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

**Part 9:
Mechanical gas thermostats**

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

Partie 9: Thermostats mécaniques

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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 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*.

This second edition cancels and replaces the first edition (ISO 23551-9:2015), which has been technically revised.

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

- the Foreword, Introduction and Scope has been made consistent with new principles and rules for the structure and drafting of ISO and IEC documents;
- the structure and numbering of the clauses have been aligned with ISO 23550:2018;
- specific regional requirements in European countries have been moved to the main document.

A list of all parts in the ISO 23551 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 in combination with ISO 23550. Together with ISO 23550, this document establishes the full requirements as they apply to the product covered by this document.

Where needed, this document adapts ISO 23550 by stating in the corresponding clause:

- “with the following modification”;
- “with the following addition”;
- “is replaced by the following”; or
- “is not applicable”.

In order to identify specific requirements that are particular to this document, that are not already covered by ISO 23550, this document can contain clauses or subclauses that are additional to the structure of ISO 23550. These subclauses are indicated by the introductory sentence: “Subclause (or Annex) specific to this document.”

To ensure global relevance of this document, the differing requirements resulting from practical experience and installation practices in various regions of the world have been taken into account. The variations in basic infrastructure associated with gas and/or oil controls and appliances have also been recognized, some of which are addressed in [Annexes F, G and H](#). This document 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 document specifies safety, construction, performance and testing requirements for mechanical gas thermostat intended for use with gas burners and gas burning appliances hereafter referred to as “thermostats”.

This document 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 use with natural gas, manufactured gas or liquefied petroleum gas (LPG). It is not applicable to corrosive and waste gases.

This document 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;
- used on gas appliances where the thermostat is not directly exposed to the outdoor environment; and
- which are intended for operating control functions.

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 23550:2018, *Safety and control devices for gas and/or oil burners and appliances — General requirements*

3 Terms and definitions

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

ISO and IEC maintain terminology 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

mechanical thermostat

thermostat which controls the temperature by adjusting the flow rate accordingly to the temperature of the *thermal sensing element* (3.11) without any external energy, such that the temperature remains within defined limits

3.2

adjustable thermostat

mechanical thermostat (3.1) in which the *temperature set-point* (3.15) can be adjusted by the user to anywhere between minimum and maximum values

3.3

fixed setting thermostat

mechanical thermostat (3.1) that has a pre-set fixed operating temperature which cannot be adjusted by the user

3.4

snap-acting thermostat

mechanical thermostat (3.1) with only two positions for the flow rate, i.e. “full on-off”, “full on-reduced rate” or “reduced rate-off”

3.5

modulating thermostat

mechanical thermostat (3.1) which controls the flow rate in accordance with a predetermined and continuous function of the temperature of the *thermal sensing element* (3.11)

3.6

modulating thermostat

mechanical thermostat (3.1) that incorporates an on-off action and which acts as a *snap-acting thermostat* (3.4) between the closed and reduced positions and as a *modulating thermostat* (3.5) between the reduced and full-on positions

3.7

thermostat closure member

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

3.8

pre-setting device

device for adjusting an operating condition only by an authorized person

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.

3.9

fixed bypass

non-adjustable *pre-setting device* (3.8) for fixing the minimum gas flow through a thermostat

3.10

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

3.11

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

3.12

operating curve

graphical representation of the flow rate as a function of the *thermal sensing element* (3.11) temperature at a given *temperature set-point* (3.15) and at a constant inlet pressure

3.13

backlash

difference of position of the *adjusting knob* (3.14) when it is moved in both directions to obtain the same flow rate at a constant thermal sensing element temperature

3.14**adjusting knob
adjusting spindle
adjusting dial**

part of the thermostat used to select the *temperature set-point* (3.15)

3.15**temperature set-point**

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

3.16**temperature set-point range**

range between the minimum and maximum adjustable *temperature set-points* (3.15), by means of the *adjusting knob* (3.14)

3.17**calibration flow rate**

flow rate declared by the manufacturer for calibration

3.18**calibration temperature set-point**

temperature at which the *calibration flow rate* (3.17) should be obtained with the adjustment set to the position and in the direction declared by the manufacturer

3.19**temperature differential**

<snap-acting thermostats> difference in temperature necessary to obtain a change in the flow rate, at a given set-point

3.20**deviation**

maximum deviation from the *temperature set-point* (3.15) declared by the manufacturer

3.21**drift**

permanent change in the *operating curve* (3.12) of the thermostat

3.22**bypass**

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

3.23**calibration reference point**

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

3.24**maximum operating position**

highest dial marking temperature for heating thermostats or the lowest dial marking temperature for refrigeration thermostats

4 Classification**4.1 Classes of controls**

ISO 23550:2018, 4.1, is not applicable.

4.2 Groups of controls

Shall be in accordance with ISO 23550:2018, 4.2.

4.3 Types of DC supplied controls

ISO 23550:2018, 4.3, is not applicable.

4.4 Classes of control functions

ISO 23550:2018 4.4, is not applicable.

5 Test conditions

Shall be in accordance with ISO 23550:2018, 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 installation and operation instructions.

6 Construction

Specific regional requirements shall be as specified in [Annex G](#).

6.1 General

Shall be in accordance with ISO 23550:2018, 6.1.

6.2 Construction requirements

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6.2.1 Appearance

Shall be in accordance ISO 23550:2018, 6.2.1.

6.2.2 Holes

Shall be in accordance with ISO 23550:2018, 6.2.2.

6.2.3 Breather holes

ISO 23550:2018, 6.2.3 is not applicable.

6.2.4 Vent limiter

ISO 23550:2018, 6.2.4 is not applicable.

6.2.5 Screwed fastenings

Shall be in accordance with ISO 23550:2018, 6.2.5.

6.2.6 Moving parts

Shall be in accordance with ISO 23550:2018, 6.2.6.

6.2.7 Sealing caps

Shall be in accordance with ISO 23550:2018, 6.2.7.

6.2.8 Dismantling and reassembling for servicing and/or adjustment for controls

Shall be in accordance with ISO 23550:2018, 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 (see 7.6.1.1).

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

6.2.9 Auxiliary channels and orifices

Shall be in accordance with ISO 23550:2018, 6.2.9.

6.2.10 Pre-setting device

Shall be in accordance with ISO 23550:2018, 6.2.10.

6.3 Materials**6.3.1 General material requirements**

Shall be in accordance with ISO 23550:2018, 6.3.1.

6.3.2 Housing

Shall be in accordance with ISO 23550:2018, 6.3.2.

6.3.3 Springs providing closing force and sealing force

Shall be in accordance with ISO 23550:2018, 6.3.3.

6.3.4 Resistance to corrosion and surface protection

Shall be in accordance with ISO 23550:2018, 6.3.4.

6.3.5 Impregnation

Shall be in accordance with ISO 23550:2018, 6.3.5.

6.3.6 Seals for glands for moving parts

Shall be in accordance with ISO 23550:2018, 6.3.6.

6.3.7 Jointing

Shall be in accordance with ISO 23550:2018, 6.3.7.

6.4 Connections

Shall be in accordance with ISO 23550:2018, 6.4.

Further requirements for GQC shall be in accordance with [Annex D](#).

6.5 Gas controls employing with electrical components in the gas way

ISO 23550:2018, 6.5 is not applicable.

6.6 Flow characteristics

Subclause specific to this document.

An adjustable bypass shall be set by means of a variable pre-setting device or shall be adjusted by means of a fixed pre-setting 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 installation and operating instructions.

6.7 Temperature adjustment of adjustable thermostats

Subclause specific to this document.

6.7.1 Range adjustment

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

6.7.2 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 set-point range by setting the adjusting knob or spindle between the stops within the maximum and minimum ambient temperatures as stated in the operating instructions.

The temperature set point adjustment means shall not change on its own accord.

6.7.3 Fixed setting thermostat

If provided, the adjustment means of a fixed setting thermostat shall be sealed (e.g. lacquer).

7 Performance

7.1 General

Shall be in accordance with ISO 23550:2018, 7.1.