

This document is a preview generated by EVS

District heating pipes - Bonded single pipe systems for directly buried hot water networks - Factory made pipe assembly of steel service pipe, polyurethane thermal insulation and a casing of polyethylene

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>See Eesti standard EVS-EN 253:2019+A1:2023 sisaldab Euroopa standardi EN 253:2019+A1:2023 ingliskeelset teksti.</p> <p>Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 20.12.2023.</p> <p>Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.</p>	<p>This Estonian standard EVS-EN 253:2019+A1:2023 consists of the English text of the European standard EN 253:2019+A1:2023.</p> <p>This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.</p> <p>Date of Availability of the European standard is 20.12.2023.</p> <p>The standard is available from the Estonian Centre for Standardisation and Accreditation.</p>
--	---

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 23.040.07, 23.040.10

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardimis- ja Akrediteerimiskeskusele. Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardimis- ja Akrediteerimiskeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardimis- ja Akrediteerimiskeskusega: Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation and Accreditation. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation and Accreditation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation and Accreditation: Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

District heating pipes - Bonded single pipe systems for directly buried hot water networks - Factory made pipe assembly of steel service pipe, polyurethane thermal insulation and a casing of polyethylene

Tuyaux de chauffage urbain - Systèmes bloqués de tuyaux pour les réseaux d'eau chaude enterrées directement - Assemblages de tubes de service en acier manufacturés, isolation thermique en polyuréthane et tube de protection en polyéthylène

Fernwärmerohre - Einzelrohr-Verbundsysteme für direkt erdverlegte Fernwärmenetze - Werkmäßig gefertigte Verbundrohrsysteme, bestehend aus Stahl-Mediumrohr, einer Wärmedämmung aus Polyurethan und einer Ummantelung aus Polyethylen

This European Standard was approved by CEN on 26 August 2019 and includes Amendment approved by CEN on 1 October 2023.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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, Türkiye and United Kingdom.



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

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

Contents

Page

European foreword.....	4
Introduction	5
1 Scope	6
2 Normative references.....	6
3 Terms and definitions	7
4 Requirements	7
4.1 General.....	7
4.2 Steel service pipe.....	8
4.2.1 Specification.....	8
4.2.2 Diameter.....	8
4.2.3 Wall thickness	8
4.2.4 Surface condition	9
4.2.5 A1 Pipe ends.....	9
4.3 Casing.....	10
4.3.1 Material properties	10
4.3.2 Casing properties	10
4.4 Polyurethane (PUR) foam thermal insulation.....	12
4.4.1 Composition	12
4.4.2 Cell structure	12
4.4.3 Compressive strength.....	12
4.4.4 Foam density.....	13
4.4.5 Water absorption at elevated temperature.....	13
4.5 Pipe assembly	13
4.5.1 General.....	13
4.5.2 Thermal insulation series	13
4.5.3 Pipe ends without thermal insulation	14
4.5.4 Diameter and wall thickness of the casing.....	14
4.5.5 Centre line deviation.....	15
4.5.6 Expected thermal life and long term temperature resistance.....	15
4.5.7 Thermal conductivity in unaged condition.....	16
4.5.8 Thermal conductivity at artificially aged condition	16
4.5.9 Impact resistance	16
4.5.10 Surface conditions at delivery.....	16
4.5.11 Measuring wires for surveillance systems.....	17
4.5.12 Linear water tightness	17
5 Test methods	17
5.1 General conditions and test specimens	17
5.1.1 General conditions.....	17
5.1.2 Test specimens.....	17
5.2 Casing.....	18
5.2.1 Appearance and surface finish.....	18
5.2.2 Elongation at break	18
5.2.3 Carbon black dispersion, homogeneity.....	19
5.2.4 Stress crack resistance test	19
5.3 Polyurethane (PUR) foam thermal insulation.....	20

5.3.1	Composition.....	20
5.3.2	Cell structure.....	20
5.3.3	Compressive strength	21
5.3.4	Foam density	21
5.3.5	Water absorption.....	21
5.4	Pipe assembly	22
5.4.1	Axial shear strength.....	22
5.4.2	Shear strength of the pipe assembly after ageing.....	24
5.4.3	Thermal conductivity in unaged condition	24
5.4.4	Thermal conductivity at artificially aged condition	25
5.4.5	Impact resistance.....	25
5.4.6	Linear water tightness.....	25
6	Marking	27
6.1	General	27
6.2	Steel service pipe	28
6.3	Casing	28
6.4	Pipe assembly	28
Annex A (informative) Relation between actual continuous operating conditions and accelerated ageing test conditions.....		29
Annex B (informative) Guidelines for inspection and testing.....		33
Annex C (normative) Thermal conductivity of factory made pipe assemblies — Test procedure		38
Annex D (informative) Waste treatment and recycling.....		43
Bibliography		44

European foreword

This document (EN 253:2019+A1:2023) 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 June 2024, and conflicting national standards shall be withdrawn at the latest by June 2024.

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 A1 EN 253:2019 A1.

This document includes Amendment 1 approved by CEN on 01 October 2023.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

In comparison with the previous edition, the main changes in this new edition of EN 253 are:

- editorial changes to the new structure of standards prepared by the Technical Committee CEN/TC 107;
- specification of steel grade moved into EN 13941-1;
- added thermal insulation series;
- added linear water tightness: requirements and test method;
- revised description of expected thermal life and long term temperature resistance in balance with EN 13941-1;
- revised description on shear strength: requirements and test method;
- removed Tangential shear strength and long-term creep resistance and modulus;
- revised Annex A, “Relation between actual continuous operating condition and accelerated ageing test conditions”;
- removed Annex C, “Calculated Continuous Operating Temperature (CCOT)”.

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, Türkiye and the United Kingdom.

Introduction

This specification is part of the standards for bonded pipe systems for district heating using polyurethane (PUR) foam thermal insulation applied to bond to a steel service pipe and a polyethylene (PE) casing.

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

- EN 448, *District heating pipes – Bonded single pipe systems for directly buried hot water networks – Factory made fitting assemblies of steel service pipes, polyurethane thermal insulation and a casing of polyethylene;*
- EN 488, *District heating pipes – Bonded single pipe systems for directly buried hot water networks – Factory made steel valve assembly for steel service pipes, polyurethane thermal insulation and a casing of polyethylene;*
- EN 489-1, *District heating pipes – Bonded single and twin pipe systems for directly buried hot water networks – Part 1: Joint casing assemblies and thermal insulation for hot water networks in accordance with EN 13941-1;*
- EN 13941-1, *District heating pipes – Design and installation of thermal insulated bonded single and twin pipe systems for directly buried hot water networks – Part 1: Design;*
- EN 13941-2, *District heating pipes – Design and installation of thermal insulated bonded single and twin pipe systems for directly buried hot water networks – Part 2: Installation;*
- EN 14419, *District heating pipes – Bonded single and twin pipe systems for directly buried hot water networks – Surveillance systems;*
- EN 15698-1, *District heating pipes – Bonded twin pipe systems for directly buried hot water networks – Part 1: Factory made twin pipe assembly of steel service pipes, polyurethane thermal insulation and one casing of polyethylene;*
- EN 15698-2, *District heating pipes – Bonded twin pipe systems for directly buried hot water networks – Part 2: Factory made fitting and valve assemblies of steel service pipes, polyurethane thermal insulation and one casing of polyethylene;*
- EN 17248, *District heating and district cooling pipe systems – Terms and definitions.*

1 Scope

This document specifies requirements and test methods for straight lengths of factory made thermally insulated bonded single pipe assemblies for hot water networks in accordance with EN 13941-1, comprising a steel service pipe, polyurethane foam thermal insulation and a casing of polyethylene.

The pipe assembly can also include the following additional elements: measuring wires, spacers and diffusion barriers.

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 10204, *Metallic products - Types of inspection documents*

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 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 10217-5, *Welded steel tubes for pressure purposes - Technical delivery conditions - Part 5: Submerged arc welded non-alloy and alloy steel tubes with specified elevated temperature properties*

EN 10220, *Seamless and welded steel tubes - Dimensions and masses per unit length*

EN 13941-1, *District heating pipes — Design and installation of thermal insulated bonded single and twin pipe systems for directly buried hot water networks — Part 1: Design*

EN 14419, *District heating pipes - Bonded single and twin pipe systems for buried hot water networks - Surveillance systems*

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

EN ISO 845, *Cellular plastics and rubbers - Determination of apparent density (ISO 845:2006)*

EN ISO 1133 (all parts), *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastic (ISO 1133 series)*

EN ISO 1923, *Cellular plastics and rubbers - Determination of linear dimensions (ISO 1923:1981)* A1

EN ISO 2505, *Thermoplastics pipes - Longitudinal reversion - Test method and parameters (ISO 2505:2005)*

EN ISO 3126, *Plastics piping systems - Plastics components - Determination of dimensions (ISO 3126:2005)*

EN ISO 4590, *Rigid cellular plastics - Determination of the volume percentage of open cells and of closed cells (ISO 4590:2016)*

EN ISO 6259-1, *Thermoplastics pipes - Determination of tensile properties - Part 1: General test method (ISO 6259-1:2015)*

EN ISO 8497:1996, *Thermal insulation - Determination of steady-state thermal transmission properties of thermal insulation for circular pipes (ISO 8497:1994)*

EN ISO 8501-1, *Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness - Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings (ISO 8501-1:2007)*

EN ISO 3127:2017, *Thermoplastics pipes - Determination of resistance to external blows - Round-the-clock method (ISO 3127:1994)*

EN ISO 9080, *Plastics piping and ducting systems - Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation (ISO 9080:2012)*

EN ISO 11357-6, *Plastics - Differential scanning calorimetry (DSC) - Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT) (ISO 11357-6:2018)*

EN ISO 12162, *Thermoplastics materials for pipes and fittings for pressure applications - Classification, designation and design coefficient (ISO 12162:2009)*

EN ISO 844, *Rigid cellular plastics - Determination of compression properties (ISO 844:2021)*

A1 Deleted text **A1**

ISO 6964, *Polyolefin pipes and fittings — Determination of carbon black content by calcination and pyrolysis — Test method*

ISO 11414:2009, *Plastics pipes and fittings — Preparation of polyethylene (PE) pipe/pipe or pipe/fitting test piece assemblies by butt fusion*

ISO 13953, *Polyethylene (PE) pipes and fittings — Determination of the tensile strength and failure mode of test pieces from a butt-fused joint*

ISO 16770, *Plastics — Determination of environmental stress cracking (ESC) of polyethylene — Full-notch creep test (FNCT)*

ISO 18553, *Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds*

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 Requirements

4.1 General

Unless otherwise specified, the requirements shall be valid for each single measurement.

For information on suitable guidelines for inspection, see Annex B.