

Specification for

Test gases — Test pressures — Appliance categories

The European Standard EN 437:1993 with the incorporation of amendments A1:1997 and A2:1999, has the status of a British Standard

ICS 91.140.40

Cooperating organizations

The European Committee for Standardization (CEN), under whose supervision this European Standard was prepared, comprises the national standards organizations of the following countries:

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United Kingdom	British Standards Institution

This British Standard, having been prepared under the direction of the Gas Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 15 February 1994

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National foreword

This British Standard has been prepared under the direction of the Gas Standards Policy Committee and is the English language version of EN 437:1993 *Test gases — Test pressures — Appliance categories*, including amendments A1:1997 and A2:1999, published by the European Committee for Standardization (CEN).

EN 437 was produced as a result of international discussion in which the United Kingdom took an active part.

BS EN 437:1994 supersedes BS 4947:1984 *Specification for test gases for gas appliances*, which is withdrawn.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 29 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Sidelining in this document indicates the most recent changes by amendment.

Test gases — Test pressures — Appliance categories

(includes amendments A1:1997 and A2:1999)

Gaz d'essais — Pressions d'essais —
Catégories d'appareils
(inclut les amendements A1:1997 et A2:1999)

Prüfgase — Prüfdrücke — Gerätekategorien
(enthält Änderungen A1:1997 und A2:1999)

This European Standard was approved by CEN on 1993-11-17, amendment A1 was approved by CEN on 1996-11-14 and amendment A2 was approved by CEN on 1999-09-03. 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

Foreword

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

This European Standard has been prepared by Technical Committee CEN/TC 238 "*Test gases, test pressures and appliance categories*" and is intended to provide all the CEN Technical Committees preparing standards on gas appliances with definitions for test gases, test pressures and categories of appliances for use by these committees within the limits of the scope defined in clause 1.

Similarly, it is emphasized that distributors of 2nd family gases using pressure couples should restrict themselves to their use in the normal manner but may, in exceptional circumstances and for short periods, use gases of the lowest Wobbe index at the lowest pressure, under conditions in which the safety of the appliance has to be ensured.

The standard seeks to clarify the present situation with respect to test gases, test pressures and appliance categories and to simplify wherever possible. The adoption of a single group of pressures (17 – 20 – 25 mbar) in the second family (groups E and H) constitutes a notable simplification in that it concerns the majority of appliances.

The replacement of the test pressures of 28 mbar and 30 mbar for butane by a single test pressure of 29 mbar also constitutes a notable advance.

The concern for clarity has led to the elucidation of a number of categories and national situations or conditions which had not appeared at all explicit in previous documents. This is the interpretation of a situation which had previously not always been clearly expressed and which this standard helps to clarify and simplify.

The present standard can therefore be considered an important stage in the harmonization of test gases, test pressures and appliance categories.

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 May 1994, and conflicting national standards shall be withdrawn at the latest by December 1995.

The standard was approved and in accordance with the CEN/CENELEC Internal Regulations, 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, United Kingdom.

Foreword to amendment A1

This Amendment EN 437:1993/A1:1996 to EN 437:1993 has been prepared by Technical Committee CEN/TC 238 "*Test gases, test pressures and categories of appliances*", the Secretariat of which is held by AFNOR.

This Amendment to the European Standard EN 437:1993 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 1997, and conflicting national standards shall be withdrawn at the latest by July 1997.

This Amendment to the European Standard EN 437:1993 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).

NOTE The symbol * placed in the margin opposite a clause or a paragraph means that the modification is a correction to the original text of EN 437:1993 which applies only to this language version of EN 437/A1.

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

Foreword to amendment A2

This Amendment EN 437:1993/A2:1999 to EN 437:1993 has been prepared by Technical Committee CEN/TC 238, *Test gases, test pressures and categories of appliances*, the Secretariat of which is held by AFNOR.

This Amendment to the European Standard EN 437:1993 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2000, and conflicting national standards shall be withdrawn at the latest by April 2000.

This Amendment to the European Standard EN 437:1993 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).

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.

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1 Scope

This standard specifies the test gases, test pressures and categories of appliances relative to the use of combustible gases of the first, second and third families. It serves as a reference document in the specific standards for appliances that fall within the scope of the Council Directive on the approximation of the laws of Member States concerning gas appliances.

The standard makes recommendations for the use of the gases and pressures to be applied for the tests. The full procedure will be given in the corresponding appliance standards.

NOTE The test gases and the test pressures specified in this standard are in principle intended to be used with all the appliances in order to establish conformity with the corresponding standards.

However, the use of some test gases and test pressures may not be appropriate in the following cases:

- appliances with nominal heat input greater than 300 kW;
- appliances constructed on site;
- appliances in which the final design is influenced by the user;
- appliances constructed for use with high supply pressures (notably direct use of the saturated vapour pressure).

In these cases, the specific appliance standards may specify other conditions of test in order to establish conformity with their requirements.

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 the 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.

ISO 6976:1995, *Natural gas — Calculation of calorific value, density, relative density and Wobbe index from composition* (Revision of ISO 6976:1983).

3 Definitions

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

3.1

gas appliance

an appliance burning combustible gases

NOTE For the purposes of this standard the term “gas” means “combustible gas”, i.e. any combustible that is in the gaseous state at a temperature of 15 °C, and under a pressure of 1 bar.

3.2

test gases

gases intended for the verification of the operational characteristics of appliances using combustible gases. They consist of reference gases and limit gases

3.3

reference gases

test gases on which appliances operate under nominal conditions when they are supplied at the corresponding normal pressure

3.4

limit gases

Test gases representative of the extreme variations in the characteristics of the gases for which appliances have been designed

3.5

test pressures

gas pressures used to verify the operational characteristics of appliances using combustible gases. They consist of normal and limit pressures

unit: millibar (mbar)

NOTE 1 mbar = 10²Pa.

3.6

normal pressure

the pressure under which the appliances operate in nominal conditions when they are supplied with the corresponding reference gas

symbol: P_n

3.7

limit pressures

pressures representative of the extreme variations in the appliance supply conditions

symbols: maximum pressure: $P_{\max}$; minimum pressure: $P_{\min}$

3.8

pressure couple

combination of two distinct gas distribution pressures applied by reason of the significant difference existing between the Wobbe indices within a single family or group in which:

- the higher pressure corresponds only to gases of low Wobbe index,
- the lower pressure corresponds to gases of high Wobbe index.

3.9

reference conditions

these correspond to 15 °C, 1 013,25 mbar, unless otherwise specified

3.10

relative density

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

symbol: d

3.11

calorific value

the quantity of heat produced by the complete combustion, at a constant pressure equal to 1 013,25 mbar, of unit volume or mass of gas, the constituents of the combustible mixture being taken at reference conditions and the products of combustion being brought back to the same conditions

a distinction is made between:

- the gross calorific value in which the water produced by combustion is assumed to be condensed.

Symbol: H_s

- the net calorific value in which the water produced by combustion is assumed to be in the vapour state.

Symbol: H_i

unit: either:

- megajoule per cubic metre (MJ/m³) of dry gas at the reference conditions, or
- megajoule per kilogram (MJ/kg) of dry gas.

3.12

wobbe index

the ratio of the calorific value of a gas per unit volume and the square root of its relative density under the same reference conditions. The Wobbe index is said to be gross or net according to whether the calorific value used is the gross or net calorific value

symbol: gross Wobbe index: W_g ; net Wobbe index: W_i

unit: either:

- megajoule per cubic metre (MJ/m³) of dry gas at the reference conditions, or
- megajoule per kilogram (MJ/kg) of dry gas.

3.13**heat input**

the quantity of energy used in unit time corresponding to the volumetric or mass flow rates, the calorific value used being either the net or gross calorific value

symbol: Q

unit: kilowatt (kW)

3.14**nominal heat input**

the value of the heat input declared by the manufacturer

symbol: Q_n

3.15**mass flow rate**

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

symbol: M

unit: kilogram per hour (kg/h), or gram per hour (g/h)

3.16**volume flow rate**

the volume of gas consumed by the appliance in unit time during continuous operation

symbol: V

unit: cubic metre per hour (m³h), litre per minute (l/min), cubic decimetre per hour (dm³/h) or cubic decimetre per second (dm³/s)

4 Test gases**4.1 Classification of gases**

Gases are classified into three families; each family may be divided into groups, (themselves being divided into ranges, see Annex B), as a function of the Wobbe index, according to the values given in Table 1.

4.2 Characteristics of the test gases

The composition and principal characteristics of the different test gases corresponding to the gas families or groups are given in Table 2 and Table 3.

The values in Table 2, Table 3 and Table 4, measured and expressed at 15 °C, are derived from ISO 6976:1995.

The conditions for the preparation of the test gases are given in Annex A.

In particular cases specified in the individual standards, gas G 24, whose characteristics are given in Table 3, may be used but only at the normal test pressure.

NOTE 1 The calorific values of the third family test gases, expressed in megajoules per cubic metre in Table 2, may also be expressed in megajoules per kilogram, as shown in Table 4.

NOTE 2 The characteristics of the reference gases of the second family at 0 °C and 1 013,25 mbar (dry gas) are given in Table 5.