

Specification for

**Dedicated liquefied petroleum
gas appliances —**

**Domestic flueless space
heaters (including diffusive
catalytic combustion heaters)**

The European Standard EN 449 : 1996 including corrigendum July 1997 has the status of a British Standard

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Committees responsible for this British Standard

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- British Combustion Equipment Manufacturers' Association
- British Gas plc
- Consumer Policy Committee of BSI
- Department of Trade and Industry (Consumer Safety Unit, CA Division)
- Gas Barbecue Association
- Institution of Fire Engineers
- LP Gas Association
- National Caravan Council Limited
- Society of British Gas Industries
- Co-opted members

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Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
Foreword	2
Text of EN 449	4

National foreword

This British Standard has been prepared by Technical Committee GSE/24, and is the English language version of EN 449 : 1996, including corrigendum July 1997 published by the European Committee for Standardization (CEN). It supersedes BS 5258 : Part 10 and BS 5258 : Part 11 which are withdrawn.

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

English version

Specification for dedicated liquefied petroleum gas appliances – Domestic flueless space heaters (including diffusive catalytic combustion heaters)

Spécifications pour les appareils fonctionnant
exclusivement aux gaz de pétrole liquéfiés —
Appareils de chauffage domestiques non raccordés
(y compris les appareils de chauffage à combustion
catalytique diffusive)

Festlegungen für flüssiggasgeräte — Abzugslose
Haushaltsraumheizer (einschließlich Heizer mit
diffusiver katalytischer Verbrennung)

This European Standard was approved by CEN on 1995-07-19. 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, 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

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 August 1996, and conflicting standards shall be withdrawn at the latest by August 1996.

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 Directive(s).

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

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

Contents

	Page
Foreword	2
1 Scope	4
2 Normative references	4
3 Definitions	4
4 Classification	6
4.1 Classification of gases	6
4.2 Classification of appliances	6
5 Safety and constructional requirements	7
5.1 Test methods	7
5.2 Conversion to different gases	7
5.3 Materials	7
5.4 Cleaning and user maintenance	7
5.5 Strength of assembly	7
5.6 Soundness of the gas circuit assembly	7
5.7 Connections	7
5.8 Appliance stability, fixing and mobility devices	8
5.9 Taps and controls	8
5.10 Control handles, knobs or pushbuttons	8
5.11 Injectors	8
5.12 Ignition device	8
5.13 Safety devices	9
5.14 Cylinder compartment	9
5.15 Verification of the heat inputs	9
5.16 Effect of light back	9
5.17 Temperature of various parts of the appliance	10
5.18 Temperature of the support, walls or adjacent surfaces	10
5.19 Temperature of taps and components	10
5.20 Overheating of the LPG cylinder and its compartment	10
5.21 Ignition	10
5.22 Crosslighting	11
5.23 Flame stability	11
5.24 Combustion	11
5.25 Additional requirements	11
6 Test methods	12
6.1 General	12
6.2 Conversion to different gases	14
6.3 Materials	14
6.4 Cleaning and user maintenance	14
6.5 Strength of assembly	14
6.6 Soundness of the gas circuit assembly	14
6.7 Connections	14

	Page		Page
6.8 Appliance stability, fixing and mobility devices	14	Tables	
6.9 Taps and controls	14	1 Classification of gases	6
6.10 Control handles, knobs or pushbuttons	14	2 Maximum allowable pressure increase inside the LPG cylinder	10
6.11 Injectors	14	3 Test gases corresponding to the categories of appliances	12
6.12 Ignition devices	14	4 Characteristics of the test gases	13
6.13 Safety devices	15	5 Test pressures	13
6.14 Cylinder compartment	16	6 Test gases and pressure for ignition tests	18
6.15 Verification of heat inputs	16	7 Test gases and pressures for crosslighting tests	19
6.16 Effect of light back	16	8 Test gases, pressures and conditions for combustion tests	20
6.17 Temperature of various parts of the appliance	17	A.1. Normal supply pressure for appliances	24
6.18 Temperature of the support, walls and adjacent surfaces	17	A.2. Appliance categories marketed in various countries	25
6.19 Temperature of taps and components	17	A.3. Types of connection used in various countries	26
6.20 Overheating of the LPG cylinder and its compartment	17	Annexes	
6.21 Ignition	18	A (normative) Special national conditions	24
6.22 Crosslighting	19	B (normative) Vitiating room	29
6.23 Flame stability	19	C (informative) Air supply and ventilation	30
6.24 Combustion	20	ZA (informative) Correspondence between this standard and EC Directive 90/396/EEC	30
6.25 Additional requirements	21		
7 Marking and instruction literature	22		
7.1 Data plate	22		
7.2 Warning label	22		
7.3 Packaging	22		
7.4 Instructions for use and user maintenance	22		
7.5 Instructions for installation	23		
7.6 Specialist servicing instructions	23		
Figures			
1 Apparatus for testing soundness	15		
2 Apparatus for measure of increase of vapour pressure	18		
3 Stability of flames: example of an apparatus for the draught test	20		
4 Details of probe	22		
A.1 Nozzles	27		
A.2 Union connector	28		
B.1 Vitiating room	29		

1 Scope

This standard specifies, for the purpose of type examination, the requirements, the test methods and the marking of domestic flueless space heaters, including diffusive catalytic combustion heaters, having a nominal heat input (H_s) not exceeding 4,2 kW burning 3rd family gases at nominal operating pressures not exceeding 50 mbar, referred to in the text as 'appliances'.

It covers the following types of appliance:

- a) fixed heaters burning commercial butane and/or commercial propane;
- b) portable or mobile heaters burning either commercial butane, or commercial propane including those that incorporate a compartment for a transportable refillable liquefied petroleum gas cylinder.

There are no specific thermal efficiency requirements appropriate to these types of appliance as:

- c) all the heat produced by the combustion process is released into the space to be heated;
- d) the requirements with regard to the combustion performance, which is a safety matter, ensure the effective burning of the fuel gas.

It does not cover appliances incorporating electrically operated gas control systems.

Annex A gives the details of the categories of appliances marketed in various countries.

Requirements for appliances given in this standard assume that the supply of gas from the container will be governed by a pressure regulator having a maximum nominal outlet pressure of 50 mbar.

This standard does not cover cylinders for liquefied petroleum gas or their associated regulators.

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	<i>Flame supervision devices for gas burning appliances — Thermo-electric flame supervision devices</i>
EN 126	<i>Multifunctional controls for gas burning appliances</i>
EN 161	<i>Automatic shut-off valves for gas burners and gas appliances</i>
EN 257	<i>Mechanical thermostats for gas burning appliances</i>
EN 549	<i>Rubber materials for seals and diaphragms for gas appliances and gas equipment</i>
EN 60335-1 : 1988	<i>Safety of household and similar electrical appliances</i> <i>Part 1: General requirements</i>
ISO 7-1	<i>Pipe threads where pressure-tight joints are made on the threads — Part 1: Designation, dimensions and tolerances</i>
ISO 228-1	<i>Pipe threads where pressure-tight joints are not made on the threads — Part 1: Designation, dimensions and tolerances</i>
ISO 274	<i>Copper tubes of circular section — Dimensions</i>

3 Definitions

For the purposes of this standard the following definitions apply.

3.1 appliance incorporating a cylinder

An appliance which includes a compartment for the cylinder.

3.2 auxiliary equipment

Auxiliary equipment includes:

- tap and cocks;
- flame supervision devices;
- thermostats;
- multifunctional controls;
- automatic shut-off valves.

3.3 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 drawn in at the port, termed secondary air, is drawn in after the burner outlet.

3.4 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 kW.

3.5 nominal heat input of burner

The value of the heat input of a burner, as declared by the manufacturer.

3.6 volume rate

The volume of gas passed in unit time. This is expressed in m³/h or in dm³/h.

3.7 mass rate

The mass of gas passed in unit time. This is expressed in kg/h or g/h.

3.8 flame lift

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

3.9 relative density (*d*)

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

3.10 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.....), or thermal (pilot, ...).

3.11 flame supervision device

A device including a sensing element which causes the gas supply to a burner to be opened or closed according to the presence or absence of the flame which activates the sensing element.

3.12 Wobbe number (*W_s*)

This is given by the formula:

$$W_s = \frac{H_s}{\sqrt{d}}$$

where *H* is the gross calorific value of a gas expressed in megajoules per cubic metre, and *d* is its relative density.

3.13 injector

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

- *calibrated injector*: where the section of the outlet orifice is fixed;
- *adjustable injector*: where the section of the outlet orifice is variable.

3.14 sound mechanical joint

A connection device assuring soundness in an assembly made up of several parts, generally of metal. It may be:

- a conical joint;
- an O-ring joint;
- a flat-faced joint.

3.15 tap handle

A manually operated component used to open, partially open, or close a tap.

3.16 putting a control out of service

A control (of temperature, pressure, etc.) is said to be put out of service if it is put out of action and sealed in this position. The appliance then functions as if this device had been removed.

3.17 primary air adjuster

A device allowing the primary aeration of a burner to be set at a predetermined value according to the supply conditions. The operation of changing the setting of this device is termed the 'adjustment of primary air'.

3.18 gas rate adjuster

A device allowing the gas rate to a burner to be set at a predetermined value according to the supply conditions. It often consists of a screw, termed a 'throttle screw' or an 'adjustment screw'. The operation of changing the setting of this device is termed the 'adjustment of the gas rate'.

3.19 gross calorific value (*H_s*)

The quantity of heat produced by the complete combustion, at constant pressure, of unit volume or mass of the considered gas, the water produced by the combustion being condensed.

It is expressed in megajoules referred either to per cubic meter of dry gas measured at 15° C at a pressure of 1 013 mbar or to per kg of dry gas.

3.20 gas supply pressure

The difference between the static pressure measured at the inlet connection of the appliance and the atmospheric pressure.

3.21 light back

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

3.22 tap

A device to adjust the heat input during use and/or isolate the gas supply to the various burners.

3.23 sealing of an adjuster

An action whereby the locking of an adjuster is achieved by a means such that any attempt to change the adjustment makes the interference with the adjuster apparent (e.g. breaking of a sealing material).

3.24 soft soldering

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

3.25 stability of flames

The flames are stable at the burner ports when the phenomena of flame lift or light back do not occur.

3.26 thermostat

A device to maintain automatically a selected constant temperature. It may include a graduated scale for the selection of the temperature.

3.27 closed fronted fire

An appliance in which the glowing area is substantially covered by means of a transparent or translucent screen.

3.28 cold condition

A condition of the appliance required for some tests and obtained by allowing the unlit appliance to attain equilibrium at room temperature.

3.29 hot condition

A condition of the appliance required for some tests and obtained by heating for one hour at the normal test pressure.

3.30 fixed heater

A heater designed to be secured to a wall or floor.

3.31 mobile heater

A self-contained heater incorporating its own gas container within the body of the appliance and designed to be moved without lifting.

3.32 portable heater

A self-contained heater for connection to a gas supply by means of flexible tubing and designed to be easily carried.

3.33 atmosphere sensing device

A device that is designed to shut off the gas supply when the carbon dioxide content of the surrounding atmosphere exceeds a given level. Such a device normally comprises a vitiation sensitive pilot in conjunction with a suitable flame supervision device.

3.34 catalytic unit

The panel and its content, including the catalytic pad, into which the gas is injected, through which it is distributed and oxidized, and from which the products are emitted.

3.35 diffusive catalytic combustion space heater

A space heating appliance in which gas diffuses through a catalytic pad and is flamelessly oxidized by oxygen that has diffused into the pad from the surrounding atmosphere at a temperature below that at which flame combustion would occur.

NOTE. Diffusive catalytic combustion space heaters do not include catalytic combustion heaters in which pre-mixing of gas and air is effected before the catalytic pad is reached, nor do they include appliances employing after-burners in which products of incomplete combustion from burners are further oxidized over a catalyst.

3.36 by-pass rate

The non-adjustable rate of flow through a thermostat when the valve is closed.

3.37 slip

Small quantities of unburnt fuel gas which have passed through the catalytic pad.

3.38 minimum operational rate

Either

- a) for any burner or section of a burner that is controlled by a thermostat, the bypass rate, or,
- b) for any burner that is manually controlled but where it is only possible to obtain certain predetermined fixed settings, the lowest rate obtainable in normal use.

3.39 removable

That which may only be removed with a tool.

4 Classification

4.1 Classification of gases

Gases likely to be used are classified in families according to the value of their Wobbe number.

Table 1. Classification of gases	
Gas families and groups, 3rd family gases	Wobbe number MJ/m ³ (H _s at 15° C)
Group B/P	between 72,9 and 87,3
Group P	between 72,9 and 76,8
Group B	between 81,8 and 87,3

4.2 Classification of appliances

Appliances are classified into categories according to the gases and pressures that they are designed to use. However, for each country, only some of the categories defined hereafter are applicable, on account of local gas distribution conditions (types of gas and supply pressures). For these categories, requirements different from those defined in this standard shall not be specified.

Annex A describes the gas distribution conditions and types of connection applicable to each country.

This specification only covers appliances of the following categories:

- a) appliances in Category I₃₊ which may be used at a nominal operating pressure of 37 mbar when used on propane and a nominal operating pressure of 28 mbar or 30 mbar when used on butane;
- b) appliances in Category I_{3B/P(30)} which may be used with propane, butane or mixes of these gases at a nominal operating pressure of 28 mbar or 30 mbar;
- c) appliances in Category I_{3B/P(50)} which may be used with propane, butane or mixes of these gases at a nominal operating pressure of 50 mbar;

- d) appliances in Category I_{3B} which may be used with butane only at a nominal operating pressures of 28 mbar or 30 mbar;
- e) appliances in Category I_{3P(37)} which may be used with propane only at a nominal operating pressure of 37 mbar;
- f) appliances in Category I_{3P(50)} which may be used with propane only at a nominal operating pressure of 50 mbar.

5 Safety and constructional requirements

5.1 Test methods

The test methods and means of assessment shall be as described in clause 6.

5.2 Conversion to different gases

The appliance shall be supplied for a single gas category and for a single operating pressure or pressure couple. Conversion to another category or pressure or pressure couple is not permitted.

5.3 Materials

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

In particular, all parts of the appliance shall withstand the mechanical, chemical and thermal conditions to which they may be submitted during their use. In normal conditions of use, of cleaning or of adjustment, the materials shall not be liable to any deformation which might impair their performance. Metal parts shall be suitably protected against the effects of corrosion.

When a European Standard is adopted for a means of sealing used on the appliance, that means of sealing shall comply with the requirements of that European Standard.

Rubber seals shall be made from materials which comply with EN 549.

The appliance gas pipework and gas controls shall be of metal except as allowed in 5.6.

Materials containing asbestos shall not be used.

Glass components shall not have sharp edges or corners likely to cause injury during use or maintenance. Mountings for glass components shall be such as to avoid stresses on the glass during normal use.

5.4 Cleaning and user maintenance

Any part of the appliance requiring cleaning by the user shall be easily accessible without having to move the appliance, and without the use of a tool. It shall be possible to replace such parts correctly and without difficulty.

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

5.5 Strength of assembly

The construction of the appliance shall be such that, during normal conditions of use, maintenance and, for mobile and portable appliances, movement, any displacement, distortion or deterioration of parts likely to impair its good performance will not occur.

5.6 Soundness of the gas circuit assembly

Holes for screws, pins, etc. intended for the assembly of components shall not open into the gas ways.

The soundness of assemblies connected to the gas circuit shall be assured, by means of metal-to-metal joints or joints with seals (e.g. washers, O-rings).

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

Soft solder shall not be used to ensure the soundness of the connections of the gas circuit.

Removable components or the threaded parts of the pipe work which may be dismantled during normal maintenance shall remain sound after five disconnections, if necessary after changing a gasket, where such exists.

Under the test condition specified in 6.6.2, the leak detected during each of the tests numbers 1 and 2 shall not exceed 0,07 dm³/h (dry air, 20° C, 1 013 mbar).

5.7 Connections

5.7.1 Gas inlet

The gas inlet to the appliance shall be one of the following types.

For fixed appliances:

- a) without a thread: for a length of at least 30 mm its extremity shall be cylindrical, smooth and clean to allow connection by means of a gas-tight compression fitting;
- b) with a thread: its extremity shall have a thread following ISO 228-1 or ISO 7-1, size ½, 3/8, ¼ (major diameter 21 mm, 17 mm or 13 mm);
- c) for connection to copper tube complying with ISO 274 (compression or capillary fittings)

For mobile and portable appliances:

- d) with a nozzle for the attachment of a flexible tube;
- e) a downward facing union connector for a hose assembly.

The special national conditions with regard to connections are given in annex A.

5.7.2 Pressure test point

For fixed appliances, means shall be provided to allow the pressure to be measured easily.