BS EN 257:2010

BSI Standards Publication

Mechanical thermostats for gas-burning appliances

raising standards worldwide™

National foreword

This British Standard is the UK implementation of EN 257:2010. It supersedes BS EN 257:1992 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GSE/22, Safety and control devices for gas and oil burners and gas burning appliances.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 63335 5

ICS 27.060.20; 97.120

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2010

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 257

June 2010

ICS 27.060.20

Supersedes EN 257:1992

English Version

Mechanical thermostats for gas-burning appliances

Thermostats mécaniques pour appareils à gaz

Mechanische Temperaturregler für Gasgeräte

This European Standard was approved by CEN on 19 May 2010.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 257:2010: E

Contents

Page

Figures

Tables

Foreword

This document (EN 257:2010) has been prepared by Technical Committee CEN/TC 58 “Safety and control devices for burners and appliances burning gaseous or liquid fuels”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2010, and conflicting national standards shall be withdrawn at the latest by December 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive.

For relationship with EU Directive, see informative Annex ZA, which is an integral part of this document.

This document supersedes EN 257:1992.

This European Standard is intended to be used in conjunction with EN 13611:2007. This document refers to clauses of EN 13611:2007 or adapts clauses by stating “with the following modification”, “with the following addition”, “is replaced by the following” or "is not applicable" in the corresponding clause. This European Standard adds clauses or sub clauses to the structure of EN 13611:2007 which are particular to this European Standard. It should be noted that these clauses and sub-clauses are not indicated as an addition.

It should be noted that the following significant technical changes compared to the previous edition have been incorporated in this European Standard:

a) scope is enlarged to maximum inlet pressures up to and including 50 kPa (500 mbar);

b) alignment with EN 13611:2007;

c) updating of Clause 2, normative references;

d) units of measurement and test conditions are updated according to EN 13611:2007;

e) requirements and tests concerning durability of elastomers in contact with gas (7.8 of this European Standard) are now totally aligned with EN 13611:2007, 7.8;

f) marking, installation and operating instructions (Clause 9 of this European Standard) are extended to cover additional information.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard specifies the safety, construction and performance requirements for mechanical thermostats intended for use with gas appliances and similar use, hereafter referred to as 'thermostats'.

This European Standard applies to thermostats with declared maximum inlet pressures up to and including 50 kPa (500 mbar) of nominal connection sizes up to and including DN 50 for use with one or more fuel gases in accordance with EN 437.

This European Standard applies to 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 European Standard only applies to thermostats used with gas appliances which are not installed in the open air.

Thermostats dealt with in this European Standard are intended for control functions.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 13611:2007, *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 EN 13611:2007 and the following apply.

3.101
mechanical thermostat
thermostat which controls the temperature by adjusting the flow rate accordingly to the temperature of the sensor without any external energy, such that the temperature remains within defined limits

3.102
adjustable thermostat
mechanical thermostat in which the temperature set-point can be adjusted by the user to anywhere between minimum and maximum values

3.103
fixed setting thermostat
mechanical thermostat that has a preset fixed operating temperature which cannot be adjusted by the user

3.104
snap-acting thermostat
mechanical thermostat 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 which controls the flow rate in accordance with a predetermined and continuous function of the temperature of the temperature sensor

3.106
modulating thermostat with additional on-off action
mechanical thermostat which acts as a snap-acting thermostat between the closed and reduced positions and as a modulating thermostat 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

NOTE It may be fixed or variable, e.g. when it is the gas flow that is adjustable, either an orifice or an adjusting screw may be used.

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
temperature sensor
device which senses the temperature of the medium to be controlled or to be supervised

3.112
operating curve
graphical representation of the flow rate as a function of the sensor temperature at a given temperature set-point and at a constant inlet pressure

3.113
backlash
difference of position of the adjusting knob when it is moved in both directions to obtain the same flow rate at a constant sensor temperature

3.114
adjusting knob (or spindle)
part of the thermostat which is used to select the temperature set-point

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 (by means of the adjusting knob)

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 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 which is declared by the manufacturer

3.121
drift
permanent change in the operating curve of the thermostat

4 Classification

4.1 Classes of control

EN 13611:2007, 4.1 is not applicable.

4.2 Groups of control

Shall be according to EN 13611:2007, 4.2.

4.3 Classes of control functions

EN 13611:2007, 4.3 is not applicable.

5 Units of measurement and test conditions

Shall be according to EN 13611:2007, Clause 5.

6 Construction requirements

6.1 General

Shall be according to EN 13611:2007, 6.1.

6.2 Mechanical parts of the control

6.2.1 Appearance

Shall be according to EN 13611:2007, 6.2.1.

6.2.2 Holes

Shall be according to EN 13611:2007, 6.2.2.

6.2.3 Breather holes

Shall be according to EN 13611:2007, 6.2.3.

6.2.4 Test for leakage of breather holes

Shall be according to EN 13611:2007, 6.2.4.

6.2.5 Screwed fastenings

Shall be according to EN 13611:2007, 6.2.5.

6.2.6 Jointing

Shall be according to EN 13611:2007, 6.2.6.

6.2.7 Moving parts

Shall be according to EN 13611:2007, 6.2.7.

6.2.8 Sealing caps

Shall be according to EN 13611:2007, 6.2.8.

6.2.9 Dismantling and reassembly

Shall be according to EN 13611:2007, 6.2.9 with the following addition:

If, in accordance with the manufacturers 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 7.101.1).

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 be made sound by a 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 7.3.

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 EN 13611:2007, 6.3.

6.4 Gas connections

6.4.1 Making connections

Shall be according to EN 13611:2007, 6.4.1.

6.4.2 Connection sizes

Shall be according to EN 13611:2007, 6.4.2.

6.4.3 Threads

Shall be according to EN 13611:2007, 6.4.3.

6.4.4 Union joints

Shall be according to EN 13611:2007, 6.4.4.

6.4.5 Flanges

Shall be according to EN 13611:2007, 6.4.5.

6.4.6 Compression fittings

Shall be according to EN 13611:2007, 6.4.6.

6.4.7 Nipples for pressure test

Shall be according to EN 13611:2007, 6.4.7.

6.4.8 Strainers

Shall be according to EN 13611:2007, 6.4.8.

6.4.101 Flow characteristics

An adjustable bypass shall be set by means of a variable presetting device or shall be adjusted by means of a fixed presetting device.

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 stated in the operating instructions.

6.4.102 Temperature adjustment

6.4.102.1 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 may be adjusted using appropriate tools. The temperature setting range stops shall not change on their own accord.

6.4.102.2 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.

The temperature setting means shall not change on its own accord.

6.4.102.3 Fixed setting thermostat

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

6.5 Electronic parts of the control

EN 13611:2007, 6.5 is not applicable.

6.6 Protection against internal faults for the purpose of functional safety

EN 13611:2007, 6.6 is not applicable.

7 Performance

7.1 General

Shall be according to EN 13611:2007, 7.1 with the following addition:

Tests shall be conducted in the sequence shown in Table 1.

Table 1 — Sequence of testing

Clause	Test	Thermostat number	
		1	2
7.2 / 7.3	Leak-tightness / Test for leak-tightness (except **6.3.2** / **6.3.3**)	X	X
7.107	Effect of storage and transport temperatures	X	
7.108	Thermal overload of the temperature sensor	X	
7.101	Calibration temperature set-point	X	X
7.106	Ambient temperature range of the body		X
7.102	Backlash	X	X
7.6 / 7.7	Rated flow rate / Test for rated flow rate		X
7.105	Operating characteristic of the thermostat		X
7.103	Opening of snap-acting thermostat with a closed position		X
7.104	Opening pressure and closing pressure for thermostats with a closed position	X	
7.109	Operating torque of the thermostat set-point adjuster	X	X
7.4 / 7.5	Torsion and bending / Torsion and bending tests	X	

Clause	Test	Thermostat number	
		1	2
7.2 / 7.3	Leak-tightness / Test for leak-tightness (except **6.3.2** / **6.3.3**)	X	
7.110 / 7.110.2.1	Endurance / Mechanical cycling test	X	
7.110 / 7.110.2.2	Endurance / Thermal cycling test		X
7.109	Operating torque of the thermostat set-point adjuster	X	
7.102	Backlash	X	
7.2 / 7.3	Leak-tightness / Test for leak-tightness (except **6.3.2** / **6.3.3**)	X	X
7.101	Calibration temperature set-point	X	X
7.8.4, 7.8.5, 7.8.6, and 7.8.7 of EN 13611:2007	Resistance to scratching / Scratch test / Resistance to humidity / Humidity test	X	
7.101 / 7.105	Calibration temperature set-point / Operating characteristic of the thermostat		X
6.3.2 / 6.3.3	Housing / Test for leakage of housing after removal of non-metallic parts		X
Thermostats which can be converted to other gas families by exchange of parts shall be supplied with these parts.			

7.2 Leak-tightness

EN 13611:2007, 7.2 is replaced by the following:

Thermostats shall be leak-tight in accordance with the leakage rates given in Table 2.

Table 2 — Maximum leakage rates

Nominal size (inlet) DN	Maximum leakage rate cm^3/h of air	
	Internal leak-tightness [a]	External leak-tightness
DN < 10	60	20
10 ≤ DN ≤ 15	60	40
15 < DN ≤ 25	80	40
25 < DN ≤ 50	120	60

[a] This requirement applies only to thermostats with complete shut-off.

7.3 Test for leak-tightness

7.3.1 General

Shall be according to EN 13611:2007, 7.3.1.

7.3.2 External leak-tightness

Shall be according to EN 13611:2007, 7.3.2.

7.3.3 Internal leak-tightness

Shall be according to EN 13611:2007, 7.3.3 with the following addition:

This test applies only to thermostats with complete shut-off. The knob is set at the middle of its temperature setting range and the temperature sensor is slowly heated (or cooled, for controls for refrigerators) until the valve is closed. The temperature of the sensor is then increased (or decreased for refrigerators) by a value equal to 10 % of the temperature range of the thermostat. The thermostat is then checked for internal leak-tightness.

The test is carried out in the direction of gas flow.

7.4 Torsion and bending

Shall be according to EN 13611:2007, 7.4.

7.5 Torsion and bending tests

Shall be according to EN 13611:2007, 7.5.

7.6 Rated flow rate

EN 13611:2007, 7.6 is replaced by the following:

The flow rate and bypass flow rate shall be measured.

The measured flow rate shall be at least 0,9 times the rated flow rate.

For thermostats with a variable preset bypass, the bypass flow rate shall be adjustable over the whole range. For thermostats with a fixed preset bypass, the bypass flow rate shall remain within the tolerance limits.

The rated flow rate and the rated bypass flow rates are stated in the operating instructions.

7.7 Test for rated flow rate

7.7.1 Apparatus

Shall be according to EN 13611:2007, 7.7.1.

7.7.2 Test procedure

EN 13611:2007, 7.7.2 is replaced by the following:

Flow rate and by-pass flow rate are taken from the operating curves as indicated in 7.105. The corrected rated flow rate and the corrected rated bypass flow rate according to 7.7.3 shall comply with the requirements of 7.6.

7.7.3 Conversion of air flow rate

Shall be according to EN 13611:2007, 7.7.3.

7.8 Durability

Shall be according to EN 13611:2007, 7.8.

7.9 Performance tests for electronic controls

EN 13611:2007, 7.9 is not applicable.

7.10 Long-term performance for electronic controls

EN 13611:2007, 7.10 is not applicable.

7.101 Calibration temperature set-point

7.101.1 Requirement

The deviation of the calibration temperature set-point at constant ambient temperature shall not exceed the value as stated in the operating instructions.

7.101.2 Test for calibration temperature set-point

With the body at an ambient temperature of (20 ± 2) °C, the adjusting knob is set to the position and in the direction indicated by the manufacturer for calibration. The operating characteristic of the thermostat is drawn according to 7.105.2.

7.102 Backlash

7.102.1 Requirement

For modulating thermostats the backlash shall not exceed 5 % of the angular movement of the setting point adjustment range of the thermostat.

7.102.2 Test for backlash

The sensor is held at a constant temperature equal to the middle of the temperature range.

The thermostat is supplied with air at 2 kPa (20 mbar). The pressure difference with all the thermostat closure members in the fully open position is adjusted to 250 Pa (2,5 mbar).

During the test, the body of the thermostat is maintained at a constant ambient temperature within ± 1 °C.

Turn the range spindle from the minimum temperature set-point until the calibration flow rate is obtained and record this position. Continue to turn the range spindle to the maximum temperature set-point and then turn the spindle back again to the position at which the calibration flow rate is obtained. Record this position. Measure the backlash which is the angular difference between these two positions.

7.103 Opening of a snap-acting thermostat with a closed position

7.103.1 Requirement

The total leakage of a two-position thermostat (on-off) or of a modulating on-off thermostat during the opening procedure up to the point of snap-action shall not exceed 1 dm^3 of air.

7.103.2 Test for opening of a snap-acting thermostat with a closed position

The thermostat is supplied with air at 2 kPa (20 mbar). The pressure difference with all the valves in the fully-open position is adjusted to 250 Pa (2,5 mbar).

During the test, the body of the thermostat is held at a constant ambient temperature within ± 1 °C.

The thermostat is set at the calibration temperature set-point as stated in the operating instructions. The temperature sensor is immersed in a bath, the temperature of which is increased at a rate of 0,5 °C/min until the thermostat valve is closed. The temperature is then lowered at the rate of 0,5 °C/min until the thermostat snaps open. During the lowering of the temperature the total flow is measured from the temperature at which closure occurred up to the moment of snap-action.

For a refrigeration thermostat the above temperature changes are reversed.

7.104 Opening pressure and closing pressure for thermostats with a closed position

7.104.1 Requirement

The thermostat shall be capable of opening and closing between the minimum and 1,2 times the maximum inlet pressure as specified in 9.1, but at least against a maximum pressure of 5 kPa (50 mbar).

7.104.2 Test for opening pressure and closing pressure for thermostats with a closed position

Using the equipment as shown in Figure 1, a pressure equal to 1,2 times the maximum inlet pressure, but at least 5 kPa (50 mbar), is supplied to the inlet of the thermostat. The pressure drop, with the valve in the fully open position, is adjusted to 250 Pa (2,5 mbar). Check that the valve opens and closes at a temperature change of the temperature sensor.

7.105 Operating characteristic of the thermostat

7.105.1 Requirement

When tested:

a) the temperature range shall be within the range and tolerances;

b) the temperature differential U_{sd} of a snap-acting or a modulating on-off thermostat shall be within the range;

c) the modulation band of thermostats shall be within the range.

The temperature range and its tolerances, the temperature differential and the modulation band are stated in the operating instructions.

7.105.2 Test for operating characteristic of the thermostat

The test shall be carried out using air at an inlet pressure of 2 kPa (20 mbar). The thermostat shall be connected in the test equipment as indicated in Figure 1. The accuracy of measurement shall be less than 2 %.

With the closure member(s) in the open position, the pressure difference is adjusted to 250 Pa (2,5 mbar) by actuating valve no. 8 for flow rate control. There shall be no further modification to this adjustment during the tests described in this clause. The flow rate is then compared to the rated flow rate.

With the thermostat closure member of the modulating thermostat closed, the bypass, if provided, is adjusted to 20 % of the maximum flow rate, or to a different value if declared by the manufacturer, and it shall not be readjusted during the test.

As shown in Figure 2, curves of thermostat flow rate versus temperature are plotted at both the minimum and maximum temperature set-points, first with falling temperature and then with rising temperature. The curve will also be plotted for the calibration temperature set-point if it is different from the minimum or maximum. In this case the setting is obtained by turning as indicated in 7.101.2.

For each temperature set-point, the flow rate is given as a percentage of the maximum flow rate measured at that set-point (i.e. the maximum flow rate may be higher at higher temperature set-points).

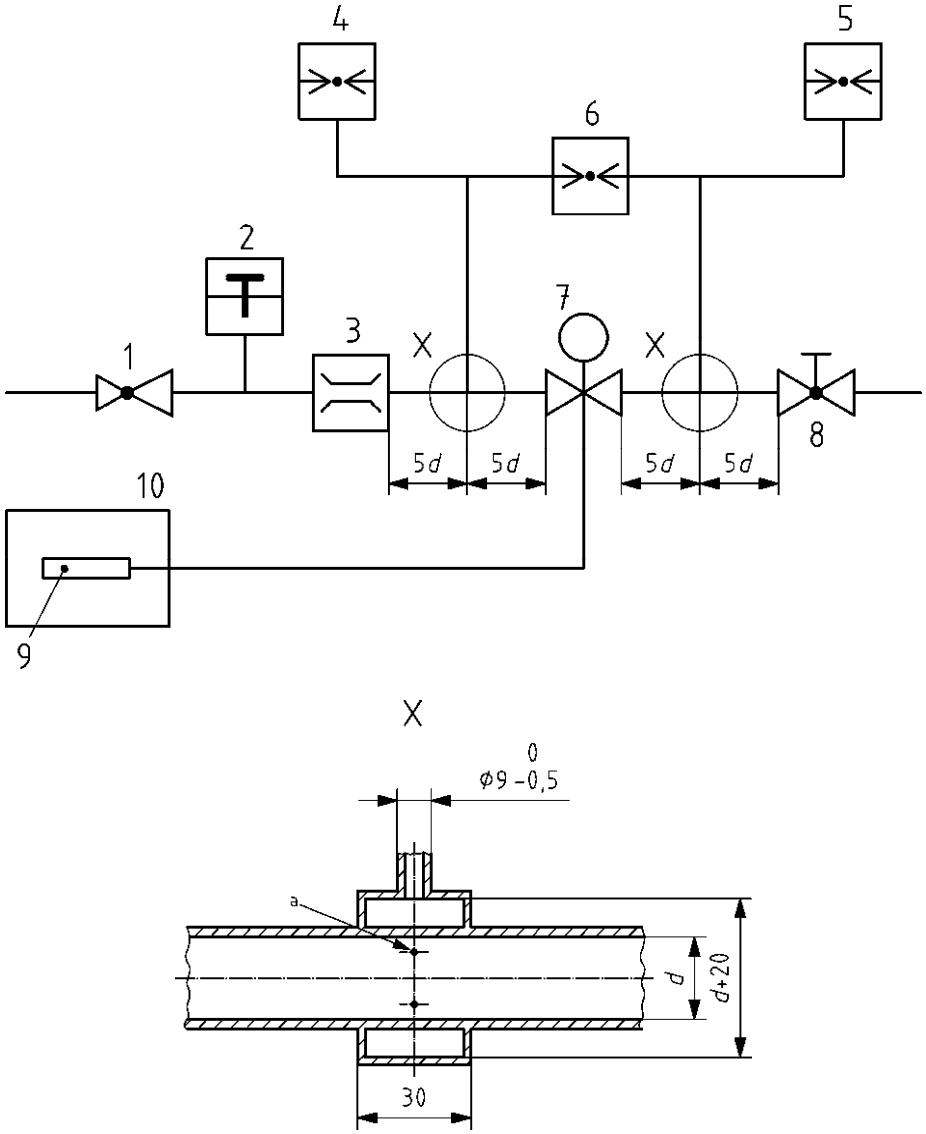
In the modulating band or temperature differential the sensor temperature is changed at a maximum rate of 1 °C/min.

To determine the modulating band, a straight line is drawn through the two points on the curve corresponding to the 75 % and 25 % of the rated flow rate, and shall extend from the bypass flow rate A up to the rated flow rate B, see Figures 2 a) and 2 c).

The modulating band X_p is the temperature difference between A and B, see Figures 2 a) and 2 c).

The temperature differential U_{sd} for a snap-acting thermostat is shown in Figure 2 b).

Dimensions in millimetres



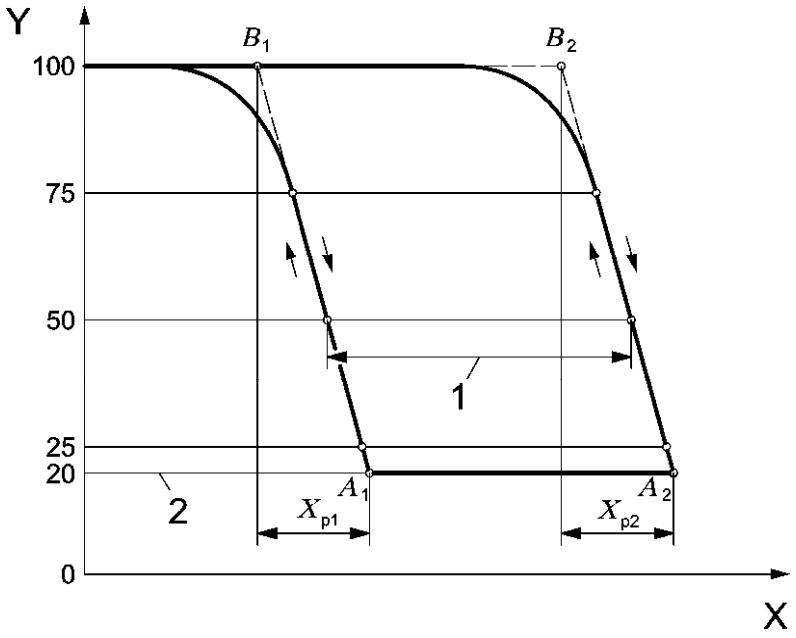
Key

1 adjustable regulator for inlet pressure
2 thermometer
3 flow meter
4 inlet pressure gauge
5 outlet pressure gauge
6 differential pressure gauge
7 control under test
8 manual control tap
9 temperature sensor
10 temperature controlled chamber

a 4 holes à 1,5 mm

Nominal size (DN)	**Internal diameter** (mm)
6	6
8	9
10	13
15	16
20	22
25	28
32	35
40	41
50	52

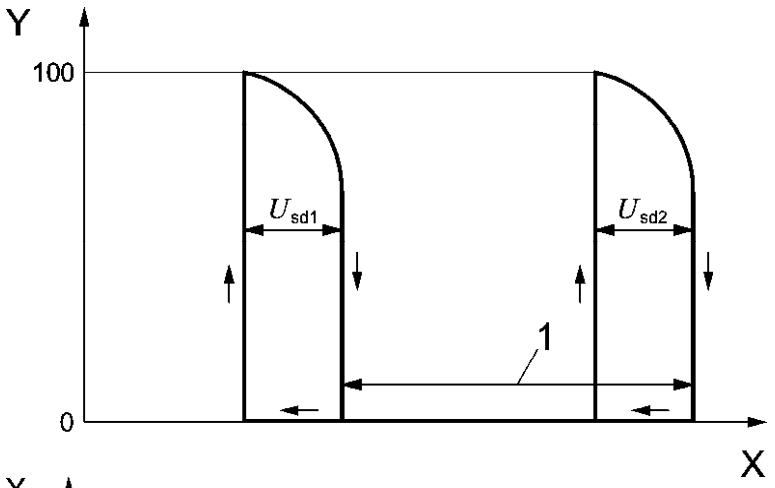
Figure 1 — Thermostat test apparatus



a) Modulating thermostat

Key

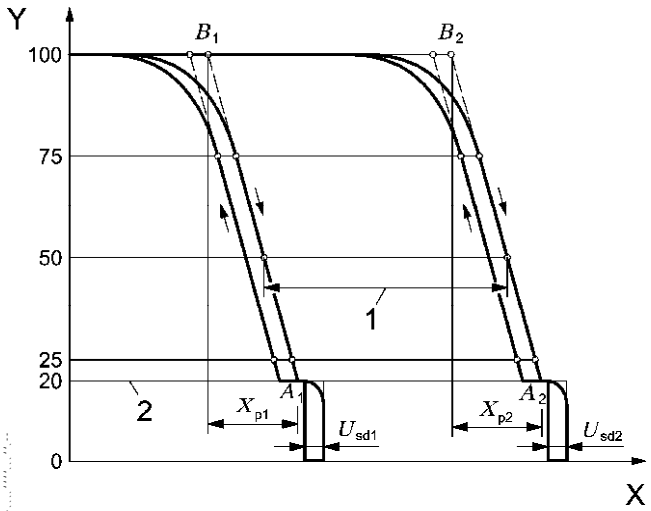
X	sensor temperature in °C
Y	rated flow rate in %
1	temperature range in °C
2	by-pass flow rate in %
X_{p1}, X_{p2}	modulating band in °C



b) Snap-acting thermostat

Key

X	sensor temperature in °C
Y	rated flow rate in %
1	temperature range in °C
U_{sd1}, U_{sd2}	temperature differential in °C



c) Modulating on-off thermostat

Key

X	sensor temperature in °C
Y	rated flow rate in %
1	temperature range in °C
2	by-pass flow rate in %
U_{sd1}, U_{sd2}	temperature differential in °C
X_{p1}, X_{p2}	modulating band in °C

Figure 2 — Typical operating characteristics of a thermostat over a range of temperature set-point adjustments

7.106 Ambient temperature range of the body

7.106.1 Requirement

The variation of the calibration temperature set-point due to temperature variation at the body of the thermostat shall not exceed the maximum value as stated in the operating instructions.

7.106.2 Test for ambient temperature range of the body

After the test in 7.101.2, the body of the thermostat is placed in a thermostatically controlled oven at (60 ± 2) °C, or at the maximum temperature as stated in the operating instructions, whichever is higher.

Any change of calibration is measured in accordance with 7.101.2, when thermal equilibrium has been reached.

7.107 Effect of storage and transport temperatures

7.107.1 Requirement

The thermostat shall withstand an ambient temperature range of –15 °C to +60 °C and stay within drift tolerances as stated in the operating instructions. The ambient temperature range for space heating and refrigeration thermostats shall be –15 °C to +50 °C.

7.107.2 Test for effect of storage and transport temperatures

The thermostat, including capillary and sensor, is maintained at (–15 ± 2) °C for 2 h and then at either (60 ± 2) °C for 2 h or, for space heating and refrigeration thermostats, (50 ± 2) °C for 2 h.

After returning to ambient temperature, any change of calibration is measured according to 7.101.2.

7.108 Thermal overload of the temperature sensor

7.108.1 Requirement

The temperature sensor shall withstand an overload temperature equal to its maximum operating temperature plus 15 % of the temperature range or 25 °C, whichever is greater, and the thermostat shall stay within the drift tolerances as stated in the operating instructions.

The exceptions are as given in Table 3.

Table 3 — Exceptions for thermal overload

Application	***Sensor overload temperature***	
Water heating	110 °C	or greater if stated in the operating instructions
Independent space heating and refrigerators	50 °C	

7.108.2 Test for thermal overload of the temperature sensor

During the test the thermostat is adjusted to the maximum temperature set-point. The temperature sensor is placed for 1 h at the maximum overload temperature given in 7.108.1, with the body of the thermostat at room temperature.

Any change of calibration is measured according to 7.101.2.

7.109 Operating torque of the thermostat set-point adjuster

7.109.1 Requirement

The torque required to turn the adjusting knob (or spindle) from and to the closed position shall not be greater than 0,5 N·m.

7.109.2 Test for operating torque of the thermostat set-point adjuster

The operating torque is measured with an appropriate torque meter, having an accuracy of ± 10 % and at an operating speed of 1,5 rad/s.

The operating torque is measured at a sensor temperature which allows opening and closing of the thermostat valve(s). Each test consists of five measurements of torque. The maximum recorded torque value is used.

7.110 Endurance

7.110.1 Requirement

The performance of the thermostat shall be satisfactory after the mechanical and thermal cycling tests specified in 7.110.2 (see Table 1 for test sequence).

7.110.2 Endurance test

7.110.2.1 Mechanical cycling test

Each mechanical cycle consists of a movement of the setting means over its complete travel, and a return to its starting point. The rate of cycling is approximately 10 per min.

The testing apparatus shall allow the setting means to operate smoothly and without interfering with the normal operation of the thermostat and will apply a torque not greater than 0,5 N·m.

Throughout the cycle the spindle is held in the unlatched position, so that the latch-pin is not in contact with its guide.

The total number of cycles, N, is that given in Table 4 according to the declared application, or as stated in the operating instructions, if greater than the value given in Table 4.

The thermostat shall be first cycled with the body at the declared maximum temperature for $N/2$ cycles, then with the body at a temperature of (20 ± 5) °C for $N/2$ cycles.

Throughout the test the sensor shall be held at a temperature approximately equal to two-thirds of the temperature range above the minimum setting.

No additional lubrication or adjustment is permitted during the test.

Table 4 — Number of mechanical cycles

Number of cycles N		
Type of thermostat	**Thermostats for hotplates and instantaneous water heaters**	**All other thermostats**
No tap fitted	5 000	1 000
Integral tap operated by set-point adjuster	30 000	5 000

7.110.2.2 Thermal cycling test

Each thermal cycle consists of changing the temperature of the sensor to either side of T_s and returning to its starting temperature.

The adjusting knob is set to the temperature corresponding to T_s, where T_s is calculated as follows:

$$T_s = T_u + 2/3 \cdot (T_o - T_u)$$

where

T_o is the maximum temperature set-point;

T_u is the minimum temperature set-point.

The test is made with air flowing through the thermostat, and at a pressure of 2 kPa (20 mbar).

The body shall be maintained at (60 ± 2) °C or at a higher temperature as stated in the operating instructions.

A total of 10 000 cycles shall be completed.

The temperature change shall be chosen in such a way that:

— in the case of a modulating thermostat the whole of the proportional band is used;

— for snap-action thermostats the differential is used;

— for combined modulating/snap-action the proportional band plus the differential is used.

8 EMC/Electrical requirements

8.1 Protection against environmental influences

EN 13611:2007, 8.1 is not applicable.

8.2 Supply voltage variations below 85 % of rated voltage

EN 13611:2007, 8.2 is not applicable.

8.3 Short term voltage interruptions and decreases

EN 13611:2007, 8.3 is not applicable.

8.4 Supply frequency variations

EN 13611:2007, 8.4 is not applicable.

8.5 Surge immunity test

EN 13611:2007, 8.5 is not applicable.

8.6 Electrical fast transient/burst

EN 13611:2007, 8.6 is not applicable.

8.7 Immunity to conducted disturbances

EN 13611:2007, 8.7 is not applicable.

8.8 Immunity to radiated fields

EN 13611:2007, 8.8 is not applicable.

8.9 Electrostatic discharge immunity test

EN 13611:2007, 8.9 is not applicable.

8.10 Power frequency magnetic field immunity test

EN 13611:2007, 8.10 is not applicable.

8.11 Electrical requirements

Shall be according to EN 13611:2007, 8.11.

9 Marking, installation and operating instructions

9.1 Marking

EN 13611:2007, 9.1 is replaced by the following:

The following information, at least, shall be durably marked on the thermostat in a clearly visible position:

a) manufacturer and/or his identification symbol;

b) type reference;

c) maximum inlet pressure in Pa or kPa (mbar or bar) (7.104);

d) ambient temperature range;

e) group 1 (if applicable);

f) direction of gas flow (by a cast or embossed arrow);

NOTE f) is not necessary if the thermostat is constructed and intended for only one type of gas appliance and if incorrect installation is impossible.

g) date of manufacture (at least year) — may be in code.

9.2 Installation and operating instructions

EN 13611:2007, 9.2 is replaced by the following:

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

a) type reference;

b) number of mechanical cycles (7.110.2.1);

c) group 1 (if applicable);

d) rated flow rate;

e) ambient temperature range;

f) mounting position(s);

g) inlet pressure range in Pa or kPa (mbar or bar);

h) gas connection(s);

i) gas families for which the thermostat is suitable;

j) the thermal overload temperature and the related thermostat drift tolerance (7.108);

k) conversion to other gas families;

l) temperature set point adjustment range (6.4.102);

m) tolerance on calibration temperature setpoint (7.101);

n) the temperature range and its tolerances, the temperature differential and the modulation band (7.105);

o) minimum flow (6.4.101);

p) bypass flow rate, or bypass flow rate change (7.6);

q) the thermostat drift tolerance (7.107);

r) the calibration temperature set point (7.101, 7.106);

s) notice for installer to consider e.g. conditions for up-stream pressure (overpressure at the inlet in case of failure of upstream components), dirt, corrosion products.

9.3 Warning notice

Shall be according to EN 13611:2007, 9.3.

Annex A
(informative)

Gas connections in common use in the various countries

Shall be according to EN 13611:2007, Annex A.

Annex B
(informative)

Leak-tightness test — volumetric method

Shall be according to EN 13611:2007, Annex B.

Annex C
(informative)

Leak-tightness test — pressure loss method

Shall be according to EN 13611:2007, Annex C.

Annex D
(normative)

Conversion of pressure loss into leakage rate

Shall be according to EN 13611:2007, Annex D.

Annex E
(normative)

Electrical/electronic component fault modes

Shall be according to EN 13611:2007, Annex E.

Annex F
(normative)

Additional requirements for safety accessories and pressure accessories as defined in EU Directive 97/23/EC

EN 13611:2007, Annex F is not applicable.

Annex G
(normative)

Materials for pressurized parts

EN 13611:2007, Annex G is not applicable.

Annex H
(informative)

Additional materials for pressurized parts

EN 13611:2007, Annex H is not applicable.

Annex I
(normative)

Requirements for controls used in DC supplied gas burners and gas burning appliances

EN 13611:2007, Annex I is not applicable.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2009/142/EC relating to appliances burning gaseous fuels

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of confirming to Essential Requirements of the New Approach Directive 2009/142/EC relating to appliances burning gaseous fuels.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 2009/142/EC relating to appliances burning gaseous fuels

N/A = Not applicable

Essential requirement (ERs) of Directive 2009/142/EC		Clause(s)/sub-clause(s) of this European Standard
1	**GENERAL CONDITIONS**	
1.1	Safety of operation	1, 6, 7
1.2	Instructions	9.2, 9.3
1.2.1	Installation instructions	9.2
1.2.2	User instructions	9.2
1.2.3	Warning notices	9.3
1.3	Correct operation	7, 9.2
2	**MATERIALS**	
2.1, 2.2	Suitability for safety and intended purpose	6.2, 6.3
3	**DESIGN AND CONSTRUCTION**	
3.1	**General**	
3.1.1	Mechanical stability	6.1, 6.2, 6.3, 6.4
3.1.2	Condensation	N/A
3.1.3	Risk of explosion	7.2, 7.3
3.1.4	Water penetration	N/A
3.1.5	Normal fluctuation of auxiliary energy	N/A
3.1.6	Abnormal fluctuation of auxiliary energy	N/A
3.1.7	Hazards of electrical origin	N/A
3.1.8	Pressurized parts	6.1

Table ZA.1 *(continued)*

Essential requirement		Clauses of this European Standard
3.1.9	Failure of safety, controlling and regulating devices	6.4, 7.101, 7.102, 7.103, 7.104, 7.105, 7.106, 7.108, 7.109
3.1.10	Safety/adjustment	6.4, 7.101, 7.102, 7.103, 7.104, 7.105, 7.106, 7.108, 7.109
3.1.11	Protection of parts set by the manufacturer	6.2
3.1.12	Controlling and setting devices	6.2, 6.4, 7.101, 7.102, 7.103, 7.104, 7.105, 7.106, 7.108, 7.109
3.2	**Unburned gas release**	
3.2.1	Gas leakage	6.2.3, 6.2.4, 6.3.2, 6.3.3, 7.2, 7.3
3.2.2, 3.2.3	Gas accumulation	N/A
3.3	**Ignition**	**N/A**
3.4	**Combustion**	**N/A**
3.5	**Rational use of energy**	**N/A**
3.6	**Temperatures**	7.1
3.7	**Foodstuffs and water used for sanitary purposes**	**N/A**

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Bibliography

Shall be according to EN 13611:2007, Bibliography.

This page deliberately left blank

British Standards Institution (BSI)

BSI is the independent national body responsible for preparing British Standards and other standards-related publications, information and services.
It presents the UK view on standards in Europe and at the international level.

It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover.

Tel: +44 (0)20 8996 9001 Fax: +44 (0)20 8996 7001

BSI offers Members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Tel: +44 (0)20 8996 7669 Fax: +44 (0)20 8996 7001
Email: plus@bsigroup.com

Buying standards

You may buy PDF and hard copy versions of standards directly using a credit card from the BSI Shop on the website **www.bsigroup.com/shop.** In addition all orders for BSI, international and foreign standards publications can be addressed to BSI Customer Services.

Tel: +44 (0)20 8996 9001 Fax: +44 (0)20 8996 7001
Email: orders@bsigroup.com

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Knowledge Centre.

Tel: +44 (0)20 8996 7004 Fax: +44 (0)20 8996 7005
Email: knowledgecentre@bsigroup.com

Various BSI electronic information services are also available which give details on all its products and services.

Tel: +44 (0)20 8996 7111 Fax: +44 (0)20 8996 7048
Email: info@bsigroup.com

BSI Subscribing Members are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration.

Tel: +44 (0)20 8996 7002 Fax: +44 (0)20 8996 7001
Email: membership@bsigroup.com

Information regarding online access to British Standards via British Standards Online can be found at **www.bsigroup.com/BSOL**

Further information about BSI is available on the BSI website at **www.bsigroup.com/standards**

Copyright

Tel: +44 (0)20 8996 7070
Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Tel +44 (0)20 8996 9001
Fax +44 (0)20 8996 7001
www.bsigroup.com/standards

raising standards worldwide™