BS EN 203-1:2021+A1:2023

BSI Standards Publication

Gas heated catering equipment

Part 1: General safety requirements

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National foreword

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The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by ⟩A1⟨.

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

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Großküchengeräte für gasförmige Brennstoffe - Teil 1: Allgemeine Sicherheitsanforderungen

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European foreword

This document (EN 203-1:2021+A1:2023) has been prepared by Technical Committee CEN/TC 106 “Large kitchen appliances using gaseous fuels”, 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of an identical text or by endorsement, at the latest by June 2024, and conflicting national standards shall be withdrawn at the latest by June 2024.

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

This document supersedes A1 EN 203-1:2021 A1.

This document includes Amendment 1, approved by CEN on 2023-10-11.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1

This document has been prepared under a Standardization Request 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.

This document constitutes Part 1 of EN 203, *Gas heated catering equipment*. Particular requirements are given in the relevant Part 2: *Specific requirements*.

A1 *deleted paragraphs* A1

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1 Scope

This document specifies the requirements and test methods for the construction and operating characteristics relating to safety and rational use of energy for gas heated commercial catering and bakery appliances intended to be used indoor.

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

Only appliances of types A_1, A_2, A_3, B_1 and B_2, as defined in Clause 4, are considered in this document.

Only the net calorific value (*H*i) and net Wobbe index (*W*i) are used.

The requirements concerning specific types of appliances are given in the relevant Part 2.

Annex C (informative) lists the main types of equipment covered by the scope of this document.

Appliances covered by this document are not intended to use gases containing carbon monoxide or other toxic components.

NOTE For appliances intended to be used in vehicles, in trailers or on-board ships, additional requirements can be necessary.

2 Normative references

The following documents are referred to in the text in such a way that some or all their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 88-1:2011+A1:2016, *Pressure regulators and associated safety devices for gas appliances - Part 1: Pressure regulators for inlet pressures up to and including 50 kPa*

EN 88-2:2007, *Pressure regulators and associated safety devices for gas appliances - Part 2: Pressure regulators for inlet pressures above 500 mbar up to and including 5 bar*

EN 125:2010+A1:2015, *Flame supervision devices for gas burning appliances - Thermoelectric flame supervision devices*

EN 126:2012, *Multifunctional controls for gas burning appliances*

EN 161:2011+A3:2013, *Automatic shut-off valves for gas burners and gas appliances*

EN 257:2010, *Mechanical thermostats for gas-burning appliances*

EN 298:2012, *Automatic burner control systems for burners and appliances burning gaseous or liquid fuels*

EN 437:2021, *Test gases - Test pressures - Appliance categories*

EN 549:2019, *Rubber materials for seals and diaphragms for gas appliances and gas equipment*

EN 751-1:1996, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water - Part 1: Anaerobic jointing compounds*

EN 751-2:1996, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water - Part 2: Non-hardening jointing compounds*

EN 1106:2010, *Manually operated taps for gas burning appliances*

EN 1672-2:2005+A1:2009, *Food processing machinery – Basic concepts – Part 2: Hygiene requirements*

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EN 1717:2000, *Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow*

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 12067-2:2004, *Gas/air ratio controls for gas burners and gas burning appliances - Part 2: Electronic types*

EN 13611:2019, *Safety and control devices for burners and appliances burning gaseous and/or liquid fuels - General requirements*

EN 16340:2014, *Safety and control devices for burners and appliances burning gaseous or liquid fuels - Combustion product sensing devices*

EN 60335-1:2012[1], *Household and similar electrical appliances - Safety - Part 1: General requirements (IEC 60335-1:2010, modified)*

EN 60335-2-102:2016, *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 60730-1:2016 [2] , *Automatic electrical controls for household and similar use - Part 1: General requirements (IEC 60730-1:2013, modified)*

EN IEC 60730-2-9:2019[3], *Automatic electrical controls - Particular requirements for temperature sensing control (IEC 60730-2-9:2015)*

EN 61770:2009[4], *Electric appliances connected to the water mains - Avoidance of backsiphonage and failure of hose-sets (IEC 61770:2008)*

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)*

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[1] As impacted by EN 60335-1:2012/AC:2014, EN 60335-1:2012/A11:2014, EN 60335-1:2012/A13:2017, EN 60335-1:2012/A1:2019, EN 60335-1:2012/A2:2019 and EN 60335-1:2012/A14:2019.

[2] As impacted by EN 60730-1:2016/A1:2019.

[3] As impacted by EN IEC 60730-2-9:2019/A1:2019 and EN IEC 60730-2-9:2019/A2:2020.

[4] As impacted by EN 61770:2009/AC:2011, EN 61770:2009/A11:2018 and EN 61770:2009/A1:2019.

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3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Terminology referring to gases and pressures

3.1.1
gas family
group of gaseous fuels with similar burning behaviour linked together by a range of Wobbe indices

[SOURCE: EN 437:2021, 3.18]

3.1.2
gas group
specified range of Wobbe index within that of the family concerned

Note 1 to entry: See EN 437:2021, Table 1.

Note 2 to entry: This range is determined on the general principle that appliances utilizing this gas group would operate safely when burning all gases within this range without adjustment.

Note 3 to entry: Adjustment of the appliance may be permitted in accordance with the special national or local conditions that apply in some countries.

[SOURCE: EN 437:2021, 3.19]

3.1.3
appliance category
means of identifying the gas families and/or gas groups for which a gas appliance is designed to operate safely and to the desired performance level

[SOURCE: EN 437:2021, 3.20]

3.1.4
gas supply pressure
p
difference between the 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).

3.1.5
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

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3.1.6
calorific value
quantity of heat produced by the complete combustion, of a unit volume or mass of dry gas, the constituents of the combustible mixture being taken at reference conditions of 15 °C, 1 013,25 mbar 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 of 15 °C, 1 013,25 mbar;

— or in megajoules per kilogram (MJ/kg) of dry gas.

3.1.7
Wobbe index
gross Wobbe index *W*s: net Wobbe index *W*i ratio of the calorific value of a dry gas per unit volume and the square root of its relative density under the reference conditions of 15 °C, 1 013,25 mbar

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 of 15 °C, 1 013,25 mbar;

— or in megajoules per kilogram (MJ/kg) of dry gas.

3.2 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 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
device with one or more orifices that is placed in the path of the gas flow between the appliance inlet connection and the burner to create a pressure drop, and thus reduces the gas pressure at the burner to a predetermined value for a given supply pressure and rate

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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 by continuous (screw adjuster) or discontinuous (changing restrictors) action

Note 1 to entry: The operation of setting this device is known as “setting the gas rate”.

3.2.1.6
pressure regulator
device which maintains a constant downstream pressure within a fixed range, independent of the upstream pressure and/or the gas rate

Note 1 to entry: Only appliances with pressure regulator are considered regulated appliances.

3.2.1.7
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 heat input

3.2.1.8
touch control
indirect manual burner control resulting from finger contact or light touch, with or without movement on the contact surface

3.2.1.9
indirect control
control that commands a shut-off or gas regulating device via some auxiliary energy (e.g. electric, pneumatic, etc.)

3.2.1.10
primary air
air entrained in the burner by gas flow and which is mixed upstream of the burner

3.2.1.11
primary aeration adjuster
device which allows the primary air rate 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”.

3.2.1.12
injector
component which admits gas into a burner

3.2.1.13
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
main burner
burner which performs the heating function of the appliance and is often called simply “burner”

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3.2.2.2
auxiliary burner
burner which allows, by means of an ignition burner or pilot, ignition of a main burner

3.2.2.3
ignition burner or pilot
burner intended to ignite the main burner or at first an auxiliary burner

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

3.2.2.4
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

3.2.2.5
permanent ignition burner
ignition burner which remains ignited even when the main burner is in use

3.2.3 Terminology referring to the combustion circuit

3.2.3.1
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

3.2.3.2
combustion products circuit
circuit including the combustion chamber, the heat exchanger and the combustion products evacuation duct if it exists

3.2.3.3
combustion chamber
enclosure in which the air/gas mixture burns

3.2.3.4
flue outlet
part of an appliance intended to be connected to a combustion products evacuation duct

3.2.3.5
draught diverter
device placed in the combustion products circuit of type B_1 appliances, which is intended to reduce the influence of the flue pull and down draught on the burner performance and combustion

3.2.3.6
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

3.2.3.7
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

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3.2.3.8
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.

3.2.3.9
control device for aeration or evacuation of combustion products
device which causes shutdown in the event of abnormal aeration or combustion products evacuation conditions

3.2.3.10
gas/air ratio device
device which automatically adjusts the combustion air flow to the gas flow and vice versa

3.2.4 Terminology referring to the auxiliary equipment

3.2.4.1
auxiliary equipment
all the devices of an appliance which act directly or indirectly on the gas rate (e.g. gas rate control, flame supervision device, governor, thermostat, etc.)

3.2.4.2
ignition device
means used to light gas admitted to the ignition burner, auxiliary burner or main burner, which may or may not be fixed to the appliance

3.2.4.3
flame supervision device
device which, on the extinguishment 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.

3.2.4.3.1
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

3.2.4.3.2
ignition safety time
TSA
time that elapses between the input to open the gas supply to the burner and the gas supply being shut off in the event no flame has been detected

3.2.4.3.3
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

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3.2.4.3.4
extinction safety time
TSE
time that elapses between extinguishment of the supervised flame and the input to shut off the gas supply to the burner

3.2.4.3.5
closing time
time interval between the interruption of the auxiliary energy or the voltage and the achievement of the closed position

3.2.4.3.6
ignition rate
Q_{ign}
average heat input during the ignition safety time, expressed as a percentage of the nominal heat input

3.2.4.3.7
spark restoration
automatic process by which, following flame failure, the ignition device is switched on again without total interruption of the gas supply

3.2.4.3.8
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

3.2.4.3.9
non-volatile lockout of the appliance
safety shutdown such that a restart can only be accomplished by manual reset and by no other means

3.2.4.3.10
volatile lock-out of the appliance
safety shutdown such that a restart can only be accomplished by either the manual reset, or an interruption of the electrical supply and its subsequent restoration

3.2.4.4
temperature regulator (thermostat)
device which controls the operation of the appliance (by on/off, on/low or modulating control), maintaining a predetermined temperature within the given limits of operation

3.2.4.5
overheat limit device
manually reset device which ensures that temperature is limited to a predetermined safety value

Note 1 to entry: Overheat limit device is not a regulating device.

3.2.4.6
control knob
component which is moved by hand and operates an appliance control device (e.g. tap, thermostat, etc.)

3.2.5
functional surface
part of the appliance which is hot for the appliance to fulfil its function

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3.2.6
marking
permanent indication on the appliance

3.2.7
removable part
part that can be removed or opened without the aid of a tool, a part that is removed or opened in accordance with the instructions for use, even if a tool is needed for removal

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 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
$\dot{V}$
volume of the dry gas consumed by the appliance divided by the operating time, the gas being taken under reference conditions of 15 °C, 1 013,25 mbar

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

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

The amount of carbon monoxide (CO) in the dry air-free products of combustion 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 extinguishment 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 light back 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
air ratio
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 service
procedure by which a control (of temperature, pressure, etc.) is put out of service and sealed in this position

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

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3.3.4
sealing an adjuster
procedure by which after setting an adjuster, it is immobilized by a mean such that any attempt to alter the adjustment setting is visible

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

3.3.6
compensation tube
pipe that is used to convey pressure from part of an installation to the signal chamber

3.4
qualified person
a person with relevant education, training, knowledge and experience to enable him or her to perceive risks and to avoid danger which is related to gas appliances

3.5
rational use of energy index
RUI
index indicating the value obtained for the rational use of energy

4 Classification

Appliances are classified as follows:

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 437:2021.

NOTE For the national situations, see Annex A, A.3.

b) into types, according to the method of evacuation of products of combustion and admission of combustion air.

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

Type A_1: Appliance without a fan.

Type A_2: Appliance with a fan downstream of the combustion chamber/heat exchanger.

Type A_3: Aappliance with a fan upstream of the combustion chamber/heat exchanger.

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— 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 B_1: A type B appliance incorporating a draught diverter in the combustion products circuit.

Type B_{11}: A natural draught type B_1 appliance.

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_{13}: A type B_1 appliance designed for a natural draught flue incorporating a fan upstream of the combustion chamber / heat exchanger.

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_2: A type B appliance without a draught diverter.

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.

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) refers to a combustion products discharge safety device, which reacts to blockage or restriction of the flue system.

EXAMPLE Type B_{11BS}: A type B_{11} 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 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 indicated below for each category.

5.1.1.2 Category I

5.1.1.2.1 Category of appliances designed for use with gases of a single family or of a single group

The following adjustments are permitted:

a) categories I_{2H}, I_{2L}, I_{2E}, I_{2E}+, $I_{3B/P}$: no adjustment to the appliance shall be made;

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b) category I_3+: change of injectors or restrictors can 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;

c) category I_{3P}: for a change of pressure, only a change of injectors, adjustment of gas rates and adjustment of the primary aeration can be made.

5.1.1.3 Category II

5.1.1.3.1 Categories of appliance designed for use with first and second family gases

The following adjustments are permitted for converting from a first family gas to a second family gas or vice versa:

a) change of injectors or restrictors;

b) adjustment of reduced gas rate;

c) adjustment of gas rate;

d) adjustment of primary aeration;

e) change of complete pilots or some of their parts;

f) adjustment of the pressure regulator downstream pressure if it exists or putting the regulator out of service in accordance with 5.2.3.4;

g) putting the gas rate adjuster out of service.

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

The following adjustments or component changes are permitted for converting from a second family gas to a third family gas or vice versa or, within the third family, from converting from one butane/propane pressure couple to another:

a) change of injectors or restrictors;

b) adjustment of reduced gas rate;

c) adjustment of primary aeration;

d) adjustment of the pressure regulator downstream pressure or putting the regulator out of service.

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

5.1.1.4.1 Categories of appliances designed for use with first, second and gas family

The following adjustments or component changes are 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:

a) change of injectors or restrictors;

b) adjustment of reduced gas rate;

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c) adjustment of the gas rate;

d) adjustment of primary aeration;

e) change of complete pilots or some of their parts;

f) adjustment of pressure downstream of the pressure regulator, or putting the regulator out of service;

g) putting the gas rate adjuster out of service.

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.

All parts of the appliance shall not show any signs of mechanical, chemical and thermal distorsion and any corrosion impairing the safety.

Compliance is checked after having subjected the appliance to all applicable tests specified in 7.

Sealing materials for metallic threaded joints in gas circuit shall be in accordance with EN 751-1:1996 (for anaerobic jointing compounds) or EN 751-2:1996 (for non-hardening jointing compounds) for the threads in compliance with EN 10226-1:2004 (Threaded joints using taper external threads and taper internal threads) and EN 10226-2:2005 (Threaded joints using taper external threads and parallel internal threads).

Elastomeric material shall comply with the requirements given for temperature class E1 or E2 and hardness class H2 or H3 as defined in EN 549:2019.

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

The gas circuit shall consist of metallic parts. Zinc alloys may only be used in contact with gas if they comply with EN 13611:2019, 6.3.3.

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 safely, in the correct position and without the risk of mistake.

The user shall have complete 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 enclosure.

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

5.1.4 Gas connections

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

The inlet connections shall have a thread which conforms to EN ISO 228-1:2003 or to EN 10226-1:2004 and EN 10226-2:2005, 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 way.

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For an appliance burning third family gases only, the connection may also be made by a conical joint in compliance with EN 10226-1:2004 (Threaded joints using taper external threads and taper internal threads) and EN 10226-2:2005 (Threaded joints using taper external threads and parallel internal threads) or by a flat joint in compliance with EN ISO 228-1:2003.

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

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 gas ways.

Internal pipework to movable parts of the appliance which are subject to strain by mechanical movement shall meet the requirements of the tests described in 7.2.1 to ensure their soundness.

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, when the appliance is installed as in normal use, shall be achieved by means of mechanical joints, e.g. metal-to-metal joints, packing or “0” ring joints, i.e. joints not necessitating the use of sealing compounds such as tape, paste or liquid.

The soundness shall be ensured, after at least three 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 operation and maintenance of the appliance.

The gas circuits shall not be assembled by means of solder with a melting point 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 exhaust circuit shall be such that they do not deteriorate under normal operation and maintenance of the appliance.

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 shall be neither adjustable nor obstructed during installation.

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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 made of corrosion-resistant materials and they shall withstand the temperature of the combustion products.

Motors and fans shall be mounted 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 and shall be such to avoid contamination of food.

5.1.6.2.2 Proof of air flow

For appliances not fitted with gas/air ratio controls, it is checked that before each fan start there is no airflow.

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

a) continuous supervision of the combustion air rate or the combustion products rate by a device activated directly by the flow of combustion air or combustion products. This is also applicable 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 a gas/air ratio control device

The gas/air ratio control device shall be designed and constructed so that reasonably foreseeable damage do not impair safety.

Gas/air ratio controls devices of pneumatic type shall comply with the relevant requirements of EN 88-1:2011+A1:2016.

Electronic gas/air ratio controls devices shall comply with the relevant requirements of EN 12067-2:2004.

Compensation 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 they shall be positioned in such a way that creasing, leakage or breakage is prevented. Where more than one compensation tube is used, the relevant connection position for each compensation tube shall be obvious. A minimum cross-sectional area of air compensation tubes of 5 mm^2 is acceptable, provided that evidence is given and precautions are taken to avoid condensation in the compensation tubes.

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 combustion products shall be designed and placed so that they cannot be obstructed unintentionally by a wall in contact with the appliance or by food or utensils.

5.1.6.5 Appliances intended to be connected to 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 be given in the instruction for installation.

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The evacuation pipe shall be able to be inserted for a length of at least 15 mm into the evacuation socket. The jointing of evacuation pipes shall not reduce the section of the evacuation pipe except for the parts involved in the jointing.

NOTE The types of connections used in the various countries are given in Annex A (Table A.2). It is possible to use special adapter for connection purposes.

5.1.6.5.2 Combustion products discharge safety device for type B1 appliances

Type B_1 appliances shall be fitted with a combustion products discharge safety device (BS) according to EN 16340:2014 or EN IEC 60730-2-9:2019[3].

The device shall be part of the appliance and shall be so designed that it cannot be dismantled without a tool. It shall withstand the thermal, mechanical and chemical effects arising during normal use.

If the controls andtheir links are arranged such that they can be removable or they can be damaged during maintenance, the instructions shall specifiy the test which shall be carried out to check the operation of the control after servicing.

The device shall not be adjustable. Any adjustable 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 damage of the sensor, shall cause safety shutdown.

5.1.7 Flame visibility

During the operation of the appliance, it shall be possible to check the ignition of burners either visibly or by any other indirect mean.

5.1.8 Electrical safety

Appliances designed to be supplied with auxiliary electrical energy shall meet the requirements of EN 60335-2-102:2016.

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 pressure regulator fitted) specified in the instructions in accordance with 8.3.1 and 8.3.2.

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 1/100 of the floor area of the compartment and that of the openings at the base being at least 1/50 of the floor area of the compartment;

— the cylinder support has sufficient mechanical strength to resist to 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 pressure regulator can be easily installed or removed from the compartment;

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