BRITISH STANDARD

BS EN
484 : 1998

Specification for

Dedicated liquefied petroleum gas appliances —

Independent hotplates, including those incorporating a grill for outdoor use

The European Standard EN 484 : 1997 has the status of a British Standard

ICS 97.040.20

National foreword

This British Standard is the English language version of EN 484 : 1997.

The UK participation in its preparation was entrusted to Technical Committee GSE/24, Dedicated LPG appliances, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled 'International Standards Correspondence Index', or by using the 'Find' facility of the BSI Standards Electronic Catalogue.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on
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EUROPEAN STANDARD
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EN 484

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ICS 97.040.20

Descriptors: Gas appliances, liquefied petroleum gases, cooking appliances, hot plates, classifications, equipment specifications, performance evaluation, safety, tests, marking, technical notices

English version

Specification for dedicated liquefied petroleum gas appliances — Independent hotplates, including those incorporating a grill for outdoor use

Spécifications pour les appareils fonctionnant exclusivement aux gaz de pétrole liquéfiés — Tables de cuisson indépendantes, équipées ou non d'un grilloir, utilisées en plein air

Festlegungen für Flüssiggasgeräte — Flüssiggasbetriebene kochgeräte einschließlich solcher mit Grillteilen zur Verwendung im Freien

This European Standard was approved by CEN on 21 August 1997.

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

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

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 484 : 1997 E

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 181, Dedicated liquefied petroleum gas appliances, the Secretariat of which is held by NSAI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 1998, and conflicting national standards shall be withdrawn at the latest by March 1998.

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

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

This standard applies only to type testing.

Items relating to quality assurance systems, production testing and particularly certificates of conformity of auxiliary equipment are not covered by this standard.

Particular attention should be paid to the suitability of non-metallic materials used in the construction of these appliances. A European Standard specifying 'Requirements for rubber materials for seals and diaphragms for gas appliances and equipment' has been prepared by CEN/TC 108 (EN 549). A European Standard for 'Flexible hose, tubing and assemblies for use with propane and butane in the vapour phase' is being prepared by CEN/TC 218. These standards will be applicable to these types of appliances.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Contents

1 Scope

This standard specifies constructional and performance characteristics, safety specifications and rational use of energy, relevant test methods and marking of independent hotplates, including those fitted with a grill, burning liquefied petroleum gas, referred to in the body of the text as 'appliances'.

This standard covers independent hotplates, including those fitted with a grill as defined in **3.39**, used outdoors and operating with the gases indicated in **4.1** and according to the categories specified in **4.2**.

This standard applies to these appliances and their functional sections whether or not the latter are independent or incorporated into an assembly.

This standard applies only to type testing.

Appliances supplied with third family gas at pressures greater than those defined in **4.2** are outside the field of application of this standard.

Appliances used in leisure vehicles and boats are outside the field of application of this standard.

Independent hotplate burners, whose nominal heat input is below 1,16 kW, and grills are not subject to any special requirement concerning the rational use of energy due to their low rate and their use for short periods of time.

2 Normative references

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

EN 125 : 1991	*Flame supervision safety devices for gas burning appliances — Thermoelectric flame supervision devices*
EN 126 : 1994	*Multifunctional controls for gas burning appliances*
EN 437 : 1993	*Test gases, test pressures, appliance categories*
EN 60335-1	*Safety of household and similar electrical appliances — Part 1: General requirements* (IEC 335-1 : 1983, modified)
HD 1003 : 1990	*Heating in contact with the front of the domestic cooking appliances burning gas*
ISO 7-1 : 1994	*Pipe threads where pressure-tight joints are made on the threads — Part 1: Designation, dimensions and tolerances*
ISO 228-1 : 1994	*Pipe threads where pressure-tight joints are not made on the threads — Part 1: Designation, dimensions and tolerances*

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1 cooking devices

Component parts of the appliance designed to hold or receive the food to be cooked.

3.2 detachable

That which can be dismantled without using a tool.

3.3 appliances incorporating a gas container

An appliance whose body or support includes a compartment for a liquefied petroleum gas container, or a fixing or support device for this container.

3.4 auxiliary equipment

All the components and devices acting directly or indirectly on the gas rate.

3.5 locking of an adjuster

Locking of an adjuster by the manufacturer or by an installer, in its adjustment position by any means (a screw, etc.).

3.6 burner

Component that allows the gas to burn. It may be one of two types:

– non-aerated burner, in which the air for combustion is entrained entirely at the burner outlet;

– aerated burner, in which part of the air for combustion, termed primary air, is entrained by the gas flow and mixed before the burner outlet. The remainder of the air, termed secondary air, is drawn in after the burner outlet.

3.7 ignition burners

Small burners whose flame is designed to light another burner. They are called 'pilots' in this standard.

3.8 covered burners

Hotplate burners where the pans being heated are screened from direct flame contact by the interposition of a surface on which they rest.

A covered burner may be:

– permanent, that is designed to be used only with the plate in position;

– with two functions: that is, designed to be capable of being used as an uncovered burner after removal of a detachable plate.

3.9 open burners

Hotplate burners where the pans being heated are in direct contact with the flames.

3.10 sooting

Phenomenon appearing during incomplete combustion and characterized by a deposit of carbon on surfaces in contact with the flame or the products of combustion.

3.11 pressure couple

Set of two separate supply gas pressures applied because of the large difference between the Wobbe indexes within a gas family or a gas group:

– the highest pressure applies only with gases of low Wobbe index;

– the lowest pressure applies only with gases of high Wobbe index. [EN 437]

3.12 shut down lid

A lid intended to be shut down over the hotplate.

3.13 heat input

The product of the volume or mass rate and the calorific value of the gas, brought to the same reference conditions. It is expressed in kilowatts (kW). Symbol: Q. For the purposes of this standard, only heat inputs calculated from the gross calorific value are considered (see **3.32**).

3.14 nominal heat input of a burner

The value of the heat input of this burner, as declared by the manufacturer. Symbol: Q_n.

3.15 mass rate

The mass of gas passed in unit time. It is expressed in kilograms per hour (kg/h) or in grams per hour (g/h). Symbol: M.

3.16 volume rate

The volume of gas passed in unit time. It is expressed in cubic metres per hour (m^3/h) or in cubic decimetres per hour (dm^3/h), the gas being dry and under the reference test conditions. Symbol: V.

3.17 flame lift

Phenomenon characterized by the partial or total movement of the base of the flame away from the burner port.

3.18 removable

That which can only be removed with a tool.

3.19 relative density

The ratio of the mass of a volume of dry gas to an equal volume of dry air under the same temperature and pressure conditions.

3.20 ignition device

A device to ignite one or more burners directly or indirectly, for instance through a flash tube.

It may be:

– either electric (resistance, spark, etc.); or

– thermal (flame, pilot, etc.).

3.21 flame supervision device

A device which, due to the presence of a flame on the sensing element, keeps open the gas flow to the burner and pilot and which cuts off the gas supply to the burner and pilot in the case of extinction of the supervised flame.

3.22 pan support

A support placed above an open hotplate burner, and designed to support the pan being heated and keep it at a set distance from the burner.

3.23 contact grill

Part of a hotplate consisting of a plate placed above a burner, allowing for the cooking of food by direct contact with the surface of this plate, which is brought to a high temperature. It may be:

– permanent, that is, designed to be used only in the above conditions;

– with two functions: that is, designed to be capable of being also used as a covered or open burner after removal or change of the detachable plate.

3.24 radiant grill

Appliance or part of an appliance allowing for cooking by radiation from a surface brought to a high temperature.

3.25 Wobbe index

The ratio of the calorific value of a gas, by unit of volume, and the square root of the density of the same gas. The Wobbe index is called gross when the calorific value considered is the gross calorific value (see **3.32**). It is expressed in megajoules per cubic metre (MJ/m^3). Symbol: gross Wobbe index W_s.

3.26 injector

A component part that admits the gas into an aerated burner. There are two types of injectors:

– calibrated injectors, where the section of the outlet orifice is fixed;

– adjustable injectors, where the section of the outlet orifice is variable.

3.27 control handle

A component designed to be operated manually so as to control the movement of a control of the appliance, such as a tap, etc.

3.28 means of sealing

Any static or dynamic device designed to ensure soundness, for example: flat-faced joints, O-ring joints, conical joints, diaphragms, grease, pastes, putties.

3.29 primary air adjuster

A device allowing the aeration rate of a burner to be set at a predetermined value according to the supply conditions. The action consisting in operating this device is termed 'primary air adjustment'.

3.30 gas rate adjuster

A device allowing the gas rate to a burner to be set at a predetermined value according to the supply conditions. The adjustment can be continuous (adjustment screw) or discontinuous (changing the calibrated orifices).

The operation of changing the setting of this device is termed the 'adjustment of the gas rate'.

3.31 useful part of a cooking device

Part of the device in contact with the food during cooking.

3.32 calorific value

The quantity of heat produced by complete combustion at a constant pressure equal to 1013,25 mbar, of unit volume or mass of the gas, the components of the fuel mixture being at 15 °C, 1013,25 mbar and the products of combustion being brought to the same conditions.

There are two calorific values:

– the gross calorific value (symbol H_s): the water produced by combustion is assumed to be condensed;

– the net calorific value (symbol H_i): the water produced by combustion is assumed to be retained in the vapour state. [EN 437]

For the purposes of this standard only the gross calorific value is used.

The calorific values are expressed in units of energy referred:

– either to the unit volume of dry gas measured under normal reference conditions: 15 °C, 1013,25 mbar. It is expressed in megajoules per cubic metre (MJ/m^3); or

– to the unit mass of dry gas. It is then expressed in megajoules per kilogram (MJ/kg).

3.33 gas supply pressure

The difference between the static pressure measured at the gas inlet connection of the appliance and the atmospheric pressure. It is expressed in millibars (mbar).

3.34 light back

Phenomenon characterized by the return of the flame inside the body of the burner.

3.35 tap

A device designed to isolate a burner from the gas supply pipework and to adjust its rate during use.

3.36 locking

Any means of locking an adjuster, such that any attempt to change the adjustment causes the breaking of the sealing device or sealing material and makes the interference with the adjuster apparent. The adjuster is said to be sealed in the adjusted position. An adjuster sealed at the factory is considered as non-existent.

3.37 soft solder

Solder for which the lowest temperature of the melting range, after application, is less than 450 °C.

3.38 stability of flames

Condition of flames when the phenomena of flame lift or light back do not occur.

3.39 independent hotplate

Cooking appliance incorporating one or several covered or uncovered burners and, if applicable, one or several contact or radiant grills.

3.40 hotplate

The part of a cooking appliance incorporating one or several covered or uncovered burners. It is designed in such a way that it can support the vessels containing the food.

3.41 ignition delay time

The time between the ignition of the flame supervised, the appliance being at room temperature, and the moment when the effect of this flame is sufficient to keep the closing member open.

3.42 extinction delay time

The time between the extinction of the flame supervised and the closure of the gas supply to the burner and to the pilot.

3.43 gripping area

Area of the appliance designed to be manipulated during normal use.

4 Classification

4.1 Classification of gases used

Gases used are classified in families and groups according to their Wobbe number.

The third family grouping, liquefied petroleum gases, covers Wobbe indexes between 72,9 MJ/m^3 and 87,3 MJ/m^3 (W_s). It is subdivided into two groups; group P, which covers the range of Wobbe indexes between 72,9 MJ/m^3 and 76,8 MJ/m^3 and group B, which covers the range of Wobbe indexes between 81,8 MJ/m^3 and 87,3 MJ/m^3.

Groups P and B are not covered by this standard.

4.2 Classification of appliances

Appliances are classified into categories according to the gases that they use. However, for each country, only some of the categories mentioned below are applicable, on account of local gas supply conditions (types of gas and supply pressures). For these categories, no requirement different from those defined in this standard shall be applied.

The gas supply conditions and types of connection applicable to each country are given in annex A.

Appliances within the field of application of this standard belong to the following categories:

a) **Category $I_{3B/P(30)}$**

An appliance capable of using third family gases (propane, butane or their mixtures), without adjustment at nominal operating pressures from 28 mbar to 30mbar;

b) **Category $I_{3B/P(50)}$**

An appliance capable of using third family gases (propane, butane or their mixtures), without adjustment at nominal operating pressures of 50 mbar;

c) **Category $I_{3+(28\text{-}30/37)}$**

An appliance capable of burning third family gases (butane and propane), and operating without adjustment on the appliance using a pressure couple. For butane, appliances in this category may be used without adjustment at nominal operating pressures from 28 mbar to 30 mbar, for propane they are used at a nominal operating pressure of 37 mbar.

5 Constructional characteristics

NOTE. The test methods for verifying the compliance of the appliance with the requirements of this clause are indicated in **7.2**.

5.1 Conversion to different gases

The appliance shall operate under normal supply conditions specified in the instructions, without requiring any intervention on the internal gas circuit or the adjusters of the appliance.

Adjusters shall be locked and sealed by the manufacturer.

5.2 Materials

The quality and thickness of materials used in the construction of an appliance shall be such that the constructional and performance characteristics are not altered in use.

In normal conditions of operation, cleaning or transport, the parts of the appliance:

– shall withstand the mechanical, chemical and thermal actions to which they may be submitted;

– shall not be liable to any alteration which might impair their operation.

Metallic parts not made of corrosion-resistant materials shall be covered with an effective protection against corrosion. This requirement does not apply to cooking devices.

Asbestos or asbestos based material shall not be used.

The surface treatment and finish of materials likely to be in contact with food shall be such that they cannot contaminate or affect the food.

5.3 Ease of cleaning and maintenance

All the parts of the appliance requiring frequent cleaning by the user (for example: cooking devices) shall be easily accessible without having to use a tool for dismantling. It shall be possible to put these parts back correctly and without difficulty by following the instructions.

Sharp corners and edges which could give rise to injury, for example during the cleaning of appliances, shall be avoided.

It shall not be possible for the gas container, the connection tube and the parts of the gas circuit to be soiled by the spillage of cooking juices.

Spillage from vessels shall not impair the operation of the burners on which they are placed and these shall be accessible for cleaning.

Grills shall be designed in such a way that cooking juices are collected in an area provided for this purpose.

Any part of the appliance installed or adjusted at the factory and which does not need to be manipulated by the user shall be protected in appropriate fashion. To this end paint may be used provided that it withstands the heat to which it is exposed during the normal operation of the appliance.

5.4 Manipulation of grills

5.4.1 *Contact grills*

If the grill can be moved, the grill handle, if any, shall allow manipulation of the grill without accidently coming loose. Flexing of the handle is allowed if its function is maintained.

5.4.2 *Radiant grills*

When the grill pan is fitted with a handle, it shall be designed in such a way that when it is held to carry the grill pan or to pour out the liquid content, it shall not come loose under the conditions given in **7.2.4.2**. Flexing of the handle is allowed if its function is maintained.

5.5 Strength

The construction of an appliance shall be such that, during normal conditions of use:

– any displacement of parts;

– any distortion;

– any deterioration

likely to impair its good performance will not occur.

The materials used, the construction and the assembly of the body of the appliance shall be such that the application of a load on the grid of the appliance under the test conditions described in **7.2.5** shall not cause any fracture or any permanent distortion greater than 1 mm at any point in the components of the appliance.

5.6 Assembly

All components which require assembly by the user shall be designed in such a way that their incorrect mounting is not possible if the instructions are followed.

5.7 Stability

5.7.1 *Stability of the appliance on a horizontal plane*

The appliance being placed on a horizontal surface, the tests described in **7.2.7.1** shall be carried out without:

– the appliance falling over;

– any of its component parts becoming loose or moving in such a way that its operation is impaired;

– lids falling accidentally from their raised position.

If the appliance is fitted with a foldable support, it shall be possible to lock it in the position of use (for example: stop, locking device).

5.7.2 *Stability of the appliance placed on a slope*

Under the test conditions of **7.2.7.2**, the appliance, when placed on a slope of 10° from the horizontal, shall not fall over, and the lid shall not fall accidentally.

None of the gas containers indicated in the instructions shall fall during this test, whatever its gas content, when placed as recommended in the instructions.

5.7.3 *Vessel stability*

There shall be adequate points of support for vessels to rest level in a stable fashion on the supports of each open burner.

The manufacturer shall indicate the minimum diameter of pan which can be placed on each of the burners in the instructions.

A 200 mm diameter vessel complying with Figure 1 shall remain stable when it is displaced off centre by 15 mm, under the test conditions described in **7.2.7.3**, and the appliance shall not fall over.

5.8 Soundness of the gas circuit assembly

Holes for screws, pins, etc. intended for the assembly of components shall not open into the space reserved for the gas ways leading to the injector.

The soundness of parts and assemblies connected to the gas circuit shall be assured by means of metal-to-metal joints or joints with seals (for example, flat-faced joints, O-rings), i.e. excluding the use of any product which ensures soundness in the threads.

For parts that do not require dismantling during normal maintenance, for example taps, injectors, the use of appropriate thread sealing compounds is permitted.

Soft solder shall not be used to ensure the soundness of the gas circuit. However, it is permitted for internal connections within the gas circuit when they do not involve soundness.

Joints and sealing compounds shall have characteristics suited to their use. Removable components or the threaded parts of the pipework which may be dismantled during normal maintenance shall remain sound after five disconnections and re-connections in accordance with the manufacturer's instructions, if necessary after changing a gasket if mentioned in the instructions.

5.9 Connections

Connections shall be easily accessible; it shall be possible to connect the appliance easily and safely following the indications given in the instructions.

The entire gas supply circuit shall be at the pressure delivered by the regulator.

Depending on the various national situations (see annex A), the end of the supply pipework shall be fitted either with:

– a nozzle allowing the connection of flexible tubing; the nozzle may be fixed or removable;

– a thread in accordance with ISO 228-1 : 1994 or ISO 7-1 : 1994.

During normal conditions of use, connections shall not come loose unintentionally.

Flexible tubing of the length recommended by the manufacturer and connected in accordance with the instructions, shall not come into contact with a part of the appliance whose temperature is higher than that specified in **6.5**b).

5.10 Locking of wheels and castors

If the appliance has wheels and/or castors to enable it to be moved, means shall be provided to prevent accidental movement of the appliance during normal use.

It shall not be possible for any locking device to operate unintentionally.

5.11 Taps

5.11.1 *General*

Each burner shall be controlled by a tap or device allowing the opening, the adjustment and closing of its supply. It shall only be possible to supply gas to the burner by deliberate operation.

Taps shall be placed in such a way that their strength, operation, manipulation and accessibility undergo no damage from the actions to which they are subjected in normal use. They shall be protected against external clogging. Moreover, after testing in accordance with this standard, their operation shall remain easy.

Taps shall be mounted in such a way that no accidental movement relative to the gas supply circuit is possible.

When it is necessary to dismantle certain parts of a tap for maintenance, this shall be possible.

After the temperature test carried out in accordance with **7.3.5**, the operation of taps shall remain possible.

5.11.2 ***Taps with marked positions***

Plug type taps shall have:

– an automatic compensating device to take up play and which ensures soundness;

– two stops, one in the 'off' position and one at the end of the tap travel.

The reduced rate may be obtained either:

– at the end of the tap travel; or

– in an intermediate position between the closed and fully opened positions. In this case, a reduced rate position shall be nited by means of a device that arrests the tap in this position when it is moved in the direction of closing.

A tap with marked positions may be a plug type tap.

5.11.3 ***Taps with variable positions***

When opening these taps it shall not be possible to unscrew the closing member completely from its housing.

A tap with variable positions can be a needle type tap. When closed, the contact of the needle on its seating shall constitute the stop.

5.12 Control handles

5.12.1 ***Construction***

It shall be obvious which burner is controlled by each control handle. They shall be so arranged relative to one another that the movement of one handle does not cause inadvertent movement of an adjacent one.

Control handles with different markings shall not be interchangeable on a single appliance.

Control handles shall be so designed that they can neither be fitted in the wrong position nor move by themselves. The shape of a handle shall be such that its manipulation is easy.

If control handles operate by turning, the closing direction shall be clockwise.

The manipulation of tap handles shall not cause inadvertent movement of the appliance.

5.12.2 ***Marking***

5.12.2.1 *Taps with marked positions*

The closed, open and, if applicable, reduced rate positions shall be marked in a visible, legible and durable fashion.

The closed position of the tap shall be marked by a full disc or circle at least 3 mm in diameter. It shall be the same for all the taps on a single appliance.

The identification of the closed position of each tap shall not give rise to any possibility of confusion with the identification of an open position.

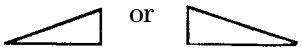
The other positions shall be identified unambiguously, preferably using the following symbols:

– full rate position: a large flame;

– reduced rate position: a small flame;

– rate range:

– triangle

 or

– scale

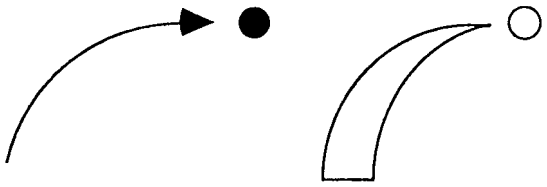
1 2 3 4 or 4 3 2 1

If the instructions indicate a specific position for ignition, this shall be clearly marked on the appliance.

Additional markings are permitted provided that they do not create confusion for the appliance user.

5.12.2.2 *Taps with variable positions*

For taps with variable positions, the closing direction shall be marked by an arrow whose tip points to a full disc or circle at least 3 mm in diameter. For example:



The marking shall be visible, legible and durable.

Additional markings are permitted provided that they do not create confusion for the appliance user.

5.13 Injectors

Injectors shall be accessible, shall not be detachable and shall be of the calibrated type.

All injectors shall carry an indelible means allowing their identification from the instructions and preventing any confusion. If the injector is integral with the tap (or another part), the assembly shall carry a means of identification.

5.14 Ignition devices

Where an ignition device exists, it shall ensure rapid and safe ignition.

The components of the ignition device shall be designed to avoid damage and accidental displacement from their correct position during transport or use. The relative positions of the ignition device and the burner shall be sufficiently well defined to ensure correct operation of the assembly.

When the burner ignition device does not ensure the ignition of all the burners, the relative position of the control handles of burners and of the igniter shall not give rise to any confusion.

5.15 Flame supervision devices

When the flame supervision device falls within the scope of EN 125 : 1991, the requirements of that standard shall apply.

When flame supervision devices are fitted, they shall be designed in such a way that, in the case of a failure of any of the components indispensable to their performance, the supply of the gas to the burner controlled by the device and any pilot is cut off automatically and can only be restored by manual intervention. They shall be so mounted as to ensure satisfactory performance.

The sensing element of a flame supervision device shall control only a single burner, except in the case where the element controls the entire supply to the appliance.

The appliance shall not incorporate any device that allows the flame supervision device to be permanently overridden. During the ignition period, a brief passage of unlit gas is permitted under the conditions given in **6.3**.

If hotplate burners (including contact grills) are not fitted with a flame supervision device, the appliance shall be designed and built in such a way as to allow the discharge of unburned gas which might accumulate under the hotplate (openings, gaps between the base of the hotplate and its support). If a radiant grill is not fitted with a flame supervision safety device, its enclosure shall be permanently open at least on one side.

5.16 Burners

Burners shall be designed in such a way that they cannot move inadvertently in use or during movement of the appliance. There shall be no leak of gas in a flammable quantity at the joints of the assembly.

It shall be easy to clean the parts of a burner which require cleaning; the parts concerned shall be either accessible without dismantling, or easily dismantled.

The relative position of flash tubes and the burners with which they are intended to function shall be fixed.

It shall not be possible for components associated with burners (pan supports, grill, etc.) to move unintentionally.

It shall not be possible to reassemble removable burner parts incorrectly when following the information given in the instructions; they shall not be interchangeable unless of identical design.

5.17 Appliance incorporating a gas container

5.17.1 If the appliance has a compartment to receive a refillable gas container, this compartment shall be designed in such a way that:

a) effective ventilation is provided by openings in its base and upper section, the total area of the openings in the upper section being 1/100 of the base area of the compartment, and that of the openings at the base being 1/50 of the base area of the compartment;

b) the support of the container (or containers) has sufficient mechanical strength to resist deformation under the load of a full container (or containers);

c) the gas container (or containers) can be easily inserted in, or removed from, the appliance;

d) the gas container valve is readily accessible and remains easy to manipulate when the gas container is in place;

e) when the appliance may be connected by a flexible tube, this shall not come into contact with sharp edges, when fitted in accordance with the indications in the instructions.

5.17.2 If the appliance is fitted with a support or fixing device for the gas container, the container shall be firmly fixed on the support or device and the requirements of **5.17.1**b), c), d) and e) shall be met.

5.18 Durability of markings

The durability of markings is considered satisfactory if, at the end of the tests in this standard, markings are still visible and legible.

5.19 Auxiliary energy

When the appliance is designed to operate on auxiliary energy via a connection to the electrical mains supply, it shall be built in such a way that no dangerous situation arises:

– in case of normal variation in the auxiliary energy (− 15 %; + 10 %) the appliance shall continue to operate in a safe fashion;

– in case of abnormal variations in the auxiliary energy (beyond the range − 15 %; + 10 %) the appliance shall either continue operating in a safe fashion or shut down;

– if failure of auxiliary energy causes the appliance to shut down its restoration shall not create any danger.

The electrical equipment of the appliance shall comply with the relevant requirements of EN 60335-1, except as mentioned below.

A protection against electrical shock is not necessary for high voltage ignition devices provided the energy content of each impulse, the number of impulses and the delay between each impulse are within the limits set by EN 126 : 1993.

6 Performance characteristics

6.1 Soundness

Under the test conditions defined in **7.3.1**, the leakage shall not exceed 0,07 l/h (dry air, 20 °C, 1013,25 mbar).

6.2 Verification of the nominal heat input

Under the test conditions defined in **7.3.2** (see also annex B), each of the burners, supplied separately, shall be capable of giving the nominal heat input stated by the manufacturer, however a tolerance of ± 8 % between the heat input obtained and the nominal heat input is permitted. The tolerance is increased to ± 10 % for burners fitted with injectors whose diameter is less than or equal to 0,5 mm.

6.3 Flame supervision devices

Under the test conditions defined in **7.3.3**, the ignition delay time shall not exceed 20 s and the extinction delay time shall not exceed 90 s.

6.4 Safety of operation

6.4.1 ***Ignition, crosslighting***

Under the test conditions defined in **7.3.4.1**, ignition and crosslighting of burners shall occur smoothly within 5 s of the burner tap being placed in the full rate position or, if applicable, in the ignition position.

It shall be possible to light the burners with an external means (for example, a match) in an easy and safe fashion, even when an ignition device exists.

It shall be possible for the user to check the ignition of burners.

6.4.2 ***Flame stability***

Under the conditions defined in **7.3.4.2**, after ignition in accordance with **6.4.1**, flames shall be stable and quiet. A slight tendency to flame lift is permitted at the time of ignition, but flames shall be stable 60 s after ignition.

6.4.3 ***Resistance to draught***

Under the test conditions defined in **7.3.4.3**, burners shall neither:

– be extinguished, unless fitted with a flame supervision device;

– nor permanently light back

under the action of a 3 m/s wind.

6.4.4 ***Resistance to overheating***

After the overheating test defined in **7.3.4.4** burners shall show no deterioration likely to impair their operation.

6.5 Temperatures

Under the test conditions defined in **7.3.5**, the temperatures shall not exceed the following limits.

a) *Front and side panels*

The rise in temperature above the ambient temperature measured on accessible surfaces of the front and side panels of the appliance, as defined in **7.3.5.3**, shall not exceed the following limits:

1) metal and painted metal: 60 K;

2) enamelled metal: 65 K;

3) glass and porcelain: 80 K;

4) plastics or wood: 100 K.

b) *Surfaces in contact with the flexible tube*

The temperatures of the appliance surface likely to come in contact with the flexible tube, when installed and connected in accordance with the instructions, shall not exceed the ambient temperature by more than 70 K.

c) *Connections*

If the end of the gas inlet is fitted with a nozzle complying with the national situations indicated in annex A, this nozzle shall be positioned in such a way that the temperature of the nozzle does not exceed the ambient temperature by more than 30 K.

d) *Auxiliary equipment*

The temperature of the auxiliary equipment the failure of which may affect the safety of operation shall not exceed the maximum temperature stated by the manufacturer.

e) *Control handles and parts intended to be touched*

The rise in temperature above the ambient temperature of parts intended to be touched in normal use, only measured in the gripping areas, shall not exceed the following limits:

– metal and painted metal: 35 K;

– glass and porcelain: 45 K;

– plastics or wood: 60 K.

f) *Support*

The surface temperature of the appliance support shall not exceed the ambient temperature by more than 70 K. If the temperature of the support exceeds 50 K, the manufacturer shall specify the conditions of use of the appliance; in particular he shall specify the type of surface protection to be used.

6.6 Overheating of the gas container

Under the test conditions defined in **7.3.6**, the rise in vapour pressure inside the container relative to that measured at the start of the test, after 1 h of operation at full rate, at normal pressure and during the 30 min following the extinction of the appliance, shall not exceed the values given in table 1.

Table 1. Values for vapour pressure rise inside the container

Ambient temperature °C	**Maximum permitted pressure rise** bar
15	0,40
20	0,45
25	0,50

6.7 Combustion

6.7.1 For each of the burners operating separately, under the test conditions defined in **7.3.7.1**, the quantity of CO in the air and water vapour free products of combustion shall not exceed 0,15 %.

6.7.2 When the hotplate burners are operated simultaneously, under the test conditions defined in **7.3.7.2**, the quantity of CO in the air and water vapour free products of combustion shall not exceed 0,20 %.

6.8 Sooting

At the end of all the tests of this standard, no deposit of soot likely to impair safe operation shall be observed.

6.9 Rational use of energy: performance of the hotplate burners

6.9.1 *Open burners*

For hotplate burners having a nominal heat input above 1,16 kW the efficiency obtained under the test conditions defined in **7.3.9.1** shall not be less than 50 %.

6.9.2 *Covered burners*

For hotplate burners having a nominal heat input above 1,16 kW the efficiency obtained under the test conditions defined in **7.3.9.2** shall not be less than:

– 25 % (from the cold condition);

– 35 % (from the hot condition).

7 Test methods

7.1 General

7.1.1 *Test gases*

The burners are tested, depending on the tests, with the relevant gases indicated in table 2 according to the category of the appliance (see **4.2**).

The composition of the test gases is given in annex C.

Table 2. Test gases corresponding to the appliance category

Test gas	**Appliance category** $\mathbf{I}_{3(30)}$, $\mathbf{I}_{3(50)}$, $\mathbf{I}_{3+(28\text{-}30/37)}$
Reference gas, incomplete combustion and sooting limit gas	G 30
Light back limit gas	G 32
Flame lift limit gas	G 31

The characteristics of test gases are given in table 3, which is in agreement with the specifications of EN 437 : 1993.

7.1.2 *Test pressures*

The values of test pressure, i.e. at the gas inlet connection of the appliance, are given in table 4.

Table 3. Characteristics of test gases (dry gas, at 15 °C at 1013,25 mbar)

Test gas	**Designation**	**Volume composition**	W_S	H_S		d
			MJ/m^3	MJ/m^3	MJ/kg	
Reference gas	G 30	C_4H_{10}	87,33	125,81	49,47	2,075
Flame lift limit gas	G 31	C_3H_8	76,84	95,65	50,37	1,550
Light back limit gas	G 32	C_3H_6	72,86	88,52	48,94	1,476

Table 4. Test pressures (in millibars)

Category of appliance	**Normal pressure** p_n	**Minimum pressure** p_{min}	**Maximumpressure** p_{max}	**Test gas**
$I_{3B/P(30)}$	29[1)]	25	35	G 30, G 31, G 32
$I_{3B/P(50)}$	50	42,5	57,5	G 30, G 31, G 32
$I_{3+(28\text{-}30/37)}$	29[1)]	20	35	G 30
	37	25	45	G 31, G 32

[1)] Appliances belonging to this category may be used without adjustment at nominal operating pressures of 28 mbar to 30 mbar.

These pressures shall be used according to the requirements of annex A, depending on the country in which the appliance is to be sold.

7.1.3 ***Test procedures***

Unless otherwise stated, the tests are carried out in a still atmosphere at an ambient temperature of (20 ± 5) °C.

If there is no predetermined reduced rate position, the value of the reduced rate shall be taken as 1/2 the nominal rate.

Unless otherwise indicated, the hotplate burners under test are covered by a 200 mm diameter pan in accordance with figure 1, filled with 2,8 kg of water; the grill burners are tested with the grill pan, if any, placed in the position recommended in the instructions.

7.2 Verification of the constructional characteristics

7.2.1 ***Conversion to different gases***

The characteristics concerning the conversion of the appliance to different gases are verified by a visual examination.

7.2.2 ***Materials***

The characteristics of the materials composing the appliance are verified by visual examination throughout the tests in this standard.

7.2.3 ***Ease of cleaning and maintenance***

Visual and mechanical examination.

7.2.4 ***Manipulation of grills***

7.2.4.1 *Contact grills*

Visual and mechanical examination.

7.2.4.2 *Radiant grills*

The grill pan is filled with water to 25 % of its capacity. It is lifted and the water it contained is poured out.

The requirements of **5.4.2** shall be met.

7.2.5 ***Strength***

A load, whose mass expressed in kilograms is equal to the number of hotplate burners multiplied by 5, is applied evenly on the appliance grid, if necessary using a tray resting on the grid.

The deformation is measured after 15 min, the load being removed.

The requirements of **5.5** shall be met.

7.2.6 ***Assembly***

Visual and mechanical examination.

7.2.7 ***Stability of the appliance***

The tests for the stability of the appliance are carried out with the cooking devices sold with the appliance.

If the gas container is incorporated in the appliance, the tests are carried out with a container of the type recommended, positioned as indicated in the instructions, both when 4/5 full of gas and when empty.

Where the appliance can use other sources of energy, tests are also carried out without a gas container.

7.2.7.1 *Stability of the appliance on a horizontal surface*

The appliance being placed on a horizontal plane, check that:

a) the placing of a 200 mm diameter vessel in accordance with Figure 1, containing a mass of water of 2,8 kg centrally on any of the burners;

b) the positioning and the removal of the cooking devices;

c) the positioning and removal of the gas container

can be carried out whilst complying with the requirements of **5.7.1**.

The requirements of **5.7.1** shall be met.

7.2.7.2 *Test on an inclined plane*

The appliance is placed on a slope of 10° to the horizontal. The requirements of **5.7.2** shall be checked in all the most unfavourable positions and configurations of use:

a) with and without the cooking device described in **7.2.7.1**a);

b) with and without any incorporated gas container.

7.2.7.3 The verification of the stability of the cooking vessel is carried out with the 200 mm diameter vessel, filled with water to a height of 10 mm from the top and offset by 15 mm in the most unfavourable direction.

The requirements of **5.7.3** shall be met.

7.2.8 ***Soundness of the gas circuit assembly***

Visual and mechanical examination.

7.2.9 ***Connections***

Visual and mechanical examination.

7.2.10 ***Locking of wheels and castors***

Visual and mechanical examination.

7.2.11 ***Taps***

Visual and mechanical examination carried out at the start and at the end of tests.

7.2.12 ***Control handles***

Visual and mechanical examination.

7.2.13 ***Injectors***

Visual and mechanical examination.

7.2.14 ***Ignition devices***

Visual and mechanical examination.

7.2.15 ***Flame supervision devices***

Visual and mechanical examination.

7.2.16 ***Burners***

Visual and mechanical examination.

7.2.17 ***Appliances incorporating a gas container***

Visual and mechanical examination.

7.2.18 ***Durability of markings***

Visual examination carried out at the end of all the tests described in this standard.

7.2.19 *Auxiliary energy*

Examination of the influence of the electrical aspects on the gas operation of the appliance.

7.3 Verification of the performance characteristics

7.3.1 *Soundness*

The tests are carried out at an air pressure of 150 mbar, under the conditions defined in **7.1.3**:

– test no. 1: all the taps closed;

– test no. 2: all the taps in the 'on' position, the burner injectors being blocked.

These tests shall be carried out firstly on delivery of the appliance and after having carried out the tests required by this standard.

The test method shall be such that the measurement error does not exceed 5 cm^3/h.

In case of dispute, the device shown in figure 2 shall be used.

7.3.2 *Verification of the nominal heat input*

The heat input is measured after 15 min operation (the measurement starts at the end of the fifteenth minute and finishes at the end of the thirtieth minute), the burner control handle being on the full rate position.

The burner is supplied with the reference gas, at the normal test pressure for the appliance (see table 4).

The method of calculation of the heat input is given in annex B.

7.3.3 *Flame supervision device*

The test is carried out with the reference gas at the normal test pressure for the appliance (see table 4).

Ignition delay time is verified either at full rate or at the position indicated for ignition in the instructions.

Extinction delay time is measured between the moment when the burner is extinguished intentionally, by cutting off the gas supply, and the moment when this supply, having been immediately restored, ceases through the action of the device.

Extinction delay time is verified after the appliance has been in operation for 15 min at full rate.

7.3.4 *Safety of operation*

7.3.4.1 *Ignition, crosslighting*

With the taps either in the full rate position, or in the position for ignition indicated in the instructions, the requirements of **6.4.1** relating to ignition and crosslighting are verified separately for each hotplate burner and for any grill, when the appliance, at ambient temperature, is supplied under the conditions indicated in table 5. Depending on the appliance category, the corresponding test pressures are given in table 4.

Table 5. Conditions for the ignition test

Test gas	Test pressure
Reference gas	p_{min} p_{max}
Light back limit gas	p_{min}
Flame lift limit gas	p_n

For each of the supply conditions, the tests are carried out on each burner, the other burners operating at full rate, without a pan for 15 min.

7.3.4.2 *Flame stability*

The flame stability requirements given in **6.4.2** are verified for each burner separately, the appliance being supplied under the conditions indicated in table 6. Depending on the appliance category, the corresponding test pressures are given in table 4.

Table 6. Conditions for the flame stability tests

Test gas	Test pressure	Burner operation
Reference gas	p_{min} p_{max}	when cold without vessel
Reference gas	p_{min}	after 15 min of operation with vessel
Light back limit gas	p_{min}	after 15 min of operation with vessel
Flame lift limit gas	p_{max}	when cold without vessel

If the instructions allow a pan to be placed on the grill, the 200 mm diameter pan as shown in figure 1 is placed over the grill burner, which is then tested under the same conditions as the hotplate burners. If this is not possible, the flame stability of the grill burner is verified under the conditions of test gases, test pressures, rates and temperatures specified in table 6, but without the pan.

7.3.4.3 *Draught resistance*

The appliance is supplied with the flame lift limit gas at the normal test pressure (see tables 2 and 4) for 15 min at full rate, 200 mm diameter vessels in accordance with figure 1 being placed on the hotplate burners.

The test shall be carried out in turn on each burner operating separately.

A substantially laminar draught of 3 m/s is directed horizontally towards the appliance at the burner height.

The air flow shall be adjusted so as to obtain a speed of 3 m/s using a measuring device fixed at burner height. The measuring device shall be removed and the appliance shall be placed in such a way that the burner occupies the same position as that of the device at the time of measurement.

The draught is interrupted so as to produce 5 gusts of 10 s with a 10 s interval between them.

Tests are repeated for successive rotations of 45°.

In all cases, the requirements of **6.4.3** shall be met.

7.3.4.4 *Resistance to overheating*

The appliance being supplied with the light back limit gas at normal test pressure (see tables 2 and 4), the gas is lit intentionally at the injector outlet orifice and if possible at the burner. Only the burner under test is supplied with gas.

Hotplate burners are covered with a 200 mm diameter vessel in accordance with figure 1.

If the flame cannot be maintained at the injector or inside the burner:

– the rate is reduced gradually until a stable flame is obtained or when the reduced rate position is reached;

– if combustion cannot be maintained at the injector or inside the burner, the pressure is reduced, without however going below the corresponding minimum test pressure (see table 4).

The test for resistance to overheating is carried out by leaving the flame under these conditions for 15 min.

The requirements of **6.4.4** shall be met.

7.3.5 ***Temperatures***

7.3.5.1 *Test installation*

The appliance, positioned as indicated in the instructions for use, is placed on a 25 mm thick wooden horizontal panel whose surface is coated with matt black paint.

Thermocouples are incorporated in the panel at the centre of 10 cm squares. These penetrate the panel from the outside so that the junctions are situated 3 mm from the surface facing the appliance.

Additional thermocouples may be added in areas likely to reach high temperatures.

The temperatures of glass or enamel surfaces shall be measured with a thermocouple complying with that described in HD 1003 : 1990.

7.3.5.2 *Test method*

The appliance, supplied with the reference gas at normal test pressure (see table 4), is operated for one hour under the following conditions:

– 200 mm diameter vessels in accordance with Figure 1 are placed on the burners. If this is not possible, a pan shall be chosen for each of the burners which leaves a distance of 10 mm between its side and that of the adjacent pan;

– the taps are placed in the position corresponding to half the nominal rate;

– a contact or radiant grill is supplied for the last 15 min, at maximum rate, the grill pan being in place.

7.3.5.3 *Measurements*

7.3.5.3.1 *Special conditions for front and side panels*

Measurements of accessible surfaces of front and side panels shall not be carried out on the parts:

– which are not accessible to a 75 mm diameter test with a hemispherical end;

– which are within 25 mm below the level of the upper tray, or are above this tray;

– of small dimensions, such as ventilation vents or those discharging products of less than 10 mm.

In addition, measurements of a surface smaller than 1 cm^2 are disregarded.

7.3.5.3.2 *Results*

It is verified that:

– the temperatures measured remain below the limits given in **6.5**;

– it is possible to operate the gas taps.

7.3.6 ***Overheating of the gas container***

The appliance is supplied at normal pressure with reference gas from a container installed as indicated in the instructions and filled to 4/5 of its capacity.

The vapour pressure inside the container is measured after 5 min of continuous operation at full rate, then after 1 h of operation at full rate, and during the 30 min which follow the extinction of the appliance.

The requirements of **7.6** shall be verified.

7.3.7 ***Combustion***

7.3.7.1 *Individual operation of the burners*

The appliance is supplied with incomplete combustion gas at maximum test pressure (see table 4).

After 15 min of operation at full rate, a sampling device for the products of combustion as shown in figure 3 is placed above the burner under test.

Sampling of the products of combustion shall be carried out under these conditions on each of the hotplate burners in turn.

The test is repeated with the tap in the position corresponding to the nominal half-rate at normal pressure.

If the instructions do not forbid the placing of a pan on the grill or on its outlet orifice for the products of combustion, a 200 mm diameter pan in accordance with figure 1 is placed on top of the grill burner, which is then tested under the same conditions as the hotplate burners. If this is not possible, a suitable sampling device shall be used.

The result of the analysis carried out in accordance with **7.3.7.3** shall meet the requirements of **6.7.1**.

7.3.7.2 *Simultaneous operation of the burners*

The appliance is supplied with the incomplete combustion limit gas at normal test pressure (see table 4).

The hotplate burners are covered with 200 mm diameter pans in accordance with figure 1. If this is not possible, a pan shall be chosen for each of the burners which leaves a distance of 10 mm between its side and that of the adjacent pan or of the sampling device.

After 15 min of operation at full rate, a sampling device for the products of combustion as shown in figure 4 is placed above the burners without impairing combustion.

The result of the analysis carried out in accordance with **7.3.7.3** shall meet the requirements of **6.7.2**.

7.3.7.3 *Analysis of the products of combustion*

The quantity of CO in the air and water vapour free products (neutral combustion) is given by the expression:

$$\%\ (CO)_N = \%\ (CO_2)_N \text{ (neutral combustion)} \cdot \frac{(CO)_M}{(CO_2)_M}$$

where

$\%\ (CO)_N$	is the percentage of CO in the dry, air free products of combustion;
$\%\ (CO_2)_N$	is the percentage of CO_2 calculated for the dry, air free products of combustion of the gas involved (neutral combustion);
$(CO)_M$ and $(CO_2)_M$	are the carbon monoxide and carbon dioxide concentrations measured in the sample during the combustion test, both expressed in the same units.

For reference gas G 30, the content of CO_2 calculated for the products of the neutral combustion, $(CO_2)_N$, is 14,0 %.

For all the tests carbon monoxide is measured with a selective method allowing a concentration of 0,005 % by volume to be detected accurately and allowing the measurement with a relative error not exceeding 6 %.

Carbon dioxide is measured with a method allowing the measurement with a relative error not exceeding 6 %.

7.3.8 ***Sooting***

The requirements of **6.8** shall be verified by visual examination.

7.3.9 ***Rational use of energy***

7.3.9.1 *Open burners*

Each burner is supplied with reference gas at normal test pressure, with the tap fully open.

Aluminium pans with matt bases, smooth sides, with no handle and in accordance with the characteristics given in figure 1 are used. The pans are covered by their lid.

Depending on the nominal heat input of the burner under test, the pan diameter to be used and the quantity of water it contains are given in table 7; the heat input may need to be adjusted so as to take into account the information given in this table.

Table 7. Pan diameter and mass of water in relation to the burner heat input

Nominal heat input of the burner kW	**Internal diameter of the vessel** mm	**Mass of water m_{e1} to be used** kg
Between 1,16 and 1,64	220	3,7
Between 1,65 and 1,98	240[1)]	4,8
Between 1,99 and 2,36	260[1)]	6,1
Between 2,37 and 4,2	260[1)] with the heat input adjusted to 2,36 kW ± 2 %	6,1

[1)] If the diameter indicated (260 mm or 240 mm) is larger than the maximum diameter indicated in the user's instructions, the test shall be carried out with a 240 mm or 220 mm diameter vessel containing the corresponding quantity of water (4,8 kg or 3,7 kg). In this case the heat input of the burner shall be adjusted to within ± 2 % of 1,98 kW or 1,64 kW respectively.

The water temperature at the beginning of the test, t_1, shall be (20 ± 1) °C and the test vessel has its lid on. The temperature when the burner is extinguished shall be (90 ± 1) °C. The maximum temperature, t_2, shall be observed after the extinction of the burner (final temperature, expressed in degrees Celsius).

A measuring device is placed in the centre of the volume of water, and the temperature is measured using a sensor whose measurement error is less than 0,5 °C.

The burner is preheated as follows:

– the burner is operated for 10 min at nominal rate or at the adjusted in accordance with table 7;

– whatever the nominal heat input the burner is covered by a 220 mm vessel containing 3,7 kg of water.

After the preheating period the 220 mm vessel is removed and immediately replaced by the efficiency test vessel. The measurement of gas consumption starts then and ends after the burner's extinction, the vessel remaining in place.

The efficiency is calculated from the formula:

$$\eta = 4{,}186 \times 10^{-3}\, m_e \frac{t_1 - t_1}{V_c(\text{ou } m_c) \cdot H_s} \cdot 100$$

where

η is the efficiency in percent;

m_e is the water equivalent of the vessel filled as indicated below.
The mass m_e is made up of:

$$m_e = m_{e1} + 0{,}213 m_{e2}$$

where

m_{e1} is the volume of water put into the vessel;

m_{e2} is the mass of aluminium corresponding to the test vessel covered by its lid (the mass m_{e2} to be taken into account shall be the mass measured).

All masses are expressed in kilograms.

V_c is the volume of dry gas burnt, in cubic metres, obtained from the volume measured using the following formula:

$$V_c = V_{mes} \cdot \frac{p_a + p - p_w}{1013{,}25} \cdot \frac{288{,}15}{273{,}15 + t_g}$$

where

V_{mes} is the volume of gas measured, in cubic metres;

p_a is the atmospheric pressure, in millibars;

p is the supply pressure of the gas at the pressure point, in millibars;

p_w is the partial pressure of the water vapour, in millibars;

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

m_c is the mass of the dry unburnt gas, in kilograms;

H_s is the gross calorific value of gas as defined in **3.32**.

The requirements of **6.9.1** shall be verified.

7.3.9.2 Covered burners

Each burner is supplied with reference gas at normal test pressure, with the tap fully open.

Efficiencies, with any plates and rings being in place, are measured under the following conditions.

The vessel corresponding to the burner under test, (see table 7), in the most suitable position, is placed on the plate with the corresponding quantity of water for this test (note 1 in table 7 does not apply).

The smallest number of vessels chosen from table 7 with the largest possible diameter are placed on the remaining surface of the plate containing the corresponding quantities of water.

The temperature is measured in the same way as for an open burner; the start temperature of the water being (20 ± 1) °C, the final temperature is for each vessel the highest temperature observed after the burner's extinction, this being carried out once the temperature of the water in any of the vessels reaches (90 ± 1) °C.

A first test shall be carried out from the cold condition, a second test shall be carried out from the hot condition. The hotplate is said to be hot when the water in the main vessel, used for the efficiency test, is brought to the boil, this vessel being used alone. When the hotplate is hot the vessels are removed and replaced by vessels containing water at (20 ± 1) °C.

The requirements of **6.9.2** shall be met.

8 Marking

8.1 Appliance marking

All appliances shall carry, in a visible, legible to the user and durable fashion, in indelible characters at least the following information. The information shall be given in the official language(s) of the country or countries in which the appliance is to be sold:

– the name of the manufacturer or his identifying symbol;

– the appliance name;

– the total nominal heat input of all the burners expressed in kilowatts based on the gross calorific value and in grams per hour;

– the type of gases which may be used and the corresponding supply pressures;

– the appliances category;

– the type of electrical supply used, if applicable.

In addition, the data plate or any other support shall give the following warnings:

a) 'use outdoors only';

b) 'read the instructions before using the appliance'.

These statements shall be visible, legible to the user during the operation of the appliance and durable.

8.2 Packaging marking

The packaging of the appliance shall carry the following information in a visible and legible fashion, in the official language(s) of the country or countries in which the appliance is to be sold:

– the type and pressure of the commercial gases which may be used;

– the appliance category;

– the instruction to only use the appliance outdoors;

– the necessity of reading the instructions before use.

8.3 Instructions for assembly, use and maintenance

Instructions for use and maintenance shall be supplied with the appliance. All the information shall be given in the official language(s) of the country or countries in which the appliance is to be sold.

The instructions shall repeat the information required by **8.1**. In addition they shall specify:

8.3.1 the manufacturer's address.

8.3.2 the conditions of assembly and dismantling and of storage of the functional section of the appliance, in particular:

– the precautions to be taken when storing the appliance;

– the precautions to be taken in the case of blockage of the venturi or venturis;

– assembly diagrams, if applicable;

– the marking of injectors.

8.3.3 the conditions of connection to the gas container, in particular:

– the type(s) of container(s) to be used and their position(s);

– the type of regulator to be used;

– the type of flexible tube connecting the appliance to the gas container and the length recommended, which shall not exceed 1,50 m;

– the routing of the flexible tube and the use of guides;

– the necessity of changing the flexible tube when the national conditions require it.

8.3.4 the conditions of installation, in particular:

– the position of the connection flexible tube so as to ensure that it is not subjected to twisting;

– an instruction such as 'this appliance must be kept away from inflammable materials';

– the necessity of not obstructing the ventilation openings of the container compartment;

– the precautions to be taken when changing the gas container, which shall be carried out away from any source of ignition;

– the type of protection for the surface to be used when the support temperature exceeds 50 K.

8.3.5 the conditions of use, in particular:

– the usual cleaning and maintenance as well as the frequency of such tasks;

– the procedure in the event of gas leak (turning off the gas supply);

– the minimum and maximum sizes of cooking vessels to be used;

– the recommendation of the use of protective gloves when handling particularly hot components;

– note advising that parts sealed by the manufacturer or his agent must not be altered by the user.

In addition, the instructions shall contain the following warnings:

– 'only to be used outdoors';

– 'read the instructions before using the appliance';

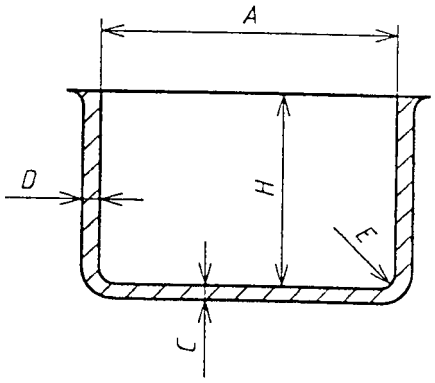
as well as the instructions of the form:

a) ' do not move the appliance during use';

b) 'turn off the gas supply at the gas container after use';

c) 'any modification of the appliance may be dangerous'.

For appliances using other sources of energy, the instructions shall contain the instructions specified by the corresponding standards.



A: internal diameter measured at the top;

B: internal height;

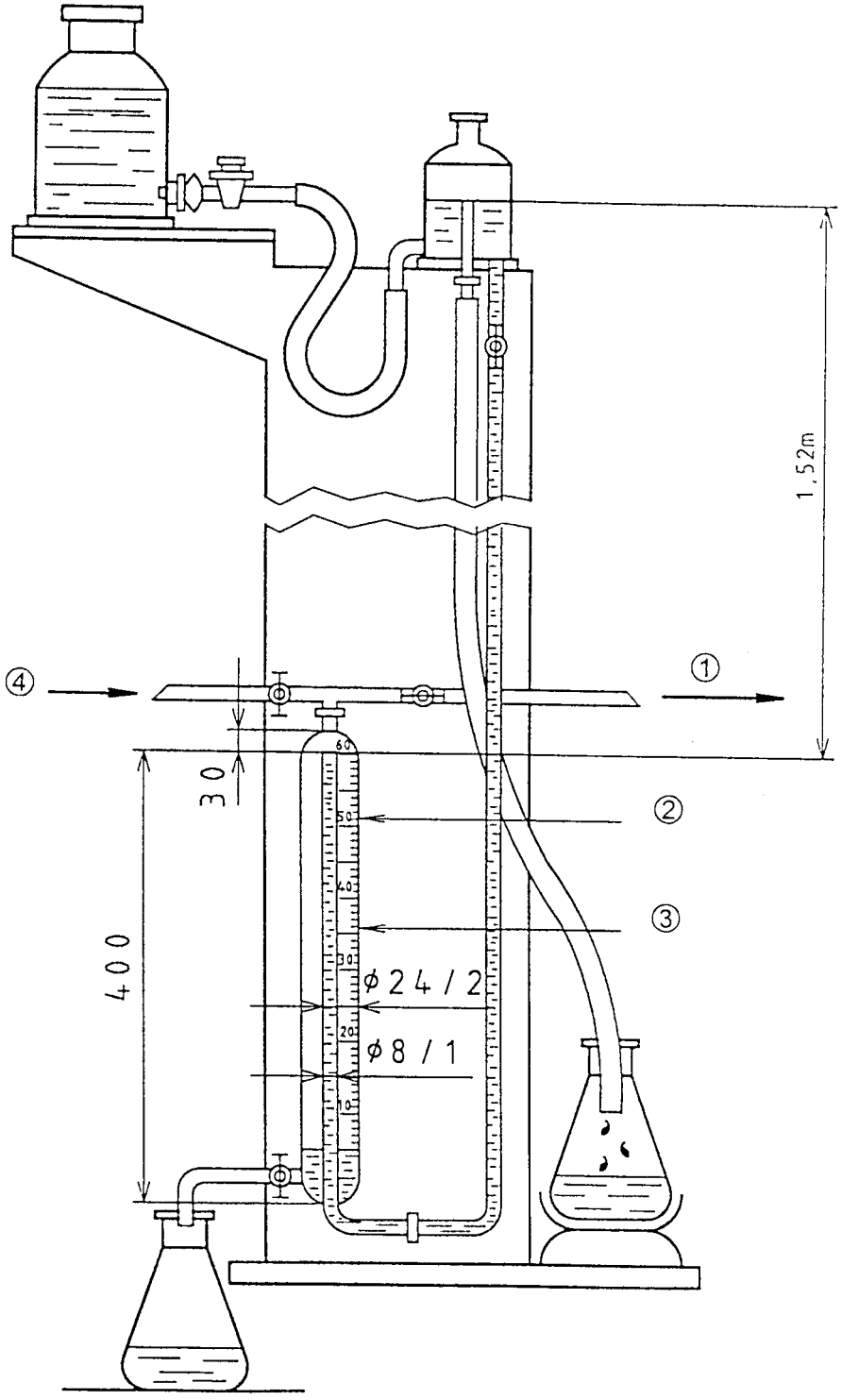
C: base thickness;

D: wall thickness;

E: internal radius.

	Designation				**Tolerance**
	20	**22**	**24**	**26**	
A (mm)	200	220	240	260	1 %
B (mm)	130	140	150	160	1 %
C min (mm)	2	2	2	2,5	
D min (mm)	1,5	1,5	1,5	1,8	
E (mm)	2,5	3	3,5	3,5	$^{+0,5}_{0}$
Base surface area (cm^2)	314	380	452	531	
Mass (g)	540	680	800	965	5 %
Lid mass[1)] (g)	125	149	177	208	
[1)] Masses without handles, calculated for lids in aluminium (specific gravity 2700 kg/m^3), given for information.					

Figure 1. Characteristics of the test pans



① Appliance under test;

② Graduated scale;

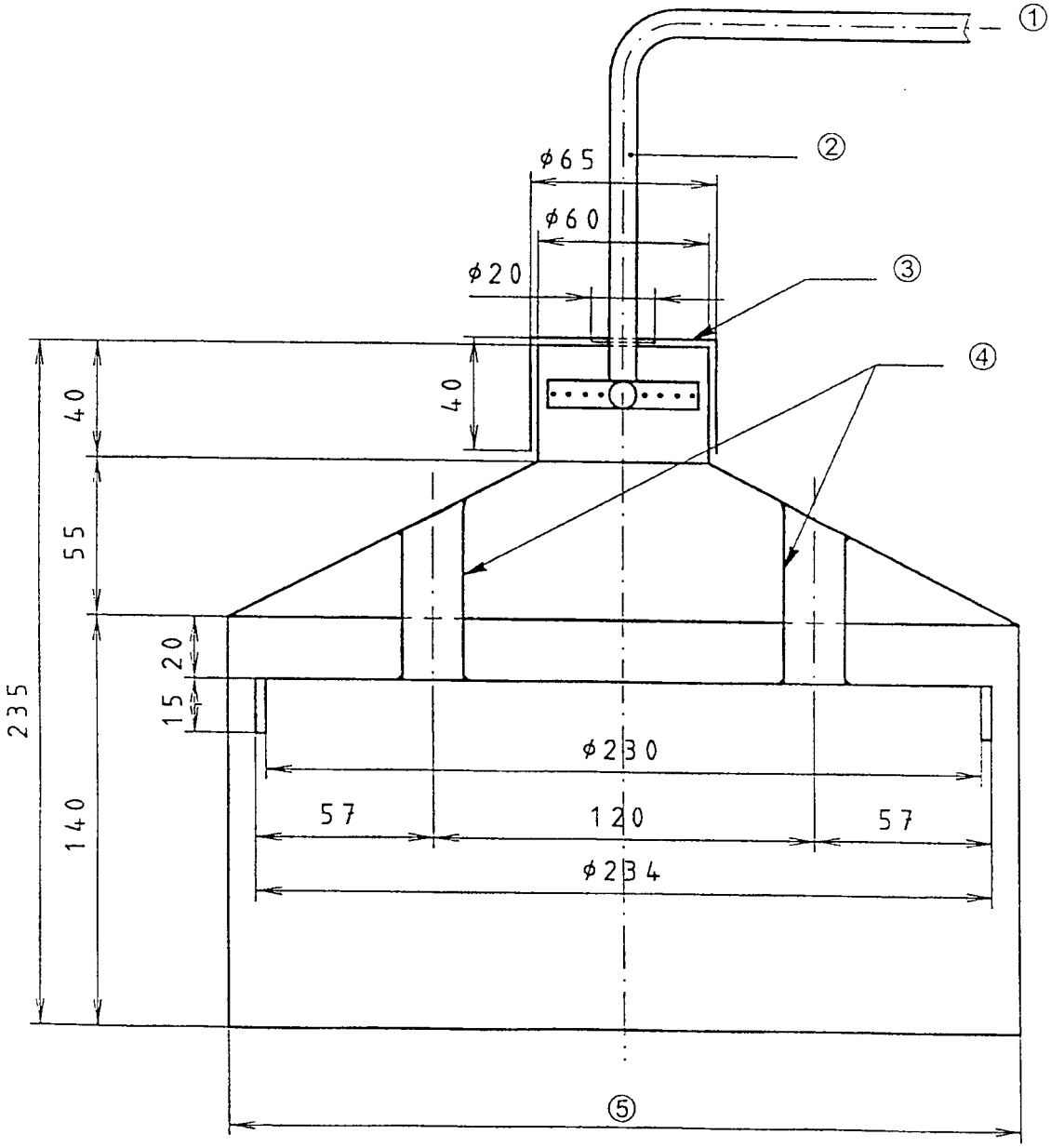
③ Measuring volume;

④ Compressed air.

The dimensions are given (in millimetres) as a guide.

Figure 2. Apparatus for testing soundness

Dimensions in millimetres



① To analyser;

② 8 mm i.d. tube;

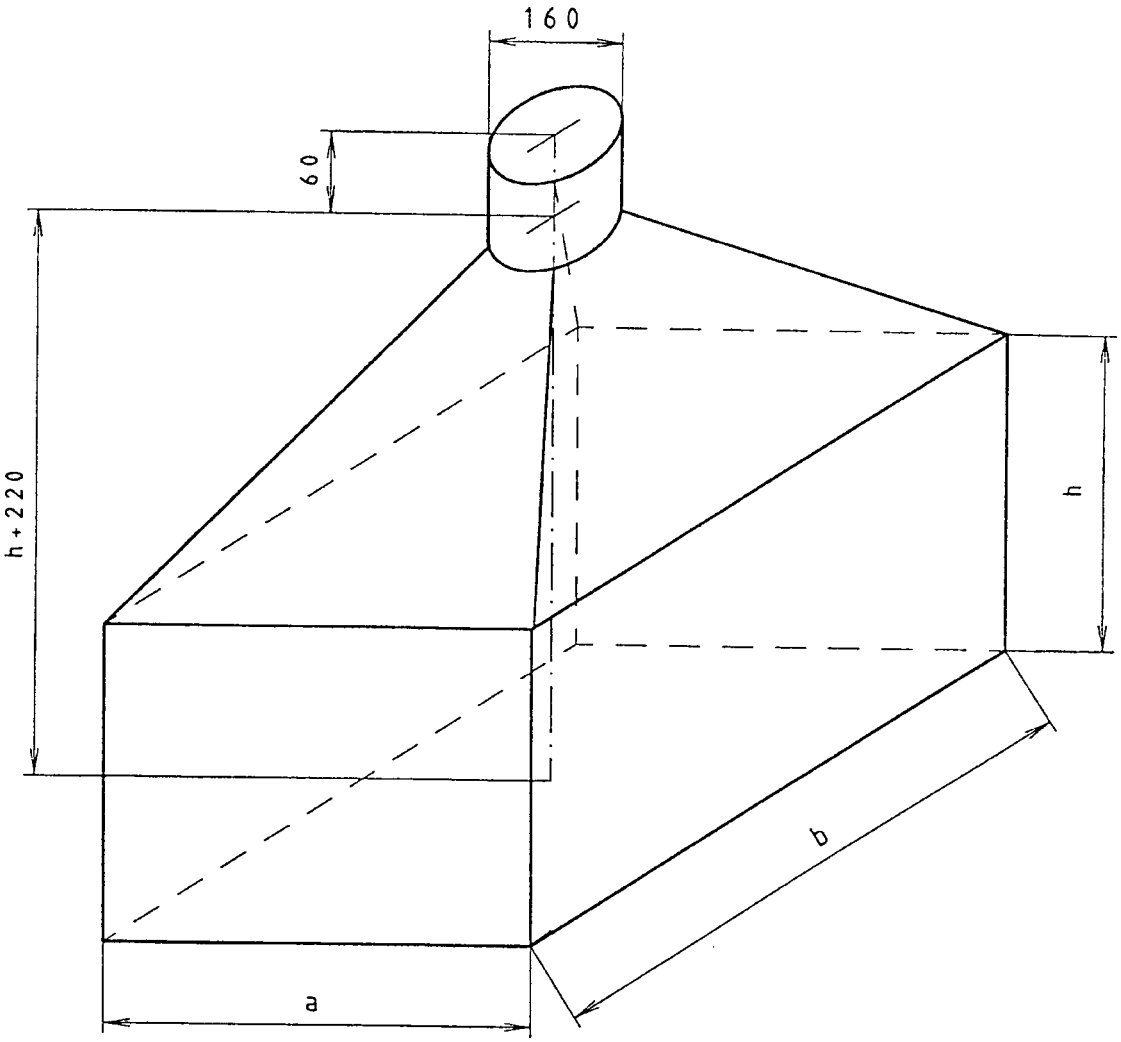
③ Restrictor;

④ Ø 22 tube;

⑤ Ø 258 internal.

Figure 3. Sampling device for checking combustion: individual operation of the burners

Dimensions in millimetres



$h \geq 320$ mm

a	500	580	680	710	630	790
b	600	700	680	780	1140	1000

The sizes of *a* and *b* for the sampling device shall be chosen in accordance with the requirements of **7.3.7.2**.
As a guide, the six devices whose dimensions are given above cover most cases met.

Figure 4. Sampling device for checking combustion: simultaneous operation of the hotplate burners

Annex A (normative)

National situations

In each country concerned with this standard only those appliances suitable for use with its particular supply and installation conditions special to this country may be sold.

In order to determine, both at the time of testing the appliances and also at the time of their delivery, the right choice among all the cases considered, the various national situations are summarized in tables A.1 and A.2.

A.1 Categories given in the body of the standard marketed in the various countries

Table A.1 gives the situations concerning marketing of categories of appliances given in the body of the standard in the various countries.

NOTE. The information given in this table in no way prohibits the manufacture and approval of appliances belonging to other categories intended for sale in other countries.

Table A.1 Appliance categories sold in various countries

Country	$\mathbf{I}_{3B/P(30)}$	$\mathbf{I}_{3B/P(50)}$	$\mathbf{I}_{3+(28\text{-}30/37)}$
Germany		x	
Austria		x	
United Kingdom			x
Belgium			x
Denmark	x		
Spain			x
Finland	x		
France			x
Greece			
Ireland			x
Iceland			
Italy			x
Luxembourg			
Norway	x		
Netherlands	x		
Portugal			x
United kingdom			x
Sweden			x
Switzerland		x	x

A.2 Types of connection used in various countries

Among all the types of connection specified in annex D, the various national situations are defined in table A.2.

NOTE. In some countries it is the custom and practice that these appliances are supplied complete with flexible hose or tubing and, in certain cases, regulators. National regulations with regard to use should be consulted for further information.

Table A.2 Types of connection used in various countries

Figures[1)] Country	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**ISO 228-1**	**ISO 7-1**
Germany								x		
Austria								x		
Belgium										
Denmark			x							
Spain										
Finland						x[4)]				
France						x[2)]				
Greece										
Ireland	x		x			x[3)]				
Iceland										
Italy										
Luxembourg										
Norway	x									
Netherlands										
Portugal						x[6)]x[7)]				
United Kingdom						x[3)]				x[5)]
Sweden										
Switzerland						x		x		

[1)] See annex D.
[2)] 6 mm diameter.
[3)] 8 mm diameter.
[4)] 13 mm diameter.
[5)] For appliances built in a unit.
[6)] 13 mm diameter with d_1 = 5 mm, d_2 = 9 mm, l = 24 mm.
[7)] 6 mm diameter with d_1 = 5,5 mm and d_2 = 6,5 mm.

Annex B (normative)

Method of calculation of the nominal heat input

B.1 The nominal heat input, indicated by the manufacturer, is given by one of the following expressions:

$$Q_n = \frac{1}{3600 \times 10^{-3}} \cdot M_n \cdot H_s$$

or

$$Q_n = \frac{1}{3600 \times 10^{-3}} \cdot V_n \cdot H_s$$

where

- Q_n is the nominal heat input, expressed in kilowatts;
- M_n is the nominal mass rate (in kilograms per hour) under reference test conditions;
- V_n is the nominal volume rate (in cubic metres per hour) obtained under reference test conditions;
- H_s is the gross calorific value of reference gas, expressed in megajoules per cubic metre or in megajoules per kilogram.

The mass and volume rates correspond to a measurement and to a flow of reference gas, under reference conditions, that is assuming the gas to be dry at 15 °C and under a pressure of 1013,25 mbar. In practice, the values obtained during the test do not correspond to the reference conditions, so they shall then be corrected so as to bring them to the values that would actually have been obtained if these reference conditions had existed at the injector outlet during the test.

B.2 Depending on whether it is determined by mass or by volume, the corrected mass rate is calculated from the following formulae:

– determination by mass:

$$\frac{M_0}{M} = \sqrt{\frac{1013{,}25 + p}{p_a + p} \cdot \frac{273{,}15 + t_g}{288{,}15} \cdot \frac{d_r}{d}}$$

– determination from volume rate:

$$\frac{V_0}{V} = \sqrt{\frac{1013{,}25 + p}{1013{,}25} \cdot \frac{p_a + p}{1013{,}25} \cdot \frac{288{,}15}{273{,}15 + t_g} \cdot \frac{d}{d_r}}$$

The corrected mass is calculated by the formula:

$$M_0 = 1{,}226 \cdot V_0 \cdot d_r$$

where

- M_0 is the mass rate under reference conditions, expressed in kilograms per hour;
- M is the mass rate obtained under test conditions, expressed in kilograms per hour;
- V_0 is the volume rate under reference conditions, expressed in cubic metres per hour;
- V is the volume rate obtained under test conditions, expressed in cubic metres per hour;
- p_a is the atmospheric pressure, expressed in millibars;
- p is the supply pressure, expressed in millibars;
- t_g is the temperature of the gas at the measuring point, in degrees Celsius;
- d is the density of dry (or wet) test gas relative to dry air;
- d_r is the density of the dry reference gas relative to dry air.

These formulae shall be used to calculate, from the mass heat input M, or volume heat input V, measured during the test, the corresponding rate M_0 or V_0 which would have been obtained under the reference conditions. It is these values M_0 and V_0 which shall be compared with the values M_n and V_n calculated from the nominal heat input using the formulae given at the beginning of this annex.

These formulae are applicable if the gas used is dry.

B.3 If a wet meter is used or if the gas used is saturated, the value d (density of dry gas in relation to dry air) shall be replaced by the value of the density of the wet gas d_h given by the following formula:

$$d_h = \frac{d(p_a + p - W) + 0{,}622W}{p_a + p}$$

where:

- W is the saturated vapour pressure of water, expressed in mbar, at the temperature t_g.

B.4 If, for practical reasons, there is a significant difference in pressure between the outlet of the meter and the inlet of the appliance, in order to obtain the volume rate, V, under test (appliance inlet) conditions, the measured volume shall be multiplied by the coefficient C:

$$C = \frac{p_a + p_m}{p_a + p}$$

where

- p_m is the meter pressure, expressed in millibars.

Annex C (normative)
Composition of test gases

C.1 The compositions of the gases used for the tests shall be as near as possible to those given in table 3. The constitution of these gases shall be in accordance with the rules given in **C.2** and **C.3**.

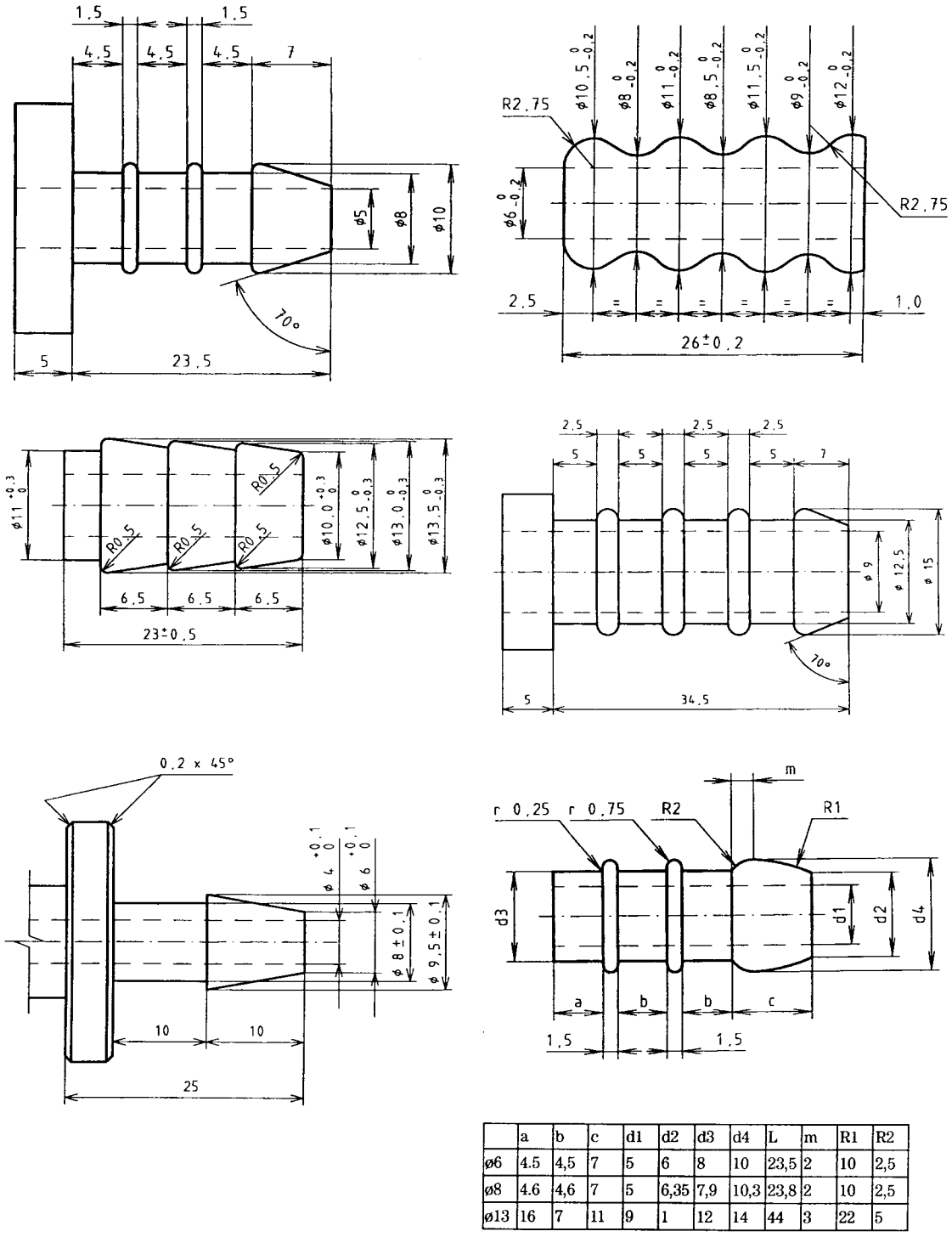
C.2 The wobbe index of the gas used shall be within ± 2 % of the value indicated in table 3 for the corresponding test gas (this tolerance includes the error of the measuring devices).

C.3 The gases used shall have the following degrees of purity:

– butane C_4H_{10} 95%	with a total quanitity of hydrogen, carbon monoxide and oxygen under 1 % and a total quantity of nitrogen and carbon dioxide under 2%.
– propane C_3H_6 95%	
– propane C_3H_8 95%	

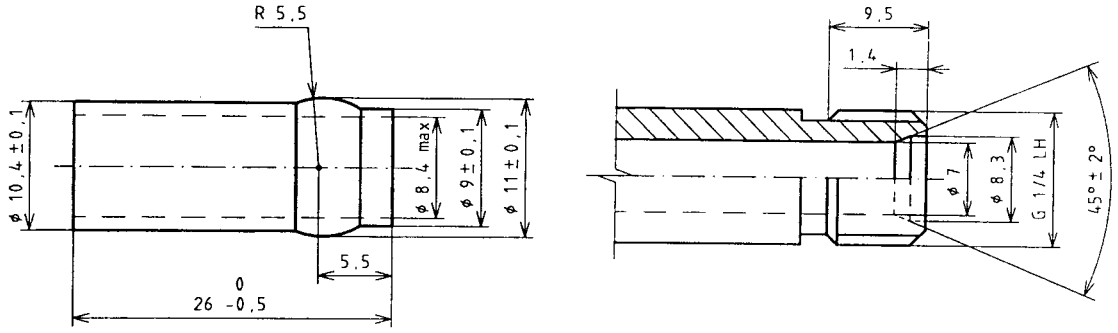
Annex D (informative)
Connection of appliances

The main types of connection used are shown in figures A to H in figure D.1 (see also annex A).



	a	b	c	d1	d2	d3	d4	L	m	R1	R2
ø6	4.5	4,5	7	5	6	8	10	23,5	2	10	2,5
ø8	4.6	4,6	7	5	6,35	7,9	10,3	23,8	2	10	2,5
ø13	16	7	11	9	1	12	14	44	3	22	5

Figure D.1 Diagram showing the various types of connections



H Threaded connection

Figure D.1 Diagram showing the various types of connections (*concluded*)

Annex ZA (informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU Directives.

Warning. Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

The following clauses of this standard are likely to support requirements of Directive 90/396/EEC 'Gas appliances'.

Compliance with the clauses of this standard provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

Table ZA.1

Essential requirement	Subject	Requirements in the standard	Comments
1	Annex 1 General conditions		
1.1	Safety of operation	**1**	
1.2	Marking and instructions Installation instructions User's instructions Warnings Official languages	**8**	
1.2.1	Information in the technical instructions	**8.3**	Fresh air supply – not applicable
1.2.2	Content of the user's and maintenance instructions		
1.2.3	Appliance and packing marking	**5.19**, **8.1**, **8.2**	
1.3	Fittings		Not applicable
2	Materials		
2.1	Characteristics	**8.2**	
2.2	Guarantee	**1** and Foreword	
3	Design and construction		
3.1	General		
3.1.1	Distortion, breakage and wear	**5.2**, **5.3**, **5.4**, **5.5**, **5.6**, **5.7**, **5.9**, **5.10**, **5.11**, **5.14**, **5.16**, **5.17**, **6.4.4**, **6.5**b), c) and d)	
3.1.2	Condensation		Not applicable
3.1.3	Risk of explosion	**5.8, 6.1**	
3.1.4	Air and water penetration		Not applicable
3.1.5	Normal fluctuation of auxiliary energy	**5.19**	

Table ZA.1

Essential requirement	Subject	Requirements in the standard	Comments
3.1.6	Abnormal fluctuation of auxiliary energy	**5.19**	
3.1.7	Electrical risks	**5.19**	
3.1.8	Pressurized parts		Not applicable
3.1.9	Failure of safety devices: flame supervision devices	**5.15**	
3.1.10	Safety and controlling devices	**5.15**	
3.1.11	Protection of parts adjusted by the manufacturer	**5.1**, **5.3**	
3.1.12	Marking of handles and of control or adjusting devices	**5.12**	
3.2	Unburned gas release		
3.2.1	Gas leakage rate	**5.8**, **5.9**, **5.16**, **6.1**	
3.2.2	Accumulation in the appliance	**5.15**, **6.3**	
3.2.3	Accumulation in rooms		Not applicable
3.3	Ignition	**5.14**, **6.4.1**	
3.4	Combustion		
3.4.1	Flame stability — concentration of substances hazardous to health in the products of combustion	**6.4.2**, **6.4.3**, **6.7**, **6.8**	
3.4.2	Accidental release of combustion products		Not applicable
3.4.3	Abnormal draught conditions		Not applicable
3.4.4	Quantity of CO in the room (flueless heaters and water heaters)		Not applicable
3.5	Rational use of energy	**6.9**	
3.6	Temperatures		
3.6.1	Floor and adjacent surfaces	**6.5**f), **6.6**, **6.3.4**	
3.6.2	Control handles	**6.5**e)	
3.6.3	Temperatures of external surfaces	**6.5**a)	
3.7	Materials in contact with food and sanitary water	**5.2**	'Potable water': not applicable
	Annex II	**1** and Foreword	
	Annex III	**8.1**	

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