SLOVENSKI STANDARD
SIST EN 17414-2:2020

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Cevi za daljinsko hlajenje - Tovarniško izdelani gibki cevni sistemi - 2. del: Vezani sistem z delovnimi cevmi iz polimernih materialov - Zahteve in preskusne metode

District cooling pipes - Factory made flexible pipe systems - Part 2: Bonded system with plastic service pipes - Requirements and test methods

Fernkühlungsrohre - Werkmäßig gedämmte flexible Rohrsysteme - Teil 2: Verbundrohrsysteme mit Mediumrohren aus Kunststoff - Anforderungen und Prüfungen

Réseaux d'eau glacée - Systèmes de tuyaux flexibles manufacturés - Partie 2 : Système bloqué avec tube de service en plastique - Prescriptions et méthodes d'essai

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ICS:

23.040.99	Drugi sestavni deli za cevovode	Other pipeline components

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English Version

District cooling pipes - Factory made flexible pipe systems - Part 2: Bonded system with plastic service pipes; requirements and test methods

Réseaux d'eau glacée - Systèmes de tuyaux flexibles manufacturés - Partie 2 : Système bloqué avec tube de service en plastique - Prescriptions et méthodes d'essai

Fernkälterohre - Werkmäßig gefertigte flexible Rohrsysteme - Teil 2: Verbundrohrsysteme mit Mediumrohren aus Kunststoff - Anforderungen und Prüfungen

This European Standard was approved by CEN on 22 June 2020.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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European foreword

This document (EN 17414-2:2020) has been prepared by Technical Committee CEN/TC 107 “Prefabricated district heating and district cooling pipe system”, the secretariat of which is held by DS.

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of an identical text or by endorsement, at the latest by January 2021, and conflicting national standards shall be withdrawn at the latest by January 2021.

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.

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.

Introduction

Factory made flexible bonded pipe systems with plastic service pipes for directly buried district cooling networks are of common technical usage. In order to ensure quality including product-related service life, to ensure safety in use, economical energy usage and to facilitate comparability in the market, CEN/TC 107 decided to set up standards for these products.

This document is one of a series of standards which form several parts of EN 17414, *District cooling pipes – Factory made flexible pipe systems*:

— *Part 1: Classification, general requirements and test methods*;

— *Part 2: Bonded system with plastic service pipes - Requirements and test methods* (this document)[1)];

— *Part 3: Non bonded system with plastic service pipes - Requirements and test methods*.

The other standards from CEN/TC 107 covering this subject are:

— EN 17415-1, *District cooling pipes - Bonded single pipe systems for directly buried cold water networks - Part 1: Factory made pipe assembly of steel or plastic service pipe, polyurethane thermal insulation and a casing of polyethylene*;

— EN 17415-2, *District cooling pipes – Bonded single pipe systems for directly buried cold water networks Part 2: Factory made fitting assemblies of steel or plastic service pipe, polyurethane thermal insulation and a casing of polyethylene*[1];

— EN 17415-3, *District cooling pipes – Bonded single pipe systems for directly buried cold water networks Part 3: Factory made steel valve assembly for steel or plastic service pipe, polyurethane thermal insulation and a casing of polyethylene*[1];

— EN ZZZZZ-1, *District cooling pipes – Design and installation of thermal insulated bonded single and twin pipe systems for directly buried cold water networks – Part 1: Design*[1];

— EN ZZZZZ-2, *District cooling pipes – Design and installation of thermal insulated bonded single and twin pipe systems for directly buried cold water networks – Part 2: Installation*[1];

— EN 489-1, *District heating pipes - Bonded single and twin pipe systems for buried hot water networks - Part 1: Joint casing assemblies and thermal insulation for hot water networks in accordance with EN 13941-1;*

— EN 14419, *District heating pipes – Bonded single and twin pipe systems for directly buried hot water networks – Surveillance systems*;

Waste management and recycling of materials is dealt with in Annex C.

[1] Under preparation.

1 Scope

This document specifies requirements and test methods for factory made thermally insulated bonded flexible pipe-in-pipe assemblies for directly buried district cooling distribution systems, comprising a service pipe and a casing of polyethylene. The pipe assembly can also include the following additional elements: measuring wires, spacers and diffusion barriers.

This document is intended to be used in conjunction with EN 17414-1.

This document applies only to insulated pipe assemblies, for continuous operation with water at various temperatures (1 to 30) °C and a maximum operation pressure of 25 bar dependent on material specified.

The design is based on an expected service life with continuous operation of a minimum 50 years.

This document does not cover surveillance systems.

In conjunction with the other parts of EN 17414, this document is applicable to pipes, fittings, their joints and to joints with components made of non-plastics materials intended to be used for district cooling installations.

NOTE For the transport of other liquids, for example potable water, additional requirements could be applicable.

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 12201-1, *Plastics piping systems for water supply, and for drainage and sewerage under pressure - Polyethylene (PE) - Part 1: General*

EN 12201-2, *Plastics piping systems for water supply, and for drainage and sewerage under pressure - Polyethylene (PE) - Part 2: Pipes*

EN 12201-3, *Plastics piping systems for water supply, and for drainage and sewerage under pressure - Polyethylene (PE) - Part 3: Fittings*

EN 12201-5, *Plastics piping systems for water supply, and for drainage and sewerage under pressure - Polyethylene (PE) - Part 5: Fitness for purpose of the system*

EN 17414-1, *District cooling pipes - Factory made flexible pipe systems - Part 1: Classification, general requirements and test methods*

EN ISO 15874-1, *Plastics piping systems for hot and cold water installations - Polypropylene (PP) - Part 1: General (ISO 15874-1)*

EN ISO 15874-2, *Plastics piping systems for hot and cold water installations - Polypropylene (PP) - Part 2: Pipes (ISO 15874-2)*

EN ISO 15874-3, *Plastics piping systems for hot and cold water installations - Polypropylene (PP) - Part 3: Fittings (ISO 15874-3)*

EN ISO 15874-5, *Plastics piping systems for hot and cold water installations - Polypropylene (PP) - Part 5: Fitness for purpose of the system (ISO 15874-5)*

EN ISO 15875-1, *Plastics piping systems for hot and cold water installations - Crosslinked polyethylene (PE-X) - Part 1: General (ISO 15875-1)*

EN ISO 15875-2, *Plastics piping systems for hot and cold water installations - Crosslinked polyethylene (PE-X) - Part 2: Pipes (ISO 15875-2)*

EN ISO 15875-3, *Plastics piping systems for hot and cold water installations - Crosslinked polyethylene (PE-X) - Part 3: Fittings (ISO 15875-3)*

EN ISO 15875-5, *Plastics piping systems for hot and cold water installations - Crosslinked polyethylene (PE-X) - Part 5: Fitness for purpose of the system (ISO 15875-5)*

EN ISO 15876-1, *Plastics piping systems for hot and cold water installations - Polybutene (PB) - Part 1: General (ISO 15876-1)*

EN ISO 15876-2, *Plastics piping systems for hot and cold water installations - Polybutene (PB) - Part 2: Pipes (ISO 15876-2)*

EN ISO 15876-3, *Plastics piping systems for hot and cold water installations - Polybutene (PB) - Part 3: Fittings (ISO 15876-3)*

EN ISO 15876-5, *Plastics piping systems for hot and cold water installations - Polybutene (PB) - Part 5: Fitness for purpose of the system (ISO 15876-5)*

EN ISO 21003-1, *Multilayer piping systems for hot and cold water installations inside buildings - Part 1: General (ISO 21003-1)*

EN ISO 21003-2, *Multilayer piping systems for hot and cold water installations inside buildings - Part 2: Pipes (ISO 21003-2)*

EN ISO 21003-3, *Multilayer piping systems for hot and cold water installations inside buildings - Part 3: Fittings (ISO 21003-3)*

EN ISO 21003-5, *Multilayer piping systems for hot and cold water installations inside buildings - Part 5: Fitness for purpose of the system (ISO 21003-5)*

EN ISO 22391-1, *Plastics piping systems for hot and cold water installations - Polyethylene of raised temperature resistance (PE-RT) - Part 1: General (ISO 22391-1)*

EN ISO 22391-2, *Plastics piping systems for hot and cold water installations - Polyethylene of raised temperature resistance (PE-RT) - Part 2: Pipes (ISO 22391-2)*

EN ISO 22391-3, *Plastics piping systems for hot and cold water installations - Polyethylene of raised temperature resistance (PE-RT) - Part 3: Fittings (ISO 22391-3)*

EN ISO 22391-5, *Plastics piping systems for hot and cold water installations - Polyethylene of raised temperature resistance (PE-RT) - Part 5: Fitness for purpose of the system (ISO 22391-5)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 17414-1 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 https://www.iso.org/obp

4 Classification

4.1 Operating temperatures and service life

Pipe systems according to this document are designed for a service life of 50 years when operated with temperature profiles within (1 to 30) °C.

The maximum continuous operating temperature shall not exceed 30 °C.

4.2 Design pressures

Pipe systems according to this document are designed for continuous operating pressures of up to 25 bar.

Table 1 defines the maximum SDR ratios of the service pipe required to withstand different operating pressures at a nominal temperature of 30 °C (see Annex A, Example 3).

Table 1 — Maximum SDR ratios for operating pressures 6 to 25 bar

Service pipe material	Operating pressure				
	6 bar	10 bar	16 bar	20 bar	25 bar
PB-1	33	21	13,6	11	9
PP-RCT	26	13,6	9	7,4	6
PE 100, PE-X, PE-RT Type II, PP-H, PP-R	21	13,6	9	7,4	6
PE 80, PP-B	17	11	7,4	6	5
Multilayer pipes	Wall thicknesses shall be calculated according to the methods defined in EN ISO 21003-2.				

NOTE 1 A higher SDR could be applicable for a lower temperature profile (see Annex A, Example 1).

NOTE 2 The calculation of the SDR ratios is based on EN ISO 15494 with the safety factor 1,25 for a service life of 50 years. Annex A shows calculations for other temperatures (20°C and 25°C).

NOTE 3 The available pipe diameters need to be checked with the manufacturer. Some SDR ratios are not suitable for all diameters, as connection methods (e.g. polyfusion welding) require certain minimum wall thicknesses.

NOTE 4 Plastic pipe materials offer a wider range of pressure ratings for specific temperature/lifetime profiles. Manufacturers are offering more detailed tables and calculations to design the best solution.

5 Requirements

5.1 General requirements

In addition to the general requirements defined in EN 17414-1, the following product specific requirements apply.

5.2 Service pipes, fittings and their connections

Service pipes, fittings and their connections shall comply with:

— EN 12201-1, EN 12201-2, EN 12201-3, EN 12201-5, for service pipes made of polyethylene (PE);

— EN ISO 15874-1, EN ISO 15874-2, EN ISO 15874-3, EN ISO 15874-5, for service pipes made of polypropylene (PP);

— EN ISO 15875-1, EN ISO 15875-2, EN ISO 15875-3, EN ISO 15875-5, for service pipes made of cross-linked polyethylene (PE-X);

— EN ISO 15876-1, EN ISO 15876-2, EN ISO 15876-3, EN ISO 15876-5, for service pipes made of polybutene (PB-H);

— EN ISO 21003-1, EN ISO 21003-2, EN ISO 21003-3, EN ISO 21003-5, for multilayer M pipes;

— EN ISO 22391-1, EN ISO 22391-2, EN ISO 22391-3, EN ISO 22391-5, for service pipes made of polyethylene of raised temperature resistance (PE-RT);

All requirements of the pipes, fittings and their connections shall be met before leaving the production site.

5.3 Axial shear strength of pipe assemblies

The axial shear strength between the service pipe and the insulation shall be at least 0,09 MPa for plastics pipes and 0,12 MPa for multilayer M pipes. The axial shear strength shall be tested in accordance with 6.2. The test result shall be determined as an average of five measurements.

5.4 Linear water tightness of pipe assemblies

When tested in accordance with 6.3, the amount of water leaking through any of the pipe ends shall not exceed 100 g after 168 h.

5.5 Water vapour permeation of pipe assemblies

The pipe supplier shall give information about the risk of water accumulation in the thermal insulation dependant on the service conditions.

NOTE 1 PB, PE, PE-RT, PE-X, PP-R and PP-RCT pipes are slightly open for diffusion of water from the media to the insulation. The rate of diffusion increases with the temperature. The casing is likewise open for diffusion from the insulation to the soil. The rate of this diffusion depends on the casing temperature and the water vapour partial pressure difference over the casing wall. For pipes installed under the ground water table there will always be a certain build-up of water directly under the casing. Experience shows that this build-up is limited and not detrimental to the function although a certain loss of insulation capacity could be expected.

NOTE 2 Multilayer M pipes which consist of a homogeneously closed and longitudinally welded or seamless metal layer with a layer thickness ≥ 100 µm in the pipe construction are considered to be water vapour tight.

6 Test procedures

6.1 General

Unless stated otherwise, all tests described in this document are to be carried out:

— no sooner than 72 h after production;

— at room temperature;

— on samples taken from coiled pipes.

Guidelines for testing frequencies and responsibilities are given in EN 17414-1 and in Annex B.

6.2 Axial shear strength of pipe assemblies

The axial shear strength between the service pipe and the thermal insulation shall be tested as shown in Figure 1, where (1) is the test specimen, (2) is a cylindrical piston pressing onto the service pipe and a support (3) with a cylindrical opening.

The test specimen (1) shall have a length which equals the outer diameter of the casing ± 5 %. The ends shall be cut in a perpendicular direction to the axis of the pipe.

The piston (2) shall be made from metal and shall have an outer diameter which equals the outer diameter of the service pipe with a tolerance of up to (0/-1) mm.

The support (3) shall be made of metal, the diameter of the circular central opening shall equal the mean of the inner and outer diameter of the insulation.