat or is brought into a position which causes the leakage rates to exceed the values given in [7.2](#).

6.2.103 Tapered plug cavity

For taper plug manual gas valves the closure member included angle shall be at least 9° 25'. The taper plug at the large diameter shall be recessed into the body, and the plug shall protrude beyond the taper of the body at the small end. There shall be adequate clearance provided for this protrusion.

NOTE Regional specific requirements are given in [Annex F](#).

6.3 Materials

6.3.1 General material requirements

Shall be according to ISO 23550:2011, 6.3.1.

6.3.2 Housing

6.3.2.1 Housing design

Shall be according to ISO 23550:2011, 6.3.2.1 with the following modification.

Item b) is not applicable. O-rings, gaskets and other seals are exempt.

6.3.2.2 Test for leakage of housing after removal of non-metallic parts

Shall be according to ISO 23550:2011, 6.3.2.2.

6.3.2.101 Manual gas valves with shaft seal

For manual gas valves with shaft seals, the shaft seal is excluded from the requirement in [6.3.2.1](#), if the following requirements are met:

The structure surrounding a shaft seal shall be such as to confine the seal properly and, with the seal removed and the valve in any position, to allow, when tested at room temperature with air, not more than 45,6 dm³/h at a pressure of 1,74 kPa to leak past the shaft.

6.3.3 Springs

Shall be according to ISO 23550:2011, 6.3.3.

6.3.4 Resistance to corrosion and surface protection

Shall be according to ISO 23550:2011, 6.3.4.

6.3.5 Impregnation

Shall be according to ISO 23550:2011, 6.3.5.

6.3.6 Seals for glands for moving parts

Shall be according to ISO 23550:2011, 6.3.6.

6.3.101 Valve closure member

Gas-closing parts shall either have a metallic support to withstand the sealing force or shall be made of metal. This requirement also applies to parts transmitting the closing force.

For guide elements (see Figures AA.1 to AA.5) non-metallic materials are admissible.

6.4 Gas connections

Shall be according to ISO 23550:2011, 6.4.

6.101 Component parts

6.101.1 General

The off-position shall have a non-adjustable stop.

6.101.2 Turning angles

6.101.2.1 General

The reduced flow position, if any, shall be placed either after the fully open position or between the open and the closed position.

The turning angle of the manual gas needle valve between the closed and the fully open position shall be between 180° and 360° when used as a shut-off valve unless otherwise specified in the installation and operating instructions.

6.101.2.2 Opening at maximum flow

If the reduced flow rate position is placed after the fully open position the following requirements shall be met:

- in order to change from the closed position to the fully open position the turning angle shall be (90 ± 5)° unless otherwise specified in the installation and operating instructions;

- the turning angle between the fully open position and the reduced flow rate position shall be greater than 70° unless otherwise specified in the manufacturer's installation and operating instructions; this requirement is not applicable to multi-outlet valves;
- the movement of the manual gas valve closure member shall be limited by a fixed stop at the reduced flow rate position.

6.101.2.3 Opening at minimum flow

If the reduced flow rate position is placed between the closed and fully open position the following requirements shall be met:

- in order to change from the closed position to the fully open position the turning angle shall be greater than 90° unless otherwise specified in the installation and operating instructions;
- in order to change from the reduced flow rate position to the fully open position the turning angle shall be greater than 70° unless otherwise specified in the installation and operating instructions; this requirement is not applicable for multi-outlet-valves;
- a reduced flow rate position shall be provided by means of a part which locates the valve closure member in this position when the movement is in the direction of closing;
- the movement of the manual gas valve closure member shall be limited in the fully open position by a stop.

6.101.2.4 Single outlet manual gas valves

If a single outlet manual gas valve does not have a reduced flow position, the turning angle to pass from the closed position to the fully open position shall be $(90 \pm 5)^\circ$ unless otherwise specified in the installation and operating instructions.

6.101.3 Lubrication

A manual gas valve shall be designed so that lubrication, if used, does not cause blockage of any gas way.

6.101.4 Stops

The travel to and from the extreme positions of a manual gas valve shall be limited by stops.

When operating a manual gas needle valve it shall not be possible to remove the needle completely from the body by unscrewing. When closing the positive stop is obtained by contact of the needle on its seat.

6.101.5 Safety lock

Single outlet manual gas valves may be provided with a safety lock that prevents any accidental opening as it requires two separate actions to operate the valve. It shall permit ready operation with one hand.

Manual gas valves with two outlets for two separate burners shall be designed so that in order to change from one outlet to the other it is necessary to pass through a locked closed position. It shall only be possible for the user to change from one outlet to the other by a deliberate action. In particular it shall not be possible to change from one outlet to the other by keeping the handle constantly pressed in or by a pure turning movement.

6.101.6 Bearing seal

The bearing seal for manual gas valves except needle valves shall be at least 3 mm (see Figure AA.1, Item 9), unless otherwise specified by the manufacturer based on tolerance calculation.

6.101.7 Pre-setting devices

If present, pre-setting devices shall be easily accessible and not be able to fall into the gas way of the manual gas valve.

The operation of pre-setting devices shall only be possible with a tool.

Pre-setting devices shall be fixed in their set positions.

6.101.8 Compensation means for manual gas valves

Manual gas valves shall be designed with compensating means to take up automatically any wear between the closure member and the valve body.

6.101.9 Spring effect in manual gas valves

The tapered plug shall be held in position in the body by a spring. The construction shall be such that any play between plug and valve body caused by wear which can be expected during normal life shall be taken up automatically.

6.101.10 Manual gas valves with two or more "on" positions

A manual gas valve having an intermediate "off" position between two or more "on" positions shall be so constructed that it will become latched in the "off" position.

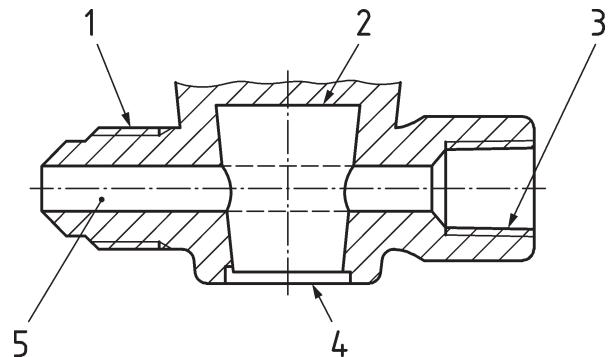
6.102 Appliance connector valves

6.102.1 Appliance connector valves shall have inlet and outlet connections in accordance with [Table 1](#).

Table 1 — Inlet and outlet connections of appliance connector valves

Inlet connection [Female iron pipe size (I.P.S.)] mm	Outlet connection (Fitting for flared tubing connection) mm
9,5	9,5
12,7	12,7
19,1	19,1

6.102.2 An appliance connector valve shall have a non-displaceable valve member (see [Figure 1](#)). If the small end of the plug is exposed, it shall be recessed in the body a minimum of 1,6 mm.



Key

- 1 flare tubing connection
- 2 spring and handle design such that plug cannot be displaced
- 3 taper pipe threads
- 4 if small end of plug is exposed, the plug shall be recessed at least in 1,6 mm
- 5 gasway

Figure 1 — Appliance connector valve with non-displaceable valve member

7 Performance

7.1 General

Shall be according to ISO 23550:2011, 7.1.

7.2 Leak-tightness

7.2.1 Criteria

Shall be according to ISO 23550:2011, 7.2.1.

NOTE Regional specific requirements are given in [Annex E](#).

7.2.2 Test for leak-tightness

Shall be according to ISO 23550:2011, 7.2.2.

NOTE Regional specific requirements are given in [Annex E](#).

7.3 Torsion and bending

Shall be according to ISO 23550:2011, 7.3.

7.4 Rated flow rate

7.4.1 Criterion

Shall be according to ISO 23550:2011, 7.4.1 with the following additions:

The flow rate shall be measured at the fully open position and if applicable at the reduced flow rate position.

Appliance connector valves shall have a capacity in accordance with that shown in [Table 2](#).

Table 2 — Minimum capacities for appliance connector valves

Outlet connection size mm	Minimum capacity
	In Watts at a specific gravity gas of 37,3 MJ/m ³ at 75 Pa pressure drop
9,5	14 654
12,7	29 307
15,9	38 099

7.4.2 Test for rated flow rate

Shall be according to ISO 23550:2011, 7.4.2.

7.5 Durability**7.5.1 Elastomers in contact with gas**

Shall be according to ISO 23550:2011, 7.5.1.

7.5.2 Resistance to lubricants

Shall be according to ISO 23550:2011, 7.5.2.

7.5.3 Resistance to gas

Shall be according to ISO 23550:2011, 7.5.3.

7.5.4 Marking resistance

Shall be according to ISO 23550:2011, 7.5.4 with the following addition:

All metal marking materials shall be rustproof. All markings shall be suitable for application to the surfaces upon which applied.

7.5.5 Resistance to scratching

Shall be according to ISO 23550:2011, 7.5.5.

7.5.6 Resistance to humidity

Shall be according to ISO 23550:2011, 7.5.6.

7.6 Functional requirements: Operating torque and force

Replace ISO 23550:2011, 7.6 by the following:

7.6.101 Requirements for operating torque**7.6.101.1 Ambient temperature operating torque**

The operating torque shall not exceed the values given in [Tables 3](#) and [4](#), as applicable, when tested in accordance with [7.6.102](#).

The operating torque of a manual gas valve knob shall not exceed 0,017 N·m per mm of the knob diameter, unless otherwise specified by the manufacturer.

NOTE If an additional device is also operated, e.g. a piezo igniter, then the torque to operate this additional device is excluded.

Table 3 — Maximum operating torque

Approach	Inlet nominal size	Operating torque							
		N·m							
		2 000	3 000	4 000	5 000 ^a	6 000	8 000	10 000 ^b	12 000
I	DN	DN ≤ 12	—	—	—	0,6	—	—	0,4
	12 < DN ≤ 25	—	—	—	0,6	—	—	0,6	—
	25 < DN ≤ 50	—	—	—	1,0	—	—	0,6	—
	6	—	—	—	—	—	—	1,12	—
	8	—	—	—	—	—	1,69	—	—
II	10	—	—	—	—	2,26	—	—	—
	15	—	—	2,82	—	—	—	—	—
	20	—	3,95	—	—	—	—	—	—
	25	5,08	—	—	—	—	—	—	—
	DN ≤ 12	—	—	—	—	—	—	0,6	—
III	12 < DN ≤ 25	—	—	—	—	—	—	1,2	—
	25 < DN ≤ 50	—	—	—	—	—	—	1,8	—

This International Standard recognizes that different allowable maximum operating torque exist in various regions throughout the world. For this purpose the country or region considering adoption of this International standard should choose the appropriate torque values (i. e. approach I (Europe), II (USA and Canada) or III (Japan)).

^a e.g. central heating or water heating.
^b e.g. space heaters.
^c e.g. domestic cooking.

Table 4 — Maximum operating torque for appliance connector valves

Nominal size DN	Operating torque N·m 1 000 operations
6	1,12
8	1,69
10 ^a	2,26 ^a
15 ^a	2,82 ^a
20 ^a	3,95 ^a
25	5,08
32	6,78
40	9,04
50	11,3
65	14,1
80	28,3
100	33,9

^a Corresponds to outlet tube size of appliance connector valves.

7.6.101.2 Low temperature operating torque

The manual gas valve shall comply with the following method of test at the minimum ambient temperature specified by the manufacturer.

Compliance is checked by the following test.

Two new manual gas valves shall be subjected to this test. This test shall be conducted after or concurrently with internal and external leakage in 7.2, as applicable.

The manual gas valves in the open position shall be placed in a chamber maintained at the manufacturer's specified minimum ambient temperature. After each manual gas valve has attained the specified minimum ambient temperature, this temperature shall be maintained for at least 1 h.

Each manual gas valve shall be cycled from the full open position to the closed position 10 times. During each closing cycle the torque needed to close the manual gas valve shall be measured and shall not exceed that shown in [Table 5](#).

Table 5 — Torque limits for low temperature test

Nominal size DN	Nominal inlet tubing size mm	Maximum torque	
			N·m
6	4,76 to 7,94		4,29
8	—		8,47
10	9,53 to 11,1		11,3
15	12,7 to 14,3		14,1
20	15,9		16,9
25	—		19,8
32	—		22,6
40	—		33,9

Table 5 (continued)

Nominal size DN		Nominal inlet tubing size	Maximum torque
		mm	N·m
50		—	45,2
65		—	56,5
80		—	113
100		—	135,6

7.6.102 Test for operating torque

The operating torque is measured with a suitable torque-meter having accuracy within $\pm 10\%$ of the maximum value of operating torque specified in [Tables 3](#) and [4](#), as applicable, for the relevant size of the manual gas valve to check for compliance with [7.6.101.1](#). The opening and closing movements are carried out at a constant angular velocity of approximately 1,5 rad/s.

7.6.103 Requirements for operating force

For manual gas valves which are operated by a push-button, the force required for the manual operation of the push-button shall not exceed the values given in [Table 6](#) or the value of $(0,5 \text{ N/mm}^2 \times \text{the surface area of the button})$, whichever is smaller, when measured with a suitable dynamometer.

Table 6 — Maximum operating force

Inlet nominal size DN	Operating force N		
	5 000 opera-tions ^a	10 000 opera-tions ^b	40 000 opera-tions ^c
DN < 10	45	45	30
DN \geq 10	60	60	45

^a e.g. central heating or water heating.
^b e.g. space heaters.
^c e.g. domestic cooking.

7.6.104 Requirements for operating torque for safety lock

7.6.104.1 If the manual gas valve is designed to lock in the off position, it shall not unlock when a torque of 1 N·m is applied when tested in accordance with [7.6.104.2](#). The performance of the manual gas valve shall not be permanently impaired by this torque.

7.6.104.2 Test for operating torque for safety lock

In the off-position the safety lock is subjected 10 times to an applied torque of 1 N·m for 10 s to check for compliance with [7.6.104.1](#).

7.6.105 Adequacy of seating means

This provision does not apply to manual gas valves having non-displaceable valve members.

The seating means for other manual gas valves shall comply with the following test.

A leakage test shall be performed with the manual gas valve in the closed position as outlined in [7.2.2](#) and all shall comply. This test may be conducted in conjunction with [7.2.2](#).

Prior to applying test pressure, the movable member shall be unseated by any convenient means that will not damage the manual gas valve. The movable member shall then be allowed to reseat and, when tested without rotation, leakage shall comply with [7.2](#).

7.7 Endurance

7.7.101 Requirement

A manual gas valve shall withstand the number of operations corresponding to the application given in [Tables 3](#) to [4](#), as applicable. This does not apply to pre-setting devices.

After endurance testing there shall be no visible damage or visible change to the marked positions. The leakage shall comply with [7.2](#). The torque or force necessary for operation shall not exceed the values specified in [7.6.101](#) or [7.6.103](#).

7.7.102 Endurance test

7.7.102.1 General

All test samples shall meet the applicable requirements of [7.6.101.1](#) prior to endurance testing.

7.7.102.2 Static endurance test

Two manual gas valves (one in the open position, the other in the closed position) are subjected successively to temperature resistance tests under the following conditions:

- 48 h at the minimum operating temperature according to [7.1](#);
- 48 h at the maximum operating temperature according to [7.1](#).

After this test without any preliminary operation of the manual gas valve the operating torque is checked at ambient temperature.

7.7.102.3 Dynamic endurance

Manual gas valves shall be tested according to the number of operations as follows:

- 50 % of the operations shall be performed at the maximum operating temperature according to [7.1](#);
- 50 % of the operations shall be performed at a temperature of $(20 \pm 5)^\circ\text{C}$.

NOTE Regional specific requirements are given in [Annex G](#).

A cycle shall consist of one opening and closing through the extremes of movement of the movable member. For a manual gas valve that has an intermediate “off” position between two “on” positions, a cycle shall consist of the movement from one “on” position to the other “on” position.

Each manual gas valve shall be securely connected to a suitable fitting and actuated to produce a cycling rate not to exceed that specified by the manufacturer.

After this test without any preliminary operation of the manual gas valve the operating torque is checked at ambient temperature.

NOTE For accelerating the endurance test the operating method and the operating frequency (operations per minute) may be declared by the manufacturer. The operating torque/force as applied during the endurance test should not be greater than 130 % of the value specified in [7.6.101](#) or [7.6.103](#).

7.7.103 Gas burner valves

A gas burner valve declared as having a non-displaceable valve member shall comply with [7.2](#) when tested at 5,23 kPa pressure with a force of 53,4 N applied radially to the stem, 12,7 mm from the edge of the bearing surface nearest to the front end of the gas burner valve stem, while the valve is operated through its normal maximum rotation.

Compliance is checked by the following method of test:

The gas burner valve shall be supported by its usual gas supply means, with the axis of its operating stem horizontal. The gas supply means shall be connected to a pneumatic system capable of supplying clean dry air at a test pressure of 5,25 kPa through devices capable of accurately indicating the allowable flow and the air pressure. Arrangements shall be made to block the gas burner valve outlet in all its operating positions and to leave it open when the gas burner valve is closed.

A light-weight handle with a grooved extension sleeve is to be mounted securely to the stem, with the plane of the groove normal to the stem axis and located 12,7 mm from the edge of the bearing surface nearest to the front end of the gas burner valve stem (see [Figure 2](#)). A loop of wire, approximately 0,5 mm in diameter, shall be placed into the handle groove. A force of 53,4 N shall be applied to the wire without impact in a downward direction with the gas burner valve in the closed position.

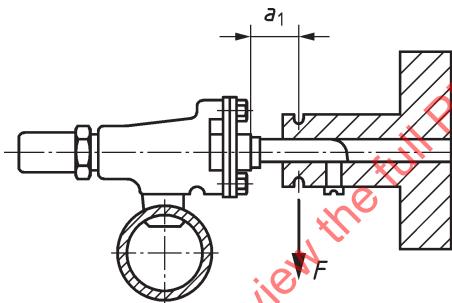


Figure 2 — Performance test for gas burner valves having non-displaceable valve members

The gas burner valve shall then be operated slowly through its full cycle of operation. No axial force is to be applied during manipulation of the gas burner valve handle except that required to release the latch should this be necessary. During this test the gas burner valve shall comply with [7.2.2](#) when tested at 5,25 kPa pressure and at room temperature.

The above test shall then be repeated with the force applied at 1,57 rad, 3,14 rad and 4,71 rad about the stem axis.

NOTE Regional specific requirements are given in [Annex G](#).

7.7.104 Food service equipment 'Delta C' manual gas valves

A manual gas valve suitable for use on food service equipment "delta C" as received and at the end of this test, shall comply with [7.2](#) and shall completely open and close upon the application of a torque not to exceed that specified in [Table 7](#).

Compliance is checked by the following test.

Five new sample valves shall be subjected to this test, all of which shall comply.

Prior to conducting this test, each delta C valve shall be tested for compliance with [7.2](#). The torque necessary to open and close each delta C valve shall be measured and shall not exceed that specified in [Table 7](#).

The delta C valve shall be securely connected to a manifold and placed inside a test chamber capable of maintaining the manufacturer's specified maximum ambient temperature. Butane gas at 2,74 kPa

(11,0 inches water column) pressure shall be passed through the delta C valves at a rate of between 0,393 cm³/s to 0,786 cm³/s (0,05 ft³/h and 0,10 ft³/h).

The delta C valve shall be maintained at the manufacturer's specified maximum ambient temperature for a period of 18 h and then at room temperature for 6 h. Each delta C valve shall be turned to its "on" position at the start of each heating period and to its closed position at the end of each heating period. The torque necessary to completely close the delta C valve shall be checked following the 18 h heating period, and the torque necessary to completely open the valve shall be checked following the 6 h cooling period. The heating and cooling sequence shall be repeated until a total of 30 cycles have been completed.

Upon completion of 30 cycles, the torque necessary to completely close the delta C valve at the elevated temperature and to completely open the valve at room temperature shall be measured and shall not exceed the applicable torque specified in [Table 7](#). Each delta C valve shall also be tested for compliance with the leakage provisions of [7.2](#).

Table 7 — Torque limits for food service equipment delta C valves

Nominal size DN	Nominal inlet tubing size mm	Maximum torque N·m
6	4,76 to 7,94	1,12
8	—	1,69
10	9,53 to 11,1	2,26
15	12,7 to 14,3	2,82
20	15,9	3,95
25	—	5,08

8 EMC/Electrical requirements

ISO 23550:2011, Clause 8 is not applicable.

9 Marking, installation and operating instructions

9.1 Marking

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

The following information, at least, shall be durably marked on the manual gas valve in a clearly visible position and securely affixed to the valves and shall meet the following specifications. Where space is limited because of size this requirement may be met by providing marking information on the package or on a notice placed inside the package in which the manual gas valve(s) is shipped.

- a) manufacturer and/or trade mark;
- b) type reference;
- c) maximum inlet pressure in Pa or kPa;
- d) direction of gas flow (by a cast or embossed arrow);
- e) date of manufacture (at least year) — may be in code;
- f) where applicable, manual gas valves shall bear the symbol of the certifying organization evaluating compliance with this standard.

NOTE Regional specific requirements are given in [Annex G](#).

9.1.101 Open and closed position of a manual gas valve

Marking of the open and closed position of a manual gas valve shall be used unless both the main burner and the ignition burner are supervised and the manual gas valve cannot be incorrectly operated and if the manual actuator, in the open and closed position is so arranged that any marking is not possible (e.g. push-button for "on" and "off").

9.1.102 Marking of positions

If markings are used for the different positions of the manual gas valve, the following symbols according to [Table 8](#) shall be used or markings shall be according to the relevant appliance standards.

Table 8 — Marking

Position	Symbol	Words
Off:	Plain disc or 0	Off
Ignition:	Star	Pilot
Full on:	Large flame	On or Hi
Reduced flow:	Small flame	Low

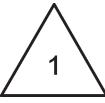
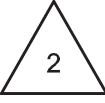
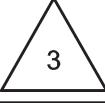
9.1.103 Marking for 'Delta C' valves

Delta C valves intended for use on food service equipment and complying with [7.4](#) shall bear a legible permanent marking "(Δ)" on the body, top cap or stem, with the letter "c" not less than 2,4 mm high.

9.1.104 Marking for appliance connector valves

An appliance connector valve shall be permanently marked with a symbol, as shown in [Table 9](#).

Table 9 — Marking symbols for appliance connector valves

Outlet connection size mm	Symbol
9,5	
12,7	
15,9	

9.2 Installation and operating instructions

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

It shall include all relevant information on use, installation, operation and servicing, in particular:

- number of manual gas valve operations;
- group 1 (if applicable);
- rated flow rate, i.e. capacity;

- d) ambient temperature range;
- e) mounting position(s);
- f) inlet pressure range in Pa or kPa;
- g) gas connection(s);
- h) manual gas valve with safety lock (if applicable);
- i) gases for which the manual gas valve is suitable;
- j) notice for installer to consider e.g. condition for up-stream pressure, dirt, corrosion products;
- k) whether or not the manual gas valve has a non-displaceable member.

9.3 Warning notice

Shall be according to ISO 23550:2011, 9.3.

Annex A
(informative)

Leak-tightness test — Volumetric method

Shall be according to ISO 23550:2011, Annex A.

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Annex B
(informative)

Leak-tightness test — Pressure-loss method

Shall be according to ISO 23550:2011, Annex B.

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Annex C
(normative)

Conversion of pressure loss into leakage rate

Shall be according to ISO 23550:2011, Annex C.

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Annex D
(normative)

Test for immunity to power-frequency magnetic fields

ISO 23550:2011, Annex D is not applicable.

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Annex E (normative)

Specific regional requirements in European countries

Shall be according to ISO 23550:2011, Annex E with the following addition:

E.1 General

For the purposes of this International Standard, the specific regional requirements given in [E.2](#) modify this International Standard as it applies in Europe. Only the affected subclauses are mentioned, hence the numbering is non-consecutive.

E.2 Additional requirements and modifications

E.6.102 Appliance connector valves

[6.102](#) is not applicable.

E.7.7.104 Food service equipment 'Delta C' valves

[7.7.104](#) is not applicable.

E.9.1 Marking

9.1 f) is not applicable.

E.9.1.103 Marking for 'Delta C' valves

[9.1.103](#) is not applicable.

Annex F (normative)

Specific regional requirements in Canada and USA

Shall be according to ISO 23550:2011, Annex F with the following addition:

F.1 General

For the purposes of this International Standard, the specific regional requirements given in [F.2](#) modify this International Standard as it applies in Canada and the USA. Only the affected subclauses are mentioned, hence the numbering is non-consecutive.

F.2 Additional requirements and modifications

F.6.2.103 Tapered plug cavity

The diameters of the tapered plug cavity in a plug type manual gas valve finished by lapping, shall correspond to those of the plug which it contains, as follows:

- a) The smallest diameter shall be at least 0,076 mm larger than the smallest diameter of the taper on the plug for a minimum distance of 1,19 mm.
- b) The largest diameter shall be at least 0,076 mm larger than the largest diameter of the taper on the plug.

F.7.2 Leak-tightness

[7.2.1](#) "Criteria" is replaced by the following:

A manual gas valve shall not leak in excess of 20 cm³/h of air corrected to 101,3 kPa pressure at 15,5 °C.

[7.2.2](#) "Test for leak-tightness" is replaced by the following:

This test shall be conducted at the manufacturer's specified maximum ambient temperature.

Manual gas valves incorporating a flow adjustment screw shall be tested for leakage with the adjustment screw in any normal adjustment position from completely closed to that permitting the maximum rate of gas flow, and with the cap, plug, lock nut, or other concealment or sealing means, if provided, tightly in place.

Five new samples shall be subjected to this test, all of which shall comply.

The inlet of the manual gas valve under test shall be connected to a pneumatic system capable of supplying clean dry air at the test pressures and to a flow measuring device capable of accurately indicating the allowable flow. The flow measuring device shall be located between the air supply and the inlet of the manual gas valve.

The manual gas valves shall be placed in a test oven and heated to the manufacturer's specified maximum ambient temperature $\pm 2,8$ °C, as indicated by a thermocouple attached to one of the valves. The manual gas valves shall be maintained at this temperature for one hour and throughout the remainder of this test.

With the manual gas valve closed and with the outlet open, air shall be admitted and maintained at a pressure of 498 Pa until equilibrium conditions are attained, after which the leakage shall be measured.

The pressure shall then be increased slowly to 20,7 kPa and maintained at that pressure until equilibrium conditions are attained, after which the leakage shall again be measured.

The above tests shall be repeated with the manual gas valve open and with the outlet sealed. The leakage rate under any test condition shall not exceed 20 cm³/h of air corrected to standard conditions of 101,3 kPa pressure at 15,5 °C.

The above test shall be conducted at 5,17 kPa rather than at 20,7 kPa for a manual gas valve where the inlet gas pressure cannot act to reduce the seating force of the valve member.

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Annex G (normative)

Specific regional requirements in Japan

Shall be according to ISO 23550:2001, 1, Annex G with the following addition:

G.1 General

For the purposes of this International Standard, the specific regional requirements given in [G.2](#) modify this International Standard as it applies in Japan. Only the affected subclauses are mentioned, hence the numbering is non-consecutive.

G.2 Additional requirements

G.6.102 Appliance connector valves

[6.102](#) is not applicable.

G.7.7.102.2 Dynamic endurance

The test is conducted at 20 °C for all cycles.

G.7.7.103 Performance test for gas burner valves having non-displaceable valve members

[7.7.103](#) is not applicable.

G.7.7.104 Food service equipment 'Delta C' valves

[7.7.104](#) is not applicable.

G.9.1 Marking

[9.1](#) b), c), d) and f) are not applicable.

G.9.1.103 Marking for 'Delta C' valves

[9.1.103](#) is not applicable.

Annex AA
(informative)

Examples of manual gas shut-off valves

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