



# SLOVENSKI STANDARD

SIST EN 12669:2002

01-april-2002

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## Plinski ventilatorski grelniki zraka za uporabo v rastlinjakih in za pomožno ogrevanje nestanovanjskih prostorov

Direct gas-fired hot air blowers for use in greenhouses and supplementary non-domestic space heating

Direkt gasbefeuerte Heißluftgebläse für Gewächshäuser und als Zusatzheizung von nicht-häuslichen Räumen

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Générateurs-pulseurs d'air chaud à chauffage direct utilisant les combustibles gazeux pour les applications horticoles et le chauffage d'appoint des locaux à usage non-domestique

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English version

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Direkt gasbefeuerte Heißluftgebläse für Gewächshäuser und als Zusatzheizung von nicht-häuslichen Räumen

This European Standard was approved by CEN on 3 December 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 179 "Gas-fired air heaters", the secretariat of which is held by NNI.

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of an identical text or by endorsement, at the latest by December 2000, and conflicting national standards shall be withdrawn at the latest by December 2000.

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

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

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

The Directive makes no specification in respect of the maximum rating of the appliances falling within its scope. However, the scope of this standard has been limited to appliances having heat inputs not exceeding 180 kW.

The reasons for this are:

- due to the intended application for such appliances whereby they will be installed to heat only one room or space, present practice indicates that the limit stated is adequate for the purpose.
- appliances sized up to 180 kW constitute the major market share.

The test gases, test pressures and appliance categories given in this European Standard are in accordance with those specified in EN 437:1993 + A1:1997.

**NOTE** For countries requesting special categories (specified in EN 437:1993 + A1:1997), the absence of specific information concerning A.3.3 and A.3.4 implies that the general requirements described in the body of the standard (clauses 4.1.1, 4.2.2, 4.2.3 and 4.2.5) also apply to these special categories.

No specific requirements concerning the rational use of energy have been included in this standard since the design of non-domestic direct gas-fired forced convection air heaters is such that all the heat generated by combustion of the gas is transferred directly into the heated space.

Other European Standards covering gas-fired air heaters are as follows.

EN 525	Non-domestic direct gas fired forced convection air heaters for space heating not exceeding a net heat input of 300 kW
EN 621	Non-domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 300 kW, without a fan to assist transportation of combustion air and/or combustion products
EN 778	Domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 70 kW, without a fan to assist transportation of combustion air and/or combustion products
EN 1020	Non-domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 300 kW, incorporating a fan to assist transportation of combustion air and/or combustion products
EN 1196	Domestic and non-domestic gas-fired air heaters - Supplementary requirements for condensing air heaters
EN 1319	Domestic gas-fired forced convection air heaters for space heating, with fan-assisted burners not exceeding a net heat input of 70 kW

## 1 Scope

This European Standard specifies the requirements and test methods for the safety of direct gas-fired hot air blowers for greenhouses, agriculturalized or supplementary space heating, hereinafter called "appliances".

"Supplementary" in this standard means to make up a deficiency, i.e. for the temporary heating of spaces intended for agricultural or commercial use:

- workshops, sheds, stables, poultry houses, barns, cattle pens, etc.
- factories, workshops, warehouses, storage sheds, mills, hangers, drying of buildings, temporary site accommodation, etc.

This standard applies to appliances of type A<sub>3</sub> with heat input 180 kW or less, based on the net calorific value, fitted with integral burners, including appliances designed for outdoor installation. Provision of the heated air will be directly into the heated space.

This standard does not apply to:

- appliances intended for use in residential dwellings;
- appliances fitted with gas boosters;
- appliances fitted with air/gas ratio controls;
- appliances fitted with forced draught package burners;
- appliances which incorporate a main burner having more than one section under a common burner control, of which one or more sections may be extinguished whilst another section remains in operation;
- mobile and transportable dedicated LPG appliances.

This standard does not cover the requirements relating to third family gas cylinders, their regulators and their connection.

This European Standard is applicable to appliances which are intended to be type tested.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these 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.

EN 88:1991	Pressure governors for gas appliances for inlet pressures up to 200 mbar
EN 125:1991	Flame supervision devices for gas burning appliances - Thermo-electric flame supervision devices
EN 126:1995	Multifunctional controls for gas burning appliances
EN 161:1991	Automatic shut-off valves for gas burners and gas burning appliances + A1:1996 + A2:1997
EN 257:1992	Mechanical thermostats for gas-burning appliances
EN 298:1993	Automatic gas burner control systems for gas burners and gas burning appliances with or without fans
EN 437:1993 + A1:1997	Test gases - Test pressures - Appliance categories
EN ISO 3166-1:1997	Codes for the representation of names of countries and their subdivisions - Part 1: Country codes (ISO 3166-1:1997)
EN 50165:1997	Electrical equipment of non-electric heating appliances for household and similar purposes - Safety requirements
EN 60335-1:1988	Safety of household and similar electrical appliances - Part 1: General requirements
EN 60529:1991	Degrees of protection provided by enclosures (IP code)



EN 60584-1:1995	Thermocouples - Part 1: Reference tables (IEC 584-1:1995)
EN 60584-2:1993	Thermocouples - Part 2: Tolerances (IEC 584-2:1982 + A1:1989)
EN 60730-1:1992	Automatic electrical controls for household and similar use - Part 1: General requirements
EN 60730-2-1:1992	Automatic electrical controls for household and similar use - Part 2: Particular requirements for electrical controls for electrical household appliances
EN 60730-2-9:1995	Automatic electrical controls for household and similar use - Part 2: Particular requirements for temperature-sensing controls
EN 60742:1995	Isolating transformers and safety isolating transformers – Requirements (IEC 60742:1983 + A1:1992, modified)
EN 61058-1:1992	Switches for appliances - Part 1: General requirements
ISO 7-1:1994	Pipe threads where pressure-tight joints are made on the threads - Part 1: Dimensions, tolerances and designation
ISO 228-1:1994	Pipe threads where pressure-tight joints are not made on the threads - Part 1: Dimensions, tolerances and designation
ISO 6976:1995	Natural gas – Calculation of calorific values, density, relative density and Wobbe index from composition
ISO 7005-1:1992	Metallic flanges - Part 1: Steel flanges
ISO 7005-2:1988	Metallic flanges - Part 2: Cast iron flanges
ISO 7005-3:1988	Metallic flanges - Part 3: Copper alloy and composite flanges

### 3 Definitions

For the purposes of this standard the following definitions apply:

#### 3.1 Appliance and its constituent parts

**3.1.1 non-domestic air heater:** An appliance designed for the heating and/or ventilation of a building other than a residential dwelling.

**3.1.2 forced convection air heater:** An appliance designed to provide space heating from a central source by distributing heated air, by means of an air moving device, either through ducting or directly into the heated space.

**3.1.3 direct gas-fired hot air blower:** A non-domestic direct gas-fired forced convection air heater in which the products of combustion mix with the heated air being supplied to the space without any kind of ducting of the delivered air directly connected to the appliance.

**3.1.4 gas inlet connection:** The part of the appliance intended to be connected to the gas supply.

**3.1.5 mechanical joint; mechanical means of obtaining soundness:** A means of assuring the soundness of an assembly of several (generally metallic) parts without the use of liquids, pastes, tapes, etc.

There are, for example:

- metal to metal joints;
- conical joints;
- toroidal sealing rings ("O" rings);
- flat joints.

**3.1.6 gas circuit:** The part of the appliance that conveys or contains the gas between the appliance gas inlet connection and the burner(s).

**3.1.7 restrictor:** A device with an orifice which is placed in the gas circuit so as to create a pressure drop and thus reduce the gas pressure at the burner to a predetermined value for a given supply pressure and rate.

**3.1.8 gas rate adjuster:** A component permitting the setting of the gas rate of the burner to a predetermined value according to the supply conditions.

Adjustment may be progressive (screw adjuster) or in discrete steps (by changing restrictors).

The adjusting screw of an adjustable governor is regarded as a gas rate adjuster.

The action of adjusting this device is called "adjusting the gas rate".

A factory sealed gas rate adjuster is considered to be non-existent.

**3.1.9 setting an adjuster:** Immobilization of an adjuster by some means such as a screw after the manufacturer or installer has adjusted it. The adjuster is said to be "set" in this position.

**3.1.10 sealing an adjuster:** Setting of an adjuster using a material such that any attempt to change the adjustment breaks the sealing material and makes the interference with the adjuster apparent. The adjuster is said to be "sealed" in its adjustment position.

A factory sealed adjuster is considered to be non-existent.

A governor is considered to be non-existent if it has been factory sealed in a position such that it is not operational in the range of supply pressures corresponding to the appliance category.

**3.1.11 putting an adjuster or a control out of service:** Putting an adjuster or a control (of temperature, pressure, etc.) out of action and sealing it in this position. The appliance then functions as if the adjuster or control had been removed.

**3.1.12 injector:** A component that admits the gas into a burner.

**3.1.13 burner:** A component that allows the gas to burn.

**3.1.14 main burner:** A burner that is intended to assure the thermal function of the appliance.

**3.1.15 ignition device:** Any means (flame, electrical ignition device or other device) used to ignite the gas at the ignition burner or at the main burner. This device can operate intermittently or permanently.

**3.1.16 ignition burner:** A burner whose flame is intended to ignite another burner.

**3.1.17 aeration adjuster:** A device enabling the excess air ratio to be set at the desired value according to the supply conditions. The action of adjusting this device is called "adjusting the primary aeration".

**3.1.18 range rating device:** A component on the appliance intended to be used by the installer to adjust the heat input of the appliance, within a range of heat inputs stated by the manufacturer, to suit the actual heat requirements of the installation.

This adjustment may be progressive (e.g. by use of a screw adjuster) or in discrete steps (e.g. by changing restrictors).

**3.1.19 combustion chamber:** A part of the appliance which combustion of the air gas mixture takes place.

NOTE The combustion chamber of a hot air blower is normally totally or partially opened for a free outlet of the combustion products.

## 3.2 *Adjusting, control and safety devices*

**3.2.1 automatic burner control system:** A system comprising at least a programming unit and all the elements of a flame detector device. The various functions of an automatic burner control system may be in one or more housings.

**3.2.2 programming unit:** A device which reacts to signals from control and safety devices, gives control commands, controls the start-up sequence, supervises the burner operation and causes controlled shut-down and, if necessary, safety shut-down and lock-out. It follows a predetermined sequence of actions and always operates in conjunction with a flame detector device.

**3.2.3 programme:** The sequence of control operations determined by the programming unit involving switching on, starting up, supervising and switching off the burner.

**3.2.4 flame supervision system:** A system that, in response to a signal from the flame detector, keeps the gas supply open and shuts it off in the absence of the supervised flame.

**3.2.5 flame detector device:** A device by which the presence of a flame is detected and signalled. It can consist of a flame sensor, an amplifier and a relay for signal transmission. These parts, with the possible exception of the actual flame sensor, may be assembled in a single housing for use in conjunction with a programming unit.

**3.2.6 flame signal:** The signal given by the flame detector device, normally when the flame sensor senses a flame.

**3.2.7 flame simulation:** A condition which occurs when the flame signal indicates the presence of a flame when in reality no flame is present.

**3.2.8 pressure governor:** A device which maintains the downstream pressure constant to within fixed limits independent of variations, within a given range, of the upstream pressure.

**3.2.9 adjustable pressure governor:** A pressure governor fitted with a means of adjusting the loading on the diaphragm and thus the downstream pressure.

**3.2.10 volume governor:** A device which maintains the gas rate constant within a given tolerance, independent of the upstream pressure.

**3.2.11 automatic shut-off valve:** A valve designed to open when energized and to close automatically when de-energized.

**3.2.12 control thermostat:** A device controlling the operation of the appliance (by on/off, high/low or modulating control) and enabling the temperature to be kept automatically, within a given tolerance, at a predetermined value.

**3.2.13 overheat cut-off device:** A device that shuts off and locks out the gas supply before the appliance is damaged and/or before safety is compromised, and which requires manual intervention to restore the gas supply.

This device is preset and sealed by the appliance manufacturer.

**3.2.14 temperature sensing element; temperature sensor:** A component that detects the temperature of the environment to be supervised or controlled.

**3.2.15 modulating control:** An automatic control by means of which the heat input of the appliance can be varied in a continuous manner between the nominal heat input and a minimum value.

**3.2.16 high/low control:** An automatic control which permits an appliance to operate either at the nominal heat input or at a fixed reduced heat input.

**3.2.17 air flow proving device:** A device which monitors and proves the existence of an adequate flow of air for combustion and, where appropriate, for dilution.

**3.2.18 CO<sub>2</sub> safety device:** A device which monitors the CO<sub>2</sub> concentration in the installed space and shuts off the burner before the concentration exceeds a specified value.

### 3.3 Operation of the appliance

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

Symbol:  $Q$

Unit: kilowatts (kW)

[3.13 of EN 437:1993 + A1:1997]

**3.3.2 nominal heat input:** The value of the heat input declared by the manufacturer.

Symbol:  $Q_n$

Unit: kilowatt (kW)

[3.14 of EN 437:1993 + A1:1997]

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

Symbol:  $M$

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

[3.15 of EN 437:1993 + A1:1997]

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

Symbol:  $V$

Unit: cubic metre per hour ( $m^3/h$ ), litre per minute ( $l/min$ ), cubic decimetre per hour ( $dm^3/h$ ), or cubic decimetre per second ( $dm^3/s$ )

[3.16 of EN 437:1993 + A1:1997]

**3.3.5 nominal mass rate:** The mass rate stated by the manufacturer.

**3.3.6 flame stability:** The characteristic of flames which remain on the burner ports or in the flame reception zone intended by the construction.

**3.3.7 flame lift:** The total or partial lifting of the base of the flame away from the burner port or the flame reception zone provided by the design. Flame lift may cause the flame to be extinguished.

**3.3.8 light-back:** The entry of a flame into the body of the burner.

**3.3.9 light-back at the injector:** Ignition of the gas at the injector, either as a result of light-back into the burner or by the propagation of a flame outside the burner.

**3.3.10 sooting:** A phenomenon appearing during incomplete combustion and characterised by deposits of soot on the surfaces or parts in contact with the combustion products or with the flame.

**3.3.11 yellow tipping:** The yellowing of the tip of the blue cone of an aerated flame.

**3.3.12 first safety time:** The interval between the ignition burner gas valve, the start gas valve or main gas valve, as applicable, being energized and the ignition burner gas valve, the start gas valve or main gas valve, as applicable, being de-energized if the flame detector signals the absence of a flame at the end of this interval.

NOTE Where there is no second safety time, this is called the safety time.

**3.3.13 second safety time:** The interval between the main gas valve being energized and the main gas valve being de-energized if the flame detector signals the absence of a flame at the end of this interval. This only applies where there is a first safety time applicable to either an ignition burner or start gas flame.

**3.3.14 start gas:** Gas that is supplied at the start gas rate to establish the start gas flame.

**3.3.15 start gas rate:** The restricted gas flow rate admitted either to a separate ignition burner or to the main burner during the first safety time.

**3.3.16 start gas flame:** A flame established at the start gas rate either at the main burner or at a separate ignition burner.

**3.3.17 running condition:** The condition of the system in which the burner is in normal operation under the supervision of the programming unit and its flame detector device.

**3.3.18 automatic burner system:** A burner system in which, when starting from the completely shut-down condition, the gas is ignited and the flame is detected and proved without manual intervention.

**3.3.19 non-automatic burner system:** A burner system with an ignition burner which is ignited under manual supervision and which remains on during ignition and operation of the main burner.

**3.3.20 controlled shut-down:** The process by which the power to the gas shut-off valve(s) is removed immediately, e.g. as a result of the action of a controlling function.

**3.3.21 safety shut-down:** The process which is effected immediately following the response of a safety limiter or sensor or the detection of a fault in the burner control system and which puts the burner out of operation by immediately removing the power to the gas shut-off valve(s) and the ignition device.

### 3.3.22 Lock-out

**3.3.22.1 non-volatile lock-out:** The safety shut-down condition of the system, such that a restart can only be accomplished by a manual reset of the system and by no other means.

**3.3.22.2 volatile lock-out:** The safety shut-down condition of the system, such that a restart can only be accomplished by either the manual reset of the system or an interruption of the electrical supply and its subsequent restoration.

**3.3.23 spark restoration:** The process by which, after disappearance of the flame signal, the ignition device is energized again without the gas supply having been totally interrupted. This process ends with the restoration of the running condition or, if there is no flame signal at the end of the safety time, with non-volatile lock-out.

**3.3.24 automatic recycling:** The process by which, after loss of flame during the running condition or accidental interruption of the operation of the appliance, the gas supply is interrupted and the complete start sequence is automatically re-initiated.

This process ends with the restoration of the running condition or, if there is no flame signal at the end of the safety time or, if the cause of the accidental interruption has not been removed, with non-volatile lock-out.

**3.3.25 ignition opening time:** The time interval between ignition of the supervised flame and the moment when the valve is held open.

**3.3.26 extinction safety time:** The time interval between extinction of the supervised flame and the gas supply being shut off to the main burner and/or to the ignition burner.

**3.3.27 no-air condition:** A condition of the air proving device in which the device is checked for correct operation at zero air flow.

**3.3.28 proved air flow:** The minimum air flow at which the air proving device indicates the presence of air flow.

## 3.4 Gases

**3.4.1 test gases:** Gases intended for the verification of the operational characteristics of appliances using combustible gases. They comprise reference gases and limit gases. [3.2 of EN 437:1993 + A1:1997]

**3.4.2 reference gases:** Test gases on which appliances operate under nominal conditions, when they are supplied at the corresponding normal pressure. [3.3 of EN 437:1993 + A1:1997]

**3.4.3 limit gases:** Test gases representative of the extreme variations in the characteristics of the gases for which appliances have been designed. [3.4 of EN 437:1993 + A1:1997]

**3.4.4 gas pressure:** The static pressure, relative to the atmospheric pressure, measured at right angles to the direction of flow of the gas.

Unit: millibar or bar.

**3.4.5 test pressures:** Gas pressures used to verify the operational characteristics of appliances using combustible gases. They consist of normal and limit pressures.

Unit: millibar (mbar).

NOTE: 1 mbar =  $10^2$  Pa.

[3.5 of EN 437:1993 + A1:1997]

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

Symbol:  $p_n$

[3.6 of EN 437:1993 + A1:1997]

**3.4.7 limit pressures:** Pressures representative of the extreme variations in the appliance supply conditions.

Symbols: <https://standards.iteh.ai/catalog/standards/sist/498a997e-b151-435c-acc5-1413af8a018d/sist-en-12669-2002>

maximum pressure:  $p_{max}$

minimum pressure:  $p_{min}$

[3.7 of EN 437:1993 + A1:1997]

**3.4.8 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; and
- the lower pressure corresponds to gases of high Wobbe index.

[3.8 of EN 437:1993 + A1:1997]

**3.4.9 relative density:** The ratio of the masses of equal volumes of dry gas and dry air under the same conditions of temperature and pressure.

Symbol:  $d$

[3.10 of EN 437:1993 + A1:1997]

**3.4.10 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:

- 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:  $H_n$

Unit: either:

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

[3.11 of EN 437:1993 + A1:1997]

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

Symbols:

gross Wobbe index:  $W_g$

net Wobbe index:  $W_n$

Unit: either:

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

[3.12 of EN 437:1993 + A1:1997]

### **3.5 Conditions of operation and measurement**

#### **3.5.1 reference conditions:**

- for calorific values: temperature 15 °C
- for gas and air volumes: dry, brought to 15 °C and to an absolute pressure of 1 013,25 mbar.

**3.5.2 cold condition:** A condition of the appliance required for some tests and obtained by allowing the unit appliance to attain thermal equilibrium at room temperature.

**3.5.3 hot condition:** A condition of the appliance required for some tests and obtained by heating to thermal equilibrium at the nominal heat input specified by the manufacturer, any thermostat remaining fully open.

#### **3.6 Country of destination**

**3.6.1 direct country of destination:** A country for which the appliance has been certificated and which is specified by the manufacturer as the intended country of destination. At the time of putting the appliance on the market and/or of the installation, the appliance shall be capable of operating, without adjustment or modification, with one of the gases distributed in the country concerned, at the appropriate supply pressure.

**3.6.2 indirect country of destination:** A country for which the appliance has been certificated, but for which, in its present state of adjustment, it is not suitable. Subsequent modification is essential in order that it can be utilized safely and correctly in this country.

### 3.7 Classification

#### 3.7.1 Classification of gases

Gases are classified into three families, possibly divided into groups, according to the value of the Wobbe index. Table 1 specifies the families and groups of gases used in this standard.

**Table 1 - Classification of gases**

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 - Group H - Group L - Group E	39,1 45,7 39,1 40,9	54,7 54,7 44,8 54,7
Third family - Group B/P - Group P - Group B	72,9 72,9 72,9 81,8	87,3 87,3 76,8 87,3

#### 3.7.2 Classification of appliances

##### 3.7.2.1 General

Appliances can be classified according to:

- the gases capable of being used;
- the mode of evacuation of the combustion products.

##### 3.7.2.2 Classification according to the gases capable of being used

###### 3.7.2.2.1 Category I

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

###### 3.7.2.2.1.1 Appliances designed for use on first family gases only

**Category I<sub>1a</sub>**: Appliances using only gases of group a of the first family at the prescribed supply pressure. (This category is not used)

[SIST EN 12669:2002](https://standards.iteh.ai/catalog/standards/sist/498a997e-b151-435c-acc5-1415a1c078d8/sist-en-12669-2000)

###### 3.7.2.2.1.2 Appliances designed for use on second family gases only

**Category I<sub>2H</sub>**: Appliances using only gases of group H of the second family at the prescribed supply pressures.

**Category I<sub>2L</sub>**: Appliances using only gases of group L of the second family at the prescribed supply pressures.

**Category I<sub>2E</sub>**: Appliances using only gases of group E of the second family at the prescribed supply pressures.

**Category I<sub>2E+</sub>**: Appliances using only gases of group E of the second family, and operating with a pressure couple without adjustment of the appliance. The appliance gas pressure regulating device, if it exists, is not operative in the range of the two normal pressures of the pressure couple.