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Test gases - Test pressures - Appliance categories

Gaz d'essais - Pressions d'essais - Catégories d'appareils

Prüfgase - Prüfdrücke - Gerätekategorien

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Foreword

This document EN 437:2003 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 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of an identical text or by endorsement, at the latest by November 2003, and conflicting national standards shall be withdrawn at the latest by November 2003.

This document replaces EN 437:1993.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports the requirements of 2.2 of the "Gas Appliances" Directive (90/396/EEC).

Annex A is normative. Annexes B, C and D are informative.

EN 437 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

The concern for clarity has led to the elucidation of numerous categories and national situations or conditions. The complexity of the standard is likely to increase as new members join the Union.

This revised standard incorporates the two previously published amendments and includes new appliance categories, the reason for which does not lie essentially with new gas resources but with new technical developments for appliances.

This revised standard can still be considered an important stage in the harmonization of test gases, test pressures and appliance categories and the quality of information on gas usage in Europe.

This standard does not give any information relating to Malta which was not a CEN member at the time of the CEN enquiry

On the other hand, the standard applies to Hungary, a country whose national body is an affiliate member of CEN.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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 (90/396/EC).

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 test conditions in order to establish compliance with their requirements.

2 Normative references

This 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 standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN ISO 3166-1:1997, *Codes for the representation of names of countries and subdivisions – Part 1: Country codes.*

ISO 6976:1995, *Natural gas – Calculation of calorific value, density, relative density and Wobbe index from composition*.

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply:

3.1
gas appliance
appliance burning combustible gases

NOTE For the purposes of this standard the term "gas" means "combustible gas", i.e. any fuel 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 with 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

NOTE The gas pressures used are expressed in millibars (mbar) 1 mbar = 10^2 Pa

3.6
normal pressure
p_n
pressure under which the appliances operate in nominal conditions when they are supplied with the corresponding reference gas

3.7
limit pressures
maximum pressure: p_{max}; minimum pressure: p_{min}
pressures representative of the extreme variations in the appliance supply conditions

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

3.11
calorific value
quantity of heat produced by the complete combustion, at a constant pressure equal to 1 013,25 mbar, of a 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 H_s: the water produced by combustion is assumed to be condensed;

— the net calorific value H_i: the water produced by combustion is assumed to be in the vapour state

NOTE The calorific value is expressed:

— either in megajoules per cubic metre (MJ/m^3) of dry gas under the reference conditions;

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

3.12
Wobbe index
gross Wobbe index W_s; net Wobbe index W_i

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

NOTE The Wobbe indices are expressed -

— either in megajoules per cubic metre (MJ/m^3) of dry gas under the reference conditions

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

3.13
heat input
Q
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

NOTE The heat input is expressed in kilowatts (kW)

3.14
nominal heat input
Q_n
value of the heat input declared by the manufacturer

3.15
mass flow rate
M
mass of gas consumed by the appliance in unit time during continuous operation

NOTE The mass flow rate is expressed in kilograms per hour (kg/h) or grams per hour (g/h)

3.16
volume flow rate
V
volume of gas consumed by the appliance in unit time during continuous operation

NOTE The volume flow rate is expressed in cubic metres per hour (m^3/h), litres per minute (l/min), cubic decimetres per hour (dm^3/h) or cubic decimetres per second (dm^3/s).

3.17
gas family
group of combustible gases with similar burning behaviour linked together by a range of Wobbe indices (see Table 1)

3.18
gas group
specified range of Wobbe index within that of the family concerned (see Table 1); this range is determined on the general principle that appliances utilising this gas group would operate safely when burning all gases within this range without adjustments.

NOTE Adjustment of the appliance may be permitted in accordance with the special national or local conditions that apply in some countries (see B.4). For gases corresponding to national or local conditions, see Tables B.5 and D.5

3.19
appliance category
means of identifying the gas families and/or gas groups that a gas appliance is designed to utilize safely and to the desired performance level (see individual appliance standards).

NOTE General appliance categories are described in 6.1. Special appliance categories marketed nationally or locally are described in B.4 and annex D.

4 Gases

4.1 Classification

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.

Table 1 – Summary of gas families and groups as a function of the Wobbe indices

Gas families and groups	Gross Wobbe index at 15 °C and 1 013,25 mbar MJ/m^3	
	minimum	maximum
First family		
— Group a	22,4	24,8
Second family	39,1	54,7
— Group H	45,7	54,7
— Group L	39,1	44,8
— Group E	40,9	54,7
Third family	72,9	87,3
— Group B/P	72,9	87,3
— Group P	72,9	76,8
— Group B	81,8	87,3

4.2 Test gases

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

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

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

The values in Tables 2, 3 and 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.

Table 2 – Characteristics of the test gases [a] gas dry at 15 °C and 1 013,25 mbar

Gas family and group	Test gases	Designation	Composition by volume[e] %	W_i MJ/m^3	H_i MJ/m^3	W_s MJ/m^3	H_s MJ/m^3	d
Gases of the first family [b]								
Group a	Reference gas Incomplete combustion flame lift and sooting limit gases	G 110	CH_4 = 26 H_2 = 50 N_2 = 24	21,76	13,95	24,75	15,87	0,411
	Light back limit gas	G 112	CH_4 = 17 H_2 = 59 N_2 = 24	19,48	11,81	22,36	13,56	0,367
Gases of the second family [b]								
Group H	Reference gas	G 20	CH_4 = 100	45,67	34,02	50,72	37,78	0,555
	Incomplete combustion and sooting limit gas	G 21	CH_4 = 87 C_3H_8 = 13	49,60	41,01	54,76	45,28	0,684
	Light back limit gas	G 222	CH_4 = 77 H_2 = 23	42,87	28,53	47,87	31,86	0,443
	Flame lift limit gas	G 23	CH_4 = 92,5 N_2 = 7,5	41,11	31,46	45,66	34,95	0,586
Group L	Reference gas and light back limit gas	G 25	CH_4 = 86 N_2 = 14	37,38	29,25	41,52	32,49	0,612
	Incomplete combustion and sooting limit gas	G 26	CH_4 = 80 C_3H_8 = 7 N_2 = 13	40,52	33,36	44,83	36,91	0,678
	Flame lift limit gas	G 27	CH_4 = 82 N_2 = 18	35,17	27,89	39,06	30,98	0,629
Group E	Reference gas	G 20	CH_4 = 100	45,67	34,02	50,72	37,78	0,555
	Incomplete combustion and sooting limit gas	G 21	CH_4 = 87 C_3H_8 = 13	49,60	41,01	54,76	45,28	0,684
	Light back limit gas	G 222	CH_4 = 77 H_2 = 23	42,87	28,53	47,87	31,86	0,443
	Flame lift limit gas	G 231	CH_4 = 85 H_2 = 15	36,82	28,91	40,90	32,11	0,617

(continued)

Table 2 (concluded)

Gas family and group	Test gases	Designation	Composition by volume [e] %	W_i MJ/m^3	H_i MJ/m^3	W_s MJ/m^3	H_s MJ/m^3	d
Gases of the third family [c]								
Third family and Groups B/ P	Reference gas		$n\text{-}C_4H_{10}$ = 50	80,58	116,09	87,33	125,81	2,075
	Incomplete combustion and sooting limit gas	G 30	$i\text{-}C_4H_{10}$ = 50					
	Flame lift limit gas	G 31	C_3H_8 = 100	70,69	88,00	76,84	95,65	1,550
and B	Light back limit gas	G 32	C_3H_6 = 100	68,14	82,78	72,86	88,52	1,476
Group P	Reference gas, incomplete combustion sooting [d] and flame lift limit gas	G 31	C_3H_8 = 100	70,69	88,00	76,84	95,65	1,550
	Light back and sooting limit gas [d]	G 32	C_3H_6 = 100	68,14	82,78	72,86	88,52	1,476

[a] For gases used nationally or locally, see B.5.

[b] For other groups, see B.5.

[c] See also Table 4.

[d] The appliance standards may only specify one sooting limit gas.

[e] See also annex A

Table 3 — Characteristics of limit gas G 24 dry gas, at 15 °C and 1 013,25 mbar

Gas family	Test gases	Designation	Composition by volume %	W_i MJ/m^3	H_i MJ/m^3	W_s MJ/m^3	H_s MJ/m^3	d
2nd family Groups H and E	Overheating limit gas	G 24	CH_4 = 68 C_3H_8 = 12 H_2 = 20	47,01	35,70	52,09	39,55	0,577

Table 4 – Calorific values of the test gases of the third family

Calorific values in megajoules per kilogram

Test gas designation	H_i	H_s
G 30	45,65	49,47
G 31	46,34	50,37
G 32	45,77	48,94

NOTE 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.

Table 5 – Characteristics of the reference gases of the second family at 0 °C and 1 013,25 mbar

Gas group	Test gas	Designation	Composition by volume %	W_i MJ/m^3	H_i MJ/m^3	W_s MJ/m^3	H_s MJ/m^3	d
Group H	Reference gas	G 20	CH_4 = 100	48,20	35,90	53,61	39,94	0,555
Group L	Reference gas, light back limit gas	G 25	CH_4 = 86 N_2 = 14	39,45	30,87	43,88	34,34	0,613
Group E	Reference gas	G 20	CH_4 = 100	48,20	35,90	53,61	39,94	0,555

5 Test pressures

The values of the test pressures, i.e. the static pressure to be applied at the gas inlet connection to the appliance whilst in operation, are given in Tables 6 and 7.

NOTE For Tables 6 and 7, the test conditions will be specified in the individual appliance standards.

However:

— for the combustion test in still air with G 21 the appliance is first adjusted on G 20 to give an increase of 5 % in the nominal heat input where a gas pressure governor exists, and an increase of 7,5 % in the absence of a governor. Gas G 21 is then substituted for G 20 without altering this adjustment;

— tests for ignition and crosslighting should be carried out at an inlet pressure of 0,7 times the normal pressure (p_n) using the reference gas(es) for the first and second families.

Table 6 – Test pressures where no pressure couple exists[a]

Pressures in millibars

Appliance categories having as index	Test gas	P_n	p_{min}	p_{max}
1st family 1a	G 110 G 112	8	6	15
2nd family 2H	G 20, G 21, G 222, G 23	20	17	25
2nd family 2L	G 25, G 26, G 27	25	20	30
2nd family 2E	G 20, G 21, G 222, G 231	20	17	25
2nd family	G 20, G 21, G 222, G 231, G 25, G 26, G 27[a]	20	17	30
2N [d]	G 25, G 26, G 27	25	20	30
3rd family 3B/P	G 30, G 31, G 32	29 [b]	25	35
	G 30, G 31, G 32	50	42,5	57,5
3rd family 3P	G 31, G 32	37	25	45
	G 31, G 32	50	42,5	57,5
3rd family 3B [c]	G 30, G 31, G 32	29	20	35

a For test pressures corresponding to gases distributed nationally or locally, refer to Table B.5.

b Appliances of this category may be used, without adjustment, at the specified supply pressures of 28 mbar to 30 mbar.

c The tests with G 31 and G 32 are carried out at the normal pressure only (p_n = 29 mbar), these test gases being more severe than any gas distributed. This condition covers the normal variations in the gas supply.

d See definition in 6.1.2.2.

Table 7 – Test pressures where a pressure couple exists

Pressures in millibars

Appliance categories having as index	Test gas	p_n	P_{min}	p_{max}
2nd family:	G 20, G 21, G 222	20	17	25
2E+	G 231	(25) [a]	17 [b]	30
3rd family: 3+	G 30	29 [c]	20	35
(28-30/37 couple)	G 31, G 32	37	25	45
3rd family: 3+	G 30	50	42,5	57,5
(50/67 couple)	G 31, G 32	67	50	80
3rd family: 3+	G 30	112	60	140
(112/148 couple)	G 31, G32	148	100	180

[a] This pressure corresponds to the use of low Wobbe index gas but in principle no test is carried out at this pressure.

[b] See B.6.

[c] Appliances of this category may be used without adjustment at the specified supply pressures of 28 mbar to 30 mbar.

6 Classification of appliances

6.1 Appliance categories

6.1.1 General

Appliances are classified into categories defined according to the gases and the pressures for which they are designed.

The definition of the categories follows from 6.1.2, 6.1.3 and 6.1.4.

In each country, taking account of the local gas distribution conditions (gas composition and supply pressures), only some of the categories defined in 6.1.2, 6.1.3 and 6.1.4 are marketed. In addition, some of these categories are used only for certain types of appliance as specified in the individual standards.

The conditions concerning the marketing of these appliance categories in each country and the corresponding supply pressures are given in Tables B.1, B.2 and B.3 (see also B.4 for the categories marketed locally and nationally, corresponding to the gases and specific supply pressures given in Table B.5; B.6 gives the particular conditions specific to certain countries).

NOTE See also annex C: Guidelines for extension to other categories.

6.1.2 Category I

Appliances of category I are designed exclusively for the use of gases of a single family or of a single group.

6.1.2.1 Appliances designed for use on first family gases only

Category I_{1a}: appliances using only gases of group a of the first family at the prescribed supply pressure (this category is not used).

6.1.2.2 Appliances designed for use on second family gases only

Category I_{2H}: appliance using only gases of group H of the second family at the prescribed supply pressure.

Category I_{2L}: appliances using only gases of group L of the second family at the prescribed supply pressure.

Category I_{2E}: appliances using only gases of group E of the second family at the prescribed supply pressure.

Category I_{2E+}: appliances using only gases of group E of the second family, and operating with a pressure couple without adjustment on the appliance. The appliance gas pressure regulating device, if it exists, is not operative at pressures in between the two normal pressures of the pressure couple.

Category I_{2N}: appliances using only second family gases at the prescribed supply pressure and that automatically adapt to all gases of the second family.

Category I_{2R}: appliances having a pressure governor using all the gases of the second family and/or gases linked to the second family which can be adjusted manually in order to utilize the various gases of a group of the second family under the local condition of distribution (see Table B.6).

6.1.2.3 Appliances designed for use on 3rd family gases only

Category $I_{3B/P}$: appliances capable of using the third family gases (propane and butane) at the prescribed supply pressure.

Category I_{3+}: appliances capable of using gases of the third family (propane and butane) and operating with a pressure couple without adjustment of the appliance. However, for certain types of appliance specified in the particular standards, adjustment of the primary combustion air may be permitted when changing from propane to butane and vice versa. No gas pressure regulating device is permitted on the appliance.

Category I_{3P}: appliances using only gases of group P of the third family (propane) at the prescribed supply pressure.

Category I_{3B}: appliances using only gases of group B of the third family (butane) at the prescribed supply pressure.

Category $I_{3R:}$ appliances having a pressure governor using all the gases of the third family which can be adjusted manually in order to utilize the various gases of a group of the third family under the local condition of distribution (see Table B.7).

6.1.3 Category II

Appliances of category II are designed for use on gases of two families.

6.1.3.1 Appliances designed for use on gases of the first and second families

Category II_{1a2H}: appliances capable of using gases of group a of the first family and gases of group H of the second family. The first family gases are used under the same conditions as for category $I_{1a.}$ The second family gases are used under the same conditions as for category I_{2H}.

6.1.3.2 Appliances designed for use on gases of the second and third families

Category $II_{2H3B/P}$: appliances capable of using gases of group H of the second family and gases of the third family. The second family gases are used under the same conditions as for category I_{2H}. The third family gases are used under the same conditions as for category $I_{3B/P.}$

Category II_{2H3+}: appliances capable of using gases of group H of the second family and gases of the third family. The second family gases are used under the same conditions as for category I_{2H}.The third family gases are used under the same conditions as for category $I_{3+.}$

Category II_{2H3P}: appliances capable of using gases of group H of the second family and gases of group P of the third family. The second family gases are used under the same conditions as for category I_{2H}. The third family gases are used under the same conditions as for category I_{3P}.

Category $II_{2L3B/P}$: appliances capable of using gases of group L of the second family and gases of the third family. The second family gases are used under the same conditions as for category I_{2L}. The third family gases are used under the same conditions as for category $I_{3B/P}$.

Category II_{2L3P}: appliances capable of using the gases of group L of the second family and gases of Group P of the third family. The second family gases are under the same conditions as for category I_{2L}. The third family gases are used under the same conditions as for category I_{3P}.

Category $II_{2E3B/P}$: appliances capable of using gases of group E of the second family and gases of the third family. The second family gases are used under the same conditions as for category I_{2E}. The third family gases are used under the same conditions as for category $I_{3B/P}$.

Category $II_{2E+3B/P}$: appliances capable of using gases of group E of the second family and gases of the third family. The second family gases are used under the same conditions as for category I_{2E+}. The third family gases are used under the same conditions as for category $I_{3B/P}$.

Category II_{2E+3+}: appliances capable of using gases of Group E of the second family and gases of the third family. The second family gases are used under the same conditions as for category I_{2E+}. The third family gases are used under the same conditions as for category I_{3+}.

Category II_{2E+3P}: appliances capable of using gases of group E of the second family and gases of group P the third family. The second family gases are used under the same conditions as for category I_{2E+}. The third family gases are used under the same conditions as for category I_{3P}.

Category II_{2R3R}: appliances having a pressure governor using all the gases of the second family and/or gases linked to the second family and all the gases of the third family which can be adjusted manually in order to utilize the various gases of a group of the second family under the local conditions of distribution. The second family gases are used under the same conditions as for category I_{2R}. The third family gases are used under the same conditions as for category I_{3R} (see Tables B.6 to B.8)

6.1.4 Category III

Appliances of category III are designed for use on gases of three families.

This category is not in general use.

The categories III accepted in specific countries are given in annex B (see B.4).

6.2 Operations permitted for a change of gas or pressure, adjustment and regulating devices

The individual appliance standards will specify

— the operations permitted for a change of gas or of pressure ;

NOTE As far as possible the permitted conversion operations should be limited so as to ensure that the conversion may be effected without difficulty.

— the conditions applicable to adjustment and regulation devices.

7 Choice of test gases and test pressures

According to the appliance category.

— the tests are carried out with the gases given in Table 8;

— the test pressures are chosen from Tables 6 and 7, as appropriate, as a function of the test gas and in accordance with the requirements given in the individual appliance standards.

Table 8 – Test gases corresponding to the appliance categories[a b]

Category	Reference gas	Incomplete combustion limit gas	Light back limit gas	Lift limit gas	Sooting limit gas
I_{2H}	G 20	G 21	G 222	G 23	G 21
I_{2L}	G 25	G 26	G 25	G 27	G 26
I_{2E},I_{2E+}	G 20	G 21	G 222	G 231	G 21
I_{2N}	G 20 [c d] G 25 [c d]	G 21 [d] G 26 [d]	G 222 [d] G 25 [d]	G 231 [d] G 27 [d]	G 21 [d] G 26 [d]
$I_{3B/P}$,I_{3+}	G 30	G 30	G 32	G 31	G 30
I_{3P}	G 31	G 31	G 32	G 31	G 31,G 32
I_{3B}	G 30	G 30	G 32	G 31	G 30
II_{1a2H}	G 110,G 20	G 21	G 112	G 23	G 21
$II_{2H3B/P}$, II_{2H3+}	G 20,G 30	G 21	G 222, G 32	G 23, G 31	G 30
II_{2H3P}	G 20, G 31	G 21	G 222, G 32	G 23, G 31	G 31, G 32
$II_{2L3B/P}$	G 25, G 30	G 26	G 32	G 27, G 31	G 30
II_{2L3P}	G 25, G 31	G 26	G 32	G 27, G 31	G 31, G 32
$II_{2E3B/P}$, $II_{2E+3B/P}$ II_{2E+3+}	G 20, G 30	G 21	G 222, G 32	G 231, G 31	G 30
II_{2E+3P}	G 20, G 31	G 21	G 222, G 32	G 231, G 31	G 31, G 32

[a] For the test gases corresponding to the categories marketed nationally or locally, see Table B.4.

[b] Tests with the limit gases are carried out with the injector and adjustment corresponding to the reference gas of the group to which limit gas used for the test belongs.

[c] The heat inputs shall be equivalent and within the tolerances specified in the appliance standards

[d] Since the adjustment of the burner changes automatically when the appliance is supplied with different test gases, it may be necessary to examine all phenomena (e.g. incomplete combustion, sooting, light back, flame lift) with all the test gases

8 Marking

The marking of a category comprises:

— in Roman numerals, the number of utilizable gas families;

— in an Arabic numeral suffix, the number assigned to the gas family considered, i.e. 1 for the first family, 2 for the second and 3 for the third;

— in the suffix following that numeral, the capital letter or letters designating the utilizable gas group or groups, respectively.

The suffix to the Roman numeral denotes all the families with all the gas groups usable by the appliance, with or without making adjustments and/or adaptations appropriate to each group.

In cases where the appliance is capable of using gases belonging to one of the groups E or B/P that completely or partially encompass more restricted groups, the breadth of which is expressed by a Wobbe number range, the supply pressure may be set according to the pressure couple principle. This supply condition for the gas group considered is symbolised by the "+" sign following the letter E or the digit 3 for group B/P; in the latter case, the symbol for the group itself is replaced by the digit 3, which denotes the third family.

Annex A
(normative)

Conditions for preparation of the test gases

The composition of the gases used for the tests shall be as close as possible to that in Tables 2 and 3. For the preparation of these gases, the following rules shall be observed:

— the Wobbe index of the gas used shall be within ± 2 % of the value indicated in the table for the corresponding test gas (this tolerance includes the error due to measuring instruments) ;

— the constituents used for the preparation of the mixtures shall have at least the following purity:

nitrogen	N_2	99 %	
hydrogen	H_2	99 %	
methane	CH_4	95 %	with a total content of hydrogen, carbon monoxide and oxygen below 1 % and a total content of nitrogen and carbon dioxide below 2 %
propene	C_3H_6	95 %	
propane	C_3H_8	95 %	
butane[1)]	C_4H_{10}	95 %	

However, these conditions are not mandatory for each of the components if the final mixture has a composition identical to that of a mixture which would have been made from components satisfying the preceding conditions. Therefore, in order to make up a mixture, it is possible to start with a gas already containing, in suitable proportions, several components of the final mixture.

However, for gases of the 2nd family:

— for the tests carried out with reference gases G 20 or G 25, a gas belonging respectively to either group H or group L or group E, may be used even if its composition does not satisfy the above conditions, provided that after the addition of either propane or nitrogen as appropriate, the final mixture has a Wobbe index within ± 2 % of the value given in the table for the corresponding reference gas;

— for preparation of the limit gases another gas may be used as the base gas instead of methane

  — for limit gases G 21, G 222, G 23 and G 24, a natural gas of group H may be used;

  — for limit gases G 27 and G 231, a natural gas of group H , L or E may be used;

  — for the limit gas G 26, a natural gas of group L may be used.

  In all cases the final mixture obtained by adding propane or nitrogen shall have a Wobbe index within ± 2 % of the value given in Table 2 or Table 3 for the corresponding limit gas and the hydrogen content of the final mixture shall be as given in Table 2 or Table 3.

1) A mixture of iso/n butane is permitted. Appliance standards may be more precise on the composition of the mixture and the purity of the gases.

Annex B
(informative)
National situations

B.1 General

In each country in which this standard applies, appliances may be marketed only if they comply with the particular national supply conditions of that country.

In order to permit, both at the time of testing the appliance and at the time of its sale, the correct choice to be made from all the situations covered, the various national situations are summarized in Tables B.1, B.2, B.3, B.4 and B.5.

In accordance with EN ISO 3166-1:1997, the names of countries shall be represented by the following codes:

AT	Austria	GR	Greece
BE	Belgium	IE	Ireland
CH	Switzerland	IS	Iceland
CZ	Czech Republic	IT	Italy
DE	Germany	LU	Luxembourg
DK	Denmark	NL	Netherlands
ES	Spain	NO	Norway
FI	Finland	PT	Portugal
FR	France	SE	Sweden
GB	United Kingdom		

B.2 Categories listed in the body of the standard marketed in the different countries

Tables B.1.and B.2 give the national situations concerning the marketing in the various countries of the appliance categories listed in the body of the standard.

The information given in these tables indicates only that these categories may be sold throughout the whole of the country concerned and B.4 has to be consulted for confirmation.

In all cases of doubt, the local gas supplier should be consulted in order to identify the precise category applicable.

Table B.1 – Category I (single categories) marketed

Country code	I_{2H}	I_{2L}	I_{2E}	I_{2E+}	I_{2N}	I_{2R} [a]	$I_{3B/P}$	I_{3+}	I_{3P} [a]	I_{3B} [a]	I_{3R} [a]
AT	x						x		x		
BE				x	x			x	x	x	
CH	x						x	x	x		
CZ	x						x	x	x		
DE			x		x [a c]	x [c]	x		x		x
DK	x						x				
ES	x				x [a]	x		x	x	x	x
FI	x						x				
FR	x[b]	x[b]		x	x [a]	x	x [a]	x	x	x	x
GB	x					x	x [d]	x	x	x	x
GR	x				x [a]	x	x	x	x	x	x
IE	x							x	x	x	
IS (?)											
IT	x						x	x	x		x
LU (?)			x								
NL	x[b]	x					x		x		
NO	x					x	x				x
PT	x				x [a]	x		x	x	x	x
SE	x						x				

[a] Categories applicable only to certain types of appliance, specified in the individual appliance standards.

[b] Categories applicable only to certain types of appliance, submitted to the on site EC verification procedure; [Annex II, article 6 of the Gas Appliance Directive (90/396/CEE)].

[c] Seer B.5.

[d] Category applicable only to appliances installed in caravans and motor caravans.

The symbol (?) placed alongside the name of the countries means that the country concerned has not indicated its choice of category.

Table B.2 – Category II (double categories) marketed

Country code	II_{1a2H}	$II_{2H3B/P}$	II_{2H3+}	II_{2H3P} [a]	$II_{2L3B/P}$	II_{2L3P} [a]	$II_{2E3B/P}$	$II_{2E+3B/P}$	II_{2E+3+}	II_{2E+3P} [a]	II_{2R3R} [a]
AT		X		x							
BE									x [a]	x	
CH	x	X	x	x							
CZ		X	x	x							
DE							x				x
DK	x	X									
ES			x [c]	x							x
FI		X									
FR				x [b]		x [b]		x [a]	x	x	x
GB			x	x							
GR		X	x	x							x
IE			x	x							
IS (?)											
IT	x	X	x	x							
LU (?)											
NL					x	x					
NO		X									x
PT			x	x							x
SE	x	X									

[a] Categories applicable only to certain types of appliance, specified in the individual standards.

[b] Categories applicable only to certain types of appliance, submitted to the on site EC verification procedure; [Annex II, article 6 of the Gas Appliance Directive (90/396/ EEC)].

[c] Appliances of this category set for group H gases of the second family may use air and commercial propane gas mixtures where the gross Wobbe index (at 15 °C and 1 013,25 mbar) is between 46 MJ/m^3 and 51,5 MJ/m^3, at the same supply pressure, without additional tests.

The symbol (?) placed alongside the name of the countries means that the country concerned has not indicated its choice of category.

B.3 Appliance supply pressures corresponding to the categories given in B.2

Table B.3 gives the conditions in the various countries concerning the supply pressures to appliances in the categories given in B.2.

The normal pressures are identified by the reference gas or gases of the gas group.

For the first family, the normal pressure is identified by the sole reference gas G 110

Table B.3 – Normal supply pressures

Gas	G 110	G 20	G 25		G 20 + G 25	G 30		G 31			G 30 + G 31		
Pressure (mbar) Country code	8	20	20	25	couple 20/25	30 28-30	50	30	37	50	couple 28-30/37	couple 50/67	couple [b] 112/148
AT		x					x			x			
BE					x	x	x [d]		X		x		
CH	x	x					x [b]		X	x [b]	x		
CZ		x				x	x [c]	x	X	x [d]	x		
DE		x	X				x			x			
DK	x	x				x		x					
ES		x				x			X	x [b]	x		
FI		x				x		x					
FR					x	x	x [b]		X	x [b]	x		x
GB		x [a]				x			X	x [b]	x		
GR		x				x	x	x	X		x		
IE		x				x			X		x		
IS (?)													
IT	x	x				x		x	X		x		
LU		x											
NL				x		x		x		x			
NO		x				x		x					
PT		x				x			X		x	x	
SE	x	x				x		x					

a For certain non-domestic appliances : 17,5 mbar.

b Only for certain types of non-domestic appliance.

c For certain types of industrial appliances.

d For certain types of appliances.

The symbol (?) placed alongside the name of the country means that the country concerned has not indicated its choice of category.

B.4 Special categories marketed nationally or locally

B.4.1 The national or local conditions of gas distribution (gas composition and supply pressures) lead to the definition of the special categories of B.4.2 that are marketed nationally or locally in certain countries. Table B.4 gives these categories for each country together with the corresponding test gases. Table B.5 gives the characteristics of these test gases and the corresponding test pressures.

Table B.4 – Test gases corresponding to categories marketed nationally or locally

Category	Reference gas	Incomplete combustion gas	Light back limit gas	Lift limit gas	Sooting limit gas	Country code
I_{2Esi} [a]	G 20, G 25	G 21	G 222	G 231	G 21	FR
I_{2Er} [a]	G 20, G 25	G 21	G 222	G 231	G 21	FR
$I_{2E(S)B}$ [a]	G 20	G 21	G 222	G 231	G 21	BE
$I_{2E(R)B}$ [a]	G 20	G 21	G 222	G 231	G 21	BE
I_{2ELL}	G 20, G 25	G 21	G 222	G 231, G 271	G 21	DE
II_{1c2H}	G 130, G 20	G 21	G 132, G 222	G 23	G 21	CH
II_{1c2E+}	G 130, G 20	G 21	G 132, G 222	G 231	G 21	FR
II_{1c2Esi} [a]	G 130, G 20 G 25	G 21	G 132, G 222	G 231	G 21	FR
II_{1c2Er} [a]	G 130, G 20 G 25	G 21	G 132, G 222	G 231	G 21	FR
II_{2E+3B}	G 20, G 30	G 21	G 222, G 32	G 231, G 31	G 30	BE
II_{2Esi3+} [a] II_{2Er3+} [a]	G 20, G 25, G 30	G 21	G 222, G 32	G 231, G 31	G 30	FR
II_{2Esi3P} [a] II_{2Er3P} [a]	G 20, G 25, G 31	G 21	G 222, G 32	G 231, G 31	G 31, G 32	FR
$II_{2ELL3B/P}$	G 20, G 25, G 30	G 21, G 30	G 222, G 32	G 231, G 271	G 30	DE
III_{1a2H3+}	G 110, G 20, G 30	G 21	G 112, G 222, G 32	G 23, G 31	G 30	IT
$III_{1a2H3B/P}$	G 110, G 20, G 30	G 21	G 112, G 222, G 32	G 23, G 31	G 30	DK, IT
$III_{1c2H3B/P}$	G 130, G 20, G 30	G 21	G 132, G 222, G 32	G 23, G 31	G 30	CH
III_{1c2H3+}	G 130, G 20, G 30	G 21	G 132, G 222, G 32	G 23, G 31	G 30	CH
III_{1c2H3P}	G 130, G 20, G 30	G 21	G 132, G 222, G 32	G 23, G 31	G 31, G32	CH
$III_{1c2E+3+}$	G 130, G 20, G 30	G 21	G 132, G 222, G 32	G 231, G 31	G 30	FR
$III_{1c2E+3P}$	G 130, G 20, G 31	G 21	G 132, G 222, G 32	G 231, G 31	G 32	FR
$III_{1c2Esi3+}$	G 130, G 20, G 25, G 30	G 21	G 132, G 222, G 32	G 231, G 31	G 30	FR

(continued)

Table B.4 – Test gases corresponding to categories marketed nationally or locally

(concluded)

Category	Reference gas	Incomplete combustion gas	Light back limit gas	Lift limit gas	Sooting limit gas	Country code
$III_{1c2Esi3P}$	G 130, G 20, G 25, G 31	G 21	G 132, G 222, G 32	G 231, G 31	G 32	FR
III1c2Er3+	G 130, G 20, G 25, G 30	G 21	G 132, G 222, G 32	G 231, G 31	G 30	FR
III1c2Er3P	G 130, G 20, G 25, G 31	G 21	G 132, G 222, G 32	G 231, G 31	G 32	FR
$III_{1ab2H3B/P}$	G110, G 120, G 20, G 30	G 21	G 112, G 222, G 32	G 23, G 31	G 30	SE
A Categories applicable only to certain types of appliance specified in the individual standards.						

B.4.2 The definitions of the categories in Table B.4 are derived in the same way as those categories listed in 6.1. The characteristics of the gases distributed regionally are given in Table B.5.

B.4.2.1 Category I

B.4.2.1.1 Appliances designed for the use of gases linked to the first family

Category I_{1b}: appliances using only gases of group b linked to the first family, at a fixed supply pressure (this category is not used).

Category I_{1c}: appliances using only gases of group c linked to the first family, at a fixed supply pressure (this category in not used).

Adjustment of the gas rate is optional for the replacement of a gas of one group by a gas of another group within the first family and of the gases which are linked to it.

B.4.2.1.2 Appliances designed for the use of gases of the second family and the gases linked to it

Category I_{2Esi}: appliances capable of using only gases of group E of the second family, and operating under the appropriate pressure of a pressure couple. The replacement of a gas in the range Es of group E (gross Wobbe index between 44,8 MJ/m^3 and 54,7 MJ/m^3) by a gas in the range Ei of group E (gross Wobbe index in the range 40,9 MJ/m^3 and 44,8 MJ/m^3) or vice versa necessitates a modification to the burner setting and possibly a change of injectors, restrictors and atmosphere control device.

Category I_{2Er}: appliances capable of using only gases of group E of the second family and being able to operate with a pressure couple without adjustment on the appliance. However, specific adjustment of the burner gas rate is optional for the replacement of a gas of the range Es of group E (gross Wobbe index between 44,8 MJ/m^3 and 54,7 MJ/m^3) by a gas of the range Ei of group E (gross Wobbe index between 40,9 MJ/m^3 et 44,8 MJ/m^3). If this adjustment has been carried out, a re-adjustment to the previous setting is then necessary in order to return to the use of a gas in the range Es of group E.

Category I_{2LL}: appliances using only gases of group LL linked to the second family, at a fixed supply pressure. On condition that the gross Wobbe index of the second family gas distributed does not exceed the upper limit of 43,7 MJ/m^3, the appliance may be adjusted according to a lower nominal value (this category is not used).

Category I_{2ELL}: appliances capable of using gases of group E of the second family, and gases of group LL linked to the second family. The gases of group E of the second family are used under the same conditions as for category I_{2E}. The gases of group LL of the second family are used under the same conditions as for category I_{2LL}.

Category $I_{2E(S)B}$: appliances capable of using only gases of group E linked to the second family used under the same conditions as for category I_{2E+}. However, appliances are fitted with a gas pressure governor which is adjusted and sealed by the manufacturer in the setting corresponding to the use of G 20 at 20 mbar.

Category $I_{2E(R)B}$: appliances capable of using only gases of group E linked to the second family used under the same conditions as for category I_{2E+}. However, appliances are fitted with a gas pressure governor which is adjusted

by the manufacturer in the setting corresponding to the use of G 20 at 20 mbar. Nevertheless, a specific adjustment for G 25 at 25 mbar may made by the installer, unless appliances are installed permanently on a network supply with gas of the range Ei.

B.4.2.2 Category II

B.4.2.2.1 Appliances designed to use gases of the first family or that are linked to it and gases of the second family or that are linked to it

Category II_{1c2E+}: appliances capable of using gases of group c linked to the first family and gases of group E of the second family. The gases linked to the first family are used under the same conditions as for category I_{1c}. The second family gases are used under the same conditions as for category I_{2E+}.

Category II_{1c2Esi}: appliances capable of using gases of group c linked to the first family and gases of group E of the second family. The gases linked to the first family are used under the same conditions as for category I_{1c}. The second family gases are used under the same conditions as for category I_{2Esi}.

Category II_{1c2Er}: appliances capable of using gases of group c linked to the first family and gases of group E of the second family. The gases linked to the first family are used under the same conditions as for category I_{1c}. The second family gases are used under the same conditions as for category I_{2Er}.

Category II_{1c2H}: appliances capable of using gases of group c linked to the first family and gases of group H of the second family. The gases linked to the first family are used under the same conditions as for category I_{1c}. The second family gases are used under the same conditions as for category I_{2H}

B.4.2.2.2 Appliances designed for the use of gases of the second family or that are linked to it and gases of third family

Category II_{2E+3B}: appliances capable of using gases of group E of the second family and gases of group B of the third family; The second family gases are used under the same conditions as for category I_{2E+}. The third family gases are used under the same conditions as for category I_{3B}.

Category II_{2Esi3+}: appliances capable of using gases of group E of the second family and gases of the third family; The second family gases are used under the same conditions as for category I_{2Esi}. The third family gases are used under the same conditions as for category I_{3+}.

Category II_{2Esi3P}: appliances capable of using gases of group E of the second family and gases of group P of the third family. The second family gases are used under the same conditions as for category I_{2Esi}. The gases of the third family are used under the same conditions as for category I_{3P}.

Category II_{2Er3+}: appliances capable of using gases of group E of the second family and gases of the third family. The second family gases are used under the same conditions as for category I_{2Er}. The gases of the third family are used the same conditions as for category I_{3+}.

Category II_{2Er3P}: appliances capable of using gases of group E of the second family and group P of the third family. The second family gases are used under the same conditions as for category I_{2Er}. The gases of the third family are used under the same conditions as for category I_{3P}.

Category $II_{2ELL3B/P}$: appliances capable of using gases of group E of the second family, gases of group LL linked to the second family and gases of the third family. The second family gases or the gases that are linked to it are used under the same conditions as for category I_{2ELL}. Gases of the third family are used under the same conditions as for category $I_{3B/P}$.

B.4.2.3 Category III

Category III_{1a2H3+}: appliances capable of using gases of group a of the first family, gases of group H of the second family and gases of the third family. The first family gases are used under the same conditions as for category I_{1a}.

The second family gases are used under the same conditions as for category I_{2H}. The third family gases are used under the same conditions as for category I_{3+}.

Category $III_{1a2H3B/P}$: appliances capable of using gases of group a of the first family, gases of group H of the second family and gases of the third family. The first family gases are used under the same conditions as for category I_{1a}. The second family gases are used under the same conditions as for category I_{2H}. The third family gases are used under the same conditions as for category $I_{3B/P}$.

Category $III_{1c2H3B/P}$: appliances capable of using gases of group c of the first family, gases of group H of the second family and gases of the third family. The first family gases are used under the same conditions as for category I_{1c}. The second family gases are used under the same conditions as for category I_{2H}. The third family gases are used under the same conditions as for category $I_{3B/P}$.

Category III_{1c2H3+}: appliances capable of using gases of group c of the first family, gases of group H of the second family and gases of the third family. The first family gases are used under the same conditions as for category I_{1c}. The second family gases are used under the same conditions as for category I_{2H}. The third family gases are used under the same conditions as for category I_{3+}.

Category III_{1c2H3P}: appliances capable of using gases of group c of the first family, gases of group H of the second family and gases of the third family. The first family gases are used under the same conditions as for category I_{1c}. The second family gases are used under the same conditions as for category I_{2H}. The third family gases are used under the same conditions as for category I_{3P}.

Category $III_{1c2E+3+}$: appliances capable of using of group c linked to the first family, gases of group E of the second family and gases of the third family. The gases linked to the first family are used under the same conditions as for category I_{1c}. The second family gases are used under the same conditions as for category I_{2E+}. The third family gases are used under the same conditions as for category I_{3+}.

Category $III_{1c2E+3P}$: appliances capable of using gases of group c linked to the first family, gases of group E of the second family and gases of group P of the third family. The gases linked to the first family are used under the same conditions as for category I_{1c}. The second family gases are used under the same conditions as for category I_{2E+}.The third family gases are used under the same conditions as for category I_{3P}.

Category $III_{1c2Esi3+}$: appliances capable of using gases of group c linked to the first family, gases of group E of the second family and gases of the third family. The gases linked to the first family are used under the same conditions as for category I_{1c}. The second family gases are used under the same conditions as for category I_{2Esi}. The third family gases are used under the same conditions as for category I_{3+}.

Category $III_{1c2Esi3P}$: appliances capable of using gases of group c linked to the first family, gases of group E of the second family and gases of group P of the third family. The gases linked to the first family are used the same conditions as for category I_{1c}. The second family gases are used under the same conditions as for category I_{2Esi}. The third family gases are used under the same conditions as for category I_{3P}.

Category $III_{1c2Er3+}$: appliances capable of using gases of group c linked to the first family, gases of group E of the second family and gases of the third family. The gases linked to the first family are used under the same conditions as for category I_{1c}. The second family gases are used under the same conditions as for category I_{2Er}. The third family gases are used under the same conditions as for category I_{3+}.

Category $III_{1c2Er3P}$: appliances capable of using gases of group c linked to the first family, gases of group E of the second family and gases of group P of the third family. The gases linked to the first family gases are used under the same conditions as for category I_{1c} The second family gases are used under the same conditions as for category I_{2Er}. The third family gases are used under the same conditions as for category I_{3P}.

Category $III_{1ab2H3B/P}$: appliances capable of using gases of group a of the first family, gases of group b linked to the first family, gases of group H of the second family and gases of the third family. The first family gases or the gases linked to it are used under the same conditions as for categories I_{1a} and I_{1b}. The second family gases are used

under the same conditions as for category I_{2H}. The third family gases are used under the same conditions as for category $I_{3B/P}$.

B.5 Test gases and test pressures corresponding to the special categories given in B.4

The characteristics of the test gases corresponding to the gases distributed nationally or locally and the test pressures are given in Table B.5.

The values in Table B.5 measured and expressed at 15 °C are derived from ISO 6976:1995.

Table B.5 – Test gases and test pressures corresponding to national or local situations, dry gas at 15 °C and 1 013,25 mbar

Gas family	Nature of gas	Designation	Composition by volume	W_i	H_i	W_S	H_S	d	Test pressures mbar	Country code
			%	MJ/m^3	MJ/m^3	MJ/m^3	MJ/m^3			

Gases linked to the first family	group b	Reference Incomplete combustion, sooting	G 120	CH_4= 32 H_2 = 47 N_2 = 21	24,40	15,68	27,64	17,77	0,413	p_n= 8 p_{min} = 6 p_{max} = 15	SE
		Light back limit	G 112	CH_4 = 17 H_2 = 59 N_2 = 24	19,48	11,81	22,36	13,56	0,367		
	group c	Reference (propane-air)	G 130	C_3H_8 = 26,9 air[a] = 73,1	22,14	23,66	24,07	25,72	1,142	p_n = 8 p_{min} = 6 p_{max} = 15	FR
		Light back limit	G 132	C_3H_8= 13,8 C_3H_6= 13,8 air[a] = 72,4	22,10	23,56	23,84	25,41	1,136		
Gases linked to the second family	group LL	Reference	G 25 [b]	CH_4 = 86 N_2 = 14	37,38	29,25	41,52	32,49	0,612	p_n = 20 p_{min} = 18 p_{max} = *25*	DE
		Incomplete combustion, sooting	G 26	CH_4 = 80 C_3H_8= 7 N_2 = 13	40,52	33,36	44,83	36,91	0,678		
		Lift limit	G 271	CH_4 = 74 N_2 = 26	30,94	25,17	34,36	27,96	0,662		

(continued)

Table B.5 *(concluded)*

Gas family		Nature of gas	Designation	Composition by volume %	W_i MJ/m^3	H_i MJ/m^3	W_s MJ/m^3	H_s MJ/m^3	d	Test pressures mbar	Country
Gases of the second family	Range Es of Group E [c]	Reference	G 20 [b]	CH_4 = 100	45,67	34,02	50,72	37,78	0,555	p_n = 20 p_{min} = 17 p_{max} = 25	FR
		Incomplete combustion, sooting	G 21	CH_4 = 87 C_3H_8= 13	49,60	41,01	54,76	45,28	0,684		
		Light back limit	G 222	CH_4 = 77 H_2 = 23	42,87	28,53	47,87	31,86	0,443		
		Lift limit	G 26	CH_4 = 80 C_3H_8= 7 N_2 = 13	40,52	33,36	44,83	36,91	0,678		
	Range Ei of group E	Reference light back limit	G 25 [b]	CH_4 = 86 N_2 = 14	37,38	29,25	41,52	32,49	0,612	p_n = 25 p_{min} = 20 p_{max} = 30	
		Incomplete combustion, sooting	G 26	CH_4 = 80 C_3H_8= 7 N_2 = 13	40,52	33,36	44,83	36,91	0,678		
		Lift limit	G 231	CH_4 = 85 N_2 = 15	36,82	28,91	40,90	32,11	0,617		

[a] Composition of the air in %: O_2 = 20,95; N_2 = 79,05.

[b] For the characteristics at 0 °C of the references gases G 20 et G 25, see Table 5.

[c] In the specific cases given in the individual appliance standards, the overheat limit gas G 24 (see Table 3) may be used but only at the normal test pressure.

B.6 Special conditions

AT

Except for type A appliances, appliances of categories I_{3P} and II_{2H3P} marketed in Austria shall have successfully undergone a test for combustion with the incomplete combustion limit gas G 30 at the normal pressure of 50 mbar following adjustment of the nominal heat input with G 31 at 50 mbar.

BE

Appliances of categories I_{2E+}, $I_{2E(R)B}$, $I_{2E(S)B}$ and I_{2N} marketed in Belgium shall have successfully undergone a test for ignition, crosslighting and flame stability with the limit gas G 231 at the reduced pressure of 15 mbar.

DE

Appliances of category I_{2N} and I_{2R} shall have successfully undergone a test with the flame lift limit gas G 271 at a pressure of 25 mbar.

IT

Appliances of categories $I_{3B/P}$, $II_{2H3B/P}$ and $III_{1a2H3B/P}$ without pressure regulators marketed in Italy shall have successfully undergone a test for flame stability with the limit gas G 31 at a pressure of 45 mbar.

All countries

Appliances of category I_{2R}, I_{3R} and II_{2R3R} shall be marked according to the national choices for the reference gas and the nominal pressure related to the country of destination as indicated in the tables B.6, B.7 and B.8.

Table B.6. - Category I_{2R}

Adjustment				Test pressures (mbar)			Test gases				
Gas group	Country	Type of gas[a]	Supply pressure (mbar)	p_n	p_{min}	p_{max}	Reference	Incomplete combustion	Light back	Lift	Sooting
H	CH, DK ES, FI, FR[b], GB[c] GR, IE, NL[b], NO, PT, SE	G 20	20	20	17	25	G 20	G 21	G 222	G 23	G 21
	CZ	G 20	20 [d]	20	17	25	G 20	G 21	G 222	G 23	G 21
E	DE,LU	G 20	20	20	17	25	G 20	G 21	G 222	G 231	G 21
	BE [e]	G 20	20	20	17	25	G 20	G 21	G 222	G 231	G 21
	BE [f]	G 25	25	25	17	30	G 25	G 26	G 25	G 231	G 26
	FR [g]	G 20	20	20	17	25	G 20	G 21	G 222	G 26	G 21
	FR [h]	G 25	25	25	17	30	G 25	G 26	G 25	G 231	G 26
L	NL	G 25	25	25	20	30	G 25	G 26	G 25	G 27	G 26
LL	DE	G 25	20	20	18	25	G 25	G 26	-	G 271	G 26

[a] Additional means of identifying the type of gas may be required (see CR 1472).

[b] Applicable only to certain types of appliance, submitted to the on site verification procedure; [Annex II, article 6 of the Gas Appliance Directive (90/396/EEC)].

[c] For certain non-domestic appliances, the supply pressure is 17,5 mbar.

[d] 18 mbar at present.

[e] When supplied under the same conditions as for category $I_{2E(S)B}$. See also B.6.

[f] When supplied under the same conditions as for category $I_{2E(R)B}$ and adjusted for range Ei. See also B.6.

[g] When supplied under the same conditions as for category I_{2Esi} or category I_{2Er} and adjusted for range Es.

[h] When supplied under the same conditions as for category I_{2Esi} or category I_{2Er} and adjusted for range Ei.

Table B.6. - Category I_{2R}

Adjustment				Test pressures (mbar)			Test gases				
Gas group	Country	Type of gas[a]	Supply pressure (mbar)	p_n	p_{min}	p_{max}	Reference	Incomplete combustion	Light back	Lift	Sooting
H	ES, FR[b], GB[c] GR, NO, PT	G 20	20	20	17	25	G 20	G 21	G 222	G 23	G 21
E	DE,	G 20	20	20	17	25	G 20	G 21	G 222	G 231	G 21
	FR [g]	G 20	20	20	17	25	G 20	G 21	G 222	G 26	G 21
	FR [h]	G 25	25	25	20	30	G 25	G 26	G 25	G 231	G 26
LL	DE	G 25	20	20	18	25	G 25	G 26	-	G 271	G 26

[a] Additional means of identifying the type of gas may be required (see CR 1472).

[b] Applicable only to certain types of appliance, submitted to the on site verification procedure; [Annex II, article 6 of the Gas Appliance Directive (90/396/EEC)].

[c] For certain non-domestic appliances, the supply pressure is 17,5 mbar.

[d] 18 mbar at present.

[e] When supplied under the same conditions as for category $I_{2E(S)B}$. See also B.6.

[f] When supplied under the same conditions as for category $I_{2E(R)B}$ and adjusted for range Ei. See also B.6.

[g] When supplied under the same conditions as for category I_{2Esi} or category I_{2Er} and adjusted for range Es.

[h] When supplied under the same conditions as for category I_{2Esi} or category I_{2Er} and adjusted for range Ei.

Table B.7 - Category I_{3R}

Adjustment				Test pressures (mbar)			Test gases				
Gas group	Country	Type of gas [a]	Supply pressure (mbar)	p_n	p_{min}	p_{max}	Reference	Incomplete combustion	Light back	Lift	Sooting
B/P	CZ, DK, FI, FR [b], GR IT, NL, NO, SE	G 30	30 28-30	29 [c]	25	35	G 30	G 30	G 32	G 31	G 32
	CH, CZ [d], DE, FR [e]	G 30	50	50	42,5	57,5	G 30	G 30	G 32	G 31	G 32
B [b]	GB, ES,FR, IE, PT	G 30	30 28-30	29	20	35	G 30	G 30	G 32 [f]	G31[f]	G 32 [f]
P [b]	BE, ES, CZ, FR, GB, GR, IE, IT, PT	G 31	37	37	25	45	G 31	G 31	G 32	G 31	G 31 [g] G 32 [g]
	BE [e], CH [e], CZ, DE, ES [e], FR [e], GB [e], GR, NL	G 31	50	50	42,5	57,5	G 31	G 31	G 32	G 31	G 31 [g] G 32 [g]

[a] Additional means of identifying the type of gas may be required (see CR 1472).
[b] Applicable only to certain types of appliance, specified in individual standards.
[c] May be used without adjustment at the specified supply pressures of 28 mbar to 30 mbar.
[d] For certain types of industrial appliances.
[e] Only for certain types of non-domestic appliance.
[f] The tests with G 31 and G 32 are carried out at the normal pressure (p_n = 29 mbar), these test gases being more severe than any gas distributed. This condition covers the normal variations in the gas supply.
[g] The appliance standards may only specify one sooting limit gas.

Table B.8 - Category $II_{2R\ 3R}$

Adjustment				Test pressures (mbar)			Test gases				
Gas groups	Country	Type of gas [a]	Supply pressure (mbar)	p_n	p_{min}	p_{max}	Reference	Incomplete combustion	Light back	Lift	Sooting
H	CH, CZ, DK, FI, GR, SE	G 20	20	20	17	25	G 20	G 21	G 222	G 23	G 21
B/P	CZ, DK, FI, GR, IT, SE	G 30	30 28-30	29 [b]	25	35	G 30	G 30	G 32	G 31	G 32
	CH, CZ [c]	G 30	50	50	42,5	57,5	G 30	G 30	G 32	G 31	G 32
H [d]	CH, CZ, ES, FR [e], GB [f], GR, IE, PT	G 20	20	20	17	25	G 20	G 21	G 222	G 23	G 21
P [d]	CZ, ES, FR [e], GR, IE, IT, PT	G 31	37	37	25	45	G 31	G 31	G 32	G 31	G 31 [g] G 32 [g]
	CH, CZ [c], ES [h], FR [h], GB [h]	G 31	50	50	42,5	57,5	G 31	G 31	G 32	G 31	G 31 [g] G 32 [g]
E	DE	G 20	20	20	17	25	G 20	G 21	G 222	G 23	G 21
B/P		G 30	50	50	42,5	57,5	G 30	G 30	G 32	G 31	G 32
E Ei	FR	G 20	20	20	17	25	G 20	G 21	G 222	G 26	G 21
Es		G 25	25	25	17	30	G 25	G 26	G 25	G 231	G 26
P [d]		G 31	37	37	25	45	G 31	G 31	G 32	G31	G 31 [g] G 32 [g]
		G 31	50 [h]	50	42,4	57,5	G 31	G 31	G 32	G 31	G 31 [g] G 32 [g]
L	NL	G 25	25	25	20	30	G 25	G 26	G 25	G 27	G 26
B/P		G 30	30 28-30	29 [b]	25	35	G 30	G 30	G 32	G 31	G 32

(continued)

Table B.8 - Category II $_{2R\,3R}$ (concluded)

Adjustment				Test pressures (mbar)			Test gases				
Gas groups	Country	Type of gas [a]	Supply pressure (mbar)	p_n	p_{min}	p_{max}	Reference	Incomplete combustion	Light back	Lift	Sooting
L	NL [g]	G 25	25	25	20	30	G 25	G 26	G 25	G 27	G 26
P		G 31	50	50	42,5	57,5	G 31	G 31	G 32	G 31	G 31 [g] G 32 [g]
E/ LL	DE	G 20	20	20	17	25	G 20	G 21	G 222	G 231	G 21
		G 25	20	20	18	25	G 25	G 26	-	G 271	G 26
B/P		G 30	50	50	42,5	57,5	G 30	G 30	G 32	G 31	G 32

[a] Additional means of identifying the type of gas may be required (see CR 1472).
[b] May be used without adjustment at the specified supply pressures of 28 mbar to 30 mbar.
[c] For certain types of industrial appliances.
[d] Applicable only to certain types of appliance, specified in individual standards.
[e] Applicable only to certain types of appliance, submitted to the on site verification procedure, [Annex II, article 6 of the Gas Appliance Directive (90/396/EEC)].
[f] For certain non-domestic appliances, the supply pressure is 17,5 mbar.
[g] The appliance standards may only specify one sooting limit gas.
[h] Only for certain types of non-domestic appliance.

Annex C
(informative)

Guidelines for extension to other categories

When an appliance meets the requirements of one or more categories, in order to establish its conformity with one or more other categories, it is necessary to check that the appliance meets all the requirements of the new category or categories.

For this purpose the tests required for the new category(ies) shall be compared with those carried out for the original category(ies) in order to determine which additional tests are necessary.

These additional tests should be kept to the minimum necessary to ensure that the appliance would satisfy the requirements applicable to the new category(ies).

Individual appliance standards may give more detailed examples of circumstances in which such additional tests are required.

Annex D
(informative)

National situation of countries whose national bodies are CEN affiliate members

D.1 General

In accordance with EN ISO 3166-1:1997, the names of countries shall be represented by the following codes:

HU Hungary

D.2 Categories listed in the body of the standard and marketed in the different countries

Tables D.1.and D.2 indicate the national situations concerning the marketing, in the different countries, of the appliance categories listed in the body of the standard.

The information given in these tables does not mean that these categories may be sold on the whole territory of the country in question and D.4 shall be consulted for verification.

In all cases where doubt exists, the local gas distributor shall be consulted in order to specify the applicable categories.

Table D.1 – Category I (single categories) marketed

Country code	I_{2H}	I_{2L}	I_{2E}	I_{2E+}	I_{2N}	I_{2R}	$I_{3B/P}$	I_{3+}	I_{3P}	I_{3B}	I_{3R}
HU	X						X		X	X	

Table D.2 – Category II (double categories) marketed

Code	II_{1a2H}	$II_{2H3B/P}$	II_{2H3+}	II_{2H3P}	II_{2H3B}	$II_{2L3B/P}$	II_{2L3P}	$II_{2E3B/P}$	II_{2E+3+}	II_{2E+3P}	II_{2R3R}
HU		X		X	X						

D.3 Supply pressures of the appliances

Table D.3 indicates the situations of the different countries concerning the normal supply pressures of the appliances belonging to the categories given in D.2.

Table D.3 - Normal supply pressures

Gas	G 110	G 20	G 25		G 20 + G 25	G 30		G 31			G 30 + G 31	
Pressures (mbar)	8	20	20	25	couple 20/25	30	50	30	37	50	couple 28-30/37	couple 50/67
Country code						28-30						
HU		[a]				X	X	X		X		

[a] Pressures of 25 mbar and 85 mbar.

D.4 Special categories marketed nationally or locally

D.4.1 The national or local gas distribution conditions (gas composition and supply pressures) lead to the definition of special categories, marketed nationally or locally in certain countries, and indicated in Table D.4.

Table D.4 - Categories marketed nationally or locally

Category	Reference gas	Incomplete combustion limit gas	Light back limit gas	Lift limit gas	Sooting limit gas	Country code
I_{2S}	G 25.1	G 26.1		G 27.1	G 26.1	HU
I_{2HS}	G 20, G 25.1	G 21, G 26.1	G 222	G 23, G 27.1	G 21, G 26.1	HU
$II_{2S3B/P}$	G 25.1, G 30	G 26.1, G 30	G 32	G 27.1, G 31	G 26.1, G 30	HU
II_{2S3P}	G 25.1, G 31	G 26.1, G 30	G 32	G 27.1, G 31	G 26.1, G 31, G 32	HU
II_{2S3B}	G 25.1, G 30	G 26.1, G 30	G 32	G 27.1, G 31	G 26.1, G 30	HU
$II_{2HS3B/P}$	G 20, G 25.1, G 30	G 21, G 26.1, G 30	G 222, G 32	G 23, G 27.1, G 31	G 21, G 26.1, G 30	HU
II_{2HS3P}	G 20, G 25.1, G 31	G 21, G 26.1, G 30	G 222, G 32	G 23, G 27.1, G 31	G 21, G 26.1, G 31, G 32	HU
II_{2HS3B}	G 20, G 25.1, G 30	G 21, G 26.1, G 30	G 222, G 32	G 23, G 27.1, G 31	G 21, G 26.1, G 30	HU

D.4.2 The categories of Table D.4 are defined in the same manner as for the categories listed in 6.1. The characteristics of the regionally distributed gases will be found in Table D.5.

D.4.2.1 Category I

D.4.2.1.1 Appliances designed for the use of gases linked to the first family

Not applicable.

D.4.2.1.2 Appliances designed for the use of gases of the second family or of gases which are linked to it

Category I_{2S}: appliances using only gases of group S linked to the second family, at the defined supply pressure.

Category I_{2HS}: appliances capable of using gases of group H of the second family and gases of group S linked to the second family. The group H second family gases are used under the same conditions as for category I_{2H}. The group S second family gases are used under the same conditions as for category I_{2S}.

D.4.2.2 Category II

D.4.2.2.1 Appliances designed for the use of gases of the first family or which are linked to it and of gases of the second family or which are linked to it

Not applicable.

D.4.2.2.2 Appliances designed for the use of gases of the second family or which are linked to it and of gases of the third family

Category $II_{2S3B/P}$: appliances capable of using gases of group S linked to the second family and gases of the third family. Gases which are linked to the second family are used under the same conditions as for category I_{2S}. The third family gases are used under the same conditions as for category $I_{3B/P}$.

Category II_{2S3P}: appliances capable of using gases of group S linked to the second family and gases of group P of the third family. Gases which are linked to the second family are used under the same conditions as for category I_{2S}. The third family gases are used under the same conditions as for category I_{3P}.

Category II_{2S3B}: appliances capable of using gases of group S linked to the second family and gases of group P of the third family. Gases which are linked to the second family are used under the same conditions as for category I_{2S}. The third family gases are used under the same conditions as for category I_{3B}.

Category $II_{2HS3B/P}$: appliances capable of using gases of group H of the second family, gases of group S linked to the second family and gases of the third family. Gases of the second family or gases which are linked to it are used under the same conditions as for category I_{2HS}. The third family gases are used under the same conditions as for category $I_{3B/P}$.

Category II_{2HS3P}: appliances capable of using gases of group H of the second family, gases of group S linked to the second family and gases of group P of the third family. Gases of the second family or gases which are linked to it are used under the same conditions as for category I_{2HS}. The third family gases are used under the same conditions as for category I_{3P}.

Category II_{2HS3B}: appliances capable of using gases of group H of the second family, gases of group S linked to the second family and gases of group B of the third family. Gases of the second family or gases which are linked to it are used under the same conditions as for category I_{2HS}. The third family gases are used under the same conditions as for category I_{3B}.

D.5 Gases and test pressures corresponding to the special categories given in D.4

The characteristics of the test gases corresponding to the nationally or locally distributed gases, as well as the corresponding test pressures, are given in Table D.5.

The values of Table D.5, measured and expressed at 15 °C, result from the application of ISO 6976:1995.

Table D.5 - Test gases corresponding to national or local situations dry gas, at 15 °C and 1 013,25 mbar

Gas family		Nature of gas	Designation	Composition by volume %	W_i MJ/m^3	H_i MJ/m^3	W_S MJ/m^3	H_S MJ/m^3	d	Test pressure mbar	Country code
Gases linked to the second family	group S	Reference gas	G 25.1	CH_4 = 86 CO_2 = 14	35,25	29,30	39,11	32,51	0,691	p_n = 25 p_{min} = 20 p_{max} = 33	HU
		Incomplete combustion, sooting limit gas	G 26.1	CH_4 = 80 C_3H_8 = 6 CO_2 = 14	37,61	32,60	41,58	36,04	0,751	or	
		Lift limit gas	G 27.1	CH_4 = 82 CO_2 = 18	32,70	27,94	36,29	31,00	0,730	p_n = 85 p_{min} = 73 p_{max}=100	