

**Preskusni plini – Preskusni tlaki – Kategorije aparatov**

Test gases - Test pressures - Appliance categories

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

Prüfgase - Prüfdrücke - Gerätekategorien

Ta slovenski standard je istoveten z EN 437:2003

ICS 27.060.20; 91.140.40

Referenčna oznaka  
oSIST EN 437:2005 ((sl); en; fr; de)Nadaljevanje na straneh II do IV in od 1 do 39 (en)  
1 do 40 (fr)  
1 do 41 (de)

**NACIONALNI UVOD**

Standard SIST EN 437:2004 ((sl)en;fr;de), Preskusni plini – Preskusni tlaki – Kategorije aparatov, ima status slovenskega standarda in je z metodo ponatisa z nacionalnim dodatkom privzet evropski standard EN 437:2003.

Ta slovenski nacionalni standard zamenjuje slovenski nacionalni standard SIST EN 437:2004, ki je zamenjal SIST EN 437:1997 in dopolnil SIST EN 437:1997/A1:1997 in SIST EN 437:1997/A2:2001..

**NACIONALNI PREGOVOR**

Evropski standard EN 437:2003 je pripravil tehnični odbor Evropskega komiteja za standardizacijo CEN/TC 238 Preskusni plini, Preskusni tlaki, Kategorije aparatov.

Pripravo tega standarda sta Evropska komisija in Evropsko združenje za prosto trgovino poverila CEN. Ta evropski standard ustreza bistvenim zahtevam Direktive Sveta 90/396/EGS o plinskih napravah, navedenim v točki 2.2.

Dodatek A je normativen, dodatki B, C in D so informativni.

Slovenski standard SIST EN 437:2005 je dne ..... po pooblastilu Stokovnega sveta za splošno področje sprejel tehnični odbor SIST/TC PLN Plinske naprave za dom.

**NACIONALNI DODATEK**

Nacionalni dodatek, ki predstavlja dopolnitev dodatka B Nacionalne razmere s parametri, ki veljajo v Sloveniji, je za Slovenijo normativen, za ostale države pa informativen.

**B.1 Splošno**

Skladno s SIST EN ISO 3166-1:2003, Kode za predstavljanje imen držav in njihovih podrejenih ent – 1. del: Kode držav, velja za Slovenijo naslednja koda:

**SI**

**B.2 Kategorije**

V Sloveniji se uporabljajo naslednje kategorije:

Kategorija I (enojne kategorije): I<sub>2H</sub>, I<sub>2N</sub>, I<sub>2R</sub>, I<sub>3B/P</sub>, I<sub>3P</sub>, I<sub>3R</sub>, I<sub>3+</sub>

Kategorija II (dvojne kategorije): II<sub>2H3B/P</sub>, II<sub>2H3P</sub>, II<sub>2R3R</sub>, II<sub>2H3+</sub>

Kategorija III (trojne kategorije): v Sloveniji se ne uporablja

Naslednje tabele se dopolnijo s parametri, ki veljajo v Sloveniji:

**Tabela B.1: Kategorija I (enojne kategorije), ki se prodaja na trgu**

Oznaka države	I <sub>2H</sub>	I <sub>2L</sub>	I <sub>2E</sub>	I <sub>2E+</sub>	I <sub>2N</sub>	I <sub>2R</sub> <sup>a)</sup>	I <sub>3B/P</sub>	I <sub>3+</sub>	I <sub>3P</sub> <sup>a)</sup>	I <sub>3B</sub> <sup>a)</sup>	I <sub>3R</sub> <sup>a)</sup>
<b>SI</b>	X				X <sup>a)</sup>	X	X	X	X		X

<sup>a)</sup> Kategorije, primerne le za posamezne vrste aparatov, navedene v ustreznih standardih za aparate

**Tabela B.2: Kategorija II (dvojne kategorije), ki se prodaja na trgu**

Oznaka države	II <sub>1a2H</sub>	II <sub>2H3B/P</sub>	II <sub>2H3+</sub>	II <sub>2H3P</sub> <sup>a)</sup>	II <sub>2L3B/P</sub>	II <sub>2L3P</sub> <sup>a)</sup>	II <sub>2E3B/P</sub>	II <sub>2E+3B/P</sub>	II <sub>2E+3+</sub>	II <sub>2E+3P</sub> <sup>a)</sup>	II <sub>2R3R</sub> <sup>a)</sup>
<b>SI</b>		X	X	X							X

<sup>a)</sup> Kategorije, primerne le za posamezne vrste aparatov, navedene v ustreznih standardih za aparate.

**Tabela B.3: Normalni priključni tlaki**

Plin	G 110	G 20	G 25		G 20 +G 25	G 30		G 31			G 30 + G 31		
Tlak (mbar)	8	20	20	25	par 20/25	30	50	30	37	50	par 28-30/37	par 50/67	par 112/148 <sup>b)</sup>
<b>SI</b>		X				X			X		X		

<sup>b)</sup> Primerno le za posamezne vrste negospodinjiskih aparatov.

**Tabela B.6: Kategorija I<sub>2R</sub>**

Nastavitev				Preskusni tlaki (mbar)			Preskusni plini				
Skupina	Država	Vrsta plina <sup>a)</sup>	Priključni tlak mbar	p <sub>n</sub>	p <sub>min</sub>	p <sub>max</sub>	Sklic	Nepopolno zgorevanje	Povratni udar	Odnašanje plamena	Sajenje
H	CH, DK, ES, FI, FR <sup>b)</sup> , GB <sup>c)</sup> , GR, IE, NL <sup>b)</sup> , NO, PT, SE, <b>SI</b>	G 20	20	20	17	25	G 20	G 21	G 222	G 23	G 21

<sup>a)</sup> Možne so dodatne zahteve za določitev vrste plina (glej CR 1472).

**Tabela B.7: Kategorija I<sub>3R</sub>**

Nastavitev				Preskusni tlaki mbar			Preskusni plini				
Skupina	Država	Vrsta plina <sup>a)</sup>	Priključni tlak mbar	p <sub>n</sub>	p <sub>min</sub>	p <sub>max</sub>	Sklic	Nepopolno zgorevanje	Povratni udar	Odnašanje plamena	Sajenje
B/P	CZ, DK, FI, FR <sup>b)</sup> , GR, IT, NL, NO, SE, <b>SI</b>	G 30	30 28-30	29 <sup>c)</sup>	25	35	G 30	G 30	G 32	G 31	G 32
P <sup>b)</sup>	BE, ES, CZ, FR, GB, GR, IE, IT, PT, <b>SI</b>	G 31	37	37	25	45	G 31	G 31	G 32	G 31	G 31 <sup>g)</sup> G 32 <sup>g)</sup>

<sup>a)</sup> Možne so dodatne zahteve za določitev vrste plina (glej CR 1472).  
<sup>b)</sup> Primerno le za posamezne vrste aparatov, navedene v ustreznih standardih za aparate.  
<sup>c)</sup> Pri priključnih tlakih 28 - 30 mbar se lahko uporabi brez nastavitve.  
<sup>g)</sup> Standardi za aparate lahko določajo preskus sajenja samo z enim od mejnih plinov.

Tabela B.8: Kategorija II<sub>2R3R</sub>

Nastavitev				Preskusni tlaki mbar			Preskusni plini				
Skupina	Država	Vrsta plina <sup>a)</sup>	Priključni tlak mbar	p <sub>n</sub>	p <sub>min</sub>	p <sub>max</sub>	Sklic	Nepopolno zgorevanje	Povratni udar	Odnašanje plamena	Sajenje
H	CH, CZ, DK, FI, GR, SE, <b>SI</b>	G 20	20	20	17	25	G 20	G 21	G 222	G 23	G 21
B/P	CZ, DK, FI, GR, IT, SE, <b>SI</b>	G 30	30 28-30	29 <sup>b)</sup>	25	35	G 30	G 30	G 32	G 31	G 32
H <sup>d)</sup>	CH, CZ, ES, FR <sup>e)</sup> , GB <sup>f)</sup> , GR, IE, PT, <b>SI</b>	G 20	20	20	17	25	G 20	G 21	G 222	G 23	G 21
P <sup>d)</sup>	CZ, ES, FR <sup>e)</sup> , GR, IE, IT, PT, <b>SI</b>	G 31	37	37	25	45	G 31	G 31	G 32	G 31	G 31 <sup>g)</sup> G 32 <sup>g)</sup>

<sup>a)</sup> Možne so dodatne zahteve za določitev vrste plina (glej CR 1472).  
<sup>b)</sup> Pri priključnih tlakih 28 - 30 mbar se lahko uporabi brez nastavitve.  
<sup>d)</sup> Primerno le za posamezne vrste aparatov, navedene v ustreznih standardih za aparate.  
<sup>g)</sup> Standardi za aparate lahko določajo preskus sajenja samo z enim od mejnih plinov.

## ZVEZE S STANDARDI

S privzemom tega evropskega standarda veljajo za omejeni namen referenčnih standardov vsi standardi, navedeni v izvorniku, razen standardov, ki smo jih že sprejeli v nacionalno standardizacijo:

SIST EN ISO 3166-1:2003 (en;fr) Kode za predstavljanje imen držav in njihovih podrejenih enot - 1. del: Kode držav

ISO 6976:1995 (en) Zemeljski plin – Izračun kalorične vrednosti, gostote, relativne gostote in Wobbejevega indeksa iz sestave

## PREDHODNE IZDAJE

SIST EN 437:1997 (en) Preskusni plini - Preskusni tlaki - Kategorije aparatov

SIST EN 437:1997/A1:1997 (en) Preskusni plini - Preskusni tlaki - Kategorije aparatov - Dopolnilo A1

SIST EN 437:1997/A2:2001 (en) Preskusni plini - Preskusni tlaki - Kategorije aparatov - Dopolnilo A2

SIST EN 437:2004 ((sl), en; fr; de) Preskusni plini - Preskusni tlaki - Kategorije aparatov

## OPOMBI

- Povsod, kjer se v besedilu standarda uporablja izraz “evropski standard”, v SIST EN 437:2004 to pomeni “slovenski standard”.
- Nacionalni uvod in nacionalni predgovor nista sestavni del evropskega standarda.

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 3 December 2002.

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



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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 2<sup>nd</sup> 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  $H_g$ : 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 The calorific value is expressed:

- either in megajoules per cubic metre ( $\text{MJ/m}^3$ ) of dry gas under the reference conditions;
- or in megajoules per kilogram ( $\text{MJ/kg}$ ) of dry gas.

**3.12****Wobbe index**

gross Wobbe index  $W_g$ ; net Wobbe index  $W_i$

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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 ( $\text{MJ/m}^3$ ) of dry gas under the reference conditions
- or in megajoules per kilogram ( $\text{MJ/kg}$ ) 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 ( $\text{m}^3/\text{h}$ ), litres per minute (l/min), cubic decimetres per hour ( $\text{dm}^3/\text{h}$ ) or cubic decimetres per second ( $\text{dm}^3/\text{s}$ ).

### 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 <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

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 <sup>a</sup>  
gas dry at 15 °C and 1 013,25 mbar**

Gas family and group	Test gases	Designation	Composition by volume <sup>e</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 H <sub>2</sub> = 50 N <sub>2</sub> = 24	21,76	13,95	24,75	15,87	0,411
	Incomplete combustion flame lift and sooting limit gases							
	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>								
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	54,76	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	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
Group L	Reference gas and 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
	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	0,443
	Flame lift limit gas	G 231	CH <sub>4</sub> = 85 H <sub>2</sub> = 15	36,82	28,91	40,90	32,11	0,617

(continued)