BS EN 1319:2009

# Domestic gas-fired forced convection air heaters for space heating, with fan-assisted burners not exceeding a net heat input of 70 kW

ICS 97.100.20



BSI
British Standards

# National foreword

This British Standard is the UK implementation of EN 1319:2009. It supersedes BS EN 1319:1999 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GSE/20/4, Air heaters (gas).

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.

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EUROPEAN STANDARD

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# EN 1319

December 2009

ICS 97.100.20

Supersedes EN 1319:1998

English Version

# Domestic gas-fired forced convection air heaters for space heating, with fan-assisted burners not exceeding a net heat input of 70 kW

Générateurs d'air chaud à convection forcée utilisant les combustibles gazeux pour le chauffage de locaux à usage d'habitation, comportant des brûleurs avec ventilateur de débit calorifique inférieur ou égal à 70 kW (sur pouvoir calorifique inférieur)

Warmlufterzeuger mit erzwungener Konvektion zum Beheizen von Räumen für den häuslichen Gebrauch, mit gebläseunterstützten Gasbrennern mit einer Nennwärmebelastung gleich oder kleiner als 70 kW

This European Standard was approved by CEN on 1 November 2009.

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# Contents

Page

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## Foreword

This document (EN 1319:2009) has been prepared by Technical Committee CEN/TC 180 “Domestic and non-domestic gas-fired air heaters and non-domestic gas-fired overhead radiant heaters”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by June 2010, and conflicting national standards shall be withdrawn at the latest by June 2010.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 supersedes EN 1319:1998.

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 EC Directive(s).

For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document.

This revision modifies EN 1319:1998. It has been prepared to incorporate requirements for combustion products evacuation ducts, POCEDs, supplied as an integral part of the system to support the EU Directive 89/106/EEC on construction products under mandate M105. To this end it extends the scope of the standard to cover type $B_4$ and $B_5$ appliances.

Furthermore, the opportunity presented by this revision has been taken to update the standard in respect to EN 437:2003.

NOTE For countries requesting special categories (specified in EN 437), the absence of specific information concerning A.4.3 and A.4.4 implies that the general requirements described in the body of the standard (see 5.1.1, 5.2.2, 5.2.3 and 5.2.5) also apply to these special categories.

Other European Standards covering gas-fired air heaters are:

EN 525, *Non-domestic direct gas-fired forced convection air heaters for space heating not exceeding a net heat input of 300 kW*

EN 621, *Non-domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 300 kW, without a fan to assist transportation of combustion air and/or combustion products*

EN 778, *Domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 70 kW, without a fan to assist transportation of combustion air and/or combustion products*

EN 1020, *Non-domestic forced convection gas-fired air heaters for space heating not exceeding a net heat input of 300 kW incorporating a fan to assist transportation of combustion air or combustion products*

EN 1196, *Domestic and non-domestic gas-fired air heaters — Supplementary requirements for condensing air heaters*

EN 12669, *Direct gas-fired hot air blowers for use in greenhouses and supplementary non-domestic space heating*




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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, 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 the United Kingdom.




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## 1 Scope

This European Standard specifies the requirements and test methods for the safety and efficiency of domestic gas-fired air heaters with a fan to assist the transportation of combustion air and/or combustion products, hereafter referred to as appliances.

This European Standard applies to Type $B_{12}$, $B_{12AS}$, $B_{12BS}$, $B_{13}$, $B_{13AS}$, $B_{13BS}$, $B_{14}$, $B_{14AS}$, $B_{14BS}$, $B_{22}$, $B_{23}$, $B_{42}$, $B_{42AS}$, $B_{42BS}$, $B_{43}$, $B_{43AS}$, $B_{43BS}$, $B_{44}$, $B_{44AS}$, $B_{44BS}$, $B_{52}$, $B_{53}$, $C_{12}$, $C_{13}$, $C_{32}$, $C_{33}$, $C_{62}$ and $C_{63}$ appliances with an input not exceeding 70 kW (net cv basis), intended primarily for use in single unit residential dwellings. Provision of the heated air may be by means of ducting.

This standard does not apply to:

a) appliances of the condensing type;

b) appliances for outdoor installation;

c) dual purpose air conditioning appliances (heating and cooling);

d) appliances where the air is heated by an intermediate fluid;

e) appliances with forced draught package burners or fully premixed burners;

f) appliances fitted with a manual means of adjusting the combustion air supply or the evacuation of the combustion products;

g) portable or transportable forced convection appliances;

h) appliances having multiple heating units with a single draught diverter;

i) appliances fitted with more than one flue outlet;

j) Type $C_{22}$, $C_{23}$, $C_{42}$, $C_{43}$, $C_{52}$ and $C_{53}$ appliances;

k) appliances that are designed for continuous condensation within the flue system under normal operating conditions;

l) appliances having combustion products evacuation ducts, POCEDs, that are non-metallic.

This standard is applicable to appliances which are intended to be type tested. It also includes requirements concerning the evaluation of conformity, including factory production control, but these requirements only apply to POCEDs and their associated terminals.

## 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 88-1:2007, *Pressure regulators and associated safety devices for gas appliances — Part 1: Pressure regulators for inlet pressures up to and including 500 mbar*

EN 125:1991, *Flame supervision devices for gas burning appliances — Thermo-electric flame supervision devices*

EN 126:2004, *Multifunctional controls for gas burning appliances*




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EN 161:2007, *Automatic shut-off valves for gas burners and gas appliances*

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

EN 298:2003, *Automatic gas burner control systems for gas burners and gas burning appliances with or without fans*

EN 437:2003, *Test gases — Test pressures — Appliance categories*

EN 1859:2000, *Chimneys— Metal chimneys — Test methods*

EN 10226-1:2004, *Pipe threads where pressure tight joints are made on the threads — Part 1: Taper external threads and parallel internal threads — Dimensions, tolerances and designation*

EN 10226-2:2005, *Pipe threads where pressure tight joints are made on the threads — Part 2: Taper external threads and taper internal threads — Dimensions, tolerances and designation*

EN 12067-1:1998, *Gas/air ratio controls for gas burners and gas burning appliances — Part 1: Pneumatic types*

EN 60335-1:2002, *Household and similar electrical appliances — Safety — Part 1: General requirements (IEC 60335-1:2001, modified)*

EN 60335-2-102:2006, *Household and similar electrical appliances — Safety — Part 2-102: Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections (IEC 60335-2-102:2004, modified)*

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

EN 60584-1:1995*, Thermocouples — Part 1: Reference tables (IEC 60584-1:1995)*

EN 60584-2:1993*, Thermocouples; part 2: Tolerances (IEC 60584-2:1982 + A1:1989)*

EN 60730-2-1:1997, *Automatic electrical controls for household and similar use — Part 2: Particular requirements for electrical controls for electrical household appliances (IEC 60730-2-1:1989, modified)*

EN 60730-2-9:2002, *Automatic electrical controls for household and similar use — Part 2-9: Particular requirements for temperature sensing controls (IEC 60730-2-9:2000, modified)*

EN ISO 228-1:2003, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1:2000)*

EN ISO 1182:2002, *Reaction to fire tests for building products — Non-combustibility test (ISO 1182:2002)*

ISO 7005-1:1992, *Metallic flanges — Part 1: Steel flanges*

ISO 7005-2:1988, *Metallic flanges — Part 2: Cast iron flanges*

ISO 7005-3:1988, *Metallic flanges — Part 3: Copper alloy and composite flanges*

CR 1404, *Determination of emissions from appliances burning gaseous fuels during type testing*




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# 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

## 3.1 Appliance and its constituent parts

**3.1.1**
**domestic air heater**
appliance designed for the heating by means of warm air and possibly ventilation of a single unit residential dwelling

**3.1.2**
**forced convection air heater**
appliance designed to provide space heating from a central source by distributing heated air, by means of an air moving device, either through ducting or directly into the heated space

**3.1.3**
**gas inlet connection**
part of the appliance intended to be connected to the gas supply

**3.1.4**
**mechanical joint**
mechanical means of obtaining soundness
means of ensuring the soundness of an assembly of several (generally metallic) parts without the use of liquids (e.g. pastes and tapes)

EXAMPLES Metal to metal joints; conical joints; toroidal sealing rings (“O” rings); flat joints.

**3.1.5**
**gas circuit**
part of the appliance that conveys or contains the gas between the appliance gas inlet connection and the burner(s)

**3.1.6**
**restrictor**
device with an orifice, which is placed in the gas circuit so as to create a pressure drop and thus reduce the gas pressure at the burner to a predetermined value for a given supply pressure and rate

**3.1.7**
**gas rate adjuster**
component allowing an authorized person to set the gas rate of the burner to a predetermined value according to the supply conditions

NOTE 1 Adjustment may be progressive (screw adjuster) or in discrete steps (by changing restrictors).

NOTE 2 The adjusting screw of an adjustable regulator is regarded as a gas rate adjuster.

NOTE 3 The action of adjusting this device is called "adjusting the gas rate".

NOTE 4 A factory sealed gas rate adjuster is considered to be non-existent.




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**3.1.8**
**setting an adjuster**
immobilizing of an adjuster (by some means such as e.g. a screw) after the manufacturer or installer has adjusted it setting an adjuster

**3.1.9**
**sealing an adjuster**
setting of an adjuster using a material such that any attempt to change the adjustment breaks the sealing material and makes the interference with the adjuster apparent

NOTE 1 The adjuster is then said to be "sealed" in its adjustment position.

NOTE 2 A factory sealed adjuster is considered to be non-existent.

NOTE 3 A regulator is considered to be non-existent if it has been factory sealed in a position such that it is not operational in the range of supply pressures corresponding to the appliance category.

**3.1.10**
**putting an adjuster or a control out of service**
putting an adjuster or a control (e.g of temperature, pressure) out of action and sealing it in this position

NOTE The appliance then functions as if the adjuster or control had been removed.

**3.1.11**
**injector**
component that admits the gas into a burner

**3.1.12**
**main burner**
burner that is intended to assure the thermal function of the appliance

**3.1.13**
**ignition device**
any means (e.g flame, electrical ignition device or other device) used to ignite the gas at the ignition burner or at the main burner

NOTE This device can operate intermittently or permanently.

**3.1.14**
**ignition burner**
burner whose flame is intended to ignite another burner

**3.1.15**
**permanent ignition burner**
ignition burner that operates continuously throughout the whole period that the appliance is in use

**3.1.16**
**intermittent ignition burner**
ignition burner that is ignited before and extinguished at the same time as the main burner

**3.1.17**
**alternating ignition burner**
ignition burner that is extinguished as soon as ignition of the main burner is effected, and that re-ignites at the main burner flame just before the latter goes out

**3.1.18**
**interrupted ignition burner**
ignition burner that operates only during the ignition sequence




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**3.1.19**
**aeration adjuster**
device enabling the air to be set at the desired value according to the supply conditions

NOTE The action of adjusting this device is called "adjusting the aeration".

**3.1.20 combustion products circuit**

**3.1.20.1**
**combustion chamber**
enclosure inside which combustion of the air-gas mixture takes place

**3.1.20.2**
**flue outlet**
part of a Type B appliance that connects with a flue to evacuate the products of combustion

**3.1.20.3**
**draught diverter**
device placed in the combustion products circuit to reduce the influence of flue-pull and that of down-draught on the burner performance and combustion

**3.1.20.4**
**flue damper**
manual or automatic device placed in the combustion products circuit intended to restrict or fully close off the passageways for the evacuation of products of combustion when the appliance is not in use

**3.1.20.5**
**flue terminal**
device fitted at the end of the duct system which enables the discharge of flue gases and may, at the same time, allow entry of combustion air

**3.1.20.6**
**$C_6$ flue terminal**
terminal which is specially approved for Type $C_6$ appliances

**3.1.20.7**
**flue adaptor box**
means of adapting the appliance for connection to different duct systems (e.g. from concentric to separate ducts)

**3.1.20.8**
**POCED**
combustion products evacuation duct that is intended to be used only with a specific appliance/system, this duct being either supplied with the appliance/system or specified in the manufacturers instructions

**3.1.21**
**fully premixed burner**
pre-aerated burner system in which gas is mixed in a pre-determined and adjustable ratio with all of the air necessary for combustion

**3.1.22**
**gas/air ratio control**
device that automatically adapts the combustion air rate to the gas rate and vice versa




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## 3.2 Adjustment, control and safety devices

**3.2.1**
**range rating device**
component on the appliance intended to be used by the installer to adjust the heat input of the appliance, within a range of heat inputs stated by the manufacturer, to suit the actual heat requirements of the installation

NOTE This adjustment may be progressive (e.g. by use of a screw adjuster) or in discrete steps (e.g. by changing restrictors).

**3.2.2**
**automatic burner system**
burner system in which, when starting from the completely shut-down condition, the start-gas flame is detected and proved and the main gas valve(s) is (are) actuated without manual intervention

**3.2.3**
**automatic burner control system**
system comprising at least a programming unit and all the elements of a flame detector device

NOTE The various functions of an automatic burner control system may be in one or more housings.

[EN 298:2003]

**3.2.4**
**non-automatic burner control system**
burner system with an ignition burner which is ignited manually

**3.2.5**
**programming unit**
device which reacts to signals from control and safety devices, gives control commands, controls the start-up sequence, supervises the burner operation and causes controlled shut-down, and if necessary safety shut-down and lock-out

NOTE The programming unit follows a predetermined sequence of actions and always operates in conjunction with a flame detector device.

[EN 298:2003]

**3.2.6**
**programme**
sequence of control operations determined by the programming unit involving switching on, starting up, supervising and switching off the burner

NOTE Safety actions such as safety shut down and lock out are also part of the programme.

[EN 298:2003]

**3.2.7**
**flame detector device**
device by which the presence of a flame is detected and signalled

NOTE A flame detector device can consist of a flame sensor, an amplifier and a relay for signal transmission. These parts, with the possible exception of the actual flame sensor, may be assembled in a single housing for use in conjunction with a programming unit.

[EN 298:2003]

**3.2.8**
**flame signal**
signal given by the flame detector device, normally when the flame sensor senses a flame




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[EN 298:2003]

**3.2.9**
**flame simulation**
condition which occurs when the flame signal indicates the presence of a flame when in reality no flame is present

[EN 298:2003]

**3.2.10**
**pressure regulator[1)]**
device which maintains the outlet pressure constant independent of the variations in inlet pressure and/or flow rate within defined limits

**3.2.11**
**adjustable pressure regulator**
regulator provided with means for changing the outlet pressure setting

**3.2.12**
**flame supervision device**
device that, in response to a signal from the flame detector, keeps the gas supply open and shuts it off in the absence of the supervised flame

**3.2.13**
**automatic shut-off valve**
valve designed to open when energized and to close automatically when de-energized

**3.2.14**
**room temperature control thermostat**
device controlling the operation of the appliance (by on/off, high/low or modulating control) and enabling the room temperature to be kept automatically, within a given tolerance, at a predetermined value

**3.2.15**
**overheat cut-off device**
device that shuts off and locks out the gas supply before the appliance is damaged and/or before safety is put into question, and that requires manual intervention to restore the gas supply

**3.2.16**
**temperature limiter**
device which is intended to keep a temperature below one particular value during normal operation conditions and which may have a provision for setting by the user

**3.2.17**
**overheat limit device**
device which is intended to keep a temperature below one particular value during abnormal operation conditions and which has either no provision for setting or is provided with a maximum temperature limit stop

NOTE The overheat limit device can be of the automatic or the manual reset type.

**3.2.18**
**fan control**
control that starts and/or stops the air delivery fan when the temperature of the delivered air reaches certain predetermined values

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1) The term "regulator" is used in this case and for a volume regulator.

**3.2.19**
**temperature sensing element**
**temperature sensor**
component that detects the temperature of the environment to be supervised or controlled

**3.2.20**
**combustion product discharge safety system**
system that automatically shuts off the gas supply to the main burner, and perhaps to the ignition burner, when spillage of combustion products from the draught diverter is detected

**3.2.21**
**atmosphere sensing device**
device designed to shut off the gas supply before the concentration of combustion products of the surrounding atmosphere reaches a set value

**3.2.22**
**modulating control**
automatic control by which the heat input of the appliance can be varied in a continuous manner between the nominal heat input and a minimum value

**3.2.23**
**high/low control**
automatic control which permits an appliance to operate either at the nominal heat input or at a fixed reduced heat input

**3.2.24**
**closed position indicator switch**
switch fitted to an automatic shut-off valve which indicates when the closure member is in the closed position

**3.2.25**
**proof of closure switch**
switch fitted to an automatic shut-off valve with mechanical overtravel which indicates when the closure member is in the closed position

**3.2.26**
**valve proving system**
system to check the effective closure of automatic shut-off valves

## 3.3 Operation of the appliance

**3.3.1**
**volume flow rate**
*V*
volume of gas consumed by the appliance in unit time during continuous operation

NOTE The volume flow rate is expressed in cubic metres per hour ($m^3/h$), litres per minute (l/min), cubic decimetres per hour ($dm^3/h$) or cubic decimetres per second ($dm^3/s$).

[EN 437:2003]

**3.3.2**
**mass flow rate**
*M*
mass of gas consumed by the appliance in unit time during continuous operation

NOTE The mass flow rate is expressed in kilograms per hour (kg/h) or grams per hour (g/h).

[EN 437:2003]




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**3.3.3**
**heat input**
*Q*
quantity of energy used in unit time corresponding to the volumetric or mass flow rates, the calorific value used being the net or gross calorific value

NOTE The heat input is expressed in kilowatts (kW).

[EN 437:2003]

**3.3.4**
**nominal heat input**
$Q_n$
value of the heat input declared by the manufacturer

NOTE The nominal heat input is expressed in kilowatts (kW).

[Adapted from EN 437:2003]

**3.3.5**
**flame stability**
characteristic of flames which remain on the flame ports or in the flame reception zone intended by the construction

**3.3.6**
**flame lift**
total or partial lifting of the base of the flame away from the burner port or the flame reception zone provided by the design

NOTE Flame lift can cause the flame to blow out (i.e. extinction of the air-gas mixture).

**3.3.7**
**light-back**
entry of a flame into the body of the burner

**3.3.8**
**light-back at the injector**
ignition of the gas at the injector, either as a result of light-back into the burner or by the propagation of a flame outside the burner

**3.3.9**
**sooting**
phenomenon appearing during incomplete combustion and characterized by deposits of soot on the surfaces or parts in contact with the combustion products or with the flame

**3.3.10**
**yellow tipping**
yellowing of the tip of the blue cone of an aerated flame

**3.3.11**
**first safety time**
interval between the ignition burner gas valve, the start gas valve or main gas valve, as applicable, being energized and the ignition burner gas valve, start gas valve or main gas valve, as applicable, being de-energized if the flame detector signals the absence of a flame at the end of this interval

NOTE Where there is no second safety time, this is called the safety time.

**3.3.12**
**second safety time**
where there is a first safety time to either a ignition burner or start gas flame only, interval between the main gas valve being energized and the main gas valve being de-energized if the flame detector signals the absence of a flame

**3.3.13**
**start gas**
gas that is supplied at the start gas rate to establish the start gas flame

**3.3.14**
**start gas rate**
restricted gas flow rate admitted either to a separate ignition burner or to the main burner during the first safety time

**3.3.15**
**start gas flame**
flame established at the start gas rate either at the main burner or at a separate ignition burner

**3.3.16**
**running condition of the system**
running condition in which the burner is in normal operation under the supervision of the programming unit and its flame detector device

**3.3.17**
**controlled shut-down**
process by which the power to the gas shut-off valve(s) is removed immediately, e.g. as a result of the action of a controlling function

[EN 298:2003]

**3.3.18**
**safety shut-down**
process which is effected immediately following the response of a protection device or a fault in the automatic burner control system and puts the burner out of operation

NOTE The resulting state of the system is defined by deactivated terminals for the gas shut-off valves and the ignition device.

[EN 298:2003]

**3.3.19 Lock-out**

**3.3.19.1**
**non-volatile lock-out**
safety shut-down condition of the system, such that a restart can only be accomplished by a manual reset of the system and by no other means

[EN 298:2003]

**3.3.19.2**
**volatile lock-out**
safety shut-down condition of the system, such that a restart can only be accomplished by either the manual reset of the system or an interruption of the electrical supply and its subsequent restoration

[EN 298:2003]




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**3.3.20**
**spark restoration**
process by which, after disappearance of the flame signal, the ignition device is energized again without the gas supply having been totally interrupted

NOTE This process ends with the restoration of the running condition or, if there is no flame signal at the end of the safety time, with non-volatile lock-out.

[Adapted from EN 298:2003]

**3.3.21**
**automatic recycling**
process by which, after a safety shut-down, a full start-up sequence is automatically repeated

NOTE This process ends with the restoration of the running condition or, if there is no flame signal at the end of the safety time, or if the cause of the accidental interruption has not disappeared, with volatile or non-volatile lock-out.

**3.3.22**
**ignition opening time**
time interval between ignition of the supervised flame and the moment when the valve is held open

**3.3.23**
**extinction safety time**
time which elapses between the moment when the supervised flame is extinguished and the moment when the automatic burner control system initiates shut-down of the burner by removing power to the automatic gas shut-off valves

**3.3.24**
**purge**
mechanical introduction of air into the combustion circuit in order to displace any fuel/air mixture which could remain there

NOTE A distinction is made between:

a) pre-purge - the purge that takes place between the start command and the ignition device being energized;

b) post-purge - the purge that is carried out after burner shut-down.

## 3.4 Gases

**3.4.1**
**test gas**
gas intended for the verification of the operational characteristics of appliances using combustible gases

NOTE Test gases comprise the reference and the limit gases.

[Adapted from EN 437:2003]

**3.4.2**
**reference gas**
test gas with which appliances operate under nominal conditions when it is supplied at the corresponding normal pressure

[EN 437:2003]

**3.4.3**
**limit gas**
test gas representative of the extreme variations in the characteristics of the gases for which appliances have been designed




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[EN 437:2003]

**3.4.4**
**gas pressure**
static pressure, relative to the atmospheric pressure, measured at right angles to the direction of flow of the gas

NOTE Test pressures are expressed in millibars (mbar) or bars (bar).

**3.4.5**
**test pressure**
gas pressure used to verify the operational characteristics of appliances using combustible gases

NOTE 1 Test pressures consist of normal and limit pressures.

NOTE 2 Test pressures are expressed in millibars (mbar). 1 mbar = $10^2$ Pa. [EN 437:2003]

**3.4.6**
**normal pressure**
$p_n$
pressure under which the appliances operate in nominal conditions when they are supplied with the corresponding reference gas

[EN 437:2003]

**3.4.7**
**limit pressure**
pressure representative of the extreme variations in the appliance supply conditions

NOTE Limit pressures consist of the maximum limit pressure $p_{max}$ and the minimum limit pressure $p_{min}$.

[Adapted from EN 437:2003]

**3.4.8**
**pressure couple**
combination of two distinct gas distribution pressures applied by reason of the significant difference existing between the Wobbe indices within a single family or group in which:

— the higher pressure corresponds only to gases of low Wobbe index;

— the lower pressure corresponds to gases of high Wobbe index

[EN 437:2003]

**3.4.9**
**relative density**
*d*
ratio of the masses of equal volumes of dry gas and dry air under the same conditions of temperature and pressure

**3.4.10**
**calorific value**
quantity of heat produced by the complete combustion, at a constant pressure equal to 1 013,25 mbar, of a unit volume or mass of gas, the constituents of the combustible mixture being taken at reference conditions and the products of combustion being brought back to the same conditions

NOTE 1 A distinction is made between:

— the gross calorific value $H_s$ in which the water produced by combustion is assumed to be condensed;

— the net calorific value $H_i$ in which the water produced by combustion is assumed to be in the vapour state.

NOTE 2 The calorific value is expressed either in megajoules per cubic metre of dry gas at the reference conditions ($MJ/m^3$) or in megajoules per kilogram of dry gas (MJ/kg).

[EN 437:2003]

**3.4.11**
**Wobbe index**
**gross Wobbe index: $W_s$; net Wobbe index: $W_i$**
ratio of the calorific value of a gas per unit volume and the square root of its relative density under the same reference conditions

NOTE 1 The Wobbe index is said to be gross or net according to whether the calorific value used is the gross or net calorific value.

NOTE 2 The Wobbe index is expressed either in megajoules per cubic metre of dry gas at the reference conditions ($MJ/m^3$) or in megajoules per kilogram of dry gas (MJ/kg).

[Adapted from EN 437:2003]

## 3.5 Conditions of operation and measurement

**3.5.1**
**reference conditions**
conditions that are
— for calorific values, temperature: 15 °C;

— for gas and air volumes dry, brought to 15 °C and to an absolute pressure of 1 013,25 mbar

**3.5.2**
**cold condition**
condition of the appliance required for some tests and obtained by allowing the unlit appliance to attain thermal equilibrium at room temperature

**3.5.3**
**hot condition**
condition of the installation required for some tests and obtained by heating to thermal equilibrium at nominal heat input

**3.5.4**
**thermal equilibrium**
operating state of the system corresponding to a particular setting of the input in which the flue gas temperature does not change by more than ± 2 % (in °C) over a period of 10 min

**3.5.5**
**maximum allowable pressure drop**
maximum pressure drop in the flue system, as a result of the total resistance to flow, that is allowed for safe operation of the appliance and that is stated by the appliance manufacturer in millibars

**3.5.6**
**equivalent length**
length in case of a straight flue system with the same diameter as the appliance outlet, that results in the same pressure drop as a flue system including components such as bends, restrictions, terminal, etc.

NOTE The equivalent length is expressed in metres (m).

### 3.6 Marking of the appliance and packaging

**3.6.1**
**direct country of destination**
country for which the appliance has been certified and which is specified by the manufacturer as the intended country of destination

NOTE 1 At the time of putting the appliance on the market and/or of installation, the appliance should be capable of operating, without adjustment or modification, with one of the gases distributed in the country concerned, at the appropriate supply pressure.

NOTE 2 More than one country may be specified if the appliance, in its current state of adjustment, may be used in each of these countries.

**3.6.2**
**indirect country of destination**
country for which the appliance has been certified, but for which, in its present state of adjustment, it is not suitable

NOTE Subsequent modification or adjustment is essential in order that the appliance can be utilized safely and correctly in that country.

## 4 Classification of systems

### 4.1 Classification according to the nature of the gases used (Categories)

Gases are classified into three families, possibly divided into groups according to the value of the Wobbe index. Table 1 specifies the families and groups of gas used in this standard.

**Table 1 — Gas classification**

| Gas family | Gas Group | Gross Wobbe index ($MJ/m^3$) at 15 °C and 1 013, 25 mbar | |
|---|---|---|---|
| | | Minimum | Maximum |
| First | a | 22,4 | 24,8 |
| Second | | 39,1 | 54,7 |
| | H | 45,7 | 54,7 |
| | L | 39,1 | 44,8 |
| | E | 40,9 | 54,7 |
| Third | | 72,9 | 87,3 |
| | B/P | 72,9 | 87,3 |
| | P | 72,9 | 76,8 |
| | B | 81,8 | 87,3 |

### 4.2 Classification according to the gases capable of being used

#### 4.2.1 Category I

Appliances of Category I are designed exclusively for the use of gases of a single family or of a single group.

a) Appliances designed for use on first family gases only

**Category $I_{1a}$**: Appliances using only gases of Group a of the first family at the prescribed supply pressure. (This category is not used.)

b) Appliances designed for use on second family gases only

**Category $I_{2H}$**: Appliances using only gases of Group H of the second family at the prescribed supply pressures.

**Category $I_{2L}$**: Appliances using only gases of Group L of the second family at the prescribed supply pressures.

**Category $I_{2E}$**: Appliances using only gases of Group E of the second family at the prescribed supply pressures.

**Category $I_{2E+}$**: Appliances using only gases of Group E of the second family, and operating with a pressure couple without adjustment on the appliance. The appliance gas pressure regulating device, if it exists, is not operative in the range of the two normal pressures of the pressure couple.

c) Appliances designed for use on third family gases only

**Category $I_{3B/P}$**: Appliances capable of using the third family gases (propane and butane) at the prescribed supply pressure.

**Category $I_{3+}$**: Appliances capable of using gases of the third family (propane and butane) and operating with a pressure couple without adjustment of the appliance. However for certain types of appliance specified in the particular standards adjustment of the primary combustion air may be permitted when changing from propane to butane and vice versa. No gas pressure regulating device is permitted on the appliance.

**Category $I_{3P}$**: Appliances using only gases of Group P of the third family (propane) at the prescribed supply pressure.

#### 4.2.2 Category II

Appliances of Category II are designed for use on gases of two families.

a) Appliances designed for use on gases of the first and second families

**Category $II_{1a2H}$**: Appliances capable of using gases of Group a of the first family and gases of Group H of the second family. The first family gases are used under the same conditions as for Category $I_{1a}$. The second family gases are used under the same conditions as for Category $I_{2H}$.

b) Appliances designed for use on gases of the second and third families

**Category $II_{2H3B/P}$**: Appliances capable of using gases of Group H of the second family and gases of the third family. The second family gases are used under the same conditions as for Category $I_{2H}$. The third family gases are used under the same conditions as for category $I_{3B/P}$.

**Category $II_{2H3+}$**: Appliances capable of using gases of Group H of the second family and gases of the third family. The second family gases are used under the same conditions as for Category $I_{2H}$. The third family gases are used under the same conditions as for Category $I_{3+}$.

**Category $II_{2H3P}$**: Appliances capable of using gases of Group H of the second family and gases of Group P of the third family. The second family gases are used under the same conditions as for Category $I_{2H}$. The third family gases are used under the same conditions as for Category $I_{3P}$.

**Category $II_{2L3B/P}$**: Appliances capable of using gases of Group L of the second family and gases of the third family. The second family gases are used under the same conditions as for Category $I_{2L}$. The third family gases are used under the same conditions as for Category $I_{3B/P}$.

**Category $II_{2L3P}$**: Appliances capable of using the gases of Group L of the second family and gases of Group P of the third family. The second family gases are used under the same conditions as for Category $I_{2L}$. The third family gases are used under the same conditions as for Category $I_{3P}$.




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**Category $II_{2E3B/P}$**: Appliances capable of using gases of Group E of the second family and gases of the third family. The second family gases are used under the same conditions as for Category $I_{2E}$. The third family gases are used under the same conditions as for Category $I_{3B/P}$.

**Category $II_{2E+3+}$**: Appliances capable of using gases of Group E of the second family and gases of the third family. The second family gases are used under the same conditions as for Category $I_{2E+}$. The third family gases are used under the same conditions as for Category $I_{3+}$.

**Category $II_{2E+3P}$**: Appliances capable of using gases of Group E of the second family and gases of Group P of the third family. The second family gases are used under the same conditions as for Category $I_{2E+}$. The third family gases are used under the same conditions as for Category $I_{3P}$.

#### 4.2.3 Category III

Category III appliances are designed for use on gases of the three families.

This category is not in general use.

Category III appliances permitted in certain countries are given in A.3.

### 4.3 Classification according to the mode of evacuation of the combustion products

#### 4.3.1 General

Appliances are classified into several types according to the method of evacuation of the combustion products and admission of the combustion air.

#### 4.3.2 Type B

An appliance intended to be connected to a flue which evacuates the products of combustion to the outside of the room containing the appliance.

The combustion air is drawn directly from the room.

The variations of Type B relevant to this standard are:

**Type $B_1$**. A type B appliance incorporating a draught diverter;

**Type $B_2$**. A type B appliance without a draught diverter;

**Type $B_4$**. A type B appliance, incorporating a draught diverter, that is designed for connection via its flue duct to its flue terminal;

**Type $B_5$**. A type B appliance, without a draught diverter, that is designed for connection via its flue duct to its flue terminal.

This standard applies to:

**Type $B_{12}$.** A type $B_1$ appliance designed for a natural draught flue incorporating a fan downstream of the combustion chamber/heat exchanger and upstream of the draught diverter;

**Type $B_{12AS}$.** A type $B_{12}$ appliance with an atmosphere sensing device;

**Type $B_{12BS}$.** A type $B_{12}$ appliance with a combustion products discharge safety system;

**Type $B_{13}$.** A type $B_1$ appliance designed for a natural draught flue incorporating a fan upstream of the combustion chamber/heat exchanger;




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**Type $B_{13AS}$.** A type $B_{13}$ appliance with an atmosphere sensing device;

**Type $B_{13BS}$.** A type $B_{13}$ appliance with a combustion products discharge safety system;

**Type $B_{14}$.** A type $B_1$ appliance having an integral fan downstream of both the combustion chamber/heat exchanger and the draught diverter;

**Type $B_{14AS}$.** A type $B_{14}$ appliance with an atmosphere sensing device;

**Type $B_{14BS}$.** A type $B_{14}$ appliance with a combustion products discharge safety system;

**Type $B_{22}$.** A type $B_2$ appliance incorporating a fan downstream of the combustion chamber/heat exchanger;

**Type $B_{23}$.** A type $B_2$ appliance incorporating a fan upstream of the combustion chamber/heat exchanger;

**Type $B_{42}$.** A type $B_4$ appliance designed for a natural draught flue incorporating a fan downstream of the combustion chamber/heat exchanger and upstream of the draught diverter;

**Type $B_{43}$.** A type $B_4$ appliance designed for a natural draught flue incorporating a fan upstream of the combustion chamber/heat exchanger;

**Type $B_{44}$.** A type $B_4$ appliance having an integral fan downstream of both the combustion chamber/heat exchanger and the draught diverter;

**Type $B_{44AS}$.** A type $B_{44}$ appliance with an atmosphere sensing device;

**Type $B_{44BS}$.** A type $B_{44}$ appliance with a combustion products discharge safety system;

**Type $B_{52}$.** A type $B_5$ appliance incorporating a fan downstream of the combustion chamber/heat exchanger;

**Type $B_{53}$.** A type $B_5$ appliance incorporating a fan upstream of the combustion chamber/heat exchanger.

#### 4.3.3 Type C

An appliance in which the combustion circuit (air supply, combustion chamber, heat exchanger, evacuation of the combustion products) is sealed with respect to the room in which the appliance is installed.

The variations of Type C relevant to this standard are:

**Type $C_1$**: a type C appliance that is designed for connection via its ducts to a horizontal terminal, which at the same time admits fresh air to the burner and discharges the products of combustion to the outside through orifices that are either concentric or close enough to come under similar wind conditions;

**Type $C_3$**: a type C appliance that is designed for connection via its ducts to a vertical terminal, which at the same time admits fresh air to the burner and discharges the products of combustion to the outside through orifices that are either concentric or close enough to come under similar wind conditions;

**Type $C_6$**: A type C appliance which is intended to be connected to a separately approved and marketed system for the supply of combustion air and discharge of the combustion products.

This standard applies to:

**Type $C_{12}$**: a type $C_1$ appliance incorporating a fan downstream of the combustion chamber/heat exchanger;

**Type $C_{13}$**: a type $C_1$ appliance incorporating a fan upstream of the combustion chamber/heat exchanger;




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**Type $C_{32}$**: a type $C_3$ appliance incorporating a fan downstream of the combustion chamber/heat exchanger;

**Type $C_{33}$**: a type $C_3$ appliance incorporating a fan upstream of the combustion chamber/heat exchanger;

**Type $C_{62}$**: a type $C_6$ appliance incorporating a fan downstream of the combustion chamber/heat exchanger;

**Type $C_{63}$**: a type $C_6$ appliance incorporating a fan upstream of the combustion chamber/heat exchanger.

# 5 Construction and design requirements

## 5.1 General

### 5.1.1 Conversion to different gases

#### 5.1.1.1 General

The only acceptable operations when converting from a gas of one group or family to a gas of another group or family and/or to adapt to different gas distribution pressures are given below for each appliance category.

NOTE It is recommended that these operations should be possible without disconnecting the appliance.

#### 5.1.1.2 Category I

a) **Category $I_{2H}$, $I_{2L}$, $I_{2E}$, $I_{2E+}$**: No modification to the appliance;

b) **Category $I_{3B/P}$**: No modification to the appliance;

c) **Category $I_{3+}$**: Replacement of injectors or calibrated orifices but only in order to convert from one pressure couple to another, e.g. from 28-30 mbar/37 mbar to 50 mbar/67 mbar or vice versa;

d) **Category $I_{3P}$**: No modification to the appliance relative to a change of gas. For a change of pressure, replacement of injectors and adjustment of gas rates.

#### 5.1.1.3 Category II

##### 5.1.1.3.1 Categories of appliance designed for use with gases of the first and second families

Adjustment of the gas rate with, if necessary, a change of injector, restrictor or regulator.

Adjustment of the gas rate of the ignition burner(s), either by using an adjuster or by a change of injector or restrictor and, if necessary, a change of the complete ignition burner(s) or of some of its/their parts.

A change, if necessary, of the automatic shut-off valve(s).

Putting the regulator out of service under the conditions of 5.2.5.

Putting the gas rate adjusters out of service under the conditions of 5.2.2.2.

The adjustments or component changes are only acceptable when converting from a gas of the first family to a gas of the second family or vice versa.

#### 5.1.1.3.2 Categories of appliance designed for use with gases of the second and third families

Adjustment of the gas rate with, if necessary, a change of injector, restrictor or regulator.

Adjustment of the gas rate of the ignition burner(s), either by using an adjuster or by a change of injector or restrictor and, if necessary, a change of the complete ignition burner(s) or of some of its/their parts.

A change, if necessary, of the automatic shut-off valve(s).

Putting the regulator out of service under the conditions of 5.2.5.

Putting the gas rate adjuster(s) out of service under the conditions of 5.2.2.2.

These adjustments or component changes are only acceptable when:

a) converting from a gas of the second family to a gas of the third family or vice versa;

b) converting from one butane/propane pressure couple to another (e.g. 28-30 mbar/37 mbar to 50 mbar/67 mbar and vice versa).

#### 5.1.1.4 Category III

Category III appliances admitted in certain countries are given in A.4.2.3.

### 5.1.2 Materials and method of construction

The quality and thickness of materials used in the construction of the appliance and the method of assembling the various parts, shall be such that the constructional and performance characteristics do not alter significantly during a reasonable life under normal conditions of installation and use.

In particular, when the appliance is installed according to accepted practice, all components including its POCED in the case of type $B_4$, $B_5$, $C_1$ and $C_3$ appliances, shall withstand the mechanical, chemical and thermal conditions to which they can be subjected in the course of normal operation.

In addition, the appliance shall be designed in such a way that there is no condensation at the operating temperatures provided by the controls.

If condensation occurs at start-up, this shall not affect the operational safety. With the exception of the outlet of the flue system, any condensate formed shall not drop outside the appliance.

Copper shall not be used for gas carrying parts where its temperature is likely to exceed 100 °C.

Asbestos or materials containing asbestos shall not be used.

Hard solder containing cadmium in its formulation shall not be used. Solder that has a melting point below 450 °C after application shall not be used for gas carrying parts.

Materials downstream of the heat exchanger shall be corrosion-resistant or be effectively protected against corrosion. Zinc-coated steel materials are not allowed if they come into contact with combustion products during normal operation.

Where appropriate, materials used on the appliance shall be non-combustible in accordance with the requirements of EN ISO 1182.

### 5.1.3 Accessibility for maintenance and use

Parts that are intended to be removable for maintenance or cleaning shall be readily accessible, shall be readily capable of correct assembly and difficult to assemble incorrectly. Such parts shall be impossible to




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assemble incorrectly where incorrect assembly would create a hazardous condition or result in damage to the appliance and its controls.

It shall be possible to clean the combustion chamber and the parts in contact with combustion products in accordance with the manufacturer's instructions without using special tools unless these are supplied as necessary accessories with the appliance.

Access shall be possible to all access devices (e.g. handles and buttons) required during normal use of the appliance, without having to remove any part of the case. For this purpose, the opening of a door or access panel is permitted.

Constructional parts accessible during use and maintenance shall be free from sharp edges and corners that might cause damage or personal injury during use or maintenance.

Panels that are required to be removed for normal servicing, maintenance and cleaning, shall be fitted with means of retention, where the appliance is intended to be installed more than 1,8 m above floor level, measured from the underside of the appliance. This requirement shall be deemed to be satisfied if suitable hinges are fitted.

The products of combustion shall not be drawn into the air distribution system when user access panels are removed.

#### 5.1.4 Thermal insulation

Any thermal insulation shall retain its insulating properties under the influences of heat and ageing. The insulation shall withstand the normally expected thermal and mechanical stresses. The insulation shall be non-combustible, securely located and shall be protected against mechanical damage, condensate and vermin.

#### 5.1.5 Gas connection

The appliance gas connection shall be accessible.

The clearance around the connection, after removing the case if necessary, shall be adequate to allow the use of tools required to make the connection. It shall be possible to make all the connections without special tools.

It shall be possible to connect the appliance by rigid metallic means to the gas supply.

If the appliance has a threaded connection, this thread shall comply with EN ISO 228-1, EN 10226-1 or EN 10226-2. In the first case (EN ISO 228-1), the end of the appliance inlet connection shall be sufficiently flat to allow the use of a sealing washer.

If flanges are used, they shall comply with ISO 7005-1, ISO 7005-2 or ISO 7005-3, as appropriate, and the manufacturer shall provide the counterflanges and sealing gaskets.

The conditions of connections prevailing in the various countries are given in A.6.

#### 5.1.6 Soundness

##### 5.1.6.1 Soundness of the gas circuit

Holes (e.g. for screws and studs) intended for the assembly of components shall not open into the gasways. The wall thickness between holes (including threads) and gasways shall be not less than 1 mm.

The soundness of components and assemblies connected to the gas circuit and likely to be dismantled for routine maintenance at the consumer's premises shall be assured by means of mechanical joints (e.g. metal to metal




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joints, O-ring joints and packing) but excluding the use of any sealing compound (e.g. tape, mastic and paste). The soundness shall be maintained after dismantling and re-assembly.

Sealing compounds may be used for permanent threaded assemblies. The sealing material shall remain effective under normal conditions of system use.

#### 5.1.6.2 Soundness of the combustion circuit

Any means to achieve soundness of the combustion circuit shall be such that it does not deteriorate under normal conditions of use and maintenance.

In particular, the soundness of parts likely to be removed in the course of routine maintenance shall be achieved by mechanical means.

### 5.1.7 Supply of combustion air and evacuation of combustion products

#### 5.1.7.1 General

Appliances shall be designed so that there is an adequate supply of combustion air during ignition and over the whole range of possible heat inputs during operation.

Openings for the access of primary air shall have dimensions greater than 4 mm.

#### 5.1.7.2 Appliance combustion air supply

##### 5.1.7.2.1 Type $B_{14}$ and $B_{44}$ appliances

The cross-section of the combustion air passageways to the appliance shall not be adjustable.

##### 5.1.7.2.2 Other appliances of Type B and Type C

The adjustment of the combustion air is permitted by manual or automatic means. The method of adjusting any damper, or other combustion air controlling device, shall be clearly defined in the manufacturer's instructions for installation and adjustment.

Automatic adjustment of the combustion air to the appliance is only permitted if the appliance is fitted with an air-gas ratio control.

#### 5.1.7.3 Flue connection and parts

##### 5.1.7.3.1 General

The flue system shall be designed in accordance with the manufacturer's instructions taking into account possible penetration of rain or snow into the appliance.

In addition, a terminal guard shall be fitted in accordance with the National Regulations applicable in the various member countries.

If the appliance has a POCED (Type $B_4$, $B_5$, $C_1$ and $C_3$ appliances) that is capable of being installed in accordance with the manufacturer’s instructions such that its outlet, when fitted with any terminal supplied with the appliance, or specified in the manufacturer’s instructions, extends beyond the external surface of a building by more than 1,5 m, this duct, together with any associated air supply duct (type $C_1$ and $C_3$ appliances), shall not undergo any permanent distortion when subjected to the wind load test specified in 4.3 2 of EN 1859:2000.

#### 5.1.7.3.2 Type $B_1$ appliances

The flue outlet shall be female and shall allow, if necessary by means of an adaptor supplied with the appliance, connection to a flue pipe whose diameter complies with the standards in force where the appliance is to be installed (see Annex A). The internal diameter of the flue outlet shall be such as to ensure compliance with requirements concerning operation. It shall be possible to insert a flue pipe with an external diameter ($D$ - 2) mm to a depth of at least $D$/4 (where $D$ is the internal diameter of the flue outlet) but not so far that the evacuation of the combustion products is impaired.

#### 5.1.7.3.3 Type $B_{12}$, $B_{12AS}$, $B_{12BS}$, $B_{13}$, $B_{13AS}$, $B_{13BS}$, $B_{14}$, $B_{14AS}$ and $B_{14BS}$ appliances

Connection to the flue shall be made by means of a flue outlet preceded by a draught diverter. This is part of the appliance.

Appliances shall be constructed to prevent release of combustion products in a dangerous quantity into the installation room under abnormal draught condition (see 6.1.9 and 6.1.10). To meet this requirement, type $B_{12}$, $B_{13}$ and $B_{14}$ appliances shall be factory fitted with a suitable device; in this case the appliance is designated as a type $B_{12AS}$, $B_{12BS}$ $B_{13AS}$, $B_{13BS}$, $B_{14AS}$ or $B_{14BS}$ appliance, according to the device (see 4.3.2 for classifications).

The device shall be an integral part of the appliance and resist the thermal, chemical and mechanical effects occurring in normal use. The device shall be protected by the manufacturer against adjustment and shall be so designed that it cannot be removed without the use of a tool. It shall be difficult to fit the device incorrectly after servicing.

However, appliances intended to be installed in a place separated from living rooms and provided with appropriate ventilation directly to the outside need not carry such a device, but in this case, appropriate warnings on the packaging and in the instructions shall clearly indicate the limit on the use of this type of appliance; in this case the appliance is designated as a type $B_{12}$, $B_{13}$ or $B_{14}$ appliance.

#### 5.1.7.3.4 Additional requirements for appliances of Type $B_{14}$, $B_{14AS}$ and $B_{14BS}$

The manufacturer shall state the maximum allowable pressure drop in the flue system.

Where the appliance is intended to be fitted to a flue having a wall termination, the manufacturer shall either supply a flue terminal or state the type of termination which shall be used. The design of this shall be such that it will not allow entry of a ball of 16 mm diameter applied with a force of 5 N. The design of the flue system shall be such that any condensate formed when operating the appliance from cold shall either be retained and subsequently re-evaporated or discharged clear of the wall.

#### 5.1.7.3.5 Type $B_{22}$ and $B_{23}$ appliances

The manufacturer shall state the maximum allowable pressure drop in the flue system.

Where the appliance is intended to be fitted to a flue having a wall termination, the manufacturer shall either supply a flue terminal or state the type of termination which shall be used. The design of this shall be such that it will not allow entry of a ball of 16 mm diameter applied with a force of 5 N. The design of the flue system shall be such that any condensate formed when operating the appliance from cold shall either be retained and subsequently re-evaporated or discharged clear of the wall.

#### 5.1.7.3.6 Type $B_{42}$, $B_{42AS}$, $B_{42BS}$, $B_{43}$, $B_{43AS}$, $B_{43BS}$, $B_{44}$, $B_{44AS}$ and $B_{44BS}$ appliances

The POCED shall either be supplied with the appliance by the manufacturer or specified in the manufacturer’s instructions. The specification shall include a description of the duct including any bends, its materials of construction and any critical tolerances e.g. in length, diameter, thickness, insertion depth, etc.

The manufacturer shall state the minimum and maximum allowable pressure drop in the POCED. The manufacturer's instructions shall give details for calculating the pressure drop in the POCED, for example the allowance to be made for bends, etc.




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Appliances shall be constructed to prevent release of combustion products in a dangerous quantity into the installation room under abnormal draught condition (see 6.1.9 and 6.1.10). To meet this requirement, type $B_{42}$, $B_{43}$ and $B_{44}$ appliances shall be factory fitted with a suitable device; in this case the appliance is designated as a type $B_{42AS}$, $B_{42BS}$ $B_{43AS}$, $B_{43BS}$, $B_{44AS}$ or $B_{44BS}$ appliance, according to the device (see 4.3.2 for classifications).

The device shall be an integral part of the appliance and resist the thermal, chemical and mechanical effects occurring in normal use. The device shall be protected by the manufacturer against adjustment and shall be so designed that it cannot be removed without the use of a tool. It shall be difficult to fit the device incorrectly after servicing.

However, appliances intended to be installed in a place separated from living rooms and provided with appropriate ventilation directly to the outside need not carry such a device, but in this case, appropriate warnings on the packaging and in the instructions shall clearly indicate the limit on the use of this type of appliance; in this case the appliance is designated as a type $B_{42}$, $B_{43}$ or $B_{44}$ appliance.

#### 5.1.7.3.7 Additional requirements for appliances of Type $B_{44}$, $B_{44AS}$ and $B_{44BS}$

Where the appliance is intended to be fitted to a flue having a wall termination, the manufacturer shall either supply a flue terminal or state the type of termination which shall be used. The design of this shall be such that it will not allow entry of a ball of 16 mm diameter applied with a force of 5 N. The design of the flue system shall be such that any condensate formed when operating the appliance from cold shall either be retained and subsequently re-evaporated or discharged clear of the wall.

#### 5.1.7.3.8 Type $B_{52}$ and $B_{53}$ appliances

The POCED shall either be supplied with the appliance by the manufacturer or specified in the manufacturer's instructions. The specification shall include a description of the duct including any bends, its materials of construction and any critical tolerances e.g. in length, diameter, thickness, insertion depth, etc.

The manufacturer shall state the minimum and maximum pressure drop in the POCED. The manufacturer's instructions shall give details for calculating the pressure drop in the POCED, for example the allowance to be made for bends, etc.

Where the appliance is intended to be fitted to a flue having a wall termination, the manufacturer shall either supply a flue terminal or state the type of termination which shall be used. The design of this shall be such that it will not allow entry of a ball of 16 mm diameter applied with a force of 5 N. The design of the flue system shall be such that any condensate formed when operating the appliance from cold shall either be retained and subsequently re-evaporated or discharged clear of the wall.

#### 5.1.7.3.9 Type $C_{12}$, $C_{13}$, $C_{32}$ and $C_{33}$ appliances

The terminal shall be supplied by the appliance manufacturer and any necessary combustion air and combustion products ducts shall be described in the installation instructions.

The manufacturer shall state the minimum and maximum lengths of ducts which can be used.

An opening in a terminal for $C_1$ appliances shall not permit the entry of a ball of 16 mm diameter, and for $C_3$ appliances 35 mm diameter, when applied with a force of 5 N.

If the terminal performance is dependent on a chamber within the wall, a chamber lining shall be provided with the appliance.

If the appliance is fitted with separate combustion air inlet and combustion products ducts, the centres of these ducts shall be in a distance of not more than 50 cm at their termination point.

The design of the flue system shall be such that any condensate formed when operating the appliance from cold shall either be retained and subsequently re-evaporated or discharged.




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#### 5.1.7.3.10 Type $C_{62}$ and $C_{63}$ appliances

The manufacturer shall state that the appliance shall only be installed with a (combined combustion air and combustion products discharge) terminal approved for use with type $C_6$ appliances.

NOTE Requirements and test methods for terminals for use with type $C_6$ appliances are given in Annex C.

In addition, the manufacturer shall state the increase of the pressure difference measured between the inlet and the outlet of the appliance equivalent to the maximum allowable resistance and the equivalent length of the combustion air supply and combustion products evacuation duct system.

### 5.1.8 Supply and distribution of air for space heating

#### 5.1.8.1 Air inlets

Where the air inlet is intended to be ducted to the appliance, the appliance shall be provided with flanges, spigots or other suitable connections on the air inlet.

#### 5.1.8.2 Air outlets

Ducted appliances shall be capable of being located positively with respect to the outlet ductwork.

### 5.1.9 Checking the state of operation

The installer shall be able to observe visually the ignition and correct operation of the burner(s) and also the flame(s) of the ignition burner, if any. A door may be opened or a case removed provided that the operation of the burner is not disturbed.

If the means of observation is a viewing port, it shall, when located in an area of high temperature, be covered with a suitable material, for example heat resistant toughened glass and, if necessary, sealed with a suitable heat resistant sealant.

However, when the main burner is fitted with its own flame detector, an indirect means of identification (e.g. an indicator light) is allowed. The means of indicating presence of flame shall not be used to indicate any other fault, except for a fault in the operation of the means of checking the flame itself which shall result in an indication that there is no flame.

It shall be possible for the user, perhaps after opening a door or removing an access panel, to check at any time that the appliance is operating, either by visual observation of the flame or by some other indirect means.

### 5.1.10 Electrical equipment

Appliances with electrical components associated with the use of gas shall comply with the relevant clauses of EN 60335-2-102.

If the appliance is fitted with electronic components or electronic systems providing a safety function, these shall comply with the relevant requirement of EN 298 with regard to electromagnetic compatibility immunity levels.

If the manufacturer specifies the nature of the electrical protection of the appliance on the data plate, this specification shall comply with EN 60529:

— to give the degree of personal protection against contact with dangerous electrical components inside the appliance case;

— to give the degree of electrical protection, inside the appliance case, against harmful actions due to water penetration.




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#### 5.1.11 Operational safety in the event of fluctuation, interruption and restoration of the auxilliary energy

Interruption and subsequent restoration of the electricity supply at any time during the starting up or operation of the appliance shall result in:

a) continued safe operation; or

b) safety shut-down; or

c) volatile or non-volatile lock-out

NOTE Requirements and test methods relating to the continued and safe operation of the appliance in the event of normal and abnormal fluctuation of auxiliary energy are specified in 6.1.6.1 and 7.3.6.1.

Interruption and subsequent restoration of the electricity supply shall not override any "lock-out" condition except where the appliance is intended to be reset by means of switching off and on the electricity supply to the appliance.

#### 5.1.12 Motors and fans

The direction of rotation of fans shall be clearly marked.

Access to motors and fans shall not be possible without the use of commonly available tools, unless guarded. The guard shall comply with IP 20 as a minimum as defined in EN 60529:1991.

Belt drives, where used, shall be so designed or positioned as to afford protection to the operator.

Means shall be provided to facilitate adjustment of belt tension. Access to such means shall be possible only with the use of commonly available tools.

Motors and fans shall be mounted in such a way as to minimize noise and vibration.

Lubrication points, if provided, shall be readily accessible.

The combustion chamber and heat exchanger shall be positioned on the pressure side of the air delivery fan. Products of combustion shall not be drawn into the air distribution system, even when user access panels are removed.

#### 5.1.13 Air filter

An air filter shall be placed upstream of the heat exchanger in the heated air circuit.

It shall be easy to inspect and to replace the filter following the manufacturer's instructions, without requiring special tools.

### 5.2 Adjusting, control and safety devices

#### 5.2.1 General

All the following devices or the multifunctional control in which they may be fitted shall be removable or exchangeable if this is necessary for cleaning or replacement of the device. Adjusters for the devices shall not be interchangeable if this can result in confusion.

When there are several control knobs (e.g. taps and thermostats), they shall not be interchangeable if this can lead to confusion or they shall be clearly marked to identify their function.




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For ducted appliances, gas connections shall be sited externally to the air duct so as to prevent ingress of gas into the duct system.

The functioning of any safety device shall not be overruled by that of any control device.

### 5.2.2 Gas rate adjusters and range-rating devices

#### 5.2.2.1 Common requirements

Gas rate adjusters and range-rating devices shall be designed so that they are protected against accidental maladjustment by the user once the appliance has been installed and put into service. It shall be possible to seal them (e.g. with paint) after adjustment; the sealing shall resist the heat to which it is subjected during normal operation of the appliance. The adjusting screws of the gas rate adjusters and range-rating devices shall be located so that they cannot fall into the gasways.

The soundness of the gas circuit shall not be put at risk by the presence of gas rate adjusters and range-rating devices.

#### 5.2.2.2 Gas rate adjusters

Appliances in categories $I_{2H}$, $I_{2L}$, $I_{2E}$, $I_{2E+}$, $I_{3B/P}$, $I_{3P}$, $II_{2H3B/P}$, $II_{2H3+}$, $II_{2H3P}$, $II_{2L3B/P}$, $II_{2E3B/P}$, $II_{2E+3+}$ and $II_{2E+3P}$ shall not be fitted with gas rate adjusters. However, regulated appliances in all of these categories except Category $II_{2E+3+}$ may have a gas rate adjuster consisting of an adjusting screw on the gas regulator.

Appliances in Category $II_{1a2H}$ shall have a gas rate adjuster for first family gases.

For appliances in categories $II_{2H3+}$ and $II_{2E+3+}$ having a gas rate adjuster, it shall be possible to put these devices out of service when these appliances are supplied with a third family gas. This also applies to appliances in Category $II_{1a2H}$ when they are supplied with a second family gas. For appliances in Category $II_{2E+3P}$ having a gas rate adjuster, it shall be possible to put these devices out of service fully or partially (see 5.2.5) when these appliances are supplied with a second family gas.

The adjusters shall be capable of adjustment only with the use of a tool and they shall be capable of being set in the operating position.

#### 5.2.2.3 Range-rating devices

A range-rating device on an appliance is optional.

For appliances in Category $II_{1a2H}$, the gas rate adjuster and the range-rating device may be one and the same. However, if the gas rate adjuster has to be sealed, either completely or partially, when the appliance is supplied with a second family gas, the gas rate adjuster or its sealed part shall no longer be used by the installer as a range-rating device.

### 5.2.3 Aeration adjusters

Any means of adjusting the primary aeration at the burner shall be pre-set and sealed by the manufacturer to discourage unauthorized interference.

### 5.2.4 Manual controls

#### 5.2.4.1 Application

Manual valves, push buttons or electrical switches that are essential for normal operation and commissioning of the appliance shall either be provided with the appliance or, where they are not integral with the appliance, specified in the manufacturer's installation instructions.




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#### 5.2.4.2 Manual valves

Manual valves shall be of the 90° turn type. Their closing direction shall be clockwise.

Manual valves shall be so designed or positioned as to prevent inadvertent operation but shall be easy to operate when required. They shall be so designed that in operation the "OPEN" and "CLOSED" positions are readily distinguishable.

When an appliance isolating valve is provided as an integral part of the appliance, it shall be capable of operating at a pressure equal to 1,5 times the maximum supply pressure and shall be readily accessible.

Manual valves used solely for OPEN/CLOSED operation shall be provided with positive stops at the "OPEN" and "CLOSED" positions.

### 5.2.5 Regulators

Regulators shall comply with the requirements of EN 88-1.

Appliances in categories $I_{2H}$, $I_{2E}$, $I_{3B/P}$, $I_{3P}$, $II_{1a2H}$, $II_{2H3B/P}$, $II_{2H3+}$, $II_{2H3P}$, $II_{2E3B/P}$ and $II_{2E+3P}$ shall be fitted with a gas regulator. Appliances in categories $I_{2L}$ and $II_{2L3B/P}$, may be fitted with a gas regulator. In addition, appliances in categories $I_{2E+}$, and $II_{2E+3+}$ may be fitted with a gas regulator. However, the regulator, if it exists, shall not be operational in the range of the two normal pressures of the second family pressure couple, i.e. 20 mbar to 25 mbar.

For appliances in categories $II_{2H3+}$ and $II_{2E+3+}$, it shall be possible to put the regulator, if any, out of service when they are supplied with third family gases. For appliances in categories $II_{2E+3+}$ and $II_{2E+3P}$, it shall be possible to put the regulator partially out of service when they are supplied with second family gases, such that the regulator is not operational in the range of the two normal pressures of the second family pressure couple, i.e. 20 mbar to 25 mbar.

The design and accessibility of the regulator shall be such that it can be easily adjusted or put out of service for use with another gas, but precautions shall be taken to make unauthorized interference with the adjustment difficult.

A regulator is considered to be non-existent if it has been factory sealed in a position such that it is not operational in the range of supply pressure corresponding to the appliance category.

### 5.2.6 Multifunctional controls

Any multifunctional control shall comply with the requirements of EN 126. In addition, multifunctional controls shall comprise as a minimum the appropriate valving requirements of 5.2.8.1 and 5.2.8.2. For permanent ignition burner systems it shall be possible to operate directly manually the upstream automatic shut-off valve in the gas line to both the ignition and main burners.

No markings are required if incorrect operation is impossible, for example when a single button controls a flame supervision device for the burner and the ignition burner. However, where it is necessary to use markings, they shall be:

a) Off - full disc;

b) Ignition of the ignition burner (if any) - stylized star;

c) Full rate of the burner - stylized flame.

If the appliance has two distinct gas rate controls, one for the burner and one for the ignition burner, the operation of these devices shall be interlocked in such a way that it is impossible for the burner to be supplied before the ignition burner. If the burner and ignition burner are served by a single control, the position for

ignition of the latter shall have a stop or notch making this position clearly perceptible to the user. It shall be possible to carry out the unlatching operation (if any) with one hand.

A control knob that operates by turning shall turn off in a clockwise direction as seen by an observer facing the knob.

#### 5.2.7 Flame supervision devices

Heat sensitive flame supervision devices shall comply with the requirements of EN 125. Other flame supervision devices shall comply with EN 298.

#### 5.2.8 Automatic shut-off valves

##### 5.2.8.1 General requirements

Automatic shut-off valves shall comply with EN 161.

Class D valves as specified in 5.2.8.2 and 5.2.8.3 may be replaced by Class C, B or A valves, Class C valves may be replaced by Class B or A valves, and Class B valves may be replaced by Class A valves.

##### 5.2.8.2 Application

For all appliances the gas supply/supplies shall be under the control of automatic shut-off valves connected to the gas line in series as given in Figure 1 and of a capability not less than that specified in Table 2.

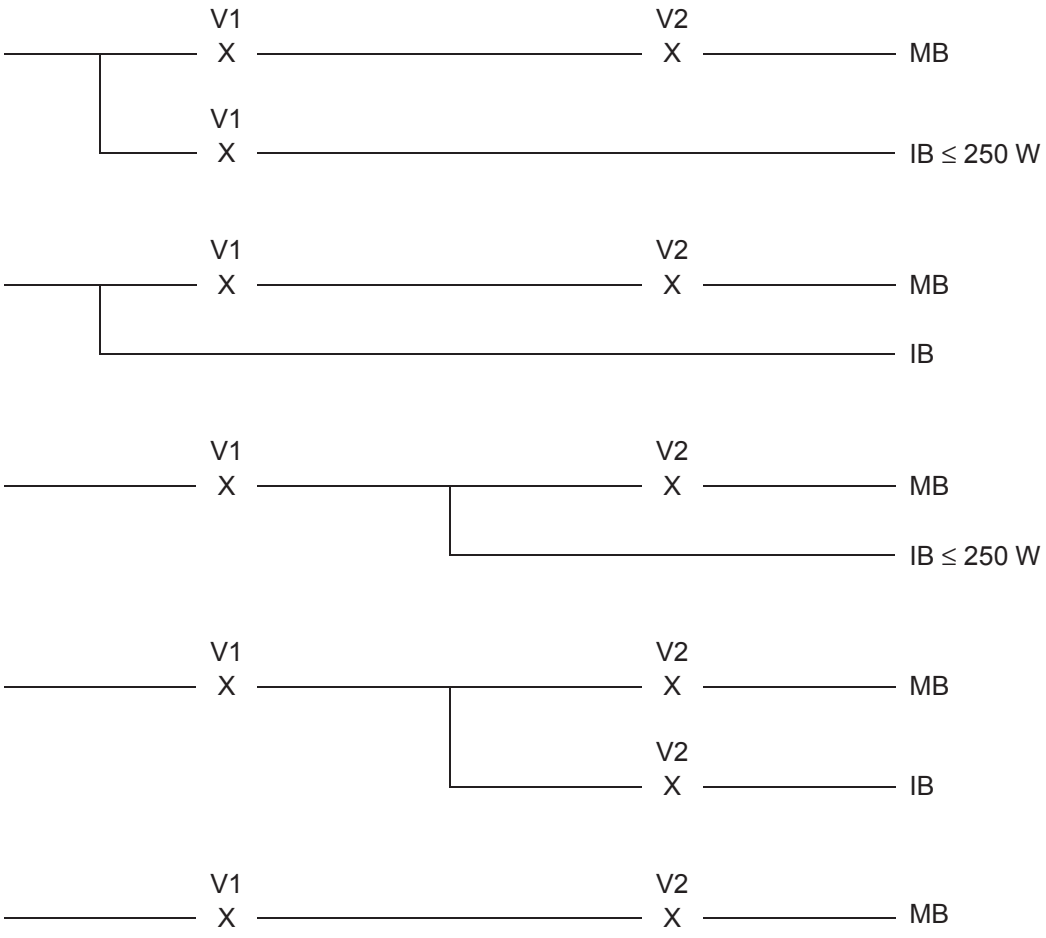
**Table 2 — Valving requirements**

| System | Valving | | Pre-purge[a] | Pre-purge[b] |
|---|---|---|---|---|
| | V1 | V2 | | |
| Permanent or alternating ignition burner | C[c] | D | NO | YES |
| Intermittent or interrupted ignition burner or direct ignition of main burner | C | D | YES | YES |
| | C | C | NO | YES |
| | B | D | NO | YES |

[a] Normal start of the appliance; i.e. preceded by controlled shut-down.

[b] Restart of the appliance; i.e. preceded by safety shut-down, lock-out or maintenance shut-down.

[c] A permanent flame supervision system (pilot) is only permitted if it acts via a reliable shut-down device (e.g. a thermo-electric shut-off valve) of the required class (EN 161).




**Key**
IB Ignition burner
MB Main burner
V1 Upstream valve
V2 Downstream

**Figure 1 — Examples of typical valve systems**

#### 5.2.8.3 Shut-down

For automatic systems, the flame supervision system and overheat cut-off device shall effect the closure of all shut-off valves.

In the case of non-automatic systems, the flame supervision system need only effect closure of valve V1 as permitted in 5.2.8.2, in which instance the room temperature control thermostat, the temperature limiter and the overheat limit device shall each effect closure of valve V2 as a minimum requirement (see Table 2).

### 5.2.9 Automatic burner control systems

#### 5.2.9.1 General

Automatic burner control systems shall comply with the requirements of EN 298.

#### 5.2.9.2 Manually operated devices

The operation of manually operated devices (e.g. push buttons and switches) incorrectly or out of sequence shall not adversely affect the safety of the automatic burner control system.

In particular, under the test conditions described in 7.2, the rapid (on and off) operation of any start switch shall not set up a hazardous condition.

### 5.2.10 Gas strainers

A strainer shall be fitted at the inlet of any system incorporating (an) automatic shut-off valve(s) to prevent the ingress of foreign matter. The strainer may be integral with the upstream automatic shut-off valve. The maximum strainer hole dimension shall comply with the requirements as laid down in EN 161 or shall not exceed 0,20 mm when a Class D valve is used.

In systems comprising multiple automatic shut-off valves, only one strainer need be fitted, provided it gives adequate protection to all valves.

Where a regulator is fitted upstream of the safety shut-off system, the strainer shall be fitted upstream of the regulator.

### 5.2.11 Transportation of combustion air and/or flue gases

#### 5.2.11.1 Type $B_{14}$ and $B_{44}$ appliances

##### 5.2.11.1.1 General

Appliances shall be fitted with a suitable device for proving adequate flow of flue gases prior to and during ignition and operation of the burner.

##### 5.2.11.1.2 Appliances with permanent ignition burners

The proving device shall be proved in the "no flow" state prior to start-up of the main burner. Failure to prove "no flow" shall prevent start-up of the main burner.

Prior to any attempt at ignition of the main burner or the opening of the main gas automatic shut-off valve(s), adequate flow of flue gases shall be proved. Failure to prove adequate flow of flue gases shall either cause a safety shut down to occur or prevent the opening of the main gas automatic shut-off valve(s).

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#### 5.2.11.1.3 Appliances fitted with automatic burner control systems

The proving device shall be proved in the "no flow" state prior to start-up. Failure to prove "no flow" shall prevent start-up or cause lock-out to occur.

Prior to any attempt at ignition of the main burner or opening of the main gas automatic shut-off valves, adequate flow of flue gases shall be proved. Failure to prove adequate flow of flue gases shall prevent start-up or cause lock-out.

Flue gas flow failure during operation of the main burner shall either cause safety shut-down or lock-out to occur.

### 5.2.11.2 All appliances except Type $B_{14}$ and $B_{44}$

#### 5.2.11.2.1 Appliances having fully pre-mixed gas/air burners under the control of a zero governor system

The appliance shall be fitted with suitable means of ensuring that there is an adequate flow of combustion air during the pre-purge (where provided), ignition and operation of the burner.

This means shall ensure that ignition and operation of the burner is only possible when there is an adequate supply of combustion air (see 6.1.6.1 d) and 6.1.6.2).

Incorrect air flow during the pre-purge period (where provided) shall either prevent start-up or cause safety shut-down or cause lock-out.

NOTE A device monitoring the rotational speed of the fan or its motor may be used for this purpose.

#### 5.2.11.2.2 Appliances other than those having fully pre-mixed gas/air burners under the control of a zero governor system

##### 5.2.11.2.2.1 General

Appliances shall be fitted with a suitable device for proving adequate flow of combustion air during the pre-purge (where applicable), ignition and over the whole range of possible heat inputs during operation.

Failure to prove adequate flow of combustion air shall either cause safety shut-down to occur or prevent the opening of the main gas valves.

##### 5.2.11.2.2.2 Appliances without pre-purge

The air proving device shall be proved in the "no flow" state prior to start-up of the main burner. Failure to prove "no flow" shall prevent start-up of the main burner or cause lock-out.

Prior to any attempt at ignition of the main burner or opening of the main burner gas automatic shut-off valves, adequate flow of combustion air shall be proved.

##### 5.2.11.2.2.3 Appliances with pre-purge

Immediately before any attempt at ignition or the opening of any gas shut-off valve, the appliance shall be purged. The pre-purge period shall be as long as to ensure five volume changes of the combustion chamber or shall be a minimum of 30 s at the combustion air rate appropriate to maximum rated heat input, or pro rata longer periods at lower air rates. The pre-purge shall be at the highest possible flow rate, but shall not be less than 25 % of the full combustion air rate.




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The air proving device shall be proved in the "no flow" state prior to start-up. Failure to prove "no flow" shall prevent start-up or cause lock-out.

During pre-purge, ignition and operation of the appliance, adequate flow of combustion air shall be proved.

#### 5.2.12 Air-gas ratio controls

Air/gas ratio controls shall be designed and constructed so that reasonably foreseeable damage does not give rise to a change capable of affecting safety. Where a pneumatic air/gas ratio control is used, this shall comply with the requirements of EN 12067-1. Control tubes shall be made of metal with suitable mechanical connections or other materials with at least equivalent properties and in this case are considered immune to breakage, accidental disconnection and leakage after soundness checks. If this requirement is met, they are not subject to the tests in 7.3.2.7.

Control tubes for air and combustion products shall have a minimum cross-sectional area of 12 $mm^2$ with a minimum internal dimension of 1 mm provided that evidence is given and precautions are taken to avoid condensation in the control tubes, the minimum cross-sectional area of air control tubes may be 5 $mm^2$. All control tubes shall be located and fixed so that any stagnation of condensate is avoided and positioned such that creasing, leakage or breakage is prevented. Where more than one control tube is used the relevant connection position for each shall be obvious.

### 5.3 Ignition devices

#### 5.3.1 General

It shall be possible to light the appliance from a readily accessible position.

Ignition burners and ignition devices shall be protected by design and position against external influences.

Ignition burners, ignition devices and their mountings shall be so designed that they can only be located rigidly and correctly in relation to every component and burner with which they are designed to operate.

#### 5.3.2 Ignition device for the main burner

The main burner shall be fitted with an ignition burner or other device for direct ignition.

#### 5.3.3 Ignition burners

If different ignition burners are used for the different gases, they shall be marked, easy to substitute for one another and easy to fit. The same applies to injectors where only they have to be changed. Injectors shall carry an indelible means of identification and shall only be removable with the aid of a tool.

Ignition burners shall be protected against blockage by gas-borne particulate matter (see 5.2.10).

### 5.4 Flame supervision system

#### 5.4.1 General

Flame supervision devices shall be designed to be fail-safe (e.g. thermoelectric type) or prevent any shut-off valve opening and/or any electric ignition, if the flame detector erroneously signals the presence of a flame when the burner is started from the completely shut-down condition.

Means shall be provided to prevent electrical interference from giving rise to flame detector signals that falsely indicate the presence of a flame.




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#### 5.4.2 Appliances with non-automatic burner systems

The burner shall be fitted with a flame supervision device to monitor the ignition burner flame and protect the main flame.

#### 5.4.3 Appliances with automatic burner systems with pre-purge

The burner shall be fitted with a flame supervision device.

The flame supervision device shall incorporate a suitable means to provide safety shut-down or lock-out if the flame detector signals flame presence at any time during pre-purge.

#### 5.4.4 Appliances with automatic burner systems without pre-purge

The burner shall be fitted with a flame supervision device.

When the burner is started from the shut-down condition, the flame supervision system shall prevent any attempt at ignition and the opening of any gas valve if a flame or flame simulating condition is present.

The design of the appliance shall be such that, during the shut-down condition, there is sufficient natural ventilation to ventilate safely any minor gas leakage.

### 5.5 Start-gas flame establishment

#### 5.5.1 Appliances without pre-purge

##### 5.5.1.1 Appliances with non-automatic burner systems

Direct ignition of the main burner is not allowed.

The gas rate of an ignition burner shall be as low as possible, consistent with satisfactory ignition and shall not exceed 0,6 kW.

The ignition opening time shall not exceed 30 s. This time is verified under the test conditions of 7.3.3. The ignition time can be raised to 60 s if no manual intervention is required.

Provision shall be made to establish the start-gas flame safely and easily, either manually or by means of an ignition device incorporated in the appliance. Where an ignition device is incorporated in the appliance, it shall also be possible to ignite the ignition burner by manual means.

Gas shall not be admitted to the main burner until the start-gas flame has been detected by the flame supervision device.

The flame supervision device, under all conditions of operation, shall detect the start-gas flame only at rates which can ignite the main gas reliably and smoothly.

##### 5.5.1.2 Appliances with automatic burner systems

###### 5.5.1.2.1 General

A start-gas flame shall be established either at a separate ignition burner or at the main burner.

The start-gas rate shall be such that when tested under the conditions of 7.3.5.2.2, the system is safe on ignition.




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The ignition source shall not be energized before a safe-start check has been made of the flame supervision system. The ignition source shall be de-energized at, or before, the end of the first safety time. If the start-gas flame has not been detected by the end of the first safety time, safety shut-down and lock-out shall result.

#### 5.5.1.2.2 Appliances featuring a separate ignition burner

The ignition burner rate shall not exceed 10 % of the main burner rate.

Where the gas rate of the ignition burner does not exceed 0,25 kW, the first safety time is not limited.

Where the gas rate of the ignition burner exceeds 0,25 kW, but does not exceed 0,6 kW, the first safety time shall not exceed 30 s.

For appliances where the start-gas rate does not exceed 0,6 kW, either safety shut-down or a single immediate attempt at re-ignition by direct spark restoration shall occur in the event of start-gas flame failure after establishment of the start-gas flame, but before the main gas automatic shut-off valves have been signalled to open.

If re-ignition is attempted and the start-gas flame is not detected within the first safety time, safety shut-down and lock-out shall result.

Where the gas rate of the ignition burner exceeds 0,6 kW, the first safety time shall not exceed 5 s. For these appliances, safety shut-down and lock-out shall occur in the event of start-gas flame failure after its establishment and before the main gas automatic shut-off valves have been signalled to open.

However, the upstream automatic shut-off valve in the main gas supply may be opened to permit gas flow where the start gas supply is taken from downstream of the first main gas automatic shut-off valve, provided that:

a) a means to prove closure of the downstream main shut-off valve prior to ignition is fitted; or

   NOTE A valve proving system, proof of closure switch or a closed position indicator switch is deemed to satisfy this requirement.

b) the requirements of 6.1.5.1.3 are met.

#### 5.5.1.2.3 Appliances where the start-gas flame is established on the main burner

The start-gas rate shall not exceed 10 % of the main burner rate, otherwise the ignition is seen as direct on the main burner.

Where the start-gas rate does not exceed 0,25 kW, the first safety time is not limited.

Where the start-gas rate exceeds 0,25 kW, but does not exceed 0,6 kW, the first safety time shall not exceed 30 s.

Where the gas rate of the ignition burner exceeds 0,6 kW, the first safety time shall not exceed 5 s. For these appliances, safety shut-down and lock-out shall occur in the event of start-gas flame failure after its establishment and before the main gas automatic shut-off valves have been signalled to open.

However, the upstream automatic shut-off valve in the main gas supply may be opened to permit gas flow where the start gas supply is taken from between the main gas automatic shut-off valves, provided that the downstream main gas automatic shut-off valve is checked for closure prior to start-up, e.g. valves fitted with closed position indicator switches. If the check indicates that the valve is not closed, start-up shall be prevented or lock-out shall occur.

Where the downstream main gas automatic shut-off valve is a two-stage valve controlling both the start-gas rate and the main gas rate, the start position of the valve shall be checked. If the check indicates that the




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downstream valve is not in the start position, start-up shall be prevented or at least volatile lock-out shall occur. In addition, any means of adjustment of the start-gas rate shall be preset and sealed by the manufacturer.

#### 5.5.1.2.4 Appliances with direct ignition of the main burner

For appliances incorporating direct ignition of the main burner, a single ignition attempt is permitted with a safety time not exceeding 5 s.

The spark shall continue until the flame has been established and detected or the safety time has elapsed.

If the main burner flame has not been established and detected by the end of the safety time, safety shut-down and lock-out shall result.

Where the downstream main gas automatic shut-off valve is a two-stage valve controlling both the start-gas rate and the main gas rate, the start position of the valve shall be checked. If the check indicates that the downstream valve is not in the start position, start-up shall be prevented or at least volatile lock-out shall occur. In addition, any means of adjustment of the start-gas rate shall be preset and sealed by the manufacturer.

### 5.5.2 Appliances with pre-purge

#### 5.5.2.1 General

Any start-gas flame shall be established either at the main burner or at a separate ignition burner.

The ignition burner or start-gas rate shall be such that when tested under the conditions of 7.3.5.2.2, the system is safe on ignition.

#### 5.5.2.2 Appliances featuring a separate ignition burner

Where the start-gas flame is established at a separate ignition burner with a gas rate exceeding 0,25 kW but not exceeding 0,6 kW, the first safety time shall not exceed 30 s.

Where the start-gas flame is established at a separate ignition burner with a gas rate not exceeding 0,25 kW, the first safety time is not limited.

If during the safety time the required flame has not been established, safety shut-down shall occur.

If after the fourth restart attempt the required flame has not been established, lock-out shall occur.

#### 5.5.2.3 Appliances where the start-gas flame is established on the main burner

The start-gas rate shall not exceed 10 % of the main burner rate, otherwise the ignition is seen as direct on the main burner.

Where the start-gas rate does not exceed 0,25 kW, the first safety time is not limited.

Where the start-gas rate exceeds 0,25 kW, but does not exceed 0,6 kW, the first safety time shall not exceed 30 s.

If during the safety time the required flame has not been established, safety shut-down shall occur.

If after the fourth restart attempt the required flame has not been established, lock-out shall occur.

#### 5.5.2.4 Appliances with direct ignition of the main burner

For appliances incorporating direct ignition of the main burner, the safety time shall not exceed 5 s.

The ignition spark (or other means of ignition) shall not be energized before the completion of the pre-purge period and shall continue until the flame has been established or the safety time has elapsed.

The start-gas valve(s) shall not be energized before the ignition spark (or other means of ignition) is energized. Where a hot surface igniter is used the ignition shall be so energized that the ignition source is capable of igniting incoming gas before the gas valve(s) are opened.

If during the safety time the required flame has not been established and detected, safety shut-down shall occur.

If after the fourth restart attempt the required flame has not been established and detected, lock-out shall occur.

Where the downstream main gas automatic shut-off valve is a two-stage valve controlling both the start-gas rate and the main gas rate, the start position of the valve shall be checked. If the check indicates that the downstream valve is not in the start position, start-up shall be prevented or at least volatile lock-out shall occur. In addition, any means of adjustment of the start-gas rate shall be preset and sealed by the manufacturer.

## 5.6 Main flame establishment

### 5.6.1 Appliances with non-automatic burner systems

Main gas shall not be admitted to the burner until the start-gas flame has been detected by the flame supervision system and manual intervention has occurred (e.g. release of a push button).

### 5.6.2 Appliances with automatic burner systems

The main gas automatic shut-off valves shall not be energized to admit the main gas flow to the burner until after the start-gas flame has been detected and proved.

The second safety time shall not exceed 5 s.

Flame failure at any time after the main gas automatic shut-off valves have been signalled to open shall lead to safety shut-down.

## 5.7 Main burner

The cross sectional area of the flame ports shall not be adjustable.

Every injector and removable restrictor shall carry an indelible means of identification. It shall be possible to change injectors and restrictors without having to move the appliance from its installed position. However, injectors shall only be removable with the aid of a tool.

The burner shall be so located and arranged that misalignment cannot occur. It shall not be possible to remove the burner assembly without the use of tools.

## 5.8 Facility for remote control

Where the appliance is capable of being controlled remotely by means of thermostats or a time control, electrical connections for these controls shall be possible without disturbing any internal connections in the appliance other than a purpose designed link.

When the appliance is installed in accordance with the manufacturer's instructions, no hazardous condition shall occur within the appliance as a result of failure of the normal means of room temperature control.




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## 5.9 Thermostats and control of air temperature

### 5.9.1 General requirements

Integral mechanical thermostats shall comply with the requirements of EN 257.

Integral electrical and electronic thermostats shall comply with the requirements of EN 60730-2-1.

Overheat cut-off devices shall comply with Type 2K requirements of EN 60730-2-9:2002.

### 5.9.2 Overheat limit device

An overheat limit device may be provided to cause shut-down of the main burner in the event of an overheat condition.

Where flame detection is achieved other than by means of a direct-acting thermoelectric device, shut-down action shall not rely on the operation of the flame detection circuits. In particular, the overheat limit device shall not be wired in series with the flame sensor.

### 5.9.3 Overheat cut-off device

An overheat cut-off device shall be provided to cause shut-down of the main burner in the event of an overheat condition. If, however, the appliance is fitted with an overheat limit device satisfying 7.3.7, test 2, the overheat cut-off device may be omitted.

### 5.9.4 Air delivery fan control

#### 5.9.4.1 Delayed start

Means may be provided to delay the operation of the air delivery fan after ignition of the burner in order to prevent the discharge of cold air into the heated space.

#### 5.9.4.2 Delayed shut-down

Means shall be provided to delay the shut-down of the air delivery fan after shut-down of the burner(s).

### 5.9.5 Sensors

Thermostats, overheat limit and overheat cut-off devices may have the same sensor if such devices are of Type 2K according to EN 60730-2-9:2002 and failure of the sensor results in safety shut-down, unless this failure is excluded by construction. Otherwise, thermostats, overheat limit and overheat cut-off devices shall have independent sensors.

## 5.10 Gas pressure test points

The appliance shall be fitted with at least two gas pressure test points. One shall be fitted upstream of the first control and safety device and the other downstream of the last gas flow rate control and in a position carefully selected so as to permit measurements to be made.

The test points shall have an external diameter of $9^{\ 0}_{-0,5}$ mm and a useful length (the straight part) of at least 10 mm to enable a tube to be fitted. At the point of its minimum cross-section, the diameter of the bore shall not exceed 1,0 mm.




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# 6 Operational requirements

## 6.1 Safety of operation

### 6.1.1 Soundness

#### 6.1.1.1 Soundness of the gas circuit

The gas circuit shall be sound. External soundness is assured if, under the conditions specified in 7.3.1.1, the air leakage rate does not exceed 100 $cm^3/h$ regardless of the number of valves fitted in series or in parallel on the appliance.

#### 6.1.1.2 Soundness of the combustion circuit and correct evacuation of combustion products

##### 6.1.1.2.1 Type $B_{12}$, $B_{13}$, $B_{42}$ and $B_{43}$ appliances

When the appliance is tested under the conditions of 7.3.1.2.1 combustion products shall not escape except from the outlet:

— of the test flue in the case of Type $B_{12}$ and $B_{13}$ appliances; or

— of the POCED in the case of Type $B_{42}$ and $B_{43}$ appliances.

##### 6.1.1.2.2 Type $B_{14}$, $B_{14AS}$, $B_{14BS}$, $B_{44}$, $B_{44AS}$ and $B_{44BS}$ appliances

When the appliance is tested under the conditions of 7.3.1.2.2 products of combustion shall not escape from the flue connection.

Moreover, at the point of shut-off, the increase in static pressure measured immediately before the flue outlet shall not be less than:

a) 0,5 mbar for an appliance connected to a vertical flue; or

b) 0,75 mbar for an appliance connected to a flue having a horizontal terminal.

##### 6.1.1.2.3 Type $B_{22}$, $B_{23}$, $B_{52}$ and $B_{53}$ appliances

When the appliance is tested under the conditions of 7.3.1.2.3 combustion products shall not escape except from the outlet:

— of the test flue in the case of Type $B_{22}$ and $B_{23}$ appliances; or

— of the POCED in the case of Type $B_{52}$ and $B_{53}$ appliances.

##### 6.1.1.2.4 Type $C_{12}$, $C_{13}$, $C_{32}$ and $C_{33}$ appliances

When the appliance is tested under the conditions of 7.3.1.2.4, the air leakage rate shall not exceed the following values:

— $(0,25\ Q_n)\ m^3/h$ for heat inputs not exceeding 16 kW;

— $4\ m^3/h$ for heat inputs above 16 kW but not exceeding 43,3 kW;

— $(0,075\ Q_n + 0,75)\ m^3/h$ for heat inputs above 43,3 kW but not exceeding 70 kW,

where $Q_n$ is the nominal heat input on net calorific value.

#### 6.1.1.2.5 Type $C_{62}$ and $C_{63}$ appliances

When the appliance is tested under the conditions of 7.3.1.2.5, the air leakage rate shall not exceed the values given in 6.1.1.2.4.

### 6.1.2 Heat inputs

#### 6.1.2.1 Nominal heat input

When measured under the conditions of 7.3.2.2, the heat input of unregulated appliances with factory sealed gas rate adjusters, obtained at the normal pressure, shall be within ± 5 % of the nominal heat input.

#### 6.1.2.2 Start gas heat input

When measured under the conditions of 7.3.2.3, the heat input of unregulated appliances with factory sealed gas rate adjusters, obtained at normal pressure, shall be within ± 5 % of the start gas heat input declared by the manufacturer.

However, this tolerance is extended to within ± 10 % where the injector has a diameter of 0,5 mm or less.

#### 6.1.2.3 Effectiveness of gas rate adjusters

For appliances without a gas regulator but with a gas rate adjuster, the rate obtained after adjustment of the device shall not:

a) be less than the nominal rate, under the conditions of Test 1 of 7.3.2.4;

b) exceed the nominal rate, under the conditions of Test 2 of 7.3.2.4.

#### 6.1.2.4 Effectiveness of the gas regulator

For appliances with an adjustable gas regulator, the rate shall not differ by more than + 7,5 % and - 10 % for first family gases, and by more than + 5 % or - 7,5 % for second and third family gases, from the rate obtained at the adjustment pressure specified in 7.3.2.5, when the upstream pressure is varied between the minimum and maximum values stated in 7.1.4 for the reference gases of the category concerned.

#### 6.1.2.5 Effectiveness of the range-rating device

For appliances fitted with a range-rating device, as distinct from a gas rate adjuster, and under the conditions specified in 7.3.2.6:

a) the nominal heat input shall be obtained to within ± 5 % of the nominal heat input stated by the manufacturer with the range-rating device in the position giving the maximum rate;

b) the minimum heat input shall be obtained to within ± 5 % of the minimum heat input stated by the manufacturer with the range-rating device in the position giving the minimum rate.

The appliance is adjusted in accordance with the installation instructions.

### 6.1.3 Flame supervision system

#### 6.1.3.1 Appliances with non-automatic burner systems

Upon flame failure, the control system shall cause lock-out.




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Where thermoelectric flame supervision devices are fitted with electric ignition, gas shall not flow to the main burner unless the ignition burner is alight when any control tap or equivalent device that is accessible to the user is turned off and then on again after 3 s.

The extinction safety time for the flame supervision system to shut down the burner shall not be more than 60 s for appliances with ignition burners protected by a thermoelectric flame supervision system.

#### 6.1.3.2 Appliances with automatic burner systems with pre-purge

The flame presence check may cease during the 5 s preceding an attempt at ignition. If a flame simulating condition lasts for 5 s or more, lock-out shall occur.

Upon flame failure during normal operation, the flame supervision device shall permit automatic restart or cause lock-out.

The time for the flame failure device to de-energize the burner automatic shut-off valves upon flame failure shall be not more than 1 s.

#### 6.1.3.3 Appliances with automatic burner systems without pre-purge

The flame presence check shall last for more than 5 s and shall cease not more than 5 s prior to any attempt at ignition. Where the flame supervision system incorporates thermionic valves, etc., requiring warm-up time, the flame presence check shall last for at least 5 s longer than the maximum warm-up time.

Upon flame failure, the control system shall cause safety shut-down. In case of control systems which incorporate hot surface ignition, however, safety shut-down and lock-out shall result following flame failure. The total extinction safety time for the flame supervision system to detect the absence of flame and shut down the burner(s) shall be not more than 3 s.

### 6.1.4 Limiting temperatures

#### 6.1.4.1 Temperatures of appliance parts which have to be touched

The surface temperatures of the control knobs and of all the parts that have to be touched during normal use of the appliance, measured only in the zones intended to be gripped under the conditions stated in 7.3.4.2, shall not exceed the ambient temperature by more than:

a) 35 K for metals;

b) 45 K for porcelain or similar materials;

c) 60 K for plastics.

If, under the conditions stated in 7.3.4.2, the temperature of the end of the gas connection at the appliance inlet exceeds the ambient temperature by more than 30 K, the installation instructions shall state the precautions to be taken in respect of the connection.

#### 6.1.4.2 Temperatures of the appliance surface

When the appliance is tested under the conditions of 7.3.4.3 the temperature of the side walls, the front, the back, the base and the top of the appliance shall not exceed 100 °C, except on working surfaces such as the external primary flue and the draught diverter.

#### 6.1.4.3 Temperatures of the surroundings

Temperatures of the surroundings are deemed irrelevant if:




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a) no parts of the appliance, including working surfaces, have been found to present surface temperatures above 85 °C when tested in accordance with 7.3.4.3; or

b) the installation instructions specify that the installation room shall not contain combustible materials.

In all other cases, the temperatures found on the test panels described in 7.3.4.4 shall not exceed 85 °C.

#### 6.1.4.4 Component temperatures

When the appliance is tested under the conditions of 7.3.4.4 the maximum temperature of the appliance components shall not exceed the maximum temperature specified by the individual component manufacturer.

#### 6.1.4.5 Fan motor winding temperatures

Electric motors shall be protected to prevent motor windings from overheating. During the test for overheat protection according to 7.3.7, test 1, the protector shall not operate.

#### 6.1.4.6 POCED (all Type $B_4$, $B_5$, $C_1$ and $C_3$ appliances)

When the appliance is tested under the conditions of 7.3.4.6.1, the external temperature of any part of the POCED, which when installed in accordance with the manufacturer's instructions is capable of being less than 25 mm from combustible parts of the fabric of a building, shall not exceed the ambient temperature by more than 50 K.

If, in accordance with the manufacturer's installation instructions, the POCED is required to be enclosed within another duct, a sleeve or insulation when it passes through a combustible wall or ceiling, the external temperatures of this duct, sleeve or insulation shall not exceed the ambient temperature by more than 50 K under the conditions of 7.3.4.6.2.

### 6.1.5 Ignition, cross-lighting, flame stability

#### 6.1.5.1 Ignition and cross-lighting

##### 6.1.5.1.1 All appliances (still air conditions)

Under the test conditions described in 7.3.5.2.1.2, correct ignition and cross-lighting shall be assured. This requirement shall also be fulfilled where spark restoration or automatic recycling is provided.

When the gas rate of any ignition burner is reduced under the test conditions described in 7.3.5.2.1.3 to the minimum required to hold open the gas supply to the main burner, correct ignition of the main burner shall be assured without undue noise.

##### 6.1.5.1.2 Appliances with automatic burner systems

Under the test conditions described in 7.3.5.2.2, the system shall be safe on ignition. In addition, the appliance shall not sustain any damage likely to affect its safe operation.

##### 6.1.5.1.3 Appliances where the start gas is taken from between the two main burner gas valves

Where the gas line is designed such that the start-gas supply is taken from between the two main gas valves, and means is not provided to prove closure of the downstream main shut-off valve prior to ignition, then under the conditions of test described in 7.3.5.2.3, ignition of the start gas shall not give rise to a hazardous situation.




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#### 6.1.5.1.4 Special conditions

##### 6.1.5.1.4.1 Type $B_{12}$, $B_{12AS}$, $B_{12BS}$, $B_{13}$, $B_{13AS}$ and $B_{13BS}$ appliances

Under the conditions of 7.3.5.2.4.1, the ignition burner or the main burner, if ignition occurs at a start-gas rate on the main burner, shall ignite and remain stable without light-back or lift and any flame supervision device shall continue to function normally.

Where ignition does occur on an ignition burner, the above requirements shall be assessed with and without the main burner alight.

##### 6.1.5.1.4.2 Type $B_{14}$, $B_{14AS}$ and $B_{14BS}$ appliances

Under the conditions of 7.3.5.2.4.2, the ignition of a manually ignited ignition burner shall be correct and the flame shall remain stable without light-back or lift and any flame supervision device shall continue to function normally, even when the flue is blocked completely.

Ignition and cross-lighting of the main burner shall be assured up until the flue is blocked so far as to operate the air proving device, shutting down the gas supply.

When an appliance having an automatic ignition is tested under the conditions of 7.3.5.2.4.2, ignition of any ignition burner and ignition and complete cross-lighting of the main burner shall be assured up until the flue is blocked so far as to operate the air proving device, shutting down the gas supply.

##### 6.1.5.1.4.3 Type C12 and C13 appliances

Under the conditions of 7.3.5.2.4.3, ignition of any ignition burner, ignition of the main burner and complete cross-lighting of the main burner shall be correct.

##### 6.1.5.1.4.4 Type $C_{32}$ and $C_{33}$ appliances

Under the conditions of 7.3.5.2.4.4, ignition of any ignition burner, ignition of the main burner and complete cross-lighting of the main burner shall be correct.

##### 6.1.5.1.4.5 Type $C_{62}$ and $C_{63}$ appliances

Under the conditions of 7.3.5.2.4.5, ignition of any ignition burner, ignition of the main burner and complete cross-lighting of the main burner shall be correct.

### 6.1.5.2 Flame stability

#### 6.1.5.2.1 All appliances (still air conditions)

Under the test conditions described in 7.3.5.3.1, the flames shall be stable. A slight tendency to lift at the moment of ignition is acceptable but the flames shall be stable in normal operation.

#### 6.1.5.2.2 Special conditions

##### 6.1.5.2.2.1 All Type $B_1$ and $B_4$ appliances

Under the conditions of 7.3.5.3.2, the main burner and any ignition burner flames shall remain stable.

##### 6.1.5.2.2.2 Type $C_{12}$ and $C_{13}$ appliances

Under the conditions of 7.3.5.2.4.3, the main burner and any ignition burner flames shall remain stable.




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#### 6.1.5.2.2.3 Type $C_{32}$ and $C_{33}$ appliances

Under the conditions of 7.3.5.2.4.4, the main burner and any ignition burner flames shall remain stable.

#### 6.1.5.2.2.4 Type $C_{62}$ and $C_{63}$ appliances

Under the conditions of 7.3.5.2.4.5, the main burner and any ignition burner flames shall remain stable.

### 6.1.6 Combustion

#### 6.1.6.1 All appliances (still air conditions)

The CO concentration of the dry air-free combustion products shall not exceed:

a) 0,10 % when the appliance is supplied with the reference gas under the conditions of 7.3.6.3.2;

b) 0,20 % when the appliance is supplied with the reference gas under the conditions of 7.3.6.3.3 and 7.3.6.3.5 and with the incomplete combustion gas under the conditions of 7.3.6.3.4;

c) 0,20 % when the appliance is supplied with the reference gas under the conditions of 7.3.6.3.5; in addition, the appliance shall ignite and continue to operate under these conditions;

d) 0,20 % when the appliance is tested according to 7.3.6.3.6 ; this also verifies the correct operation of the air proving device.

The test methods are specified in 7.3.6.

#### 6.1.6.2 Special conditions

##### 6.1.6.2.1 Type $B_{22}$, $B_{23}$, $B_{52}$ $B_{53}$ , $C_{12}$ , $C_{13}$ , $C_{32}$ , $C_{33}$ , $C_{62}$ ,and $C_{63}$ appliances having fully pre-mixed gas/air burners under the control of a zero governor system

The CO concentration of the dry air-free combustion products shall not exceed 0,10 % when the appliance is supplied with reference gas under the conditions of 7.3.6.4.1.

##### 6.1.6.2.2 Appliances other than those having fully pre-mixed gas/air burners under the control of a zero governor system

The CO concentration of the dry air-free combustion products shall not exceed 0,20 % when the appliance is supplied with reference gas under the conditions of 7.3.6.4.2.

##### 6.1.6.2.3 All Type $B_{12}$, $B_{13}$, $B_{42}$ and $B_{43}$ appliances

The CO concentration of the dry air-free combustion products shall not exceed 0,20 % when the appliance is supplied with reference gas under the conditions of 7.3.6.4.3.

##### 6.1.6.2.4 All Type $B_{14}$ and $B_{44}$ appliances

The CO concentration of the dry air-free combustion products shall not exceed 0,20 % when the appliance is supplied with reference gas under the conditions of 7.3.6.4.4.

##### 6.1.6.2.5 Type $B_{22}$, $B_{23}$, $B_{52}$ and $B_{53}$ appliances

The CO concentration of the dry air-free combustion products shall not exceed 0,20 % when the appliance is supplied with reference gas under the conditions of 7.3.6.4.5.




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#### 6.1.6.2.6 Type $C_{12}$ and $C_{13}$ appliances

The CO concentration of the dry air-free combustion products shall not exceed 0,20 % when the appliance is supplied with reference gas under the conditions of 7.3.6.4.6.

#### 6.1.6.2.7 Type $C_{32}$ and $C_{33}$ appliances

The CO concentration of the dry air-free combustion products shall not exceed 0,20 % when the appliance is supplied with reference gas under the conditions of 7.3.6.4.7.

#### 6.1.6.2.8 Type $C_{62}$ and $C_{63}$ appliances

The CO concentration of the dry air-free combustion products shall not exceed 0,20 % when the appliance is supplied with reference gas under the conditions of 7.3.6.4.8.

### 6.1.6.3 Other pollutants

Under the test and calculation conditions of 7.3.6.5, the $NO_x$ concentration in the dry air-free combustion products shall not exceed 260 mg/kWh or the manufacturer's declared maximum concentration, whichever is the lower. However, for appliances intended to use only third family gases, the limit $NO_x$ value is multiplied by a factor of 1,60. For appliances intended to use propane only, the limit $NO_x$ value is multiplied by a factor of 1,50.

### 6.1.7 Overheat protection

Under the conditions of 7.3.7, test 1 and test 2:

a) the gas supply to the burner shall be cut off by either an overheat limit device or an overheat cut-off device to prevent:

1) a hazardous condition;

2) any damage to the appliance;

3) the mean temperature of the air at the appliance outlet exceeding 100 °C;

b) neither the overheat limit device, nor the overheat cut-off device (if fitted), nor the switch of a thermally protected fan motor shall operate during the normal cyclic action of the appliance;

c) flame stability shall be satisfactory throughout the test.

### 6.1.8 Heat exchanger thermal cycling

The appliance shall undergo the thermal cycle test as described in 7.3.8 in order to verify continued compliance of the heat exchanger with 6.1.1.2. In addition, the heat exchanger shall not develop any split, opening or perforation visible to the naked eye and at the end of the test there shall be no signs of corrosion that will adversely affect the life of any POCED.

### 6.1.9 Atmosphere sensing device (Types $B_{12AS}$, $B_{13AS}$, $B_{14AS}$, $B_{42AS}$, $B_{43AS}$ and $B_{44AS}$)

#### 6.1.9.1 Normal operating conditions

The appliance shall not shut down under the test conditions described in 7.3.9.2.1.

#### 6.1.9.2 Sealed room conditions

Under the test conditions described in 7.3.9.2.2, the appliance shall go to non-volatile lock-out before the carbon monoxide concentration of the atmosphere in the test room exceeds $200 \times 10^{-6}$ (V/V).

### 6.1.10 Combustion products discharge safety device (Types $B_{12BS}$, $B_{13BS}$ , $B_{14BS}$ $B_{42BS}$, $B_{43BS}$ and $B_{44BS}$)

#### 6.1.10.1 Switching function

In response to an unsafe situation, the combustion products discharge safety device shall at least perform a safety shut-down of the main burner, with automatic or manual reset. If provision is made for automatic reset, the gas supply to the main burner shall remain closed for at least 600 s if the cause of the safety shut-down is not rectified. It is permissible in this case for the combustion products discharge safety device to be incorporated into the control circuit.

Compliance with this requirement is checked as described in 7.3.10.1.

#### 6.1.10.2 Response time at zero flue draught

Under the conditions of 7.3.10.2, the response time of the combustion products discharge safety device shall not exceed 120 s at nominal heat input or at the maximum heat input in case of an appliance with variable heat input or a range-rated appliance.

In case of a range-rated appliance or an appliance with variable heat input control it is a further requirement that the response time shall not exceed 240 s at 50 % of the maximum heat input.

If the lowest value of the heat input range and/or control range is more than 50 % of the maximum heat input, this test shall be carried out at this lowest value. The response time of the combustion products discharge safety device shall not exceed $T_r$ seconds, determined by Equation (1).

$$T_r \leq 120 - \frac{Q_{max}}{Q_{min}} \quad (1)$$

where

$T_r$ is the response time of the combustion products discharge safety system in seconds (s);

$Q_{max}$ is the maximum or nominal heat input in kilowatts (kW);

$Q_{min}$ is the minimum heat input of the (input/control) range in kilowatts (kW).

#### 6.1.10.3 Unintentional shutdown

Under the conditions of 7.3.10.3, the combustion products discharge safety device shall not come into operation at the nominal heat input or at the maximum heat input in case of a range-rated appliance.

#### 6.1.10.4 Response time in the event of partial leakage

The response time of the combustion products discharge safety device shall not exceed 600 s when tested under conditions of partial leakage of combustion products in accordance with 7.3.10.4.

#### 6.1.10.5 Behaviour in the event of a sensor defect

In the event of the sensor becoming defective, the combustion products discharge safety system shall at least perform a safety shut-down of the main burner. A shut-down without lock-out is permissible in the case where

the gas supply to the main burner is interrupted for at least 600 s as a result of a defective sensor. In this case the main burner shall not continue to burn for more than 120 s.

Compliance with this requirement is checked in 7.3.10.5.

#### 6.1.10.6 Temperature resistance

The operation of the flue gas discharge monitoring system shall satisfy the requirements of 6.1.10.1, 6.1.10.2, 6.1.10.3 and 6.1.10.4 after testing in accordance with 7.3.10.6. After this test, both the flue gas monitoring device, its attachment and its wiring shall be undamaged.

### 6.1.11 Air-gas ratio controls

#### 6.1.11.1 Leakage of non-metallic control tubes

When control tubes are not made of metal or other materials of at least equivalent properties, their disconnection, breakage or leakage shall not lead to an unsafe situation. This implies either locking out or safe operation with no leakage of gas outside the appliance.

#### 6.1.11.2 Gas-air pressure ratio adjustment

If the gas-air ratio is adjustable, the control shall function when the adjustment is at its extreme limits and the range of pressure ratios achieved shall cover the declared adjustment range when tested in accordance with 7.3.2.7.2.

## 6.2 Efficiency

The efficiency based on the net calorific value determined at nominal heat input, $\eta_n$, shall not be less than 84 % when measured in accordance with 7.4.

If the appliance has a modulating or high/low control, when measured in accordance with 7.4.5, the efficiency based on the net calorific value with the appliance adjusted to give the minimum rate ($\eta_{min}$) shall be such that:

$$\eta_{min} \geq \eta_n - \frac{10\left(Q_n - Q_{min}\right)}{Q_n}$$

where

$\eta_{min}$ is the efficiency based on the net calorific value with the appliance adjusted to give the minimum rate, in percent (%);

$\eta_n$ is the efficiency based on the net calorific value determined at the nominal heat input, in percent (%);

$Q_n$ is the heat input at nominal rate;

$Q_{min}$ is the heat input at minimum rate.

Under no circumstances shall $\eta_{min}$ be less than 79 %.

# 7 Test methods

## 7.1 General

### 7.1.1 Characteristics of test gases: reference and limit gases

Appliances are intended for use with gases of various qualities. One of the aims of this standard is to check that the performance of an appliance is satisfactory for each family or group of gases and for the pressures for which it is designed, if necessary using the adjusting devices.

The test gases, test pressures and appliance categories given in this standard are in accordance with those specified in EN 437.

The characteristics of the reference and limit gases are given in Tables 3 and 4. The values in Table 3, measured and expressed at 15 °C, are derived from EN ISO 6976:2005.

### 7.1.2 Conditions for preparation of the test gases

The composition of gases used for the tests shall be as near as possible to those given in Table 3. For the constitution of the gases the following rules shall be observed.

a) the Wobbe number of the gas used shall be within ± 2 % of the value in the table (this tolerance includes the errors of the measuring equipment);

b) the gases used to constitute the mixtures shall have minimum degrees of purity of :

1) nitrogen $N_2$ 99 %;

2) hydrogen $H_2$ 99 %;

3) methane $CH_4$95 % with a total concentration of H2, CO and O2 below 1 %;

4) propene $C_3H_6$ 95 % and a total concentration of N2 and CO2 below 2 %;

5) propane $C_3H_8$ 95 %;

6) butane[2)] $C_4H_{1O}$ 95 %.

However, these requirements are not mandatory for each of the constituent gases provided that the final mixture has a composition identical with that of a mixture that would have resulted from using the above constituents. To make up a mixture, a gas may be used which already contains, in convenient proportions, several constituents of the final mixture.

2) Any mixture of iso-butane and n-butane can be used.




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**Table 3 — Characteristics of the test gases[a], Gas dry at 15 °C and 1 013,25 mbar**

| Gas Family and Group | Test Gases | Desig-nation | Composition by volume % | $W_i$ MJ/m$^3$ | $H_i$ MJ/m$^3$ | $W_s$ MJ/m$^3$ | $H_s$ MJ/m$^3$ | $d$ |
|---|---|---|---|---|---|---|---|---|
| Gases of the first family[b] | | | | | | | | |
| Group a | Reference gas Incomplete combustion flame lift and sooting limit gases | G 110 | $CH_4$ = 26 $H_2$ = 50 $N_2$ = 24 | 21,76 | 13,95 | 24,75 | 15,87 | 0,411 |
| | Light back limit gas | G 112 | $CH_4$ = 17 $H_2$ = 59 $N_2$ = 24 | 19,48 | 11,81 | 22,36 | 13,56 | 0,367 |
| Gases of the second family | | | | | | | | |
| Group H | Reference gas | G 20 | $CH_4$ = 100 | 45,67 | 34,02 | 50,72 | 37,78 | 0,555 |
| | Incomplete combustion Sooting limit gas | G 21 | $CH_4$ = 87 $C_3H_8$ = 13 | 49,60 | 41,01 | 54,76 | 45,28 | 0,684 |
| | Light back limit gas | G 222 | $CH_4$ = 77 $H_2$ = 23 | 42,87 | 28,53 | 47,87 | 31,86 | 0,443 |
| | Flame lift limit gas | G 23 | $CH_4$ = 92,5 $N_2$ = 7,5 | 41,11 | 31,46 | 45,66 | 34,95 | 0,586 |
| Group L | Reference gas and Light back limit gas | G 25 | $CH_4$ = 86 $N_2$ = 14 | 37,38 | 29,25 | 41,52 | 32,49 | 0,612 |
| | Incomplete combustion and Sooting limit gas | G 26 | $CH_4$ = 80 $C_3H_8$ = 7 $N_2$ = 13 | 40,52 | 33,36 | 44,83 | 36,91 | 0,678 |
| | Flame lift limit gas | G 27 | $CH_4$ = 82 $N_2$ = 18 | 35,17 | 27,89 | 39,06 | 30,98 | 0,629 |
| Group E | Reference gas | G 20 | $CH_4$ = 100 | 45,67 | 34,02 | 50,72 | 37,78 | 0,555 |
| | Incomplete combustion and Sooting limit gas | G 21 | $CH_4$ = 87 $N_2$ = 13 | 49,60 | 41,01 | 54,76 | 45,28 | 0,684 |
| | Light back limit gas | G 222 | $CH_4$ = 77 $H_2$ = 23 | 42,87 | 28,53 | 47,87 | 31,86 | 0,443 |
| | Flame lift limit gas | G 231 | $CH_4$ = 85 $N_2$ = 15 | 36,82 | 28,91 | 40,90 | 32,11 | 0,617 |
| Gases of the third family[c] | | | | | | | | |
| Groups 3B/P and 3B | Reference gas Incomplete combustion limit gases | G 30 | n-$C_4H_{10}$=10 i-$C_4H_{10}$= 50[d] | 80,58 | 116,09 | 87,33 | 125,81 | 2,075 |
| | Flame lift and sooting | G 31 | $C_3H_8$ = 100 | 70,69 | 88,00 | 76,84 | 95,65 | 1,550 |
| | Light back limit gas | G 32 | $C_3H_6$ = 100 | 68,14 | 82,78 | 72,86 | 88,52 | 1,476 |
| Group 3P | Reference gas Incomplete combustion Sooting and flame lift limit gas | G 31 | $C_3H_8$ = 100 | 70,69 | 88,00 | 76,84 | 95,65 | 1,550 |
| | Light back limit gas Sooting limit gas | G 32 | $C_3H_6$ = 100 | 68,14 | 82,78 | 72,86 | 88,52 | 1,476 |

[a] For gases used nationally or locally, see A.3.

[b] For other groups, see A.3.

[c] Also see Table 4.

[d] Any mixture of ISO/normal butane is permitted.

The calorific values of the third family test gases, expressed in megajoules per cubic metre (MJ/m³) in Table 3, may also be expressed in megajoules per kilogram (MJ/kg), as shown in Table 4.

**Table 4 — Calorific values of the test gases of the third family**

| Test gas designation | Hi MJ/kg | Hs MJ/kg |
|---|---|---|
| G 30 | 45,65 | 49,47 |
| G 31 | 46,34 | 50,37 |
| G 32 | 45,77 | 48,94 |

Moreover, for gases of the second family:

c) for tests carried out with reference gases G 20 or G 25, a gas belonging respectively to either Group H or Group E, may be used even if its composition does not satisfy the above conditions, provided that after the addition of either propane or nitrogen as appropriate, the final mixture has a Wobbe index within ± 2 % of the value given in the table for the corresponding reference gas;

d) for preparation of the limit gases, another gas may be used as the base gas instead of methane;

e) for limit gases G 21, G 222 and G 23, a natural gas of Group H may be used;

f) for limit gases G 27 and G 231, a natural gas of Group H or Group L or Group E may be used;

g) for the limit gas G 26, a natural gas of Group L may be used.

In all cases the final mixture obtained by adding propane or nitrogen shall have a Wobbe index within ± 2 % of the value given in Table 3 for the corresponding limit gas and the hydrogen concentration of the final mixture shall be as given in Table 3.

### 7.1.3 Practical application of test gases

#### 7.1.3.1 Choice of test gases

Gases required for the tests described in clauses:

— 7.3.5 Ignition; cross-lighting; flame stability;

— 7.3.6 Combustion

shall be as specified in 7.1.1 and made up in accordance with 7.1.2.

For the tests described in other clauses, it is permissible, in order to facilitate testing, to replace the reference gas by a gas actually distributed, provided that its Wobbe index is within ± 5 % of that of the reference gas.

When an appliance can use gases of several groups or families, test gases selected from those listed in Table 3 and in accordance with the requirements of 7.1.5.1, are used. The selected gases, for each appliance category, are listed in Table 5.




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**Table 5 — Test gases corresponding to the appliance categories**

| Category | Reference gas | Incomplete combustion limit gas | Light back limit gas | Lift limit gas | Sooting limit gas |
|---|---|---|---|---|---|
| $I_{2H}$ | G 20 | G 21 | G 222 | G 23 | G 21 |
| $I_{2L}$ | G 25 | G 26 | G 25 | G 27 | G 26 |
| $I_{2E}$, $I_{2E+}$ | G 20 | G 21 | G 222 | G 231 | G 21 |
| $I_{3B/P}$, $I_{3+}$ | G 30 | G 30 | G 32 | G 31 | G 30 |
| $I_{3P}$ | G 31 | G 31 | G 32 | G 31 | G 31, G 32 |
| $II_{1a2H}$ | G 110, G 20 | G 21 | G 112 | G 23 | G 21 |
| $II_{2H3B/P}$, $II_{2H3+}$ | G 20, G 30 | G 21 | G 222, G 32 | G 23, G 31 | G 30 |
| $II_{2H3P}$ | G 20, G 31 | G 21 | G 222, G 32 | G 23, G 31 | G 31, G 32 |
| $II_{2L3B/P}$ | G 25, G 30 | G 26 | G 32 | G 27, G 31 | G 30 |
| $II_{2L3P}$ | G 25, G 31 | G 26 | G 32 | G 27, G 31 | G 31, G 32 |
| $II_{2E3B/P}$, $II_{2E+3+}$ | G 20, G 30 | G 21 | G 222, G 32 | G 231, G 31 | G 30 |
| $II_{2E+3P}$ | G 20, G 31 | G 21 | G 222, G 32 | G 231, G 31 | G 31,G 32 |
| NOTE Tests with the limit gases are carried out with the injector and adjustment corresponding to the reference gas of the group to which the limit gas used for the test belongs. | | | | | |

#### 7.1.3.2 Conditions of supply and adjustment of the burners

##### 7.1.3.2.1 Initial adjustment of appliance

Before all tests that are required to be carried out the appliance shall be fitted with the injector(s) corresponding to the gas family or gas group to which the specified test gas belongs (see Table 5). Any gas rate adjusters are set in accordance with the manufacturer's instructions using the appropriate reference gas(es) (see 7.1.5.1) and the corresponding normal pressure(s) given in 7.1.4.

This initial adjustment of the appliance is subject to the limitations given in 5.1.1.

##### 7.1.3.2.2 Supply pressures

Except where an adjustment of the supply pressure is necessary (as described in 7.1.3.2.3 and 7.1.3.2.4) the normal, minimum and maximum supply pressures to be used for testing purposes shall be in accordance with the requirements given in 7.1.4.

Unless otherwise specified, the initial adjustment of the appliance is not altered.

##### 7.1.3.2.3 Adjustment of heat inputs

For tests requiring adjustment of the burner to the nominal or another specified heat input, it shall be ensured that the pressure upstream of the injectors is such that the heat input obtained is within ± 2 % of that specified (by altering the preset adjusters or the appliance regulator, if adjustable, or the appliance supply pressure).

The specified heat input shall be determined in accordance with 7.3.2 and with the appliance supplied with the appropriate reference gas(es).

##### 7.1.3.2.4 Corrected pressures

Where, in order to obtain the nominal heat input within ± 2 %, it is necessary to use a supply pressure, $p$, different from the normal pressure $p_n$, then those tests normally carried out at the minimum or maximum pressures $p_{min}$ and $p_{max}$ shall be carried out at the corrected pressures $p'_{min}$ and $p'_{max}$. The corrected test pressures are calculated using Equation (2).

$$\frac{p'_{\min}}{p_{\min}} = \frac{p'_{\max}}{p_{\max}} = \frac{p}{p_n} \qquad (2)$$

where

$p_n$ is the normal test pressure;

$p_{min}$ is the minimum test pressure;

$p_{max}$ is the maximum test pressure;

$p$ is the burner unit inlet pressure;

$p'_{min}$ is the corrected minimum test pressure;

$p'_{max}$ is the corrected maximum test pressure.

### 7.1.4 Test pressures

The values of the test pressures (i.e. the static pressure to be applied at the gas inlet connection of the appliance whilst in operation) are given in Table 6 (also see Table A.4).

These pressures and the corresponding injectors are used in accordance with the special national conditions given in Annex A, for the country in which the appliance is to be installed.

**Table 6 — Test pressures**

| Appliance categories carrying as index | Test gas | $p_n$ mbar | $p_{min}$ mbar | $p_{max}$ mbar |
|---|---|---|---|---|
| first family: 1a | G 110, G 112 | 8 | 6 | 15 |
| second family: 2H | G 20, G 21, G 222, G 23 | 20 | 17 | 25 |
| second family: 2L | G 25, G 26, G 27 | 25 | 20 | 30 |
| second family: 2E | G 20, G 21, G 222, G 231 | 20 | 17 | 25 |
| second family: 2E+ | G 20, G 21, G 222 | 20 | 17[b] | 25 |
| | G 231 | (25)[a] | 17[b] | 30 |
| third family: 3B/P | G 30, G 31, G 32 | 29[c] | 25 | 35 |
| | G 30, G 31, G 32 | 50 | 42,5 | 57,5 |
| third family: 3P | G 31, G 32 | 37 | 25 | 45 |
| | G 31, G 32 | 50 | 42,5 | 57,5 |
| third family: 3+ (28-30/37 couple) | G 30 | 29[c] | 20 | 35 |
| | G 31, G 32 | 37 | 25 | 45 |
| third family: 3+ (50-67 couple) | G 30 | 50 | 42,5 | 57,5 |
| | G 31, G 32 | 67 | 50 | 80 |

[a] This pressure corresponds to the use of low Wobbe index gas but in principle no test is carried out at this pressure.

[b] See Annex F.

[c] Appliances of this category may be used without adjustment at the specified supply pressures of 28 mbar to 30 mbar.

### 7.1.5 Test procedures

#### 7.1.5.1 Tests requiring the use of reference gases

The tests specified in:

— 7.3.2 Heat inputs;

— 7.3.7 Overheat protection;

— 7.3.8 Heat exchanger;

— 7.3.9 Atmosphere sensing device;

— 7.3.10 Combustion products discharge safety system;

— 7.4 Efficiency

shall be carried out with the reference gas(es) appropriate to the country in which the appliance is to be installed, according to the information given in Table A.1 and the category of the appliance.

The other tests are carried out with only one of the reference gases of the appliance category (see 7.1.1) at one of the normal test pressures required in 7.1.4 for the selected reference gas, hereafter referred to as "the reference gas".

However, the test pressure shall be one of those stated by the manufacturer and the appliance shall be fitted with the appropriate injectors.

#### 7.1.5.2 Tests requiring the use of limit gases

These tests shall be carried out with the limit gases appropriate to the appliance Category (see Table 5) and with the injector(s) and the adjustments corresponding to the reference gas of the group, or family, to which each limit gas belongs.

### 7.1.6 Test conditions

#### 7.1.6.1 General

The test conditions given in 7.1.6.2, 7.1.6.3, 7.1.6.4, 7.1.6.5, 7.1.6.6, 7.1.6.7 and 7.1.6.8 are generally applicable except where otherwise specified in particular test methods.

#### 7.1.6.2 Test room

The appliance is installed in a well ventilated, draught free room which has an ambient temperature of (20 ± 5) °C.

NOTE A wider temperature range is permissible provided that the effect on the test result can be taken into account.

#### 7.1.6.3 Evacuation of the products of combustion

##### 7.1.6.3.1 All Type $B_{12}$ , $B_{13}$ , $B_{42}$ and $B_{43}$ appliances

a) Appliances with a vertical flue outlet shall be tested with:

1) a 1 m vertical secondary flue of the same nominal diameter of the flue outlet in the case of type $B_{12}$ and $B_{13}$ appliances; or

2) in the case of type $B_{42}$ and $B_{43}$ appliances, with a vertical POCED as supplied or specified by the appliance manufacturer, having the maximum equivalent resistance specified in the manufacturer's instructions;

b) Appliances with a horizontal flue outlet shall be fitted in accordance with the manufacturer's instructions; these shall include the maximum length of horizontal run and the method of adaption to a vertical flue; thereafter, thereafter the vertical flue shall be fitted in accordance with 7.1.6.3.1 a).

In the case of type $B_{12}$ and $B_{13}$ appliances the vertical flue shall be made from sheet metal having a metal thickness not less than 1 mm. Unless otherwise stated in the test method, the flue shall be uninsulated.

#### 7.1.6.3.2 All Type $B_{14}$ appliances and Type $B_{22}$ and $B_{23}$ appliances

Appliances intended to be fitted to a flue having a wall termination shall be tested with a flue having the same diameter as the flue outlet and of the maximum equivalent resistance as stated by the manufacturer.

Appliances intended to be fitted to a vertical flue shall be tested with:

a) 1 m of vertical flue, fitted in accordance with the manufacturer's instructions, or the minimum length specified by the manufacturer, having the same diameter as the flue outlet; or

b) a horizontal flue outlet, fitted in accordance with the manufacturer's instructions, these shall include the maximum length of horizontal run and the method of adaption to a vertical flue; thereafter the vertical flue shall be fitted in accordance with 7.1.6.3.2 a).

The flue shall be made from sheet metal having a metal thickness less than 1 mm. Unless otherwise stated the flue shall be uninsulated.

#### 7.1.6.3.3 Type $B_{44}$, $B_{52}$ and $B_{53}$ appliances

Appliances shall be tested with the POCED as supplied or specified in the appliance manufacturer, having the maximum equivalent resistance specified in the manufacturer's instructions.

#### 7.1.6.3.4 Type $C_{12}$ and $C_{13}$ appliances

Except where otherwise stated, the tests are carried out using the air supply duct and combustion products duct (POCED) arrangement having the maximum equivalent resistance specified in the manufacturer's instructions. These shall be supplied by the manufacturer. Any terminal guard is not fitted. If necessary, an external telescopic duct may be sealed in accordance with the manufacturer's instructions.

#### 7.1.6.3.5 Type $C_{32}$ and $C_{33}$ appliances

Except where otherwise stated the tests are carried out twice. First, using air supply duct and combustion products duct (POCED) arrangements having the maximum equivalent resistance and then with the air supply duct and combustion products duct (POCED) arrangements having the minimum equivalent resistance specified in the manufacturer's instructions. These ducts shall be supplied by the manufacturer.

#### 7.1.6.3.6 Type $C_{62}$ and $C_{63}$ appliances

Except where otherwise stated, the tests are carried out with the appliance connected to a test duct system for the combustion air inlet and the combustion products outlet, each test duct length is 1 m (see Figure 1).

The combustion products outlet duct shall be equipped with an adjustable restrictor at the outlet (see Figures 2 and 3).




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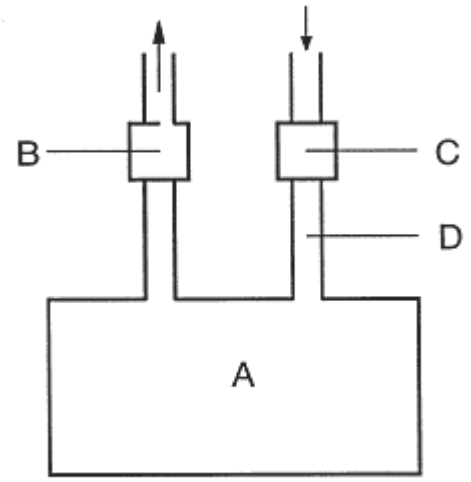
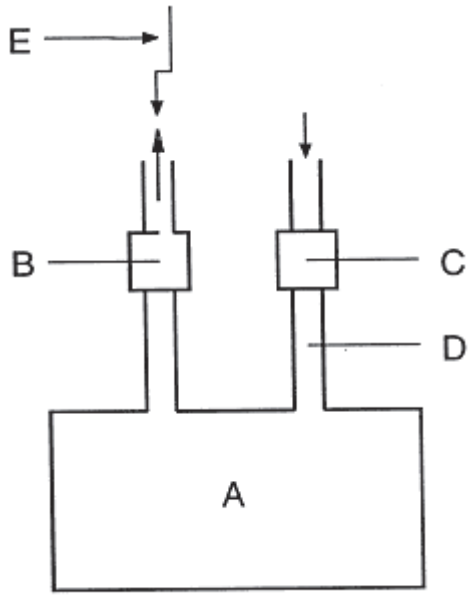



**Key**
A appliance
B pressure test point
C pressure test point
D $CO_2$ probe

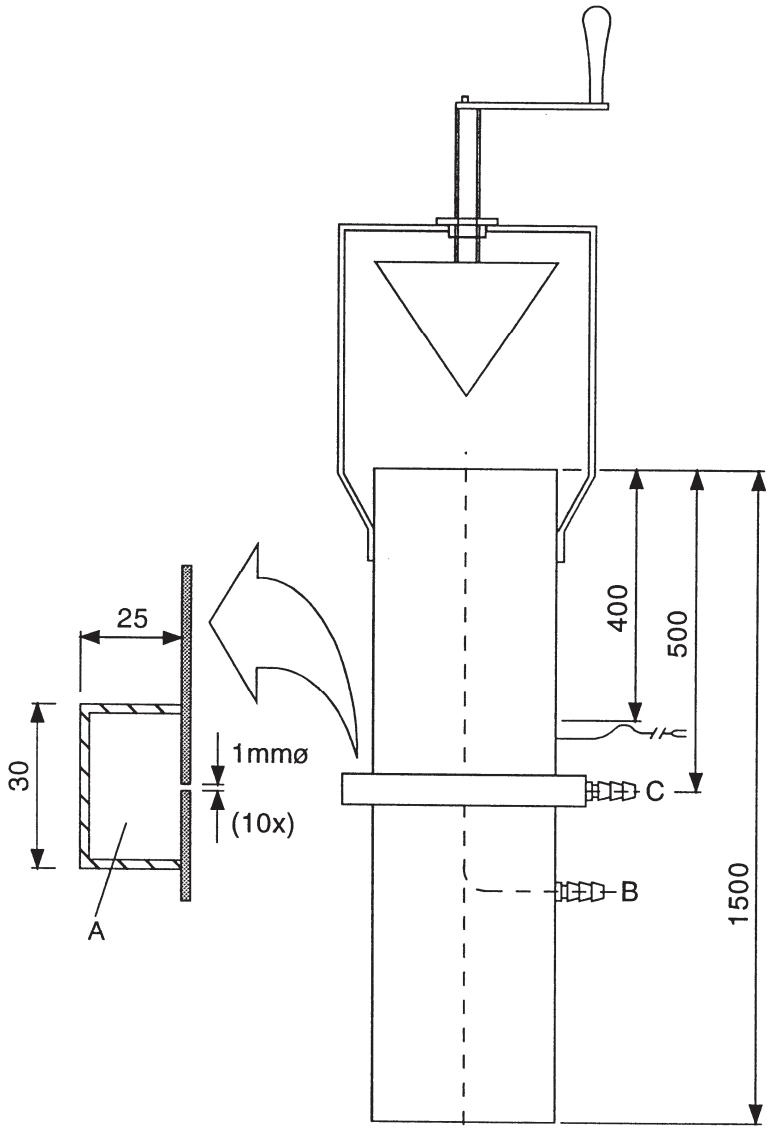
**Figure 2 — $C_6$ test duct system**




**Key**
A appliance
B pressure test point
C pressure test point
D $CO_2$ probe
E restrictor

**Figure 3 — $C_6$ test duct system - position of restrictor**

Dimensions in millimetres




**Key**
A ring chamber for static pressure measurement with ten holes of Ø 1 mm
B flue gas sample
C static pressure

**Figure 4 — $C_6$ test duct system – Restrictor detail**

#### 7.1.6.4 Test installation

The appliance shall be installed in accordance with the manufacturer's instructions, with particular reference to minimum declared clearances round the appliance.

#### 7.1.6.5 Influence of thermostats

Precautions shall be taken to prevent thermostats or other controls from operating and affecting the gas rate, unless this is necessary for the test.

#### 7.1.6.6 Electrical supply

The appliance is connected to an electrical supply at the nominal voltage, except where otherwise stated in the clause concerned.

#### 7.1.6.7 Range-rated appliances

For appliances that are designed to be range-rated, all tests are carried out at their maximum and minimum nominal heat inputs, except where otherwise stated.

#### 7.1.6.8 Modulating and high/low operation

For appliances with modulating or high/low operation, the tests are carried out at the nominal heat input unless otherwise stated in the particular test.

## 7.2 Construction and design

If the appliance has an automatic burner control system featuring a manually operated device, the appliance is installed as described in 7.1.6 and supplied with an appropriate reference gas (see Table 5) at the nominal heat input in accordance with 7.1.3.2.1. The start device is manually operated ten times, once every 5 s.

It is checked that the requirements of 5.2.9.2 are met.

## 7.3 Safety of operation

### 7.3.1 Soundness

#### 7.3.1.1 Soundness of the gas circuit

The tests are carried out with an air inlet pressure of 50 mbar or 1,5 times the applicable maximum pressure stated in Table 6, whichever is the greater.

Any regulator may be locked in its maximum open position to avoid damage.

Compliance with the requirements of 6.1.1.1 is checked with all gas valves open and the injectors for any ignition burner and main burner removed and the holes sealed.

Where the design of any ignition burner is such that its gas outlet cannot be sealed, this test is carried out with the gasway to the ignition burner sealed at a convenient place. In this case an additional test is also carried out, using soap solution, to verify that there is no leakage from the ignition burner when it is operating at its normal working pressure.

For the determination of the leakage rate, a volumetric method is used which gives a direct reading of the leakage rate and which is of such accuracy that the error in its determination does not exceed 0,01 $dm^3/h$.

These tests are carried out first when the appliance is delivered and again, on completion of all the tests in the standard, after any assembly in the gas circuit that has a gas-tight joint whose removal is provided for in the manufacturer's instructions has been removed and replaced five times.

#### 7.3.1.2 Soundness of the combustion circuit and correct evacuation of the combustion products

##### 7.3.1.2.1 All Type $B_{12}$, $B_{13}$, $B_{42}$ and $B_{43}$ appliances

The appliance is installed as described in 7.1.6 and connected to a flue as described in 7.1.6.2. The test is carried out after operating the appliance for 10 min starting from the cold condition, burning one of the reference gases for the category concerned at the nominal heat input.

Possible leaks are looked for with a dew plate whose temperature is maintained at a value slightly above the dewpoint temperature of the ambient air. The plate is brought near to all the places where a leak could be suspected.

During the test there should not be any dew visible on the plate. In doubtful cases, however, leaks are looked for with a sampling probe connected to a $CO_2$ analyser. Any instrument used shall be sensitive to a concentration of 0,01 % $CO_2$, and precautions shall be taken to ensure that sampling does not interfere with the normal evacuation of the combustion products. An increase in the $CO_2$ level above the ambient of more than 0,05 % in the installation room shall be regarded as unsatisfactory.

##### 7.3.1.2.2 All Type $B_{14}$ and $B_{44}$ appliances

The appliance is installed as described in 7.1.6 and connected to a flue as described in 7.1.6.2. The test is carried out after operating the appliance for 10 min starting from the cold condition, burning one of the reference gases for the category concerned at the nominal heat input.

Under these conditions, the flue is progressively restricted until the main burner and, where appropriate, the ignition burner are shut off by the action of the air proving device. At the point of shut-off, the increase in static pressure is measured immediately before the flue outlet.

Possible leaks are looked for with a dew plate or the sampling probe as described in 7.3.1.2.1.

It is checked that the requirements of 6.1.1.2.1 are met.

##### 7.3.1.2.3 Type $B_{22}$, $B_{23}$ , $B_{52}$ and $B_{53}$ appliances

The appliance is installed as described in 7.1.6 and connected to a flue having the maximum allowable pressure drop. The test is carried out after operating the appliance for 10 min starting from the cold condition, burning one of the reference gases for the category concerned at the nominal heat input.

Possible leaks from the appliance and flue connection are looked for with a sampling probe connected to a $CO_2$ analyser. An increase in the $CO_2$ level above the ambient of more than 0,05 % in the installation room shall be regarded as unsatisfactory.

It is checked that the requirements of 6.1.1.2.2 are met.

##### 7.3.1.2.4 Type $C_{12}$, $C_{13}$, $C_{32}$ and $C_{33}$ appliances

The appliance is installed with the longest lengths of the combustion air supply duct and combustion products duct (POCED), and with the maximum number of connections in the ducting allowed by the manufacturer's instructions.

The terminal(s) and/or duct(s) for combustion air and/or combustion products (POCED) is/are sealed at the ends, any lighting door is closed and the gas inlet to the main burner and any ignition burner is blocked. Openings intended for the entrainment of air for motor cooling purposes may be blocked during the test. The manufacturer shall demonstrate that such entrainment cannot be reversed in operation.

Air is passed into the appliance and the air flow rate is noted when the pressure inside the appliance is steady at 0,5 mbar overpressure.

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#### 7.3.1.2.5 Type $C_{62}$ and $C_{63}$ appliances

The appliance is tested as described in 7.3.1.2.4 above but without the combustion air supply and combustion products evacuation ducts fitted.

### 7.3.2 Heat inputs

#### 7.3.2.1 General

For the purposes of this standard all heat inputs are determined from the volumetric rate ($V_o$) or mass rate ($M_o$) which relate to the rate obtained with reference gas under reference test conditions (dry gas, 15 °C, 1 013,25 mbar). The heat input ($Q_o$) in kilowatts (kW) is given by one of Equations (2) or (3).

$$Q_o = 0{,}278\ M_o \times H_i \text{ (or } H_s\text{); or} \quad (2)$$

$$Q_o = 0{,}278\ V_o \times H_i \text{ (or } H_s\text{)} \quad (3)$$

where

$M_o$ is the mass rate in kilograms per hour (kg/h) obtained at reference conditions;

$V_o$ is the volume rate in cubic metres per hour ($m^3$/h) obtained at reference conditions;

$H_i$ is the net calorific value of the reference gas in megajoules per kilogram (MJ/kg) or in megajoules per cubic metre (MJ/$m^3$) (dry gas, 15 °C, 1 013,25 mbar), as appropriate;

$H_s$ is the gross calorific value of the reference gas in megajoules per kilogram (MJ/kg) or in megajoules per cubic metre (MJ/$m^3$) (dry gas, 15 °C, 1 013,25 mbar), as appropriate.

The mass and volume rates correspond to a measurement and to a flow of reference gas, under reference conditions, in other words assuming the gas to be dry, at 15 °C and under a pressure of 1 013,25 mbar.

In practice, the values obtained during the tests do not correspond to these reference conditions so they shall then be corrected so as to bring them to the values that would actually have been obtained if these reference conditions had existed at the injector outlet during the test.

If the corrected mass flow rate ($M_o$) is determined using the mass flow rate ($M$), Equation (4) is used.

$$M_0 = M\sqrt{\frac{1013{,}25 + p}{p_a + p} \times \frac{273 + t_g}{288} \times \frac{d_r}{d}} \quad (4)$$

where

$M_o$ is the corrected mass flow rate in kilograms per hour (kg/h), obtained under test conditions;

$M$ is the mass flow rate in kilograms per hour (kg/h), obtained under test conditions;

$p_a$ is the atmospheric pressure in millibars (mbar);

$p$ is the gas supply pressure in millibars (mbar);

$t_g$ is the temperature of the gas at the measuring point in degrees Celsius (°C);

$d$ is the density of dry gas relative to dry air;

$d_r$ is the density of the reference gas relative to dry air.




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If the corrected volumetric flow rate ($V_o$) is determined using the volumetric flow rate ($V$), Equation (5) is used.

$$V_0 = V\sqrt{\frac{1013{,}25 + p}{1013{,}25} \times \frac{p_a + p}{1013{,}25} \times \frac{288}{273 + t_g} \times \frac{d}{d_r}} \quad (5)$$

where

$V_o$ is the corrected volumetric flow rate in cubic metres per hour ($m^3/h$), under reference conditions;

$V$ is the volumetric flow rate in cubic metres per hour ($m^3/h$), obtained under test conditions;

$p_a$ is the atmospheric pressure in millibars (mbar);

$p$ is the gas supply pressure in millibars (mbar);

$t_g$ is the temperature of the gas at the measuring point in degrees Celsius (°C);

$d$ is the density of dry gas relative to dry air;

$d_r$ is the density of the reference gas relative to dry air.

The corrected mass flow rate ($M_o$), under reference conditions is calculated using Equation (6).

$$M_0 = 1{,}226\ V_0 \times d \quad (6)$$

where

$M_o$ is the corrected mass flow rate in kilograms per hour (kg/h), obtained under test conditions;

$V_o$ is the corrected volumetric flow rate in cubic metres per hour ($m^3/h$), under reference conditions;

$d$ is the density of dry gas relative to dry air;

Equations (2) and (3) are used to calculate, from the mass flow rate ($M$) or volumetric flow rate ($V$) measured during the test, the corresponding corrected flow rates $M_o$ or $V_o$ which would have been obtained under the reference conditions.

Equations (2) and (3) are applicable if the test gas used is dry.

If a wet meter is used or if the gas used is saturated, the value $d$ is replaced by the value of the density of the wet gas ($d_h$) and is given by Equation (7).

$$d_h = \frac{d(p_a + p - p_w) + 0{,}622 + p_w}{p_a + p} \quad (7)$$

where

$d_h$ is the density of the wet gas relative to dry air;

$d$ is the density of dry gas relative to dry air;

$p$ is the gas supply pressure in millibars (mbar);

$p_a$ is the atmospheric pressure in millibars (mbar);

$p_w$ is the saturation vapour pressure of the test gas in millibars (mbar) at temperature $t_g$.




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#### 7.3.2.2 Nominal heat input

The tests are carried out at the pressure specified by the manufacturer in accordance with the requirements of 7.1.4.

The appliance is fitted successively with each of the injectors prescribed by the manufacturer for each gas group and adjusted in accordance with 7.1.3.2.1. The heat input is determined as described in 7.3.2 for each reference gas.

The measurements are taken with the appliance at thermal equilibrium and with any thermostat put out of action.

The heat input obtained $Q_o$ is compared with the nominal heat input $Q_n$ in order to verify the requirements of 6.1.2.1.

#### 7.3.2.3 Start gas heat input

The tests are carried out at the pressure specified by the manufacturer in accordance with the requirements of 7.1.4, using an arrangement which allows operation of the start-gas flame on its own.

The appliance is fitted successively with each of the injectors prescribed by the manufacturer for each gas group and adjusted in accordance with 7.1.3.2.1. The heat input is determined as described in 7.3.2 for each reference gas.

The measurements are taken immediately after ignition of the start-gas flame.

The heat input obtained is compared with the start gas heat input declared by the manufacturer in order to verify the requirements of 6.1.2.2.

#### 7.3.2.4 Effectiveness of the gas rate adjusters

This clause concerns only appliances fitted with gas rate adjusters which are not put out of action.

a) Test 1

The rate is measured with the adjuster fully open and with the minimum supply pressure given in 7.1.4 for the particular reference gas.

b) Test 2

The rate is measured with the adjuster fully closed and with the maximum supply pressure given in 7.1.4 for the particular reference gas.

The tests are carried out for each reference gas for the appliance category with the exception of cases where the adjuster has been set by the manufacturer in a given position. In this case, the adjuster is regarded as non-existent.

#### 7.3.2.5 Effectiveness of the gas regulator

If the appliance has an adjustable regulator, this is adjusted if necessary to give the nominal volumetric rate with reference gas at the normal pressure given in 7.1.4 and corresponding to this gas. Keeping the initial adjustment, the supply pressure is varied between the corresponding minimum and maximum values.

This test is carried out for all the reference gases for which the regulator is not put out of action. For first family gases, however, this check is made between the nominal pressure and the maximum pressure.




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#### 7.3.2.6 Effectiveness of the range-rating device

The tests are carried out as described in 7.3.2.2 for the two extreme positions of the range-rating device.

#### 7.3.2.7 Air-gas ratio controls

##### 7.3.2.7.1 Leakage of non-metallic tubes

The appliance is installed as described in 7.1.6. It is supplied with reference gas at its nominal heat input. The requirements of 6.1.11.1 are checked under the various situations which could occur, in particular:

— simulated leak from the air pressure tube;

— simulated leak from the combustion chamber pressure tube;

— simulated leak from the gas pressure tube.

##### 7.3.2.7.2 Gas-air pressure ratio adjustment

Adjustable air-gas ratio controls are operated at the maximum and minimum gas/air pressure ratio settings. It is checked that the requirements of 6.1.11.2 are met.

### 7.3.3 Flame supervision

#### 7.3.3.1 General

The appliance is installed as described in 7.1.6 and the tests described in 7.3.3.2 and 7.3.3.3 are carried out using the appropriate reference gas for the appliance category.

#### 7.3.3.2 Ignition opening time

With the appliance cold, the gas supply is turned on and the ignition burner is lit. 20 s after ignition, manual intervention is withdrawn and it is checked that the ignition burner remains alight.

#### 7.3.3.3 Extinction safety time

With the appliance operating in the hot condition, the gas supply to the ignition burner and the main burner is turned off and then turned on again immediately after the flames have been extinguished. The extinction safety time is measured from the moment the flame is extinguished until the gas supply is shut off by the action of the flame supervision device.

### 7.3.4 Limiting temperatures

#### 7.3.4.1 General

The appliance is operated with any reference gas for the appliance category at the nominal heat input, the minimum circulated air rate corresponding with the response level of the overheat limit device or overheat cut-off device as preset by the manufacturer and any adjustable thermostat at maximum setting. Unless otherwise specified, the tests are carried out with the appliance at thermal equilibrium.

The minimum air rate at which the overheat limit device or overheat cut-off device responds is detected as described in 7.3.7.

For ductless heaters, the discharge louvres shall be set at the position of closure corresponding with the response of the overheat limit device or overheat cut-off device as preset by the manufacturer.




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Range-rated appliances are operated at the maximum heat input.

#### 7.3.4.2 Temperatures of appliance parts which have to be touched

Under the test conditions of 7.3.4.1, the temperatures of the parts specified in 6.1.4.1 are measured to an accuracy of ± 2 K using for instance contact thermocouples, and compliance with 6.1.4.1 is verified.

#### 7.3.4.3 Temperatures of the appliance surface

Under the test conditions of 7.3.4.1, the appliance is operated until the rise of the case temperature does not exceed 2 K/10 min.

The temperatures of the hottest parts of the appliance surface are measured by a suitable means (e.g. thermocouples) with an accuracy of ± 2 K with sensing elements applied against the external surfaces of the parts concerned.

It is checked that the requirements of 6.1.4.2 are satisfied.

#### 7.3.4.4 Temperatures of the surroundings

The appliance is installed on, under or opposite to a 20 mm thick oak panel painted a dull black with the minimum clearances and, if applicable, the indicated methods of protecting walls and ceilings as specified in the manufacturer's instructions.

After the appliance has been in operation for at least 30 min or, if necessary, sufficiently longer to reach thermal equilibrium, the temperature of the above panel is determined by means of suitable surface temperature sensing instruments or temperature-sensitive chemicals. At abnormal ambient temperatures the panel temperatures should be calculated by interpolation.

The test is repeated until the thermal effect of all parts hotter than 85 °C has been established. It is checked that the requirements of 6.1.4.3 are met.

#### 7.3.4.5 Component temperatures

If a maximum temperature is stated and defined for a specific point on the surface of the component by the component manufacturer, this temperature has to be checked when thermal equilibrium has been reached in the test described in 7.3.4.1.

If there is no specific point defined by the component manufacturer, the direct ambient temperature is measured within a distance of 20 mm from the component by means of a sensing element which is accurate within ± 2 K.

The measured ambient temperature has to be checked with the maximum allowed ambient temperature as stated by the component manufacturer, with the appliance installed as described in 7.3.4.1.

The temperature measurements of the components are deemed to be satisfactory if the requirements of Equation (8) are met.

$$t_m \leq t_s + t_a - 25\ °C \qquad (8)$$

where

$t_m$ is the maximum temperature measured in the test in degrees Celsius (°C);

$t_s$ is the maximum temperature specified by the component manufacturer in degrees Celsius (°C);

$t_a$ is the ambient room temperature in degrees Celsius (°C).

NOTE If the maximum temperature of the component was specified for an ambient temperature other than 25 °C, this should be used.

It is checked that the requirements of 7.3.4.4 are satisfied.

#### 7.3.4.6 POCED (Type $B_{41}$, $C_{11}$ and $C_{31}$ appliances)

##### 7.3.4.6.1 Test no. 1

This test is carried out if, when the appliance is installed in accordance with the manufacturer's instructions, any part of the POCED is capable of being less than 25 mm from combustible parts of the fabric of the building.

Install the appliance in accordance with 7.1.6.3 and attach thermocouples junctions to the external surface of those parts of the POCED that are capable of being less than 25 mm from combustible parts of the fabric of the building. Thermocouples shall be used in accordance with EN 60584-1 with the limits of accuracy of the thermoelectric voltage used in accordance with class 2 of EN 60584-2:1993.

The appliance is supplied with one of the reference gases indicated in 7.1.1 according to its category and adjusted in accordance with 7.1.3.2.1.

The test is carried out with the appliance operating at its nominal heat input. All measurements are taken when thermal equilibrium has been reached. It is recommended that for this test the appliance should be placed in a room where the ambient temperature is approximately 20 °C.

At the end of the test, check that the maximum temperature rise of the POCED does not exceed the limit specified in 6.1.4.6.

##### 7.3.4.6.2 Test no. 2

This test is carried out if, in accordance with the manufacturer's installation instructions, the POCED is required to be enclosed within another duct, a sleeve or insulation when it passes through a combustible wall or ceiling.

Install the appliance in accordance with 7.1.6.3. The duct, sleeve or insulation enclosing the POCED shall be fitted in accordance with the manufacturer's instructions. This duct, sleeve or insulation shall be so dimensioned and arranged that it encloses a section of the POCED that is 350 mm in length, as close to the appliance as the manufacturer's instructions allow.

Attach thermocouples junctions to the external surface of the duct, sleeve or insulation and then enclose the duct, sleeve or insulation with a 25 mm thick layer of insulation. Thermocouples shall be used in accordance with EN 60584-1 with the limits of accuracy of the thermoelectric voltage used in accordance with class 2 of EN 60584-2:1993.

The appliance is supplied with one of the reference gases indicated in 7.1.1 according to its category and adjusted in accordance with 7.1.3.2.1.

The test is carried out with the appliance operating at its nominal heat input. All measurements are taken when thermal equilibrium has been reached. It is recommended that for this test the appliance should be placed in a room where the ambient temperature is approximately 20 °C.

At the end of the test, check that the maximum temperature rise at the external surface of the duct, sleeve or insulation enclosing the POCED does not exceed the limit specified in 6.1.4.6.




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### 7.3.5 Ignition, cross-lighting, flame stability

#### 7.3.5.1 General

Unless otherwise stated, the tests described in 7.3.5 are carried out with the appliance in the cold condition and at thermal equilibrium.

#### 7.3.5.2 Ignition and cross-lighting

##### 7.3.5.2.1 All appliances (still air conditions)

###### 7.3.5.2.1.1 General

These tests are carried out with the appliance installed in accordance with 7.1.6.

###### 7.3.5.2.1.2 Ignition of the burner(s)

The requirements of 6.1.5.1.1 are verified using the following series of tests:

a) Test no. 1

The appliance is supplied with the appropriate reference and limit gases (see Table 5) at the normal pressure in accordance with 7.1.4.

Under these supply conditions it is checked that ignition of the main burner or the ignition burner occurs correctly and that ignition of the main burner by the ignition burner as well as cross-lighting of the various parts of the burner occurs correctly.

This test is repeated at the minimum heat input given by the controls, if ignition is possible under these conditions during normal operation in accordance with the manufacturer's instructions for use.

b) Test no. 2

Without altering the initial burner and ignition burner adjustments, the appliance is supplied with reference gas with the pressure at the appliance inlet reduced to the minimum pressure given in 7.1.4.

Under these supply conditions it is checked that ignition of the main burner or the ignition burner occurs correctly and that ignition of the main burner by the ignition burner as well as cross-lighting of the various parts of the burner occurs correctly.

This test is repeated at the minimum heat input given by the controls, if ignition is possible under these conditions during normal operation in accordance with the manufacturer's instructions for use.

c) Test no. 3

Without altering the initial main burner or ignition burner adjustment, the appropriate flame lift and light-back limit gases are substituted successively for the reference gas and the pressure is reduced at the appliance inlet to the minimum pressure given in 7.1.4.

Under the supply conditions it is checked that ignition of the main burner or the ignition burner occurs correctly and that ignition of the main burner by the ignition burner as well as cross-lighting of the various parts of the burner occurs correctly.

This test is repeated at the minimum heat input given by the controls, if ignition is possible under these conditions during normal operation in accordance with the manufacturer's instructions for use.




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#### 7.3.5.2.1.3 Ignition burner flame reduction

This test is carried out with the appliance installed in accordance with 7.1.6. The appliance is initially adjusted in accordance with the requirements of 7.1.3.2.1 and supplied with the appropriate reference gases (see Table 5) at nominal heat input.

The ignition burner gas rate is then reduced to the minimum required to hold open the gas supply to the main burner. The necessary reduction in the ignition burner gas rate may be achieved either:

— by the adjustment of the ignition burner gas rate adjuster, if this exists; or, if this is not possible,

— by means of an adjuster inserted into the ignition burner gas supply for this purpose.

Correct ignition of the main burner by the ignition burner is then checked.

Where an ignition burner has several ports that are likely to become blocked, the test is carried out with all the ignition burner orifices blocked except for the one that produces the flame that heats the flame sensor.

It is checked that the requirements of 6.1.5.1.1 are satisfied.

#### 7.3.5.2.2 Appliances with automatic burner systems

The appliance is installed as described in 7.1.6.

The appliance is initially adjusted in accordance with the requirements of 7.1.3.2.1 and supplied with the appropriate reference gas (see Table 5) at the nominal heat input.

Ignition of the ignition burner or the main burner if this is ignited directly is checked. The test is repeated, progressively delaying the ignition up to the end of the safety time.

In order to delay the ignition, it will generally be necessary to provide independent control of the main gas or start gas shut-off valves and the operation of the ignition device. A suitable arrangement is to provide a voltage supply, independent of the automatic burner control system, to the relevant gas valve(s) and the ignition device. For safety reasons the ignition delay should be increased in stages.

#### 7.3.5.2.3 Appliances where the start gas is taken from between the two main burner gas valves

The appliance is initially adjusted in accordance with the requirements of 7.1.3.2.1 and supplied with an appropriate reference gas (see Table 5) at the nominal heat input.

With the downstream automatic gas valve in the main gas line kept open artificially, ignite the appliance.

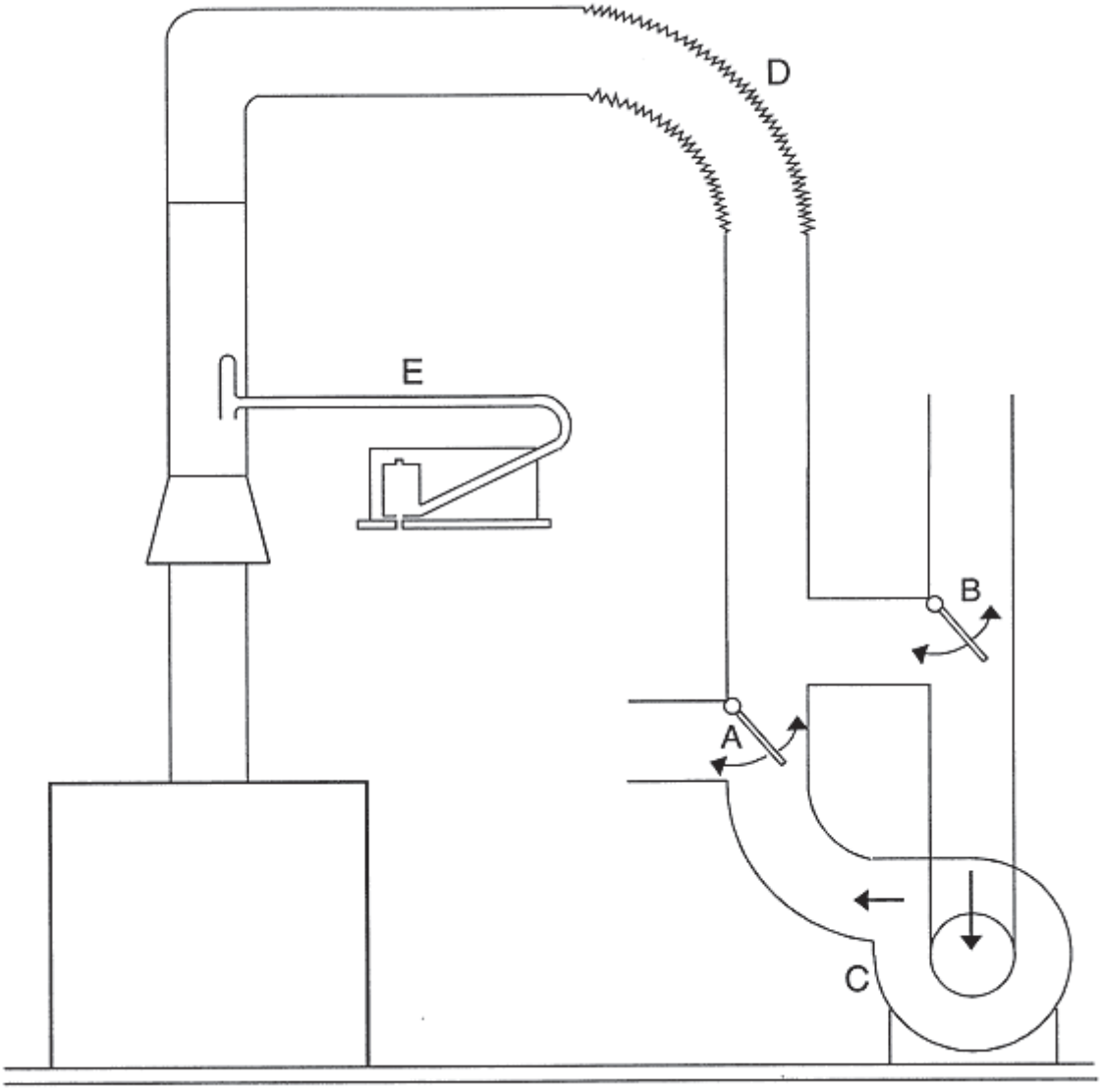
It is checked that the requirement of 6.1.5.1.2 is met.

#### 7.3.5.2.4 Special conditions

##### 7.3.5.2.4.1 All Type $B_{12}$, $B_{13}$, $B_{42}$ and $B_{43}$ appliances

The appliance is supplied with an appropriate reference gas (see Table 5) at normal pressure. It is connected to a secondary flue of the same nominal diameter as the flue connection and straight for a length of not less than 10 diameters immediately above the draught diverter. A down-draught of up to 3 m/s is applied through the secondary flue using a suitable down-draught apparatus (see Figure 5).

A second test is carried out with the test flue blocked.




**Key**

| | |
|---|---|
| A and B | diverter valves to obtain either downdraught or updraught |
| C | fan |
| D | flexible |
| E | velocity measurement by means of a Pitot tube |

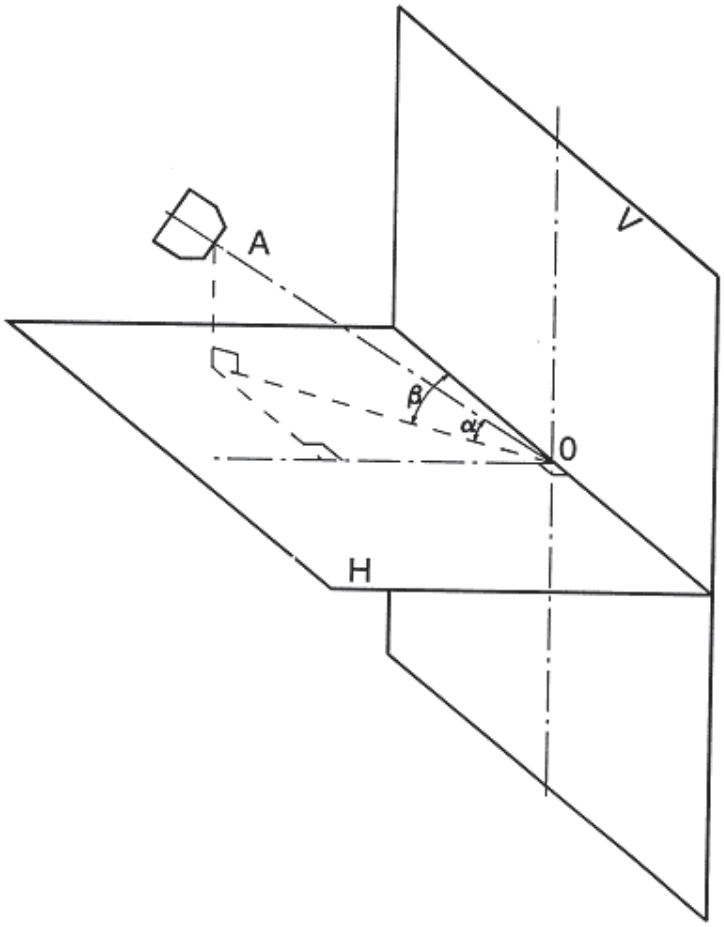
**Figure 5 — Test of an appliance under abnormal draught conditions**

#### 7.3.5.2.4.2 All Type $B_{14}$ and $B_{44}$ appliances

The appliance is tested under the same conditions as given in 7.3.1.2.2. However, for appliances having a manually ignited ignition burner, the restriction of the flue outlet is continued until the flue is completely blocked. In addition the restriction of the flue outlet is carried out in stages in order that the requirements of 6.1.5.1.4.2 and 6.1.5.2.2.1 can be checked.

#### 7.3.5.2.4.3 Type $C_{12}$ and $C_{13}$ appliances

The appliance is installed on the apparatus described in Figure 6, using the shortest lengths of combustion products duct and, where applicable, combustion air duct specified in the manufacturer's instructions.




**Key**

A wind generator
H horizontal plane
V vertical plane

$\alpha$ = 0° (horizontal winds), + 30° and - 30°

*ß* = 0° (glancing winds), 15°, 30°, 45°, 60°, 75°, 90° (perpendicular to the test wall)

NOTE When the terminal is not symmetrical, the tests are continued with the following incident angles: 105°, 120°, 135°, 150°, 165°, 180°.

Angle *β* may be varied either by modification of the position of the wind generator (fixed wall) or by rotation of the test wall about a central vertical axis.

The test wall consists of a strong vertical wall at least 1,8 m square with a removable panel at its centre. The terminal of the appliance is mounted so that its geometric centre is at the centre *0* of the test wall, and its projection from the wall is recommended by the manufacturer.

The characteristics of the wind generator and the distance from the test wall at which it is placed are chosen such that the following criteria are met at the level of the test wall, after the central panel has been removed:

— the wind front is either approximately 90 cm square or a circular section with a diameter of 60 cm;

— wind speeds of 2,5 m/s, 5 m/s and 10 m/s can be obtained, with an accuracy of 10 %, over the whole of the wind front;

— the wind stream is essentially parallel and has no residual rotational movement.

When the central removable panel is not large enough to allow checking of these criteria, they are checked without the wall at a distance corresponding to the distance existing in practice between the wall and the wind generator discharge nozzle.

**Figure 6 — Test apparatus for a Type $C_1$ appliance**

The appliance is supplied with an appropriate reference gas in accordance with Table 5, and adjusted to obtain the nominal heat input.

Three series of tests are carried out:

a) Series 1

The appliance terminal is subjected to winds of different speeds in the following three planes (see also Figure 6):

1) horizontal;

2) ascending, at 30° to the horizontal;

3) plunging, at 30° to the horizontal.

In each of these three planes, the incident angle of the wind is varied by 15° increments between 0° and 90° inclusive. If the terminal is not symmetrical about the vertical axis, the tests are carried out at 15° increments between 0° and 180° inclusive.

The tests are carried out at three wind speeds, 1 m/s, 2,5 m/s and 12,5 m/s.

Under each of these conditions a visual check is made of:

4) the ignition and stability of any ignition burner without the main burner alight;

5) the ignition of the main burner by any ignition burner;

6) the ignition and stability of the main burner at any start-gas rate;

7) the cross lighting of the main burner;

8) where applicable, the stability of any ignition burner and the main burner when operating simultaneously.

These tests are carried out with the appliance at thermal equilibrium.

For each combination of wind speed and incident angle, the CO and $CO_2$ concentrations in the combustion products are noted.

b) Series 2

For each of the three incident planes, the three combinations of wind speed and incident angle that produce the lowest $CO_2$ concentrations in the combustion products are selected. For these nine combinations, it is checked that, with the appliance cold, it is possible to light the ignition burner, if any, and then the main burner by means of either the ignition burner or the device for direct ignition.

c) Series 3

The first and second series are repeated at the minimum heat input given by the controls if such operation is intended by the manufacturer.

#### 7.3.5.2.4.4 Type $C_{32}$ and $C_{33}$ appliances

The appliance is installed on the apparatus as shown in Figures 7 and 8. The complete test series of each figure shall be performed twice, one time with the shortest and one time with the longest possible lengths of the combustion products duct and combustion air duct as stated and delivered by the manufacturer.

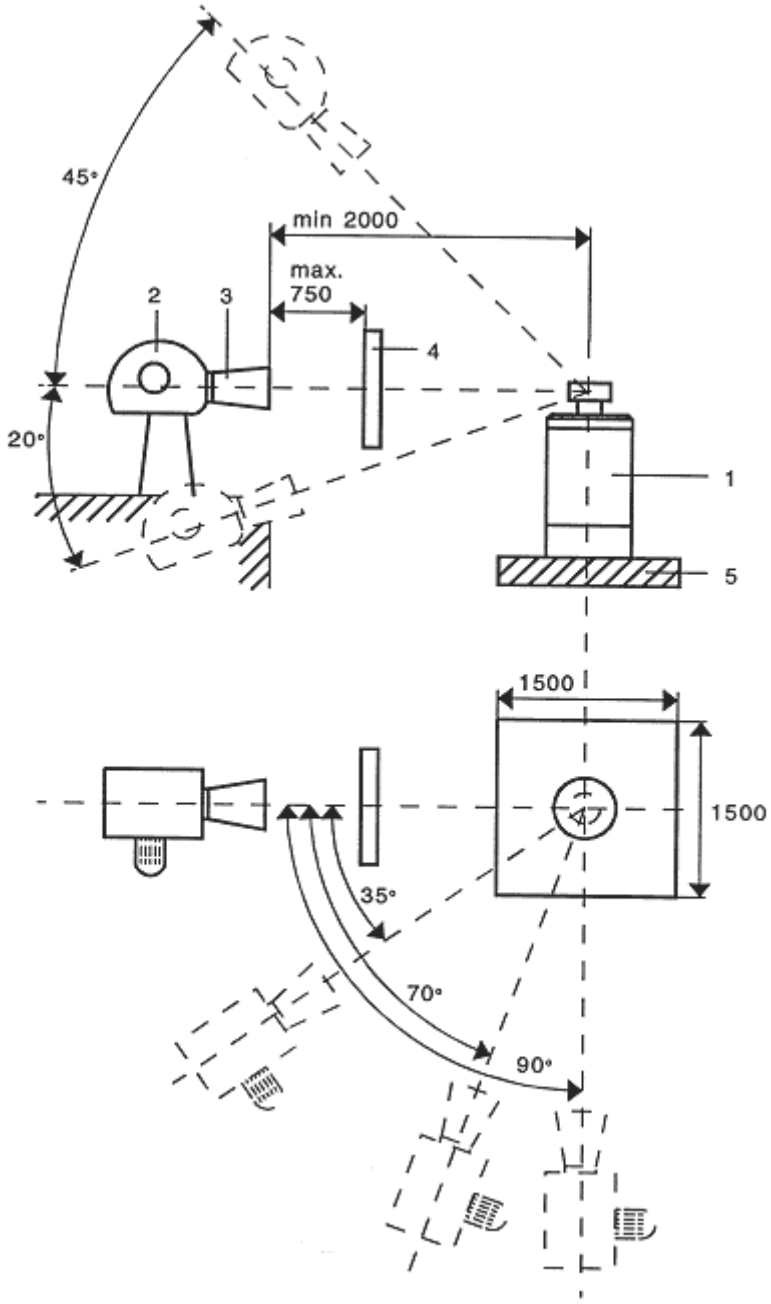
The appliance is supplied with the appropriate reference gas in accordance with Table 5, and adjusted to obtain the nominal heat input.

Three series of tests are carried out; these are the same as those described in 7.3.5.2.4.3 (Type $C_{12}$ and $C_{13}$ appliances) except the planes and angles of the wind (ascending 20°, plunging 45°).

The wind speeds are as shown in 7.3.5.2.4.3.

The wind directions are as shown in Figures 7 and 8.

Dimensions in millimetres

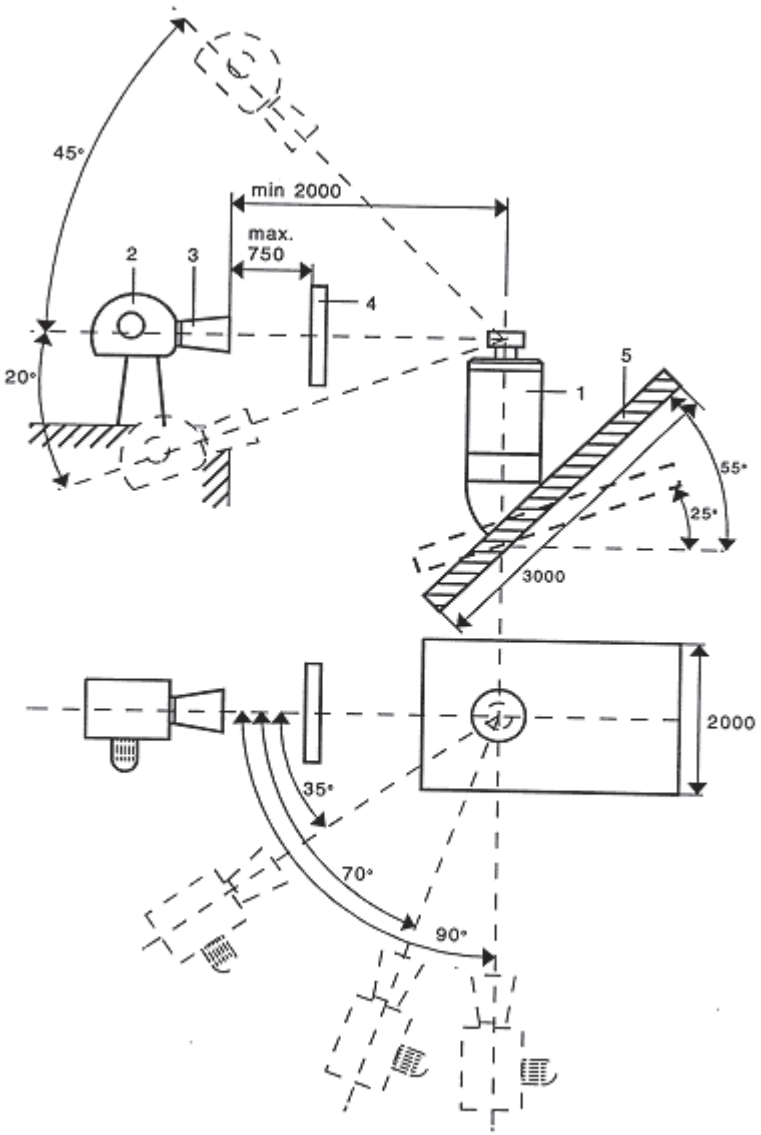



**Key**

1 combustion air intake and flue outlet
2 wind generator (shall be such that it can reproduce the specified wind speeds to within an accuracy of ± 10 % across a wind front)
3 diffuser
4 wind front (shall be sufficient to ensure that both the inlet and outlet of the terminal are covered)
5 test surface

**Figure 7 — Test apparatus for Type $C_3$ appliances - flat roof**

Dimensions in millimetres




**Key**

1 combustion air intake and flue outlet
2 wind generator (shall be such that it can reproduce the specified wind speeds to within an accuracy of ± 10 % across a wind front)
3 diffuser
4 wind front (shall be sufficient to ensure that both the inlet and outlet of the terminal are covered)
5 test surface

**Figure 8 — Test apparatus for Type $C_3$ appliances - angled roof**

#### 7.3.5.2.4.5 Type $C_{62}$ and $C_{63}$ appliances

The appliance is installed with the test duct described in 7.1.6.

Except for the wind generation, three series of tests are performed as described in 7.3.5.2.4.3 (Type $C_{12}$ and $C_{13}$ appliances). The revised wind direction requirements are that the:

a) restrictor in the test duct is set in the position simulating the least possible resistance in the duct system as stated by the manufacturer;

b) restrictor in the test duct is set in the position of the maximum allowable pressure drop in the duct system;

c) restrictor in the test duct is set in the position of minimum resistance in the duct system, an external fan is used to generate a negative pressure (suction) that reduces the actual pressure by 0,5 mbar at the outlet of the appliance.

### 7.3.5.3 Flame stability

#### 7.3.5.3.1 All appliances (still air conditions)

The tests described in 7.3.5.3.1 a) and b) are applicable to all appliances. However, for Type $C_6$ appliances, they shall be carried out with the restrictor in the test duct system (see Figure 3) set to simulate the least possible resistance in the duct system stated by the manufacturer. The test shall be repeated with the restrictor set to simulate the maximum allowable pressure drop in the duct system.

a) Test 1

Without altering the initial main burner or ignition burner adjustment, the appropriate light-back gas is substituted for the reference gas and the pressure is reduced at the appliance inlet to the minimum pressure given in 7.1.4.

Under these conditions it is checked that the flames are stable.

This test is then repeated at the minimum input given by the controls at which the appliance can operate normally in accordance with the manufacturer's instructions.

b) Test 2

Without altering the initial main burner or ignition burner adjustment, the appropriate flame lift and light-back limit gases are substituted successively for the reference gas and the pressure is increased at the appliance inlet to the maximum given in 7.1.4.

Under these conditions it is checked that the flames are stable.

This test is then repeated at the minimum input given by the controls at which the appliance can operate normally in accordance with the manufacturer's instructions.

#### 7.3.5.3.2 Special conditions (Type B appliances only)

The appliance is supplied with the reference gas at normal pressure and is subjected at burner level to a wind stream of 2 m/s. The wind stream has a minimum diameter of 0,5 m, but covers at least the width of the appliance and is essentially parallel (speed uniform to within ± 20 %).

The axis of the wind stream is in a horizontal plane and is moved through one or more (at the discretion of the test house) angles of incidence within a semi-circle in front of the appliance, the centre of the semi-circle passing through the plane of symmetry of the appliance.

The test is carried out with the main burner and any ignition burner alight together and, if appropriate, with only the ignition burner alight. Any lighting door remains closed during the test.

The test is repeated at the minimum input given by the controls if such operation is intended by the manufacturer.

During the test, precautions should be taken to screen the draught diverter from the effects of the 2 m/s wind stream.

### 7.3.6 Combustion

#### 7.3.6.1 Test installation

The appliances are installed in accordance with the relevant clauses of 7.1.6, with the following additions:

Type $B_{22}$ and $B_{23}$ appliances are installed as follows:

— Appliances intended to be fitted to a flue having a wall termination shall be connected in turn to a flue of the minimum and maximum allowable pressure drop as stated by the manufacturer.

— Appliances intended to be fitted to a vertical flue having a termination above roof level shall be connected in turn to a flue of 1 m height or the minimum specified by the manufacturer and to a flue of the maximum allowable pressure drop as stated by the manufacturer.

Type $B_{44}$, $B_{52}$ and $B_{53}$ Appliances are connected in turn to a POCED, as supplied or specified by the appliance manufacturer, having the minimum and maximum equivalent resistances specified in the manufacturer's instructions.

#### 7.3.6.2 Test procedure

The appliance is initially adjusted to the nominal heat input in accordance with 7.1.3.2.

The products of combustion shall be collected in such a manner as to ensure a representative sample, using a suitable sampling probe. For Type $C_6$ appliances, a suitable probe is shown in Figure 9.

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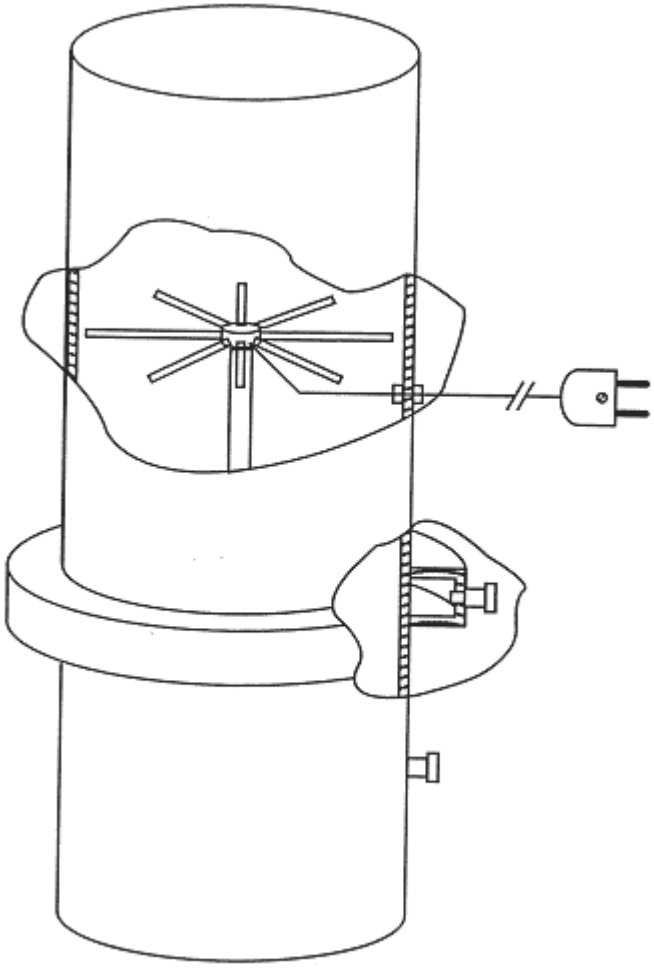

**Figure 9 — Sampling probe for Type $C_6$ appliances**

The concentrations of carbon monoxide (CO), carbon dioxide ($CO_2$), and oxygen ($O_2$), where appropriate, are measured by a method accurate to within ± 6 % of the reading.

For all tests the sample shall be taken when the appliance has reached thermal equilibrium whilst operating under the specified conditions.

The carbon monoxide concentration of the dry, air-free products of combustion (neutral combustion) is given by Equation (9).

$$V_{\mathrm{CO,N}} = V_{\mathrm{CO_2,N}} \times \frac{V_{\mathrm{CO,M}}}{V_{\mathrm{CO_2,M}}} \tag{9}$$

where

$V_{\mathrm{CO,N}}$ is the carbon monoxide concentration of the dry air-free products of combustion in percent (%);

$V_{CO_2,N}$ the calculated carbon dioxide content of the dry air-free products of combustion in percent (%);

$V_{CO,M}$ and $V_{CO_2,M}$ are the carbon monoxide and carbon dioxide concentrations measured in the sample during the combustion test in percent (%).

The values of $V_{CO_2,N}$ (neutral combustion) are given for the test gases in Table 7.

**Table 7 — $V_{CO_2,N}$ values**

| Gas designation | G 110 | G 20 | G 21 | G 25 | G 26 | G 30 | G 31 |
|---|---|---|---|---|---|---|---|
| $V_{CO_2,N}$ | 7,6 | 11,7 | 12,2 | 11,5 | 11,8 | 14,0 | 13,7 |

The carbon monoxide concentration of the dry, air-free combustion products ($V_{CO,N}$) may also be calculated using Equation (10).

$$V_{CO,N} = \frac{21}{21 - V_{O_2,M}} \times V_{CO,M} \quad (10)$$

where

$V_{CO,N}$ is the carbon monoxide concentration in percent (%) of the dry, air free combustion products;

$V_{O_2,M}$ is the oxygen concentration in percent (%) measured in the sample;

$V_{CO,M}$ is the carbon monoxide concentration in percent (%) measured in the sample.

The use of this formula is recommended where it gives greater accuracy than the formula based on the $CO_2$ concentration.

#### 7.3.6.3 All appliances (still air conditions)

##### 7.3.6.3.1 General

The tests described in 7.3.6.3 are carried out under still air conditions.

##### 7.3.6.3.2 Test no. 1

Without altering the initial burner adjustment the appliance is supplied with the appropriate reference gases (see Table 5) according to its category and the pressure at the appliance inlet increased to the maximum pressure given in 7.1.4.

##### 7.3.6.3.3 Test no. 2

Without altering the initial burner adjustment, the appliance is supplied with the appropriate reference gases (see Table 5) according to its category with the pressure at the appliance inlet reduced to 70 % of the normal pressure or the minimum pressure given in 7.1.4, whichever is the lower.

##### 7.3.6.3.4 Test no. 3

Without altering the initial burner adjustment, the appropriate incomplete combustion limit gases are substituted successively for the reference gas and the pressure at the appliance inlet increased to the maximum pressure given in 7.1.4. It is checked that the requirements of 6.1.6.1 are met.

#### 7.3.6.3.5 Test no. 4

Without altering the initial burner adjustment, the appliance is supplied with the appropriate reference gases (see Table 5) according to its category and with the normal gas pressure at the appliance inlet.

The test is carried out with the appliance supplied with electricity at a voltage of 85 % of the minimum and then at a voltage of 110 % of the maximum voltage in the range stated by the manufacturer.

#### 7.3.6.3.6 Test no. 5

Without altering the initial burner adjustment, the appliance is supplied with the appropriate reference gases (see Table 5) according to its category and with the normal gas pressure at the appliance inlet.

For the purpose of this test, the combustion air fan only shall be supplied with electricity by means of a suitable device which permits variation in voltage.

With the appliance operating at thermal equilibrium, gradually reduce the voltage supply to the fan in the combustion circuit until the gas is shut off. Sample the products of combustion until the moment the gas supply is shut off.

The voltage supply is then increased until the air proving device permits restart of the appliance. Operate it until thermal equilibrium conditions are re-established and then sample the products of combustion in order to check that the requirements of 6.1.6.1 are met.

### 7.3.6.4 Special conditions

#### 7.3.6.4.1 Type $B_{22}$, $B_{23}$, $B_{52}$ $B_{53}$ , $C_{12}$ , $C_{13}$ , $C_{32}$ , $C_{33}$ , $C_{62}$ ,and $C_{63}$ appliances having fully pre-mixed gas/air burners under the control of a zero governor system

Without altering the initial adjustment, the appliance is supplied with the appropriate reference gases (see Table 5) according to its category at the normal pressure.

With the appliance in the cold condition, the flue/combustion products duct is progressively restricted to the maximum amount that still enables the burner to be ignited. The means of carrying out the restriction shall not give rise to recirculation of the products of combustion. Under this condition, the appliance is operated until thermal equilibrium is reached and the products of combustion are then sampled.

It is checked that the requirements of 6.1.6.2.1 are met.

#### 7.3.6.4.2 Appliances other than those having fully pre-mixed gas/air burners under the control of a zero governor system

Without altering the initial burner adjustment, the appliance is supplied with the appropriate reference gases (see Table 5) according to its category and with the normal gas pressure at the appliance inlet.

The combustion air intake or the combustion products outlet, by agreement between the manufacturer and the test house, is then progressively covered. Sample the products of combustion until the moment the gas supply is shut off.

#### 7.3.6.4.3 All Type $B_{12}$, $B_{13}$, $B_{42}$ and $B_{43}$ appliances

Without altering the initial burner adjustment, the appliance is supplied with the appropriate reference gases (see Table 5) according to its category and operated at the nominal heat input.

A first test is carried out with the flue blocked.

A second test is carried out by applying a continuous down-draught of 3 m/s and 1 m/s within the test flue using a suitable down-draught apparatus (see Figure 5).

The combustion products are collected in such a manner as to ensure a representative sample using a suitable device properly located with respect to the draught diverter.

It is checked that the requirements of 6.1.6.2.3 are satisfied.

#### 7.3.6.4.4 All Type $B_{14}$ and $B_{44}$ appliances

The appliance is installed as described in 7.1.6 and connected to a flue as described in 7.1.6.2. The test is carried out with each of the reference gases appropriate to the appliance category supplied at the nominal pressure.

Once thermal equilibrium conditions have been attained, the flue outlet is progressively restricted until the main burner is shut off. The products of combustion are sampled during the period that the flue outlet is being restricted.

#### 7.3.6.4.5 Type $B_{22}$, $B_{23}$, $B_{52}$ and $B_{53}$ appliances

Without altering the initial adjustment, the appliance is supplied with the appropriate reference gases (see Table 5) according to its category at the normal pressure.

An appliance intended to be used with a flue having a wall termination shall be tested once thermal equilibrium conditions have been attained:

a) with the appliance connected to a flue of the manufacturer's maximum allowable pressure drop, the outlet is progressively restricted until the increase in pressure at the outlet of the appliance is at least 0,75 mbar;

b) with a suction applied to the outlet of the flue, the pressure at the outlet of the appliance is reduced to 0,5 mbar below that produced by a flue of the manufacturer's minimum allowable pressure drop;

c) an appliance intended to be used with a vertical flue having a termination above roof level shall be tested once thermal equilibrium conditions have been attained:

1) with the appliance connected to a flue of the manufacturer's maximum allowable pressure drop, the outlet is progressively restricted until the increase in pressure at the outlet of the appliance is at least 0,5 mbar;

2) with a suction applied to the outlet of the flue, the pressure at the outlet of the appliance is reduced to 0,5 mbar below that produced by a flue of the manufacturer's minimum allowable pressure drop.

#### 7.3.6.4.6 Type $C_{12}$ and $C_{13}$ appliances

The combustion products are sampled under the conditions of test given in 7.3.5.2.4.3 using a flue of the maximum (equivalent) length specified by the manufacturer.

#### 7.3.6.4.7 Type $C_{32}$ and $C_{33}$ appliances

The combustion products are sampled under the conditions of test given in 7.3.5.2.4.4 using a combustion air and combustion products duct of the maximum length specified by the manufacturer.




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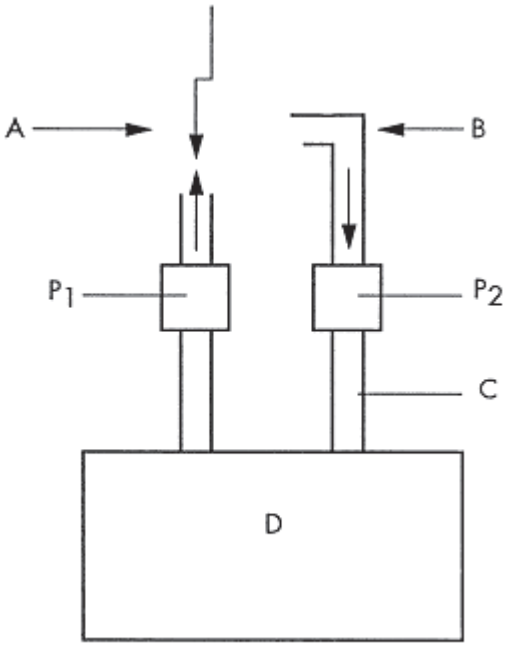
#### 7.3.6.4.8 Type $C_{62}$ and $C_{63}$ appliances

##### 7.3.6.4.8.1 Operation with recirculation of combustion products

The combustion air inlet duct of the test duct system is fitted with a bend that can be rotated through 360° (see Figure 10). The bend is positioned so that the products of combustion are drawn into the combustion air inlet duct.




**Key**

| | |
|---|---|
| A | restrictor |
| B | rotatable bend |
| C | $CO_2$ probe |
| D | appliance |
| $P_1$ and $P_2$ | pressure test points |

**Figure 10 — $C_6$ test duct system for recirculation test**

With the combustion products outlet duct unrestricted, the appliance is operated under normal running conditions at nominal distribution air flow. At thermal equilibrium, the combustion products outlet duct is restricted to simulate the maximum resistance to flow in the duct system specified by the manufacturer. The bend fitted to the combustion air inlet duct, is rotated so that products of combustion from the outlet duct enter the inlet duct to give a $CO_2$ concentration in the air inlet duct of 10 % of the $CO_2$ concentration initially measured in the combustion products outlet duct.

##### 7.3.6.4.8.2 Operation at minimum combustion air flow

The appliance is operated under normal running conditions at nominal distribution air flow. At thermal equilibrium, the restrictor in the test duct system is set to give the minimum flow through the appliance to actuate the air proving device.

#### 7.3.6.4.8.3 Operation under suction

The appliance is operated under normal running conditions at nominal distribution air flow. At thermal equilibrium, the restrictor in the test duct system is set to simulate the minimum resistance to flow in the duct system.

By means of an external fan, the appliance is subjected to a suction that reduces the pressure measured in the above condition by 0,5 mbar at the outlet of the appliance.

### 7.3.6.5 Other pollutants

#### 7.3.6.5.1 General

The appliance is installed as specified in 7.3.6.1

For appliances intended to use second and third family gases, the tests are carried out with reference gas G 20. For appliances intended to use only G 25 as the reference gas, the tests are carried out with G 25. For appliances intended to use only third family gases, the tests are carried out with reference gas G 30. For appliances intended to use propane only, the tests are carried out with reference gas G 31.

The appliance is adjusted to its nominal heat input and, where appropriate, to other heat inputs provided by the controls.

Then $NO_x$ measurements are carried out when the appliance is at thermal equilibrium, conforming with details as given in CR 1404.

The reference conditions for the combustion air are:

a) temperature: 20 °C;

b) humidity: 10 g $H_2O$/kg air.

If the test conditions are different from these reference conditions, it will be necessary to correct the $NO_x$ values using Equation (11):

$$NO_{x,o} = NO_{x,m} + \frac{0,02\ NO_{x,m} - 0,34}{1 - 0,02\ (h_m - 10)}(h_m - 10) + 0,85\ (20 - T_m) \qquad (11)$$

where

$NO_{x,0}$ is the value of $NO_x$ corrected to the reference conditions expressed in milligrams per kilowatt hour (mg/kWh);

$NO_{x,m}$ is the $NO_x$ measured at $h_m$ and $T_m$ in milligrams per kilowatt hour (mg/kWh) in the range 50 mg/kWh to 300 mg/kWh;

$h_m$ is the humidy during the measurement of $NO_{x,m}$ in grams per kilogram (g/kg) in the range 5 g/kg to 15 g/kg;

$T_m$ is the ambient temperature during the measurement of $NO_{x,m}$ in degrees Celsius (°C) in the range 15 °C to 25 °C.

The measured $NO_x$ values are weighted in accordance with 7.3.6.5.2. It is checked that the weighted $NO_x$ value does not exceed the limit stated in 6.1.6.3.

For the calculation of conversions of $NO_x$, see Annex I.

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#### 7.3.6.5.2 Weighting

##### 7.3.6.5.2.1 General

The measured $NO_x$ values are weighted using Equations (12), (13) and (14) which take into account the efficiency of the appliance, its heat capacity and its usage characteristics.

##### 7.3.6.5.2.2 On/Off appliances

$$E_{Q_n} = \frac{9\eta_{ref}}{10\eta_{Q_n}} \quad (12)$$

##### 7.3.6.5.2.3 High/low appliances

$$0{,}5E_{Qn} \times \frac{9\eta_{ref}}{10\eta_{Qn}} + 0{,}5E_{Qmin} \times \frac{9\eta_{ref}}{10\eta_{Q\,min}} \quad (13)$$

##### 7.3.6.5.2.4 Modulating appliances

$$0{,}5E_{Qn} \times \frac{9\eta_{ref}}{10\eta_{Qn}} + 0{,}8E_{Qmin} \times \frac{9\eta_{ref}}{10\eta_{Qmin}} \quad (14)$$

where

$E_{Qn}$ is the emission figure at the nominal heat input;

$E_{Qmin}$ is the emission figure at the minimum heat input;

$\eta_{ref}$ is the reference efficiency (i.e. the applicable efficiency requirement stated in 6.2);

$\eta_{Qn}$ is the efficiency at nominal heat input;

$\eta_{Qmin}$ is the efficiency at minimum heat input;

$\eta_{60}$ is the efficiency at 60 % of the nominal heat input.

NOTE See also 6.2, where $Q_{min}$ is understood to be any heat input lower than the nominal heat input, and for which both the efficiency and the $NO_x$ emission figure are measured.

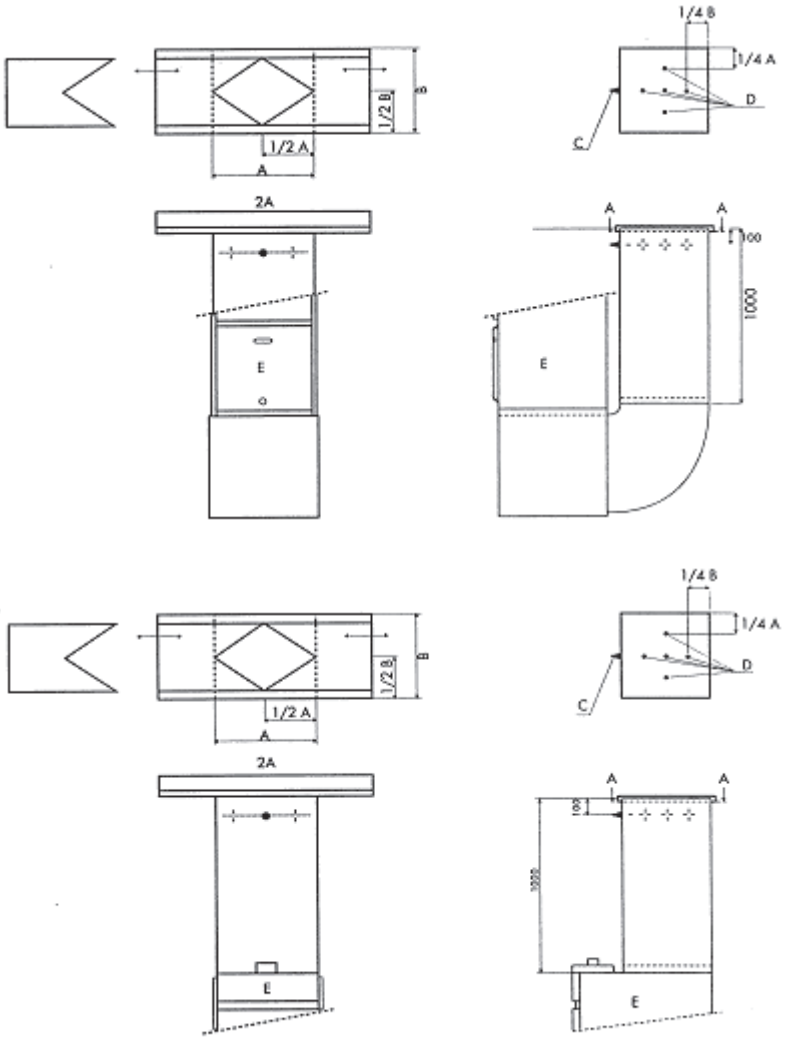
### 7.3.7 Overheat protection

#### 7.3.7.1 General

The appliance is installed as described in 7.1.6.

For ducted appliances the air outlet spigot is fitted with a duct with a length of 1 m, having the same shape as the outlet. At the end of the duct, two sliding covers are mounted to adjust the free outlet opening.

The sensors for measuring the air temperature and the static air pressure test point are placed 100 mm before the outlet end of the test duct (see Figure 11).




**Key**

| | |
|---|---|
| A and B | outlet dimensions |
| C | static air pressure |
| D | air temperature on frame |
| E | appliance |

**Figure 11 — Sensor positions for overheat protection test**

This test duct shall be supplied by the manufacturer.

Ductless appliances meant for single or multiple outlets are tested with the outlet(s) fitted in accordance with the installation instructions. Louvres may be adjustable. The sensors for measuring the air temperature are placed directly outside each outlet and in the plane of that outlet, whereas the static air pressure test point is in the centre of the appliance outlet and at least 100 mm from any louvre.

#### 7.3.7.2 Test 1

The appliance is operated from the nominal condition or an air temperature of at least 20 K below the expected response temperature of the overheat limit device or overheat cut-off device, using an appropriate reference gas as specified in Table 5. The overheat protection shall not operate.

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Range-rated appliances are operated at the maximum heat input and at the minimum heat input as specified by the manufacturer.

For ducted appliances, the airflow is progressively reduced by sliding the covers on the duct until the overheat protection operates to stop the gas supply to the main burner. The temperature rise during this test shall not exceed 3 K/min.

For ductless appliances, the airflow is progressively reduced by closing the louvres until the overheat protection operates to stop the gas supply to the main burner. In case of multiple outlets the effect of closing each outlet is determined. The temperature rise during this test shall not exceed 3 K/min.

The appliance is cycled on the overheat control for sufficient time to ensure that the worst conditions have been reached.

It is checked that the relevant requirements of 6.1.7 and 6.1.4.5 are satisfied.

#### 7.3.7.3 Test 2

The air delivery fan and the air temperature controls other than meant for overheat protection, are rendered inoperative.

The appliance is operated from the cold condition at the nominal heat input using an appropriate reference gas as specified in Table 5. Range-rated appliances are operated at the maximum heat input specified by the manufacturer.

In case of an autoreset type of control the appliance is cycled on the overheat control for sufficient time to ensure that the worst condition has been reached.

In case of a manual reset mechanism, this is operated after the first cut-out and after each minute of this and every subsequent cooling period until the control permits reheat.

It is checked that the relevant requirements of 6.1.7 are satisfied.

### 7.3.8 Heat exchanger thermal cycling

The appliance is installed as described in 7.1.6. The test is carried out at 1,1 times the nominal input.

The heat exchanger elements are examined carefully. Manufacturing abnormalities (e.g. tool damage, poor welding, careless assembly) are identified as far as possible and are not considered in the assessment of the test.

Any necessary action shall be taken to safeguard other components that may be adversely affected during the test and to avoid abnormal deleterious effects on the heat exchanger.

The appliance is installed on a test rig equipped with inlet and outlet air ducts sized to suit the output rating of the appliance.

The air temperature control and the overheat control are disconnected and the control system is modified by the introduction of a timing device to enable the appliance to cycle for 3,5 min with the gas supply on and the fan off followed by 3,5 min with the gas supply off and the fan on.

Inspect the heat exchanger for failure at least every 2 000 cycles until 10 000 cycles have been completed.

When inspecting the heat exchanger, the appliance is operated with both fan and gas on together and it is checked that the burner operates correctly. The heat exchanger is visually examined in situ using a mirror and inspection lamp.




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On completion of 10 000 cycles, the heat exchanger is carefully dismantled from the appliance and examined for splits, openings and perforations. Surface deteriorations or defects shall be ignored. It is checked that the requirements of 6.1.8 are satisfied.

NOTE If it can be shown that either the physical form of the heat exchanger, or the type of control adopted, make such a test inappropriate, an equivalent test may be devised and agreed by negotiation between the manufacturer and the notified body.

### 7.3.9 Atmosphere sensing device (Types $B_{12AS}$, $B_{13AS}$ , $B_{14AS}$ , $B_{42AS}$, $B_{43AS}$ and $B_{44AS}$)

#### 7.3.9.1 Test room

The appliance is installed in accordance with the manufacturer's instructions other than for the ventilation requirements and with 1 m of flue fitted on or adjacent to the narrowest wall of a sealed room and adjusted to the nominal heat input using the appropriate reference gases.

Minimum room dimensions are:

a) length 3,5 m;

b) width 2,0 m;

c) height 2,5 m;

d) volume 17,5 $m^3$.

Alternative room geometries may be used by agreement between the manufacturer and the notified body.

The soundness of the room shall be such that, after a homogeneous concentration of approximately 4,0 % $CO_2$ in the room has been established, it shall not have decreased by more than 0,15 % after 1 h.

The room is designed so that:

e) the operator can, at any time, observe the appliance in operation;

f) the atmosphere in the room is maintained as a homogeneous mixture;

g) the temperature at the centre of the room is maintained between 15 °C and 35 °C.

#### 7.3.9.2 Test method

##### 7.3.9.2.1 General

Using the appropriate reference gas, the appliance is operated at its maximum heat input. Return air and delivered air shall be sealed from the air in the test room. If the appliance is meant for ductless operation, the manufacturer shall provide a suitable duct. Sampling of the room atmosphere for carbon monoxide shall be carried out in a horizontal plane 1,5 m above floor level.

##### 7.3.9.2.2 Normal operating conditions

The appliance is operated at its maximum heat input with the door of the room open and the flue functioning normally to the outside of the room for 30 min, then it is checked that requirement 6.1.9.1 is met.

#### 7.3.9.2.3 Sealed room conditions

At the end of the 30 min period of operation, the flue is capped, the room sealed and the atmosphere in the room monitored continuously for its CO concentration until the burner is extinguished, then for a further 5 min to ensure stability of reading. It is checked that the requirement of 6.1.9.2 is met.

### 7.3.10 Combustion products discharge safety device (Types $B_{12BS}$, $B_{13BS}$, $B_{14BS}$, $B_{42BS}$, $B_{43BS}$ and $B_{44BS}$)

#### 7.3.10.1 Switching operation

The requirements of 6.1.10.1 shall be met when the combustion products discharge safety device is tested in accordance with 7.3.10.2, 7.3.10.3, and 7.3.10.4. Except where stated otherwise, testing shall be carried out with a standard flue pipe (after the draught diverter) with a length of 0,5 m and a diameter equal to that of the flue outlet.

#### 7.3.10.2 Response time at zero flue draught

The appliance is fitted with a flue pipe as defined in 7.3.10.1. Using the appropriate reference gas, the appliance is adjusted to the nominal heat input or to the maximum heat input in case of a range-rated appliance. The delivery air flow is set to its maximum.

The outlet of the flue is then covered completely and the time elapsing between the covering of the flue and the operation of the combustion products discharge safety device is measured.

In case of a range-rated appliance or an appliance with variable heat input control, this test shall also be carried out at 50 % of the maximum heat input or at the minimum value stated in 6.1.10.2, as applicable.

It is checked that the requirements of 6.1.10.2 are satisfied.

#### 7.3.10.3 Prevention of unintentional shut-down

The appliance is installed with a flue pipe in accordance with 7.3.10.1, and set at its nominal heat input or at the maximum of the heat input range in case of a range-rated appliance, using an appropriate reference gas. The delivery air flow is set to its nominal rate as stated by the manufacturer.

The appliance is operated under these conditions for 30 min. It is then checked that the requirements of 6.1.10.3 are satisfied.

#### 7.3.10.4 Operation at partial leakage or reduced draught

The appliance is set at its nominal heat input or at the maximum of the heat input range in case of a range-rated appliance, using an appropriate reference gas. The delivery air flow is set to its nominal rate as stated by the manufacturer.

A telescopic flue pipe adjusted to the minimum flue height stated by the manufacturer and with a diameter equal to that of the flue outlet is fitted on the appliance, instead of the flue pipe mentioned in 7.3.10.1.

With the pipe adjusted to this height, the appliance is operated until thermal equilibrium is reached.

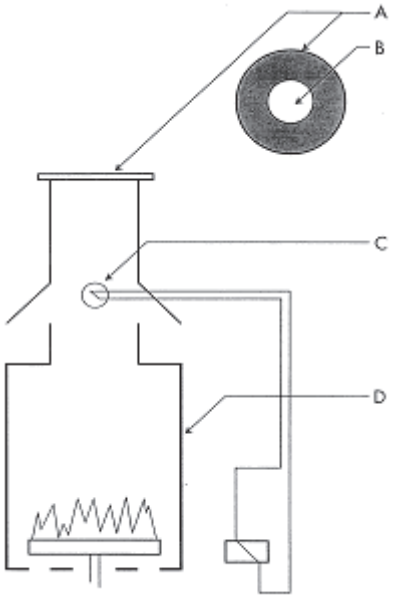
Then the flue pipe is so adjusted that leakage of flue gas through the draught diverter just fails to occur. This is checked with a suitable means (e.g. a dewpoint mirror) at the draught diverter edges.

If the combustion products discharge safety device shuts down the appliance before the point is reached at which leakage of flue gas just fails to occur, the requirements of 6.1.10.4 are satisfied and further testing is not required.

If this is not the case, the test is continued with:

a) the outlet of the adjusted flue pipe is covered by a plate with an aperture having an area of 35 % of the nominal area of the flue pipe (see Figure 12);

b) the time elapsing between the fitting of the plate and the operation of combustion products discharge safety device is measured and it is checked that the requirements of 6.1.10.4 are satisfied.




**Key**
A annulus
B area = 35 % of nominal area of flue duct
C sensor of combustion products discharge safety system
D appliance

**Figure 12 — Test apparatus for combustion products discharge safety device (Type $B_{12BS}$, $B_{13BS}$ and $B_{14BS}$ appliances)**

#### 7.3.10.5 Behaviour in the event of defective sensor

With the appliance operating at nominal heat input under normal operating conditions, the sensor wiring is disconnected, and it is checked that the requirements of 6.1.10.5 are satisfied.

#### 7.3.10.6 Temperature resistance

The appliance is fitted with a flue pipe as defined in 7.3.10.1. Using the appropriate reference gas, the appliance is adjusted to the nominal heat input or to the maximum heat input in case of a range-rated appliance. The delivery air flow is set to its minimum.

The combustion products discharge safety device is deliberately disabled without removing any of its components.

The outlet of the flue is then covered completely and the appliance is allowed to operate in this condition for 4 h. After this period, a check is made that the requirements of 6.1.10.6 are satisfied.

## 7.4 Efficiency

### 7.4.1 General test conditions

#### 7.4.1.1 Principle

The thermal efficiency is determined by the flue loss method from measurements of $CO_2$ (or $O_2$) concentration and the temperature of the products of combustion.

#### 7.4.1.2 Test room

The room shall be adequately ventilated but free from draughts likely to affect the performance of the appliance. The room temperature shall be in accordance with 7.1.6.1 and during the course of a test, it shall not vary by more than 2 K.

#### 7.4.1.3 Preparation of the appliance

The appliance is installed in accordance with 7.1.6 and operated, in accordance with the manufacturer's instructions, with reference gas (see Table 5), except that Type B appliances are installed using the widest test flue stated by the manufacturer and that Type $C_3$ appliances are installed on combustion air and combustion products ducts of the shortest length declared by the manufacturer.

#### 7.4.1.4 Test conditions

The appliance is supplied with typical distributed gas(es) or the reference test gas(es) corresponding to its category and operated within ± 2 % of the specified heat input(s) against the maximum static pressure in the warm air delivery duct recommended by the manufacturer. The fan speed is such that the temperature rise of the delivered air is according to the manufacturer's specifications ± 5 K when the appliance is operated at the maximum rated heat input.

The $CO_2$ (or, where appropriate, $O_2$) concentration and the temperature of the combustion products are measured by means of a probe as defined, incorporating a temperature measuring device, located in the secondary flue or combustion products duct, as appropriate. The sampling rate of combustion products for the measurement of temperature is approximately 100 $dm^3/h$.

For Type B appliances with an outlet diameter of 100 mm or more, the test probe to be used is as shown in Figure 13. Where possible, it is positioned 200 mm from the top of the flue, as shown in Figure 14. When the diameter of the outlet is less than 100 mm, the test probe to be used is as shown in Figure 15. Where possible, it is positioned in the same way as the test probe for the bigger diameters.

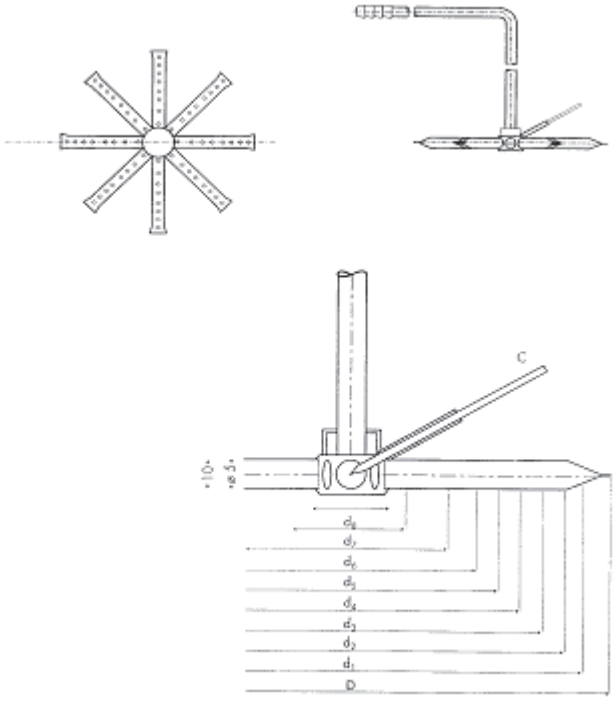
For Type $C_{12}$ and $C_{13}$ appliances, the test probe to be used is as shown in Figure 16. Where possible, it is positioned as shown in Figure 17.

NOTE For Type $C_{12}$ and $C_{13}$ appliances where the aforementioned location is not appropriate, the sampling position will be by agreement between the manufacturer and the test house, sufficient measurements being taken to ensure consistency of results.

For Type $C_{32}$ and $C_{33}$ appliances with an outlet diameter of 100 mm or more, the test probe to be used is as shown in Figure 13. Where possible, it is positioned 200 mm from the top of the flue; as shown in Figure 14. When the diameter of the outlet is less than 100 mm, the test probe to be used is as shown in Figure 15. Where possible, it is positioned in the same way as the test probe for the bigger diameters.

For Type $C_6$ appliances, the test probe is incorporated in the test duct described in 7.1.6.3.6.

Dimensions in millimetres




**Key**

c Temperature probe in the sampling probe.

| *D* (nominal) | $d_1$= 0,97*D* | $d_2$=0,90*D* | $d_3$=0,83*D* | $d_4$=0,75*D* | $d_5$=0,66*D* | $d_6$=0,56*D* | $d_7$=0,43*D* | $d_8$= 0,25*D* |
|---|---|---|---|---|---|---|---|---|
| 100 | 97 | 90 | 83 | 75 | 66 | 56 | 43 | 25 |
| 110 | 107 | 99 | 91 | 82 | 74 | 62 | 47 | 27 |
| 120 | 116 | 108 | 100 | 90 | 79 | 67 | 52 | 30 |
| 130 | 126 | 117 | 108 | 98 | 86 | 73 | 56 | 33 |
| 150 | 145 | 135 | 125 | 113 | 99 | 84 | 65 | 38 |
| 180 | 175 | 162 | 149 | 135 | 119 | 101 | 77 | 45 |
| 200 | 194 | 180 | 166 | 150 | 132 | 112 | 86 | 50 |
| 250 | 242 | 225 | 208 | 188 | 165 | 140 | 108 | 63 |
| 300 | 291 | 270 | 249 | 225 | 198 | 168 | 129 | 75 |
| 400 | 388 | 360 | 332 | 300 | 264 | 224 | 173 | 100 |
| 500 | 485 | 450 | 415 | 375 | 330 | 280 | 216 | 125 |

**Figure 13 — Sampling probe for Type $B_{12}$, $B_{13}$, $B_{14}$, $C_{32}$ and $C_{33}$ appliances with an outlet diameter of 100 mm or more**

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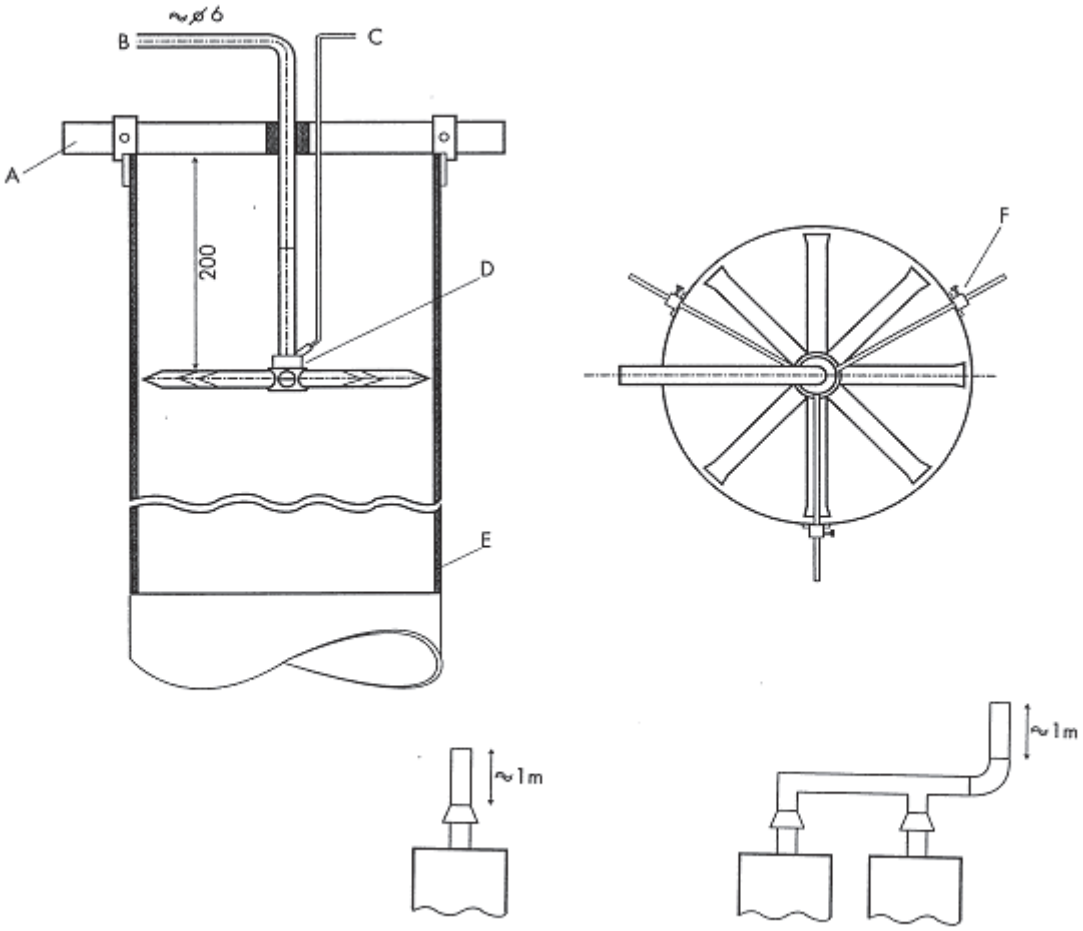
Dimensions in millimetres

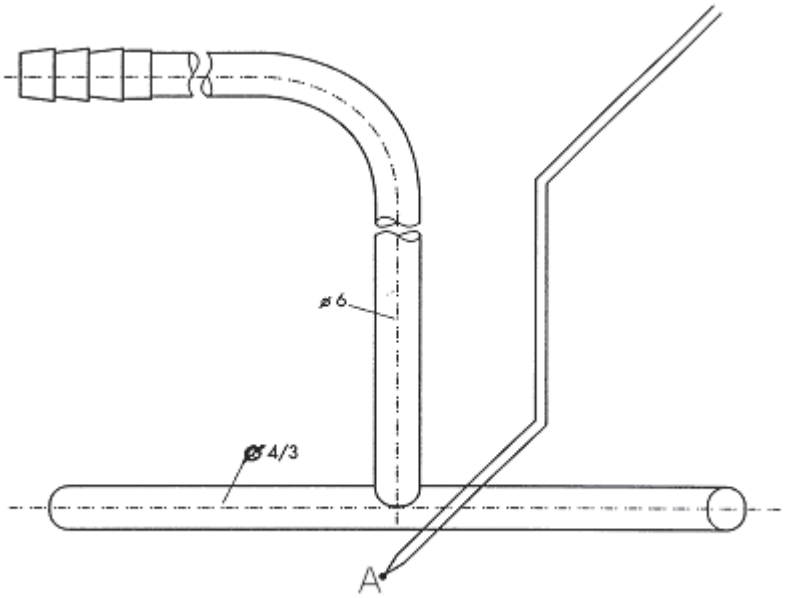


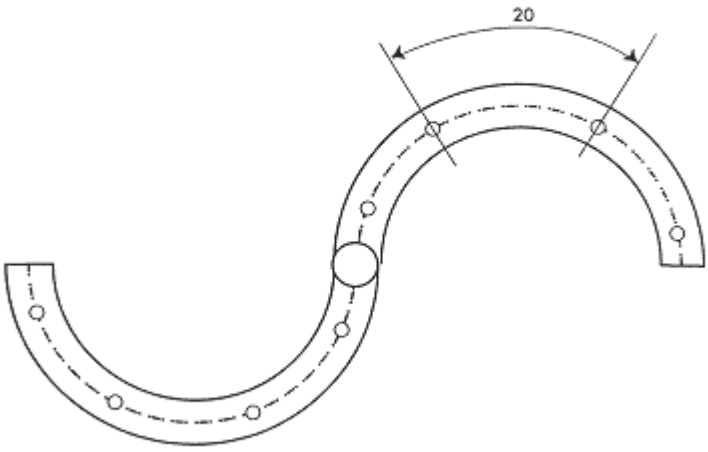

**Key**

| | |
|---|---|
| A | support |
| B | to sampling pump |
| C | to pyrometer |
| D | sampling probe (see Figure 13) |
| E | sheet metal |
| F | adjustable spacing device |

**Figure 14 — Location of the sampling probe for Type $B_{12}$, $B_{13}$, $B_{14}$, $C_{32}$ and $C_{33}$ appliances with an outlet diameter of 100 mm or more**

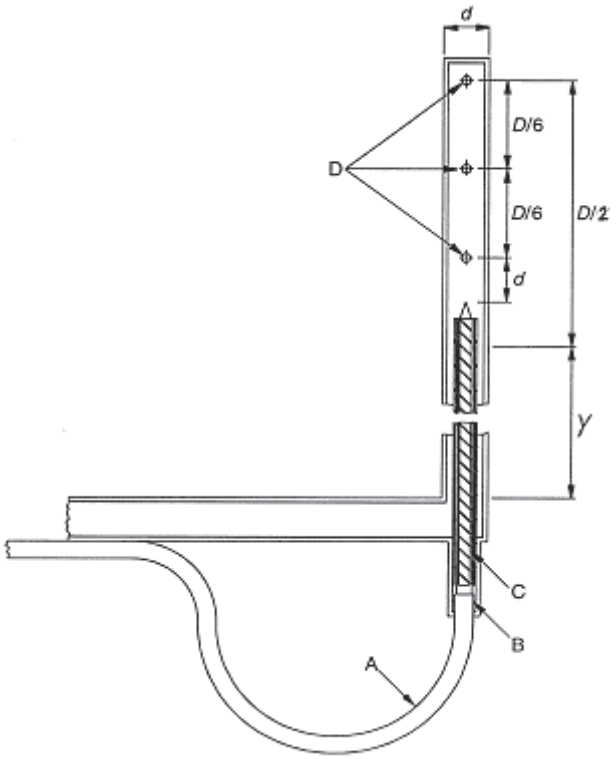
Dimensions in millimetres




**Key**
A thermocouple

**Figure 15 — Sampling probe for Type $B_{12}$, $B_{13}$, $B_{14}$, $C_{32}$ and $C_{33}$ appliances with an outlet diameter of less than 100 mm**




**Key**

A chromel/alumel thermocouple wire
B insulating cement
C twin bore ceramic sleeve
D three sampling holes Ø x mm

NOTE 1 The material is stainless steel with a polished finish.

NOTE 2 Dimension Y should be chosen according to the diameter of the air inlet duct and its insulation.

NOTE 3 Dimensions for 6 mm diameter probe (suitable for product outlet ducts of diameter (D) over 75 mm) are:

a) outside diameter of probe (d) 6 mm;

b) wall thickness 0,6 mm;

c) diameter of sampling holes (x) 1,0 mm;

d) twin bore ceramic sleeve Ø 3 mm x 0,5 mm bore;

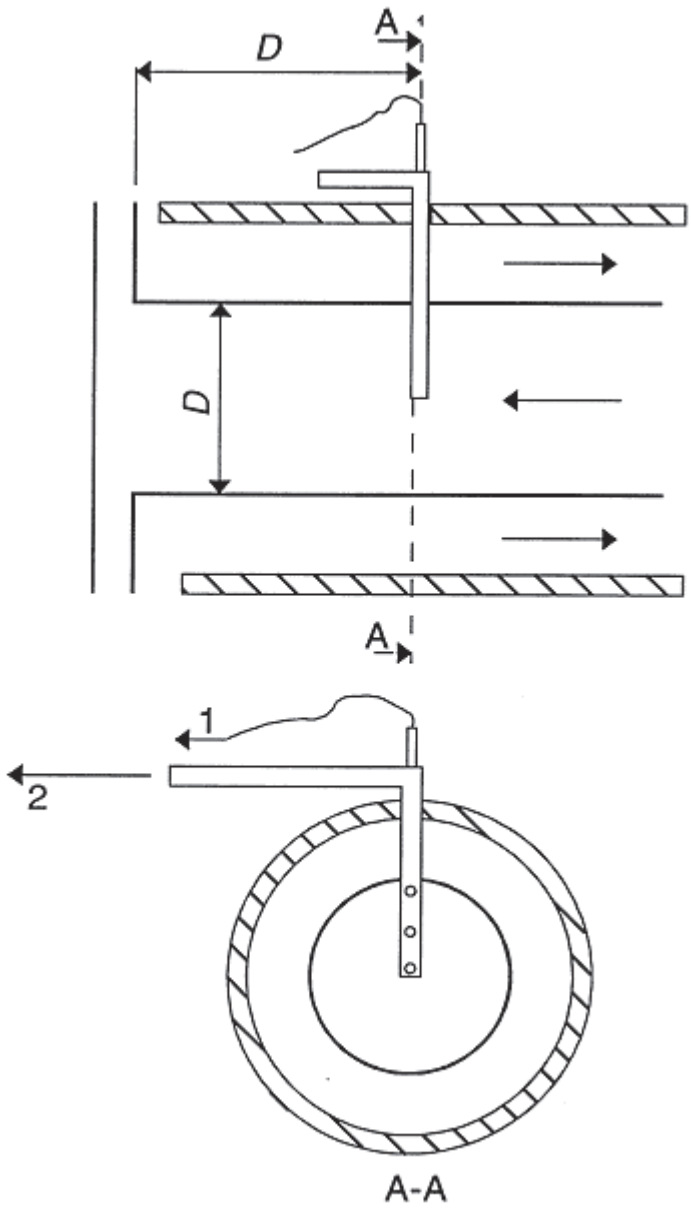
e) thermocouple wire Ø 0,2 mm.

For products outlet ducts less than 75 mm diameter a smaller probe should be used with d and x chosen such that :

f) the area obstructed by the probe is less than 5 % of the cross section of the duct;

g) the total area of the sampling holes is less than three-quarters of the cross section of the probe.

**Figure 16 — Sampling probe for Type $C_{12}$ and $C_{13}$ appliances**




**Key**
1 to temperature indicator
2 to sampling pump
*D* diameter of the duct

**Figure 17 — Location of the probe for Type $C_{12}$ and $C_{13}$ appliances**

### 7.4.2 Test procedure

With the appliance installed and adjusted as described in 7.4.1.3, the appliance is operated for a sufficient time to reach thermal equilibrium. Measurements are then made of the temperature and the $CO_2$ concentration of the combustion products and of the combustion air.

The gas rate is measured by timing an integral number of revolutions of the gas meter over a period of at least 100 s.

### 7.4.3 Accuracy of measurement

The accuracy of the efficiency calculated from the measured values shall be within ± 2 %.

The accuracies shown in Table 8 can be used as guidance.

**Table 8 — Measurement accuracy**

| Quantity measured | Measurement accuracy |
|---|---|
| Combustion air temperature | ± 1 K |
| Gas temperature | ± 1 K |
| Combustion products temperature | ± 2 K |
| Delivery air temperature | ± 2 K |
| $CO_2$ and $O_2$ concentration in combustion air and combustion products | ± 6 % of reading |
| Calorific value | ± 0,5 % of reading |
| Gas quantity (volume) | ± 1 % of reading |

### 7.4.4 Calculation of efficiency

$V_f$ is calculated from the volume of $CO_2$ ($V_{CO2}$) produced by the combustion of one cubic metre of gas (see Table 9), and from the $CO_2$ concentration of the products of combustion ($V_{CO2,M}$) as given by Equation (15).

$$V_f = 100 \frac{V_{CO_2}}{V_{CO_2,M}} \quad (15)$$

**Table 9 — $V_{CO2}$ values**

| Gas designation | $V_{CO2}$ |
|---|---|
| G 110 | 0,26 |
| G 120 | 0,32 |
| G 20 | 1 |
| G 25 | 0,86 |
| G 30 | 4 |
| G 31 | 3 |

The net efficiency, $\eta_{net}$, in percent (%) is given by Equation (16).

$$\eta_{net} = 100 - (q_1 + q_2) \quad (16)$$

where

$$q_1 = C_1 V_f \left( \frac{t_2 - t_1}{H_i} \right) 100$$

and

$$q_2 = 0{,}077 (t_2 - t_1) \left( \frac{H_s - H_i}{H_i} \right)$$

and

$q_1$ is the heat of the dry products of combustion (percentage of heat released per unit volume of gas);

$q_2$ is the heat of the water vapour contained in the products of combustion (percentage of heat released per unit volume of gas);

$C_1$ is the mean specific heat of the dry products of combustion in megajoules per cubic metre Kelvin ($MJ/m^3 \cdot K$) (see Figure 18);

$t_1$ is the average combustion air temperature in degrees Celsius (°C);

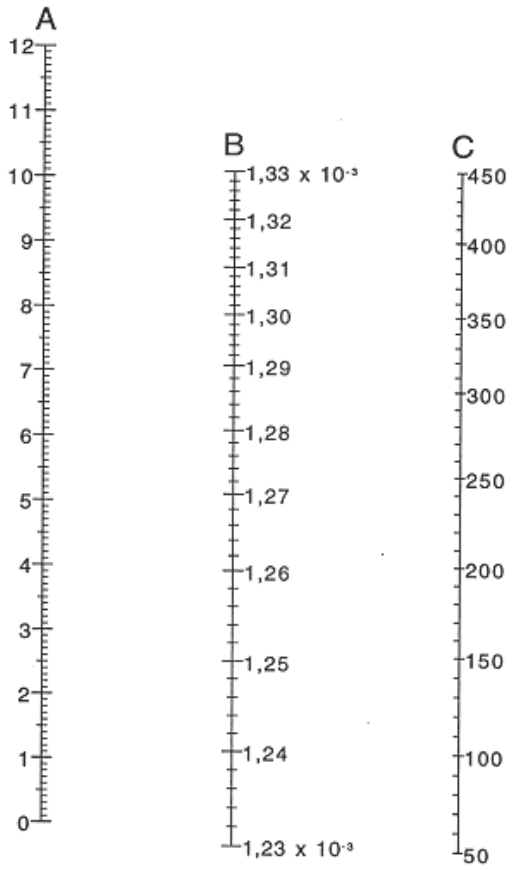
$t_2$ is the average temperature of the products of combustion in degrees Celsius (°C);

$H_i$ is the net calorific value of the gas at 1 013,25 mbar and 15 °C, dry in megajoules per cubic metre ($MJ/m^3$);

$H_s$ is the gross calorific value of the gas at 1 013,25 mbar and 15 °C, dry in megajoules per cubic metre ($MJ/m^3$);

$V_f$ is the volume of dry products of combustion per unit volume of gas in cubic metres ($m^3$).

It is checked that the requirements of 6.2 are satisfied.




**Key**
A % $CO_2$ in combustion products minus % $CO_2$ in air
B mean specific heat of dry products of combustion in megajoules per cubic metre Kelvin ($MJ/m^3 \cdot K$)
C temperature of combustion products in degrees Celsius (°C)

**Figure 18 — Mean specific heat of dry products of combustion**

#### 7.4.5 Supplementary test for appliances with a modulating or high/low control

The test is carried out and the efficiency measured as specified in 7.4.1 to 7.4.5, with the appliance adjusted to give the minimum rate.

It is checked that the requirements of 6.2 are satisfied.

## 8 Marking and instructions

### 8.1 Marking of the appliance

#### 8.1.1 Description

Appliances are described by their:

a) category;

b) nominal input, or range of adjustable inputs.

#### 8.1.2 Data plate

The appliance shall carry one or more data plates and/or labels that are firmly and durably attached to the appliance such that the information given is visible to, and can be read by, the installer. The data plate(s) and/or label(s) shall give at least, in indelible[3)] characters:

a) the manufacturer's[4)] name and address;

b) the nominal heat input and, where necessary, the range of input for an appliance with an adjustable input, expressed in kilowatts, stating whether it is based on net or gross calorific value;

c) the trade name of the appliance;

d) the serial number;

e) the product identification number (PIN) of the notified body;

f) the commercial identification symbol of the appliance;

g) the type of gas in relation to the pressure and/or the pressure couple, for which the appliance has been adjusted; any pressure indication shall be identified in relation to the corresponding category index; if an intervention is necessary on the appliance in order to change from one pressure to the other within a pressure couple of the third family, only the pressure corresponding to the current adjustment of the appliance shall be indicated;

h) the direct country or countries of destination of the appliance;

i) the appliance category or categories; if more than one appliance category is specified, each of these categories shall be identified in relation with the appropriate country or countries of destination (see Annex A);

---

3) The indelibility of the marking is checked by a test carried out in accordance with 7.14 of EN 60335-1:2002.

4) Manufacturer means the person, organization or company who assumes responsibility for designing and manufacturing a product with a view to placing it on the market on their own behalf within the EU.

j) the setting pressure for regulated appliances;

k) the nature and voltage of the current used and the maximum electrical power used (volts, amperes, hertz and kilowatts) for all intended electrical supply conditions;

l) if appropriate, the degree of protection given as IP code.

No other information shall be included on the appliance if this could lead to confusion with regard to the current state of adjustment of the appliance, the corresponding appliance category (or categories) and the direct country (or countries) of destination.

For an appliance with an adjustable nominal input, there shall be room for the installer to durably mark the nominal heat input value for which it has been adjusted on commissioning.

#### 8.1.3 Other marking

For the user the appliance shall be marked with:

"Read the user's instructions before lighting the appliance."

For the installer, the appliance shall be marked with:

"This appliance shall be installed in accordance with the rules in force, and used only in a sufficiently ventilated space. Consult instructions before installation and use of this appliance."

Moreover, if the appliance can cause the temperature of the surroundings to exceed 85 °C as described in 6.1.4.3, it shall also be marked with:

"This appliance shall NOT be installed in a room containing combustible materials."

### 8.2 Marking of the packaging

The packaging shall carry at least:

a) the type of gas in relation to the pressure and/or the pressure couple, for which the appliance has been adjusted; any pressure indication shall be identified in relation to the corresponding category index; if an intervention is necessary on the appliance in order to change from one pressure to the other within a pressure couple of the third family, only the pressure corresponding to the current adjustment of the appliance shall be indicated;

b) the direct country or countries of destination of the appliance;

c) the appliance category or categories; if more than one appliance category is specified, each of these categories shall be identified in relation with the appropriate country or countries of destination.

In addition, the packaging shall be marked with:

"This appliance shall be installed in accordance with the rules in force, and used only in a sufficiently ventilated space. Consult instructions before installation and use of this appliance."

Moreover, if the appliance can cause the temperature of the surroundings to exceed 85 °C as described in 6.1.4.3, it shall also be marked with:

"This appliance shall NOT be installed in a room containing combustible materials."

For Type $B_{12}$, $B_{13}$, $B_{14}$, $B_{42}$, $B_{43}$ and $B_{44}$ appliances, it is necessary to clearly indicate that the appliance is intended to be installed in a space separated from living rooms and provided with appropriate ventilation directly to the outside.

No other information shall be included on the packaging if this could lead to confusion with regard to the current state of adjustment of the appliance, the corresponding appliance category (or categories) and the direct country (or countries) of destination.

## 8.3 Utilization of symbols on the appliance and packaging

### 8.3.1 Electrical supply

The marking concerning electrical values shall be in conformity with EN 60335-1.

### 8.3.2 Type of gas

In order to represent all of the category indices corresponding to the adjustment of an appliance, the symbol of the reference gas shall be used which is common to all of these indices, in accordance with Table 10.

During a transitional period, the declared means of identification in use in the various CEN Member Countries shall be used in addition to the symbol. These additional means are given in Annex D.

**Table 10 — Gas type symbol**

| Gas type symbol | | Corresponding category index |
|---|---|---|
| First family[a] | G 110 | 1a |
| | G 120 | 1b |
| | G 130 | 1c |
| Second family | G 20 | 2H, 2E, 2E+, 2Esi[b], 2Er[b], 2ELL[b] |
| | G 25 | 2L, 2Esi[c], 2Er[c], 2ELL[c] |
| Third family | G 30 | 3B/P, 3+[d) f], 3B |
| | G 31 | 3+[e f], 3P |

[a] If, in its current state of adjustment, the appliance can use gases from different groups, all the reference gases corresponding to these groups shall be indicated.

[b] When the appliance is adjusted for G 20.

[c] When the appliance is adjusted for G 25.

[d] Only applies to appliances which do not need any adjustment between G 30 and G 31, or to appliances which need an adjustment and which are adjusted for G 30.

[e] Only applies to appliances which need an adjustment between G 30 and G 31, and which are adjusted for G 31.

[f] For the appliances which need an adjustment between G 30 and G 31, the label concerning the adjustment to the other gas and the other pressure of the pressure couple shall be supplied with the technical instructions.

### 8.3.3 Gas supply pressure

The gas supply pressure can be expressed uniquely by the numerical value using the unit (mbar). Nevertheless, if it is necessary to explain this value, the symbol "p" shall be used.

### 8.3.4 Country of destination

In accordance with EN ISO 3166-1, the names of countries shall be represented by

| | | | |
|---|---|---|---|
| AT | Austria | IE | Ireland |
| BE | Belgium | IS | Iceland |
| BG | Bulgaria | IT | Italy |
| CH | Switzerland | LT | Lithuania |
| CY | Cyprus | LU | Luxembourg |
| CZ | Czech Republic | LV | Latvia |
| DE | Germany | NL | Netherlands |
| DK | Denmark | MT | Malta |
| EE | Estonia | NO | Norway |
| ES | Spain | PL | Poland |
| FI | Finland | PT | Portugal |
| FR | France | RO | Romania |
| GB | United Kingdom | SE | Sweden |
| GR | Greece | SI | Slovenia |
| HU | Hungary | SK | Slovakia |

#### 8.3.5 Category

The category can be expressed uniquely by its designation in accordance with EN 437. Nevertheless, if it is necessary to explain it, the term "category" shall be symbolized by "cat".

#### 8.3.6 Other information

##### 8.3.6.1 General

The symbols given below are not obligatory, but are recommended under the title "preferential", and to the exclusion of any other symbol, to avoid the use of many and different markings.

##### 8.3.6.2 Nominal heat input of a burner: *Q*n.

##### 8.3.6.3 Nominal heat input of all appliance burners: Σ*Q*n.

#### 8.3.7 Emissions

The manufacturer may choose to declare the weighted $NO_x$ emission value or to express it by a class according to the following list:

a) Class 1, for values not exceeding 250 mg/kWh;

b) Class 2, for values not exceeding 200 mg/kWh;

c) Class 3, for values not exceeding 150 mg/kWh;

d) Class 4, for values not exceeding 100 mg/kWh;

e) Class 5, for values not exceeding 50 mg/kWh.

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The value or class may be marked on the appliance or contained in the technical data.

## 8.4 Instructions

### 8.4.1 General

The instructions shall be written in the official language(s) of the country or countries of destination and shall be valid for that or those countries.

If the instructions are written in an official language that is used by more than one country, the country or countries for which they are valid shall be identified by the codes given in 8.3.4.

Instructions for countries other than those stated on the appliance may be supplied with the appliance, on condition that each set of instructions has the following initial statement:

"These instructions are only valid if the following country code is on the appliance[5)]. If this code is not present on the appliance, it is necessary to refer to the technical instructions which will provide the necessary information concerning the modification of the appliance to the conditions of use for the country."

### 8.4.2 Technical instructions for the installer

In addition to the information given in 8.2, the technical instructions may include information indicating, where appropriate, that the appliance has been certified for use in countries other than those stated on the appliance[6)]. If such information is given, the instructions shall include a warning that modification of the appliance and its method of installation are essential in order to use the appliance safely and correctly in any of these additional countries. This warning shall be repeated in the official language(s) of each of these countries. Furthermore, the instructions shall indicate how to obtain the information, instructions and parts that are necessary for safe and correct use in the countries concerned.

"Before installation, check:

— that the local distribution conditions, nature of gas and pressure, and the current state adjustment of the appliance are compatible; and

— that the local electrical supply conditions are compatible with the electrical data given on the data plate."

Taking into account national regulations in this field, if any, the technical instructions for installation and adjustment shall explain the installation conditions for the appliance (on a floor or wall, etc.) and its accessories (room thermostat, etc.); they shall state the minimum distance necessary between the appliance surfaces (including surfaces of the POCED in the case of type $B_4$, $B_5$, $C_1$ and $C_3$ appliances) and any nearby walls, and also any precautions to be taken to avoid overheating the floor, walls or ceiling if these are made from combustible materials. These precautions shall include details of any insulation or sleeve required when a POCED passes through a wall or ceiling made from combustible materials. The instructions shall also state the minimum and maximum ambient temperature in which the appliance is designed to operate. They shall include the heat output of the appliance and the NOx class if declared by the manufacturer.

For Type $B_{12}$, $B_{13}$ and $B_{14}$ appliances, they shall specify the minimum flue height for the appliance and, where necessary, they shall also describe the method of fixing the draught diverter and the connecting piece for the flue pipe. They shall specify the method of checking for spillage of products of combustion from the draught diverter.

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5) E.g. "DE", therefore excluding AT and CH.

6) Indirect country of destination.

For Type $B_{14}$ appliances, the installation instructions shall specify the method of adjusting any damper or other combustion air controlling device.

For Type $B_{22}$, $B_{23}$ appliances, they shall state the minimum and maximum equivalent resistance, or such other information for the assembly of the flue system, and give details for calculating the equivalent resistance, for example the allowance to be made for bends, etc.

For all type $B_4$, $B_5$, $C_1$ and $C_3$ appliances, they shall specify the minimum and maximum equivalent resistance[7)].

For all type $B_4$, $B_5$, $C_1$ and $C_3$ appliances, the specification shall include a description of the POCED including any bends, its materials of construction and any critical tolerances e.g. in length, diameter, thickness, insertion depth, etc; the method of installing the POCED, including any necessary supporting elements, the method of attachment to the building and a statement confirming that the POCED is capable of withstanding its own weight.

For Type B appliances, they shall also specify the minimum ventilation requirements for the appliance.

For Type $B_{12AS}$, $B_{12BS}$, $B_{13AS}$, $B_{13BS}$, $B_{14AS}$, $B_{14BS}$, $B_{42AS}$, $B_{42BS}$, $B_{43AS}$, $B_{43BS}$, $B_{44AS}$ and $B_{44BS}$ appliances, the instructions shall, as applicable and with respect to the atmosphere sensing device and the combustion products discharge safety device, additionally state that:

a) the device is a very important safety device;

b) the device shall not be adjusted by the installer;

c) the device shall not be put out of operation; and

d) when the device, or any of its parts is exchanged, only original manufacturer's parts shall be used.

For Type C appliances, with the exception of Type $C_6$ appliances, they shall state the maximum and minimum lengths of the air supply and combustion products ducts.

For Type $C_6$ appliances, they shall state the maximum allowable pressure drop and equivalent resistance permitted in the combustion air inlet duct and combustion products outlet duct, and the corresponding temperature and $CO_2$ concentration or mass flow of the combustion products to enable the calculation of possible duct systems. Furthermore, they shall specify the method for calculating the pressure drop in the duct system, using the aforementioned parameters.

NOTE In verifying the above parameters specified by the manufacturer, the test house checks that the deviations of the temperature and the $CO_2$ concentration of the combustion products are within 10 K and 0,5 % respectively. If the manufacturer specifies a mass flow, it is checked that the actual mass flow is within 5 % of the stated value.

For ductless appliances, they shall:

e) explain the method of installation, location and setting up of single or multiple air outlets supplied by the manufacturer;

f) give all relevant information for adjusting the gas rate;

g) include a table for the appliance category, giving the various calorific values and the gas rate settings, in cubic metres per hour ($m^3/h$) in relation to the reference conditions (15 °C, 1 013,25 mbar) or in kilograms per hour (kg/h), together with the instructions about how to adjust the air rate;

---

7) In the case of type $B_4$, $B_5$, $C_1$ and $C_3$ appliances the minimum and maximum equivalent resistance corresponds to the POCED supplied or specified by the manufacture with the minimum and maximum resistance to flow. Due account shall be taken of the resistance to flow of any terminal supplied or specified by the manufacturer and in the case of type C appliances the resistance to flow of the air supply duct.




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h) explain the operations and adjustment to be carried out when converting from one gas to another and, in particular, the markings on the parts and injectors supplied for each of the gases which may be used;

i) deal with the maintenance, replacement and cleaning of functional parts where necessary;

j) contain a description of the appliance and of the exchangeable or conversion parts with an illustration and, where necessary, a numbered key for identifying the main parts to be cleaned, serviced or replaced.

#### 8.4.3 Instructions for the user

All the instructions shall be provided by the manufacturer. The instructions for the user shall provide all the necessary information for the safe and sensible use of the appliance.

In particular, they shall deal with the operations of ignition and extinction, the use of the various controls with which the appliance may be fitted, simple cleaning and maintenance of the appliance, also mentioning, where necessary, the nature of the materials recommended. They shall also stress that a qualified installer is required to install, adjust and, where necessary, convert the appliance for use with other gases.

They shall also state the recommended frequency of periodic servicing.

## 9 Evaluation of POCED conformity and their associated terminals

### 9.1 General

The compliance of a POCED and its associated terminal shall be demonstrated by:

a) initial type testing;

b) factory production control by the manufacturer, including product assessment.

NOTE The requirements are given in the relevant Table ZB.1 or ZB.2.

### 9.2 Type testing

#### 9.2.1 Initial type testing

Initial type testing shall be performed to show conformity to the requirements of this standard.

NOTE The requirements are given in the relevant Table ZB.1 or ZB.2.

Tests previously performed in accordance with the provisions of this standard (same product, same characteristic(s), test method, sampling procedure, system of attestation of conformity, etc.) may be taken into account. In addition, initial type testing shall be performed at the beginning of the production of a new POCED and/or its associated terminal, or at the beginning of a new method of production (where this can affect the stated properties).

Where characteristics are determined on the basis of conformity with other product standards (for metals including coatings, seals and sealants), these characteristics do not need to be reassessed provided that the designer ensures the validity of the results. Products CE marked in accordance with appropriate harmonised European specifications may be presumed to have the performances stated of them, although this does not replace the responsibility of the manufacturer to ensure that the POCED and any associated terminal as a whole is correctly designed and its component products have the necessary performance values.




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#### 9.2.2 Further type testing

Whenever a change occurs in the POCED, any associated terminal, the raw material or supplier of the components, or the production process, which would change the tolerances or one or more of the characteristics that are assessed by the requirements, the type tests shall be repeated for the appropriate characteristic(s).

#### 9.2.3 Sampling for type testing

Unless otherwise stated in the particular test method given in Clause 7 of this standard, type testing is carried out utilising a POCED, and any associated terminal, having the minimum and maximum equivalent resistance.

The results of all type tests shall be recorded and held by the manufacturer, until superseded.

### 9.3 Factory production control (FPC)

#### 9.3.1 General

NOTE 1 A FPC system conforming with the following requirements of the relevant part(s) of EN ISO 9001, and made specific to the requirements of this standard, is considered to satisfy the above requirements.

The manufacturer shall establish, document and maintain a FPC system to ensure that the manufactured products conform to the stated performance characteristics. The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to e.g. control raw and other incoming materials or components, equipment, the production process and the product.

The manufacturer is responsible for organising the effective implementation of the factory production control system. Tasks and responsibilities in the production control organisation should be documented and this documentation should be kept up to-date. In each factory the manufacturer may delegate the action to a person having the necessary authority to:

— identify procedures to demonstrate conformity of the product at appropriate stages;

— identify and record any instance of non-conformity;

— identify procedures to correct instances of non conformity.

The manufacturer should draw up and keep up-to-date documents defining the factory production control which he applies. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. All FPC systems should achieve an appropriate level of confidence in the conformity of the product. This involves:

— the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the reference technical specification;

— the effective implementation of these procedures and instructions;

— the recording of these operations and their results;

— the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-conformity.

The production control operations shall include some or all of:

a) the specification and verification of raw materials and constituents;




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b) the controls and tests to be carried out during manufacture according to a frequency laid down;

c) the verifications and tests to be carried out on finished products according to a frequency which may be laid down in the technical specifications and adapted to the product and its conditions of manufacture.

NOTE 2 Depending on the specific case, it may be necessary to carry out:

1) the operations referred to under 9.3.1 b) and 9.3.1 c);

2) only the operations under 9.3.1 b); or

3) only those under 9.3.1 c).

The operations under 9.3.1 c) centre as much on the intermediate states of the product as on manufacturing machines and their adjustment, and equipment. These controls and tests and their frequency are chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters.

The manufacturer shall have or have available the installations, equipment and personnel which enable him to carry out the necessary verifications and tests. He may, as may his agent, meet this requirement by concluding a sub-contracting agreement with one or more organisations or persons having the necessary skills and equipment.

The manufacturer has responsibility to calibrate or verify and maintain the control, measuring or test equipment in good operating condition, whether or not it belongs to him, with a view to demonstrating conformity of the product with its technical specification. The equipment shall be used in conformity with the specification or the test reference system to which the specification refers.

If necessary, monitoring is carried out of the conformity of intermediate states of the product and at the main stages of its production.

This monitoring of conformity focuses where necessary on the product throughout the process of manufacture, so that only products having passed the scheduled intermediate controls and tests are dispatched.

The results of inspections, tests or assessments requiring action shall be recorded, as any action taken. The action to be taken when control values or criteria are not met shall be recorded.

### 9.3.2 Equipment

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

### 9.3.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as the inspection scheme for ensuring their conformity.

### 9.3.4 Product testing and evaluation

The manufacturer shall establish procedures to ensure that the stated values of the characteristics are maintained. An example of a sampling plan for FPC is given in Annex J.

### 9.3.5 Non-conforming products

The manufacturer shall establish procedures for dealing with non-conforming products.




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# Annex A
(informative)

# National situations[8)]

## A.1 General

In each country in which this standard applies, appliances may be marketed only if they comply with the particular national supply conditions of that country.

In order to permit, both at the time of testing the appliance and at the time of its sale, the correct choice to be made from all the situations covered, the various national situations are summarized in A.2, A.3, A.4, A.5, A.6 and A.7.

## A.2 Categories listed in the body of the standard and marketed in different countries

Tables A.1 and A.2 give the national situations concerning the marketing in the various countries of the appliance categories listed in the body of the standard.

The information given in the table indicates only that these categories may be sold throughout the whole of the country concerned and A.3 should be consulted for confirmation.

In all cases of doubt the local gas supplier should be consulted in order to identify the precise category applicable.

8) This annex does not apply to the POCEDS(chimneys).

**Table A.1 — Category I (single categories) marketed**

| Country | $I_{2H}$ | $I_{2L}$ | $I_{2E}$ | $I_{2E+}$ | $I_{2N}$ [a] | $I_{2R}$ [a] | $I_{3B/P}$ | $I_{3+}$ | $I_{3P}$ | $I_{3B}$ | $I_{3R}$ [a] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AT | X | | | | | | X | | X | | |
| BE | | | | X | | | | X | X | | |
| BG | | | | | | | | | | | |
| CH | X | | | | | | X | X | X | | |
| CY[b] | | | | | | | | | | | |
| CZ | X | | | | | | X | | X | | |
| DE | | | X | | | | X | | X | | |
| DK | X | | | | | | X | | | | |
| EE[b] | | | | | | | | | | | |
| ES | X | | | | | | | X | X | | |
| FI | X | | | | | | X | | | | |
| FR | X [c] | X [c] | | X | | | X [d] | X | X | | |
| GB | X | | | | | | | X | X | | |
| GR | X | | | | | | | X | X | | |
| HU[b] | X | | | | | | X | | X | X | |
| IE | X | | | | | | | X | X | | |
| IS | | | | | | | | | | | |
| IT | X | | | | | | | X | | | |
| LT[b] | | | | | | | | | | | |
| LU | | | X | | | | | | | | |
| LV [b] | | | | | | | | | | | |
| MT[b] | | | | | | | | | | | |
| NL | X [c] | X | | | | | X | | X | | |
| NO | | | | | | | X | | | | |
| PL | | | X | | | | X | | X | | |
| PT | X | | | | | | | X | X | | |
| SE | X | | | | | | X | | | | |
| SI | X | | | | X | X | X | X | X | | X |
| SK[b] | | | | | | | | | | | |

[a] Category to be deleted if it is not selected by any country.
[b] Information on categories to be supplied by new CEN member.
[c] Categories applicable only to certain types of appliance, submitted to on site EC verification procedure, Annex II, article 6 of the Gas Appliance Directive (90/396/EEC). (France and Netherlands to clarify if applicable here.)
[d] Categories applicable only to certain types of appliance specified in the individual standards (France to specify if applicable here).




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**Table A.2 — Double categories marketed**

| Country | $II_{1a2H}$ | $II_{2H3B/P}$ | $II_{2H3+}$ | $II_{2H3P}$ | $II_{2H3B}$ | $II_{2L3B/P}$ | $II_{2L3P}$ | $II_{2E3B/P}$ | $II_{2E3+B/P}$ | $II_{2E+3+}$ | $II_{2E+3P}$ | $II_{2R3R}$ [a] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AT | | X | | X | | | | | | | | |
| BE | | | | | | | | | | | | |
| BG | | | | | | | | | | | | |
| CH | X | X | X | X | | | | | | | | |
| CY [b] | | | | | | | | | | | | |
| CZ | | X | | X | | | | | | | | |
| DE | | | | | | | | X | | | | |
| DK | X | X | | | | | | | | | | |
| EE [b] | | | | | | | | | | | | |
| ES | | | X [c] | X | | | | | | | | |
| FI | | X | | | | | | | | | | |
| FR | | | | X [d] | | | X [d] | | X [e] | X | X | |
| GB | | | X | X | | | | | | | | |
| GR | | X | X | X | | | | | | | | |
| HU [b] | | X | | X | X | | | | | | | |
| IE | | | X | X | | | | | | | | |
| IS | | | | | | | | | | | | |
| IT | X | | X | | | | | | | | | |
| LT [b] | | | | | | | | | | | | |
| LU | | | | | | | | | | | | |
| LV [b] | | | | | | | | | | | | |
| MT [b] | | | | | | | | | | | | |
| NL | | | | | | X | X | | | | | |
| NO | | | | | | | | | | | | |
| PL | | | | | | | | X | | | | |
| PT | | | X | X | | | | | | | | |
| SE | X | X | | | | | | | | | | |
| SI | | X | X | X | | | | | | | | X |
| SK [b] | | | | | | | | | | | | |

[a] Category to be deleted if it is not selected by any country.
[b] Information on categories to be supplied by new CEN member.
[c] Appliances of this Category set for Group H gases of the second family may use air and commercial propane gas mixtures where the gross Wobbe index (at 15 °C and 1 013,25 mbar) is between 46 MJ/m$^3$ and 51,5 MJ/m$^3$, at the same supply pressure, without additional tests.
[d] Categories applicable only to certain types of appliance, submitted to on site EC verification procedure, Annex II, article 6 of the Gas Appliance Directive (90/396/EEC) (France to clarify if applicable here).
[e] Categories applicable only to certain types of appliance specified in the individual standards (France to specify if applicable here).

## A.3 Appliance supply pressures corresponding to the categories given in A.2

Table A.3 gives the conditions in the various countries concerning the supply pressures to appliances in the categories given in A.2

Other, higher supply pressures can be necessary and such pressures may be provided after consultation with the appropriate gas supplier(s) in the country(ies) concerned.




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**Table A.3 — Normal supply pressures**

| Gas | G 110 | G 20 | G 25 | | G 20 + G 25 | G 30 | | G 31 | | | G 30 + G 31 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pressure (mbar) | 8 | 20 | 20 | 25 | Couple 20/25 | 30 28-30 | 50 | 30 | 37 | 50 | Couple 28-30/37 | Couple 50/67 |
| Country | | | | | | | | | | | | |
| AT | | X | | | | | X | | | X | | |
| BE | | | | | X | | | | | x[a] | X | X |
| BG | | | | | | | | | | | | |
| CH | | X | | | | | X | | | X | X | |
| CY[b] | | | | | | | | | | | | |
| CZ | | X[c] | | | | | X[d] | X | X | X[e] | | |
| DE | | X | X | | | X | X | | | X | | |
| DK | X | X | | | | | | X | | | | |
| EE[b] | | | | | | | | | | | | |
| ES | | X | | | | X | | | X | X[a] | X | |
| FI | | X | | | | X | | X | | | | |
| FR | | | | | X | X | X[a] | | x | X[a] | X | |
| GB | | X[f] | | | | X | | | X | X | X | |
| GR | | X | | | | X | | X | X | X | x | |
| HU[b] | | X[g] | | | | X | X | X | | x | | |
| IE | | X | | | | X | | | X | | X | |
| IS | | | | | | | | | | | | |
| IT | X | X | | | | | | | | | X | |
| LT[b] | | | | | | | | | | | | |
| LU | | X | | | | | | | | | | |
| LV[b] | | | | | | | | | | | | |
| MT[b] | | | | | | | | | | | | |
| NL | | | | X | | | | X | | X | | |
| NO | | | | | | X | | X | | | | |
| PL | | X | | | | | | | X | | | |
| PT | | X | | | | X | | | X | | X | |
| SE | X | X | | | | X | | X | | | | |
| SI | | X | | | | X | | | X | | X | |
| SK[b] | | | | | | | | | | | | |

[a] Only for certain types of non-domestic appliances (countries to clarify).
[b] Information on supply pressures to be supplied by new CEN member.
[c] Currently 18 mbar.
[d] For certain types of industrial appliances (CZ to clarify).
[e] For certain types of appliances (CZ to clarify).
[f] Normal supply pressure for this appliance: 17,5 mbar.
[g] Pressures of 25 mbar and 85 mbar.

## A.4 Special categories marketed nationally or locally

### A.4.1 General

The national or local conditions of gas distribution (gas composition and supply pressures) lead to the definition of special categories which are marketed nationally or locally in certain countries, as shown in Table A.4.




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**Table A.4 — Test gases corresponding to categories marketed nationally or locally**

| Category | Reference gas | Incomplete combustion limit gas | Light back limit gas | Lift limit gas | Sooting limit gas | Country |
|---|---|---|---|---|---|---|
| $I_{2Esi}$, $I_{2Er}$ | G 20, G 25 | G 21 | G 222 | G 231 | G 21 | FR |
| $I_{2E(S)B}$ | G 20, G 25 | G 21 | G 222 | G 231 | G 21 | BE |
| $I_{2E(R)B}$ | G 20, G 25 | G 21 | G 222 | G 231 | G 21 | BE |
| $I_{2ELL}$ | G 20, G 25 | G 21 | G 222 | G 231, G 271 | G 21 | DE |
| $I_{2S}$ | G 25.1 | G 26.1 | G 222 | G 27.1 | G 26.1 | HU[a] |
| $I_{2HS}$ | G 20, G 25.1 | G 21, G 26.1 | G 222 | G 27.1 | G 21, G 26.1 | HU[a] |
| $I_{2ELw}$ | G 20, G 27 | G 21 | G 222 | G 2.412 | G 21 | PL |
| $I_{2ELs}$ | G 20, G 2.350 | G 21 | G 222 | G 2.352 | G 21 | PL |
| $I_{2ELn}$ | G 20, G 2.300 | G 21 | G 222 | G 2.302 | G 21 | PL |
| $I_{2ELwLs}$ | G 20, G 27, G 2.350 | G 21 | G 222 | G 2.352 | G 21 | PL |
| $I_{2ELwLsLn}$ | G 20, G27, G2.350, G 2.300 | G 21 | G 222 | G 2.302 | | PL |
| $I_{3B/P}$[b] | G 30 | G 30 | G 32 | G 31 | G 30 | PL |
| $I_{3P(B/P)}$[b] | G 31, G 30 | G 31, G 30 | G 32 | G 31 | G 30 | PL |
| $II_{1c2H}$ | G 130, G 20 | G 21 | G 132, G 222 | G 23 | G 21 | CH |
| $II_{2Esi3+}$ $II_{2Er3+}$ | G 20, G 25 G 30 | G 21 | G 222 G 32 | G 231 G 31 | G 30 | FR |
| $II_{2Esi3P}$ $II_{2Er3P}$ | G 20, G 25 G 31 | G 21 | G 222 G 32 | G 231 G 271 | G 31 G 32 | FR |
| $II_{2ELL3B/P}$ | G 20, G 25, G 30 | G 21, G 30 | G 222, G 32 | G 231 G 271 | G 30 | DE |
| $II_{2S3B/P}$ | G 25.1, G 30 | G 26.1, G 30 | G 32 | G 27.1 G 31 | G 26.1, G 30 | HU[a] |
| $II_{2S3P}$ | G25.1, G 31 | G 26.1, G 30 | G 32 | G 27.1, G 31 | G 26.1, G 31, G 32 | HU[a] |
| $II_{2S3B}$ | G 25.1, G 30 | G 26.1, G 30 | G 32 | G 27.1, G 31 | G 26.1, G 30 | HU[a] |
| $II_{2HS3B/P}$ | G 20, G 25.1 G 30 | G 21, G 26.1, G 30 | G 222 G 32 | G 23, G 27.1, G 31 | G 21, G 26.1, G 30 | HU[a] |
| $II_{2HS3P}$ | G 20, G 25.1 G 31 | G 21, G 26.1, G 30 | G 222 G 32 | G 23, G 271, G 31 | G 21, G 26.1, G 31, G 32 | HU[a] |
| $II_{2HS3B}$ | G 20, G 25.1 G 30 | G 21,G 26.1, G 30 | G 222 G 32 | G 23, G 271, G 31 | G 21, G 26.1, G 30 | HU[a] |
| $II_{1Lm2E}$ | G1.250, G 20 | G 21 | G 1.252, G 222 | G 1,252 | G 21 | PL |
| $II_{1Lm2ELwLsLn}$ | G.1.250, G 20, G 27, G 2.350, G 2.300 | G 21 | G 1.252, G 222 | G 1,252 | G 21 | PL |
| $II_{2E3B/P}$ | G 20, G 30 | G 21 | G 222, G 32 | G 231, G31 | G 30 | PL |
| $II_{2E3P}$ | G 20, G 31 | G 21 | G 222, G 32 | G 231, G31 | - | PL |

**Table A.4** *(continued)*

| Category | Reference gas | Incomplete combustion limit gas | Light back limit gas | Lift limit gas | Sooting limit gas | Country |
|---|---|---|---|---|---|---|
| $II_{2E3P(B/P)}$ [b] | G 20, G30, G 31 | G 21 | G 222, G 32 | G 231, G31 | G 30 | PL |
| $II_{2Els3B/P}$ | G 20, G 2.350, G 30 | G 21 | G 222, G 32 | G 2.352 G 31 | G 30 | PL |
| $II_{2Els3P}$ | G 20, G 2.350, G 31 | G 21 | G 222, G 32 | G 2.352 G 31 | - | PL |
| $II_{2ELwLs3B/P}$ | G 20, G 27, G 2.350, G 30 | G 21 | G 222, G 32 | G 2.352 G 31 | G 30 | PL |
| $II_{2ELwLs3P}$ | G 20, G 27, G 2.350, G 31 | G 21 | G 222, G 32 | G 2.352 G 31 | - | PL |
| $II_{2ELwLs3P(B/P)}$ [b] | G 20, G 27, G 2.350, G 31, G 30 | G 21 | G 222, G 32 | G 2.352 G 31 | G 30 | PL |
| $II_{2ELwLsLn3P(B/P)}$ [b] | G 20, G 27, G 2.350, G 2.300 G 31, G 30 | G 21 | G 222, G 32 | G 2.302 G 31 | G 30 | PL |
| $III_{1a2H3B/P}$ | G 110, G 20 G 30 | G 21 | G 112 G 222, G 32 | G 23 G 31 | G 30 | DK, IT |
| $III_{1c2H3B/P}$ | G 130, G 20 G 30 | G 21 | G 132 G 222, G 32 | G 23 G 31 | G 30 | CH |
| $III_{1c2H3+}$ | G 130, G 20 G 30 | G 21 | G 132 G 222, G 32 | G 23 G 31 | G 30 | CH |
| $III_{1c2H3P}$ | G 130, G 20, G 30 | G 21 | G 132 G 222, G 32 | G 23 G 31 | G 31 G 32 | CH |
| $III_{1c2E+3+}$ | G 130, G 20, G 30 | G 21 | G 132 G 222, G 32 | G 231 G 31 | G 30 | FR |
| III1c2E+3P | G 130, G 20 G 31 | G 21 | G 132 G 222, G 32 | G 231 G 31 | G 32 | FR |
| III1c2Esi3+ III1c2Er3+ | G 130, G 20 G 25, G 30 | G 21 | G 132 G 222, G 32 | G 231 G 31 | G 30 | FR |
| III1c2Esi3P III1c2Er3P | G 130, G 20 G 25, G 31 | G 21 | G 132 G 222, G 32 | G 231 G 31 | G 32 | FR |
| III1ab2H3B/P | G 110, G 120 G 20, G 30 | G 21 | G 112 G 222, G 32 | G 23 G 31 | G 30 | SE |
| $III_{1c2E3B/P}$ | G 130, G 20, G 30 | G 21 | G 132, G 222, G 32 | G 31 | G 30 | PL |
| $III_{1Lm2ELwLsLn3B/P}$ | G 1.250, G20, G 27, G 2.350, G 2.300, G 30 | G 21 | G 1.252, G 222, G 32 | G 1.252 G 31 | G 30 | PL |

[a] Hungary to confirm selection.
[b] Only used on appliances less than 12 kW and at normal pressure of 37 mbar for both butane and propane.

## A.4.2 Definition of special categories

### A.4.2.1 General

The definitions of the special categories given in Table A.4 are derived in the same way as those categories listed in 4.2. The characteristics of the gases distributed regionally are given in A.5.

### A.4.2.2 Category I

#### A.4.2.2.1 Appliances designed for the use of gases linked to the first family

**Category $I_{1b}$:** appliances using only gases of Group b linked to the first family, at a fixed supply pressure (this category is not used).

**Category $I_{1c}$:** appliances using only gases of Group c linked to the first family, at a fixed supply pressure (this category is not used).

Adjustment of the gas rate is optional for the replacement of a gas of one group to a gas of another group within the first family and of the gases which are linked to it.

**Category $I_{1Lm}$:** appliances using only of group Lm gases linked to the first family at the prescribed supply pressure (this category is not used).

#### A.4.2.2.2 Appliances designed for the use of gases of the second family and the gases linked to it

**Category $I_{2Esi}$:** appliances capable of using only gases of Group E of the second family, and operating under the appropriate pressure of a pressure couple. The replacement of a gas in the range Es of Group E (Wobbe index between 44,8 MJ/m$^3$ and 54,7 MJ/m$^3$) by a gas in the range Ei of Group E (Wobbe index in the range 40,9 MJ/m$^3$ and 44,8 MJ/m$^3$) or vice versa necessitates a modification to the burner setting and possibly a change of injectors, of calibrated orifices and of the atmosphere control device.

**Category $I_{2Er}$:** appliances capable of using only gases of Group E of the second family and being able to operate with a pressure couple without adjustment on the appliance. However, specific adjustment of the burner gas rate is optional for the replacement of a gas of the range Es of Group E (Wobbe index between 44,8 MJ/m$^3$ and 54,7 MJ/m$^3$) by a gas of the range Ei of Group E (Wobbe index between 40,9 MJ/m$^3$ and 44,8 MJ/m$^3$). If this adjustment has been carried out, a re-adjustment to the previous setting is then necessary in order to return to the use of a gas in the range Es of Group E.

**Category $I_{2LL}$:** appliances using only gases of Group LL linked to the second family, at a fixed supply pressure. On condition that the Wobbe index of the second family gas distributed does not exceed the upper limit of 43,7 MJ/m$^3$, the appliance may be adjusted according to a lower nominal value (this category is not used).

**Category $I_{2ELL}$:** appliances capable of using gases of Group E of the second family, and gases of Group LL linked to the second family. The gases of Group E of the second family are used under the same conditions as for Category $I_{2E}$. The gases of Group LL of the second family are used under the same conditions as for Category $I_{2LL}$.

**Category $I_{2S}$:** appliances using only gases of Group S linked to the second family, at the defined supply pressure.

**Category $I_{2HS}$:** appliances using only gases of Group H of the second family and gases of Group S linked to the second family. The Group H second family gases are used under the same conditions as for Category $I_{2H}$. The Group S second family gases are used under the same conditions as for Category $I_{2S}$.

**Category $I_{2Lw}$:** appliances using only of group Lw gases linked to the second family at the prescribed supply pressure (this category is not used).




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**Category $I_{2Ls}$**: appliances using only of group Ls gases linked to the second family at the prescribed supply pressure (this category is not used).

**Category $I_{2Ln}$**: appliances using only of group Ln gases linked to the second family at the prescribed supply pressure (this category is not used).

**Category $I_{2ELwLs}$**: appliances capable of using gases of group E second family and gases group Lw and Ls linked to the second family. The gases of group E are used under the same conditions as for category $I_{2E}$. The gases group Lw and Ls are used accordingly under the same conditions as for category $I_{2Lw}$ and category $I_{2Ls}$.

**Category $I_{2ELwLsLn}$**: appliances capable of using gases of group E second family and gases group Lw, Ls and Ln linked to the second family. The gases of group E are used under the same conditions as for category $I_{2E}$. The gases group Lw, Ls and Ln are used accordingly under the same conditions as for category $I_{2Lw}$, category $I_{2Ls}$.and category $I_{2Ln}$.

#### A.4.2.2.3 Appliances designed for the use of gases of the third family and the gases linked to it

**Category $I_{3P(B/P)}$**: appliances capable of using gases of group P and B/P third family. The gases of group P are used under the same conditions as for category $I_{3P}$. The gases group B/P are used under the same conditions as for category $I_{3B/P}$.

### A.4.2.3 Category II

#### A.4.2.3.1 Appliances designed to use gases of the first family or that are linked to it and gases of the second family or that are linked to it

**Category $II_{1Lm2ELwLsLn}$**: appliances capable of using of group Lm gases linked to the first family and gases of group E, Lw, Ls, Ln of the second family or linked to the second family. The gases linked to the first family are used under the same conditions as for category $I_{1Lm}$. The second family gases are used under the same conditions as for category $I_{2ELwLsLn}$.

#### A.4.2.3.2 Appliances designed to use gases of the second family or that are linked to it and gases of the third family

**Category $II_{2Esi3+}$:** appliances capable of using gases of Group E of the second family and gases of the third family. The second family gases are used under the same conditions as for Category $I_{2Esi}$. The third family gases are used under the same conditions as for Category $I_{3+}$.

**Category $II_{2Esi3P}$:** appliances capable of using gases of Group E of the second family and gases of Group P of the third family. The second family gases are used under the same conditions as for Category $I_{2Esi}$. The gases of the third family are used under the same conditions as for Category $I_{3P}$.

**Category $II_{2Er3+}$:** appliances capable of using gases of Group E of the second family and gases of the third family. The second family gases are used under the same conditions as for Category $I_{2Er}$. The gases of the third family are used under the same conditions as for Category $I_{3+}$.

**Category $II_{2Er3P}$:** appliances capable of using gases of Group E of the second family and gases of Group P of the third family. The second family gases are used under the same conditions as for Category $I_{2Er}$. The gases of the third family are used under the same conditions as for Category $I_{3P}$.

**Category $II_{2ELL3B/P}$:** appliances capable of using gases of Group E of the second family, gases of Group LL linked to the second family and gases of the third family. The second family gases or the gases that are linked to it are used under the same conditions as for Category $I_{2ELL}$. Gases of the third family are used under the same conditions as for Category $I_{3B/P}$.

**Category $II_{2S3B/P}$:** appliances capable of using gases of Group S linked to the second family and gases of the third family. The gases linked to the second family are used under the same conditions as for Category $I_{2S}$. The third family gases are used under the same conditions as for Category $I_{3B/P}$.

**Category $II_{2S3P}$:** appliances capable of using gases of Group S linked to the second family and gases of Group P of the third family. The gases linked to the second family are used under the same conditions as for Category $I_{2S}$. The third family gases are used under the same conditions as for Category $I_{3P}$.

**Category $II_{2S3B}$:** appliances capable of using gases of Group S linked to the second family and gases of Group B of the third family. The gases linked to the second family are used under the same conditions as for Category $I_{2S}$. The third family gases are used under the same conditions as for Category $I_{3B}$.

**Category $II_{2HS3B/P}$:** appliances capable of using gases of Group H of the second family, gases of Group S linked to the second family and gases of the third family. Gases of the second family or gases linked to it are used under the same conditions as for Category $I_{2HS}$. The third family gases are used under the same conditions as for Category $I_{3B/P}$.

**Category $II_{2HS3P}$:** appliances capable of using gases of Group H of the second family, gases of Group S linked to the second family and gases of Group P of the third family. Gases of the second family or gases linked to it are used under the same conditions as for Category $I_{2HS}$. The third family gases are used under the same conditions as for Category $I_{3P}$.

**Category $II_{2HS3B}$:** appliances capable of using gases of Group H of the second family, gases of Group S linked to the second family and gases of Group B of the third family. Gases of the second family or gases linked to it are used under the same conditions as for Category $I_{2HS}$. The third family gases are used under the same conditions as for Category $I_{3B}$.

**Category $II_{2E3P(B/P)}$:** appliances capable of using gases of group E of the second family and gases of groups P and B/P of the third family. The second family gases are used under the same conditions as for category $I_{2E}$. The gases of the third family are used under the same conditions as for category $I_{3P(B/P)}$.

**Category $II_{2ELwLsLn3B/P}$**: appliances capable of using gases of group E of the second family, gases groups Lw, Ls, Ln linked to the second family and gases of group B/P of the third family. The second family gases are used under the same conditions as for category $I_{2ELwLsLn}$. The gases of the third family are used under the same conditions as for category $I_{3B/P}$.

**Category $II_{2ELwLsLn3P}$**: appliances capable of using gases of group E of the second family, gases groups Lw, Ls, Ln linked to the second family and gases of group P of the third family. The second family gases are used under the same conditions as for category $I_{2ELwLsLn}$. The gases of the third family are used under the same conditions as for category $I_{3P}$.

**Category $II_{2ELwLsLn3P(B/P)}$**: appliances capable of using gases of group E of the second family, gases groups Lw, Ls, Ln linked to the second family and gases of group P and B/P of the third family. The second family gases are used under the same conditions as for category $I_{2ELwLsLn}$. The gases of the third family are used under the same conditions as for category $I_{3P(B/P)}$.

#### A.4.2.4 Category III

**Category $III_{1a2H3B/P}$:** appliances capable of using gases of Group a of the first family, gases of Group H of the second family and gases of the third family. The first family gases are used under the same conditions as for Category $I_{1a}$. The second family gases are used under the same conditions as for Category $I_{2H}$. The third family gases are used under the same conditions as for Category $I_{3B/P}$.

**Category $III_{1c2E+3+}$:** appliances capable of using gases of Group c linked to the first family, gases of Group E of the second family and gases of the third family. The gases linked to the first family are used under the

same conditions as for Category $I_{1c}$. The second family gases are used under the same conditions as for Category $I_{2E+}$. The third family gases are used under the same conditions as for Category $I_{3+}$.

**Category $III_{1c2E+3P}$:** appliances capable of using gases of Group c linked to the first family, gases of Group E of the second family and gases of Group P of the third family. The gases linked to the first family are used under the same conditions as for Category $I_{1c}$. The second family gases are used under the same conditions as for Category $I_{2E+}$. The third family gases are used under the same conditions as for Category $I_{3P}$.

**Category $III_{1c2Esi3+}$:** appliances capable of using gases of Group c linked to the first family, gases of Group E of the second family and gases of the third family. The gases linked to the first family are used under the same conditions as for Category $I_{1c}$. The second family gases are used under the same conditions as for Category $I_{2Esi}$. The third family gases are used under the same conditions as for Category $I_{3+}$.

**Category $III_{1c2Esi3P}$:** appliances capable of using gases of Group c linked to the first family, gases of Group E of the second family and gases of the third family. The gases linked to the first family are used under the same conditions as for Category $I_{1c}$. The second family gases are used under the same conditions as for Category $I_{2Esi}$. The third family gases are used under the same conditions as for Category $I_{3P}$.

**Category $III_{1c2Er3+}$:** appliances capable of using gases of Group c linked to the first family, gases of Group E of the second family and gases of the third family. The gases linked to the first family are used under the same conditions as for Category $I_{1c}$. The second family gases are used under the same conditions as for Category $I_{2Er}$. The third family gases are used under the same conditions as for Category $I_{3+}$.

**Category $III_{1c2Er3P}$:** appliances capable of using gases of Group c linked to the first family, gases of Group E of the second family and gases of Group P of the third family. The gases linked to the first family are used under the same conditions as for Category $I_{1c}$. The second family gases are used under the same conditions as for Category $I_{2Er}$. The third family gases are used under the same conditions as for Category $I_{3P}$.

**Category $III_{1ab2H3B/P}$:** appliances capable of using gases of Group a of the first family, gases of Group b linked to the first family, gases of Group H of the second family and gases of the third family. The first family gases or the gases linked to it are used under the same conditions as for categories $I_{1a}$ and $I_{1b}$. The second family gases are used under the same conditions as for Category $I_{2H}$. The third family gases are used under the same conditions as for Category $I_{3B/P}$.

**Category $III_{1Lm2ELwLsLn3B/P}$:** appliances capable of using gases of group Lm linked to the first family, gases of group E of the second family, gases groups Lw,Ls,Ln linked to the second family and gases of group B/P of the third family. The first family gases are used under the same conditions as for category $I_{1Lm}$. The second family gases are used under the same conditions as for category $I_{2ELwLsLn}$. The third family gases are used under the same conditions as for category $I_{3B/P.}$.

### A.4.3 Gas rate adjusters, aeration adjusters and regulators

This clause has been included to enable CEN members to provide information equivalent to that given in 5.2.2, 5.2.3, 5.2.4 and 5.2.6 in relation to the special categories they have requested, detailed in A.4.1.

### A.4.4 Conversion to different gases

This clause has been included to enable certain member states to provide information equivalent to that given in 5.1.1.2 in relation to the special appliance categories listed in A.4.1.

## A.5 Test gases corresponding to the special categories given in A.4

The characteristics of the test gases corresponding to the gases distributed nationally or locally and the corresponding test pressures are given in Table A.5 (reference conditions only).




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Mixtures of gases of Group a with gases of Groups c or e, where the Wobbe index is between 21,1 MJ/$m^3$ and 24,8 MJ/$m^3$ are also linked to Group a of the first family.

These mixtures may only be used without supplementary tests in appliances in multiple categories including Group a of the first family.




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**Table A.5 — Test gases corresponding to local situations**

| Gas family and group | | Nature of gas | Desig-nation | Composition Volume % | *WI* MJ/m3 | *HI* MJ/m3 | *Ws* MJ/m3 | *Hs* MJ/m3 | *d* | Test Pressure mbar | Country |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gases linked to the first family | Group b | Reference Incomplete combustion Sooting | G 120 | $H_2$ = 47<br>$CH_4$ = 32<br>$N_2$ = 21 | 24,40 | 15,68 | 27,64 | 17,77 | 0,413 | $p_n$ = 8<br>$p_{min}$ = 6<br>$p_{max}$ = 15 | SE |
| | | Light back | G 112 | $H_2$ = 59<br>$CH_4$ = 17<br>$N_2$ = 24 | 19,48 | 11,81 | 22,36 | 13,56 | 0,367 | | |
| | Group c | Reference (Propane–air) | G 130 | $C_3H_8$ = 26,9<br>Air = 73,1[a] | 22,14 | 23,66 | 24,07 | 25,72 | 1,142 | FR:<br>$p_n$ = 8<br>$p_{min}$ = 6<br>$p_{max}$ = 15<br>PL:<br>$p_n$ = 20<br>$p_{min}$ = 16<br>$p_{max}$ = 23 | FR<br><br><br><br>PL |
| | | Light back | G 132 | $C_3H_8$ = 13,8<br>$C_3H_6$ = 13,8<br>Air[a] = 72,4 | 22,10 | 23,56 | 23,84 | 25,41 | 1,136 | | |
| | Group Lm | Reference | G 1.250 | CH4 = 54<br>N2 = 46 | 21,27 | 18,36 | 23,64 | 20,40 | 0,745 | PL:<br>$p_n$ = 8<br>$p_{min}$ = 6<br>$p_{max}$ = 11 | PL |
| | | Incomplete combustion | G 1.251[c] | CH4 = 58<br>N2 = 42 | 23,12 | 19,73 | 25,68 | 21,31 | 0,728 | | |
| | | Light back limit<br>Flame lift limit | G 1.252 | CH4 = 50<br>N2 = 50 | 19,48 | 17,00 | 21,65 | 18,89 | 0,761 | | |
| Gases Linked to the second family | Group Lw | Reference | G 27 | $CH_4$ = 82<br>$N_2$ = 18 | 35,17 | 27,89 | 39,06 | 30,98 | 0,629 | $p_n$ = 20<br>$p_{min}$ = 16<br>$p_{max}$ = 23 | PL |
| | | Incomplete combustion | G 2.411 | $CH_4$ = 89<br>$N_2$ = 11 | 39,09 | 30,28 | 43,40 | 33,62 | 0,600 | | |
| | | Light back limit<br>Flame lift limit | G 2.412 | $CH_4$ = 76<br>$N_2$ = 24 | 31,96 | 25,85 | 35,50 | 28,71 | 0,654 | | |
| | Group Ls | Reference | G 2.350 | CH4 = 72<br>N2 = 28 | 29,67 | 24,49 | 33,22 | 27,20 | 0,670 | $p_n$ = 13<br>$p_{min}$ = 10<br>$p_{max}$ = 16 | |
| | | Incomplete combustion | G 2.351 | $CH_4$ = 77<br>$N_2$ =23 | 32,48 | 26,19 | 36,09 | 29,09 | 0,650 | | |
| | | Light back limit<br>Flame lift limit | G 2.352 | $CH_4$ = 67<br>$N_2$ = 33 | 27,42 | 22,79 | 30,15 | 25,31 | 0,691 | | |
| | Group Ln | Reference | G 2.300 | $CH_4$ = 63<br>$N_2$ = 37 | 25,49 | 21,43 | 28,30 | 23,80 | 0,707 | $p_n$ = 13<br>$p_{min}$ = 10<br>$p_{max}$ = 16 | |
| | | Incomplete combustion | G 2.301 | $CH_4$ = 68<br>$N_2$ = 32 | 27,91 | 23,13 | 31,00 | 25,69 | 0,687 | | |
| | | Light back limit<br>Flame lift limit | G 2.302[c] | $CH_4$ = 58<br>$N_2$ = 42 | 23,12 | 19,73 | 25,68 | 21,31 | 0,728 | | |




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**Table A.5** *(continued)*

| Gas family and group | | Nature of gas | Desig-nation | Composition Volume % | $W_i$ MJ/m$^3$ | $H_i$ MJ/m$^3$ | $W_s$ MJ/m$^3$ | $H_s$ MJ/m$^3$ | $d$ | Test Pressure mbar | Country |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gases Linked to the second family | Group LL | Reference | G 25[b] | $CH_4$ = 86 $N_2$ = 14 | 37,38 | 29,25 | 41,52 | 32,49 | 0,612 | $p_n$ = 20 | DE |
| | | Incomplete combustion Sooting | G 26 | $CH_4$ = 80 $C_3H_8$ = 7 $N_2$ = 13 | 40,52 | 33,36 | 44,83 | 36,91 | 0,678 | $p_{min}$ = 18 | |
| | | Flame lift | G 271 | $CH_4$ = 74 $N_2$ = 26 | 30,94 | 25,17 | 34,36 | 27,96 | 0,662 | $p_{max}$ = 25 | |
| | Group S | Reference | G 25.1 | $CH_4$ = 86 $CO_2$ = 14 | 35,25 | 29,30 | 39,11 | 32,51 | 0,691 | $p_n$ = 25 | HU |
| | | Incomplete combustion Sooting | G 26.1 | $CH_4$ = 80 $C_3H_8$ = 6 $CO_2$ = 14 | 37,61 | 32,60 | 41,58 | 36,04 | 0,751 | $p_{min}$ = 20 | |
| | | Lift limit | G 27.1 | $CH_4$ = 82 $CO_2$ = 18 | 32,70 | 27,94 | 36,29 | 31,00 | 0,730 | $p_{max}$ = 33<br>02<br>$p_n$ = 85<br>$p_{min}$ = 73<br>$p_{max}$= 100 | |
| Gases of the second family | Range Es of Group E | Reference | G 20[b] | $CH_4$ = 100 | 45,67 | 34,02 | 50,72 | 37,78 | 0,555 | $p_n$ = 20 | FR |
| | | Incomplete combustion Sooting | G 21 | $CH_4$ = 87 $C_3H_8$ = 13 | 49,60 | 41,01 | 54,76 | 45,28 | 0,684 | $p_{min}$ = 17 | |
| | | Light back | G 222 | $CH_4$ = 77 $H_2$ = 23 | 42,87 | 28,53 | 47,87 | 31,86 | 0,443 | $p_{max}$ = 25 | |
| | | Lift limit | G 26 | $CH_4$ = 80 $C_3H_8$ = 7 $N_2$ = 13 | 40,52 | 33,36 | 44,83 | 36,91 | 0,678 | | |
| | Range Ei of Group E | Reference Light back | G 25[b] | $CH_4$ = 86 $N_2$ = 14 | 37,38 | 29,25 | 41,52 | 32,49 | 0,612 | $p_n$ = 25 | |
| | | Incomplete combustion Sooting | G 26 | $CH_4$ = 80 $C_3H_8$ = 7 $N_2$ = 13 | 40,52 | 33,36 | 44,83 | 36,91 | 0,678 | $p_{min}$ = 20 | |
| | | Lift limit | G 231 | $CH_4$ = 85 $N_2$ = 15 | 36,82 | 28,91 | 40,90 | 32,11 | 0,617 | $p_{max}$ = 30 | |

a Composition of the air (%): $O_2$ = 20,95; $N_2$ = 79,05.

b For the characteristics of the reference gases G 20 and G 25, see Table 3.

c Gases G 2.302 and G 1.251 have the same composition but different pressure.

## A.6 Gas connections in the various countries

Table A.6 shows the national situations concerning the various types of gas connection specified in 5.1.6.

**Table A.6 — Permitted inlet connections**

| Country | Category $I_{3+}$, $I_{3P}$, $I_{3B}$, $I_{3B/P}$ | | | Other categories | | |
|---|---|---|---|---|---|---|
| | Threaded connections | | Other connections | Threaded connections | | Other connections |
| | EN 10226-1 EN 10226-2: | EN ISO 228-1 | | EN 10226-1 EN 10226-2: | EN ISO 228-1 | |
| AT | Yes | — | Yes | Yes | — | — |
| BE | Yes | Yes | Yes | — | Yes | — |
| BG | — | — | — | — | — | — |
| CH | Yes | Yes | Yes | Yes | Yes | — |
| CY | — | — | — | — | — | — |
| CZ | — | — | — | — | — | — |
| DE | Yes | — | Yes | Yes | — | — |
| DK | Yes | Yes | Yes | — | Yes | — |
| EE | — | — | — | — | — | — |
| ES | — | — | — | — | — | — |
| FI | Yes | Yes | Yes | Yes | Yes | — |
| FR | — | Yes | Yes | — | Yes | — |
| GB | Yes [a b] | — | Yes | Yes [a b] | — | Yes |
| GR | Yes | — | Yes | Yes | — | — |
| HU | — | — | — | — | — | — |
| IE | Yes | — | Yes | Yes | — | Yes |
| IS | — | — | — | — | — | — |
| IT | Yes | — | Yes | Yes | — | — |
| LT | — | — | — | — | — | — |
| LU | — | — | — | — | — | — |
| LV | — | — | — | — | — | — |
| MT | — | — | — | — | — | — |
| NL | Yes | — | — | Yes | — | — |
| NO | Yes | Yes | Yes | — | — | — |
| PL | Yes [b] | Yes | Yes | Yes [b] | Yes | — |
| PT | Yes | Yes | Yes | Yes | Yes | Yes |
| RO | — | — | — | — | — | — |
| SE | — | — | — | — | — | — |
| SI | Yes | Yes | Yes | Yes | Yes | Yes |
| SK | — | — | — | — | — | — |

[a] taper – taper threads
[b] taper – parallel threads


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## A.7 Flue connections in the various countries

Table A.7 shows the national situations concerning the diameters of standard flue pipes.

**Table A.7 — Standard flue pipe diameters**

| Country | Standard flue pipe diameters (external) in mm | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AT | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 180 | 200 | | | | |
| BE | All diameters acceptable | | | | | | | | | | | | | | | | |
| BG | | | | | | | | | | | | | | | | | |
| CH | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 150 | 160 | 170 | 180 | 200 | | | | |
| CY | | | | | | | | | | | | | | | | | |
| CZ | | | | | | | | | | | | | | | | | |
| DE | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 150 | 200 | | | | | | | |
| DK | Diameters not standardized | | | | | | | | | | | | | | | | |
| EE | | | | | | | | | | | | | | | | | |
| ES | | | | | | | | | | | | | | | | | |
| FI | 90 | 100 | 110 | 130 | 150 | 180 | 200 | | | | | | | | | | |
| FR | 66 | 83 | 97 | 111 | 125 | 139 | 153 | 167 | 180 | | | | | | | | |
| GB | 76 | 102 | 127 | 153 | metal pipes (all 0, -1 tolerance) | | | | | | | | | | | | |
| GR | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 150 | 180 | 200 | | | | | | |
| IE | 76 | 102 | 127 | 153 | metal pipes (all 0, -1 tolerance) | | | | | | | | | | | | |
| | 84 | 109 | 137 | 162 | fibrous cement pipes (all ± 3 tolerance) | | | | | | | | | | | | |
| IS | | | | | | | | | | | | | | | | | |
| IT | 60 | 80 | 100 | 110 | 120 | 150 | | | | | | | | | | | |
| LT | | | | | | | | | | | | | | | | | |
| LU | | | | | | | | | | | | | | | | | |
| LV | | | | | | | | | | | | | | | | | |
| MT | | | | | | | | | | | | | | | | | |
| NL | 60 | 70 | 80 | 90 | 100 | 110 | 130 | 150 | 180 | 200 | | | | | | | |
| NO | | | | | | | | | | | | | | | | | |
| PL | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 200 | 250 | 250 | |
| PT | 60 | 85 | 90 | 95 | 105 | 110 | 115 | 120 | 125 | 130 | 135 | 145 | 155 | 205 | 255 | 305 | 355 |
| RO | | | | | | | | | | | | | | | | | |
| SE | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 180 | 200 | | | | |
| SI | | | | | | | | | | | | | | | | | |
| SK | | | | | | | | | | | | | | | | | |

# Annex B
(informative)

# Equivalence rules[9)]

## B.1 Conversion to categories within a restricted Wobbe index range

Any appliance belonging to one category may be categorized as an appliance belonging to another category covering a more restricted range of Wobbe index provided that the requirements 5.1.1, 5.2.2.2, 5.2.2.3 and 5.2.5 are satisfied, that its state of conversion corresponds to that of the country (or countries) of destination and that the information provided on the appliance corresponds to its adjustment.

In principle, this equivalence is recognized without the appliance having to be submitted to new tests.

However, supplementary tests can be necessary using the pressures and the test gases currently in force in the intended country (or countries) of destination:

a) when the supply pressures are different in the country (or countries) for which the appliance has been tested from those in the intended country of destination; or

b) when an appliance fitted with adjusters[10)], even though sealed, has been tested under the conditions of the original category with test gases different from those of the country where it is to be sold; or

c) when the requirements for regulators (see 5.2.5) with respect to the existing category differ from those of the new category.

In all cases these supplementary tests are at most those stated in 7.1.5.1.

EXAMPLE 1 An appliance in Category $I_{2E}$ for G 20 at 20 mbar may be categorized as an appliance in Category $I_{2H}$ for G 20 at 20 mbar without additional tests.

If, however, the pressures are different, the tests specified in 6.1.5.1 shall be carried out, after changing the injectors, if necessary.

EXAMPLE 2 An appliance in Category $I_{2E+}$ for G 20 at 20 mbar may be categorized as an appliance in Category $I_{2H}$ for G 20 at 20 mbar provided that it satisfies the corresponding tests specified in 7.1.5.1 after changing the injectors, if necessary, and after adjusting the regulator in accordance with 5.2.5.

## B.2 Conversion to categories within an identical Wobbe index range

Any appliance belonging to one category may be categorized as an appliance belonging to another category covering a more restricted range of Wobbe index provided that the requirements 5.1.1, 5.2.2.2, 5.2.2.3 and 5.2.5 are satisfied, that its state of conversion corresponds to that of the country (or countries) of destination and that the information provided on the appliance corresponds to its adjustment.

In principle, this equivalence is recognized without the appliance having to be submitted to new tests.

---

9) This annex does not apply to the POCEDS(chimneys).

10) Throughout Annex B the word "adjuster" refers to gas rate adjusters and to fixed primary aeration adjusters as appropriate.




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However, supplementary tests may be necessary using the pressures and the test gases currently in force in the intended country (or countries) of destination:

a) when the supply pressures are different in the country (or countries) for which the appliance has been tested from those in the intended country of destination; or

b) when an appliance fitted with adjusters, even though sealed, has been tested under the conditions of the original category with test gases different from those of the country where it is to be sold; or

c) when the requirements for regulators (see 5.2.5) with respect to the existing category differ from those of the new category.

In all cases these supplementary tests are at most those stated in 7.1.5.1.

EXAMPLE 1 An appliance in Category $I_{2E+}$ may be categorized as an appliance in Category $I_{2Esi}$ or $I_{2Er}$ provided that it satisfies the tests specified in 7.1.5.1 for the test pressures and the test gases relating to Category $I_{2Esi}$ or $I_{2Er}$ and with the corresponding injectors and adjustments. These adjustments shall take into account the requirements of 5.2.5.

EXAMPLE 2 An appliance in Category $I_{2Esi}$ or $I_{2Er}$ may be categorized as an appliance in category $I_{2E+}$ provided that it satisfies the tests specified in 7.1.5.1 for the test pressures corresponding to Category $I_{2E+}$. In addition, any adjusters shall be locked and sealed in the appropriate positions, taking account the requirements of 5.2.5.

NOTE Where the intended country of destination is Belgium, account should be taken of the Special Conditions given in Annex F.

## B.3 Conversion to categories within a wider Wobbe index range

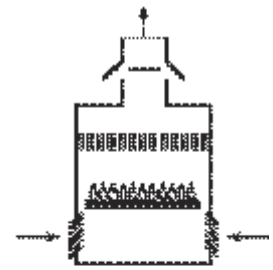
An appliance belonging to one category may be categorized as an appliance in another category covering a wider range of Wobbe index if it complies with all the constructional requirements of the proposed new category.

In addition, the appliance shall be submitted to the tests specified in 7.1.5.1 using the test gases and test pressures for the proposed new category. Where appropriate, account shall be taken of the Special Conditions given in Annex F.

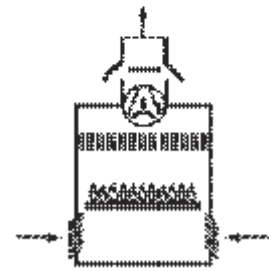
# Annex C
(normative)

# Classification according to the evacuation of the combustion

## C.1 Type $B_1$

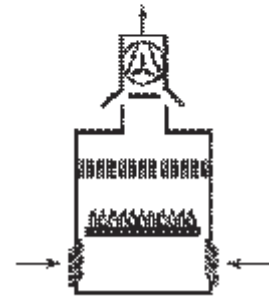


Type $B_{11}$



Type $B_{12}$

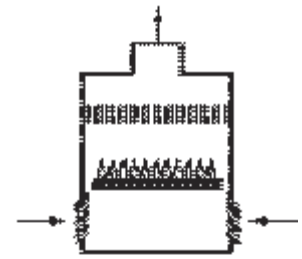
Type $B_{13}$



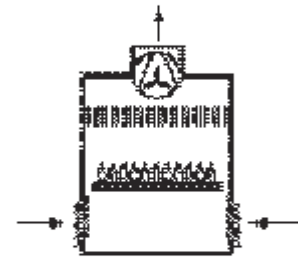
Type $B_{14}$

**Figure C.1**

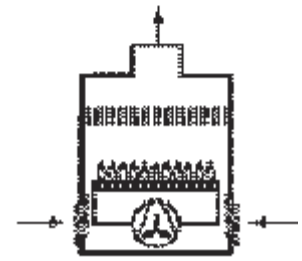
## C.2 Type $B_2$



Type $B_{21}$



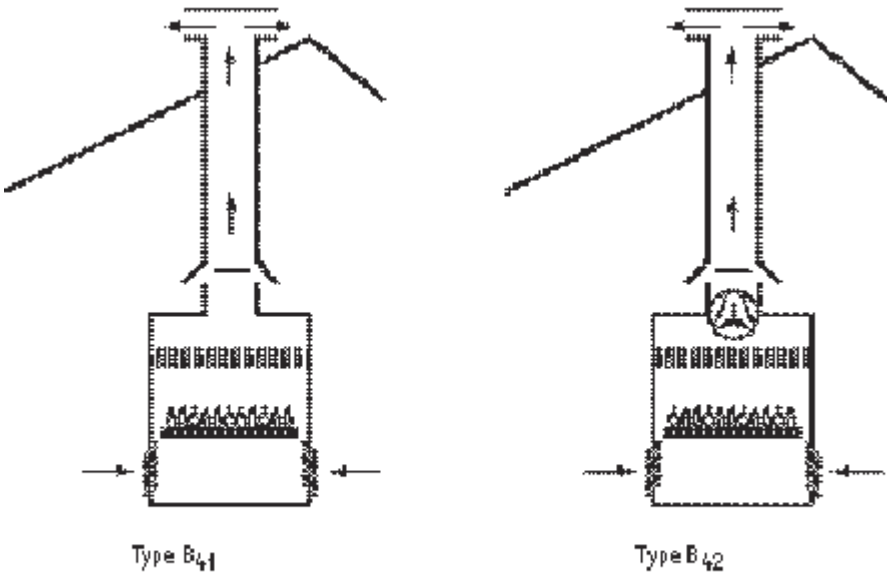
Type $B_{22}$



Type $B_{23}$

**Figure C.2**

## C.3 Type $B_4$



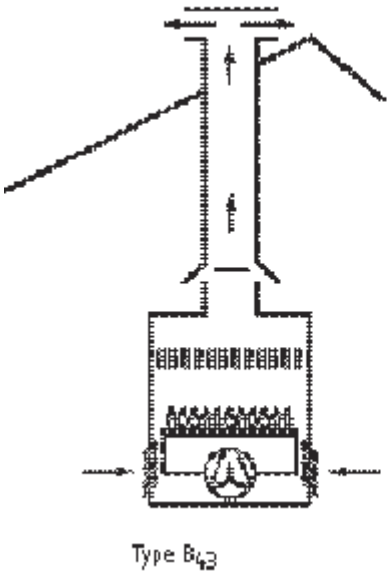




**Figure C.3**

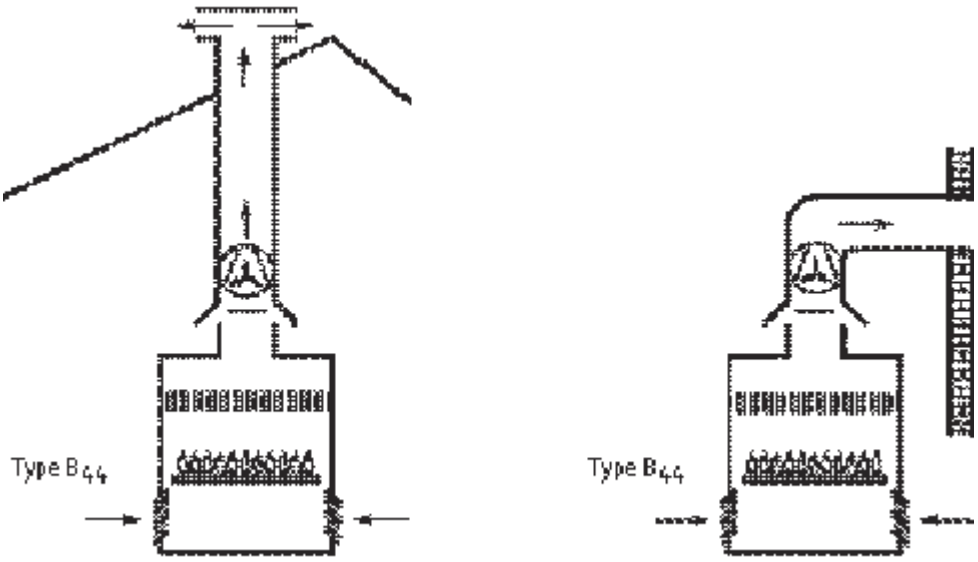



**Figure C.4**

## C.4 Type $B_5$

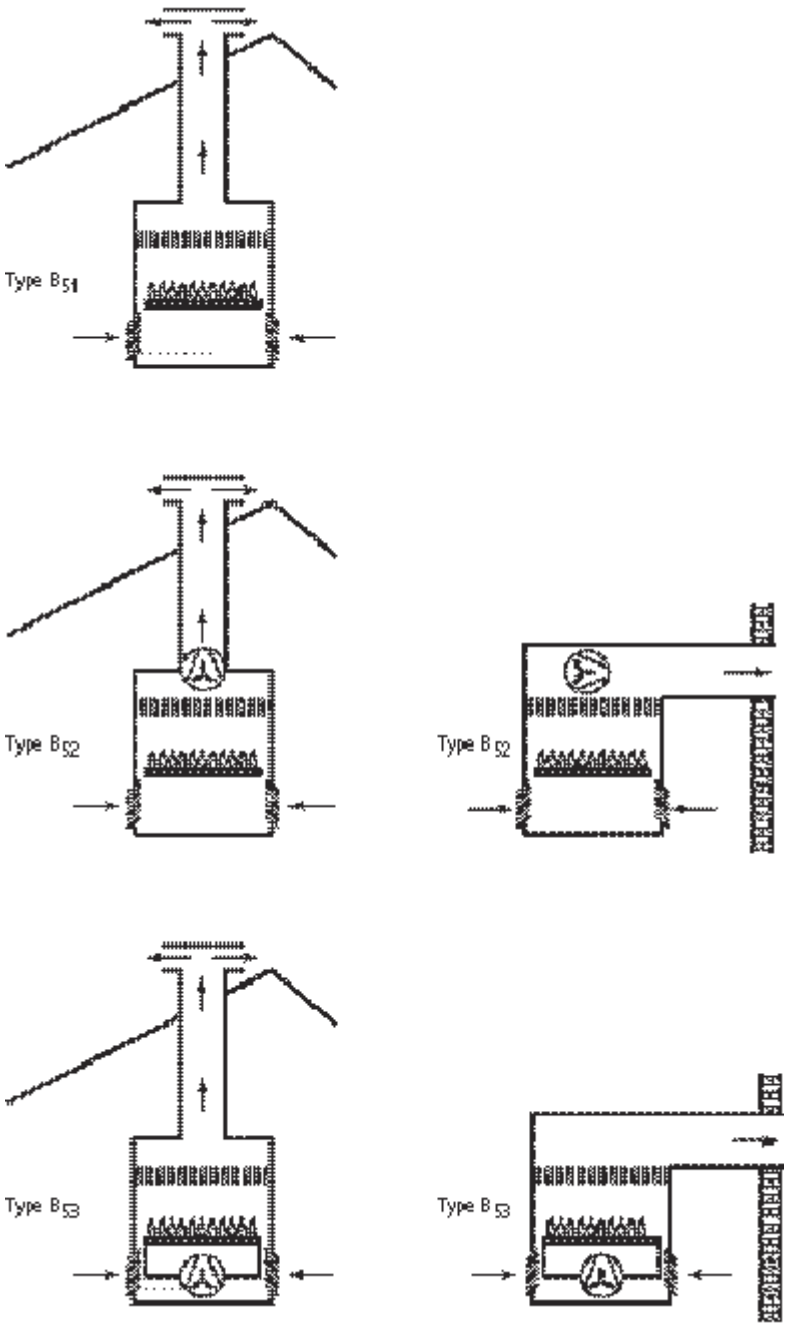



**Figure C.5**

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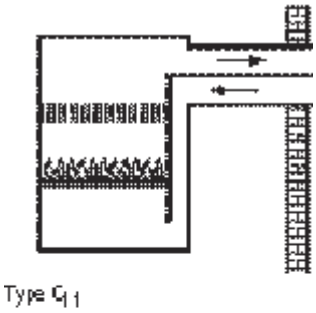
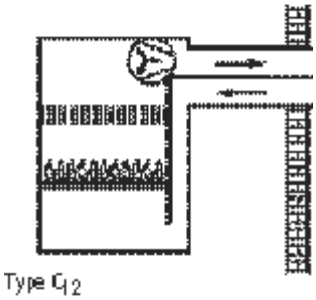
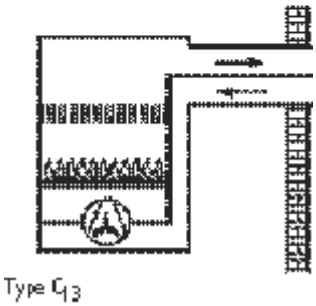
## C.5 Type $C_1$



Type $C_{11}$



Type $C_{12}$



Type $C_{13}$

**Figure C.6**

## C.6 Type $C_3$

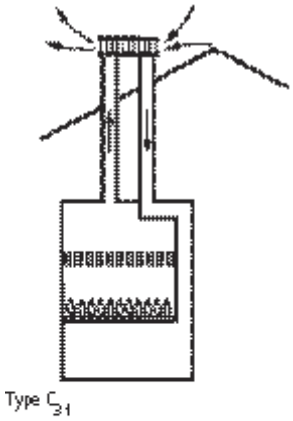



**Figure C.7**

# Annex D
(normative)

# Requirements and tests for the ducting of $C_6$ appliances[11)]

## D.1 Requirements

### D.1.1 Pressure losses

The pressure loss in the combustion products evacuation duct system (including the terminal) of a combined air supply and combustion products evacuation system corresponding to an air speed of 2 m/s shall be less than 20 Pa.

### D.1.2 Pressure loss under the influence of wind

Under the test conditions corresponding to a wind speed of 2 m/s in the combustion products evacuation duct, the pressure loss of a combined air supply and combustion products evacuation system shall not exceed 40 Pa.

### D.1.3 Suction under the influence of wind

Under the wind test conditions corresponding to a wind speed of 2 m/s in the combustion products evacuation duct, the pressure difference between the inlet of the air supply duct and the outlet of the combustion products evacuation duct of a combined air supply and combustion products evacuation system shall be less than 50 Pa.

### D.1.4 Recirculation of the combustion products

Under the wind test conditions corresponding to a wind speed of 2 m/s in the combustion products evacuation duct, the recirculation of the combustion products between the outlet and the inlet shall be less than the value given in Figure D.1.

## D.2 Test methods

### D.2.1 Pressure loss in still air

The combined air supply and combustion products evacuation system is connected to the recycling device as shown in Figure D.2.

### D.2.2 Pressure loss under the influence of wind

With the combined system installed and adjusted as stated in D.2.1, it is subjected to a wind speed as stated in D.2.5.

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11) This annex does not apply to the POCEDS (chimneys).




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### D.2.3 Suction under the influence of wind

Under the test conditions of D.2.2, it is checked that the suction between the inlet and outlet of the combined system is less than 0,5 mbar.

### D.2.4 Recirculation of the combustion products

With the combined system installed and adjusted as stated in D.2.1, it is subjected to a wind speed as stated in D.2.5.

The recirculation of air from the evacuation duct to the air supply duct is determined by means of a gas tracer (e.g. $CO_2$).

At the various wind angles, the recirculation shall be less than the value given in Figure D.2.

### D.2.5 Wind test conditions

#### D.2.5.1 Incident angles

The appliance terminal is subjected to various wind speeds at incident angles varying in 15° steps from - 45° to + 90° in relation to a horizontal plane (see Figure D.3).

#### D.2.5.2 Wind speeds

The tests described in D.2.2 and D.2.3, concerning the pressure loss and suction under the influence of wind, are carried out at a wind speed of 12 m/s.

During the recirculation tests of D.2.4, the wind speed is maintained constant at 2,5 m/s.

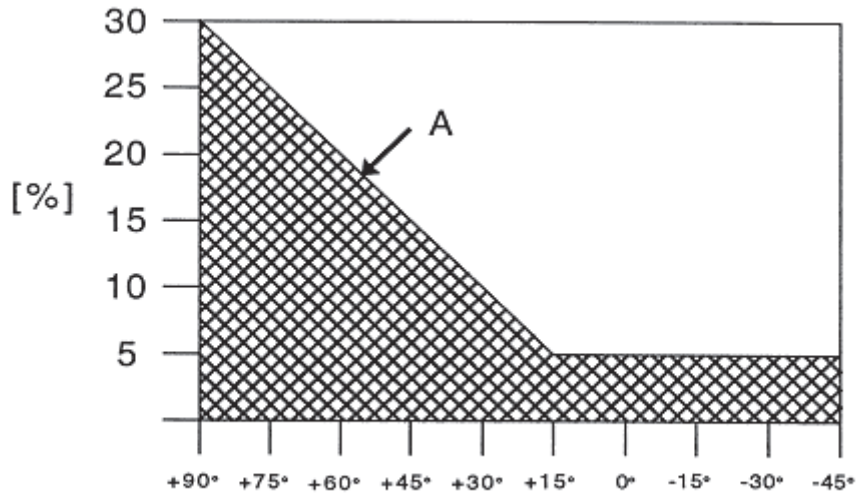
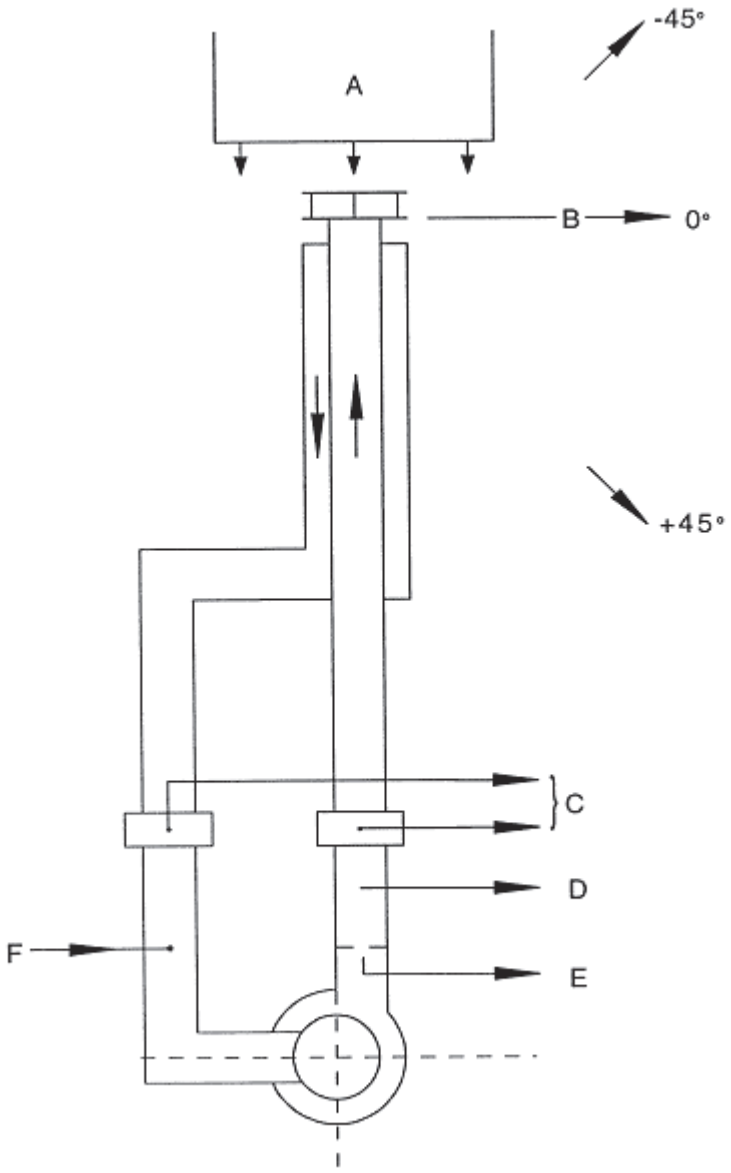



**Figure D.1 — Maximum permitted recirculation of the combustion products**




$$\%\ recirculation = \frac{(measured\ \ recirculation - source\ \ recirculation)}{measured\ \ recirculation} \times 100$$

**Key**

| | |
|---|---|
| A | air tunnel wind speed: 0 m/s to 12 m/s |
| B | rotation point |
| C | measurement of air pressure |
| D | measurement of CO2 |
| E | orifice plate for a wind speed of 2,0 m/s |
| F | injection of CO2 |

**Figure D.2 — Recycling device for pressure loss test (see D.2.1)**

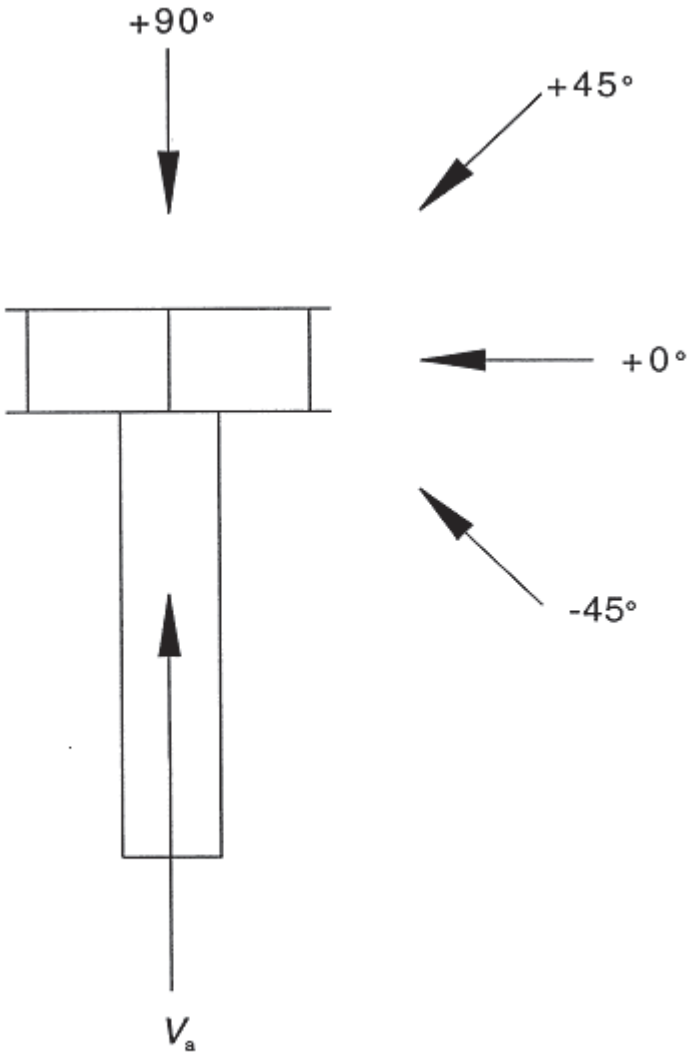



**Figure D.3 — Relationship of terminal and wind direction for wind test (D.2.5)**

# Annex E
(informative)

# A-deviations[12)]

## E.1 General

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN/CENELEC member.

This European Standard falls under Directive 90/396/EEC on the approximation of the laws of Member States concerning gas appliances.

A-deviations in an EFTA country are valid instead of the relevant provisions of the European Standard in that country until they have been removed.

## E.2 Switzerland

The Swiss law (Luftreinhalte-Verordnung, LRV) of 1985-12-16 (state on 1993-01-01) is applicable instead of the requirements of 5.1.5 and 5.2 regarding energy efficiency (chimney losses, standby losses) and emissions of CO and $NO_x$.

12) This annex does not apply to the POCEDS (chimneys).

# Annex F
(normative)

# Special national conditions[13)]

## F.1 General

Special national conditions are National characteristics or practice that cannot be changed even over a long period (e.g. climatic conditions, electrical earthing conditions). If it affects harmonization, it forms part of the European Standard or Harmonization Document.

For the countries in which the relevant special national conditions apply these provisions are normative, for other countries they are informative.

## F.2 Belgium

Appliances of categories $I_{2E+}$, $I_{2E(R)B}$ and $I_{2E(S)B}$ marketed in Belgium have to undergo a test for ignition, crosslighting and flame stability with the limit gas G 231 at the minimum pressure of 15 mbar.

## F.3 Italy

Appliances of categories $I_{3B/P}$, $II_{2H3B/P}$ and $III_{1a2H3B/P}$ without pressure regulators marketed in Italy shall have successfully undergone a test for flame stability with the limit gas G 31 at the pressure of 45 mbar.

## F.4 Poland

Appliances of categories with index 3B/P shall be tested with the test gases for 3B/P given in Table 6 but with the following pressures: $p_n$ = 37 mbar, $p_{min}$ = 25 mbar and $p_{max}$ = 45 mbar.

Additional information for gases used in Poland for Table 7 - Percentage by volume of CO2 (dry products of neutral combustion).

| Designation of gas | G27 | G 2.411 | G 2.412 | G 2.350 | G 2.351 | G 2.352 | G 2.300 | G 2.301 | G 2.302<br>G 1.251 | G 1.250 | G 1.252 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| % $(CO_2)_N$ (neutral combustion) | 11,5 | 11,6 | 11,3 | 11,2 | 11,3 | 11,1 | 11,0 | 11,1 | 10,8 | 10,7 | 10,5 |

13) This annex does not apply to the POCEDS (chimneys).

# Annex G
(informative)

## Identification of gas types in use in various countries[14)]

**Table G.1 — Means of identification of gas types in use in various countries**

| Type of gas / Country code [b] | G 110 | G 120 | G 130 | G 150 | G 20 | G 25 | G 30 | G 31 |
|---|---|---|---|---|---|---|---|---|
| AT | | | | | Erdgas | | Flüssiggas | |
| BE | | | | | Aardgas, Gaz naturel | Aardgas, Gaz naturel | Butaan, Butane | Propaan, Propane |
| BG | | | | | | | | |
| CH | | | Propan-Luft Butan-Luft | | Erdgas H | | Butan | Propan |
| CY | | | | | | | | |
| CZ | | | | | | | | |
| DE | | | | | Erdgas E $W_o$ (12,0 – 15,7) kWh/m$^3$ 0 °C | Erdgas LL $W_o$ (10,0 – 13,1) kWh/m$^3$ 0 °C | Flüssiggas B/P Butan | Propan |
| DK | Bygas | | | | Naturgas | | F-Gas | F-Gas |
| EE | | | | | | | | |
| ES | Gas manufacturado | | Aire propanado | Aire metanado | Gas natural | | Butano | Propano |
| FI | | | | | Maakaasu, Naturgas | | Butaani, Butan | Propaani, Propan |
| Fr[a] | | | Air propané/ Air butané | | Gaz naturel Lacq | Gaz naturel Groningue | Butane | Propane |
| GB | | | | | Natural Gas | | Butane | Propane |
| GR | | | | | Qυσικὸ Aèριο | | Υγραèριο Μείγμα | Προπανιο |
| HU | | | | | | | | |
| IE | | | | | Natural Gas | | Butane | Propane |
| IS | | | | | | | | |
| IT | Gas di Città | | | | Gas naturale/ Gas metano | | GPL | |
| LT | | | | | | | | |
| LU | | | | | | | | |
| LV | | | | | | | | |
| MT | | | | | | | | |
| NL | | | | | | Aardgas | Butaan | Propaan |
| NO | | | | | | | Butan | Propan |
| PL | | | | | | | | |
| PT | | | | | Gás Natural | | Butano | Propano |
| SE | | | | | | | | |
| SI | | | | | Zemeljski plin | | Utekočinjeni naftni plin (UNP) Butan | Utekočinjeni naftni plin (UNP) Propan |
| SK | | | | | | | | |

[a] The meaning of the symbol corresponding to the type of gas should be explained in detail in the technical instructions. Concerning the system and its packaging, if an additional marking is intended by the manufacturer to explain the symbol, this text should be in conformity with the description given in this table. In the case of pressure couples, the two descriptions of the family should be mentioned

[b] See 8.3.4 for codes.

14) This annex does not apply to the POCEDS (chimneys).

# Annex H
(informative)

# National solutions for countries whose national bodies are Affiliate Members of CEN[15)]

NOTE The content of this annex is to be completed with information to be provided by the Affiliate Members of CEN.

## H.1 Categories listed in the body of the standard and marketed in different countries

## H.2 Appliance supply pressures corresponding to the categories given in H.1

## H.3 Special categories marketed nationally or locally

## H.4 Gases and test pressures corresponding to the special categories given in H.3

15) This annex does not apply to the POCEDS (chimneys).

# Annex I
(informative)

# Calculation of conversions of $NO_x$[16)]

**Table I.1 — Conversion of the emission value of $NO_x$ for first family gases**

| $1x10^{-6}$ = 2,054 mg/$m^3$ ($1x10^{-6}$ = 1 $cm^3/m^3$) | | G 110 | |
|---|---|---|---|
| | | mg/kWh | mg/MJ |
| $O_2$ = 0% | $1x10^{-6}$ = | 1,714 | 0,476 |
| | 1 mg/$m^3$= | 0,834 | 0,232 |
| $O_2$ = 3% | $1x10^{-6}$ = | 2,000 | 0,556 |
| | 1 mg/$m^3$= | 0,974 | 0,270 |

**Table I.2 — Conversion of the emission value of $NO_x$ for second family gases**

| $1x10^{-6}$ = 2,054 mg/$m^3$ ($1x10^{-6}$ = 1 $cm^3/m^3$) | | G 20 | | G 25 | |
|---|---|---|---|---|---|
| | | mg/kWh | mg/MJ | mg/kWh | mg/MJ |
| $O_2$ = 0% | $1x10^{-6}$ = | 1,764 | 0,490 | 1,797 | 0,499 |
| | 1 mg/$m^3$= | 0,859 | 0,239 | 0,875 | 0,243 |
| $O_2$ = 3% | $1x10^{-6}$ = | 2,059 | 0,572 | 2,098 | 0,583 |
| | 1 mg/$m^3$= | 1,002 | 0,278 | 1,021 | 0,284 |

**Table I.3 — Conversion of the emission value of $NO_x$ for third family gases**

| $1x10^{-6}$ = 2,054 mg/$m^3$ ($1x10^{-6}$ = 1 $cm^3/m^3$) | | G 30 | | G 31 | |
|---|---|---|---|---|---|
| | | mg/kWh | mg/MJ | mg/kWh | mg/MJ |
| $O_2$ = 0% | $1x10^{-6}$ = | 1,792 | 0,498 | 1,778 | 0,494 |
| | 1 mg/$m^3$= | 0,872 | 0,242 | 0,866 | 0,240 |
| $O_2$ = 3% | $1x10^{-6}$ = | 2,091 | 0,581 | 2,075 | 0,576 |
| | 1 mg/$m^3$= | 1,018 | 0,283 | 1,010 | 0,281 |

16) This annex does not apply to the POCEDS (chimneys).

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# Annex J
(informative)

# An example of sampling plans

## J.1 Sampling plans

### J.1.1 General

In this example sampling plans are selected from the tables published in ISO 2859-1.

### J.1.2 Acceptable Quality Level (AQL)

In this example the AQL is decided in relation to the nature of the inspection feature being controlled. For defects classed as Major, the sampling plan is based on an AQL of 4,0.

NOTE Classification of defects should be the responsibility of the person responsible for the manufacturing process.

### J.1.3 The inspection level

The inspection level defines the relationship between the batch size and the sample size. In this example all incoming goods are subjected to inspection level II.

### J.1.4 Normal, tightened or reduced inspection

In this example the normal inspection is used initially on all incoming materials, after which, the following rules apply:

a) when ten successive batches have been accepted on original there may be a switch to reduced inspection. This should remain in operation until one batch is rejected, at which point normal inspection is resumed;

b) when two out of any five successive batches have been rejected on original inspection, there may be a switch to tightened inspection. This should remain in operation until five successive batches have been accepted, at which point normal inspection is resumed.

### J.1.5 Single, double, multiple or sequential sampling

Unless otherwise specified, all incoming material should be subjected to single sampling plans.

### J.1.6 Batch quality

Once the first four variables have been decided, the sampling plan tables should indicate the amount of samples to be inspected for any given batch quantity.

All information regarding levels of inspection should be indicated where appropriate on the inspection records.




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## J.2 Inspection levels and procedures

### J.2.1 Incoming material

In this example sample inspected to ISO 2859-1 using an AQL = 2,5, general inspection level II, single sampling plan for normal inspection incorporating the switching rules to tighten or reduce inspection if necessary. All mill certification should be checked against the relevant technical specification.

### J.2.2 In-process aspects

For all dimensional aspects an inspection feature should be introduced each time the material changes form during the process.

A first inspection should be implemented and verified by the setter or supervisor at each machine operation and from then on the operators should carry out each required dimensional check at a rate of four per batch – unrecorded, using go-no go gauges.

For the purposes of this example this is supplemented by a beginning and end of shift full dimensional check by the line supervisor using measuring equipment. This is a record check, a register of all results being maintained.

### J.2.3 Finished goods checks

At the end of the manufacturing process, each unit should be visually inspected for damage.

At the warehouse, once a week, the goods inwards inspector should randomly select four samples from a particular product range and subject each item to full dimensional checks. This should also be carried out to a formalised programme.

# Annex ZA
(informative)

## Relationship between this European Standard and the Essential Requirements of EU Directive 90/396/EEC

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 conforming to Essential Requirements of the New Approach Directive 90/396/EEC.

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 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 corresponding Essential Requirements of that Directive and associated EFTA regulations.

**Table ZA.1 - Correspondence between this European Standard and the EU Directive 90/396/EEC on the approximation of the laws of Member States concerning gas appliances**

| Essential Requirement | Subject | Relevant clauses in EN 1319 |
|---|---|---|
| 1 | General conditions | ↓ |
| 1.1 | Safe design and construction | Whole standard |
| 1.2 | Instructions<br>-installer<br>-user<br>Warning notices<br>-appliance<br>-packaging<br>Official language | <br>8.4.2<br>8.4.3<br><br>8.1, 8.3<br>8.2, 8.3<br>8.4.1 |
| 1.2.1 | Installer's instructions contain:<br>-Type of gas used<br>-Gas supply pressure<br>-Fresh air for combustion<br>-Products dispersal<br>-Forced draught burners | <br>8.1.2, 8.2, 8.4.2<br>8.1.2, 8.2, 8.4.2<br>7.1.2, 7.2, 7.4.2<br>7.4.2<br>Not applicable |
| 1.2.2 | User instructions contain:<br>-all instructions<br>-restrictions on use | <br>8.4.1, 8.4.3<br>8.4.2 |
| 1.2.3 | Warning notices state:<br>-type of gas<br>-gas supply pressure<br>-restrictions on use | <br>8.1, 8.2, 8.4<br>8.1, 8.2, 8.4<br>8 .1.3 |
| 1.3 | Fittings<br>Instructions | Not applicable<br>Not applicable |

**Table ZA.1** *(continued)*

| Essential Requirement | Subject | Relevant clauses in EN 1319 |
|---|---|---|
| 2.1 | Fitness for purpose | 5.1.2, 6.1.8 |
| 2.2 | Properties of materials | Foreword, 1 |
| 3.1.1 | Durability | 5.1.2, 5.1.4, 6.1.8 |
| 3.1.2 | Condensation | 5.1.2 |
| 3.1.3 | Explosion risk | 5.1.2, 5.1.6.1 |
| 3.1.4 | Air/water penetration | Not applicable |
| 3.1.5 | Normal auxiliary energy fluctuation<br>-appliance<br>-controls | <br>5.1.11, 6.1.6.1, 7.3.6.3.5<br>5.2.6, 5.2.7, 5.2.8, 5.2.9, 5.4 |
| 3.1.6 | Abnormal auxiliary energy fluctuation<br>-appliance<br>-controls | <br>5.1.11, 6.1.6.1, 7.3.6.3.5<br>5.2.6, 5.2.7, 5.2.8, 5.2.9, 5.4 |
| 3.1.7 | Electrical hazards | 5.1.10 |
| 3.1.8 | Deformation | Not applicable |
| 3.1.9 | Safety/control device failure<br>-gas circuit<br>-regulators<br>-multifunctional controls<br>-automatic burner control systems<br>-flame supervision device<br>-automatic shut-off valves<br>-thermostats/cut-off device<br>-atmosphere sensing device<br>-combustion products discharge safety s. | <br>5.2.1<br>5.2.5<br>5.2.6<br>5.2.9<br>5.2.7, 5.4<br>5.2.8<br>5.9<br>6.1.9<br>6.1.10 |
| 3.1.10 | Overruling of safety devices | 5.2.1 |
| 3.1.11 | Pre-set adjuster protection | 5.2.2.1 |
| 3.1.12 | Levers and setting devices | 5.2.4.2, 5.2.6 |
| 3.2.1 | Gas leakage | 5.1.6, 6.1.1.1 |
| 3.2.2 | Gas release during ignition, re-ignition and extinction | 5.4, 5.5, 5.6 |
| 3.2.3 | Unburned gas accumulation | Not applicable |
| 3.3 | Ignition: ignition, re-ignition and cross-lighting | 6.1.5.1.1, 7.3.3 |
| 3.4.1 | Flame stability<br>Harmful substances | 6.1.5.2<br>6.1.6.1 |
| 3.4.2 | Combustion products release | 6.1.1.2 |
| 3.4.3 | Combustion products release | 6.1.9, 6.1.10 |
| 3.4.4 | Flueless domestic appliances | Not applicable |
| 3.5 | Rational use of energy | 6.2 |
| 3.6.1 | Floor etc. temperatures | 6.1.4.3 |
| 3.6.2 | Temperature of knobs/levers | 6.1.4.1 |
| 3.6.3 | External parts | 6.1.4.2 |
| 3.7 | Foodstuffs and water | Not applicable |
| Annex II | Certification | Foreword, 1 |
| Annex III | Data plate | 8.1.2 |

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




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# Annex ZB
(informative)

# Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

## ZB.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M105 “Chimneys, flues and specific products” given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in this annex meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the chimneys covered by this annex for the intended uses indicated herein; reference shall be made to the information accompanying the CE marking.

**WARNING — Other requirements and other EU Directives, not affecting the fitness for intended uses, can be applicable to the chimneys falling within the scope of this European Standard.**

NOTE 1 In addition to any specific clauses relating to dangerous substances contained in this standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

NOTE 2 An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through http://ec.europa.eu/enterprise/construction/internal/dangsub/dangmain_en.htm).

This annex establishes the conditions for the CE marking of the chimneys intended for the uses indicated in Table ZB.1 and shows the relevant clauses applicable.

This annex has the same scope as Clause 1 of this standard and is defined by Tables ZB.1 and ZB.2




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**Table ZB.1 — Scope and relevant requirement clauses**

| Product: Metal system POCEDs as covered in Clause 1 of this standard, except terminals and supports. Intended use: Single- and multi-wall POCEDs. | | | |
|---|---|---|---|
| Essential characteristics | Requirement clauses in this European Standard(s) | Levels and/or classes | Notes |
| Compressive strength | 8.4.2 | None | Manufacturer's declaration |
| Fire reaction | None | None | Not applicable [a] |
| Resistance to fire<br>Soot fire resistance, integrity E and insulation I<br><br>Classification O and declaration of distance to combustible material | None<br><br>8.4.2<br><br>6.1.4.6 | None<br><br>Oxx<br><br>None | Not applicable [b c]<br><br>Manufacturer's declaration of minimum distance to combustible material<br><br>Pass/fail criteria |
| Gas tightness /leakage | 6.1.1.2 | None | Pass/fail criteria |
| Flow resistance | 8.4.2 | None | Manufacturer's declaration of minimum and maximum equivalent resistance |
| Thermal resistance/<br><br>Dimensioning | None<br><br>8.4.2 | None<br><br>None | Not applicable [d]<br><br>Manufacturer's declaration |
| Thermal shock resistance | None | None | Not applicable [b] |
| Flexural tensile strength | 5.1.7.3<br>8.4.2 | None | Pass/ fail criteria.<br>Manufacturer's declared value |
| Durability against chemicals | 5.1.2<br>6.1.8 | None | Pass-fail criteria |
| Durability against corrosion | 5.1.2<br>6.1.8 | None | Pass-fail criteria |
| Resistance to freeze-thaw | None | None | Not applicable [e] |

[a] Fire reaction - no requirements for metal POCEDs.

[b] Soot fire resistance G - is not applicable to gas-fired appliances.

[c] Insulation I - is not required for metal POCEDs.
Integrity E - is not required for metal POCEDs.

[d] This characteristic is only relevant when it is required to match the chimney with the appliance. The performance of the POCED is verified as part of the performance testing of the appliance.

[e] This characteristic is only relevant to construction materials that absorb water. This standard only applies to appliances with metal POCEDs.

**Table ZB.2 — Scope and relevant requirement clauses**

| Product: Terminals as covered in Clause 1 of this standard.<br><br>Intended use: Single- and multi-wall POCEDs. | | | |
|---|---|---|---|
| Essential characteristics | Requirement clauses in this European Standard(s) | Levels and/or classes | Notes |
| Flow resistance | 8.4.2 | None | Manufacturers declaration |

The requirement on a certain characteristic is not applicable in those Member States (MSs) where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these MSs are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option “No performance determined” (NPD) in the information accompanying the CE marking (see ZB.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.

## ZB.2 Procedure(s) for attestation of conformity of [construction products]

### ZB.2.1 System(s) of attestation of conformity

The system(s) of attestation of conformity of the POCEDs indicated in Tables ZB.1 and ZB.2 in accordance with the Decision of the Commission 95/467/EC of 27-09-95 amended by the decisions 01/596/EC of 8 January 2001 and 2002/592/EC of 15 July 2002 and as given in Annex III of the mandate for “Chimneys, flues and specific products", is shown in Table ZB.3 for the indicated intended use(s) and relevant level(s) or class(es).

**Table ZB.3 — System(s) of attestation of conformity**

| Product(s) | Intended use(s) | Level(s) or class(es) | Attestation of conformity system(s) |
|---|---|---|---|
| Metal system chimney products | Chimneys | Any | 2+ |
| Terminals | | | 4 |
| System 2+: See Directive 89/106/EEC (CPD) Annex III.2 (ii), First possibility, including certification of the factory production control by an approved body on the basis of initial inspection of factory and of factory production control as well as of continuous surveillance, assessment and approval of factory production control.<br><br>System 4: See Directive 89/106/EEC (CPD) Annex III.2 (ii),Third possibility. | | | |

The attestation of conformity of the POCEDs in Tables ZB.1.and ZB.2 shall be based on the evaluation of conformity procedures indicated in Tables ZB.4 and ZB.5 respectively resulting from application of the clauses of this or other European Standard indicated therein.

**Table ZB.4 – Assignment of evaluation of conformity tasks for chimneys under system 2+ in Table ZB.1**

| Tasks | | | Content of the task | Evaluation of conformity clauses to apply |
|---|---|---|---|---|
| Tasks under the responsibility of the manufacturer | Factory production control (FPC) | | Parameters related to all relevant characteristics of Table ZB.1 | 9.3 |
| | Initial type testing by the manufacturer | | All relevant characteristics of Table ZB.1 | 9.2 |
| | Possibly testing of samples taken at the factory | | All relevant characteristics of Table ZB.1 | 9.3 |
| Tasks of the Approved body | Certification of the FPC by the FPC certification body on the basis of: | Initial inspection of factory and of FPC | Parameters related to all relevant characteristics of Table ZB.1 | 9.3 |
| | | Continuous surveillance, assessment and approval of FPC | Parameters related to all relevant characteristics of Table ZB.1 | 9.3 |

**Table ZB.5 — Assignment of evaluation of conformity tasks for terminals under system 4 in Table ZB.2**

| Tasks | | Content of the task | Evaluation of conformity clauses to apply |
|---|---|---|---|
| Tasks for the manufacturer | Factory production control (F.P.C) | Parameters related to all relevant characteristics of Table ZB.2 | 9.3 |
| | Initial type testing | All relevant characteristics of Table ZB.2 | 9.2 |

### ZB.2.2 EC Certificate and Declaration of conformity

When, in the case of products under system of conformity 2+, compliance with the conditions of this annex is achieved, and once the notified body has drawn up the certificate mentioned below, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of conformity, which entitles the manufacturer to affix the CE marking. This declaration shall include:

a) name and address of the manufacturer, or his authorised representative established in the EEA, and the place of production;

NOTE 1 The manufacturer may also be the person responsible for placing the product onto the EEA market, if he takes responsibility for CE marking.

b) description of the product (type, identification, use, etc.), and a copy of the information accompanying the CE marking;

NOTE 2 Where some information required for the declaration is already given in the CE marking information, it does not need to be repeated.

c) provisions to which the product conforms (i.e. Annex ZB of this EN);

d) particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);

e) the number of the accompanying factory production control certificate;

f) name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

The declaration shall be accompanied by a factory production control certificate, drawn up by the notified body, which shall contain, in addition to the information above:

g) the name and address of the notified body;

h) the number of the factory production control certificate;

i) the conditions and period of validity of the certificate, where applicable;

j) the name of, and position held by, the person empowered to sign the certificate.

The above mentioned declaration and certificate shall be presented in the official language or languages of the Member State in which the product is to be used.

When, in the case of products under system of conformity 4, compliance with the conditions of this annex is achieved, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of

conformity (EC Declaration of conformity), which entitles the manufacturer to affix the CE marking. This declaration shall include:

k) name and address of the manufacturer, or his authorised representative established in the EEA, and the place of production;

NOTE 3 The manufacturer may also be the person responsible for placing the product onto the EEA market, if he takes responsibility for CE marking.

l) description of the product (type, identification, use, etc.), and a copy of the information accompanying the CE marking;

NOTE 4 Where some information required for the declaration is already given in the CE marking information, it does not need to be repeated.

m) provisions to which the product conforms (i.e. Annex ZB of this EN), and a reference to the ITT report(s) and factory production control records (if appropriate);

n) particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);

o) name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

## ZB.3 CE marking and labelling

The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking.

The CE marking symbol to affix shall be in accordance with Directive 93/68/EC and shall be shown on the appliance Data Badge. The following information shall accompany the CE marking symbol and may be on the Data Badge, the packaging, in the appliance Installation instructions or as a separate insert with the appliance instruction pack. Where is it is not possible for this information to appear with the CE marking symbol on the appliance Data Badge, the CE marking symbol shall be repeated at the head of the information (see Figure ZB.1):

a) identification number of the certification body (only for products under systems 2+);

NOTE 1 The certification body is the “Notified Body” (notified under the CPD) responsible for the Factory Production Control Certificate (FPC certificate).

b) name or identifying mark and registered address of the appliance manufacturer;

c) the last two digits of the year in which the marking is affixed;

d) number of the factory production control certificate (if relevant);

e) reference to this European Standard.

Figure ZB.1 gives an example of the information to be given on the product, label, packaging and/or commercial documents.




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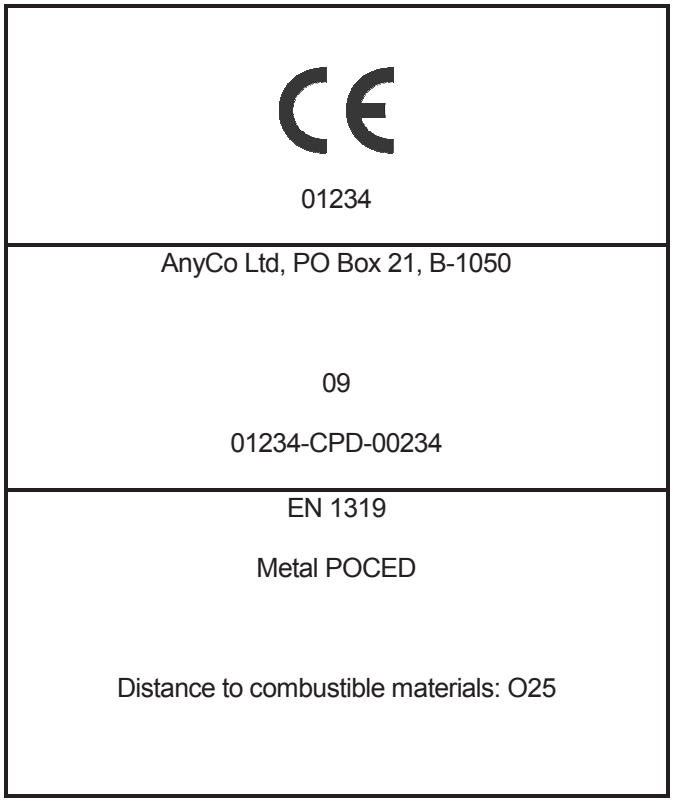


**Figure ZB.1 — Example of CE marking information of a POCED**

In addition to any specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE 2 European legislation without national derogations need not be mentioned.

NOTE 3 Affixing the CE marking symbol to a product means that it complies with all applicable directives.

# Bibliography

[1] ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

[2] EN ISO 6976:2005, *Natural gas — Calculation of calorific values, density, relative density and Wobbe index from composition (ISO 6976:1995 including Corrigendum 1:1997, Corrigendum 2:1997 and Corrigendum 3:1999)*

[3] EN ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes (ISO 3166-1:2006)*

[4] EN ISO 9001, *Quality management systems — Requirements (ISO 9001:2008)*

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