



# SLOVENSKI STANDARD SIST EN 437:2019

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Nadomešča:

SIST EN 437:2005+A1:2009

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## Preskusni plini - Preskusni tlaki - Kategorije naprav

Test gases - Test pressures - Appliance categories

Prüfgase - Prüfdrücke - Gerätekategorien

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

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Ta slovenski standard je istoveten z: ~~SIST EN 437~~ **EN 437:2018**

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### **ICS:**

27.060.20	Plinski gorilniki	Gas fuel burners
91.140.40	Sistemi za oskrbo s plinom	Gas supply systems

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
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Supersedes EN 437:2003+A1:2009

English Version

## Test gases - Test pressures - Appliance categories

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

Prüfgase - Prüfdrücke - Gerätekategorien

This European Standard was approved by CEN on 23 June 2018.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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**EN 437:2018 (E)****European foreword**

This document (EN 437:2018) has been prepared by Technical Committee CEN/TC 238 “Test gases, test pressures, appliance categories and gas appliance types”, 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 May 2019, and conflicting national standards shall be withdrawn at the latest by May 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights

This document supersedes EN 437:2003+A1:2009.

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.

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

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This revised European Standard incorporates the previously published amendment and includes new appliance categories, the reason for which is the introduction of modified appliance categories in countries, due to national changes in the gas distribution.

The standard also applies to countries whose national standardization body is affiliate member of CEN (see Annex D).

Annex B gives national situations relating to gases, gas pressures and appliance categories that apply nationally or locally. The information provided is included under the responsibility of the national standardization bodies. The tables of Annex B give the available information. Therefore Annex B is informative.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## 1 Scope

This document specifies the test gases, test pressures and categories of appliances relative to the use of gaseous fuels 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 2009/142/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

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 3166-1:2014, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes (ISO 3166-1:2013)*

EN ISO 6976:2016, *Natural gas — Calculation of calorific values, density, relative density and Wobbe indices from composition (ISO 6976:2016)*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

### 3.1

#### gas appliance

appliance burning gaseous fuels

Note 1 to entry For the purposes of this standard the term “gaseous fuels” means any fuel that is in the gaseous state at a temperature of 15 °C, and under a pressure of 1 bar.

**EN 437:2018 (E)****3.2****distributed gases**

gaseous fuels used on the territory of the CEN members and affiliated members

Note 1 to entry This definition corresponds to the one given in the Directive 2009/142/EC on gas appliances (article 2.2).

Note 2 to entry The list of CEN members is given in Annex B and the one of affiliated members is given in Annex D.

**3.3****test gases**

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

**3.4****reference gases**

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

**3.5****limit gases**

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

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**3.6****test pressures**

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

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Note 1 to entry The gas pressures used are expressed in millibars (mbar) 1 mbar = 10<sup>2</sup> Pa.

**3.7****normal pressure ( $p_n$ )**

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

**3.8****limit pressures**

**maximum pressure:  $p_{max}$ ; minimum pressure:  $p_{min}$**

pressures representative of the extreme variations in the appliance supply conditions

**3.9****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.

Note 1 to entry The pressure couple is indicated by using the symbol ( $\Leftrightarrow$ ).

**3.10****reference conditions**

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



**3.11****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

**3.12****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  $H_g$ : 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 1 to entry The calorific value is expressed:

- either in megajoules per cubic metre (MJ/m<sup>3</sup>) of dry gas under the reference conditions;
- or in megajoules per kilogram (MJ/kg) of dry gas.

**3.13****Wobbe index****gross Wobbe index  $W_g$ ; 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 1 to entry The Wobbe indices are expressed in megajoules per cubic metre (MJ/m<sup>3</sup>) of dry gas under the reference conditions.

**3.14****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 1 to entry The heat input is expressed in kilowatts (kW).

**3.15****nominal heat input ( $Q_n$ )**

value of the heat input declared by the manufacturer

**3.16****mass flow rate ( $M$ )**

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

Note 1 to entry The mass flow rate is expressed in kilograms per hour (kg/h) or grams per hour (g/h).

**3.17****volume flow rate ( $V$ )**

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

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Note 1 to entry The volume flow rate is expressed in cubic metres per hour (m<sup>3</sup>/h), litres per minute (l/min), cubic decimetres per hour (dm<sup>3</sup>/h) or cubic decimetres per second (dm<sup>3</sup>/s).

**3.18****gas family**

group of gaseous fuels with similar burning behaviour linked together by a range of Wobbe indices (see Table 1)

**3.19****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 1 to entry 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, B.6 and B.7.

**3.20****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 1 to entry General appliance categories are described in 6.1. Special appliance categories marketed nationally or locally are described in B.4 and Annex D.

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**4 Gases**

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**4.1 Classification in gas families and groups**

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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.

NOTE The classification given in Table 1 is used by Member states for the communication of the types of gas used in their territory according to Article 2.2 of the Gas Appliances Directive 2009/142/EC.

**Table 1 — Classification of gas families and groups as a function of the Wobbe indices, dry gas at 15 °C and 1 013,25 mbar**

Gas families and groups	Gross Wobbe index, dry gas at 15 °C and 1 013,25 mbar MJ/m <sup>3</sup>	
	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

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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 mega joules per cubic metre in Table 2, may also be expressed in mega joules per kilogram of dry gas, as shown in Table 3.

The values in Tables 2 and 3, measured and expressed at 15 °C, are derived from EN ISO 6976:2016.

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

NOTE The characteristics for second family gases at reference conditions other than 15 °C for metering and 15 °C for combustion can be calculated using the coefficients given in EN ISO 13443:2005, Annex A (normative). As an example the characteristics of the reference gases of the second family at 0 °C for metering and for combustion and 1 013,25 mbar (dry gas) are given in Table 4.

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**Table 2 — Characteristics of the test gases<sup>a</sup> for the first and second families, gas dry at 15 °C and 1 013,25 mbar**

Gas family and Group	Test gases	Designation	Composition by volume % <sup>c</sup>	$W_i$ MJ/m <sup>3</sup>	$H_i$ MJ/m <sup>3</sup>	$W_s$ MJ/m <sup>3</sup>	$H_s$ MJ/m <sup>3</sup>	$d$
Gases of the first family <sup>b</sup>								
Group a	Reference gas	G 110	CH <sub>4</sub> = 26	21,76	13,95	24,75	15,87	0,411
	Incomplete combustion, flame lift and sooting limit gas		H <sub>2</sub> = 50 N <sub>2</sub> = 24					
	Light back limit gas	G 112	CH <sub>4</sub> = 17 H <sub>2</sub> = 59 N <sub>2</sub> = 24	19,48	11,81	22,36	13,56	0,367
Gases of the second family <sup>b</sup> (standards.iteh.ai)								
Group H	Reference gas	G 20	CH <sub>4</sub> = 100	45,67	34,02	50,72	37,78	0,555
	Incomplete combustion and sooting limit gas	G 21	CH <sub>4</sub> = 87 C <sub>3</sub> H <sub>8</sub> = 13	49,60	41,01	54,69	45,28	0,684
	Light back limit gas	G 222	CH <sub>4</sub> = 77 H <sub>2</sub> = 23	42,87	28,53	47,87	31,86	0,443
	Flame lift limit gas	G 23	CH <sub>4</sub> = 92,5 N <sub>2</sub> = 7,5	41,11	31,46	45,66	34,95	0,586
	Over heating limit gas <sup>d</sup>	G 24	CH <sub>4</sub> = 68 C <sub>3</sub> H <sub>8</sub> = 12 H <sub>2</sub> = 20	47,01	35,70	52,09	39,55	0,577
Group L	Reference gas light back limit gas	G 25	CH <sub>4</sub> = 86 N <sub>2</sub> = 14	37,38	29,25	41,52	32,49	0,612

Gas family and Group	Test gases	Designation	Composition by volume % <sup>c</sup>	$W_i$	$H_i$	$W_s$	$H_s$	$d$
				MJ/m <sup>3</sup>	MJ/m <sup>3</sup>	MJ/m <sup>3</sup>	MJ/m <sup>3</sup>	
	Incomplete combustion and sooting limit gas	G 26	CH <sub>4</sub> = 80 C <sub>3</sub> H <sub>8</sub> = 7 N <sub>2</sub> = 13	40,52	33,36	44,83	36,91	0,678
	Flame lift limit gas	G 27	CH <sub>4</sub> = 82 N <sub>2</sub> = 18	35,17	27,89	39,06	30,98	0,629
Group E	Reference gas	G 20	CH <sub>4</sub> = 100	45,67	34,02	50,72	37,78	0,555
	Incomplete combustion and sooting limit gas	G 21	CH <sub>4</sub> = 87 C <sub>3</sub> H <sub>8</sub> = 13	49,60	41,01	54,76	45,28	0,684
		Light back limit gas	G 222	CH <sub>4</sub> = 77 H <sub>2</sub> = 23	42,87	28,53	47,87	31,86
	Flame lift limit gas	G 231	CH <sub>4</sub> = 85 N <sub>2</sub> = 15	36,82	28,91	40,90	32,11	0,617
	Over heating limit gas <sup>d</sup>	G 24	CH <sub>4</sub> = 68 C <sub>3</sub> H <sub>8</sub> = 12 H <sub>2</sub> = 20	47,01	35,70	52,09	39,55	0,577

<sup>a</sup> For gases used nationally or locally, see B.5.

<sup>b</sup> For other groups, see B.5.

<sup>c</sup> See also Annex A.

<sup>d</sup> Limit gas used only for certain types of appliance, specified in the individual appliance standards (e.g. fully premixed burners, forced draught burners, ...).

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**Table 3 — Characteristics of the test gases<sup>a</sup> for the third family, gas dry at 15 °C and 1 013,25 mbar**

NOTE The characteristics for second family gases at reference conditions other than 15 °C for metering and 15 °C for combustion can be calculated using the coefficients given in EN ISO 13443:2005, Annex A (normative). As an example the characteristics of the reference gases of the second family at 0 °C for metering and for combustion and 1 013,25 mbar (dry gas) are given in Table 4.

Gas family and Group	Test gases	Designation	Composition by volume  % <sup>c</sup>	$W_i$	$H_i$		$W_s$	$H_s$		$d$
				MJ/m <sup>3</sup>	MJ/m <sup>3</sup>	MJ/kg	MJ/m <sup>3</sup>	MJ/m <sup>3</sup>	MJ/kg	
Gases of the third family <sup>b</sup>										
Groups B/P and B	Reference gas	G 30	n- C <sub>4</sub> H <sub>10</sub> = 50	80,58	116,09	45,65	87,33	125,81	49,47	2,075
	Incomplete combustion and sooting limit gas		i- C <sub>4</sub> H <sub>10</sub> = 50							
	Flame lift limit gas	G 31	C <sub>3</sub> H <sub>8</sub> = 100	70,69	88,00	46,34	76,84	95,65	50,37	1,550
	Light back limit gas	G 32	C <sub>3</sub> H <sub>6</sub> = 100	68,14	82,78	45,77	72,86	88,52	48,94	1,476
Group P	Reference gas, Incomplete combustion, flame lift and sooting <sup>a</sup> limit gas	G 31	C <sub>3</sub> H <sub>8</sub> = 100	70,69	88,00	46,34	76,84	95,65	50,37	1,550
	Light back and sooting limit gas <sup>d</sup>	G 32	C <sub>3</sub> H <sub>6</sub> = 100	68,14	82,78	45,77	72,86	88,52	48,94	1,476

<sup>a</sup> For gases used nationally or locally, see B.5.

<sup>b</sup> For other groups, see B.5.

<sup>c</sup> See also Annex A.

<sup>d</sup> Limit gas used only for certain types of appliance, specified in the individual appliance standards (e.g. fully premixed burners, forced draught burners, ...).

Table 4 — 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 %	$W_i$	$H_i$	$W_s$	$H_s$	$d$
				MJ/m <sup>3</sup>	MJ/m <sup>3</sup>	MJ/m <sup>3</sup>	MJ/m <sup>3</sup>	
Group H	Reference gas	G 20	CH <sub>4</sub> = 100	48,20	35,90	53,61	39,94	0,555
Group L	Reference gas, light back limit gas	G 25	CH <sub>4</sub> = 86  N <sub>2</sub> = 14	39,45	30,87	43,88	34,34	0,613
Group E	Reference gas	G 20	CH <sub>4</sub> = 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 5 and 6.

NOTE The test conditions are 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.