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Ploskovni sistemi za ogrevanje in hlajenje z vodo - 4. del: Vgradnja

Water based surface embedded heating and cooling systems - Part 4: Installation

Raumflächenintegrierte Heiz- und Kühlsysteme mit Wasserdurchströmung - Teil 4: Installation

Systèmes de surfaces chauffantes et rafraîchissantes hydrauliques intégrées - Partie 4: Installation

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 130.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 1264-4:2019) has been prepared by Technical Committee CEN/TC 130 “Space heating appliances without integral heat sources”, the secretariat of which is held by UNI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1264-4:2009.

This document, *Water based surface embedded heating and cooling systems*, consists of the following parts:

— *Part 1: Definitions and symbols;*

— *Part 2: Floor heating: Methods for the determination of the thermal output using calculations and experimental tests;*

— *Part 3: Dimensioning;*

— *Part 4: Installation;*

— *Part 5: Determination of the thermal output for wall and ceiling heating and for floor, wall and ceiling cooling.*

The main changes with respect to the previous edition are listed below:

a) Clarified the scope;

b) Improved wording, especially the term “prove method”;

c) Added a new subclause 4.1 Hydronic balancing;

d) Added a paragraph in 4.2.2.1 Supporting base;

e) Modified 4.2.2.2 Insulating layers;

f) Added a new subclause 4.2.2.4 Other layers;

g) Modified 4.2.2.9 Weight bearing layer;

h) Added a new subclause 4.2.2.9.5.4 Tubes damage;

i) Modified 4.2.3 Leak test;

j) Modified 4.2.4 Initial heat up;

k) Added a new Annex B Initial heating up protocol;

l) Added a new subclause 4.2.5 Heating up for readiness for covering;

m) Modified 4.3.3 Insulation;

n) Improved wording.

1 Scope

EN 1264 covers surface embedded heating and cooling systems installed in buildings, residential and non-residential (e.g. office, public, commercial and industrial buildings) and focuses on systems installed for the purpose of thermal comfort.

EN 1264 applies to water based heating and cooling systems embedded into the enclosure surfaces of the room to be heated or to be cooled. It also applies as appropriate to the use of other heating media instead of water.

EN 1264 applies to identify standardized product characteristics by calculation and testing the thermal output of heating for technical specifications and certification. For the design, construction and operation of these systems, EN ISO 11855 applies.

The systems covered in EN 1264 are adjoined to the structural base of the enclosure surfaces of the building, mounted directly or with fixing supports. It does not cover ceiling systems mounted in a suspended ceiling with a designed open air gap between the system and the building structure which allows the thermally induced circulation of the air. The thermal output of these systems can be determined according to ISO 18566, EN 14037 and EN 14240.

EN 1264-4 specifies uniform requirements for the design and the construction of heating and cooling floor, ceiling and wall structures to ensure that the heating/cooling systems are suited to the particular application.

The requirements specified by EN 1264 apply only to the components of the heating/cooling systems which are part of the heating/cooling system. EN 1264-4 does not cover all other elements which are not part of the heating/cooling system.

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

EN 1254 (all parts), *Copper and copper alloys — Plumbing fittings*

EN 1264-1, *Water based surface embedded heating and cooling systems - Part 1: Definitions and symbols*

EN ISO 11855, *Building environment design — Design, dimensioning, installation and control of embedded radiant heating and cooling systems*

EN ISO 15874 (all parts), *Plastics piping systems for hot and cold water installations*

EN ISO 15875 (all parts), Plastics piping systems for hot and cold water installations — Crosslinked polyethylene (PE-X)

EN ISO 15876 (all parts), *Plastics piping systems for hot and cold water installations — Polybutylene (PB)*

EN ISO 15877 (all parts), Plastics piping systems for hot and cold water installations — Chlorinated poly(vinyl chloride) (PVC-C)

EN ISO 21003 (all parts), *Multilayer piping systems for hot and cold water installations inside buildings*

ISO 10508, *Plastics piping systems for hot and cold water installations — Guidance for classification and design*

ISO 22391 (all parts), *Plastics piping systems for hot and cold water installations — Polyethylene of raised temperature resistance (PE-RT)*

DIN 4724, *Kunststoff-Rohrleitungssysteme für Warmwasserheizung und Heizkörperanbindung — Vernetztes Polyethylen mittlerer Dichte (PE-MDX)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1264-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Requirements

4.1 Hydronic balancing

According to ISO 11855-6:2018, 4.8, water based heating and cooling systems shall have a hydronic balancing. The components shall be adjusted in order to ensure the required flow rates. Under dynamic conditions, e.g. during the heating up period, it shall be ensured that the hydraulic interaction between the different heating circuits is small (the flow rates in the different circuits should not be greater than the design flow rates). Depending on the situation of the heating system the floor heating distribution system shall be equipped with facilities for degassing and sludge separation.

Each circuit shall have a balancing device.

The balance of the system shall be done according to the realized project, e.g. “as build”, because the length of circuits realized can differ from the project, therefore once the system has been installed, the flow rates shall be updated and then set on the manifold.

4.2 Floor heating and cooling systems

4.2.1 General structural preconditions

The installation of a hot water floor heating and/or cooling system shall follow the prior installation of any electrical, sanitary and other pipe facilities. The structure as specified in 4.1.2.1 with the draught-free closure of all building openings, e.g. windows and outer doors, shall be completed.

4.2.2 Building layers, building components

4.2.2.1 Supporting base

The supporting base shall be prepared in accordance with relevant standards.

Any pipe work or conduits shall be fixed and encased to provide a level base upon which thermal insulation and/or acoustic insulation is added before laying the heating pipes. In this respect, the necessary structural height shall be taken into account.

In the case of service pipes installed within the insulation layer, these pipes shall be protected against temperature change in accordance with National Regulations.

If the external doors and windows are not present before the installation of the system, it is recommended to close all windows holes, even with provisional systems (in order to avoid too high/low temperatures and to limit the effect of the speed of the air). Walls plaster shall be completed.

4.2.2.2 Insulating layer

In the case of floor heating and cooling systems, as a rule the thermal resistance $R_{\lambda,ins}$ is provided by the insulation layers which are integral parts of the system; on this topic, national rules shall be consulted.

The resistance $R_{\lambda,ins}$ of the insulating layer of the heating/cooling system is specified in Table 1. These requirements are for heating and cooling systems.

Table 1 — System Insulation — Minimum heat conduction resistance of system-insulating layers below the pipes of heating/cooling systems (m^2·K)/W

	heated room below or adjacent	Unheated or intermittent heated room below, adjacent or directly on the ground[a]	external air temperature below or adjacent		
			external design temperature $\vartheta_d \geq 0$ °C	external design temperature 0 °C > $\vartheta_d \geq -5$ °C	external design temperature −5 °C > $\vartheta_d \geq -15$ °C
heat conduction resistance $R_{\lambda,ins}$	0,75	1,25	1,25	1,50	2,00
[a] with ground water level ≤ 5 m below the supporting base, the value should be increased.					

NOTE Insulation are not vapour barrier.

When installing the system-insulating layer, the insulating panels shall be butted tightly together. Multiple insulating layers shall be staggered or placed in such a way that the joints between panels of one layer are out of line with the next layer.

Prior to the laying of the screed, a peripheral insulating strip (edge joint) shall be placed along the walls and other building components penetrating the screed and firmly secured to the supporting base, e.g. door frames, pillars and risers.

The peripheral insulating strip shall rise from the supporting base up to the surface of the finished floor and permit a movement of the screed of at least 5 mm.

In the case of multiple insulating layers, the peripheral insulating strip shall be placed prior to application of the upper insulating layer. When laying the screed, the peripheral insulating strip shall be secured against any change in position. The top part of the peripheral insulating strip which rises over the finished floor shall not be cut off until completion of the floor covering and, in the case of textile and plastic coverings, hardening of the filler.

4.2.2.3 Protective layer

Prior to laying the screed, the insulation layer shall be covered with a protective layer consisting of a polyethylene film of at least 0,15 mm thickness, with a minimum of 80 mm overlaps, or with another product of equivalent function.

In accordance with 4.1.2.2.2, the protective layer shall be turned pulled up above the upper edge of the peripheral insulating strip unless the strip itself fulfils the function of protection. The peripheral

insulating strip shall be firmly secured to the insulating layer or to the protective layer to avoid the infiltration of the liquid screed.

When using synthetic resin screeds or calcium sulphate screeds, the protective layer of the insulating layer shall be liquid-tight by for instance being stuck or welded together.

When using gush asphalt screeds, also a therefore suitable protective layer shall be applied, but in this case, liquid tightness is not necessary.

Protective layers are not humidity barriers.

4.2.2.4 Other layers

If other layers (such as acoustic insulation layers) are included and they have an influence on the thermal output, they have to be taken into account in the thermal performance calculation.

4.2.2.5 Equipment

4.2.2.5.1 Safety

For heating systems, a safety device, independent of the control unit, and which operates even in the absence of electric power, shall cut off the heat supply in the floor heating circuit in such a way that the temperature around the heating elements does not exceed the data given in 4.1.2.8.2. For cooling systems, the control system shall prevent condensation with interruption of flow rate or increase in flow temperature.

4.2.2.5.2 Manifolds

The central manifold of the piping system shall be placed in such a manner to get the shortest flow pipes. Otherwise, the flow pipes can have an unwanted impact on the control of the room temperature.

4.2.2.5.3 Stop valves

Each circuit shall have two stop valves. At least one circuit per heated/cooled room shall be installed in order to permit temperature control either manual or automatic.

4.2.2.6 Piping (pipes and couplings)

4.2.2.6.1 Plastic piping

Requirements for plastic pipes shall comply with the following Standards:

PE-X	EN ISO 15875 (parts −1, −2, −3 and −5)
PB	EN ISO 15876 (parts −1, −2, −3 and −5)
PP	EN ISO 15874 (parts −1, −2, −3 and −5)
PVC-C	EN ISO 15877 (parts −1, −2, −3 and −5)
Multilayer Piping Systems	EN ISO 21003 (parts −1, −2, −3 and −5)
PE-RT Systems	ISO 22391 (parts −1, −2, −3 and −5)
PE-MDX	DIN 4724

Calculate the minimum wall thickness in accordance with the following conditions:

a) Service conditions: Class 4 in accordance with ISO 10508;

b) Operating pressure: ≥ 4 bar;

c) Lifetime = 50 years.

It is recommended to use pipes with an oxygen-barrier layer in conformity with Annex A. Precautions shall be taken to protect the system against corrosion.

In the case of junction of the circuit, or repair of tubes the technical information of the manufacturer should be followed.

4.2.2.6.2 Copper piping

Copper piping shall comply with the requirements of EN 1057 (pipes) and EN 1254 series(fittings).The preferred temper is annealed R220 (see EN 1057:2010, Clause 4).

4.2.2.7 Installation of piping

4.2.2.7.1 Storage and transport

The pipes shall be transported, stored and handled in such a way as to be:

a) protected from anything which could damage them;

b) for plastic pipes stored out of direct sunlight.

4.2.2.7.2 Clearance area

The pipes are placed more than:

a) 50 mm distance from vertical structures;

b) 200 mm distance from smoke ducts and open fireplaces, open or walled shafts, lift wells.

4.2.2.7.3 Bending radius

Use only a bending radius equal to the radius of bending for the pipes as recommended by the system supplier.

4.2.2.7.4 Couplings

All couplings within the floor construction shall be exactly located and designated on the record drawing.

4.2.2.8 Attachment of pipes

The pipes and their attachment systems shall be secured such that their horizontal and vertical positions are maintained as planned. The vertical deviation upwards of the pipes before and after application of the screed shall not exceed 5 mm at any point. The horizontal deviation of the specified pipe spacing in the heating circuit shall not exceed ± 10 mm at the attachment points. These requirements are not applicable in the area of bends and deflections. The attachment spacing necessary to comply with these requirements is dependent on the tube materials, dimensions and systems.

The manufacturer shall specify the maximum permissible distance between attachments.

NOTE Attachments that are more frequent provide greater security concerning pipe positioning. Spacing of the attachments depends on the system applied. Experience has shown that systems with individual attachments necessitate spacing of approximately 50 cm in order to comply with the above-mentioned requirements.

4.2.2.9 Weight bearing layer

4.2.2.9.1 Screed layer

The thickness of the screed is calculated according to relevant standards taking into account loading capacity and flexural strength class. The relevant European and National Standards shall be used.