SLOVENSKI STANDARD

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Multi-burner gas-fired overhead radiant tube heater systems for non-domestic use - Part 1: System D, safety

Gasgeräte-Heizstrahler Dunkelstrahlersysteme mit mehreren Brennern mit Gebläse für gewerbliche und industrielle Anwendung - Teil 1: System D, Sicherheit

Tubes radiants suspendus a multi-bruleurs utilisant les combustibles gazeux a usage non domestique - Partie 1: Systeme D, sécurité

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English version

Multi-burner gas-fired overhead radiant tube heater systems for non-domestic use - Part 1: System D, safety

Tubes radiants suspendus à multi-brûleurs utilisant les combustibles gazeux à usage non domestique - Partie 1: Système D, sécurité

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This European Standard was approved by CEN on 15 November 1998.

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.

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 180 "Non-domestic gas-fired overhead radiant heaters", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by March 2000, and conflicting national standards shall be withdrawn at the latest by March 2000.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

Other parts of EN 777 covering multi-burner gas-fired overhead radiant tube heater systems for non-domestic use are as follows:

Part 2: System E, Safety

Part 3: System F, Safety

Part 4: System H, Safety

Many requirements of EN 416-1 "Single burner gas-fired overhead radiant tube heaters for non-domestic use — Part 1: Safety" are also applicable to EN 777-1 "Multi-burner gas-fired overhead radiant tube heater systems for non-domestic use — Part 1: System D, safety".

In order to facilitate the reading of EN 777-1, it was decided that instead of using cross references it would be preferable to reproduce the parts of the text of EN 416-1 which apply also for multi-burner systems. These parts are reproduced without change.

Test methods for rational use of energy are dealt with in European Pre-standards ENV 1259-1, ENV 1259-2 and ENV 1259-3.

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

1 Scope

This European Standard specifies the requirements and test methods for the construction, safety, classification and marking of non-domestic gas-fired overhead radiant tube heaters incorporated into a multi-burner system (referred to in the body of the text as the 'system') with each burner unit under the control of an automatic burner control system.

This standard is applicable to Type B_{22} systems (see **4.3**) 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 standard is not applicable to:

- systems designed for use in domestic dwellings;
- outdoor systems;
- systems in which the heat input of an individual burner unit exceeds 120 kW (based on the net calorific value of the appropriate reference test gas);
- systems having a draught diverter;
- systems having fully pre-mixed gas and air burners in which:
  - either the gas and all the combustion air are brought together just before the level of the combustion zone;
  - or the pre-mixing of the gas and all combustion air is carried out in a part of the burner upstream of the combustion zone.

This European Standard is applicable to systems which are intended to be type tested. Requirements for systems which are not intended to be type tested would need to be subject to further consideration.

Requirements concerning the rational use of energy have not been included in this European Standard.

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 with thermo-electric flame failure devices for gas burning appliances*

EN 161: 1991, *Automatic shut-off valves for gas burners and gas 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: 1993)

EN 60335-1: 1988, *Safety of household and similar electrical appliances — Part 1: General requirements* (IEC 335-1: 1983)

EN 60529: 1991, *Degrees of protection provided by enclosures* (IP Code) (IEC 529: 1989)

EN 60584-1: 1995, *Thermocouples — Part 1: Reference tables*

EN 60584-2: 1993, *Thermocouples — Part 2: Tolerances*

EN 60730-1: 1995, *Automatic electrical controls for household and similar general purposes — Part 1: General requirements*

EN 61058-1: 1992, *Switches for appliances — Part 1: General requirements*

prEN 50165: 1995, *Electrical equipment of non-electrical heating appliances for household and similar purposes, safety requirement*

IEC 479, *Effects of current on human beings and livestock*

IEC 479-1: 1994, *Part 1: General aspects*

IEC 479-2: 1987, *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 274: 1975, *Copper tubes of circular section — Dimensions*

ISO 6976: 1995, *Natural gas — Calculation of the calorific value, density, relative density and Wobbe index from composition*

ISO 7005-2: 1988, *Metallic flanges — Part 2: Cast iron flanges*

ISO 7005-3: 1988, *Metallic flanges — Part 3: Copper flanges and composite flanges*

3 Definitions

For the purposes of this standard the following definitions apply:

3.1
system and its constituent parts

3.1.1
overhead radiant tube heater
a 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

3.1.2
multi-burner systems
those radiant tube heater systems which employ two or more burner units with each unit incorporating independent flame monitoring. 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

System D: A system in which individual units without fans are connected to a common duct with a fan. Only one burner unit is situated in each branch tube. (See annex A).

Two arrangements of system D are recognized:

System D_1: Having branched tubes which may be of such short length that the flame produced at the burner may extend into the common duct.

System D_2: Having branched tubes of sufficient length that the flame produced at the burner cannot extend into the common duct.

3.1.3
branch tube
for the purposes of this part, a tube in which only one burner unit is situated and which only contains the products of combustion generated by this burner

3.1.4
common duct
a duct which receives products of combustion from two or more branch tubes for the purposes of evacuation to the outside

3.1.5
individual burner unit
a unit comprising a main burner and, if appropriate, an ignition burner. 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

3.1.6
inlet connection
the part of the system intended to be connected to the gas supply

3.1.7
mechanical joint (mechanical means of obtaining soundness)
a means of ensuring the soundness of an assembly of several (generally metallic) parts without the use of liquids, pastes, tapes, etc.

NOTE For example the following:

— metal to metal joints;

— conical joints;

— toroidal sealing rings ("O" rings);

— flat joints.

3.1.8
gas circuit
the part of the burner unit that conveys or contains the gas between the burner unit gas inlet connection and the burner(s)

3.1.9
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

3.1.10
gas rate adjuster
a component allowing an authorised person to set the gas rate of the burner to a predetermined value according to the supply conditions

NOTE Adjustment can 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.

3.1.11
setting an adjuster
immobilizing a gas rate adjuster by such means as a screw, etc., after the gas rate has been ajusted by the manufacturer or installer

3.1.12
sealing an adjuster
the term applied to any 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

NOTE A factory sealed adjuster, i.e. an adjuster sealed by the system manufacturer, is considered to be non-existent.

A governor is considered to be non-existent if it has been factory sealed, i.e. by the system manufacturer in a position such that it is not operational in the range of the normal supply pressure corresponding to the system category.

3.1.13
putting an adjuster or a control out of service
an adjuster or a control (of temperature, pressure, etc.) is said to be 'put out of service' if it is put out of action and sealed in this position. The burner unit then functions as if this device has been removed

3.1.14
injector
a component that admits the gas into a burner

3.1.15
main burner
a burner that is intended to ensure the thermal function of the system and is generally called the burner

3.1.16
ignition device
a means (flame, electrical ignition device or other device) used to ignite the gas at the ignition burner or at the main burner

NOTE This device can operate intermittently or permanently.

3.1.17
ignition burner
a burner whose flame is intended to ignite another burner

3.1.18
primary aeration adjuster
a device enabling the primary air to be set at the desired value according to the supply conditions

3.1.19
combustion products circuit

3.1.19.1
combustion chamber
an enclosure inside which combustion of the air-gas mixture takes place

3.1.19.2
flue outlet
the part of a type B system that connects with a flue to evacuate the products of combustion

3.1.19.3
draught diverter
a 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

3.1.20
range-rating device
a 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

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

3.1.21
zero govenor
a device which maintains a specified downstream pressure between it and a gas orifice at zero pressure within fixed limits independent of variation within a given range of upstream pressure and negative pressure downstream of the gas orifice

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. The programming unit 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 detector
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.

3.2.5
flame signal
the signal given by the flame detector device, normally when the flame sensor senses a flame

3.2.6
flame simulation
a condition which occurs when the flame signal indicates the presence of a flame when in reality no flame is present

3.2.7
pressure governor[1)]
a device which maintains the outlet pressure constant independent of the variations in inlet pressure within defined limits

3.2.8
adjustable pressure governor
a governor provided with means for changing the outlet pressure setting

3.2.9
flame supervision device
a 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

[1)] The term 'governor' is used in this case and for a volume governor.

3.2.10
automatic shut-off valve
a device that automatically opens, closes or varies the gas rate on a signal from the control circuit and/or the safety circuit

3.3
operation of the system

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

Symbol: Q

Unit: kilowatt (kW). [EN 437: 1993]

3.3.2
nominal heat input
the value of heat input declared by the manufacturer

Symbol: Q_n

Unit: kilowatt (kW) [EN 437: 1993]

3.3.3
volumetric flow rate
the volume of gas consumed by the system in unit time during continuous operation

Symbol: V

Unit: cubic metre per hour (m^3/h).

3.3.4
mass flow rate

rhe mass of gas consumed by the system in unit time during continuous operation

Symbol: M

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