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Stropna plinska linijska sevala in cevna sevala z več plinskimi gorilniki za gretje nestanovanjskih prostorov - Varnost in energijska učinkovitost

Gas-fired overhead radiant strip heaters and multi-burner continuous radiant tube heater systems for non-domestic use Safety and energy efficiency

Gasbefeuerte Strahlungsheizstreifen und Dunkelstrahlersysteme mit mehreren Brennern für gewerbliche und industrielle Anwendungen - Sicherheit und Energieeffizienz

Bandes radiantes et systèmes à tubes radiants continus à brûleurs multiples suspendus à usage non domestique utilisant les combustibles gazeux - Sécurité et efficacité énergétique

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97.100.20 Plinski grelniki Gas heaters

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Gas-fired overhead radiant strip heaters and multi-burner continuous radiant tube heater systems for non-domestic use - Safety and energy efficiency

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Gasbefeuerte Strahlungsheizstreifen und Dunkelstrahlersysteme mit mehreren Brennern für gewerbliche und industrielle Anwendungen - Sicherheit und Energieeffizienz

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EN 17175:2019 (E)**European foreword**

This document (EN 17175:2019) has been prepared by Technical Committee CEN/TC 180 “Decentralized gas heating”, 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of an identical text or by endorsement, at the latest by month year of DOP, and conflicting national standards shall be withdrawn at the latest by month year of DOW.

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 416-1:2009, EN 416-2:2006 and EN 777-4:2009.

In comparison with the previous editions, the following technical modifications have been made:

- aspects of safety and energy efficiency of appliances are brought together;
- incorporation recent state of art of overhead radiant strips heaters and multi-burner continuous radiant tube heater systems;
- unique and more detailed description of method to determine radiant factor;
- incorporating terms and calculation scheme of Ecodesign Regulation (EU) No. 2015/1188;
- minimum requirements of an optional flue gas heat exchanger.

This document 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 document.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document specifies the requirements and test methods for the construction, safety, classification, marking and efficiency of non-domestic gas-fired overhead radiant strips heaters and multi-burner continuous radiant tube heater systems (referred to in the body of the text as the “system”) with each burner unit under the control of an automatic burner control system.

For radiant strip heaters incorporating a single burner, this standard is applicable to Type B₂₂, B₂₃, B₅₂, B₅₃, C₁₂, C₁₃, C₃₂, C₃₃, C₅₂ and C₅₃ appliances intended for use in other than domestic dwellings, in which the supply of combustion air and/or the evacuation of the products of combustion is achieved by mechanical means.

For multi-burner continuous radiant tube heater systems this standard is applicable to type B₂₂, B₅₂, and C₅₂ appliances intended for use in other than domestic dwellings, in which the supply of combustion air and/or the evacuation of the products of combustion is achieved by mechanical means.

This document also includes appliances incorporating a secondary heat exchanger in the flue system.

This document is not applicable to:

- a) appliances designed for use in domestic dwelling;
- b) outdoor appliances;
- c) radiant strip heaters where the heat input is in excess of 300 kW (based on the net calorific value of the appropriate reference test gas);
- d) continuous radiant tube heater systems where the heat input of any individual burner unit is in excess of 70 kW (based on the net calorific value of the appropriate reference test gas);
- e) appliances having combustion products evacuation ducts that are non-metallic in the flue system – except ducts downstream of a possible additional condensing exhaust gas heat exchanger.

In addition, for heater systems incorporating multiple tube heaters this standard is not applicable to:

- f) appliances that are designed for continuous condensation within the flue system under normal operating conditions – except downstream a possible additional exhaust gas heat exchanger.

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

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 88-1:2011+A1:2016, *Pressure regulators and associated safety devices for gas appliances - Part 1: Pressure regulators for inlet pressures up to and including 50 kPa*

EN 126:2012, *Multifunctional controls for gas burning appliances*

EN 161:2011+A3:2013, *Automatic shut-off valves for gas burners and gas appliances*

EN 257:2010, *Mechanical thermostats for gas-burning appliances*

EN 298:2012, *Automatic burner control systems for burners and appliances burning gaseous or liquid fuels*

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EN 437:2003+A1:2009, *Test gases - Test pressures - Appliance categories*

EN 1057:2006+A1:2010, *Copper and copper alloys - Seamless, round copper tubes for water and gas in sanitary and heating applications*

EN 1106:2010, *Manually operated taps for gas burning appliances*

EN 1856-1:2009, *Chimneys - Requirements for metal chimneys - Part 1: System chimney products*

EN 1859:2009+A1:2013, *Chimneys - Metal chimneys - Test methods*

EN 10226-1:2004, *Pipe threads where pressure tight joints are made on the threads - Part 1: Taper external threads and parallel internal threads - Dimensions, tolerances and designation*

EN 10226-2:2005, *Pipe threads where pressure tight joints are made on the threads - Part 2: Taper external threads and taper internal threads - Dimensions, tolerances and designation*

EN 12067-2:2004, *Gas/air ratio controls for gas burners and gas burning appliances - Part 2: Electronic types*

EN 13216-1:2004, *Chimneys - Test methods for system chimneys - Part 1: General test methods*

EN 13410:2001, *Gas-fired overhead radiant heaters - Ventilation requirements for non-domestic premises*

EN 14459:2015, *Safety and control devices for burners and appliances burning gaseous or liquid fuels - Control functions in electronic systems - Methods for classification and assessment*

EN 14597:2012, *Temperature control devices and temperature limiters for heat generating systems*

EN 14800:2007, *Corrugated safety metal hose assemblies for the connection of domestic appliances using gaseous fuels*

EN 60335-1:2012, *Household and similar electrical appliances - Safety - Part 1: General requirements (IEC 60335-1:2010)*

EN 60335-2-102:2016, *Household and similar electrical appliances - Safety - Part 2-102: Particular requirements for gas, oil and solid-fuel burning appliances having electrical connection (IEC 60335-2-102:2004)s*

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

EN 60584-1:2013, *Thermocouples - Part 1: EMF specifications and tolerances (IEC 60584-1:2013)*

EN 60730-2-9:2010, *Automatic electrical controls for household and similar use - Part 2-9: Particular requirements for temperature sensing controls (IEC 60730-2-9:2008)*

EN 60751:2008, *Industrial platinum resistance thermometers and platinum temperature sensors (IEC 60751:2008)*

EN ISO 228-1:2003, *Pipe threads where pressure-tight joints are not made on the threads - Part 1: Dimensions, tolerances and designation (ISO 228-1:2000)*

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

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 7005-1:2011, *Pipe flanges — Part 1: Steel flanges for industrial and general service piping systems*

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 Terms, definitions and symbols

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 System and its constituent parts

3.1.1

radiant strip

gas fired appliance intended for installation above head level which is designed to heat the space beneath by radiation by means of a strip or large tubes with diameters from 105 – 400 mm, heated by the internal passage of recirculated combustion products, producing a max. surface temperature of the radiant strip tube of 400°C, the radiant strip tubes being thermally insulated on the top with a suitable and durable thermal isolation and thermally protected on the side

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3.1.2

single burner heater

radiant tube heaters which employ a single combustion appliance incorporating independent flame monitoring and combustion air fan

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3.1.3

multi-burner continuous radiant tube heater system

any of the following:

- gas fired appliance intended for installation above head level which is designed to heat the space beneath by radiation by means of a tube or tubes, heated by the internal passage of combustion products; or
- multi-burner continuous radiant tube heaters which employ two or more, in series and/or parallel connected, fully premixed gas/air burner units with each unit incorporating independent flame monitoring; or
- heaters in which individual units without fans are connected to a common duct with a fan. One or more burner units are situated in each branch tube (see Annex B)

Note 1 to entry: The units may be located in one or more sections of tubing. One or more fans may be used to assist in the evacuation of products of combustion or the supply of combustion air.

3.1.4

radiant strip tube

strip or large tubes with diameters from 105 – 400 mm in which one burner unit is situated and which only contains the products of combustion generated by this burner

EN 17175:2019 (E)**3.1.5****continuous radiant tube heater branch tube**

tube in which one or more burner units is/are situated and which only contains the products of combustion generated by this, or these, burners

3.1.6**burner and recirculation unit (radiant strips)**

unit equipped with a main burner, and if appropriate, an ignition burner, a fan that sucks the exhausted products of combustion at the end of the radiant strips, recirculating a part of them another time in the radiant strip

Note 1 to entry: The remaining part of the exhaust products will be evacuate through a flue outlet.

Note 2 to entry: A combustion chamber protects the burner head from the recirculation flow and permits the mixing of the hot recirculating combustion products with new produced combustion products. The section of the recirculation, between the fan and the combustion chamber of the recirculation unit, may have a fixed or adjustable section.

3.1.7**individual burner unit (multi-burner continuous radiant tube heater systems)**

unit comprising a main burner and, if appropriate, an ignition burner

Note 1 to entry: In addition, such components which are necessary to ignite the burner(s), monitor the flame and control the gas supply to the burner(s) are included in the unit

3.1.8**inlet connection**

part of the burner intended to be connected to the gas supply

3.1.9**mechanical joint**

means of ensuring the soundness of an assembly of several parts e.g. metal to metal joints, conical joints, toroidal sealing rings ("O" rings), flat joints without the use of liquids (e.g. pastes and tapes)

3.1.10**gas circuit**

part of the burner unit that conveys or contains the gas between the burner unit gas inlet connection and the burner(s)

3.1.11**restrictor**

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

3.1.12**gas rate adjuster**

component allowing to set the gas rate of the burner to a predetermined value according to the supply conditions

Note 1 to entry: Adjustment can be progressive (screw adjuster) or in discrete steps (by changing restrictors).

Note 2 to entry: The adjusting screw of an adjustable regulator is regarded as a gas rate adjuster.

Note 3 to entry: The action of adjusting this device is called "adjusting the gas rate".

Note 4 to entry: A factory sealed gas rate adjuster is considered to be non-existent.

Note 5 to entry: Immobilizing a gas rate adjuster by means as e.g. a screw is called "setting an adjuster".

Note 6 to entry: Arrangement in respect of the adjuster such that any attempt to change the adjustment breaks the sealing device or sealing material and makes this interference apparent is called "sealing an adjuster".

Note 7 to entry: A gas rate adjuster 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.

Note 8 to entry: Putting an adjuster or a control (of temperature, pressure, etc.) out of action and sealing it in this position is called "putting an adjuster or a control out of service"; the appliance functions as if the adjuster or control had been removed.

3.1.13 injector

component that admits the gas into a burner

3.1.14 main burner

burner that is intended to ensure the thermal function of the appliance

Note 1 to entry: Main burner is generally called "the burner"

3.1.15 ignition device

means (e.g. flame, electrical ignition device or other device) used to ignite the gas at the ignition burner or at the main burner

Note 1 to entry: This device can operate intermittently or permanently.

3.1.16 ignition burner

burner whose flame is intended to ignite another burner

3.1.17 fully pre-mixed gas/air burner

pre-aerated burner system in which gas is mixed in a pre-determined and adjustable ratio with all of the air necessary for combustion

3.1.18 aeration orifice

device in a burner unit enabling a volume of combustion air to enter the burner or point of combustion consistent with the gas flow through the gas orifice and variable with downstream negative pressure

3.1.19 primary aeration adjuster

device enabling the primary air to be set at the desired value according to the supply conditions

3.1.20 System aeration adjuster

one or more devices enabling the air flow condition within a branch tube or common duct to be set to design values

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EN 17175:2019 (E)**3.1.21****flue gas heat exchanger**

heat exchanger directly mounted in the flue system to transfer heat from the combustion products to a heat sink

3.2 Combustion circuit**3.2.1****combustion products circuit**

circuit including the combustion chamber, the radiant tube, the combustion products evacuation duct and either the fitting piece or the connection to the terminal, if any

3.2.2**air supply and combustion products evacuation ducts**

means for transporting combustion air to the burner and combustion products to the terminal or fitting piece

Note 1 to entry: A fitting piece is not utilized by appliances of Type C₁ or of Type C₃. It is necessary to distinguish between:

- a) completely surrounded ducts where the combustion products evacuation duct is surrounded by combustion air throughout its length; and
- b) separate ducts where the combustion products evacuation duct and the combustion air supply duct are neither concentric nor completely surrounded ducts.

3.2.3**combustion chamber**

enclosure inside which combustion of the air-gas mixture takes place

3.2.4**flue outlet**

part of a Type B or C system that connects with a flue to evacuate the products of combustion

3.2.5**terminal**

device fitted to the outside of the building, which are connected to the air supply and combustion products evacuation ducts for Type C₁ and Type C₃ appliances (one or two devices)

3.2.6**terminal guard**

device that protects the terminal from mechanical damage from outside influences

3.2.7**POCED**

combustion products evacuation duct that is intended to be used only with specific appliance/system; this duct being either supplied with the appliances or specified in the technical instructions

3.3 Adjusting, control and safety devices**3.3.1****automatic burner control system**

system comprising at least a programming unit and all the elements of a flame detector device

Note 1 to entry: The various functions of an automatic burner control system may be in one or more housings.

3.3.2

programming unit

device which executes the programme reacting 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

Note 1 to entry: The programming unit follows a predetermined sequence of actions and always operates in conjunction with a flame detector device. Such a sequence of operations involving switching on, starting up, supervising and switching off the burner is called "programme".

3.3.3

flame detector

device by which the presence of a flame is detected and signalled

Note 1 to entry: 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

3.3.4

flame signal

signal given by the flame detector device, normally when the flame sensor senses a flame

3.3.5

pressure regulator

device which maintains the outlet pressure constant independent of the variations in inlet pressure within defined limits

3.3.6

adjustable pressure regulator

regulator provided with means for changing the outlet pressure setting

3.3.7

volume regulator

device which maintains the gas rate constant within a given tolerance, independent of the upstream pressure

3.3.8

flame supervision device

device 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

3.3.9

flame simulation

condition which occurs when the flame signal indicates the presence of a flame when in reality no flame is present

3.3.10

range-rating device

component on the burner unit intended to be used by the installer to adjust the heat input of the burner unit, within a range of heat inputs stated by the manufacturer, to suit the actual heat requirements of the installation

Note 1 to entry: This adjustment may be progressive (e.g. by use of a screw adjuster) or in discrete steps (e.g. by changing restrictors).