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Non-domestic direct gas-fired forced convection air heaters for space heating not exceeding a net heat input of 300 kW

Gasbefeuerte Warmlufterzeuger ohne Wärmetauscher mit erzwungener Konvektion zum Beheizen von Räumen für den nicht-häuslichen Gebrauch mit einer Nennwärmebelastung nicht über 30 kW

Générateurs d'air chaud a chauffage direct et a convection forcée utilisant les combustibles gazeux pour le chauffage de locaux a usage non-domestique, de débit calorifique sur Hi, inférieur ou égal a 300 kW

**Ta slovenski standard je istoveten z: EN 525:1997**

**ICS:**

97.100.20 Plinski grelniki Gas heaters

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EUROPEAN STANDARD

EN 525

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 1997

ICS 91.140.10

Descriptors: heaters, gas appliances, hot air generators, premises, classifications, specifications, safety, equipment specifications, performance evaluation, tests, marking, name plates, technical notices

English version

## Non-domestic direct gas-fired forced convection air heaters for space heating not exceeding a net heat input of 300 kW

Générateurs d'air chaud à chauffage direct et à convection forcée utilisant les combustibles gazeux pour le chauffage de locaux à usage non-domestique, de débit calorifique sur  $H_i$  inférieur ou égal à 300 kW

Gasbefeuerte Warmlufterzeuger ohne Wärmetauscher mit erzwungener Konvektion zum Beheizen von Räumen für den nicht-häuslichen Gebrauch mit einer Nennwärmebelastung nicht über 300 kW

This European Standard was approved by CEN on 13 March 1997.

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.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN 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 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 March 1998, and conflicting national standards shall be withdrawn at the latest by March 1998.

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 Annex ZA, which is an integral part of this standard.

The scope of this European standard has been limited to appliances having heat inputs not greater than 300 kW. Nevertheless the limitation on appliance rating in the scope of this standard does not necessarily prohibit its application to higher rating appliances, although special arrangements may have to be made to ensure compliance.

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

**NOTE:** For countries requesting special categories (specified in EN 437:1993), 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, 4.2.4 and 4.2.6) 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 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
prEN 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
prEN 1196	Domestic and non-domestic gas-fired air heaters - Supplementary requirements for condensing air heaters
prEN 1319	Domestic gas-fired forced convection air heaters for space heating, with fan-assisted burners not exceeding a net heat input of 70 kW



prEN 12669 Non-domestic gas-fired hot air blowers for agriculturalized and supplementary space heating including special requirements for use in greenhouses

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.

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## 1 SCOPE

This European Standard specifies the requirements and test methods for the safety of non-domestic direct gas-fired forced convection air heaters having fully automatic control systems, hereafter referred to as "appliances".

This European Standard applies to appliances of type A<sub>2</sub> and type A<sub>3</sub> with heat input based on the net calorific value of 300 kW or less fitted with integral burners intended for use other than in residential dwellings. It also applies to appliances designed for outdoor installation. For indoor appliances provision of the heated air may be by means of ducting or may be directly into the heated space.

This standard does not apply to:

- appliances intended for use in residential dwellings;
- portable or transportable forced convection appliances;
- appliances fitted with gas boosters;
- appliances fitted with air/gas ratio controls.
- 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.

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

NOTE: Requirements for appliances which are not type tested would need to be subject to further consideration.

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## 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 126:1995	Multifunctional controls for gas burning appliances
EN 161:1992	Automatic shut-off valves for gas burners and gas-burning appliances
EN 257:1992	Mechanical thermostats for gas burning appliances
EN 298:1993	Automatic burner control systems for gas burners and gas burning appliances with or without fans
EN 437:1993	Test gases - Test pressures - Appliance categories
EN 23166:1993	Codes for the representation of names of countries (ISO 3166:1988)
prEN 50165:1993	Electrical equipment of non-electric heating appliances for household and similar appliances
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 60730-1:1991	Automatic electrical controls for household and similar use - Part 1: General requirements
EN 60730-2-1:1991	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 60742:1989	Isolating transformers and safety isolating transformers - Requirements
EN 61058-1:1992	Switches for appliances - Part 1: General requirements
IEC 479-1:1994	Effects of current passing through the human body - Part 1: General aspects
IEC 479-2:1987	Effects of current passing through the human body - Part 2: Special aspects
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 6976:1991	Natural gas - Calculation of the calorific value, the density and the relative density
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 fired forced convection air heater:** A forced convection air heater in which the products of combustion mix with the heated air being supplied to the space.

**3.1.4 high temperature direct fired forced convection air heater:** A direct fired forced convection air heater designed to operate with an air temperature rise through the appliance greater than 60 K.

**3.1.5 low temperature direct fired forced convection air heater:** A direct fired forced convection air heater designed to operate with a maximum air temperature rise through the appliance of 60 K or less.

**3.1.6 appliance with facility for downstream re-circulation of air:** An appliance in which a proportion of the heated air can be returned to the appliance at a point down stream of the burner and re-distributed.

**3.1.7 appliance with facility for upstream re-circulation of air:** An appliance in which a proportion of the heated air can be returned to the appliance at a point upstream of the burner and re-distributed.

**3.1.8 profile plates:** Fixed or adjustable plates fitted for the purpose of setting the air flow velocity across the burner.

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

**3.1.10 combustion chamber:** That part of the appliance in which the principal combustion process takes place.

**3.1.11 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.

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

**3.1.13 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.

**3.1.14 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).

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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.

**3.1.15 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.

**3.1.16 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.

**3.1.17 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.

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

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

**3.1.20 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.

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

**3.1.22 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".

**3.1.23 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).

## 3.2 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 vent valve:** A normally open automatic valve fitted between two automatic shut-off valves and intended to vent any small leakages of gas.

**3.2.18 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.

**3.2.19 proof of closure device:** A device fitted to a class A, B or C automatic shut-off valve with mechanical overtravel which proves the valve to be in the closed position.

**3.2.20 closed position indicator device:** A device fitted to a class A, B or C automatic shut-off valve which indicates when the valve is in the nominally closed position.

**3.2.21 valve proving system:** A system to check the effective closure of the start gas or main gas safety shut-off valves, and which is capable of detecting small gas leakage rates, e.g. by means of a pressure or vacuum proving system.

### 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)

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

Symbol:  $Q_n$

**3.3.3 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).

**3.3.4 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<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).

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

**3.3.6 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.

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

**3.3.8 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.

**3.3.9 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.

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

**3.3.11 first safety time<sup>1)</sup>:** 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.

**3.3.12 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.

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

**3.3.14 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.

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

**3.3.16 start gas flame proving period:** The interval between the end of the first safety time and the beginning of the second safety time which is used to prove that the start gas flame is stable.

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<sup>1)</sup> Where there is no second safety time, this is called the safety time.