

BS EN 203-1:2014
Incorporating corrigendum March 2016



BSI Standards Publication

Gas heated catering equipment

Part 1: General safety rules

bsi.

AVA Documents
Document Sharing Hub

National foreword

This British Standard is the UK implementation of EN 203-1:2014, incorporating corrigendum March 2016. It supersedes BS EN 203-1:2005+A1:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GSE/19, Catering equipment (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.

© The British Standards Institution 2016. Published by BSI Standards Limited 2016

ISBN 978 0 580 93920 4

ICS 97.040.20

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 28 February 2014.

Amendments/corrigenda issued since publication

Date	Text affected
30 April 2016	Implementation of CEN corrigendum March 2016: Subclause 6.6.2 corrected

English Version

Gas heated catering equipment - Part 1: General safety rules

Appareils de cuisine professionnelle utilisant les
combustibles gazeux - Partie 1: Règles générales de
sécurité

Großküchengeräte für gasförmige Brennstoffe - Teil 1:
Allgemeine Sicherheitsanforderungen

This European Standard was approved by CEN on 13 December 2013.

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

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

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



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	6
1 Scope	8
2 Normative references	8
3 Terms and definitions	9
3.1 Terminology referring to gases and pressures	9
3.2 General terminology referring to appliance design	10
3.3 Terminology referring to appliance operation	15
4 Classification.....	17
5 Constructional requirements.....	19
5.1 General.....	19
5.1.1 Conversion to different gases	19
5.1.2 Materials and methods of construction	20
5.1.3 Use, cleaning and maintenance	21
5.1.4 Gas connections	21
5.1.5 Soundness.....	21
5.1.6 Supply of combustion air and evacuation of combustion products	22
5.1.7 Flame visibility	24
5.1.8 Electrical safety.....	24
5.1.9 Construction requirements for gas cylinder compartment.....	24
5.2 Particular requirements for components in the gas circuit	25
5.2.1 General.....	25
5.2.2 Gas rate control and shut-off device	25
5.2.3 Auxiliary equipment	27
5.2.4 Burners	29
5.2.5 Gas rate adjusters.....	29
5.3 Particular requirements	29
5.3.1 Food spillage.....	29
5.3.2 Stability and mechanical safety	30
5.3.3 Safety from fire risk	30
5.3.4 Appliances connected to a potable water supply	30
6 Performance requirements	30
6.1 Soundness.....	30
6.1.1 Soundness of the gas circuit.....	30
6.1.2 Soundness of combustion product circuit of type B appliances	30
6.2 Obtaining the gas rate	31
6.2.1 Nominal heat input (Q_n).....	31
6.2.2 Full calorific rate	31
6.2.3 Reduced heat input.....	31
6.2.4 Ignition burner heat input	31
6.3 Safety of operation	31
6.3.1 Burners	31
6.3.2 Temperature limits.....	32
6.3.3 Ignition – cross-lighting - flame stability.....	33
6.3.4 Combustion products safety devices for type B _{11BS} appliances	34
6.3.5 Pre-purge	34
6.4 Influence of burners on each other.....	34
6.5 Auxiliary equipment	35
6.5.1 Flame shut off device	35

6.5.2	Ignition device	36
6.6	Air proving device	36
6.6.1	General	36
6.6.2	Supervision of the combustion air or combustion products rate	36
6.6.3	Supervision of the combustion air pressure or combustion products pressure	36
6.6.4	Air/gas ratio controls	37
6.7	Combustion.....	37
6.7.1	All appliances (in calm air)	37
6.7.2	Special conditions	37
6.8	Particular requirements	37
6.8.1	Stability and mechanical safety	37
6.8.2	Pressurized parts	37
6.8.3	Lack of heat-bearing fluid.....	38
6.9	Auxiliary energy.....	38
6.9.1	General	38
6.9.2	Electrical energy fluctuation	38
6.9.3	Other auxiliary energy.....	38
6.10	Rational use of energy	38
6.11	Operating requirements - Temperature of the LPG cylinder and its compartment.....	38
6.11.1	Temperature of the walls of the compartment	38
6.11.2	Temperature of the LPG cylinder.....	39
7	Test conditions	39
7.1	General	39
7.1.1	Characteristics of the test gases	39
7.1.2	Requirements for making up test gases	39
7.1.3	Test room	39
7.1.4	Preparation of the appliance	39
7.1.5	Practical method of test.....	40
7.1.6	Test pressures	41
7.1.7	Carrying out the tests	41
7.2	Soundness	41
7.2.1	Soundness of the gas circuit	41
7.2.2	Soundness of the combustion circuit and correct evacuation of the combustion products for type B appliances	42
7.3	Obtaining gas rates	43
7.3.1	General	43
7.3.2	Nominal heat input	43
7.3.3	Full rate.....	45
7.3.4	Reduced rate.....	45
7.4	Operational safety	45
7.4.1	Burners.....	45
7.4.2	Limit temperatures	46
7.4.3	Ignition - cross- lighting - flame stability	47
7.5	Auxiliary equipment	51
7.5.1	Flame shut off device.....	51
7.5.2	Ignition device	53
7.6	Combustion.....	53
7.6.1	General	53
7.6.2	Tests carried out under normal conditions	54
7.6.3	Specific test for type B appliances.....	55
7.6.4	Test with sooting limit gas	56
7.7	Air-proving device	56
7.7.1	General	56
7.7.2	Supervision of the combustion air or the combustion products rate	56
7.7.3	Supervision of the combustion air or the combustion products pressure.....	57
7.8	Special tests.....	57

7.8.1	Stability and mechanical safety	57
7.8.2	Pressurized parts.....	57
7.8.3	Lack of heat bearing fluid	58
7.9	Test method - Overheating of the LPG cylinder and its compartment	58
8	Designation	58
9	Marking and instructions	59
9.1	General.....	59
9.2	Marking on the appliance.....	59
9.2.1	Data plates and labels	59
9.2.2	Other marking on the appliance.....	59
9.3	Instructions	60
9.3.1	General.....	60
9.3.2	Instructions for use and maintenance.....	60
9.3.3	Instructions for installation and adjustment.....	60
9.3.4	Instructions for conversion to different gases	62
9.4	Packaging	62
Annex A	(informative) National situations	69
A.1	Connection requirements in force in various countries (see 5.1.4)	69
A.2	Requirements for flue connection in force in various countries (see 5.1.6.5)	70
A.3	Categories, test gases and test pressures	71
Annex B	(normative) Use of symbols on appliances and packaging.....	72
B.1	General.....	72
B.2	Electric power supply.....	72
B.3	Type of gas	72
B.4	Gas supply pressure	72
B.5	Country of destination	73
B.6	Category	73
B.7	Other optional information	73
B.8	Nominal heat input of burner.....	73
B.9	Nominal heat input of set of burners on appliance.....	73
Annex C	(informative) Trilingual list of appliances in the scope of EN 203-1 and corresponding Part 2	74
Annex D	(normative) Non pneumatic air/gas control devices.....	75
D.1	Requirements	75
D.1.1	Endurance	75
D.1.2	Leakage of non-metallic control tubes.....	75
D.1.3	Safety of operation	75
D.1.4	Adjustment of air/gas ratio	75
D.2	Tests.....	76
D.2.1	Endurance	76
D.2.2	Leakage of non-metallic control tubes.....	76
D.2.3	Safety of operation	76
D.2.4	Adjustment of the air/gas ratio controls	77
Annex E	(informative) Composition of the gas circuit	78
E.1	Minimum requirements for:	78

E.2	Minimum requirements for appliances with fan, without permanent or alternating ignition burner and without pre-purge	79
Annex ZA (informative)	Clauses of this European Standard addressing essential requirements or other provisions of EU Directives	80
Bibliography		82

Foreword

This document (EN 203-1:2014) has been prepared by Technical Committee CEN/TC 106 “Gas heated catering equipment”, 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 August 2014 and conflicting national standards shall be withdrawn at the latest by August 2014.

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 203-1:2005+A1:2008.

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

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

Questions relating to quality assurance systems, manufacturing tests and certificates of conformity of ancillary devices in particular, are not covered by this document.

This European Standard constitutes Part 1 of EN 203, *Gas heated catering equipment*. It states the definitions, the requirements of construction and performance, the test requirements, the requirements of marking applicable to all professional catering equipment mainly on matters of safety. The particular requirements relative to safety and rational use of energy for each specific type of appliance are the subjects of Part 2: *Specific requirements*. The particular requirements relative to materials and parts in contact with food and other sanitary aspects are the subjects of Part 3: *Materials and parts in contact with food and other sanitary aspects*.

The main changes compared to the former version are the following:

- forbid the use of needle taps;
- addition of requirements for regulated appliances;
- declaration and checking of a minimum rate;
- better definition of normal and abnormal operation;
- requirement on TSA for automatic burners;
- measurement of TSE;
- information on LPG cylinders and tubes and flexible hoses;
- clarification on the fact that doors are not working surfaces;
- addition of sequential burners;
- reference to national regulation for connection to water network.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece,

Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies the general requirements and the constructional and operating characteristics relating to safety¹⁾, marking, and the associated test methods for gas heated commercial catering and bakery appliances.

The specific requirements are given in Part 2.

Requirements on materials and parts in contact with food and other sanitary aspects are given in Part 3.

Only appliances of types A₁, A₂, A₃, B₁ and B₂, as defined in Clause 4, are considered in this European Standard.

This European Standard applies to all professional cooking and bakery appliances using gas for preparing food and drink.

Only the net calorific value (H_i) and net Wobbe number (W_i) are used.

Annex C, informative, lists the main types of equipment entering into the field of application of this European Standard.

This European Standard does not deal with rational use of energy. This aspect is mentioned in 6.10 only for the coherency with the associated Part 2 (clauses numbering) and to mention that if no Part 2 exists for a specific product, rational use of energy should however be considered.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 88 (all parts), *Pressure regulators and associated safety devices for gas appliances*

EN 125, *Flame supervision devices for gas burning appliances - Thermoelectric flame supervision devices*

EN 126, *Multifunctional controls for gas burning appliances*

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

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

EN 298, *Automatic burner control systems for burners and appliances burning gaseous or liquid fuels*

EN 437:2003+A1:2009, *Test gases - Test pressures - Appliance categories*

EN 1106, *Manually operated taps for gas burning appliances*

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

1) The term "safety" includes not only the safety of the appliance gas line but also that of the overall cooking appliance during its normal use in catering.

EN 10226-2, *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 60335-1:2002, *Household and similar electrical appliances – Safety – Part 1: General requirements (IEC 60335-1:2001, modified)*

EN 60335-2-102, *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)*

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

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

ISO 301, *Zinc alloy ingots intended for castings*

3 Terms and definitions

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

3.1 Terminology referring to gases and pressures

3.1.1

reference conditions

15 °C, 1 013,25 mbar

3.1.2

units

calorific value and Wobbe number: (MJ/m³)

Note 1 to entry: Test pressures: 1 mbar = 10² Pa.

3.1.3

gas supply pressure

p

difference between the static pressure measured at the inlet connection of the appliance, with the appliance in operation, and atmospheric pressure

Note 1 to entry: Gas supply pressure is expressed in millibars (mbar).

3.1.4

relative density

d

ratio of the masses of equal volumes of dry gas and dry air under the same conditions of temperature and pressure: 15 °C or 0 °C and 1 013,25 mbar

[SOURCE: EN 437:2003+A1:2009, 3.10]

3.1.5

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 to entry: A distinction is made between:

- the gross calorific value H_s : the water produced by combustion is assumed to be condensed;
- the net calorific value H_i : the water produced by combustion is assumed to be in the vapour state.

Note 2 to entry: The calorific value is expressed:

- either in megajoules per cubic metre (MJ/m^3) of dry gas under the reference conditions;
- or in megajoules per kilogram (MJ/kg) of dry gas.

[SOURCE: EN 437:2003+A1:2009, 3.11, modified – added a Note 1 to entry]

3.1.6

Wobbe index

gross Wobbe index W_g ; 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 to entry: 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 to entry: The Wobbe indices are expressed:

- either in megajoules per cubic metre (MJ/m^3) of dry gas under the reference conditions;
- or in megajoules per kilogram (MJ/kg) of dry gas.

[SOURCE: EN 437:2003+A1:2009, 3.12, modified – added a Note 1 to entry]

3.2 General terminology referring to appliance design

3.2.1 Terminology referring to the gas circuit

3.2.1.1

gas circuit

part of an appliance between the gas inlet connection and the burner(s) which conveys or contains the gas

3.2.1.2

inlet connection

part of the appliance which is intended to be connected to the gas supply

3.2.1.3

mechanical soundness joint (or mechanical means of obtaining soundness)

assembly of several parts, generally metallic, which achieves soundness by use of mechanical means such as metal-to-metal joints, toroidal sealing rings (O rings) or flat joints

3.2.1.4

restrictor or calibrated orifice

device with one or more orifices that is placed in the path of the gas flow between the appliance inlet connection and the burner 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

3.2.1.5

gas rate adjuster

component which allows the gas input to each burner to be set at a predetermined value according to supply conditions

Note 1 to entry: Adjustment may be continuous (screw adjuster) or discontinuous (changing restrictors).

Note 2 to entry: The adjusting device of an adjustable regulator is regarded as a gas rate adjuster.

Note 3 to entry: The operation of setting this device is known as “setting the gas rate”.

3.2.1.6

gas rate control

tap or equivalent component which allows the gas supply to one or more burners to be opened or closed, and possibly, the burner or burners to be adjusted to a gas input lower than the nominal rate

3.2.1.7

touch control

indirect manual burner control resulting from finger contact or light touch, with or without movement of the contact surface

3.2.1.8

indirect control

control that commands a shut-off or gas regulating device via some auxiliary energy (e.g. electric, pneumatic, etc.)

3.2.1.9

primary aeration adjuster

device which allows the aeration of a burner to be set at a desired value, according to the supply conditions

Note 1 to entry: The operation of changing the setting of the device is called “adjusting the primary aeration”.

3.2.1.10

injector

component which admits gas into an atmospheric burner

3.2.1.11

heat bearing fluid

intermediary fluid that indirectly conveys the heat from a burner to the food or cooking container

3.2.2 Terminology referring to the burner

3.2.2.1

atmospheric induction burner

burner in which part of the air necessary for combustion, called primary air, is entrained by the gas flow and is mixed upstream of the burner

Note 1 to entry: The remainder of the air, called secondary air, is taken up downstream of the burner.

3.2.2.2

main burner

burner which affects the heating function of the appliance and is often called simply a “burner”

3.2.2.3

auxiliary burner

burner which allows, by means of an ignition burner or pilot, ignition of a main burner

3.2.2.4

ignition burner or pilot

burner intended to ignite the main burner

Note 1 to entry: If a burner operates independently of the main burners, it is called a “pilot”.

3.2.2.5

alternating ignition burner

ignition burner which goes off as soon as the main burner is ignited and is ignited from the main burner just before the main burner is extinguished

3.2.2.6

forced draught burner

burner in which the combustion air is introduced by means of a fan

3.2.2.7

pre-mixed burner

burner in which the gas and at least the quantity of air necessary for complete combustion is pre-mixed before the burner ports

3.2.3

purging

act of forcing air into the combustion circuit to expel any remaining gas/air mixture or products of combustion

Note 1 to entry: Pre-purging is a purging that takes place between the starting demand and the activation of the ignition device.

3.2.4

control device for aeration or evacuation of combustion products

device which causes shut-down in the event of abnormal aeration or combustion products evacuation conditions

3.2.5

air/gas ratio device

device which automatically adjusts the combustion air flow to the gas flow and vice versa

3.2.6 Terminology referring to the combustion circuit

3.2.6.1

combustion circuit

circuit including the air supply duct, if it exists, the combustion chamber, the heat exchanger and the combustion products evacuation duct, if it exists

3.2.6.2

combustion products circuit

circuit including the combustion chamber, the heat exchanger and the combustion products evacuation duct if exists

3.2.6.3

combustion chamber

enclosure in which the air/gas mixture burns

3.2.6.4

flue outlet

part of an appliance intended to be connected to a combustion products evacuation duct

3.2.6.5

draught diverter

device placed in the combustion products circuit of type B₁ appliances, which is intended to reduce the influence of the flue pull and down draught on the burner performance and combustion

3.2.6.6

combustion products outlet or flueway extension

part of an appliance not connected to a flue, through which products of combustion are discharged into a room

3.2.6.7

combustion products discharge safety device

device that at least shuts off the main burner when there is an unacceptable spillage of combustion products at the draught diverter of type B_{11BS} appliances

3.2.7

auxiliary equipment

all the accessory devices of an appliance which act directly or indirectly on the gas rate (e.g. gas rate control, flame supervision device, governor, thermostat, etc.)

3.2.7.1

ignition device

means used to light gas admitted to the ignition burner or main burner

Note 1 to entry: This can be intermittent or permanent.

3.2.7.1.1

intermittent ignition device

means, which may or may not be fixed to the appliance, to assure ignition of the initial flow of gas only to the ignition burner or main burner

3.2.7.1.2

permanent ignition device

means which, at any time when the gas rate controls are open, assures ignition or re-ignition of the gas admitted to ignition burners or main burners

3.2.7.2

flame supervision device

device which, on the disappearance of the supervised flame, shuts off the gas supply

Note 1 to entry: It is described as having "simple control" if it shuts off the gas supply to the main burner only.

Note 2 to entry: It is described as having "complete control" if it shuts off the gas supply to the main burner and to the ignition burner.

3.2.7.2.1

ignition time

time interval between the ignition of the supervised flame and the moment when the force thus produced is sufficient to keep the valve open

3.2.7.2.2 ignition safety times

3.2.7.2.2.1

ignition safety time (TSA)

time that elapses between the order to open the gas supply to the burner and the gas supply being shut off in the event no flame has been detected

[SOURCE: EN 297:1994, 1.3.4.5.3]

3.2.7.2.2.2

maximum ignition safety time (TSA_{MAX})

ignition safety time measured under the least favourable conditions of ambient temperature and variation in supply voltage

[SOURCE: EN 297:1994, 1.3.4.5.3.1]

3.2.7.2.3

extinction safety time (TSE)

time that elapses between extinction of the supervised flame and the order to shut off the gas supply to the burner

[SOURCE: EN 297:1994, 1.3.4.5.4]

3.2.7.2.4

closing time

time interval between the interruption of the auxiliary energy or the voltage and the achievement of the closed position

[SOURCE: EN 297:1994, 1.3.4.5.5]

3.2.7.2.5

ignition rate

(Q_{ign})

average heat input during the ignition safety time, expressed as a percentage of the nominal heat input

[SOURCE: EN 297:1994, 1.3.4.6]

3.2.7.2.6

spark restoration

automatic process by which, following flame failure, the ignition device is switched on again without total interruption of the gas supply

[SOURCE: EN 297:1994, 1.3.4.7]

3.2.7.2.7

recycling

automatic process by which, after loss of flame during operation, the gas supply is interrupted and the full start procedure is re-initiated automatically

[SOURCE: EN 297:1994, 1.3.4.8]

3.2.7.2.8

flame supervision burner

burner which acts on a flame detector

3.2.7.2.9

flame detector

part of the flame supervision device sensing element on which the supervised flame acts directly and transforms the flame effect into a signal which is transmitted directly or indirectly to a shut off valve

3.2.7.2.10

non-volatile lockout (of the system)

safety shut-down of the system, such that a restart can only be accomplished by manual reset of the system and by no other means

3.2.7.2.11

volatile lock-out (of the system)

safety shut-down 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

3.2.7.2.12

non volatile lock-out (of the burner)

safety shut-down of the burner, such that a restart can only be accomplished by a manual reset of the burner and by no other means

3.2.7.2.13

volatile lock-out (of the burner)

safety shut-down of the burner, such that a restart can only be accomplished by either a manual reset of the burner, or an interruption of the electrical supply and its subsequent restoration

3.2.7.3

pressure regulator

device which maintains a constant downstream pressure within a fixed range, independent of the upstream pressure and/or the gas rate

3.2.7.4

temperature regulator (thermostat)

device which controls performance of the appliance (by on/off, on/low or modulating control), maintaining a predetermined temperature within the given limits of operation

3.2.7.5

overheat limit device

manually reset device which enables temperature to be limited to a predetermined safe value

3.2.7.6

control knob

component which is moved by hand and operates an appliance control (e.g. tap, thermostat, etc.)

3.2.8

working surface

part of the appliance which is hot in order for the appliance to fulfil its function

Note 1 to entry: For specific appliances, this definition is completed in Part 2.

Note 2 to entry: Unless otherwise specified, the doors are not considered as working surfaces.

3.2.9

marking

permanent indication on the appliance

3.2.10

display

dynamic indication on the appliance

3.3 Terminology referring to appliance operation

3.3.1 Terminology referring to gas rates

3.3.1.1

heat input

Q

quantity of energy used in unit time corresponding to the volumetric or mass gas flow rates, the calorific value to be considered in this document being the net calorific value

Note 1 to entry: Heat input is expressed in kilowatts (kW).

3.3.1.2

nominal heat input

Q_n

value of the heat input declared by the manufacturer

Note 1 to entry: Nominal heat input is expressed in kilowatts (kW).

3.3.1.3

mass flow rate

M

mass of gas consumed by the appliance divided by the operating time

Note 1 to entry: The mass flow rate is expressed in kilograms per hour (kg/h) or grams per hour (g/h).

3.3.1.4

volumetric flow rate

V

volume of the gas consumed by the appliance divided by the operating time, the gas being taken under reference conditions

Note 1 to entry: Volumetric flow rate is expressed in cubic metres per hour (m^3/h), litres per minute (l/m), cubic decimetres per hour (dm^3/h) or cubic decimetres per second (dm^3/s).

3.3.2 Terminology referring to gas combustion

3.3.2.1

combustion

oxidation phenomena of combustible gases by the oxygen of air, taking place throughout the burners

Note 1 to entry: The combustion may be:

— complete; in this case only traces of combustible constituents (hydrogen, carbon monoxide, carbon etc.) remain in the products of combustion;

or

— incomplete; in this case at least one combustible constituent is present in significant proportions in the products of combustion.

It is the amount of carbon monoxide (CO) in the dry air-free products of combustion which is used as the criterion to distinguish between complete and incomplete combustion.

The maximum CO limits according to the circumstances of the test are defined in 6.7. In each case, combustion is regarded as complete (or hygienic) if the CO concentration is below the maximum allowed; if not, it is regarded as incomplete (or non-hygienic).

3.3.2.2

aerated flame

flame produced by the combustion of gas previously mixed with air

3.3.2.3

non-aerated flame

flame produced by the combustion of gas which comes into contact with air at the moment of its combustion

3.3.2.4

flame stability

condition of the flame firmly attached to the burner ports or the contact area provided by the design, with no risk of flame lift or light back

3.3.2.5

flame lift

phenomenon characterized by the total or partial lifting of the base of the flame from the burner port or the flame contact area provided by the design

Note 1 to entry: Flame lift may cause the extinction of the flame.

3.3.2.6

light back

phenomenon characterized by the return of the flame into the body of the burner

3.3.2.7

light back at the injector

phenomenon characterized by the ignition of the gas at the injector, either as a result of the flame returning into the burner or by the propagation of a flame around the outside of the burner

3.3.2.8

sooting

phenomenon appearing with incomplete combustion and characterized by the deposit of soot on the surfaces or parts of the appliance in contact with the products of combustion or with the flame

3.3.2.9

aeration rate

ratio of the air rate entrained at the burner to the minimum air rate necessary for complete combustion

3.3.3

putting an adjuster or control device out of action

procedure by which a control (of temperature, pressure, etc.) is put out of action and sealed in this position

Note 1 to entry: The appliance then functions as if this device had been removed.

3.3.4

sealing an adjuster

procedure by which after setting an adjuster, this one is immobilized by a mean such that any attempt to alter the adjustment setting is apparent

Note 1 to entry: A factory sealed pre-set adjuster is considered to be non-existent.

Note 2 to entry: A pressure regulator is considered to be non-existent if it has been factory sealed in the fully opened position.

3.3.5

sequential operation

succession of temporized sequences, pre-established or adjustable, allowing the burner to operate by intermittent cycles

4 Classification

Appliances are divided:

- a) into categories defined according to the nature of the gases and pressures for which they are designed. The definitions of these categories are given in EN 437. For the national situations, see A.3;
- b) into types, according to the method of evacuation of products of combustion and admission of combustion air.

Only the types of appliances listed after are considered in the scope of this document and are defined as follows according to CEN/TR 1749:

Type A

An appliance not intended for connection to a flue or to a device for evacuating the products of combustion to the outside of the room in which the appliance is installed.

These appliances shall be installed with sufficient ventilation to prevent the formation of unacceptable concentrations of substances harmful to health in the room in which they are installed.

This requirement shall be stated in the installation instructions.

- Type A₁: An appliance without a fan.
- Type A₂: An appliance with a fan downstream of the combustion chamber/heat exchanger.
- Type A₃: An appliance with a fan upstream of the combustion chamber/heat exchanger.

Type B

An appliance intended to be connected to a flue that evacuates the products of combustion to the outside of the room containing the appliance. The combustion air is drawn directly from the room.

- Type B₁: A type B appliance incorporating a draught diverter in the combustion products circuit.
- Type B₁₁: A natural draught type B₁ appliance.
- Type B₁₂: A type B₁ appliance designed for a natural draught flue incorporating a fan downstream of the combustion chamber / heat exchanger and upstream of the draught diverter.
- Type B₁₃: A type B₁ appliance designed for a natural draught flue incorporating a fan upstream of the combustion chamber / heat exchanger.
- Type B₁₄: A type B₁ appliance having an integral fan downstream of both the combustion chamber / heat exchanger and the draught diverter.
- Type B₂: A type B appliance without a draught diverter.
- Type B₂₂: A type B₂ appliance incorporating a fan downstream of the combustion chamber / heat exchanger.
- Type B₂₃: A type B₂ appliance incorporating a fan upstream of the combustion chamber / heat exchanger.

A supplementary classification for type B appliances is used to clarify the identification of such appliances when fitted with particular safety devices. The subscript letters "BS" (blocked safety) refer to a combustion products discharge safety device, which reacts to blockage or restriction of the flue system.

EXAMPLE Type B_{11BS}: A type B₁₁ appliance fitted with a combustion products discharge safety device.

A type B appliance intended to operate with a pressurized flue duct shall be identified by an extra subscript "P". This subscript "P" is only used when installation in accordance with the instructions on a flue specified by the instructions results in the flue operating at a positive pressure.

5 Constructional requirements

5.1 General

5.1.1 Conversion to different gases

5.1.1.1 General

The only acceptable operations for converting from the gas of one group or family and/or for adapting to the different supply pressures of a gas are given below for each category.

5.1.1.2 Category I

- a) categories I_{2H} , I_{2L} , I_{2E} , I_{2E+} : no adjustment to the appliance may be made;
- b) category $I_{3B/P}$: no adjustment to the appliance may be made;
- c) category I_{3+} : change of injectors or restrictors may be made but only to convert from one pressure couple to another (e.g. 28-30/37 mbar to/from 50/67 mbar). Adjustment of the primary aeration to convert from one pressure couple to another or to convert from one pressure couple to another within the same pressure couple can be made;
- d) category I_{3P} : for a change of pressure, only a change of injectors, adjustment of gas rates and adjustment of the primary aeration may be made.

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

- a) change of injectors or restrictors;
- b) adjustment of reduced rate;
- c) adjustment of gas rate for first family gases;
- d) adjustment of primary aeration;
- e) change of complete pilots or some of their parts;
- f) adjustment of the regulator downstream pressure if exists or putting the regulator out of service in accordance with 5.2.3.4;
- g) putting the gas rate regulator out of service for second family gases.

These adjustments are only permitted for converting from a first family gas to a second family gas or vice versa.

5.1.1.3.2 Categories of appliance designed for use with second and third family gases

- a) change of injectors or restrictors;
- b) adjustment of reduced rate;
- c) adjustment of primary aeration;
- d) adjustment of the regulator downstream pressure if exists or putting the regulator out of service, in accordance with 5.2.3.4.

These adjustments or component changes are only permitted:

- e) for converting from a gas of one family to a gas of another family;
- f) within the third family, for converting from one gas to another within a pressure couple (e.g. 28-30/37 mbar to/from 50/67 mbar).

For third family gases, when converting from one gas to another within a pressure couple, only adjustment of primary aeration is permitted.

5.1.1.4 Category III

The adjustments or component changes permitted for converting from a gas of one family to a gas of another family, or from converting from one butane/propane pressure couple to another, are as follows:

- a) change of injectors or restrictors;
- b) adjustment of reduced rate;
- c) adjustment of the gas rate for first family gases;
- d) adjustment of primary aeration;
- e) change of complete pilots or some of their parts;
- f) adjustment of pressure downstream of the regulator, if it exists, or putting the regulator out of service in accordance with 5.2.3.4;
- g) putting the gas rate regulator out of service for third family gases;
- h) within the third family, for converting from one gas to another within a pressure couple (e.g. 28-30/37 mbar to/from 50/67 mbar).

For third family gases, when converting from one gas to another within a pressure couple, adjustment of primary aeration only is permitted.

5.1.2 Materials and methods of construction

The quality and thickness of the materials used in the construction of the appliance shall be such that the constructional and operational characteristics are not altered during normal operation (particularly for parts in contact with combustion products). All parts of the appliance, when installed in accordance with the instructions and accepted practice, shall withstand the mechanical, chemical and thermal actions to which they may be exposed during operation, and in particular:

- condensation produced at start-up and/or during operation of the appliance shall not affect the safety;
- any corrosion shall not give rise to a disturbance which might affect safety.

All pressurized parts of the appliance shall be designed and constructed so that they withstand the mechanical and thermal conditions to which they are subjected, without this affecting safety.

Materials containing asbestos shall not be used in the construction of the appliance.

Zinc alloys may only be used in contact with gas if they are of quality ZnAl₄ as defined in ISO 301 and if the parts are not likely to be exposed to a temperature greater than 80 °C, under the conditions of 7.4.2. For the main valve inlet and outlet connections, only external threads as specified in EN ISO 228-1 are permitted if they are made from zinc alloy.

The nature and surface conditions of materials likely to come into contact with food shall be such that they cannot contaminate or spoil the food.

Sharp borders and edges, which could give rise to injury, shall be avoided.

If the appliance is fitted with wheels or castors, two of them at least shall be lockable and accessible.

5.1.3 Use, cleaning and maintenance

Parts which are required to be removed during maintenance shall be designed or marked so that they can be re-assembled easily, and in complete safety, in the correct position and without the risk of mistake.

The user shall have completely safe access to every control knob, button, etc., necessary for the use of the appliance, after opening a door if necessary, but without having to remove any part of the case.

The user shall be able to clean the appliance easily. In particular, it shall be possible to carry out, without the use of a tool, all the operations described in the instructions for use and maintenance.

Unless they are fitted with an electrical interlock which cuts off the supply to motorized parts, it shall not be possible to loosen the protective covers of movable parts without the aid of a tool.

5.1.4 Gas connections

The connection point shall be easily accessible and allow free range of movement of tightening tools.

For all appliances, the inlet connections shall have a thread which conforms to EN ISO 228-1 or with EN 10226-1 and EN 10226-2, or shall have a compression fitting. In the first case, the end of the inlet connection shall be sufficiently flat to allow the use of a sealing device.

The pipe carrying the inlet connections shall be fixed to the appliance body in a rigid fashion.

The types of connection used in various countries are given in Table A.1.

However, for an appliance burning third family gases only, it is not mandatory to make the connection by means of a threaded joint or a compression fitting. It may also be made by a conical joint or by a flat joint.

5.1.5 Soundness

5.1.5.1 Soundness of the gas circuit

5.1.5.1.1 General

Sealing compounds shall be suitable for contact with the gas and for the mechanical and thermal conditions to which they are subjected.

Holes for screws, studs, etc., intended for the assembly of components other than those carrying gas shall not open into gasways.

Pipework to movable parts of the appliance and subject to strain by mechanical movement shall meet the requirements of the tests described in 7.2.1 to ensure their operation (soundness, rate).

5.1.5.1.2 Assemblies designed to be dismantled

The soundness of parts and assemblies placed in the gas line and likely to be dismantled for routine maintenance *in situ* shall be achieved by means of mechanical joints, e.g. metal-to-metal joints, packing or "O" ring joints, i.e. joints not necessitating the use of sealing compounds such as tape, paste or liquid.

This soundness shall be ensured even after several sequences of disconnection and reassembly according to the test conditions described in 7.2.1.

5.1.5.1.3 Permanent assemblies

When sealing compounds specified in 5.1.5.1.1 are used for permanent assemblies, they shall remain effective under normal conditions of appliance use and maintenance.

The gas circuits shall not be assembled by means of solder with a melting point range limit below 450 °C after application.

5.1.5.2 Soundness of the combustion products circuit

The means used to prevent leakage of the combustion products from the normal circuit shall be such that they do not deteriorate under normal conditions of appliance use and maintenance.

5.1.6 Supply of combustion air and evacuation of combustion products

5.1.6.1 General

Appliances shall be constructed so that, under normal conditions of use and maintenance, the supply of combustion air and the evacuation of combustion products are permanently ensured. The cross-section of the air passage to the combustion chamber and of the combustion products passage, fixed by construction, shall be neither adjustable nor obstructed during installation.

5.1.6.2 Appliances equipped with a fan

5.1.6.2.1 Fan

The parts of the fan in contact with combustion products shall be effectively protected against corrosion unless they are of corrosion-resistant materials and they shall withstand the temperature of the combustion products.

Motors and fans shall be mounted so as to minimize noise and vibrations. Direct access to the rotating parts of the fan shall be prevented. Lubrication points, if they exist, shall be easily accessible.

5.1.6.2.2 Proof of air flow

Except for appliances with gas/air ratio controls, before each fan start it is checked that there is no simulation of airflow in the absence of airflow.

The supply of combustion air shall be checked by one of the following methods:

- a) continuous supervision of the combustion air rate or the combustion products rate. In this system, the supervision device is activated directly by the flow of combustion air or combustion products. This is also valid for appliances with more than one fan speed in which the flows associated with each fan speed are monitored by separate supervision devices;
- b) gas/air ratio control.

5.1.6.3 Appliances fitted with an air/gas ratio control device

The air/gas ratio control device shall be designed and constructed so that reasonably foreseeable damage does not give rise to a change capable of affecting safety.

Air/gas ratio controls devices of pneumatic type shall comply with the relevant requirements of EN 88-1, non-pneumatic devices shall meet the requirements given in Annex D.

Control tubes may be of metal with suitable mechanical connections or of other materials with at least equivalent properties and in this case are considered immune to breakage, accidental disconnection and leakage after initial soundness checks. As such, they are not subject to tests in D.2.2.

When such control tubes are made of materials with less than 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.

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

5.1.6.4 Appliances not intended to be connected to an evacuation duct of the combustion products (Type A)

The openings provided to evacuate the products of combustion shall be designed and placed so that they cannot be obstructed unintentionally by a wall in contact with the appliance and the possibility of their being obstructed by food or utensils is avoided.

5.1.6.5 Appliances intended to be connected to a an evacuation duct of the combustion products (Type B)

5.1.6.5.1 General

The flue socket of appliances fitted with a draught diverter shall be female and allow connection to be made to an evacuation line, the diameter of which shall comply with the standards which apply in the countries where the appliance is installed.

The types of connections used in the various countries are given in Annex A (Table A.2).

A special adapter for connection purposes may be used.

The evacuation pipe shall be able to be inserted for a length of 15 mm into the evacuation socket. The jointing of evacuation pipes shall not impair the evacuation of combustion products. Compliance is ensured by visual examination.

5.1.6.5.2 Combustion products discharge safety device for type B₁ appliances

Type B₁ appliances shall be fitted with a combustion products discharge safety device (BS).

The device shall form an integral part of the appliance. It shall withstand the thermal, mechanical and chemical effects arising in the course of normal use or normally foreseeable use.

The device shall not be adjustable. Any adjusting components shall be sealed.

Incorrect refitting after servicing shall be made difficult.

The device shall be designed so that the electrical insulation withstands the thermal stresses resulting from spillage of the combustion products.

Interruption of the link between the sensor and the device responding to its signal or destruction of the sensor shall at least cause safety shutdown, if necessary after a waiting time.

5.1.7 Flame visibility

5.1.7.1 Verification by the installer

During the installation of the appliance, it shall be possible to check the ignition of all burners either visibly or by some other means, e.g. measurement of flame current provided that this does not adversely affect the performance of the burner.

5.1.7.2 Confirmation by the user

During use at any time and without any dismantling it shall be possible to verify that the burner is operating either by a direct check of the presence of at least a portion of the flame or by any other indirect mean.

5.1.8 Electrical safety

If the appliance is designed to be supplied with auxiliary electrical energy, its design shall be such that no dangerous situation can arise.

Appliance shall meet the relevant requirements of EN 60335-2-102.

5.1.9 Construction requirements for gas cylinder compartment

The opening of this compartment shall be of a size which will permit the easy introduction and removal of the cylinder.

The dimensions of the opening and of the inside of the compartment shall be at least large enough to accommodate the largest cylinder (with regulator fitted) specified in the instructions in accordance with 9.3.2.

In addition, the compartment shall be designed so that:

- effective ventilation is provided by openings compartment base and upper side areas. The total area of the openings in the upper part being at least 1/100th of the floor area of the compartment and that of the openings at the base being at least 1/50th of the floor area of the compartment;
- the cylinder support has sufficient mechanical strength to resist permanent deformation under the load weight of a full cylinder; an arrangement with the cylinder resting directly on the ground is not allowed;
- the cylinder fitted with a regulator can be easily installed or removed from, the compartment;
- the cylinder can be easily installed in a vertical position with the valve and regulator upper most;
- the cylinder valve is accessible and remain easy to manipulate when the cylinder is in place;
- overflow of liquid from pans on the hotplate cannot fall onto the cylinder or its accessories;
- where the appliance is connected by a tubing or hose, the latter does not come into contact with sharp edges. The length of tubing or hose necessary for correct connection of the cylinder shall be shown in the instructions. It shall not be less than 400 mm in length. The cylinder connection shall be easily accessible.

If the gas supply tubing or hose is provided with the appliance, it shall comply with the national requirements in force.

In addition, no internal communication means or conduits shall exist between the cylinder compartment and parts of the appliance where burners are located.

It shall not be possible to block or obstruct the ventilation openings of the compartment accidentally, when the gas cylinder is placed in position.