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

**Part 9:
Mechanical gas thermostats**

iTeh STANDARD PREVIEW
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*Dispositifs de commande et de sécurité pour brûleurs à fioul et pour
appareils à fioul - Exigences particulières —
Partie 9: Thermostats mécaniques*

ISO 23551-9:2015

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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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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/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*

An additional part dealing with vent valves is planned.

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 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 clause. 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.

In an attempt to develop an 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 [Annex E](#) to [Annex G](#). This part of ISO 23551 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 9: Mechanical gas thermostats

1 Scope

This part of ISO 23551 specifies safety, constructional, and performance requirements and testing of mechanical gas thermostat for gas burners, gas appliances, and similar use hereafter referred to as “thermostats”.

This part of ISO 23551 covers type testing only.

This part of ISO 23551 applies to mechanical gas thermostats of nominal connection sizes up to and including DN 50 with declared maximum inlet pressures up to and including 50 kPa for burners and gas-burning appliances using fuel gases as natural gas, manufactured gas, and liquefied petroleum gas (LPG).

This part of ISO 23551 applies to mechanical thermostats controlling the gas flow directly or indirectly through an integral gas valve and which do not require external electrical energy for their operation.

This part of ISO 23551 only applies to mechanical thermostats used on gas appliances where the thermostat is not directly exposed to the outdoor environment.

This part of ISO 23551 only applies to mechanical thermostats which are intended for operating control functions.

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

3.101

mechanical thermostat

thermostat which controls the temperature by adjusting the flow rate accordingly to the temperature of the *thermal sensing element* (3.111) without any external energy such that the temperature remains within defined limits

3.102

adjustable thermostat

mechanical thermostat (3.101) in which the *temperature set-point* (3.115) can be adjusted by the user to anywhere between minimum and maximum values

3.103

fixed setting thermostat

mechanical thermostat (3.101) that has a preset fixed operating temperature which cannot be adjusted by the user

3.104

snap-acting thermostat

mechanical thermostat (3.101) with only two positions for the flow rate, i.e. “full on-off”, “full on-reduced rate”, or “reduced rate-off”

3.105

modulating thermostat

mechanical thermostat (3.101) which controls the flow rate in accordance with a predetermined and continuous function of the temperature of the *thermal sensing element* (3.111)

3.106

modulating thermostat with additional on-off action

mechanical thermostat (3.101) which acts as a *snap-acting thermostat* (3.104) between the closed and reduced positions and as a *modulating thermostat* (3.105) between the reduced and full-on positions

3.107

thermostat closure member

movable part of the thermostat which opens and closes the gas way and/or varies the flow rate

3.108

presetting device

device for adjusting an operating condition only by an authorized person

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Note 1 to entry: It can be fixed or variable (e.g. when it is the gas flow that is adjustable, either an orifice or an adjusting screw can be used).

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3.109

fixed bypass

non-adjustable presetting device for fixing the minimum gas flow through a thermostat

3.110

bypass adjusting device

screw adjustment or an exchangeable orifice that fixes the minimum gas flow rate through the thermostat and which is accessible only by the use of tools

3.111

thermal sensing element

part of a thermostat which is directly acted upon by temperature changes of the medium to be controlled or to be supervised and which through physical change, thus produced, originates the motion directly or indirectly controlling the action of the closure member

3.112

operating curve

graphical representation of the flow rate as a function of the thermal sensing element temperature at a given *temperature set-point* (3.115) and at a constant inlet pressure

3.113

backlash

difference of position of the *adjusting knob* (3.114) when it is moved in both directions to obtain the same flow rate at a constant thermal sensing element temperature

3.114

adjusting knob

spindle

dial

part of the thermostat which is used to select the *temperature set-point* (3.115)

3.115**temperature set-point**

any value selected within the temperature range at which the controlled temperature should be maintained

3.116**temperature set-point range**

range between the minimum and maximum adjustable *temperature set-points* (3.115) (by means of the *adjusting knob* (3.114))

3.117**calibration flow rate**

flow rate declared by the manufacturer for calibration

3.118**calibration temperature set-point**

temperature at which the *calibration flow rate* (3.117) should be obtained with the adjustment set to the position and in the direction declared by the manufacturer

3.119**temperature differential for snap-acting thermostats**

difference in temperature necessary to obtain a change in the flow rate at a given set-point

3.120**deviation**

maximum deviation from the *temperature set-point* (3.115) which is declared by the manufacturer

3.121**drift**

permanent change in the *operating curve* (3.112) of the thermostat

3.122**bypass**

passage provided in which permits a flow of gas to the main burner(s) independently of the action of the thermostatic valve

3.123**calibration reference point**

dial setting at which a control is calibrated for agreement between dial indication and sensing element temperature

4 Classification**4.1 Classes of controls**

ISO 23550:2011, 4.1 is not applicable.

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 with the following addition:

Where applicable, the thermostat shall be mounted in an appropriate test fixture and the tests conducted with the thermal sensing element immersed in the intended medium (e.g. water, oil, or air) for the application as specified in the operation and installation instructions.

6 Construction

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

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

Shall be according to ISO 23550:2011, 6.2.3.

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. [ISO 23551-9:2015
https://standards.iteh.ai/catalog/standards/sist/8f1f3c36-61fa-48dc-b2e0-40e5e31d8c5a/iso-23551-9-2015](https://standards.iteh.ai/catalog/standards/sist/8f1f3c36-61fa-48dc-b2e0-40e5e31d8c5a/iso-23551-9-2015)

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 with the following addition:

If, in accordance with the manufacturer's instructions, the thermostat can be dismantled for servicing. Such action shall not result in a change in temperature calibration exceeding the declared maximum set point deviation ([7.6.101.1](#)).

Suitable means for maintaining all adjustments shall be provided. Lock nuts or adjusting nuts held by springs or compression will be considered satisfactory except where their adjustment can be accidentally disturbed.

6.2.9 Auxiliary channels

Shall be according to ISO 23550:2011, 6.2.9.

6.2.101 Presetting devices

A presetting device shall only be adjustable by use of a tool. The means of adjustment shall be easily accessible and shall not change of its own accord, but shall be protected against unauthorized interference, e.g. use of a sealing (lacquer).

A presetting device which connects a gas-carrying part to atmosphere shall provide leak tightness by means which shall not seal on the thread, e.g. use of an O-ring seal.

The presetting device shall not be able to fall into the gas ways of the thermostat. If an O-ring or equivalent gasket provides a seal against the atmosphere, then when the presetting device is completely unscrewed, it shall not be able to be pushed out by gas pressure and shall remain tight at the maximum pressure specified in 7.2.2.

If a presetting device is used for different gas families, it shall have a fixed minimum orifice.

A cover of any presetting device shall require a tool for removal and replacement and it shall not interfere with the adjustment of the temperature range.

6.3 Materials

Shall be according to ISO 23550:2011, 6.3.

6.3.1 General material requirements

Shall be according to ISO 23550:2011, 6.3.1.

NOTE Regional specific requirements are given in Annex F.

6.3.2 Housing

Shall be according to ISO 23550:2011, 6.3.2.

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.

6.4 Gas connections

6.4.1 Making connections

Shall be according to ISO 23550:2011, 6.4.1.

6.4.2 Connection sizes

Shall be according to ISO 23550:2011, 6.4.2.

6.4.3 Threads

Shall be according to ISO 23550:2011, 6.4.3.

6.4.4 Union joints

Shall be according to ISO 23550:2011, 6.4.4.

6.4.5 Flanges

Shall be according to ISO 23550:2011, 6.4.5.

6.4.6 Compression fittings

Shall be according to ISO 23550:2011, 6.4.6.

6.4.7 Nipples for pressure tests

Shall be according to ISO 23550:2011, 6.4.7.

6.4.8 Strainers

Shall be according to ISO 23550:2011, 6.4.8.

6.101 Flow characteristics

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An adjustable bypass shall be set by means of a variable presetting device or shall be adjusted by means of a fixed presetting device. Bypass rate adjustments shall be independent of pilot rate adjustments.

When specified by the manufacturer, it shall be possible to gain access to any fixed bypass or bypass adjusting device for cleaning without changing the calibration temperature set-point.

The opening and closing of the thermostat closure member with a total shut-off function shall happen by snap-action between the off position and the reduced flow position.

[Figure 2](#) shows typical operating curves of a modulating, snap-acting, and modulating on-off thermostat.

The flow rate at the moment of snap-action shall not be less than the value as specified in the operation and installation instructions.

6.102 Temperature adjustment

6.102.1 Range adjustment

The allowed temperature setting range shall be limited by stops. Where applicable, the operating instructions shall state the limits in which the temperature setting range can be adjusted using appropriate tools. The temperature setting range stops shall not change on their own accord.

6.102.2 Set point adjustment

If the adjusting knob is supplied as part of the thermostat, the marking of its positions shall be easily recognizable. It shall indicate the direction in which the temperature is raised or lowered. If numbers are used, higher numbers shall indicate higher temperatures, except for thermostats for refrigerators where higher numbers shall indicate lower temperatures.

It shall be possible to select any temperature set-point over the whole temperature range by setting the adjusting knob or spindle between the stops within the maximum and minimum ambient temperatures as stated in the operating instructions.