



SLOVENSKI STANDARD

SIST EN 437:1997

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Preskusni plini - Preskusni tlaki - Kategorije aparatov

Test gases - Test pressures - Appliance categories

Prüfgase - Prüfdrücke - Gerätekategorien

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

Ta slovenski standard je istoveten z: **EN 437:1993**

[SIST EN 437:1997](https://standards.iteh.ai/catalog/standards/sist/8232ef83-e17e-4409-8c6e-794039ff8aab/sist-en-437-1997)

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EUROPEAN STANDARD

EN 437

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English version

Test gases - Test pressures - Appliance categoriesGaz d'essais - Pressions d'essais - Catégories
d'appareils

Prüfgase - Prüfdrücke - Gerätekategorien

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CENEuropean Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

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

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

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

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

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

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

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

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 1994, and conflicting national standards shall be withdrawn at the latest by December 1995.

The standard was approved and in accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Switzerland, 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.

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 determined by the user ;
- appliances constructed for use with high supply pressures (notably direct use of the saturated vapour pressure).

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

2 Normative references

This European Standard incorporates by ~~means of~~ dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of the publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

- ISO/DIS 6976 : 1992 Natural gas - Calculation of calorific value, density, relative density and Wobbe index from composition
(Revision of ISO 6976:1983)

3 Definitions

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

3.1 gas appliance : an appliance burning combustible gases.

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

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

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

3.4 limit gases : test gases representative of the extreme variations in the characteristics of the gases for which appliances have been designed. (standards.iteh.ai)

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 EN 437:1993
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Unit : millibar (mbar).

NOTE : 1 mbar = 10² Pa.

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

Symbol : P_n

3.7 limit pressures : pressures representative of the extreme variations in the appliance supply conditions.

Symbols : maximum pressure : P_{max} ; minimum pressure : P_{min}.

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

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

3.9 reference conditions : these correspond to 15 °C, 1 013,25 mbar, unless otherwise specified.

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

Symbol : d

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

A distinction is made between EN 437:1997

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

Symbol : H_G.

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

Symbol : H_i.

Units : either

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

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

Symbol : gross Wobbe index : W_g ; net Wobbe index : W_n .

Units : either

- megajoules per cubic metre (MJ/m^3) of dry gas at the reference conditions, or
- megajoules per kilogram (MJ/kg) of dry gas.

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

Symbol : Q .

Unit : kilowatt (kW).

3.14 nominal heat input : the value of the heat input declared by the manufacturer.

Symbol : Q_n . <https://standards.iteh.ai/catalog/standards/sist/8232ef83-e17e-4409-8c6e-794039ff8aab/sist-en-437-1997>

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

Symbol : M .

Units : kilograms per hour (kg/h), or grams per hour (g/h).

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

Symbol : V .

Units : 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).

4 Test gases

4.1 Classification of gases

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

Table 1 : Classification of gases

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 Characteristics of the test gases

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

The values in tables 2, 3 and 4, measured and expressed at 15 °C, are derived from ISO/DIS 6976:1992.

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

Table 2 (concluded)

Gas Family and Group	Test Gases	Designation	Composition volume %	Wi MJ/m ³	Hi MJ/m ³	Ws MJ/m ³	Hs MJ/m ³	d
Gases of the third family 3)								
Third Family and Groups 3B/P and 3B	Reference gas, Incomplete combustion and Sooting limit gas	G 30	nC ₄ H ₁₀ ^o =50 iC ₄ H ₁₀ ^o =50	80,58	116,09	87,33	125,81	2,075
	Flame lift limit gas	G 31	C ₃ H ₈ = 100	70,69	88,00	76,84	95,65	1,550
	Light back limit gas	G 32	C ₃ H ₆ = 100	68,14	82,78	72,86	88,52	1,476
Group 3P	Reference gas, Incomplete combustion Sooting 4) and flame lift limit gas	G 31	C ₃ H ₈ = 100	70,69	88,00	76,84	95,65	1,550
	Light back and Sooting limit gas 4)	G 32	C ₃ H ₆ = 100	68,14	82,78	72,86	88,52	1,476
1) For gases used nationally or locally, see B.4. 2) For other groups, see B.4. 3) See also table 4. 4) The appliance standards may only specify one sooting limit gas.								

Table 2 : Characteristics of the test gases 1)
Gas dry at 15 °C and 1 013,25 mbar

Gas Family and Group	Test Gases	design- nation	Compo- sition volume %	Wi MJ/m ³	Hi MJ/m ³	Ws MJ/m ³	Hs MJ/m ³	d
Gases of the first family 2)								
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								
Group H	Reference gas	G 20	CH ₄ = 100	45,67	34,02	50,72	37,78	0,555
	Incomplete combustion Sooting limit gas	G 21	CH ₄ = 87 C ₃ H 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 ₃ H 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 ₃ H 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 N ₂ = 15	36,82	28,91	40,90	32,11	0,617
						continued		