SLOVENSKI STANDARD
SIST EN 13410:2002

01-april-2002

Plinska stropna sevala ï Zahteve za prezraļevanje nestanovanjskih prostorov

Gas-fired overhead radiant heaters - Ventilation requirements for non-domestic premises

Heizungsanlagen mit Gas-Infrarotstrahlern - Be- und Entlüftung von gewerblich und industriell genutzten Gebäuden

Appareils de chauffage à rayonnement utilisant les combustibles gazeux - Exigences de ventilation des locaux a usage non domestique

Ta slovenski standard je istoveten z: EN 13410:2001

ICS:

91.140.30	Prezraļevalni in klimatski sistemi	Ventilation and air-conditioning
97.100.20	Plinski grelniki	Gas heaters

SIST EN 13410:2002 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13410

August 2001

ICS 91.140.30; 97.100.20

English version

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This European Standard was approved by CEN on 8 March 2001.

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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 Management Centre 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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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of an identical text or by endorsement, at the latest by February 2002, and conflicting national standards shall be withdrawn at the latest by February 2002.

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).

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.

Gas-fired overhead radiant heaters fall within the scope of the Gas Appliance Directive, 90/396/EEC and as such are required to bear the CE mark according to the appropriate Regulations.

This European Standard has been prepared with the support of CEN/PC 3, now replaced by the Sector Forum Gas, with the intention of harmonising national installation and ventilation requirements for heating systems, consisting of one or more individual overhead radiant heating appliances.

The scope of the Gas Appliance Directive does not indicate a maximum value for the heat input of an individual gas appliance. However, in the scope of EN 416-1: 1999 and EN 419-1:1999 the heat input of an individual radiant heater is limited to 120 kW (based on the net calorific value of the appropriate reference gas), this being the maximum rating at which it is anticipated that an appliance of the type covered by this standard will be marketed, installed and operated.

1 Scope

This European Standard specifies the requirements for the ventilation of non-domestic premises where gas-fired radiant heaters complying with EN 416-1:1999 or EN 419-1:1999 are installed and operated.

This European Standard is applicable to type A appliances (see 3.2).

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 (including amendments).

EN 416-1:1999 Single burner gas-fired overhead radiant-tube heaters – Part 1: Safety

EN 419-1:1999 Non-domestic gas-fired overhead luminous radiant heaters – Part 1: Safety

3 Terms and definitions

For the purposes of this standard the following terms and definitions apply:

3.1 appliance and its constituent parts

3.1.1
overhead radiant heater
gas-fired appliance intended for installation at a height above head level and which is designed to heat the space beneath by radiation

3.1.2
overhead luminous radiant heater
overhead radiant heater in which the heat is produced by means of burning the fuel at or near the outer surface of a material such as a ceramic plaque or gauze, or by means of an atmospheric burner heating a gauze or similar material
[EN 419-1: 1999]

3.1.3
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, heated by the internal passage of combustion products
[EN 416-1: 1999]

3.1.4
atmospheric burner
aerated burner in which the air for combustion is entrained at atmospheric pressure
[EN 419-1: 1999]

3.2
type A appliance
appliance not intended for connection to a flue or to a device for evacuating the products of combustion to the outside of the room in which the appliance is installed

3.3 means of ventilation

3.3.1
ventilation by thermal evacuation
convective evacuation of the products of combustion/air mixture through defined openings in the roof or the walls of a building

3.3.2
ventilation by mechanical evacuation
evacuation of the products of combustion/air mixture by one or more fans in the roof or the walls of a building

3.3.3
ventilation by natural air change
evacuation of the products of combustion/air mixture through undefined openings by pressure differences and temperature differences between the inside and outside of a building

4 Installation and connection

4.1 Installation room

The installation room shall have a volume of at least 10 m³/kW of installed nominal heat input of the radiant heaters.

4.2 Evacuation of the products of combustion

4.2.1 General

The products of combustion from radiant heaters shall be evacuated out of the installation room to the outside of the building. For type A appliances it is done by non-direct evacuation of the products of combustion. The products of combustion leave the appliance, mix with the air in the installation room and leave the building.

This ventilation may be achieved by any of the three following different means:

a) thermal evacuation of the products of combustion/air mixture;

b) mechanical evacuation of the products of combustion/air mixture;

c) natural air change.

The following sub clauses describe the detailed calculations to be performed for all three ventilation methods (see Annex A).

4.2.2 Ventilation by thermal evacuation

4.2.2.1 The air of the room mixed with the products of combustion shall be evacuated above the radiant heaters, if possible near the ridge by means of exhaust air openings.

4.2.2.2 Exhaust air openings shall be constructed and located so that suction of the exhaust air shall not be disturbed by wind influence. European or National regulations and guidelines may prescribe the location of exhaust air openings.

4.2.2.3 Shut down devices and restrictors at exhaust air openings are permissible if an automatic safety device ensures opening of the devices/restrictors for the safe operation of the appliances. Otherwise exhaust air openings shall not be restricted or closed.

4.2.2.4 The number and arrangement of the exhaust air openings depend on radiant heater arrangement and room geometry.

The horizontal distance between a radiant heater and an exhaust air opening shall not exceed six times the exhaust air opening height (measured to the centre of the opening) for wall openings and three times the exhaust air opening height (measured to the centre of the opening) for roof openings.

4.2.2.5 Ventilation by thermal evacuation is sufficient if 10 m³/h of exhaust air per kW of operating heat input are ventilated out of the installation room.

4.2.2.6 When applicable, the exhaust air flow rate shall take into account any exhaust air flow rate required for other purposes. The size and number of openings is then computed based on the higher of these air flow rates.

4.2.2.7 The calculation methods are as follows.

a) Calculation of the necessary exhaust air volume rate.

$$V_{tot} = \Sigma\ Q_{NB} \cdot L$$

where:

V_{tot} is the total necessary exhaust air volume rate in m³/h;

$\Sigma\ Q_{NB}$ is the total operating heat input of all radiant heaters in kW;

L is the specific exhaust air rate ($\geq$ 10 m³/h)/kW.

b) Calculation of the evacuation velocity at the exhaust air opening.

The evacuation velocity may be taken from Figure 1,

where:

h is the vertical distance from the centre of the inlet opening to the centre of the exhaust opening in m;

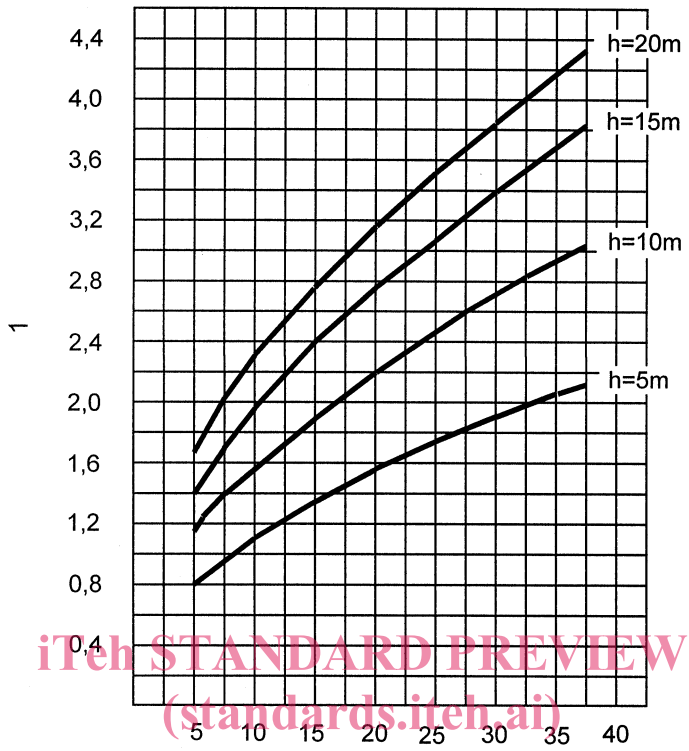
v is the evacuation velocity in m/s;

Δt is the temperature difference $t_2 - t_1$ in °C;

where t_1 is the lowest outdoor temperature in °C;

t_2 is the indoor temperature in °C.

Figure 1 is valid for exhaust air openings and circuits free of internal obstacles or bends.



Key
1 Evacuation velocity v (m/s)
2 Temperature difference Δt (°C)

Figure 1 - Evacuation velocity at the exhaust opening

c) Calculation of the free cross-section of the exhaust air opening.

The free cross-section of the exhaust air opening is given by the following equation:

$$A = \frac{V}{v \times 3600 \times n}$$

where:

A is the free cross-section of all exhaust air openings in m²;

V is the total exhaust air volume rate in m³/h;

v is the evacuation velocity in m/s;

n is the number of exhaust air openings.

Slits and gaps of fixed cross section can also be used as exhaust air openings.

4.2.3 Ventilation by mechanical evacuation

4.2.3.1 The products of combustion mixed with room air shall be evacuated from above the radiant heaters using fans. Only fans with a steep characteristic shall be used.

4.2.3.2 It shall only be possible to operate the radiant heaters when the exhaust air evacuation is assured.

4.2.3.3 The number and arrangement of the fans depend on radiant heater arrangement and room geometry.

The horizontal distance between a radiant heater and a fan shall not exceed six times the fan mounting height (measured to the axis of the fan) for wall mounted fans and three times the fan mounting height (measured to the axis of the fan) for roof mounted fans.

The fans shall be installed above the radiant heaters, if possible near the ridge.

4.2.3.4 Ventilation by mechanical evacuation is sufficient if 10 m³/h of exhaust air per kW of operating heat input are ventilated out of the installation room.

4.2.3.5 When applicable, the exhaust air flow rate shall take into account any exhaust air flow rate required for other purposes. The fan capacity is then computed based on the higher of these air flow rates.

4.2.3.6 The calculation methods are as follows.

a) Calculation of the necessary exhaust air volume rate:

$$V_{tot} = \Sigma\, Q_{NB} \cdot L$$

where:

V_{tot} is the total necessary exhaust air volume rate in m³/h;

$\Sigma\, Q_{NB}$ is the total operating heat input of all radiant heaters in kW;

L is the specific exhaust air rate (≥ 10 m³/h)/kW.

b) The total fan capacity, whether provided by one or more fans, shall be at least equal to the value of V_{tot} as computed in a).

4.2.4 Ventilation by natural air change

Gas-fired radiant heaters may be operated without any special exhaust system, if the exhaust gases are discharged to the outside atmosphere by a sufficient natural air change in the installation room.

No provision for thermal or mechanical ventilation is needed in the following particular cases:

- buildings with natural air change greater than 1,5 volumes per hour;

- buildings with density of operating heat input not greater than 5 W/m³.