

Multifunctional controls for gas burning appliances

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- Association of Control Manufacturers [TACMA (BEAMA Ltd.)]
- British Combustion Equipment Manufacturers' Association
- British Gas plc
- Department of Trade and Industry (Consumer Safety Unit, CA Division)
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- Health and Safety Executive
- LP Gas Association
- Society of British Gas Industries

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National foreword

This British Standard was prepared by Technical Committee GSE/22, Safety and control devices for gas governors and gas burning appliances, and is the English language version of EN 126:1995 *Multifunctional controls for gas burning appliances* published by the European Committee for Standardization (CEN).

It replaces BS 6067:1981 which is withdrawn.

EN 126 was produced as a result of international discussion in which the UK took an active part.

Cross-references

Publication referred to	Corresponding British Standard
EN 88:1991	BS EN 88:1991 <i>Pressure governors for gas appliances for inlet pressures up to 200 mbar</i>
EN 125:1991	BS EN 125:1991 <i>Specification for flame supervision devices for gas burning appliances — Thermo-electric types</i>
EN 161:1991	BS EN 161:1991 <i>Automatic shut-off valves for gas burners and gas appliances</i>
EN 257:1992	BS EN 257:1992 <i>Mechanical thermostats for gas-burning appliances</i>
EN 298:1994	BS EN 298:1994 <i>Automatic burner control systems for gas burners and gas burning appliances with or without fans</i>
EN 60335-1:1988	BS 3456 <i>Specification for household and similar electrical appliances</i> Part 201:1990 <i>General requirements</i>
EN 60529:1991	BS EN 60529:1991 <i>Specification for degrees of protection provided by enclosures (IP Code)</i>
EN 60730-1:1992	BS EN 60730 <i>Specification for automatic electrical controls for household and similar use</i> Part 1:1992 <i>General requirements</i>
ISO 7-1:1982	BS 21:1985 <i>Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads (metric dimensions)</i>
ISO 65:1982	BS 1387:1985 <i>Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or for screwing to BS 21 pipe threads</i>
ISO 228-1:1982	BS 2779:1986 <i>Specification for pipe threads for tubes and fittings where pressure-tight joints are not made on the threads (metric dimensions)</i>
ISO 262:1973	BS 3643 <i>ISO metric screw threads</i> Part 1:1981 <i>Principles and basic data</i>
ISO 1817:1985	BS 903 <i>Physical testing of rubber</i> Part A16:1987 <i>Determination of the effect on liquids</i>

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 44, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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English version

Multifunctional controls for gas burning appliances

Robinetterie multifonctionnelle pour les
appareils utilisant les combustibles gazeux

Mehrfachstellgeräte für Gasgeräte

This European Standard was approved by CEN on 1994-08-11. 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 Central Secretariat or to any CEN member.

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CEN

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Europäisches Komitee für Normung

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Foreword

This European Standard was prepared by Technical Committee CEN/TC 58, Safety and control devices for gas-burning appliances, the Secretariat of which is held by British Standards Institution (BSI).

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

The methods of test given in this standard are intended for product type testing. Tests intended for production testing are not specifically included.

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 August 1995, and conflicting national standards shall be withdrawn at the latest by December 1995.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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Introduction

This standard is drawn up by taking the relevant clauses of the existing European Standards EN 88, EN 125, EN 161 and EN 257. The construction and performance requirements are as far as applicable in total conformity with these above mentioned European Standards. Since a multifunctional control is a combination of at least two functions, the aspects of their combination are the new items of this standard. If in future important aspects are changed in one of the above mentioned ENs, the necessity shall be considered to change EN 126 at the same time.

1 Scope

This European Standard specifies the safety, constructional and performance requirements for multifunctional controls for gas burners and gas appliances, hereafter referred to as multifunctional controls. It also gives the test procedures for evaluating these requirements and information necessary to the purchaser and the user.

It applies to multifunctional controls of nominal inlet connection size up to and including DN 50 with a declared maximum working pressure up to and including 200 mbar for use on burners or in appliances for use with one or more fuel gases of the 1st, 2nd or 3rd families.

It applies to multifunctional controls with two or more of the following functions, one of which is a shut-off function.

These functions may be:

- automatic shut-off;
- flame supervision;
- governor;
- manually operated tap;
- mechanical thermostat;
- gas pressure switch.

Multifunctional controls complying with this standard may also include additional features (e.g. igniters, timers).

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 88:1991, *Pressure governors for gas appliances for inlet pressures up to 200 mbar.*

EN 125:1991, *Flame supervision devices for gas burning appliances — Thermoelectric flame supervision devices.*

EN 161:1991, *Automatic shut-off valves for gas burners and gas appliances.*

EN 257:1992, *Mechanical thermostats for gas burning appliances.*

EN 60335-1:1988, *Safety of household and similar electrical appliances*

A5:1989 — *Part-1: General requirements.*

(IEC 335-1:1983 modified)

EN 60529:1991, *Classification of degrees of protection provided by enclosures (IP Code).*

EN 60730-1:1991, *Automatic electrical controls for household and similar use — Part 1: General requirements.*

CEE Rec. 6:1974, *Snap-on connectors.*

ISO 7-1:1982, *Pipe threads where pressure tight joints are made on the threads —*

Part 1: Designation, dimensions and tolerances.

ISO 65:1981, *Carbon steel tubes suitable for screwing in accordance with ISO 7-1.*

ISO 228-1:1982, *Pipe threads where pressure-tight joints are not made on the threads —*

Part 1: Designation, dimensions and tolerances.

ISO 262:1973, *ISO general purpose metric screw threads — Selected sizes for screws, bolts and nuts.*

ISO 274:1975, *Copper tubes of circular section — Dimensions.*

ISO 301:1981, *Zinc alloy ingots intended for casting.*

ISO 1817:1985, *Rubber, vulcanized — Determination of the effect of liquids.*

ISO 7005, *Metallic flanges.*

IEC 998-2-1:1990, *Connecting devices for low voltage circuits for household and similar purposes — Part 2-1: Particular requirements for connecting devices as separate entities with screw-type clamping units.*

IEC 998-2-2:1991, *Connecting devices for low voltage circuits for household and similar purposes — Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units.*

3 Definitions

For the purposes of this standard the following definitions apply.

3.1

multifunctional control

a device having two or more functions, one of which is a shut-off function, integrated within one housing, whereby the functional parts can not operate if separated

3.2 valves

3.2.1

automatic shut-off valve

a valve designed to open when energized and to close automatically when de-energized (See EN 161.)

3.2.2

closure member

the movable part of the valve which shuts off the gas flow

3.3

actuating mechanism

that part which actuates the closure member

3.4 energy and force

3.4.1

actuating energy

the energy necessary for the actuating mechanism to move the closure member to the open position. It is supplied from an external source (electric, pneumatic, hydraulic) and may be converted within the valve

3.4.2

opening force

the force required to move the closure member to the open position

3.4.3

closing force

the force available to close the valve independent of any force provided by fuel gas pressure

3.4.4

sealing force

the force acting on the valve seat when the closure member is in the closed position, independent of any force provided by fuel gas pressure

3.4.5

frictional force

the largest force which, with the closure spring removed, is necessary for the displacement of the actuating mechanism together with the closure member from the open to the closed position, independent of any force provided by fuel gas pressure

3.4.6

auxiliary energy

the external energy for the multifunctional control (e.g. electric, pneumatic or hydraulic auxiliary energy) other than that provided by the thermocouple

3.5 component parts

3.5.1

breather hole

an orifice that allows atmospheric pressure to be maintained in a compartment of variable volume

3.5.2

governor diaphragm

the flexible member which, under the influence of the forces arising from loading and pressure, operates the valve

3.5.3

diaphragm plate

a stiffening plate fitted to the diaphragm

3.5.4

thermocouple

a thermo-electric flame sensing element that responds to the temperature of the supervised flame, and in which the flame generates an electromotive force (emf)

3.5.5

flame supervision device

a device which, in response to a sensed flame by the flame sensor, maintains the gas supply to the main burner or the main burner and the pilot burner and which shuts off the gas supply to the main burner at least, after extinction of the supervised flame (For thermo-electric flame supervision devices see EN 125.)

3.5.6

ignition interlock

mechanism which prevents the operation of the igniter as long as the main gasway is open

3.5.7**re-start interlock**

mechanism which prevents the manual re-opening of the gasway to the main burner or to the main burner and the pilot burner during the closing time of the flame supervision device

3.6 leak-tightness**3.6.1****external leak-tightness**

the leak-tightness of a gas-carrying compartment with respect to the atmosphere

3.6.2**internal leak-tightness**

the leak-tightness of the closure member (in the closed position) sealing a gas-carrying compartment with respect to another compartment or to the outlet of the multifunctional control

3.7 pressures**3.7.1****actuating pressure**

the pressure, either hydraulic or pneumatic, supplied to the actuating mechanism of the multifunctional control

3.7.2**pressure difference**

the difference between the inlet and outlet pressures

3.7.3**test pressure**

the pressure to be applied during a test

3.7.4**pressure drop**

the pressure difference with the valve open to its fullest extent

3.7.5 governor pressures**3.7.5.1****maximum inlet pressure ($p_{1\max}$)**

the maximum inlet pressure declared by the manufacturer

3.7.5.2**minimum inlet pressure ($p_{1\max}$)**

the minimum inlet pressure declared by the manufacturer

3.7.5.3**inlet pressure range**

the range of inlet pressure between the maximum and minimum values

3.7.5.4**maximum outlet pressure ($p_{2\max}$)**

the maximum outlet pressure declared by the manufacturer

3.7.5.5**minimum outlet pressure ($p_{2\max}$)**

the minimum outlet pressure declared by the manufacturer

3.7.5.6**outlet pressure range**

the range of outlet pressure between the maximum and minimum values

3.7.5.7**setting point**

this refers to the inlet and outlet pressures declared by the manufacturer, to which the governor is initially adjusted for test purposes (see 7.7.4 and 8.7.4) at a declared flow rate. The respective pressures and flow rate are termed “inlet setting pressure”, “outlet setting pressure” and “setting flow rate”

3.7.5.8**inlet setting pressure**

see 3.7.5.7

3.7.5.9**outlet setting pressure**

see 3.7.5.7

3.8**rated flow rate**

the air flow rate at a given pressure difference, declared by the manufacturer, corrected to standard conditions

3.9 governors

(see EN 88)

3.9.1**governor**

a device which maintains the outlet pressure constant independent of the variations in inlet pressure and/or flow rate, within defined limits

3.9.2**adjustable governor**

a governor provided with means for changing the outlet pressure setting

3.10 governor flow rates**3.10.1****flow rate**

the volume of the medium flowing through the governor in unit time

3.10.2**maximum flow rate ($q_{\max}$)**

a maximum rate, as a function of inlet and outlet pressures, declared by the manufacturer and expressed in m³/h of air at standard conditions. For a non-adjustable governor there is only one flow rate

3.10.3**minimum flow rate ($q_{\min}$)**

a minimum rate, as a function of inlet and outlet pressures, declared by the manufacturer and expressed in m³/h of air at standard conditions. For a non-adjustable governor there is only one flow rate

3.10.4**flow rate range**

the range of flow rate between the maximum and minimum values

3.10.5**setting flow rate**

see 3.7.5.7

3.11 times**3.11.1****opening time**

the time interval between the instant the electrical control signal to open the valve is given and the achievement of the maximum or other defined flow rate

3.11.2**closing time**

the time interval between the instant the electrical control signal is removed and the achievement of the closed position

3.11.3**delay time**

the time interval between the instant the electrical control signal to open the valve is given and the start of flow through the valve

3.12**mounting position**

a position declared by the manufacturer for mounting the multifunctional control

3.13**de-energized position**

the position of the valve or valves in the absence of the thermo-electrical energy or auxiliary energy (if applicable)

3.14**pilot valve**

a valve which controls the fluid (e.g. compressed air) supplied to the actuating mechanism

3.15 temperature**3.15.1****maximum ambient temperature**

the highest temperature of the surrounding air declared by the manufacturer at which the multifunctional control may be operated

3.15.2**minimum ambient temperature**

the lowest temperature of the surrounding air declared by the manufacturer at which the multifunctional control may be operated

3.16**rated voltage**

the voltage declared by the manufacturer at which the multifunctional control may be operated

3.17**standard conditions**

the standard conditions for air and gas are 15 °C, 1 013 mbar, dry

3.18 thermostats**3.18.1****mechanical thermostat**

thermostat which controls the temperature by adjusting the gas flow according to the temperature of the sensor without any external energy, such that the temperature remains within defined limits (see EN 257)

3.18.2 types of mechanical thermostat**3.18.2.1****adjustable thermostat**

thermostat in which the temperature set point can be adjusted by the user between minimum and maximum values

3.18.2.2**fixed setting thermostat**

thermostat with a pre-set fixed operating temperature which cannot be adjusted by the user

3.18.2.3**snap-acting thermostat**

thermostat with only two positions for the flow rate, i.e. "On — Off", "Full on — Reduced rate" or "Reduced rate — Off"

3.18.2.4**modulating thermostat**

thermostat which controls the flow rate in accordance with a predetermined and continuous function of the temperature of the temperature sensor

3.18.2.5**modulating thermostat with additional on-off action**

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

3.19 pre-setting devices**3.19.1****pre-setting device**

device for adjusting an operating condition by an authorized person only. It may be fixed or variable, e.g. when the gas flow is adjustable, either an orifice or an adjusting screw may be used

3.19.2**fixed by-pass**

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

3.19.3**by-pass adjusting device**

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

3.20**temperature sensor**

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

3.21**operating curve**

graphical representation of the gas flow as a function of the sensor temperature at a given temperature set-point and at a constant inlet pressure

3.22**backlash**

difference in the positions of the adjusting knob when it is moved in both directions to obtain the same gas flow at a constant sensor temperature

3.23**maximum cycling frequency**

number of working cycles in unit time as declared by the manufacturer which shall not be exceeded during operation

3.24**temperature set-point**

any value selected within the temperature range at which the controlled temperature is maintained

3.25**calibration flow rate**

gas flow rate declared by the manufacturer for calibration

3.26**calibration temperature set-point**

temperature at which the calibration gas flow is obtained with the adjustment of the thermostat set to the position and in the direction declared by the manufacturer

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

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

3.28**deviation**

maximum deviation from the temperature set-point which is declared by the manufacturer

3.29**drift**

permanent change in the operating curve of the thermostat

4 Classification**4.1 Classes of automatic shut-off valve**

Class A, B and C valves:

Valves where the sealing force is not decreased by the gas inlet pressure are graded class A, B or C according to their sealing force (see 7.7.6.6).

Class D valves:

Valves which are not subject to any sealing force requirement.

Class E valves:

Valves where the sealing force is decreased by the gas inlet pressure and which meet the requirements of 7.7.6.7.

4.2 Number of operations for flame supervision devices

Flame supervision devices are classified according to the number of operations that may be expected during the life of the appliance in three groups:

- 5 000 operations;
- 10 000 operations;
- 40 000 operations.

4.3 Groups of device

A multifunctional control is classified as group 1 or group 2 according to the bending stresses which it is required to withstand (see Table 3).

Group 1 device: A multifunctional control intended for use in an appliance and/or installation where it is not subjected to bending stresses imposed by installation pipework, e.g. by the use of rigid adjacent supports.

Group 2 device: A multifunctional control for use in any situation, either internal or external to the appliance, typically without support.

NOTE A multifunctional control which conforms with the requirements for group 2 conforms also with the requirements for group 1.

4.4 Classes of governor

A governor is classified as class A, class B or class C. (See 7.7.4 Table 9.)

4.5 Classification according to protection against electric shock

For this classification, see the definitions of EN 60730-1:1991, 2.7 and 6.8.

4.6 Classification according to the electrical supply

For this classification see EN 60730-1:1991, 6.1.

4.7 Classification according to the degree of protection provided by the electrical enclosure

For this classification see EN 60529:1991.

4.8 Classification according to the means of electrical connection

For this classification see EN 60730-1:1991, 6.6.

4.9 Classification according to the proof tracking index (PTI) of the insulating material

For this classification see EN 60730-1:1991, 6.13.

5 Measuring units

5.1 All dimensions are given in millimetres.

5.2 All pressures are static pressures above atmospheric pressure and are expressed in millibars or bars.

5.3 Bending moments and torques are given in Newton metres (N · m).

6 Construction requirements

6.1 General

6.1.1 The multifunctional control shall be designed, manufactured, and assembled so that its various functions operate correctly when installed and used according to the manufacturer's instructions.

6.1.2 The multifunctional control shall be free from sharp edges and corners which might cause damage, injury or incorrect operation.

The multifunctional control shall be designed such that access to internal parts requires the use of tools.

6.1.3 Holes for screws, pins, etc., which are used for the assembly of parts of the multifunctional control or for mounting, shall not penetrate gasways from the atmosphere.

The wall thickness between these holes and gasways shall be at least 1 mm.

6.1.4 Holes necessary in manufacture which connect gasways to the atmosphere but which do not affect the function of the multifunctional control shall be permanently sealed by metallic means.

NOTE Suitable jointing compounds may additionally be used.

6.1.5 Closure parts, including those of measuring and test points, which may be dismantled for servicing, adjustment or conversion, shall be constructed such that leak-tightness in accordance with 7.3 is achieved by mechanical means (e.g. metal to metal joints, O-rings). This excludes all jointing compounds such as liquids, pastes and tapes. Leak-tightness shall also be maintained after dismantling and reassembling.

Jointing compounds, however, may be used for permanent assemblies and shall remain effective under normal operating conditions.

6.1.6 Parts which require dismantling, (e.g. for servicing), shall be capable of being dismantled and reassembled with common commercial tools and shall be so constructed or marked, that following the instructions of the manufacturer, incorrect assembly is impossible.

Screwed fastenings which may be removed during servicing shall have metric threads according to ISO 262:1973.

Self-tapping screws that cut a thread and produce swarf shall not be used for connecting gas-carrying parts or parts which may be removed in servicing. Self-tapping screws which form a thread and do not produce swarf may be used. They shall permit replacement by metric machine screws conforming to the above mentioned ISO standard.

6.1.7 The function of moving parts, (e.g. diaphragms, bellows), shall not be impaired by other parts.

6.1.8 Soldering or other processes where the jointing material has a melting point below 450 °C after application shall not be used for joining gas-carrying parts except for additional sealing.

6.1.9 Sealing caps of adjusters, if used, shall only be capable of removal and replacement with standard tools and shall be capable of being sealed e.g. by lacquer. A sealing cap shall not hinder adjustment within the whole range declared by the manufacturer.

6.1.10 Pressure test nipples

Pressure test nipples, where fitted, shall have an external diameter of $(9_{-0,5}^0)$ mm and a useful length of at least 10 mm for connection to tubing. The equivalent diameter of the bore shall be not greater than 1 mm.

6.1.11 Auxiliary canals and orifices

Blockage of auxiliary canals and orifices shall not lead to an unsafe situation otherwise they shall be protected against blockage by suitable means.

6.1.12 Strainers

Where an inlet strainer is fitted to a multifunctional control the maximum strainer hole dimension shall not exceed 1,5 mm and it shall prevent the passage of a 1 mm diameter pin gauge.

Where an inlet strainer is not fitted to a multifunctional control the installation instructions shall include relevant information concerning the use of at least a strainer complying with the above requirements and its installation position to prevent the ingress of foreign matter.

6.2 Materials

6.2.1 General material requirements

The quality of materials, the dimensions used and the method of assembling the various parts shall be such that construction and performance characteristics are safe. Performance characteristics shall not alter significantly during a reasonable life when installed and used according to the manufacturer's instructions. Under these circumstances, all components shall withstand any mechanical, chemical, and thermal conditions to which they may be subjected during service.

6.2.2 Zinc alloys

Zinc alloys shall only be used for gas-carrying parts if of quality ZnAl₄ to ISO 301:1981 and if the parts will not be exposed to a temperature higher than 80 °C. For the main inlet and outlet threaded connections only external threads conforming to ISO 228-1:1982 are permitted if these connections are made of zinc alloy.

6.2.3 Housing

6.2.3.1 Parts of the housing which separate a gas-carrying compartment from the atmosphere shall be manufactured only of metallic materials.

This also applies to parts of the housing separated by a diaphragm from the gas-carrying compartment.

Nevertheless, a gas-carrying compartment may be made of non-metallic material provided that upon removal or fracture of this non-metallic part under all circumstances not more than 30 dm³/h of air can escape at the maximum working pressure. The test shall be carried out in accordance with 8.3.2.2.

This requirement is not intended to cover O-rings, gaskets and seals, including the static part of diaphragms.

6.2.3.2 Breather holes in parts of the housing which indirectly separate a gas-carrying compartment from atmosphere shall be so designed that, when the associated diaphragm is damaged, either;

- a) the flow of air through the hole shall not exceed 70 dm³/h at the maximum working pressure; or
- b) they shall have a connection for a suitable vent pipe, in which case the installation and operation instructions shall state that the breather shall be vented to a safe place.

For maximum working pressures up to 30 mbar, requirement a) shall be deemed to be met with a breather hole of diameter not greater than 0,7 mm.

If compliance with a) is by the use of a leakage rate limiter, it shall be able to withstand three times the maximum working pressure. If a safety diaphragm is used as a leakage rate limiter it shall not take the place of the working diaphragm in case of a fault.

The test shall be carried out in accordance with 8.3.2.3.

Breather holes shall be protected against blockage or shall be located so that they do not easily become blocked. They shall be so arranged that the diaphragm cannot be damaged by any cleaning instrument inserted through the breather hole.

6.2.4 Closure members

Closure members of class A, B, C and E valves of connection size larger than DN 25 shall either have a mechanical support (e.g. metallic) to withstand the sealing force or shall be made of metal.

This requirement also applies to valves of any connection size with a maximum working pressure higher than 150 mbar.

This requirement also applies to parts transmitting the closing force.

Closure members of class D valves do not have to meet this requirement.