TECHNICAL SPECIFICATION

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Domestic gas cooking appliances — Safety —

Part 1: General requirements

Appareils de cuisson domestiques utilisant les combustibles gazeux — Sécurité —

Partie 1: Exigences générales

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Contents

Page

Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 291, *Domestic gas cooking appliances*.

Introduction

This document provides general requirements for safety of domestic gas cooking appliances.

This document can also be applied, so far as is reasonable, to appliances not mentioned in this specific standard and to appliances designed on the basis of new principles, in which case additional requirements may be necessary.

Where no specific International Standard for an appliance exists, the appliance can be tested according to this document and further tests which take into account the intended use.

Gas burning appliances using fuel gases need to withstand the type of gas which is specified. Other ISO technical committees, e.g. ISO/TC 193, Natural gas, deal with the testing and properties of fuel gases.

Note that, due to the differing properties of fuel gas depending on its source/region of origin, certain differences in regulations exist at present in different regions; some of these differences are presented in Annexes A and E.

This document covers type testing.

This document series ISO 21364 "Domestic gas cooking appliances – Safety" is structured as follows:

- Part 1: General requirements
- Part 21: Particular requirements for hobs, surface grills and griddles
- Part 22: Particular requirements for ovens and compartment grills

This document can be supplemented by the corresponding clauses of ISO/TS 21364-21:2021 and ISO/TS 21364-22:2021.

Domestic gas cooking appliances — Safety —

Part 1: General requirements

1 Scope

This document specifies the safety requirements for domestic gas cooking appliances. These appliances are freestanding, built-in or table-top and are intended to be used indoors. This document applies to the gas sections of the appliances and their component parts (e.g. combined gas-electric cooking appliances). This document does not apply to:

a) electrical heated elements as part of the appliance;

b) outdoor appliances;

c) appliances supplied at pressures greater than the maximum pressure of the test gases;

d) cook stoves, covered by the standards being developed in ISO/TC 285

In general, it does not take into account children playing with the appliance.

NOTE 1 For requirements of electrical safety refer to the IEC 60335 standard series.

NOTE 2 Attention is drawn to the fact that

- for appliances intended to be used in vehicles or on board of ships or aircrafts, additional requirements could be necessary;
- in many countries additional requirements are specified by the national health authorities, the national water supply authorities and similar authorities

This document does not cover requirements relating to gas cylinders, their pressure regulators and their connections.

This document does not cover requirements for gas installation.

2 Normative references

The following documents are referred to in the text in such a way that some or all of 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.

ISO 3166-1:2020, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

ISO 21364-22:2021, *Domestic gas cooking appliances – Safety- Part 22: Particular requirements for ovens and compartment grills*

ISO 23550:2018, *Safety and control devices for gas and/or oil burners and appliances — General requirements*

ISO 23551-1:2012, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 1: Automatic and semi-automatic valves*

ISO 23551-2:2018, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 2: Pressure regulators*

ISO 23551-5:2014, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 5: Manual gas valves*

ISO 23551-6:2014, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 6: Thermoelectric flame supervision controls*

ISO 23551-8:2016+Amd 1:2019, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 8: Multifunctional controls*

ISO 23551-9:2015, *Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 9: Mechanical gas thermostats*

IEC 60068-2-75:2014, *Environmental testing Part 2: Test Eh: Hammer test*

IEC 60335-1:2020, *Household and similar electrical appliances — Safety — Part 1: General requirements*

IEC 60335-2-6:2014, *Household and similar electrical appliances — Safety — Part 2-6: Particular requirements for stationary cooking ranges, hobs, ovens and similar appliances*

IEC 60335-2-102:2017, *Household and similar electrical appliances — Safety — Part 2-102: Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections*

IEC 60730-1:2013+AMD1:2015+AMD2:2020, *Automatic electrical controls - Part 1: General requirements*

IEC 60730-2-7:2015, *Automatic electrical controls for household and similar use — Part 2-7: Particular requirements for timers and time switches*

IEC 60730-2-9:2015+AMD1:2018+AMD2:2020, *Automatic electrical controls for household and similar use — Part 2-9: Particular requirements for temperature sensing controls*

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 http://www.electropedia.org/

3.1 Definitions relating to appliances

3.1.1
domestic gas cooking appliance
appliance burning gas for food preparation incorporating one or more cooking function(s) and to be used by private individuals in a domestic environment

3.1.2
freestanding appliance
appliance intended to be placed on the floor, having an enclosure and not intended to have direct contact with adjacent furniture and not intended to be built-in

3.1.3
built-in appliance
appliance intended to be installed in a cabinet or unit or in a housing located in a wall

3.1.4
cooking range
combination of a *hob* (3.1.10) and an *oven* (3.1.13) which may incorporate a *grill* (3.1.5) or a *griddle* (3.1.11)

Note 1 to entry: Can be freestanding or built-in.

[SOURCE: IEC 60335-2-6:2014, 3.104]

3.1.5
grill
appliance or a part of an appliance constructed so that the food is supported on a grid or spit and is cooked by radiant heat

Note 1 to entry: Can be built-in, freestanding, placed in a compartment or a cooking surface. The *grill* (3.1.5) is sometimes also named as radiant.

[SOURCE: IEC 60335-2-6:2014, 3.102 modified – Note to entry has been replaced.]

3.1.6
combined gas-electric cooking appliance
appliance where the cooking function is powered by gas and electrical energy.

Note 1 to entry: Examples are a *cooking range* (3.1.4) with an electrical *oven* (3.1.13) and a gas *hob* (3.1.10) or a *hob* (3.1.10) with gas burners and electrical heating elements.

3.1.7
warming drawer
appliance or part of the appliance that fulfils an independent warming function

Note 1 to entry: The same requirements of a warming drawer are applied to a warming cabinet.

3.1.8
portable appliance
appliance that is intended to be placed on a table or working surface and having a mass less than 18 kg

3.1.9
table-top appliance
appliance that is intended to be placed on a table or working surface

Note 1 to entry: It can be portable

3.1.10
hob
appliance that incorporates one or several covered or open burners, and/or one or more electric heating element(s)Note to entry: Can be built-in, part of a *cooking range* (3.1.4) or table top.

[SOURCE: IEC 60335-2-6:2014, 3.103]

3.1.11
griddle
appliance or part of an appliance constructed so that the food is only cooked by contact heat on closed surface

3.1.12
surface cooking appliance
appliance that can be a *hob* (3.1.10), *griddle* (3.1.11), surface *grill* (3.1.5) or a combination of these devices

3.1.13
oven
appliance or part of an appliance having a closed compartment constructed so that the food is cooked by the heat transmitted by natural convection or by forced convection

Note 1 to entry: Can be freestanding, built-in, table top or part of a *cooking range* (3.1.4)

3.1.14
compartment grill
appliance or part of an appliance having a radiant heating element placed in a cavity

Note 1 to entry: Can be built-in or freestanding.

3.2 Definitions relating to gas

3.2.1
gas family
group of combustible gases with similar burning characteristics linked together by range of Wobbe indices

Note 1 to entry: Three gas families are known:

- First family: Town/Manufactured gas
- Second family: Natural gas
- Third family: Liquefied Petroleum Gas (LPG)

3.2.2
Wobbe index
ratio of the calorific value of a gas per unit volume and the square root of its *relative density* (3.2.17) under the same *reference conditions* (3.2.15)

Note 1 to entry: In this document only the gross Wobbe index (W_S) is used

Note 2 to entry: The Wobbe index is expressed either in

a) megajoules per cubic metre (MJ/m^3) of dry gas, or

b) megajoules per kilogram (MJ/kg) of dry gas.

3.2.3
test gas
gas intended for the verification of the operational characteristics of appliances using combustible gas; it can be *reference gas* (3.2.4) or *limit gas* (3.2.5)

3.2.4
reference gas
test gas (3.2.3) representative of the *gas family* (3.2.1) with which appliances operate under nominal conditions

3.2.5
limit gas
test gas (3.2.3) representative of the extreme variations in characteristics of the *gas family* (3.2.1) for which the appliances have been designed; such as:

— for *incomplete combustion* (3.2.10),

— for *flame lift* (3.2.6),

— for *light back* (3.2.7),

— for *sooting* (3.2.8) or *yellow tipping* (3.2.9).

3.2.6
flame lift
phenomenon characterized by the partial or total movement of the base of the flame away from the burner port

3.2.7
light back
phenomenon characterized by the return of the flame inside the body of the burner or on the *injector* (3.3.10)

3.2.8
sooting
phenomenon appearing at the time of *incomplete combustion* (3.2.10) and characterized by a deposit of soot on the surfaces in contact with the flames or the *combustion products* (3.2.25)

3.2.9
yellow tipping
phenomenon characterized by the appearance of yellow colouring at the top of the blue cone of an aerated flame

3.2.10
incomplete combustion
combustion process which entails only partial burning of gas

Note 1 to entry: Carbon monoxide is typically produced as a by-product

3.2.11
cross lighting
complete ignition of all ports around a ring of flame ports and/or successful ignition of all rings of ports from an adjacent ring of ports

3.2.12
heat input
quantity of energy used in unit time corresponding to the *volumetric* or *mass flow rates* (3.2.23, 3.2.24), the calorific value used being the *Gross calorific value* (3.2.16)

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

3.2.13
nominal heat input
value of the *heat input* (3.2.12) as declared by the manufacturer

[SOURCE: ISO 22967:2010]

3.2.14
gas installation
a combination of the following used or intended to be used in the supplying and utilisation of gas taken as separate items or as a whole: Consumer piping, fittings, components, flues, sub-meters, apparatus or other devices and associated requirements

3.2.15
reference conditions
dry gas under conditions of temperature and pressure: 15 °C and 101,325 kPa

[SOURCE: ISO 6976:2016]

3.2.16
Gross calorific value
amount of heat that would be released by the complete combustion with oxygen of a specified quantity of gas, in such a way that the pressure, 101,325 kPa, at which the reaction takes place remains constant, and all the *combustion products* (3.2.25) are returned to the same specified temperature, 15 °C, as that of the reactants, all of these products being in the gaseous state except for water, which is condensed to the liquid state at 15 °C

[SOURCE: ISO 6976:2016, 3.1, modified – p1 replaced by 101,325 kPa; t1 replaced by 15°C, Note to entry has been replaced]

Note 1 to entry: The calorific value is expressed:

– either in megajoules per cubic metre (MJ/m^3) of dry gas;

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

Note 2 to entry: In this document only the Gross calorific value is used

3.2.17
relative density
ratio of the masses of equal volumes of dry gas and dry air under the same conditions of temperature and pressure

[SOURCE: ISO 22967:2010, 3.2.3]

3.2.18
gas supply pressure
difference between the static pressure measured at the inlet connection of the appliance in operation and the atmospheric pressure

[SOURCE: EN 30-1-1:2008+A3:2013]

Note 1 to entry: The gas pressures used are expressed in kilopascals (kPa).

3.2.19
test pressure
gas pressure used to verify the operational characteristics of appliances using combustible gases, consisting of normal or *limit pressure* (3.2.21)

[SOURCE: EN 30-1-1:2008+A3:2013]

3.2.20
normal pressure
pressure under which the appliances operate in nominal conditions, when they are supplied with the corresponding *reference gas* (3.2.4)

Note 1 to entry: The gas pressures used are expressed in kilopascals (kPa)

3.2.21
limit pressure
pressure representative of the extreme variations in the supply conditions

maximum pressure: p_{max};

minimum pressure: p_{min}

3.2.22
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 in which:

– the higher pressure corresponds only to gases of low *Wobbe index* (3.2.2);

– the lower pressure corresponds to gases of high *Wobbe index* (3.2.2)

[SOURCE: EN 437:2018, modified – Note to entry has been deleted]

3.2.23
volumetric flow rate
volume of gas consumed by the burner or burners in unit time, with the gas under *reference conditions* (3.2.15)

Note 1 to entry: The volumetric flow rate is expressed in cubic meter per hour (m3/h) or possibly litre per minute (l/min), litre per second (l/s), cubic decimetre per hour (dm3/h), cubic decimetre per second (dm3/s).

[SOURCE: EN 30-1-1:2008+A3:2013]

3.2.24
mass flow rate
mass of gas consumed by the appliance in unit time during continuous operation

Note 1 to entry: The mass flow rate is expressed in kilogram per hour (kg/h), or eventually gram per hour (g/h).

[SOURCE: EN 30-1-1:2008+A3:2013]

3.2.25
combustion products
constituents resulting from the combustion of a fuel gas with the oxygen of the air, including the inerts, but excluding excess air

3.3 Definitions relating to components

3.3.1
pressure regulator
device that maintains the outlet pressure constant within given limits, independently of the variations in inlet pressure and/or flow rate

[SOURCE: ISO 23551-2:2006, 3.1.1]

3.3.2
manual gas shut-off valve (tap)
manually operated valve for the control of the gas flow from an “off” to an “on” position and vice versa

[SOURCE: ISO 23551-5:2014]

3.3.3
multifunctional control
combination of two or more controls, at least one of these is a mechanical control, whereby the functional parts cannot operate if separated

[SOURCE: ISO 23551-8: 2016+Amd 1:2019]

3.3.4
mechanical thermostat
thermostat which controls the temperature by adjusting the flow rate accordingly to the temperature of the thermal sensing element without any external energy, such that the temperature remains within defined limits

[SOURCE: ISO 23551-9:2015]

3.3.5
flame supervision device
device designed to stop flammable gas going to the burner of a gas appliance if the flame is extinguished

3.3.6
thermoelectric flame supervision control
thermoelectric flame supervision device
control which, in response to the electromagnetic force produced by the thermocouple, maintains the gas way to the main burner open and which shuts off the gas way after extinction of the supervised flame

[SOURCE: ISO 23551-6:2014, modified – Note to entry has been deleted; pilot burner has been deleted]

3.3.7
opening time
time which elapses between the ignition of the supervised flame and the moment when the effect of this flame is sufficient to hold open the shut-off device

[SOURCE: EN 30-1-1:2008+A3:2013]

3.3.8
extinction delay time
time which elapses between the extinction of the supervised flame and the closure of the gas supply controlled by the *flame supervision device* (3.3.5)

[SOURCE: EN 30-1-1:2008+A3:2013]

3.3.9
automatic shut-off valve
valve which opens when energized and closes automatically when de-energized

[SOURCE: ISO 23551-1:2012]

3.3.10
injector
component part that admits the gas into an aerated burner

Note 1 to entry: There are two types of injectors:

– calibrated injector in which the section of the outlet orifice is fixed;

– adjustable injector in which the section of the outlet orifice is variable.

[SOURCE: EN 30-1-1:2008+A3:2013]

3.3.11
low rate adjuster
device allowing the reduced gas rate to a burner to be set at a pre-determined value according to the supply conditions

[SOURCE: EN 30-1-1:2008+A3:2013]

Note 1 to entry: The adjustment may be continuous (adjustment screw) or discontinuous (change of calibrated orifices, etc.)

Note 2 to entry: The operation of changing the setting of this device is termed the "adjustment of the reduced gas rate"

3.3.12
air rate adjuster
device allowing the aeration of a burner to be set at a pre-determined value according to the supply conditions

[SOURCE: EN 30-1-1:2008+A3:2013]

3.3.13
spacer
component used in a gap to maintain a predetermined gap width

[SOURCE: ISO 6707-1:2014, 5.5.90]

3.3.14
touch control
control actuated by contact or proximity of a finger, with little or no movement of the contact surface

[SOURCE: IEC 60335-2-6:2014]

3.3.15
pan support
support placed above an uncovered hob burner, which supports the pan being heated

3.3.16
covered burner
burner under a removable closed cooking surface; there is no direct flame contact to the pan or food

[SOURCE: EN 30-1-1:2008+A3:2013]

3.3.17
hob guard
device that reduces physical access to the cooking surface to avoid hazardous situations

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

4 Components in gas cooking appliances

4.1 General

Components in gas cooking appliances shall conform with the applicable ISO- or IEC Standards. Components not covered by these standards shall be tested in the appliance.

4.2 Manual gas shut-off valves (Taps)

Manual gas shut-off valves shall conform with ISO 23551-5:2014.

4.3 Knobs

4.3.1 Design of knobs

The purpose of knobs shall be clearly identifiable in respect to the burner they control. Removable knobs shall be constructed such that installation shall be possible in only the correct orientation.

For a tap operated by rotating, the closing direction shall be clockwise. This does not apply to a combined tap for oven and grill burners.

4.3.2 Marking for knobs

Markings shall be clearly visible, legible and durable. It shall be easy for the user to identify the burner and the setting the markings refer to.

The closed position shall be marked with figure "0", or a full disc or a circle of at least 3 mm in diameter.

The closed position for all knobs shall be the same.

Symbols for the other positions may be as follows:

full rate position:	large flame	
reduced rate position:	small flame	
range of rates:	triangle	 or 
	or	
	scale	1 2 3 4 or 4 3 2 1
position of ignition	stylized star	

Other symbols may be used except letters.

If there is a special position for ignition, it shall be marked e.g. by a stylized star.

4.4 Multifunctional controls

Multifunctional controls shall conform with ISO 23551-8: 2016+Amd 1:2019.

4.5 Thermoelectric flame supervision controls

4.5.1 General

Thermoelectric flame supervision controls shall conform with ISO 23551-6:2014+Amd 1:2019. Its sensing element shall supervise a single burner only.

In the case of a failure of any of the components indispensable to their operation, the supply of gas controlled by the device is cut off automatically and its re-establishment shall require manual intervention.

For measuring the opening time and the extinction delay time the appliance shall be supplied with each of the reference gases that the appliance can use at the corresponding normal pressure.

4.5.2 Opening time

4.5.2.1 Requirement

During the following test the opening time of a hob burner shall be less than 10 s. The opening time of an oven or a grill burner shall be less than 15 s.

4.5.2.2 Test

The appliance shall be in cold conditions. Each burner is lit, and the opening time is measured as the time between the moment the flame appears and the moment when the thermoelectric flame supervision control allows admission of gas to the burner without manual intervention

4.5.3 Extinction delay time

4.5.3.1 Requirement

During the following test the extinction delay time for hob burners shall be less than 90 s. The extinction delay time for an oven or grill burner shall be less than 60 s.

4.5.3.2 Test

The burner is operated at full rate for 20 min and hob burners are equipped with a pan according 5.7 and filled with water up to (50 ± 2) mm from the bottom. The extinction delay time is measured between the moment when the flame goes off (e.g. by cutting and immediately restoring the gas supply) and the moment when gas flow to the burner stops due to the action of the thermoelectric flame supervision control.

4.6 Thermostats

Mechanical thermostats for domestic gas cooking appliances shall conform with ISO 23551-9:2015.

Electrical thermostats shall conform with IEC 60730-2-9:2015+AMD1:2018+AMD2:2020 and IEC 60335-2-6:2014, 24.101.

4.7 Pressure regulators

4.7.1 General

Pressure regulators shall conform with ISO 23551-2:2018.

A pressure regulator is prohibited for appliances operating with a pressure couple.

4.7.2 Regulation capacity

4.7.2.1 Requirement

Under the test conditions below, the gas rate shall be within ± 7,5 % of the rate obtained at the normal pressure.

4.7.2.2 Tests

Two tests shall be performed using reference gas at ambient temperature.

The gas rate is adjusted as described for Test 1 and Test 2, and then, the pressure is varied between minimum pressure and maximum pressure of the corresponding reference gas (corresponding Table of Annex A).

4.7.2.2.1 Test 1

For an appliance with several burners, the gas rate corresponds to 2/3 of the sum of the nominal heat inputs of all the burners, which can function simultaneously. For an appliance with only one burner, the gas rate corresponds to the nominal heat input.

4.7.2.2.2 Test 2

The appliance gas rate is adjusted to 0,08 m^3/h for first family gases and to 0,05 m^3/h for second family gases, and to 0,02 m^3/h for third family gases.

4.8 Automatic shut-off valves

Automatically operated valves shall conform with ISO 23551-1:2012.

4.9 Injectors and adjusters

4.9.1 General

Air rate adjusters and injectors shall be of metallic material and have a melting point above 500 °C. Additionally they shall be corrosion resistant or have a corrosion resistant finish.

4.9.2 Injectors

It shall only be possible to mount and dismantle an injector with the use of a tool.

Injectors, that are likely to be soiled as a result of cooking, shall be accessible for cleaning. They shall be indelibly marked for identification if, once the appliance is installed, it is possible to dismantle and exchange the injectors.

4.9.3 Air rate adjusters

Air rate adjuster shall be set in the factory and, if necessary, shall only be adjusted by a qualified person.

Air rate adjusters shall be locked. They shall not be unlocked without the aid of a tool.

NOTE Locked in the adjustment position means fixed or immobilized.

4.9.4 Low rate adjusters

Low rate adjusters shall be set and locked in the factory.

Low rate adjusters shall only be adjusted by a qualified person according to the instructions for conversion to various gases**.**

It shall only be possible to move the adjuster with the use of a tool. Adjusting screws shall be placed so that they cannot fall into the gas passage.

NOTE Locked in the adjustment position means fixed or immobilized.

4.10 Ignition systems

A touchable spark ignition system shall conform with IEC 60335-2-102:2017, 8.101.

It shall withstand 25.000 cycles of operation.

All the components of the ignition device shall be designed to avoid damage or accidental displacement in normal use. The relative position of the ignition device and the burner shall be sufficiently well defined to ensure satisfactory operation of the assembly.

In the event of failure of the ignition system for the burner(s) of the appliance, it shall be possible to light the burner(s) concerned with a match after removing, if necessary, a movable part (griddle, bottom of the oven, etc.). This requirement shall not apply to oven burners that are designed specifically to prevent the ignition by manual means. In this case, the manufacturer's instructions for use and maintenance shall state that the ignition by manual means is prohibited.

The electrical safety shall be checked according to IEC 60335-2-102:2017.

4.11 Thermal cut-outs

Thermal cut-outs of the capillary type shall conform with the requirements for type 2 K controls in IEC 60730-2-9:2015+AMD1:2018+AMD2:2020.

5 General conditions of test

5.1 Reference conditions

All determined values of this document shall be in accordance with the following reference conditions:

- dry gas
- temperature of 15 °C
- pressure of 101,325 kPa

In this document, only the Gross calorific value (H_s) shall be used.

5.2 Reference and test gases

5.2.1 Characteristics of the test gases

The burners shall be tested with the test gases indicated in Annex A, in the corresponding Table for the countries of destination.

5.2.2 Conditions for producing test gases

The composition of the gases used for the tests shall be as near as possible to those given in Annex A, in the corresponding Table for the countries of destination. The production of these gases shall be in accordance with the following rules:

- the Wobbe index of the gas used shall be within ± 2 % of the value indicated in the Table for the corresponding test gas (this tolerance includes the error of the measuring equipment);
- the constituents of the test gases shall have the minimum degree of purity according to Annex B, Table B1.

5.3 Test pressures

The test pressures, i.e. the static pressure to be applied at the gas inlet connection of the appliance in operation, are given in Annex A, in the corresponding Table for the countries of destination.

5.4 Temperature conditions

The ambient temperature for the tests shall be (20 ± 5) °C. All tests shall be carried out in a substantially draught-free room in which the ambient temperature is maintained during the complete test.

The ambient temperature is measured with an appropriate instrument under the following conditions:

- at a height of (900 ± 50) mm from the floor;
- at a distance of between 1 m and 1,5 m from the appliance;
- using an instrument which is accurate to within ± 0,5 °C.

The instrument shall not be affected by radiation from the appliance.

For the purposes of this document, the burner is considered to be cold, when it meets the specification for ambient temperature. A burner is considered to be hot after 10 minutes of operation at full rate (hot conditions).

5.5 Adjustment of the burner

For all the tests, the appliance shall be fitted with the appropriate injector(s) for the family of gases to which the test gas belongs. The adjusters, if any, shall be adjusted according to the instructions for the installer.

One burner is considered to be operating at the nominal heat input if, when supplied at normal pressure with reference gas, the heat input meets the requirements of 6.2, Table 3.

Once the adjustments have been made for one reference gas, they shall not be altered for the tests at the other pressures and for the limit gases defined for the reference gas for which the appliance is equipped and adjusted.

5.6 Test installation

5.6.1 General

The test structure and the cabinet shall be made of (20 ± 2) mm thick matt black painted wooden panels. The worktop shall be 18 mm up to 32 mm thick.

For surface cooking appliances, a range hood or horizontal wooden panel shall be placed at a minimum height of 650 mm from pan supports, unless a greater distance is stated in the instructions for the installer of the appliance.

Any spacers specified in the instructions for the installer shall be placed between the panels and the appliance in accordance with the instructions for the installer.

All freestanding, built-in and table-top appliances shall be tested with a back panel with a minimum height of 1,80 m from the floor, and a length at least 50 mm longer than the appliance.

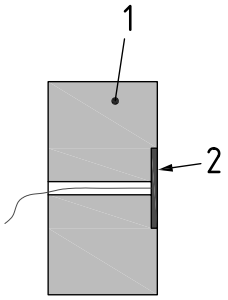
Temperature rises shall be determined by means of fine-wire thermocouples positioned so that they have minimum effect on the temperature of the part under test.

NOTE Thermocouples having wires with a diameter not exceeding 0,3 mm are considered to be fine-wire thermocouples.

Thermocouples used for determining the temperature rise of the surface of walls, ceiling and floor of the test installation are attached to the back of small blackened disks of copper or brass, 15 mm in diameter and 1 mm thick. The front of the disk shall be flush with the surface of the board (Figure 1).

As far as possible, the appliance shall be positioned so that the thermocouples detect the highest temperature.

Dimensions in millimetres



Key

1 = matt black painted wooden test panel (20 ± 2) mm

2 = blackened copper or brass disc Ø 15 mm

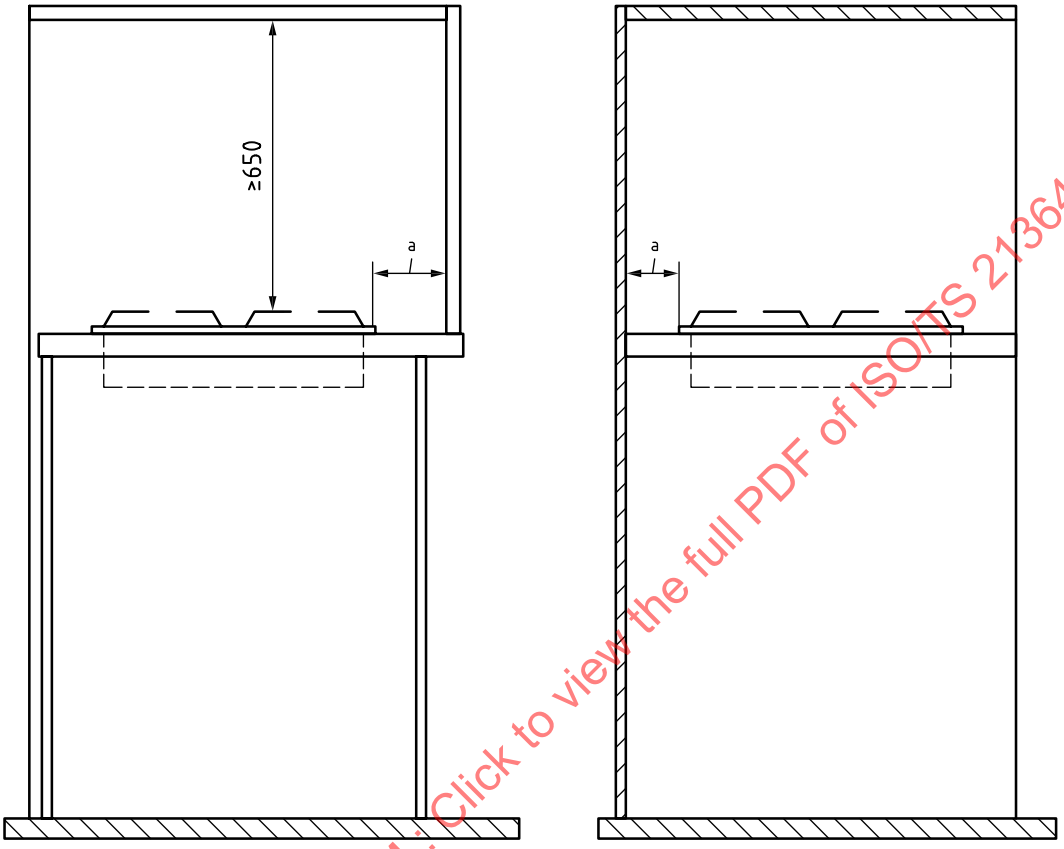
Figure 1 — Placement of the thermocouple in the test installation

5.6.2 Built-in appliances

The tests shall be carried out with the appliance installed in a cabinet according to the instructions for the installer (Figure 2).

The tests shall be carried out with all the appliance doors closed, if any.

Dimensions in millimetres



front view **side view**

Key

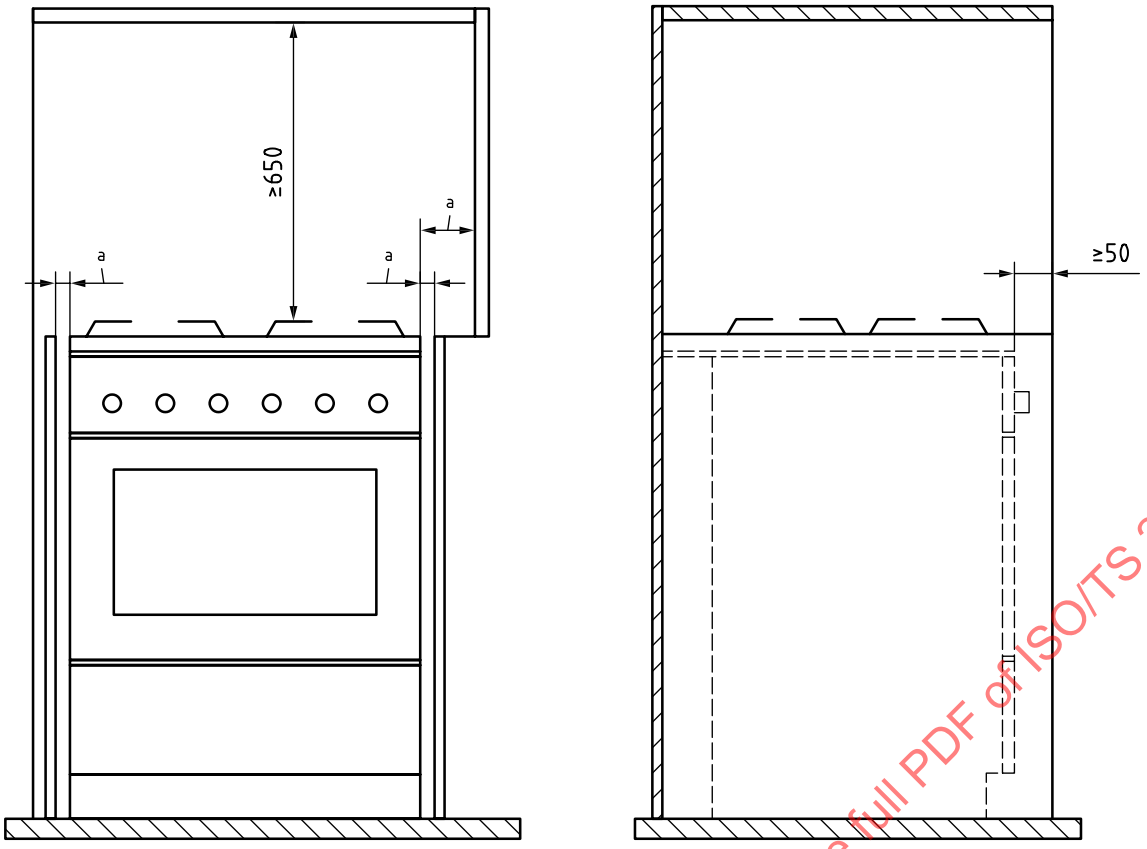
a = dimensions specified in the instructions for the installer

Figure 2 — Example of test installation for built-in appliances

5.6.3 Freestanding appliances

A freestanding appliance shall be installed according to the instructions for the installer with wooden panels on both sides extending up to the nominal worktop height, a back panel and a panel above the cooking surface (Figure 3). A floor-supported unit with adjustable feet shall be level with the feet adjusted to the most unfavourable position.

Dimensions in millimetres



front view **side view**

Key

a = dimensions specified in the instructions for the installer

Figure 3 — Example of test installation for free standing appliances

5.6.4 Table-top appliances

Table-top appliances shall be placed on a horizontal panel representing a table or working surface and extending at least 100 mm beyond the corresponding dimensions of the appliance. The appliance shall be placed against the back panel. A vertical panel shall be placed on the most critical side of the appliance.

5.7 Characteristics of the test pans

5.7.1 Pans required for testing on gas burners

The pan is made of unpolished commercial quality aluminium.

Unless otherwise indicated, the pans required for testing on gas burners shall be selected in accordance with Table 1 and their dimensions shall be in accordance with Table 2 and Figure 4.

Table 1 — Pan size

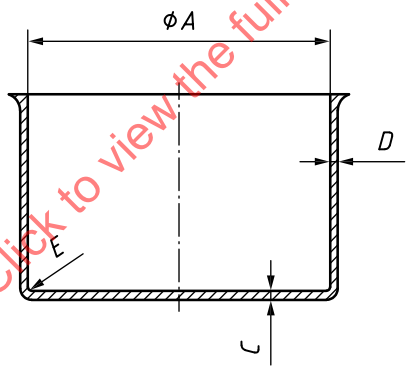
Heat input (kW)	Pan size (mm)
< 1.26	140

Table 1 *(continued)*

1.26 - 1.59	160
1.60 - 2.01	180
2.02 - 2.43	200
2.44 - 2.92	220
2.93 - 3.48	240
3.49 - 4.18	260
4.19 - 5.23	280
>5.23	300

Table 2 — Characteristics of pans necessary for testing on gas burners

Dimension	Unit	Pan [1]													Tolerances
ØA	mm	140	160	180	190	200	220	240	260	280	300	320	340	360	± 3 %
C	mm	1 , 0 - 2,0	1 , 0 - 2,0	1 , 0 - 2,0	1 , 0 - 2,0	1 , 0 - 2,0	1 , 0 - 2,0	1 , 0 - 2,0	1 , 5 - 2,5	1 , 5 - 2,5	1 , 5 - 2,5	1 , 5 - 2,5	1 , 5 - 2,5	1 , 5 - 2,5	
D	mm	1 , 0 - 2,0	1 , 0 - 2,0	1 , 0 - 2,0	1 , 0 - 2,0	1 , 0 - 2,0	1 , 0 - 2,0	1 , 0 - 2,0	1 , 5 - 2,5	1 , 5 - 2,5	1 , 5 - 2,5	1 , 5 - 2,5	1 , 5 - 2,5	1 , 5 - 2,5	
E_{max}	mm	20	23	26	27	29	32	35	38	41	44	47	50	53	
[1] All pans are without handles															



Key

A internal diameter measured at the top
C thickness of base
D thickness of the side
E internal radius

Figure 4 — Test pans required for testing on gas burners

5.7.2 Pans required for testing on electric hob elements and induction hob elements

For electric hob elements the test pans shall be according to IEC 60335-2-6:2014, Figure 101. For induction hob elements the test pans shall be according to IEC 60335-2-6:2014, Figure 102. The water content shall be according to IEC 60335-2-6:2014, 3.1.9.101, Table 101.

6 Heat input

6.1 General

The appliance shall be adjusted under the conditions described in 5.5.

6.2 Obtaining the nominal heat input

Each of the burners, supplied separately, shall be capable of giving the nominal heat input stated in the instructions for use and maintenance.

This requirement is deemed to be satisfied if the variation between the heat input obtained with each of the gases indicated and the nominal heat input Q_n is within the limits indicated below:

Table 3 — Tolerances for the heat input

Nominal heat input in kW	Tolerance of heat input
< 3,6	± 10 %
≥ 3,6	± 5 %

If an appliance can operate with several gas families, the nominal heat input of the burner is not required to be identical for all the gas families.

6.3 Measurements and calculations

a) The nominal heat input shall be verified by using the reference gases of all countries of destination of the appliance, using the appropriate test pressures as defined in the Tables of Annex A, corresponding to the pressure data on the appliance and using the corresponding injectors.

The nominal heat input Q_n shall be calculated by Formula (1) or Formula (2):

$$Q_n = 0{,}278 M_n \cdot H_s \quad (1)$$

or:

$$Q_n = 0{,}278 V_n \cdot H_s \quad (2)$$

where

Q_n is expressed in kilowatts;

M_n is the mass flow rate of dry gas under reference conditions corresponding to the nominal heat input in kilograms per hour;

V_n is the volumetric flow rate of dry gas under reference conditions corresponding to the nominal heat input in cubic meter per hour;

H_s is the gross calorific value of the reference gas in the corresponding Table of Annex A, given in mega joules per cubic meter or mega joules per kilogram.

b) The mass (M_n and M_o) and volume (V_n and V_o) inputs correspond to a measurement and flow of the reference gas, under reference conditions, i.e. assuming a dry gas at 15 °C and under a pressure of 101,325 kPa. In practice, the values obtained during the tests do not correspond to these reference conditions, they shall therefore be corrected in order to bring them to the values, which would actually have been obtained if these reference conditions had been achieved during the tests, at the injector outlet.

The corrected mass flow rate is calculated using the following formula, according to whether it has been determined by weighing or based on a volumetric flow rate:

— determination by weighing using Formula (3):

$$\frac{M_o}{M} = \sqrt{\frac{101{,}325+p}{p_a+p} \cdot \frac{273{,}15+t_g}{288{,}15} \cdot \frac{d_r}{d}} \quad (3)$$

— determination on the basis of volumetric flow rate using Formula (4):

$$\frac{V_o}{V} = \sqrt{\frac{101{,}325+p}{101{,}325} \cdot \frac{p_a+p}{101{,}325} \cdot \frac{288{,}15}{273{,}15+t_g} \cdot \frac{d}{d_r}} \quad (4)$$

The corrected mass rate is calculated using Formula (5):

$$M_o = 1{,}226 V_o \cdot d_r \quad (5)$$

where

M_o is the mass flow rate of dry gas which would have been obtained under reference conditions in kilogram per hour;

M is the mass flow rate obtained under test conditions in kilograms per hour;

V_o is the volumetric flow rate of dry gas which would have been obtained under reference conditions in cubic meter per hour under the same conditions;

V is the volumetric flow rate obtained and expressed under test conditions in cubic meter per hour;

p_a is the atmospheric pressure, in kilopascal;

p is the gas supply pressure at the measuring point in kilopascal;

t_g is the gas temperature at the measuring point, in degrees Celsius;

d is the relative density of the dry (or wet) test gas relative to dry air;

d_r is the relative density of the dry reference gas relative to dry air.

These equations shall be used to calculate, from the mass input M or volume input V measured during the test, the corresponding rates M_o or V_o which would have been obtained under reference conditions.

These values M_o and V_o which shall be compared with the values M_n and V_n calculated from the nominal heat input using the equations given in a) of this subclause.

These equations 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 (relative density of dry gas in relation to dry air) shall be replaced by the value of the relative density of the wet gas d_h given in Formula 6:

$$d_h = \frac{(p_a + p - p_{ws})d + 0{,}622\ p_{ws}}{p_a + p} \quad (6)$$

where

p_{ws} is the saturation vapour pressure (expressed in kPa) at temperature t_g.

The saturation vapour pressure at t_g can be taken as equal to Formula 7:

$$p_{ws} = exp\left(21{,}094 - \frac{5{,}262}{273{,}15 + t_g}\right) \cdot 0{,}1 \quad (7)$$

NOTE In the case o:f 2nd family gases, this correction is negligible.

6.4 Obtaining the reduced heat input

6.4.1 Requirement

The reduced heat input shall be checked, if stated in the instructions and expressed in kW.

During the following test the value obtained shall not exceed the reduced heat input as stated in the instructions.

6.4.2 Test

The burner is supplied with all reference gases at normal pressure given in the corresponding Table of Annex A at low rate position. Then the reduced heat input is calculated under reference conditions according to 6.3.

6.5 Total heat input

6.5.1 Requirement

During the following test the total heat input of the appliance, all the taps being in the fully open position, shall not be lower than 85 % of the sum of the individual measured inputs of the different burners supplied separately under the same conditions, as measured during the tests of 6.2.

6.5.2 Test

The appliance is supplied with reference gas at normal pressure (see corresponding Table of Annex A) and with the corresponding injectors, adjusted to nominal heat input as indicated in the instructions for the installer. The total rate is measured with all burners operating simultaneously. If the appliance can be adjusted to more than one reference gas, the test is carried out with the one having the lowest Wobbe index or with the largest injector diameter.

The total rate of the appliance is calculated under reference conditions according to 6.3.

7 Heating

7.1 General

The appliance is installed and adjusted under the conditions described in Clause 5.

7.2 Operating conditions

The appliance is supplied with the reference gas giving the highest heat input. If the heat input is the same for all reference gases, use the gas with the highest Wobbe index.

The tests are started from cold conditions according to 5.4.

7.3 Heating tests

7.3.1 Requirement

For the test in 7.3.2 the relevant temperature rise limits in Table 4 shall be met.

Table 4 — Maximum temperature rise limits

Part	Temperature rise K
Knobs and grips	35
– *of bare metal*	39
– *of coated metal* [a]	45
– *of glass and ceramic*	60
– *of plastic having a thickness exceeding 0,4 mm* [b, c]	
Wood	85
– *Wooden supports, walls, ceiling and floor of the test corner and wooden cabinet:*	
Components	Shall not exceed the maximum temperature specified by the component manufacturer
Surface temperature of the accessible base of surface cooking appliances	100[d]
Surfaces likely to be in contact with a non-metallic flexible tube	45
Push-on connector	30
Wall of the cylinder compartment likely to come in contact with the flexible tube or the gas cylinder	30

a Metal is considered coated when a coating having a minimum thickness of 90 µm made by enamel or non-substantially plastic coating is used

b the limit of 60 K shall also be applicable for plastic with a metal coating less than 0,1 mm thick

c when the thickness of the plastic coating does not exceed 0,4 mm, the temperature rise limits of the coated metal or of glass and ceramic material apply

d if this limit is exceeded, the instructions for the installer shall request a horizontal separation to be installed below the appliance

7.3.2 Test under normal operation

7.3.2.1 General

All parts of the appliance that can operate together are operated together as specified below.

For gas appliances incorporating electrical heating elements, the contribution of these heating elements to the safety of the gas appliance shall be considered when testing the gas appliances according to this clause.

The duration of the test is 1 h.

7.3.2.2 Hob burner

A pan with lid according to 5.7, Table 2, is placed on each burner. The diameter is selected according to the heat input (5.7, Table 1), but if it is outside the range of dimensions given in the instructions for use and maintenance, then those prevail.

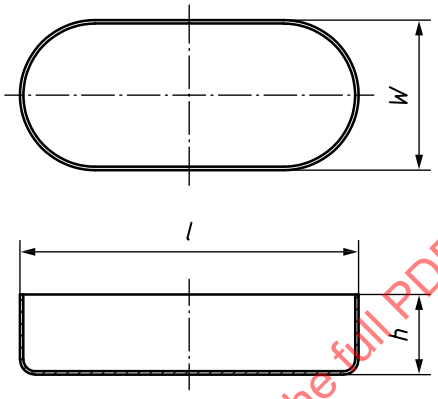
For fish burners, a special pan shall be used, having a width and length sufficient to overlap all sides of the burner by at least 60 mm and at most 80 mm. If such pan is not available, a standardized pan with circular ends shall be used (e.g. see Figure 5).

A burner designed to be used for wok-pans only, shall be tested with a special wok-pan, which is in conformity with the instructions for use and maintenance.

For the placement of the pans, the following arrangement shall be met:

The pans are placed on each hob burner and electric cooking elements (see 7.3.2.3), starting with the special pans. No pan shall overlap the edges of the hob. A distance of at least 10 mm shall be provided between the side surface of each pan and all other pans. If this arrangement is not possible, pans with smaller diameter given in 5.7, Table 2 are used.

All pans shall be filled with water to a level of (50 ± 2) mm above the bottom of the pan.



Key

h	= 100 mm (height of the pan)
l	= 356 mm (length of the pan)
w	= 152 mm (width of the pan)
Thickness of material	= 3,2 mm

Figure 5 — Example of a special pan for a fish burner

At the start of the test, all hob burners are put into operation, their control being at their highest setting. As soon as the water boils, the controls are adjusted so that the water maintains light boiling (simmering) and they are left at this setting until the end of the test.

During the test, the pans are used with lids. Hot water is added to ensure a sufficient water level in order that boiling can be maintained.

7.3.2.3 Electric hob elements

All electric hob elements are operated as described in IEC 60335-2-6:2014, 3.1.9.101 and 11.7.101.

For electric hob elements and induction hob elements, test pans according to 5.7.2 shall be used.

7.3.2.4 Oven burner

Ovens are tested empty with the exception of a grid with the thermocouple for measuring the temperature at the centre of the oven.

Each oven burner is ignited at the start of the test.

For an oven with a thermostat, the control is positioned in order to obtain an average temperature of 230 °C at the centre of the oven.

For an oven without a thermostat, the control is set to the highest position until a temperature of about 230 °C is obtained at the centre of the oven. The control is then set to the position allowing a temperature of 230 °C to be maintained.

7.3.2.5 Electric oven

All electric ovens are operated as described in IEC 60335-2-6: 2014, 3.1.9.102 and 11.7.102.

7.3.2.6 Gas compartment grill

The grill pan or grid is placed in the normal position indicated in the instructions for use and maintenance as soon as the grill is operated. A grid is placed in the compartment with the thermocouple for measuring the temperature at the centre of the compartment. The compartment door is open or closed according to the instructions for use and maintenance.

A grill with a thermostat is put into operation at the start of the test for 60 min, with its control set to a temperature of 230 °C in the centre of the compartment. If this temperature cannot be reached, the control is set to full rate for 60 min.

A grill without a thermostat is put into operation at the start of the test for 60 min or until the operation time of the overheat prevention device (thermistor, bimetal, etc.). The control is set to full rate.

If a compartment has a rotating spit, the duration of operation of the grill is 60 min with the control set to give the most unfavourable conditions. The compartment door is open or closed according to the instructions for use and maintenance.

NOTE Requirements for a simultaneous operation of an oven burner and a gas grill is specified in ISO 21364-22:2021.

7.3.2.7 Electric compartment grill

Electric grills are operated as described in IEC 60335-2-6:2014, 3.1.9.103 and 11.7.103.

7.3.2.8 Gas griddle

Griddles are put into operation 30 min after the start of the test and tested without a pan.

They are put into operation with the control set to reach a temperature at the centre of the griddle plate of (275 ± 15) °C. This temperature shall be maintained. If this temperature cannot be reached the control shall be set to full rate.

7.3.2.9 Electric griddle

Electric griddles are operated as described in IEC 60335-2-6:2014, 3.1.9.106 and 11.7.104.

7.3.2.10 Gas surface grill

Gas surface grills are operated for 60 min at full rate.

A flat sheet metal-plate, covering 75 % of the grill surface, shall be placed in the middle of the grill.

7.3.2.11 Electric surface grill

Electric surface grills are operated as described in IEC 60335-2-6:2014, 11.7.103.

7.3.2.12 Gas warming drawer

Gas warming drawers are put into operation 30 min after the starting of the test with their control set to full rate. The drawers are tested empty.

7.3.2.13 Electric warming drawer

Electric warming drawers are operated as described in IEC 60335-2-6:2014, 3.1.9.105 and 11.7.105.

7.4 Abnormal operation

Appliances shall be constructed so that as a result of abnormal or careless operation, the risk of fire, mechanical damage impairing safety or protection against gas leakage is obviated as far as practicable.

Unless otherwise specified, only one abnormal condition is simulated at any one time. If more than one of the tests is applicable to the same appliance, these tests are carried out consecutively after the appliance has cooled down to room temperature.

During the tests, the appliance shall not emit flames, molten metal, or poisonous or ignitable gas in hazardous amounts and temperature rises shall not exceed the values of Table 5.

Table 5 — Maximum temperature rise limits

Part	Temperature rise K
Wood (furniture, walls, ...)	150
Surfaces in contact with a non-metallic flexible tube	70
Push on connector	50
Insulation of supply cord without T marking, or with T marking up to 75 °C	150
Insulation of supply cord with T marking above 75° C	T + 75

At the end of the test, the manual gas shut-off valve (tap) shall be able to be closed properly (no blocking)

After the tests, the leakage test of 10.2 has to be performed.

8 Combustion

8.1 Measurement of all burners simultaneously

8.1.1 Requirement

During the following test the CO concentration in the air- and water-free combustion products, as calculated in 8.3, shall not exceed 0,20 %.

8.1.2 Test

All burners including oven and/or grill burners and all electric heating elements, that can be operated simultaneously, are operated under the following conditions.

The appliance is adjusted according to 5.5 and supplied with each reference gas at normal pressure.

The appliance shall be installed according 5.6 but without the horizontal wooden panel or range hood above the appliance.

Hob burners are adjusted to their nominal heat input.

Oven burners are operated with their controls in the full rate position.

Gas grills situated in separate compartments are operated with their controls in the position corresponding to half the nominal heat input, or, if this is not possible, using the position corresponding to a heat input as close to this as possible.

In the case of a gas grill situated in the same compartment as an oven, the test is repeated with the gas grill operated to half the nominal heat input instead of the oven. All other elements of the appliance, including any other oven, are operated with their controls in the full rate position.

Electric grills situated in separate compartments are operated with their controls in the position corresponding to half the electric power, or, if this is not possible, using the position corresponding to an electric power as close to this as possible.

For griddles, this test is carried out using the position corresponding to half the nominal heat input, or, if this is not possible, using the position of the nominal heat input.

Each of the hob burners are covered by a pan in accordance with 5.7, Table 2, but with the following diameters: if the hob burner has a nominal heat input not exceeding 4,2 kW, pan of diameter 220 mm filled with 2 kg of water; if the hob burner has a nominal heat input greater than 4,2 kW, pan of diameter 300 mm filled with 3 kg of water. A distance of at least 10 mm is to be left between the pans, and between each pan and the wall of the sampling device and between the pans and the shut-down lid, if any. If such arrangement is not possible, pans with smaller diameters according 5.7, Table 1 are chosen, filled up to (50 ± 2) mm from the bottom with water at ambient temperature. No pans are placed on covered burners or griddles.

Accessories for the oven or compartment grill situated under the hob are put in the normal position for use.

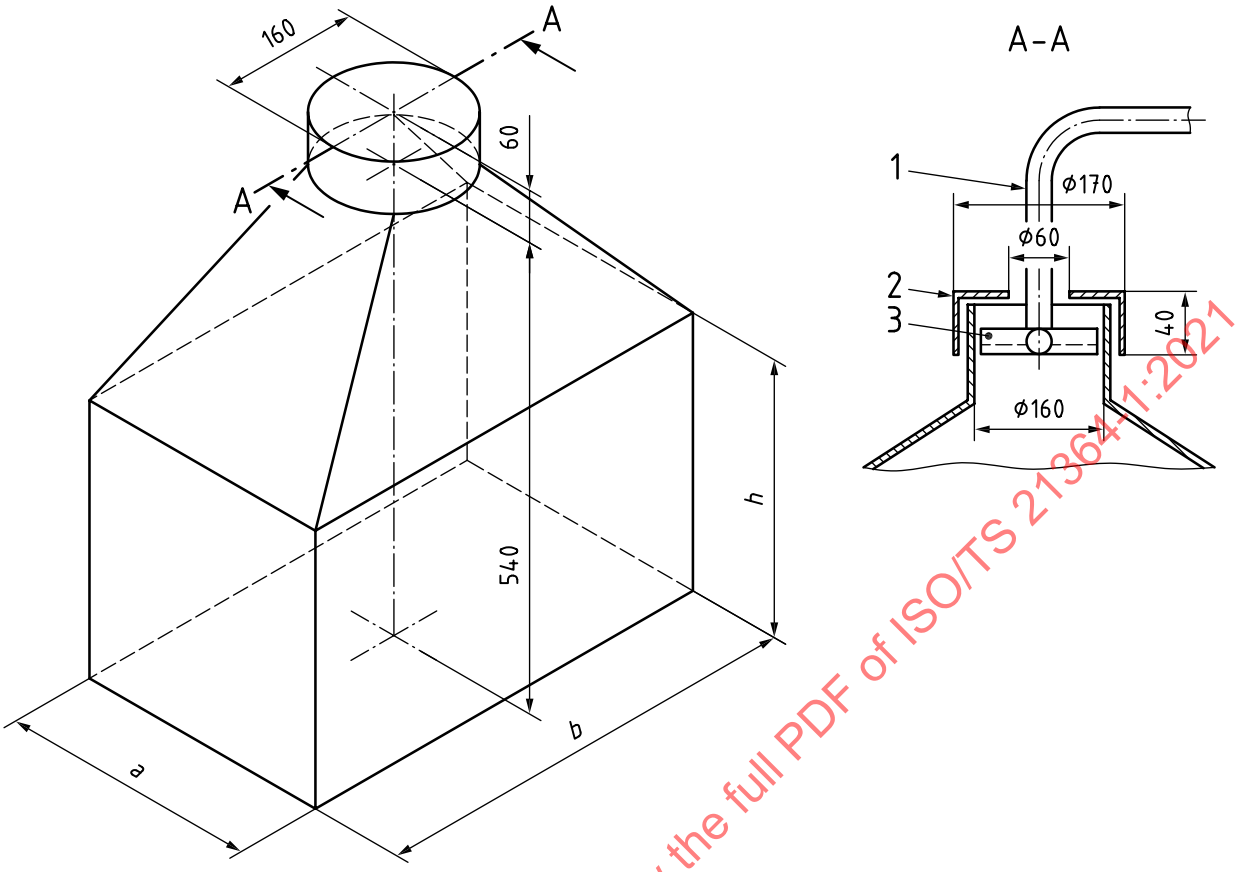
A sampling device is placed over the appliance such as those shown as examples in Figure 6, selected according to the shape of the hob. The device shall overlap the hob by at least 40 mm. If the appliance has a shut-down lid which renders this arrangement impossible, the device is slid between the lid and the back panel of the test installation. It shall overlap the other three sides of the hob by at least 40 mm. The distance between the base of the device and the top of the pan supports shall be between 20 mm and 80 mm.

The device shall collect all the combustion products (including those from any oven or compartment grill in operation) but shall not alter their course to the extent where this is likely to affect the quality of combustion. In particular, the distance between the base of the device and the level of the pan supports shall be such that it does not affect the quality of combustion of the burners.

The combustion products are sampled 20 min after the start of the test.

There shall be no escape of combustion products from the base of the sampling device and the CO_2 concentration shall be greater than 1 % by volume. If the CO_2 concentration in the combustion products is less than 1 % by volume, a restrictor is placed in the upper part of this device in order to bring this quantity to a value slightly over 1 %. This restrictor is not used if it affects combustion quality or if, as a result of its presence, the combustion products spill outside the device, but it shall be ensured that the sample is representative.

Dimensions in millimetres



Key

a = width in accordance with Table 6

b = length in accordance with Table 6

h ≥ 320 mm

1 copper tube diameter 8 mm

2 restrictor

3 combustion products sampling cross with 16 holes Ø 3

Figure 6 — Sampling device

Table 6 — Examples of dimensions of the sampling device

Value	Dimensions in mm						
a	300	500	580	680	710	630	790
b	500	600	700	680	780	1 140	1 000

8.2 Blocked combustion products outlet

8.2.1 Requirement

The final outlet for combustion products of the oven and/or compartment grill shall be designed so that accidental obstruction by pans placed on the hob is either not possible or does not give rise to a CO concentration in the air-free and dry combustion products as calculated in 8.3, of more than 0,1 % by volume, 15 min after ignition under the following test conditions.

8.2.2 Test

Ovens and grills located below a hob are operated with each of the reference gases at normal pressure.

Pans with a diameter 220 mm according to 5.7, Table 2 are placed flat on the pan support(s) of the hob for every burner that is adjacent to a combustion products outlet

They are then moved as far as possible off-centre from their respective burners in order to cause the maximum obstruction to the flow of combustion products from the oven or grill. The pans shall retain their stability on the pan support(s).

The thermostat of the oven and/or compartment grill is set at full rate or, if there is no thermostat, the tap is set to full rate position.

The hob is not operated.

8.3 Analysis of the combustion products

8.3.1 General

The use of the two calculations in 8.3.2 and 8.3.3 is alternative.

8.3.2 Calculation with CO_2

The volumetric concentration of CO in the air free and dry products (neutral combustion) is given by the Formula (8):

$$CO = (CO)_a \times \frac{(CO_2)_{max}}{(CO_2)_a - (CO_2)_t} \quad (8)$$

where

CO is the calculated volumetric percentage of CO concentration relative to the dry, air-free combustion products;

$(CO_2)_{max}$ is the volumetric percentage of CO_2 calculated for the dry, air-free combustion products;

$(CO)_a$ and $(CO_2)_a$ are the measured volumetric percentage of CO and CO_2 for dry combustion products.

$(CO_2)_t$ is the volumetric percentage of CO_2 in testing room $(CO_2)_t$ is "0" under normal conditions

The % values of $(CO_2)_{max}$ for some test gases are given in Table 7.

Table 7 — Some examples of percentage by volume of $(CO_2)_{max}$ (dry products of neutral combustion)

Designation of gas	G110	G120	G130	G150	G20	G21	G25	G26	G30	G31
% $(CO_2)_{max}$ (neutral combustion)	7,6	8,35	13,7	11,8	11,7	12,2	11,5	11,9	14,0	13,7

For all the tests, the CO is measured using a selective method allowing the detection with an accuracy not exceeding 6 %.

NOTE The use of infra-red absorption analysers is recommended.

8.3.3 Calculation with O_2

The volumetric concentration of CO in the air free and dry products (neutral combustion) is given in Formula 9:

$$CO = (CO)_a \times \frac{(O_2)_t}{(O_2)_t - (O_2)_a} \quad (9)$$

CO	calculated volumetric percentage of CO concentration relative to the dry, air-free combustion products;
$(CO)_a$ and $(O_2)_a$	measured volumetric percentage of CO and O_2 for dry combustion products;
$(O_2)_t$	volumetric percentage of O_2 in testing room $(O_2)_t$ is 21 under normal conditions)

9 Ignition, cross lighting and flame stability

9.1 General

The appliance is supplied with each reference gas according to the corresponding Table in Annex A and installed according to 5.6.

Hot and cold ignition tests with AC supplied systems are performed at a reduced voltage of 0,85 times the lowest nominal voltage.

For battery powered ignition systems, the ignition test shall be performed with 70 % of the nominal battery voltage. The ignition frequency shall be higher than 2 Hz.

9.2 Movement of oven/grill door or cabinet door

9.2.1 Requirement

During the following test there shall be no extinction and no light-back of the flames of all burner types (oven, hob, grill etc.). Complete extinction is allowed when the gas supply to the burner is shut-off by the flame supervision device (FSD) or if there is a permanent ignition device or an automatic re-ignition device and normal operation returns without any manual intervention 4 s after the movement of the door ceases.

9.2.2 Test

Each of the burners is supplied with each reference gas at normal pressure. The burner is ignited and operated until hot conditions (see 5.4) are reached. The test is performed with pans according to 5.7, Tables 1 and 2. Surface grill burners and griddle burners are tested without pans. The control is turned to low rate.

The oven/grill door or the cabinet door is opened and closed, each action in a time of approximately 1 s. The test is performed 5 times in succession, waiting 15 s between each repetition.

10 Accumulation of unburnt gas and leak tightness

10.1 Accumulation of unburnt gas

The appliance shall incorporate means that automatically shuts off the gas supply to prevent a dangerous accumulation of unburnt gas. A flame supervision device (FSD) is mandatory for all burners. It shall control all of the gas supply to the burner. If the gas supply is shut-off by a FSD, manual intervention shall be necessary in order to open the gas supply during ignition.

10.2 Leakage

10.2.1 Requirement

Any leak detected during each of the following two tests shall not exceed 0,1 l/h.

10.2.2 Tests

The test is carried out with air. The inlet pressure of the appliance is adjusted to 15 kPa, except if one of the components cannot withstand that pressure, in this case the appliance shall be tested at 1,5 times the maximum rated pressure of the component. The gas carrying parts of the appliance are tested under the following conditions:

Test No.1

— All taps or shut-off valves are closed.

Test No.2

— All taps and shut-off valves are open, but all injectors are temporarily blocked.

The tests are carried out in delivery conditions and at the end of all the tests to which the appliance is subjected.

10.3 Leak tightness of the appliance

10.3.1 General

The leak tightness of parts and assemblies connected to the gas circuit shall be assured by means of metal-to-metal joints or joints with seals, excluding the use of any product, which ensures leak tightness in the threads. For parts that do not require to be dismantled during normal maintenance or for a change of gas, the use of thread sealing compounds is permitted. Soft soldering shall not be used to ensure leak tightness of the connections of the gas circuit.

NOTE Soft soldering means soldering for which the lowest temperature of the melting range is less than 450 °C

10.3.2 Requirement

Mechanically fastened components, or the threaded parts of the pipework, which are subjected to be dismantled during normal maintenance shall remain sound after 5 disconnections and re-assemblies are carried out.

During the following test there shall be no leakage of any flammable quantity of air/gas mixture at the joints of the assembly.

10.3.3 Test

The appliance is supplied with each of the reference gases that the appliance can use at the corresponding maximum pressure. All burners are ignited and all taps or valves are at full rate.

A suitable means (e.g. a leak detector or a mobile burner) is then used to search for gas leaks from the joints of the assembly. The appliance may be open to have access to the joints of the assembly.

10.4 Spillage of unburnt gas inside the appliance

10.4.1 Requirement

During the following test the maximum unburnt gas concentration in the air inside the appliance shall not exceed 0,025 % by volume.

The concentration of gas in the air shall be determined to an accuracy of 0,005 % of the volume of the sample.

10.4.2 Test

The appliance is supplied with each of the reference gases at the corresponding normal pressure.

Each burner is first tested at its nominal heat input. Then the test is repeated with each burner in low rate, if any.

A detector for combustible gases (e.g. infrared analyser, gas analyser) is used to search for unburnt gas coming from gas carrying parts or e.g. from the air rate adjuster, if any, in the appliance.

The measurement ends as soon as a stable value is achieved.

Care shall be taken to ensure, that the sampling method used, does not affect the flow of gas and air inside the burner. In particular, the sampling probe shall not be placed against the air inlet or burner body.

11 Construction

11.1 General

Sharp borders and edges which could give rise to injury to the user, for example during cleaning and maintenance, shall be avoided.

The appliance shall be easy to clean and for parts that can be removed for cleaning, any incorrect reassembly shall be obvious. Components cleaning and maintenance done by the user according to 14.2 shall be easily possible with common tools.

All components shall be stable and reliable and no sliding or falling is allowed. There shall be no break or deformation affecting the operation of the appliance.

11.2 Materials

11.2.1 General

Materials shall withstand the mechanical, chemical and thermal conditions during normal use and cleaning. Corrosive materials shall be avoided or shall be protected against corrosion in gas-carrying parts.

Materials and parts used in the construction of an appliance, which may come into contact with food or water intended for human consumption, shall not impair the quality of food or water.

Asbestos shall not be used.

The temperature resistance of an injector seat shall be at least 350 °C.

Conformance is checked by verifying the relevant documentation.

11.2.2 Burner material test

11.2.2.1 Requirement

During the following test there shall be no deformation affecting the safe operation of the burner.

11.2.2.2 Test

Burner assembly materials of parts intended to get in touch with flames shall fulfil the following test:

One sample of each burner part which is in contact with the flame at normal use shall be put in an oven for 1 hour at 500 °C for hob and surface grill burners and 1 hour at 700 °C for oven, compartment grill and covered burners.

11.2.3 Sealings

Elastomer sealings shall be according to ISO 23550:2018, 7.5.1.1 and Annex E.

Non-hardening jointing compounds and anaerobic jointing compounds shall be suitable for the application and resistant to the contact with LPG.

11.3 Gas inlet connections

The gas inlet connection shall be located outside of the appliance enclosure.

The gas inlet connection of the appliance shall terminate in a standard pipe thread, a push on hose connector or a quick-action coupling in accordance with the relevant National Standards of the country where the appliance shall be installed.

Examples are given in Annex D.

11.4 Conversion to different gases

Permitted conversion operations for the conversion to a different gas are:

- Replacement of injectors or calibrated orifices;
- Adjustment of the low gas rate;
- Adjustment of the primary air;
- Converting the pressure regulator. If this is not possible, the pressure regulator shall be put out of service (if inside the appliance).

These operations shall be possible without disconnecting the appliance from the supply.

These operations shall be performed according to 14.2.4.6 by a qualified person.

11.5 Pull forces of knobs for manual gas shut-off valves (taps)

11.5.1 Requirement

Knobs for manual gas shut-off valves (taps) shall be fixed in a reliable manner so that they will not work loose in normal use, if loosening could result in a hazard.

Conformance is checked by inspection, by manual test and by trying to remove the part as specified in the following test.

11.5.2 Test

The following axial force is applied to knobs and manual gas shut-off valves (taps):

– 15 N, if an axial pull is unlikely to be applied in normal use;

– 30 N, if an axial pull is likely to be applied in normal use.

The force is applied for 1 min.

11.6 Appliances that enable the user to program the start or the end of the cooking cycle

11.6.1 General

For hob burners, surface grill and griddle burners the programming of a delayed start of the cooking cycle by a timer is prohibited. A delayed stop of the cooking cycle of a hob burner, surface grill and griddle burner, is permitted.

For grill burners in a compartment that have to be operated with the compartment door open, the programming of a delayed start and delayed stop of the cooking cycle by a timer is prohibited.

For ovens, the programming of the delayed start and the delayed stop of the cooking cycle by a timer is permitted.

The timers used shall conform with the requirements of 11.6.2 or 11.6.3.

The appliance shall be so designed and arranged that the programming of the timer is possible either before starting or during the cooking cycle. The programming of the cooking cycle shall be done only by direct manual intervention of the user on the appliance.

The appliance shall be so designed and arranged, that it is always possible for the user to activate manual operated controls to override the programming of the cooking cycle.

Starting of the cooking cycle for oven burners and programming of the end of the cooking cycle for each burner shall be achieved by two independent interventions by the user.

The controls shall be so designed that the burner or burners can be shut-off quickly by means of a single action. At the end of the programmed cooking cycle the burner shall go to shut-off condition.

Fluctuation of the supply voltage by more than 10 % or less than 15 % of the nominal value, including voltage interruption for more than 30 seconds, shall cause the burner to go to shut-off condition or the programmed cooking cycle shall continue to operate correctly and the safe operation of the burner shall not be impaired.

The number of "on/off" operating cycles required for all type of timers shall be minimum 5000.

11.6.2 Electronic timer

The timer shall be of type 2 action and shall be classified as Class B control function according to IEC 60730-1:2013+AMD1:2015+AMD2:2020. It shall be of type 2.U action, according to IEC 60730-2-7:2015.

11.6.3 Electro-mechanical or motorized timer

Electro-mechanical or motorized devices shall be of Type 2.S according to IEC 60730-2-7:2015.

11.7 Compartment for one gas cylinder

The size of the opening of the cylinder compartment shall 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), but only one, specified in the instructions for use and maintenance in accordance with 14.2.2.

In addition, the compartment shall be so designed that:

- effective ventilation is provided by openings at its base and upper part; 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 permanent deformation under the load of a full cylinder; an arrangement with the cylinder resting directly on the ground is not allowed;
- it does not have a sill extending above the level on which the cylinder rests;
- the cylinder fitted with its pressure regulator can easily be inserted in, or removed from, the compartment;
- the cylinder tap is readily accessible and remains easy to manipulate when the cylinder is in place;
- overflow of liquid from pans on the hob does not fall onto the cylinder or its accessories;
- where the appliance is connected by a flexible tube, the latter shall not be in contact with sharp edges. The length of flexible tube necessary for correct connection of the cylinder shall be indicated in the instructions for the installer. It shall not be less than 400 mm. The cylinder connection point shall be easily accessible.

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

It shall not be possible to obstruct the ventilation openings of the compartment when the appliance is placed in position.

11.8 Touch controls

Gas appliances having touch controls shall require at least two manual operations to switch on a burner but only one operation to switch it off. Additional burners may be switched on by a single manual operation. In this case, 1 min after all the burners have been switched off, two manual operations are required to re-ignite a burner.

Two operations that consist of touching two different touch pads but not the same touch pad twice meets the intent of the requirement for two manual operations to switch on a burner.

12 Mechanical strength

12.1 Parts made of glass and glass-ceramic

12.1.1 General

Glass and glass-ceramic parts shall have adequate mechanical strength and be constructed to withstand such rough handling that may be expected in normal use.

12.1.2 Spring hammer test

12.1.2.1 Requirement

During the following test the glass and glass-ceramic shall not fracture.

12.1.2.2 Test

Conformance is checked by applying blows to the outer glass and glass-ceramic parts in accordance with Test E_{hb} of IEC 60068-2-75:2014, the spring hammer test.

Three successive blows, having an impact energy of (0,5 ± 0,04) J, are applied perpendicularly to every point of the surface of all outer glass and glass-ceramic parts that is likely to be weak. The blows are not applied to surfaces within 20 mm from rims (e.g. knobs, burners), edges or facets.

If the appliance has glass doors, three blows are applied to the centre of the glass, the door being in the closed position. If the door has horizontal hinges, the blows are also applied to the inside of the door when it is in the open position. Additional support is not provided for the door in the open position.

For hob surfaces of glass-ceramic or similar material, which comprise more than one single piece of material except for the outer frame, three blows are applied to parts of the surfaces, with an impact energy being increased to (0,70 ± 0,05) J. The blows are not applied to surfaces within 20 mm from rims (e.g. knobs, burners), edges or facets.

12.1.3 Punch test

12.1.3.1 General

Outer glass panels of oven doors and glass in hinged lids of hobs shall be made either from

- glass that breaks into small pieces when it fractures (see 12.1.3.2); or
- glass that is not released or dropped from its normal position when broken (see 12.1.3.3).

Hob glass surfaces that are not glass ceramic shall break into small pieces when fractured (see 12.1.3.2).

12.1.3.2 Toughened glass parts

12.1.3.2.1 Requirement

During the following test, glass parts shall break into small pieces when fractured.

Not later than 5 min following the fracture, the number of crack free particles within the mask is counted and for each assessment it shall not be less than 60.

NOTE Inspection performed without an aid to vision except spectacles if these are normally worn.

12.1.3.2.2 Test

Conformance is checked by the following test.

Frames or other parts attached to the glass panel to be tested are removed and the glass is placed on a rigid horizontal flat surface.

The edges of the sample to be tested are contained within a frame of adhesive tape in such a manner that the broken pieces remain in place after breakage but without hindering expansion of the sample.

The sample under test is broken by means of a test punch having a head with a mass of (75 ± 5) g and a conical tungsten carbide tip with an angle of (60 ± 2) °. The punch shall be positioned approximately 13 mm in from the longest edge of the glass at the midpoint of that edge. The punch is then hit by a hammer so that the glass breaks (see Figure 7).

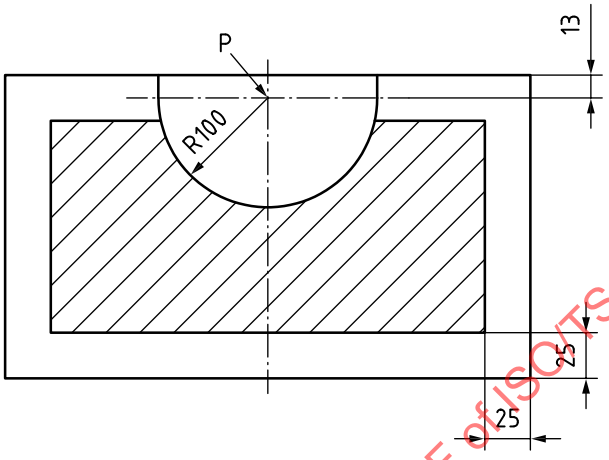
A transparent mask of 50 mm × 50 mm is placed on the fractured glass except within a peripheral margin of 25 mm from the edge of the sample and a semi-circular area having a radius of 100 mm from the point of impact.

The assessment shall be undertaken on at least two areas of the sample, and the areas chosen shall contain the largest particles.

In the case of curved glass, plane pieces of the same material can be used for the test.

NOTE The presentation of a declaration by the glass supplier that the glass used conforms with the relevant requirement of this clause can be accepted.

Dimensions in millimetres



Key

P = point of impact

Figure 7 — Point of impact and area of assessment

12.1.3.3 Glass that is not released or dropped from its normal position when broken

12.1.3.3.1 Requirement

During the following test the glass part shall not be broken or cracked such that pieces are released or dropped from their normal position.

12.1.3.3.2 Test

Conformance is checked by breaking the glass when mounted in its normal position in the appliance by means of a test punch having a head with a mass of (75 ± 5) g and a conical tungsten carbide tip with an angle of (60 ± 2) °. The punch shall be positioned approximately 13 mm from the longest edge of the glass at the midpoint of that edge. The punch is then hit by a hammer so that the glass breaks.

13 Electrical safety

13.1 General

Appliances having electrical components that are not heating elements, shall conform with IEC 60335-2-102:2017.

Gas appliances having electrical heating elements shall conform with IEC 60335-2-6:2014. Additionally, the contribution of these electrical heating elements to the safety of the gas appliance shall be considered when testing the gas appliance according to this document.

13.2 Battery powered appliances

Appliances with DC powered systems shall conform with IEC 60335-1:2020, Annex B, if applicable.

If the voltage decreases to 70 % or less of the rated voltage, safety devices shall function well and appliance shall work as in normal use or the appliance shall fail safe.

14 Marking and instructions

14.1 Marking

14.1.1 Marking on the appliance

14.1.1.1 Data plate

All appliances shall bear in a way which is visible, legible for the installer and indelible at least the following information on one or more data plates and/or labels fixed securely and durably onto the appliance:

- the name of the manufacturer and/or their identification symbol;
- the model designation of the appliance;
- the type of electricity supply (AC/DC) used, where appropriate;
- the type of gas and the pressure and/or pressure couple for which the appliance is adjusted;
- the direct country or countries of destination;
- the sum of the nominal heat input of all burners, expressed in kilowatts based on the gross calorific value and, optionally for liquefied petroleum gas, the total gas rate in grams per hour; if the sum of the nominal heat input is different by more than 3 % between two gas families, all respective values shall be stated. Otherwise, only the value for which the appliance is adjusted shall be given;
- Date of manufacturing (can be encoded);
- Serial number of the appliance.

The following information should be written with the aid of units.

- Rated voltage — in V
- Frequency — in Hz
- Pressure — in kPa
- Country(ies) of destination — according to ISO 3166-1:2020
- Nominal heat input — $\sum Q_n$ in kW and/or for liquefied petroleum gas in g/h
- Electric Power — in kW or W or Rated Current in A

No other information shall be given on the appliance if it is likely to cause confusion regarding the current adjustment setting of the appliance and the direct country or countries of destination.

For example, if it is necessary to adjust the appliance in order to convert it from one pressure to another within a third family pressure couple, only the pressure corresponding to the actual adjustment shall be indicated.

The indelibility of the markings is verified by a test carried out in accordance with IEC 60335-1:2020 7.14.

14.1.1.2 Warning

All appliances shall bear, in a legible manner which may not be permanently fixed and which is visible to the installer and the user, the substance of the following warning, drafted in the official language(s) of the direct country or countries of destination of the appliance.

"This appliance shall be installed in accordance with the regulations in force and only used in a well ventilated space. Read the instructions before installing or using this appliance."

14.1.1.3 Additional marking

For appliances having a gas cylinder compartment, the interior of the compartment door shall bear a label visible, legible for the user and indelible that specifies the dimensions of the cylinder to be used.

The indelibility of the markings is verified by a test carried out in accordance with IEC 60335-1:2020 7.14.

14.1.2 Marking on the packaging

The packaging shall bear at least the following information:

– the type of gas and, if necessary, the pressure and/or pressure couple for which the appliance is adjusted; any reference to pressure shall be identified;

NOTE If it is necessary to adjust the appliance in order to convert it from one pressure to another within a third family pressure couple, only the pressure corresponding to the current adjustment needs to be indicated.

– the direct country or countries of destination of the appliance;

This information shall be written with aid of symbols.

No other information shall be given on the packaging if it is likely to cause confusion regarding the current adjustment setting of the appliance and the direct country or countries of destination.

In addition, the substance of the following warning, drafted in the official language(s) of the country or countries of destination of the appliance, shall be given on the packaging:

"This appliance shall be installed in accordance with the regulations in force and only used in a well-ventilated space. Read the instructions before installing or using this appliance."

14.2 Instructions

14.2.1 General

The appliance shall be accompanied by instructions intended for the installer and by instructions for use and maintenance intended for the user.

These instructions shall contain the address of the manufacturer.

They shall be written in the official language or languages of the country or countries of destination of the appliance and shall be valid for this country or 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 using the symbols of ISO 3166-1:2020.

National accepted terminology may be substituted for the instructions.

NOTE This means all WARNINGS and CAUTIONS include only the substance/content and not the exact wording like it is written in this document

Instructions for countries other than those mentioned on the appliance may be supplied with the appliance on condition that each set of instructions includes the following initial statement: "These instructions are only valid if the country symbol appears on the appliance. If the symbol does not appear on the appliance, it is necessary to refer to the instructions for the installer which shall provide the necessary instructions concerning modification of the appliance to the conditions of use of the country".

If in addition to the information given above, the instructions include information, that the appliance is suitable for use in countries other than those stated on the appliance, they shall include a warning stipulating that modification of the appliance and its method of installation are essential in order to use the appliance safely and correctly in all the additional countries. This warning shall be repeated in the official language(s) of each of these countries. Furthermore, the instructions shall state how to obtain the information, instructions and parts necessary for safe and correct installation in the country concerned.

14.2.2 Instructions for use and maintenance

The instructions for use and maintenance shall warn the user against incorrect use of the appliance. It shall list any applicable restrictions on the use of the appliance resulting from this document. It shall give all necessary information for the appliance to be used safely and sensibly. They shall include in particular:

- indications of the nominal heat input of each of the burners; if the nominal heat input of each of the burners is different between two gas families, the respective values shall be stated;
- explanation of the symbols used on the appliance.
- where appropriate the minimum dimensions of the pans to be used on the various burners of the hob, and, where appropriate, specifications on the use of pans with concave or convex bases;
- information, warning the user against the use of cooking pans on the hob that overlap its edges;
- instructions for the use of the oven. If there is a thermostat, its use shall be detailed. The list and position of each accessory in the oven shall be given. The maximum load to be supported by each tray shall be given;
- the oven volume in litre;
- instructions for use of the compartment grill (in particular the position of accessories); they shall state in particular if the grill is only to be used at its nominal heat input.

In the case of appliances with a cooling fan, the instructions shall include the steps to be taken by the user in the event of a fault with the fan.

When incorrect placement of an accessory in an oven or compartment grill is likely to compromise the safe operation of the appliance, the instructions shall identify it and give details in relation to the marking carried by the accessory.

The instructions for use and maintenance shall state, if the compartment grill is operated with the door open or closed.

If the instructions for use and maintenance instruct the user to use the compartment grill with the door open, the substance of the following warning shall be stated in emphasis (e.g. by colour or underlined):

"**CAUTION:** Accessible parts may be hot when the grill is in use."

When the appliance needs a detachable guard to conform with temperature limits of accidentally touchable surfaces, the instructions for use and maintenance shall contain the substance of the following:

“An additional detachable guard to avoid contact with the oven door is available. This part shall be fitted when young children are likely to be present.”

The reference number of the detachable guard and information on how to obtain it shall be given in the instructions for use and maintenance.

If the appliance incorporates a lamp for illumination, and does not incorporate a switch providing all-pole disconnection, the instructions shall include the substance of the following:

"**WARNING**: Ensure that the appliance is switched off before replacing the lamp to avoid the possibility of electric shock."

The instructions for use for ignition of the burner shall be clearly identified and include the substance of the following caution:

"**CAUTION**: The ignition device shall not be operated for more than 15 s. If after 15 s, the burner has not lit, stop operating the device and open the compartment door and/or wait 1 min before attempting a further ignition of the burner."

This requirement does not apply, if the burner, situated in an oven or grill, can only be ignited with the compartment door open;

Where the burner is not fitted with an automatic re-ignition device, the instructions for use and maintenance shall include the substance of the following:

"**CAUTION**: In the event of the burner flames being accidentally extinguished, turn off the burner control and do not attempt to re-ignite the burner for at least 1 min."

The instructions for use and maintenance shall contain the substance of the following warnings:

"**CAUTION:** This appliance is for cooking purposes only. It must not be used for other purposes, for example room heating."

"**CAUTION:** The use of a gas cooking appliance results in the production of heat, moisture and combustion products in the room in which it is installed. Ensure that the kitchen is well ventilated especially when the appliance is in use. Prolonged intensive use of the appliance may call for additional ventilation, for example opening of a window, or more effective ventilation, for example increasing the level of mechanical ventilation where applicable. Always check instructions for use of the ventilation device because limitations of use together with a gas hob could exist."

The instructions for appliances with battery powered ignition systems shall include the substance of the following:

"**WARNING**: If no ignition occurs within 4 s wait 10 s and try again. If no ignition occurs after 3 unsuccessful ignition attempts the battery has to be checked and replaced, if necessary."

Where applicable, the instructions for use and maintenance shall warn to use only hob guards designed by the manufacturer of the cooking appliance or declared by the manufacturer of the appliance as suitable or hob guards incorporated in the appliance.

"**CAUTION**: The use of inappropriate hob guards can cause accidents. Only use the guards designed by the manufacturer or declared by the manufacturer as suitable; or the guards incorporated in the appliance."

The instructions for hobs with a lid shall state that the hob should be allowed to cool before closing the lid. In addition, they shall state that it has to be ensured that the hob is switched off before closing the lid.

The instructions for hobs shall include the substance of the following:

"**WARNING:** Danger of fire: Do not store items on the hob surface and/or pan supports."

"**CAUTION**: The cooking process has to be supervised. A short-term cooking process has to be supervised continuously."

"**WARNING**: Unattended cooking on a hob with fat or oil can be dangerous and may result in a fire."

For appliances having a gas cylinder compartment, the instructions shall specify the dimensions of cylinders to be used. If necessary, the instructions shall describe the means of assuring a particular path for the flexible tube used for connection.

14.2.3 Instructions for use and maintenance of glass parts

The instructions for ovens having doors with glass panels and the instructions for hobs with glass hinged lids shall include the substance of the following:

"CAUTION: Do not use harsh abrasive cleaners or sharp metal scrapers to clean the oven door glass or the glass of hinged lids of the hob, since they can scratch the surface, which may result in shattering of the glass."

When an appliance is provided with a hob made of glass or glass ceramic, the instructions shall bear the substance of the following:

"WARNING: In case of hob glass breakage or if the surface is cracked:

- shut immediately off all burners and any electrical heating element and isolate the appliance from the power supply to avoid the possibility of electric shock
- do not touch the appliance surface,
- do not use the appliance."

14.2.4 Instructions for the installer

14.2.4.1 General

The instructions intended for the installer shall give all instructions for installation, adjustment and maintenance.

14.2.4.2 Specifications applicable to all appliances

The instructions for the installer shall include the substance of the following warnings:

a) "prior to installation, ensure that the local distribution conditions (nature of the gas and gas pressure) and the adjustment of the appliance are compatible";

b) "the adjustment conditions for this appliance are stated on the label (or data plate)";

c) "this appliance is not connected to a combustion products evacuation device. It shall be installed and connected in accordance with current installation regulations. Particular attention shall be given to the relevant requirements regarding ventilation".

The instructions shall include:

- the nominal heat input for each of the burners, expressed in kilowatts based on the gross calorific value and, optionally in grams per hour for liquefied petroleum gas; if the nominal heat input of each of the burners is different between two gas families, the respective values shall be stated;
- adjustment devices;
- lubrication of taps, where necessary;
- method for verifying correct operation of the burners.

For an appliance that is likely to operate with several gases, these instructions shall also state the operations and adjustments to be carried out when converting from one gas to another. It shall give, for each of the interchangeable injectors and calibrated orifices, the markings for each gas and pressures that are allowed to be used.

For appliances intended to operate exclusively with the factory-fitted injector, the instructions shall where necessary, give information concerning the use of products for making pressure-tight joints on the thread in the event of the injectors concerned being dismantled.

These instructions shall also give precise indications for connecting the appliance to the gas and a reference to the installation regulations in force in the country in which the appliance is to be used. In particular, the instructions shall specify the type, length and position of any flexible hose used for supplying gas and details for the fitting of gas connection devices.

If, when tested according to 7.3, the temperature rises above the ambient temperature of a part of the appliance likely to be in contact with the non-metallic flexible tube exceeds 45 K, the maximum temperature shall be stated and a label shall be fixed adjacent to the gas inlet connection stating that an appropriate connecting tube shall be used in accordance with the corresponding national installation regulations.

If the appliance is connected to an electrical supply, the instructions shall include a wiring diagram (for connection purposes) unless the appliance is equipped with a connection cord fitted with a plug.

14.2.4.3 Particular specifications for built-in appliances

The instructions for the installer shall give all necessary information for building-in and fixing the appliance, and in particular:

- for all appliances concerned, information giving the minimum dimensions of the space in which the appliance is to be installed;
- precise instructions that are to be observed for the evacuation of combustion products, and for ventilation when flueing and ventilation components are not supplied with the appliance, or where they are supplied but not fitted to the appliance;
- in the case of an appliance incorporating a hob, information on the minimum distances from each adjacent wall above the level of the hob:
    - o the minimum vertical distance above the hob of 650 mm is measured from the plane of the pan supports; a greater distance can be defined by the manufacturer.
    - o the minimum horizontal distances are measured from the vertical planes passing through the edges of the hob;
- in the case of appliances with an oven, information stating that the unit housing of the appliance shall be appropriately fixed;
- in the case of built-in hobs, where the instructions specify that a horizontal separation shall be included below the base of the hob, the critical dimensions of this separation shall be given. In addition, the minimum distance between this separation and the underneath of the worktop shall be stated.

Also, where the use of a flexible tube is specified, the instructions shall state that the flexible tube shall be fitted in such a way that it cannot come into contact with a moveable part of the cabinet (e.g. a drawer) and does not pass through any space susceptible of becoming congested.

14.2.4.4 Particular specifications for free-standing appliances

The instructions for the installer shall state the minimum vertical distance of 650 mm between the plane of the pan support of the hob and adjacent horizontal walls or a range hood located above it. A greater distance can be defined by the manufacturer.

All horizontal distances as given in 5.6.3, Figure 3 are measured from the vertical plane which coincides with that of the side of the appliance.

For free-standing appliances, these stated minimum distances shall not exceed 20 mm for walls adjacent to the sides which are:

– below the hob, excluding the plane of the pan supports, or

– below the shut-down lid in its closed position, for appliances fitted with a shut-down lid and designed so that the lid is at the same level as the work top of adjacent units, or

– below the height of the appliance in the case of freestanding ovens.

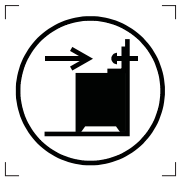
The instructions shall also give information concerning the fixing of the appliance, where this is specified in the instructions or required by the installation regulations in force in the country or countries in which the appliance is intended to be used.

14.2.4.5 Stabilizing means for freestanding appliances

For freestanding appliances that are normally placed on the floor and that have horizontally hinged oven doors with a hinge height of less than 430 mm from the floor, if a stabilizing means is necessary in order to conform with the test of ISO 21364-22:2021, 12.4, then

– the stabilising means shall be marked with [Symbol IEC 60417-6060 (2011-05)] or in lettering at least 3 mm high, with the substance of the following:

"WARNING In order to prevent tilting of the appliance, this stabilising means must be installed. Refer to the instructions for the installer."



[symbol IEC 60417-6060 (2011-05)] Anti-tip restraints

NOTE Commonly available fixing hardware, such as screws and bolts or brackets, need not be marked or delivered with the appliance.

– the appliance shall be marked with [Symbol IEC 60417-6059 (2011-05)] or in lettering at least 3 mm high, at the point of gas supply and at least one other point to draw the attention of the user to the need to stabilise the appliance.

[symbol IEC 60417-6059 (2011-05)] Caution, possibility of tilting

If [symbol IEC 60417-6059 (2011-05)] or [IEC 60417-6060 (2011-05)] are used, their meaning shall be explained in the instructions for use and maintenance and in the instructions for the installer. Their height shall be at least 30 mm.

14.2.4.6 Instructions for conversion to other gases

On delivery of parts intended for conversion to another type of gas or to another pressure, adequate and clear instructions for changing the parts and also for cleaning, adjustment and control of the appliance, shall be given.

After conversion of the appliance to another type of gas or to another pressure than that for which it was previously adjusted, information on the new adjustment shall be given in place of the previous information, so as to permit unambiguous identification of the state of the appliance after modification.

If, in order to conform with this requirement, a new plate or label is required, this shall be supplied with the conversion parts and it shall conform with the requirements of legibility and durability in 14.1.1.1.

Where appropriate, instructions written in the official language or languages of the country or countries of destination corresponding to the new adjustment state of the appliance shall be supplied.

Annex A
(normative)

Table of test gases

A.1 General

The tabled values are measured and expressed at 15°C and 101,325 kPa unless otherwise specified.

Reference condition values can be converted from one condition to another according to ISO 13443:1996.

NOTE 1 Attention is drawn to national legislation

NOTE 2 This is not an exhaustive list of all countries

A.1.1 Germany

Table A.1.1 — Test gases for Germany

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
Natural gas							
Group E	**Reference gas**	**G20**	CH_4 = 100	37,78	50,72	0,555	1,7 – 2,0 – 2,5
	Limit gases						
	incomplete combustion	G21	CH_4 = 87 C_3H_8 = 13	45,28	54,69	0,684	1,7 – 2,0 – 2,5
	light back	G222	CH_4 = 77 H_2 = 23	31,86	47,87	0,443	1,7 – 2,0 – 2,5
	sooting	G21	CH_4 = 87 C_3H_8 = 13	45,28	54,69	0,684	1,7 – 2,0 – 2,5
	flame lift	G231	CH_4 = 85 N_2 = 15	32,11	40,90	0,617	1,7 – 2,0 – 2,5
Group LL	**Reference gas**	**G 25**	CH_4 = 86 N_2 = 14	32,49	41,52	0,612	1,8 – 2,0 – 2,5
	light back limit gas	**G 25**	CH_4 = 86 N_2 = 14	32,49	41,52	0,612	1,8 – 2,0 – 2,5
	incomplete combustion	G 26	CH_4 = 80 C_3H_8 = 7 N_2 = 13	36,91	44,83	0,678	1,8 – 2,0 – 2,5
	sooting limit gas	G 26	CH_4 = 80 C_3H_8 = 7 N_2 = 13	36,91	44,83	0,678	1,8 – 2,0 – 2,5

Table A.1.1 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
	Flame lift limit gas	G 271	CH_4= 74 N_2= 26	27,96	34,36	0.622	1,8 – 2,0 – 2,5
LPG							
Group B/P	**Reference gas**	**G30**	n-C4H10 = 50 i-C4H10 = 50	125,81	87,33	2,075	4,25 – 5,0 – 5,75
	Limit gases						
	incomplete combustion	G30	$n\text{-}C_4H_{10}$ = 50 $i\text{-}C_4H_{10}$ = 50	125,81	87,33	2,075	4,25 – 5,0 – 5,75
	sooting	G30	$n\text{-}C_4H_{10}$ = 50 $i\text{-}C_4H_{10}$ = 50	125,81	87,33	2,075	4,25 – 5,0 – 5,75
	light back	G32	C_3H_6 = 100	88,52	72,86	1,476	4,25 – 5,0 – 5,75
	flame lift	G31	C_3H_8 = 100	95,65	76,84	1,550	4,25 – 5,0 – 5,75
Group P	**Reference gas**	**G31**	C_3H_8 = 100	95,65	76,84	1,550	4,25 – 5,0–5,75
	incomplete combustion gas	**G31**	C_3H_8 = 100	95,65	76,84	1,550	4,25 – 5,0–5,75
	flame lift gas	**G31**	C_3H_8 = 100	95,65	76,84	1,550	4,25 – 5,0–5,75
	sooting gas	**G31**	C_3H_8 = 100	95,65	76,84	1,550	4,25 – 5,0–5,75
	lightback gas	G 32	C_3H_6 = 100	88,52	72,86	1,476	4,25 – 5,0 – 5,75
	sooting gas	G 32	C_3H_6 = 100	88,52	72,86	1,476	4,25 – 5,0 – 5,75

A.1.2 France

Table A.1.2 — Test gases for France

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
Natural gas							
Group E+	**Reference gases**	G20	CH_4 = 100	37,78	50,72	0,555	1,7 – 2,0 – 2,5
	Limit gases						
	incomplete combustion	G21	CH_4 = 87 C_3H_8 = 13	45,28	54,69	0,684	1,7 – 2,0 – 2,5

Table A.1.2 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
	light back	G222	CH_4 = 77 H_2 = 23	31,86	47,87	0,443	1,7 – 2,0 – 2,5
	sooting	G21	CH_4 = 87 C_3H_8 = 13	45,28	54,69	0,684	1,7 – 2,0 – 2,5
	flame lift	G231	CH_4 = 85 N_2 = 15	32,11	40,90	0,617	1,7 – 2,5 – 3
Town gas (not used in France)							
LPG	**Reference gases**	G30	n-C4H10 = 50 i-C4H10 = 50	125,81	87,33	2,075	2 – 2,9 – 3,5
Group 3+	**Limit gases**						
	incomplete combustion	G30	n-C4H10 = 50 i-C4H10 = 50	125,81	87,33	2,075	2 – 2,9 – 3,5
	light back	G32	C3H6 = 100	88,52	72,86	1,476	2,5 – 3,7 – 4,5
	sooting	G30	n-C4H10 = 50 i-C4H10 = 50	125,81	87,33	2,075	2 – 2,9 – 3,5
	flame lift	G31	C3H8 = 100	95,65	76,84	1,550	2,5 – 3,7 – 4,5

A.1.3 Netherlands

Table A.1.3 — Test gases for Netherlands

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
Natural gas							
Group E	**Reference gas**	**G20**	CH_4 = 100	37,87	50,72	0,555	1,7 – 2,0 – 2,5
	Limit gases						
	incomplete combustion	G21	CH_4 = 87 C_3H_8 = 13	45,28	54,69	0,684	1,7 – 2,0 – 2,5
	light back	G222	CH_4 = 77 H_2 = 23	31,86	47,87	0,443	1,7 – 2,0 – 2,5
	sooting	G21	CH_4 = 87 C_3H_8 = 13	45,28	54,69	0,684	1,7 – 2,0 – 2,5

Table A.1.3 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
	flame lift	G231	CH_4 = 85 N_2 = 15	32,11	40,90	0,617	1,7 – 2,0 – 2,5
Group K	**Reference gas**	**G25.3**	CH_4 = 88 N_2 = 12	33,2	42,71	0,604	2,0 – 2,5 – 3,0
	Limit gases (set 1)						
	Sooting & incomplete combustion	G26.3	CH_4 = 64 C_2H_6 = 22 N_2 = 14	38,73	45,65	0,72	2,0 – 2,5 – 3,0
	Flame lift type A	G27.3A	CH_4 = 84 CO_2 = 16	31,72	37,65	0,71	2,0 – 2,5 – 3,0
	Flame lift type B	G27.3B	CH_4 = 95,5 CO_2 = 4,5	36,05	46,6	0,598	2,0 – 2,5 – 3,0
	Light back type A	G28.3A	CH_4 = 60 C_2H_6 = 17 N_2 = 13 H_2 = 10	35,1	43,79	0,643	2,0 – 2,5 – 3,0
	Light back type B	G28.3B	CH_4 = 50 C_2H_6 = 17 N_2 = 23 H_2 = 10	31,32	37,87	0,684	2,0 – 2,5 – 3,0
	Limit gases (set 2)						
	Sooting & incomplete combustion	G26.4	CH_4 = 75 C_3H_8 = 11 N_2 = 14	38,67	45,58	0,72	2,0 – 2,5 – 3,0
	Flame lift type A	G27.4A	CH_4 = 78 N_2 = 22	29,42	36,62	0,65	2,0 – 2,5 – 3,0
	Flame lift type B	G27.4B	CH_4 = 95 N_2 = 5	35,85	47,26	0,58	2,0 – 2,5 – 3,0
	Light back type A	G28.4A	CH_4 = 67 C_2H_6 = 10 N_2 = 13 H_2 = 10	35,9	44,29	0,66	2,0 – 2,5 – 3,0
	Light back type B	G28.4B	CH_4 = 68 N_2 = 12 H_2 = 20	28,06	39,41	0,51	2,0 – 2,5 – 3,0

Table A.1.3 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
Group B/P	Reference gas	G30	n-C4H10 = 50 i-C4H10 = 50	125,81	87,33	2,075	2,5 – 2,9 – 3,5
	Limit gases						
	incomplete combustion	G30	n-C4H10 = 50 i-C4H10 = 50	125,81	87,33	2,075	2,5 – 2,9 – 3,5
	sooting	G30	n-C4H10 = 50 i-C4H10 = 50	125,81	87,33	2,075	2,5 – 2,9 – 3,5
	light back	G32	C3H6 = 100	88,52	72,86	1,476	2,5 – 2,9 – 3,5
	flame lift	G31	C3H8 = 100	95,65	76,84	1,550	2,5 – 2,9 – 3,5
Group P	Reference gas	G31	C3H8 = 100	95,65	76,84	1,550	2,5 – 2,9 – 3,5
	Limit gases						
	incomplete combustion gas	G31	C3H8 = 100	95,65	76,84	1,550	2,5 – 2,9 – 3,5
	flame lift gas	G31	C3H8 = 100	95,65	76,84	1,550	2,5 – 2,9 – 3,5
	sooting gas	G31	C3H8 = 100	95,65	76,84	1,550	2,5 – 2,9 – 3,5
	lightback gas	G 32	C3H6 = 100	88,52	72,86	1,476	2,5 – 2,9 – 3,5
	sooting gas	G 32	C3H6 = 100	88,52	72,86	1,476	2,5 – 2,9 – 3,5
Application of the test gases shall be in accordance with the EN 437:2018 or later versions and NTA 8837:2012 or later versions.							

A.1.4 Spain

Table A.1.4 — Test gases for Spain

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
Natural gas							
Group H	**Reference gases**	G20	CH_4 = 100	37,78	50,72	0,555	1,7 – 2,0 – 2,5
	Limit gases						
	incomplete combustion	G21	CH_4 = 87 C_3H_8 = 13	45,28	54,69	0,684	1,7 – 2,0 – 2,5
	light back	G222	CH_4 = 77 H_2 = 23	31,86	47,87	0,443	1,7 – 2,0 – 2,5
	sooting	G21	CH_4 = 87 C_3H_8 = 13	45,28	54,69	0,684	1,7 – 2,0 – 2,5
	flame lift	G23	CH_4 = 92,5 N_2 = 7,5	34,95	45,66	0,586	1,7 – 2,0 – 2,5

Table A.1.4 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
LPG 3+	**Reference gases**	G30	$n\text{-}C_4H_{10}$ = 50 $i\text{-}C_4H_{10}$ = 50	125,81	87,33	2,075	2 – 2,9 – 3,5
	Limit gases						
	incomplete combustion	G30	$n\text{-}C_4H_{10}$ = 50 $i\text{-}C_4H_{10}$ = 50	125,81	87,33	2,075	2 – 2,9 – 3,5
	light back	G32	C_3H_6 = 100	88,52	72,86	1,476	2,5 – 3,7 – 4,5
	sooting	G30	$n\text{-}C_4H_{10}$ = 50 $i\text{-}C_4H_{10}$ = 50	125,81	87,33	2,075	2 – 2,9 – 3,5
	flame lift	G31	C_3H_8 = 100	95,65	76,84	1,550	2,5 – 3,7 – 4,5
LPG 3P	**Reference gases**	G31	C_3H_8 = 100	95,65	76,84	1,550	2,5 – 3,7 – 4,5
	Limit gases						
	incomplete combustion	G31	C_3H_8 = 100	95,65	76,84	1,550	2,5 – 3,7 – 4,5
	light back	G32	C_3H_6 = 100	88,52	72,86	1,476	2,5 – 3,7 – 4,5
	sooting	G31 G32	C_3H_8 = 100 C_3H_6 = 100	95,65 88,52	76,84 72,86	1,550 1,476	2,5 – 3,7 – 4,5
	flame lift	G31	C_3H_8 = 100	95,65	76,84	1,550	2,5 – 3,7 – 4,5

A.1.5 Portugal

Table A.1.5 — Test gases for Portugal

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
Natural gas							
Group H	**Reference gases**	G20	CH_4 = 100	37,78	50,72	0,555	1,7 – 2,0 – 2,5
	Limit gases						
	incomplete combustion	G21	CH_4 = 87 C_3H_8 = 13	45,28	54,69	0,684	1,7 – 2,0 – 2,5
	light back	G222	CH_4 = 77 H_2 = 23	31,86	47,87	0,443	1,7 – 2,0 – 2,5

Table A.1.5 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
	sooting	G21	CH_4 = 87 C_3H_8 = 13	45,28	54,69	0,684	1,7 – 2,0 – 2,5
	flame lift	G23	CH_4 = 92,5 N_2 = 7,5	34,95	45,66	0,586	1,7 – 2,0 – 2,5
LPG 3+	**Reference gases**	G30	n-C_4H_{10} = 50 i-C_4H_{10} = 50	125,81	87,33	2,075	2 – 2,9 – 3,5
	Limit gases						
	incomplete combustion	G30	n-C_4H_{10} = 50 i-C_4H_{10} = 50	125,81	87,33	2,075	2 – 2,9 – 3,5
	light back	G32	C_3H_6 = 100	88,52	72,86	1,476	2,5 – 3,7 – 4,5
	sooting	G30	n-C_4H_{10} = 50 i-C_4H_{10} = 50	125,81	87,33	2,075	2 – 2,9 – 3,5
	flame lift	G31	C_3H_8 = 100	95,65	76,84	1,550	2,5 – 3,7 – 4,5

A.1.6 Slovenia

Table A.1.6 — Test gases for Slovenia

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
Natural gas							
Group H	**Reference gases**	**G20**	CH4 = 100	37,78	50,72	0,555	1,7 – 2,0 – 2,5
	Limit gases						
	incomplete combustion	**G21**	CH4 = 87 C3H8 = 13	45,28	54,76	0,684	1,7 – 2,0 – 2,5
	light back	G222	CH4 = 77 H2 = 23	31,86	47,87	0,443	1,7 – 2,0 – 2,5
	sooting	G21	CH4 = 87 C3H8 = 13	45,28	54,76	0,684	1,7 – 2,0 – 2,5
	flame lift	G23	CH4 = 92,5 N2 = 7,5	34,95	45,66	0,586	1,7 – 2,0 – 2,5
* Appliances of this category may be used without adjustment at the specified supply pressures of 28 mbar to 30 mbar (EN 437).							

Table A.1.6 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition	H_s	W_s	Relative density d	Test pressures P_{min} - P_n - P_{max}
			%	[MJ/m³]	[MJ/m³]		[kPa]
LPG							
Group B/P	**Reference gases**	**G30**	n-C4H10 = 50 i-C4H10 = 50	125,81	87,33	2,075	2,5 – (2,9*) – 3,5
	Limit gases						
	incomplete combustion	G30	n-C4H10 = 50 i-C4H10 = 50	125,81	87,33	2,075	2,5 – (2,9*) – 3,5
	light back	G32	C_3H_6 = 100	88,52	72,86	1,476	2,5 – (2,9*) – 3,5
	sooting	G30	n-C4H10 = 50 i-C4H10 = 50	125,81	87,33	2,075	2,5 – (2,9*) – 3,5
	flame lift	G31	C_3H_8 = 100	95,65	76,84	1,550	2,5 – (2,9*) – 3,5
* Appliances of this category may be used without adjustment at the specified supply pressures of 28 mbar to 30 mbar (EN 437).							
LPG							
Group 3P	**Reference gases**	**G31**	C_3H_8 = 100	95,65	76,84	1,550	2,5 – 3,7 – 4,5
	Limit gases						
	incomplete combustion	G31	C_3H_8 = 100	95,65	76,84	1,550	2,5 – 3,7 – 4,5
	light back	G32	C_3H_6 = 100	88,52	72,86	1,476	2,5 – 3,7 – 4,5
	sooting	G31 G32	C_3H_8 = 100 C_3H_6 = 100	95,65 88,52	76,84 72,86	1,550 1,476	2,5 – 3,7 – 4,5
	flame lift	G31	C_3H_8 = 100	95,65	76,84	1,550	2,5 – 3,7 – 4,5
LPG							
Group 3+	**Reference gases**	**G30**	n-C4H10 = 50 i-C4H10 = 50	125,81	87,33	2,075	2,0 – (2,9*) – 3,5
	Limit gases						
	incomplete combustion	G30	n-C4H10 = 50 i-C4H10 = 50	125,81	87,33	2,075	2,0 – (2,9*) – 3,5
	light back	G32	C3H6 = 100	88,52	72,86	1,476	2,5 – 3,7 – 4,5
	sooting	G30	n-C4H10 = 50 i-C4H10 = 50	125,81	87,33	2,075	2,0 – (2,9*) – 3,5
	flame lift	G31	C3H8 = 100	95,65	76,84	1,550	2,5 – 3,7 – 4,5
* Appliances of this category may be used without adjustment at the specified supply pressures of 28 mbar to 30 mbar (EN 437).							

A.1.7 Canada/USA

Reference condition: 30” HG and 60 F (101,592 kPa and 15,556 °C)

Table A.1.7 — Test gases for Canada/USA

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
Natural Gas							
	Reference gas	Gas A (Natural)	CH_4 = 100	40,1	49,7	0,650	0,87 – 1,74 – 2,61
	limit gas	Gas G (Butane-Air)	C_4H_{10} N_2, O_2	52,2	43,8	1,42	0,87 – 1,74 – 2,61
LP-Gas							
	Reference gas	Gas E (Propane)	C_3H_8 = 100	93,1	74,8	1,55	1,99 – 2,74 – 3,23
	Reference gas	Gas D (Butane)	C_4H_{10} = 100	119,2	84,3	2,00	1,99 – 2,74 – 3,23
LPG-Air Mixture							
	Reference gas	Gas F (Propane-Air)	C_3H_8 N_2, O_2	26,1	24,2	1,16	0,75 – 1,49 – 2,24
	Reference gas	Gas H (Propane-Air)	C_3H_8 N_2, O_2	52,2	45,8	1,30	0,75 – 1,49 – 2,24
Mfd. Gas							
	Reference gas	Gas B (Mfd.)	a. H_2 = 50% CH_4 = 35% CO = 10% C_2H_4 = 5%	19,9	32,3	0,38	0,75 – 1,49 – 2,24
Mixed Gas							
	Reference gas	Gas C (Mixed)	Not specified	29,8	42,1	0,5	0,75 – 1,49 – 2,24

A.1.8 China

Table A.1.8 — Test gases for China

Gas families	Test gases (reference gases and limit gases)	Designation	Composition	H_s	W_s	Relative density d	Test pressures P_{min} - P_n - P_{max}
			%	[MJ/m³]	[MJ/m³]		[kPa]
Manufactured gas							

Table A.1.8 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition	H_s	W_s	Relative density d	Test pressures P_{min} - P_n - P_{max}
			%	[MJ/m³]	[MJ/m³]		[kPa]
3R	**Reference gases**	3R-0	CH_4 = 9 H_2= 51 N_2 = 40	9,57	13,92	0,472	0,5– 1,0 – 1,5
	Limit gases						
	incomplete combustion	3R-1	CH_4 = 13 H_2= 46 N_2 = 41	10,48	14,81	0,500	0,5– 1,0 – 1,5
	light back	3R-2	CH_4 = 7 H_2= 55 N_2 = 38	9,30	13,94	0,445	0,5– 1,0 – 1,5
	Sooting	3R-1	CH_4 = 13 H_2= 46 N_2 = 41	10,48	14,81	0,500	0,5– 1,0 – 1,5
	flame lift	3R-3	CH_4 = 16 H_2= 32 N_2 = 52	9,92	12,65	0,614	0,5– 1,0 – 1,5
4R	**Reference gases**	4R-0	CH_4 =8 H_2=63 N_2 = 29	10,64	17,53	0,369	0,5– 1,0 – 1,5
	Limit gases						
	incomplete combustion	4R-1	CH_4 = 13 H_2=58 N_2 =29	11,93	19,03	0,393	0,5– 1,0 – 1,5
	light back	4R-2	CH_4 = 6 H_2=67 N_2 =27	10,37	17,76	0,341	0,5– 1,0 – 1,5
	Sooting	4R-1	CH_4 = 13 H_2=58 N_2 =29	11,93	19,03	0,393	0,5– 1,0 – 1,5
	flame lift	4R-3	CH_4 = 18 H_2=41 N_2 =41	11,76	16,23	0,525	0,5– 1,0 – 1,5
5R	**Reference gases**	5R-0	CH_4 = 19 H_2=54 N_2 =27	13,71	21,57	0,404	0,5– 1,0 – 1,5
	Limit gases						

Table A.1.8 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition	H_s	W_s	Relative density d	Test pressures P_{min} - P_n - P_{max}
			%	[MJ/m³]	[MJ/m³]		[kPa]
	incomplete combustion	5R-1	CH_4 =25 H_2=48 N_2 =27	15,25	23,17	0,433	0,5– 1,0 – 1,5
	light back	5R-2	CH_4 =18 H_2=55 N_2 =27	13,45	21,29	0,399	0,5– 1,0 – 1,5
	Sooting	5R-1	CH_4 =25 H_2=48 N_2 =27	15,25	23,17	0,433	0,5– 1,0 – 1,5
	flame lift	5R-3	CH_4 =29 H_2=32 N_2 =39	14,83	19,81	0,560	0,5– 1,0 – 1,5
6R	**Reference gases**	6R-0	CH_4 = 22 H_2=58 N_2 =20	15,33	25,70	0,356	0,5– 1,0 – 1,5
	Limit gases						
	incomplete combustion	6R-1	CH_4 =29 H_2=52 N_2 =19	17,25	27,95	0,381	0,5– 1,0 – 1,5
	light back	6R-2	CH_4 =22 H_2=59 N_2 =19	15,45	26,23	0,347	0,5– 1,0 – 1,5
	Sooting	6R-1	CH_4 =29 H_2=52 N_2 =19	17,25	27,95	0,381	0,5– 1,0 – 1,5
	flame lift	6R-3	CH_4 = 34 H_2=35 N_2 =31	17,08	23,85	0,513	0,5– 1,0 – 1,5
7R	**Reference gases**	7R-0	CH_4 = 27 H_2=60 N_2 =13	17,46	31,00	0,317	0,5– 1,0 – 1,5
	Limit gases						
	incomplete combustion	7R-1	CH_4 =34 H_2=54 N_2 =12	19,38	33,12	0,342	0,5– 1,0 – 1,5
	light back	7R-2	CH_4 =25 H_2=63 N_2 =12	17,07	31,23	0,299	0,5– 1,0 – 1,5

Table A.1.8 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition	H_s	W_s	Relative density d	Test pressures P_{min} - P_n - P_{max}
			%	[MJ/m³]	[MJ/m³]		[kPa]
	Sooting	7R-1	CH_4 =34 H_2=54 N_2 =12	19,38	33,12	0,342	0,5– 1,0 – 1,5
	flame lift	7R-3	CH_4 = 40 H_2=37 N_2 =23	19,59	28,57	0,470	0,5– 1,0 – 1,5
Natural gas							
3T	**Reference gases**	3T-0	CH_4 = 32,5 Air=67,5	12,28	13,30	0,853	0,5– 1,0 – 1,5
	Limit gases						
	incomplete combustion	3T-1	CH_4 = 35 Air=65	13,22	14,41	0,842	0,5– 1,0 – 1,5
	light back	3T-2	CH_4 = 16 H_2=34 N_2 =50	10,16	13,16	0,596	0,5– 1,0 – 1,5
	Sooting	3T-1	CH_4 = 35 Air=65	13,22	14,41	0,842	0,5– 1,0 – 1,5
	flame lift	3T-3	CH_4 = 30,5 Air=69,5	11,52	12,42	0,862	0,5– 1,0 – 1,5
4T	**Reference gases**	4T-0	CH_4 = 41 Air=59	15,49	17,16	0,815	0,5– 1,0 – 1,5
	Limit gases						
	incomplete combustion	4T-1	CH_4 =44 Air=56	16,62	18,56	0,802	0,5– 1,0 – 1,5
	light back	4T-2	CH_4 =22 H_2=36 N_2 =42	12,67	17,03	0,553	0,5– 1,0 – 1,5
	Sooting	4T-1	CH_4 =44 Air=56	16,62	18,56	0,802	0,5– 1,0 – 1,5
	flame lift	4T-3	CH_4 =38 air=62	14,36	15,77	0,828	0,5– 1,0 – 1,5
10T	**Reference gases**	10T-0	CH_4 = 86 N_2 =14	32,49	41,52	0,613	1,0– 2,0 – 3,0
	Limit gases						
	incomplete combustion	10T-1	CH_4 = 80 C_3H_8 =7 N_2 =13	36,92	44,84	0,678	1,0– 2,0 – 3,0

Table A.1.8 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition	H_s	W_s	Relative density d	Test pressures P_{min} - P_n - P_{max}
			%	[MJ/m³]	[MJ/m³]		[kPa]
	light back	10T-2	CH_4 =70 H_2=19 N_2 =11	28,75	40,33	0,508	1,0– 2,0 – 3,0
	Sooting	10T-1	CH_4 = 80 C_3H_8 =7 N_2 =13	36,92	44,84	0,678	1,0– 2,0 – 3,0
	flame lift	10T-3	CH_4 =82 N_2 =18	30,98	39,06	0,629	1,0– 2,0 – 3,0
12T	**Reference gases**	12T-0	CH_4 = 100	37,78	50,72	0,555	1,0– 2,0 – 3,0
	Limit gases						
	incomplete combustion	12T-1	CH_4 = 87 C_3H_8 =13	45,30	54,77	0,684	1,0– 2,0 – 3,0
	light back	12T-2	CH_4 = 77 H_2=23	31,87	47,88	0,443	1,0– 2,0 – 3,0
	Sooting	12T-1	CH_4 = 87 C_3H_8 =13	45,30	54,77	0,684	1,0– 2,0 – 3,0
	flame lift	12T-3	CH_4 = 92,5 N_2 =7,5	34,95	45,66	0,586	1,0– 2,0 – 3,0
LPG							
19Y	**Reference gases**	19Y-0	C_3H_8 =100	95,65	76,84	1,550	2,0 – 2,8 – 3,3
	Limit gases						
	incomplete combustion	19Y-1	C_4H_{10} =100	125,81	87,33	2,076	2,0 – 2,8 – 3,3
	light back	19Y-2	C_3H_6 =100	88,52	72,86	1,476	2,0 – 2,8 – 3,3
	Sooting	19Y-1	C_4H_{10} =100	125,81	87,33	2,076	2,0 – 2,8 – 3,3
	flame lift	19Y-3	C_3H_8 =100	95,65	76,84	1,550	2,0 – 2,8 – 3,3
22Y	**Reference gases**	22Y-0	C_4H_{10} =100	125,81	87,33	2,076	2,0 – 2,8 – 3,3
	Limit gases						
	incomplete combustion	22Y-1	C_4H_{10} =100	125,81	87,33	2,076	2,0 – 2,8 – 3,3
	light back	22Y-2	C_3H_6 =100	88,52	72,86	1,476	2,0 – 2,8 – 3,3
	Sooting	22Y-1	C_4H_{10} =100	125,81	87,33	2,076	2,0 – 2,8 – 3,3

Table A.1.8 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition	H_s	W_s	Relative density d	Test pressures P_{min} - P_n - P_{max}
			%	[MJ/m³]	[MJ/m³]		[kPa]
	flame lift	22Y-3	C_3H_8 =100	95,65	76,84	1,550	2,0 – 2,8 – 3,3
20Y	**Reference gases**	20Y-0	C_3H_8 =75 C_4H_{10} =25	103,19	79,59	1,682	2,0 – 2,8 – 3,3
	Limit gases						
	incomplete combustion	20Y-1	C_4H_{10} =100	125,81	87,33	2,076	2,0 – 2,8 – 3,3
	light back	20Y-2	C_3H_6 =100	88,52	72,86	1,476	2,0 – 2,8 – 3,3
	Sooting	20Y-1	C_4H_{10} =100	125,81	87,33	2,076	2,0 – 2,8 – 3,3
	flame lift	20Y-3	C_3H_8 =100	95,65	76,84	1,550	2,0 – 2,8 – 3,3
LPG-Air Mixture							
12YK	**Reference gases**	12YK-0	LPG=58 Air=42	59,85	50,70	1,393	1,0– 2,0 – 3,0
	Limit gases						
	incomplete combustion	12YK-1	C_4H_{10}=58 Air=42	72,97	57,29	1,622	1,0– 2,0 – 3,0
	light back	12YK-2	LPG=48 Air=42 H2=10	50,74	45,71	1,232	1,0– 2,0 – 3,0
	Sooting	12YK-1	C_4H_{10}=58 Air=42	72,97	57,29	1,622	1,0– 2,0 – 3,0
	flame lift	12YK-3	C_3H_8=55 Air=40 N2=5	52,61	46,16	1,299	1,0– 2,0 – 3,0
Dimethyl ether							
12E	**Reference gases**	12E-0	CH_3OCH_3=100	59,87	47,45	1,592	1,0– 2,0 – 3,0
	Limit gases						
	incomplete combustion	12E-1	CH_3OCH_3=87 C_3H_8=13	64,52	51,23	1,587	1,0– 2,0 – 3,0
	light back	12E-2	CH_3OCH_3=77 H_2=23	48,88	43,86	1,242	1,0– 2,0 – 3,0
	Sooting	12E-1	CH_3OCH_3=87 C_3H_8=13	64,52	51,23	1,587	1,0– 2,0 – 3,0

Table A.1.8 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition	H_s	W_s	Relative density d	Test pressures P_{min} - P_n - P_{max}
			%	[MJ/m³]	[MJ/m³]		[kPa]
	flame lift	12E-3	CH_3OCH_3=92,5 N_2=7,5	55,38	44,55	1,545	1,0– 2,0 – 3,0
Biogas							
6Z	**Reference gases**	6Z-0	CH4=53 N2=47	20,02	23,14	0,749	0,8 – 1,6 – 2,4
	Limit gases						
	incomplete combustion	6Z-1	CH4=57 N2=43	21,54	25,17	0,732	0,8 – 1,6 – 2,4
	light back	6Z-2	CH4=41 H2=21 N2=38	18,03	23,09	0,610	0,8 – 1,6 – 2,4
	Sooting	6Z-1	CH4=57 N2=43	21,54	25,17	0,732	0,8 – 1,6 – 2,4
	flame lift	6Z-3	CH4=50 N2=50	18,89	21,66	0,761	0,8 – 1,6 – 2,4

A.1.9 Korea

Table A.1.9 — Test gases for Korea

Gas families	Test gases (reference gases and limit gases)	Designation	Composition	H_s	W_s	Relative density d	Test pressures P_{min} - P_n - P_{max}
			%	[MJ/m³]	[MJ/m³]		[kPa]
Natural gas							
	Standard gas	R	CH_4 =96,0 C_3H_8 = 4,0	40,05	51,97	0,593	1,0 – 2,0 – 2,5
	Limit gases						
	incomplete combustion	13A-1	CH_4 =87,0 C_3H_8 = 13,0	45,16	54,69	0,681	1,0 – 2,0 – 2,5
	light back	13A-2	CH_4 = 66,0 H_2 = 23,0 C_3H_8 = 11,0	38,07	51,34	0,549	1,0 – 2,0 – 2,5
	sooting	13A-1	CH_4 =87,0 C_3H_8 = 13,0	45,16	54,69	0,681	1,0 – 2,0 – 2,5
	flame lift	13A-3	CH_4 = 96,5 N_2 = 3,5	36,46	48,32	0,569	1,0 – 2,0 – 2,5

Table A.1.9 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
LPG							
	Standard gas	—					
	Limit gases						
	incomplete combustion	B(butane)	C_4H_{10} = 100	126,21	87,54	2,078	2,3 – 2,8 – 3,3
	light back	P(propane)	C_3H_8 = 100	95,65	76,83	1,549	2,3 – 2,8 – 3,3
	sooting	B(butane)	C_4H_{10} = 100	126,21	87,54	2,078	2,3 – 2,8 – 3,3

A.1.10 Japan

Values are measured and expressed at 0°C and 101,325 kPa

Table A.1.10 — Test gases for Japan

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
Example							
Natural gas		13A					
	Standard gas	13A-0	—	—	**52,7~57,8**		
	Limit gases						
	incomplete combustion	13A-1	CH_4 =85,0 C_3H_8 = 15,0	49,15	58,5	0,705	1,0 – 2,0 – 2,5
	light back	13A-2	CH_4 = 60,0 H_2 = 31,0 C_3H_8 = 9,0	37,05	52,7	0,494	1,0 – 2,0 – 2,5
	sooting	13A-1	CH_4 = 85,0 C_3H_8 = 15,0	49,15	58,5	0,705	1,0 – 2,0 – 2,5
	flame lift	13A-3	CH_4 = 98,0 N_2 = 2,0	39,14	52,2	0,563	1,0 – 2,0 – 2,5
		12A					
	Standard gas	12A-0	—	-	49,2~53,8	-	
	flame lift	12A-3	CH_4 = 93,0 N_2 = 7,0	37,14	48,6	0,584	1,0 – 2,0 – 2,5
LPG							
	Standard gas	—					
	Limit gases						
	incomplete combustion	Butane	C_4H_{10}=100	134,29	92,8	2,094	2,0-2,8-3,3

Table A.1.10 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
	light back	Propane	C_3H_8=100	101,38	81,3	1,555	2,0-2,8-3,3
	sooting	Butane	C_4H_{10}=100	134,29	92,8	2,094	2,0-2,8-3,3
	flame lift	75P	C_3H_8=75 C_4H_{10}=25	109,61	84,3	1,689	2,0-2,8-3,3
Town gas							
6A		6A					
	Standard gases	6A-0	—		24,5~28,2		
	incomplete combustion	6A-1	C_4H_{10}=23,6 Air=76,4	31,69	28,3	1,258	0,7-1,5-2,2
	soothing						0,7-1,5-2,2
	flame lift	6A-3	C_4H_{10}=21,5 N_2=15,5 Air=63,0	28,87	26,0	1,230	0,7-1,5-2,2
L1		L1					
	Standard gases	L1-0	-	-	23,7~28,9	-	-
	Limit gases						
	incomplete combustion	L1-1	H_2=49,0 C_3H_8=16,5 N_2=34,5	22,99	29,1	0,624	0,5-1,0-2,0
	light back	L1-2	H_2=64,5 C_3H_8=8,5 N_2=27,0	16,86	25,5	0,438	0,5-1,0-2,0
	sooting	L1-1	H_2=49 C_3H_8=16,5 N_2=34,5	22,99	29,1	0,624	0,5-1,0-2,0
	flame lift	L1-3	H_2=36,0 C_3H_8=15,5 N_2=48,5	20,31	23,7	0,735	0,5-1,0-2,0
5C		5C					
	Standard gases	5C-0			21,4~24,7		
	Limit gases						
	incomplete combustion	5C-1	H_2=37,5 CH_4=15,0 C_3H_8=8,5 N_2=39,0	19,4	24,7	0,619	0,5-1,0-2,0
	light back	5C-2	H_2=56,5 C_3H_8=8,0 N_2=35,5	15,33	21,5	0,507	0,5-1,0-2,0

Table A.1.10 *(continued)*

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m^3]	W_s [MJ/m^3]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
	sooting	5C-1	H_2=37,5 CH_4=15 C_3H_8=8,5 N_2=39,0	19,4	24,7	0,619	0,5-1,0-2,0
	flame lift	5C-3	H_2=35,5 C_3H_8=13,5 N_2=51,0	18,23	21,3	0,728	0,5-1,0-2,0
L2		L2					
	Standard gases	L2-0			19,0~22,6		
	Limit gases						
	incomplete combustion	L1-1	H_2=25,0 C_3H_8=17,5 N_2=57,5	20,94	22,8	0,846	0,5-1,0-2,0
	light back	L2-2	H_2=43,5 C_3H_8=9,5 N_2=47,0	15,19	19,1	0,632	0,5-1,0-2,0
	sooting	L2-1	H_2=25 C_3H_8=17,5 N_2=57,5	20,94	22,8	0,846	0,5-1,0-2,0
	flame lift	L2-3	CH_4=42,5 N_2=5,5 Air=52,0	16,97	18,9	0,809	0,5-1,0-2,0
L3		L3					
	Standard gases	L3-0			16,2~18,6		
	Limit gases						
	incomplete combustion	L3-1	H_2=36,0 C_3H_8=11,0 N_2=53,0	15,75	18,7	0,709	0,5-1,0-2,0
	light back	L3-2	H_2=49,5 C_3H_8=5,5 N_2=45,0	11,9	16,0	0,555	0,5-1,0-2,0
	sooting	L3-1	H_2=36,0 C_3H_8=11,0 N_2=53,0	15,75	18,7	0,709	0,5-1,0-2,0
	flame lift	L3-3	CH_4=36,5 N_2=5,0 Air=58,5	14,58	15,9	0,836	0,5-1,0-2,0

A.1.11 Mexico

Table A.1.11 — Test gases for Mexico

Gas families	Test gases (reference gases and limit gases)	Designation	Composition	H_s	W_s	Relative density d	Test pressures P_{min} - P_n - P_{max}
			%	[MJ/m³]	[MJ/m³]		[kPa]
LP-Gas	Reference gas	Gas E (Propane)	C_3H_8 = 90	95		1,55	1,99 – 2,75 – 2,99
Natural Gas	Reference gas	Gas X (Methane)	90	37,3		0,612	1,26 – 1,76 – 2,16

A.1.12 New Zealand

Table A.1.12 — Test gases for New Zealand

Gas families	Test gases (reference gases and limit gases)	Designation	Composition %	H_s [MJ/m³]	W_s [MJ/m³]	Relative density d	Test pressures P_{min} - P_n - P_{max} [kPa]
Natural gas[1]							
	Reference gases	N	CH_4 = 85,5 C_3H_8 = 10,0 CO_2 = 4,5		50,0	0,70	P_{min} = 1 P_{max} = 5
	Limit gases						
	incomplete combustion, yellow tipping, sooting	P	CH_4 = 69,0 C_3H_8 = 26,0 CO_2 = 5,0		≥ 54,6	0,86	
	flame lift, incomplete combustion	Q	CH_4 = 79,5 C_3H_8 = 7,0 CO_2 = 13,5		≤ 44,0	0,76	
	sooting light back	S	C_3H_8 = 55,0 Air = 45,0		44 > W > 55	>1,2	
LPG	**Reference gases**	X	C_3H_8 = 100,0				P_{min} = 2 P_{max} = 3.5
	Limit gases						
	flame lift, light back, incomplete combustion	X	C_3H_8 = 100,0		76,8	1,56	
	incomplete combustion, yellow tipping, sooting	Y	C_4H_{10} = 100,0		87,1	2,09	

[1] NOTE: These are taken from NZS 5266:2014 Safety of gas appliances (Table C1 – Supply pressures, Table C2 – Specification of test gases, and Table C3 – Indicative composition and properties of acceptable test gas mixtures). The specifications for test gases in either NZS 5266:2014 or AS/NZS 5263.0:2017 Gas appliances – General requirements are acceptable in New Zealand.