SLOVENSKI STANDARD
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Cevi za daljinsko ogrevanje - Tovarniško izdelani gibki cevni sistemi - 3. del: Nevezani cevni sistemi iz polimernih materialov - Zahteve in preskusne metode

District heating pipes - Factory made flexible pipe systems - Part 3: Non bonded system with plastic service pipes; requirements and test methods

Fernwärmerohre - Werkmäßig gedämmte flexible Rohrsysteme - Teil 3: Nicht-Verbund-Rohrsysteme mit Mediumrohren aus Kunststoff; Anforderungen und Prüfungen

Tuyaux de chauffage urbain - Systèmes de tuyaux flexibles manufacturés - Partie 3 : Système non bloqué avec tubes de service en plastique ; exigences et méthodes d'essai

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English Version

District heating pipes - Factory made flexible pipe systems - Part 3: Non bonded system with plastic service pipes; requirements and test methods

Tuyaux de chauffage urbain - Systèmes de tuyaux flexibles manufacturés - Partie 3 : Système non bloqué avec tubes de service en plastique ; exigences et méthodes d'essai

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This European Standard was approved by CEN on 27 March 2022.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 15632-3:2022) has been prepared by Technical Committee CEN/TC 107 “Prefabricated district heating and district cooling pipe systems”, 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of an identical text or by endorsement, at the latest by November 2022, and conflicting national standards shall be withdrawn at the latest by November 2022.

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 15632-3:2010+A1:2014.

This document is one of a series of standards which form several parts of EN 15632, *District heating 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*;

— *Part 3: Non bonded system with plastic service pipes; requirements and test methods*;

— *Part 4: Bonded system with metal service pipes; requirements and test methods*.

In comparison with EN 15632-3:2010+A1:2014, the following changes have been made:

a) revised temperature profile in Clause 4 with explicitly stated (unchanged) safety factors;

b) introduction of an alternative option of thermal stability testing at 115 °C in 5.2;

c) improved specification of a service pipe according to EN ISO 21003 in 5.2;

d) completely revised informative Annex A “Application of Miner’s rule”;

e) completely revised “guideline for testing” in the informative Annex B.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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

District heating technology has developed rapidly since its origin and especially in recent times. Today, there are different generations of district heating networks. The technologies of these generations are driven by the different heat sources and operating temperatures used.

CEN/TC 107 provides a set of European standard series for rigid and flexible piping systems in district heating to suit all generations and requirements of district heating networks in the market.

The standard documents ensure quality for pre-fabricated piping systems in district heating.

This standard series covers flexible, pre-fabricated piping systems for operation conditions as described in the scope of part 1.

1 Scope

This document specifies requirements and test methods for flexible, factory made, buried district heating pipe systems with plastic service pipes and no bonding between the layers of the pipe assemblies.

It is only applicable in conjunction with part 1.

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 heating installations.

This document is applicable to a maximum operating temperature of 95 °C and maximum operating design pressure up to 1,0 MPa for a design service life of at least 30 years.

This document does not apply to cover surveillance systems.

NOTE For higher temperatures or for the transport of other fluids, for example potable water, additional requirements and testing is needed. Such requirements are not specified in this document.

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 485-2, *Aluminium and aluminium alloys - Sheet, strip and plate - Part 2: Mechanical properties*

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 573-3, *Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical composition and form of products*

EN 10025-2, *Hot rolled products of structural steels - Part 2: Technical delivery conditions for non-alloy structural steels*

EN 10025-3, *Hot rolled products of structural steels - Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels*

EN 10025-4, *Hot rolled products of structural steels - Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels*

EN 10216-1, *Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 1: Non-alloy steel tubes with specified room temperature properties*

EN 10216-2, *Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 2: Non-alloy and alloy steel tubes with specified elevated temperature properties*

EN 10216-3, *Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 3: Alloy fine grain steel tubes*

EN 10217-1, *Welded steel tubes for pressure purposes - Technical delivery conditions - Part 1: Electric welded and submerged arc welded non-alloy steel tubes with specified room temperature properties*

EN 10217-2, *Welded steel tubes for pressure purposes - Technical delivery conditions - Part 2: Electric welded non-alloy and alloy steel tubes with specified elevated temperature properties*

EN 10217-3, *Welded steel tubes for pressure purposes - Technical delivery conditions - Part 3: Electric welded and submerged arc welded alloy fine grain steel tubes with specified room, elevated and low temperature properties*

EN 15632-1, *District heating pipes - Pre-insulated flexible pipe systems - Part 1: Classification, general requirements and test methods*

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 17248, *District heating and district cooling pipe systems - Terms and definitions*

EN ISO 19893, *Plastics piping systems - Thermoplastics pipes and fittings for hot and cold water - Test method for the resistance of mounted assemblies to temperature cycling (ISO 19893)*

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

ISO 17455, *Plastics piping systems — Multilayer pipes — Determination of the oxygen permeability of the barrier pipe*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 17248 apply.

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

— IEC Electropedia: available at https://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 at least 30 years when operated at the following temperature profile DH (Table 1):

Table 1 — Temperature profile DH

	Temperatures	**Duration**
Operating Temperature (T_{op})	80 °C	29 Years
Maximum operating temperature (T_{max})	90 °C 95 °C	7 760 h 1 000 h
Malfunction temperature (T_{mal})	100 °C	100 h

NOTE The temperature profile DH of this document exceeds the requirements especially the thermal load of other plastic piping system standards for conveyed medium water by far. This document requires a thermal stability test at 110 °C of 15 000 h (see 5.2.1) in comparison to a thermal stability test at 110 °C of 8 760 h for hot drinking water applications inside of buildings.

Other temperature/time profiles may be applied in accordance with EN ISO 13760 (Miner's Rule). Further information is given in Annex A.

The maximum operating temperature shall not exceed 95 °C.

4.2 Design pressures

Pipe systems according to this document are designed for continuous operating pressures of 0,6 MPa, 0,8 MPa or 1,0 MPa.

Table 2 specifies the maximum SDR ratios of the service pipe required to withstand the operating pressures.

Table 2 — SDR ratios required for different design pressures

	Design Pressure		
Service pipe	0,6 MPa	0,8 MPa	1,0 MPa
PE-X	SDR 11	SDR 9	SDR 7,4
PB-H	SDR 13,6	SDR 11	SDR 9
Multilayer M pipes	The construction shall meet the design pressure 0,6 MPa, 0,8 MPa or 1,0 MPa, as applicable, when tested according to EN ISO 21003-2.		

NOTE 1 The SDR ratios in Table 2 are based on the reference lines given in EN ISO 15875-1 and EN ISO 15876-1, respectively.

The following minimum safety factors for design stress shall be applied (Table 3):

Table 3 — Safety factors for design stress

Temperature	Safety factor	Temperature range [a]
Operating Temperature (T_{op})	1,5	≤ 80 °C
Maximum operating temperature (T_{max})	1,3	> 80 °C to ≤ 95 °C
Malfunction temperature (T_{mal})	1,0	> 95 °C to ≤ 100 °C
[a] The given temperature range defines the safety factors, which shall be applied for other temperature / time profiles than Table 1 calculated in accordance with Annex A.		

NOTE 2 These safety factors are identical with the overall service (design) coefficients given in EN ISO 15875-2, EN ISO 15876-2 and EN ISO 21003-2, respectively.

NOTE 3 The column "Temperature range" of Table 3 shows the temperature ranges in which the relevant safety factors are applied. This is of particular importance for the temperature profiles of Annex A, or for further customized temperature profiles.

5 Requirements

5.1 General requirements

In addition to the general requirements specified in EN 15632-1 the following product specific requirements shall apply.

5.2 Service pipes, fittings and their connections

5.2.1 Quality of service pipes, fittings and their connections

Service pipes, fittings and their connections shall comply with one of the following standard series, as applicable: EN ISO 15875 series or EN ISO 15876 series or EN ISO 21003 series. The respective details to comply with are as follows:

— EN ISO 15875-1, EN ISO 15875-2, EN ISO 15875-3 and EN ISO 15875-5 for service pipes made of crosslinked polyethylene (PE-X).

The EN ISO 15875 standards series consisting of part 1, 2, 3 and 5 is a piping system standard.

EN ISO 15875-1 is of general importance. Pipes conforming to EN ISO 15875-2 are intended to be joined with fittings conforming to EN ISO 15875-3, whereby the connection conforms to the requirements of EN ISO 15875-5.

This document shall only be used in conjunction with all these parts of EN ISO 15875.

NOTE 1 The test results obtained from a specific piping system test according EN ISO 15875-5 cannot be transferred to other combinations of pipes and fittings.

All requirements of the pipe and fitting according to EN ISO 15875-2 and EN ISO 15875-3, particularly the degree of cross-linking, shall be met before leaving the production site.

— Deviating from EN ISO 15875-2, the thermal stability test on service pipes shall be carried out as follows:

  — pipes shall not fail when tested at 110 °C at a hoop stress of 2,4 N/mm^2 for 15 000 h;

  — alternatively, pipes shall not fail when tested at 115 °C at a hoop stress of 2,1 N/mm^2 for 8 760 h;

  — in case of dispute, the result of the thermal stability test at 110 °C applies.

— Deviating from EN ISO 15875-5, the thermal cycling test on service pipes and fittings shall be carried out with test parameters specified in 6.2.

— EN ISO 15876-1, EN ISO 15876-2, EN ISO 15876-3 and EN ISO 15876-5 for service pipes made of polybutylene (PB-H).

The EN ISO 15876 standards series consisting of part 1, 2, 3 and 5 is a piping system standard.

EN ISO 15876-1 is of general importance. Pipes conforming to EN ISO 15876-2 are intended to be joined with fittings conforming to EN ISO 15876-3, whereby the connection conforms to the requirements of EN ISO 15876-5.

This document shall only be used in conjunction with all these parts of EN ISO 15876.

NOTE 2 The test results obtained from a specific piping system test according EN ISO 15876-5 cannot be transferred to other combinations of pipes and fittings.

All requirements of the pipes and fittings according to EN ISO 15876-2 and EN ISO 15876-3 shall be met before leaving the production site.

— Deviating from EN ISO 15876-2, the thermal stability test on service pipes shall be carried out as follows:

  — pipes shall not fail when tested at 110 °C at a hoop stress of 2,2 N/mm^2 for 15 000 h;

  — alternatively, pipes shall not fail when tested at 115°C at a hoop stress of 1,6 N/mm^2 for 8 760 h;

  — in case of dispute, the result of the thermal stability test at 110°C applies.

— Deviating from EN ISO 15876-5, the thermal cycling test on service pipes and fittings shall be carried out with test parameters specified in 6.2.