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

iTeh STANDARD PREVIEW

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

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Gasbefeuerte Dunkelstrahler und Dunkelstrahlersysteme für gewerbliche und industrielle Anwendungen - Sicherheit und Energieeffizienz

Systèmes à tubes radiants suspendus à usage non domestique utilisant les combustibles gazeux - Sécurité et efficacité énergétique

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

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Gasbefeuerte Dunkelstrahler und Dunkelstrahlersysteme für gewerbliche und industrielle Anwendungen - Sicherheit und Energieeffizienz

This European Standard was approved by CEN on 26 August 2019.

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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 CEN-CENELEC Management Centre has the same status as the official versions.

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Contents	Page
European foreword.....	6
1 Scope	7
2 Normative references	8
3 Terms and definitions	9
3.1 System and its constituent parts	10
3.2 Combustion circuit	12
3.3 Adjusting, control and safety devices	13
3.4 Operation of the appliance	15
3.5 Gases	18
3.6 Conditions of operation and measurement.....	19
3.7 Energy efficiency	22
3.8 Country of destination.....	23
3.9 Symbols.....	24
4 Classification of appliances	28
4.1 Classification according gases and categories.....	28
4.2 Classification according to the mode of evacuation of the combustion products.....	28
5 Constructional requirements	31
5.1 General.....	31
5.2 Requirements for adjusting, controls and safety devices.....	37
5.3 Ignition devices.....	44
5.4 Main burners	44
5.5 Pressure test points.....	44
5.6 Injectors.....	45
5.7 Exhaust gas heat exchanger.....	45
6 Operational requirements.....	45
6.1 Test methods.....	45
6.2 Safety of operation.....	51
6.3 Oxides of Nitrogen, NO_x.....	74
6.4 Determination of electrical power consumption	76
7 Energy Efficiency	77
7.1 General principle of measurement and calculation radiant factor	77
7.2 Working space.....	77
7.3 Test equipment to determine radiant output.....	77
7.4 Test procedure	81
7.5 Calculation of radiant factor	83
7.6 Determination of thermal efficiency.....	86
7.7 Test report.....	87
8 Requirements of energy efficiency (rational use of energy).....	87
8.1 General.....	87
8.2 Seasonal energy efficiency.....	87
9 Risk assessment.....	91
10 Marking and instructions.....	91
10.1 Marking of the appliance and the packaging	91
10.2 Instructions	94
10.3 Presentation.....	99

10.4	Information Requirements.....	99
	Annex A (informative) National situations	100
A.1	General.....	100
A.1.1	General.....	100
A.1.2	Gas rate adjusters, aeration adjusters and regulators	100
A.1.3	Conversion to different gases	100
A.2	Gas connections in the various countries.....	100
A.3	Flue connections in the various countries	102
	Annex B (informative) Typical Systems.....	103
B.1	Single burner systems	103
B.1.1	Type B appliances with a fan in the combustion circuit	103
B.1.2	Type C appliances with a fan in the combustion circuit.....	107
B.2	Multi tube heater systems.....	109
B.2.1	Type D System	109
B.2.2	Type E System.....	111
B.2.3	Type F systems.....	112
	Annex C (informative) Equivalence rules.....	113
C.1	Conversion to categories within a restricted Wobbe Index range	113
C.2	Conversion to categories within an identical Wobbe Index range.....	113
C.3	Conversion to categories within a wider Wobbe Index range.....	114
	Annex D (informative) Calculation of the mass flow rate of flue gases.....	115
D.1	Flue gas mass flow rate	115
D.2	Quantity of air in the flue gas.....	115
D.3	Flue gas excess air ratio (λ)	115
D.4	Quantity of water vapour in the flue gas.....	116
D.5	Quantity of Nitrogen in the flue gas.....	116
D.6	Quantity of Oxygen in the flue gas.....	116
D.7	Dry quantity of flue gas	117
D.8	Quantity of carbon dioxide in the flue gas.....	117
	Annex E (informative) Identification of the types of gas in use in various countries.....	119
	Annex F (normative) Special national conditions	121
	Annex G (normative) Calculation of conversions of NO _x	122
G.1	NO _x emission conversion factors (NCV)	122
G.2	NO _x Conversion — Calculation.....	123
	Annex H (informative) National situations of countries whose national bodies are CEN associate members	125

Annex I (informative) Different types of heat input control.....	126
Annex J (informative) Radiometer design.....	127
J.1 Principle radiometer design features.....	127
J.2 Radiometer technical design	128
J.3 Pyro-electric detector.....	128
J.4 Ulbricht Sphere	128
Annex K (informative) Radiometer calibration	131
K.1 Radiometer calibration.....	131
K.2 Black body calibration equipment and procedure	131
K.2.1 General.....	131
K.2.2 Temperature calibration at reference condition	133
K.2.3 Temperature calibration at higher temperatures	134
K.2.4 Calibration calculation	135
K.3 Calibration procedure in detail, presented as a worked example	136
K.3.1 Calibration Measurements	136
K.3.2 Selecting the average readings.....	136
K.3.3 Determination of the 1/S sensitivity per temperature	137
K.3.4 Determining the 1/S sensitivity of the radiometer.....	137
K.3.5 Documentation of calibration results.....	137
Annex L (normative) Correction of measured radiant output for absorption by H₂O and CO₂.....	141
L.1 General.....	141
L.2 Calculation method.....	143
Annex M (informative) Radiant heat output data - Recording of results.....	144
M.1 General information to be recorded	144
M.1.1 Test and appliance data	144
M.1.2 Radiometer technical data.....	144
M.1.3 Measuring plane technical data	144
M.2 Measurement results	145
M.2.1 Test information.....	145
M.2.2 Test ambient conditions	145
M.2.3 Gas/heat input data.....	145
M.2.4 Flue gas data.....	146
M.2.5 Absorption of water vapour and CO₂ data.....	146
M.2.6 Irradiation measurement data.....	146
Annex N (informative) Worked example.....	147

N.1	General information.....	147
N.2	Radiometer technical data.....	147
N.3	Measuring plane technical data	147
N.4	Measurement results	148
N.4.1	Test information.....	148
N.4.2	Test ambient conditions	148
N.4.3	Gas/heat input data.....	148
N.4.4	Flue gas data.....	149
N.4.5	Absorption of water vapour and CO ₂ data.....	149
N.4.6	Irradiation measurement data.....	149
	Annex O (normative) Flue test probes.....	150
	Annex P (normative) Product information required	155
	Annex Q (informative) Derivation of equations to determine thermal efficiency ..	157
	Annex R (normative) Flue gas heat exchanger	159
R.1	General.....	159
R.2	Materials.....	159
R.3	Corrosion resistance.....	159
R.4	Thermal insulation	160
R.5	Gas tightness	161
R.6	Removal of condensate.....	161
R.7	Non-metallic flue system	161
R.8	Frost protection	161
R.9	Distance to flammable materials.....	161
R.10	Safety-related equipment.....	161
R.11	Operation over-pressure when using water as secondary medium.....	161
R.12	Calculation of the heat transfer performance.....	162
R.12.1	Test requirements	162
R.12.2	Heat transfer calculations.....	162
R.12.3	Minimum requirements.....	163
	Annex S (normative) Uncertainty of measurements	164
	Annex ZA (informative) Relationship between this European Standard and the ecodesign requirements of Commission Regulation (EU) No 2015/1188 aimed to be covered	166
	Bibliography.....	167

EN 416:2019 (E)**European foreword**

This document (EN 416:2019) 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 April 2020, and conflicting national standards shall be withdrawn at the latest by April 2020.

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, EN 777-1:2009, EN 777-2:2009 and EN 777-3:2009.

Aspects of safety and energy efficiency of appliances are brought together. Significant changes of the new document compared to the earlier standards are: incorporation recent state of the art radiant tube heaters, unique and more detailed description of method to determine radiant factor, incorporating terms and calculation scheme of Ecodesign Regulation (EU) No. 2015/1188, and minimum requirements of an optional flue gas heat exchanger.

The test gases, test pressures and appliance categories given in this European Standard are in accordance with those specified in EN 437:2003+A1:2009.

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

SIST EN 416:2020

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 tube heaters incorporating a single burner and multiple burner 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 tube heaters incorporating a single burner, this standard is applicable to Type A₂, A₃, B₁₂, B₁₃, B₂₂, B₂₃, B₄₂, B₄₃, 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 located upstream of the draught diverter, if provided.

For radiant tube heater systems incorporating multiple tube heater segments, this document is applicable to Type B₅₂, B_{52x}, B₅₃ and B_{53x} systems 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) appliances where the heat input of any individual burner unit is in excess of 120 kW (based on the net calorific value of the appropriate reference test gas);
- d) 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:

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

This standard is applicable to systems which are intended to be type tested.

EN 416:2019 (E)**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 88-1:2011,¹ *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*

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 12828:2012+A1:2014, *Heating systems in buildings - Design for water-based heating systems*

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*

¹ Impacted by EN 88-1:2011+A1:2016

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

EN 60335-1:2012,² *Household and similar electrical appliances - Safety - Part 1: General requirements (IEC 60335-1:2010, modified)*

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 connections (IEC 60335-2-102:2004, modified)*

EN 60529:1991,³ *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

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

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)*

EN ISO/IEC 17025:2005, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)*

ISO 7-1,⁴ *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

SIST EN 416:2020

<https://standards.iteh.ai/catalog/standards/sist/dae5d754-2483-4560-9511->

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 and definitions

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>

² As impacted by EN 60335-1:2012/AC:2014, EN 60335-1:2012/A11:2014 and EN 60335-1:2012/A12:2017.

³ As impacted by EN 60529:1991/AC:2016-12, EN 60529:1991/A1:2000, EN 60529:1991/A2:2012.

⁴ As impacted by ISO 7-1/Cor 1:2007.

EN 416:2019 (E)

3.1 System and its constituent parts**3.1.1****overhead radiant tube heater**

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, covered over complete tube length at their top side by a reflector and heated by the internal passage of combustion products

3.1.2**single burner heater**

radiant tube heater which employ a single combustion system incorporating independent flame monitoring and combustion air fan

3.1.3**multiple tube heater system**

radiant tube heater systems which employ two or more tube heaters each with burner units with each unit incorporating independent flame monitoring

Note 1 to entry: One or more fans may be used to assist in the evacuation of products of combustion or the supply of combustion air.

System D: tube heater system in which individual tube heater segments without fans are connected to a common duct with evacuation fan.

System E: tube heater system in which individual tube heater segments each with a fan are connected to a common duct without a fan, the fans of the tube heater segments can be positioned at the entrance or at the end of the segments.

System F: tube heater system in which individual tube heater segments each with a fan are connected to a common duct with a fan, the fans of the tube heater segments can be positioned at the entrance or at the end of the segments

3.1.4**tube heater segment**

tube heater in which only one burner unit is situated and which only contains the products of combustion generated by this burner, the tube heater segment being connected with other tube heater segments to a common duct

3.1.5**common duct**

duct which receives products of combustion from two or more tube heater segments for the purposes of evacuation to the outside

3.1.6**individual burner unit**

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

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

3.1.7**inlet connection**

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

3.1.8**mechanical joint
(mechanical means of obtaining soundness)**

means of ensuring the soundness of an assembly of several (generally metallic) parts without the use of liquids, pastes, tapes, etc

Note 1 to entry: For example the following:

- a) metal to metal joints;
- b) conical joints;
- c) toroidal sealing rings ("O" rings);
- d) flat joints.

3.1.9**gas circuit**

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

3.1.10**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

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3.1.11**gas rate adjuster**

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

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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.

3.1.12**injector**

component that admits the gas into a burner

EN 416:2019 (E)**3.1.13****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”.

3.1.14**premixed burner**

burner in which the gas and a quantity of air, at least equal to that theoretically necessary for complete combustion, are mixed before the flame port(s)

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**primary aeration adjuster**

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

3.1.18**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 system that connects with a flue to evacuate the products of combustion

3.2.5

draught diverter

device placed in the combustion products circuit to reduce the influence of flue-pull and that of down-draught on the burner performance and combustion

3.2.6

terminal

device(s) 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)

3.2.7

terminal guard

device that protects the terminal from mechanical damage from outside influences

3.2.8

POCED

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

3.3 Adjusting, control and safety devices

3.3.1

automatic burner control system

system comprising 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

air proving device

device intended to cause safety shutdown in the event of abnormal conditions of air admission or of combustion products evacuation

3.3.3

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. Such a sequence of operations involving switching on, starting up, supervising and switching off the burner is called "programme".