

District heating pipes - Design and installation of thermal insulated bonded single and twin pipe systems for directly buried hot water networks - Part 2: Installation

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 13941-2:2019 sisaldab Euroopa standardi EN 13941-2:2019 ingliskeelset teksti.	This Estonian standard EVS-EN 13941-2:2019 consists of the English text of the European standard EN 13941-2:2019.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 17.04.2019.	Date of Availability of the European standard is 17.04.2019.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

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, 91.140.10

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
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

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.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

District heating pipes - Design and installation of thermal insulated bonded single and twin pipe systems for directly buried hot water networks - Part 2: Installation

Tuyaux de chauffage urbain - Conception et installation des systèmes bloqués de tuyaux monotubes et bitubes isolés thermiquement pour les réseaux d'eau chaude enterrés directement - Partie 2 : Installation

Fernwärmerohre - Auslegung und Installation von gedämmten Einzel- und Doppelrohr-Verbundsystemen für direkt erdverlegte Heizwasser-Fernwärmenetze - Teil 2: Installation

This European Standard was approved by CEN on 14 December 2018.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey 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.....	6
Introduction	7
1 Scope.....	8
2 Normative references.....	8
3 Terms and definitions and symbols	11
3.1 Terms and definitions	11
3.2 Symbols.....	11
3.3 Abbreviations.....	11
4 Procurement.....	11
4.1 Manufacturer of thermal insulated pipe elements.....	11
4.2 Performing assembly of casing joints and PE-welding on casings.....	11
5 General requirements	12
6 Required information	12
6.1 Documents from the design phase.....	12
6.2 Documents from the manufacturers.....	12
6.3 Existing construction and underground systems	13
6.3.1 General.....	13
6.4 Wiring design diagram.....	13
7 Quality control	13
7.1 General.....	13
7.2 Installation and approval.....	14
8 Site preparation.....	15
8.1 General.....	15
8.2 Liason with Authorities and other parties concerned.....	16
8.3 Site access	16
8.4 Equipment and material.....	16
9 Trenching.....	17
9.1 General.....	17
9.2 Groundwater extraction.....	17
9.3 Installation of pipelines crossing or parallel with other constructions and existing conduits.....	18
9.4 Excavations crossing or parallel to existing district heating pipelines, reducing of soil cover, etc	18
10 Transport and storage of pipe elements, pipe components and other materials	18
10.1 General.....	18
10.2 Transport and delivery	18
10.2.1 Loading and unloading	18
10.2.2 Checking of the delivery	19
10.3 Storage	19
10.3.1 General.....	19
10.3.2 Storage of pipe assemblies	19
10.3.3 Storage of fitting and valve assemblies.....	20
10.3.4 Storage of joint casing systems and other materials	20

11	Pipe laying.....	20
11.1	General.....	20
11.2	Installation in the trench.....	21
11.3	Welding and testing of welds.....	21
11.3.1	Welding of the steel service pipe and testing of the welds.....	21
11.4	Venting and Draining.....	30
11.5	Test for leak tightness and strength.....	34
11.5.1	General.....	34
11.5.2	Visual test with over pressure by air.....	34
11.5.3	Visual test below atmospheric pressure by air.....	35
11.5.4	Hydrostatic test.....	35
11.6	Joint Casing.....	39
11.6.1	General.....	39
11.6.2	Joints.....	39
11.6.3	Site prepared components.....	39
11.7	Surveillance system.....	42
11.8	Expansion cushions.....	43
11.9	Electrical and telecommunication cable of the systems.....	45
11.10	Requirements for horizontal directional drilling (HDD).....	45
11.11	Requirements for critical locations.....	45
11.11.1	Wall penetrations.....	45
11.11.2	Connections to other pipe systems.....	46
11.11.3	Pipe laying in protection tubes.....	46
11.11.4	Protection against external impact for above ground installations.....	46
11.12	Position of pipeline.....	46
12	Backfilling.....	47
12.1	General.....	47
12.2	Bedding material and composition.....	48
13	Commissioning.....	49
14	Operation.....	49
15	Documentation.....	49
15.1	Information on operation and maintenance.....	49
15.1.1	Range of application.....	49
15.1.2	Documentation — aims and uses.....	49
15.1.3	Technical documentation.....	50
15.1.4	Drawings of the technical documentation.....	54
15.1.5	As-built documentation.....	58
15.2	Documentation under the scope of the PED.....	58
Annex A (informative)	Venting and Draining.....	59
A.1	General.....	59
A.2	Venting and draining devices.....	59
A.3	Draining devices for large pipeline dimensions.....	61
A.4	Venting of new pipe sections.....	62
A.4.1	Venting by house connection pipeline.....	62
A.4.2	Venting by venting cabinets.....	63
Annex B (informative)	Recommendations for HDD.....	65
B.1	General.....	65

B.2	Depth under roads.....	65
B.3	Minimum intermediate distances.....	66
B.4	Casing and casing field joints.....	66
B.5	Drilling fluid composition.....	66
B.6	Drilling fluid pressures.....	66
B.7	Borehole dimensions and borehole stability.....	67
B.8	Ballasting	67
B.9	Installation of pipe bundles	68
B.10	Determination of position and route corrections.....	68
B.11	Registration and control of HDD	69
B.12	Drilling Tolerances.....	69
B.13	Verification of design and methodology for the pullback operation	70
B.14	As-Built information	70
Annex C (informative)	Qualification of fitters installing joints in pre-insulated bonded pipe networks	71
C.1	Knowledge and skills.....	71
C.2	Background for training and testing.....	71
C.3	Subjects for training and testing	71
C.3.1	General.....	71
C.3.2	Casing of polyethylene (PE)	72
C.3.2.1	Important construction characteristics and properties.....	72
C.3.2.2	Technological behaviour of PE.....	72
C.3.2.3	Mechanical properties of PE	72
C.3.2.4	Conditions for casing elements under load	73
C.3.3	Surveillance	73
C.3.4	PUR-foam system	73
C.3.4.1	PUR-foam as a two component material	73
C.3.4.2	Insulation procedures on job site	73
C.3.5	Joint types/jointing systems	74
C.3.5.1	General.....	74
C.3.5.2	Shrink sleeve joint with mastic/adhesive sealing	74
C.3.5.3	Welded joints/systems	74
C.3.6	Installation of joints.....	75
C.3.6.1	General.....	75
C.3.6.2	Installation of surveillance system.....	75
C.3.6.3	Sealed joints.....	76
C.3.6.4	Welded joints.....	77

C.3.6.5	Insulation of joints	77
C.3.6.6	Documentation.....	78
Annex D (informative)	Quality control program and documentation.....	79
Annex E (normative)	Commissioning.....	91
E.1	Commissioning.....	91
E.1.1	General.....	91
E.1.2	Filling with water for initial operation.....	92
E.1.3	Surveillance system.....	92
Annex F (informative)	Operation.....	93
Bibliography	94

European foreword

This document (EN 13941-2:2019) 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 October 2019, and conflicting national standards shall be withdrawn at the latest by October 2019.

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 13941:2009+A1:2010.

EN 13941, *District heating pipes — Design and installation of thermal insulated bonded single and twin pipe systems for directly buried hot water networks* consists of the following parts:

- Part 1: Design;
- Part 2: Installation.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document has been prepared by CEN/TC 107/WG 13 „Prefabricated district heating and district cooling pipe system“.

According to the scope of CEN/TC 107:

- the task of CEN/TC 107/WG 13 is to specify rules for design, calculation and installation for factory made thermal insulated bonded single and twin pipe systems for directly buried hot water networks.;
- CEN/TC 107/WG 13 also contributes to rules for functional tests for thermal-insulated bonded pipe systems for underground hot water networks;

When use is made of the standard, the different sections of which it is made up are to be interpreted as being interdependent and, because of this, cannot be dissociated.

The revision of EN 13941:2009+A1:2010 involves the subdivision of the document in two separate documents:

- 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*.

This volume (Part 2) consists of a main part and six annexes.

Annex E is normative. Annexes A, B, C, D, and F are informative.

This standard contains a number of requirements aimed at ensuring the sound execution of distribution networks for district heating.

The requirements contained in this document should be assessed and applied in compliance with the intentions of the standard and in due consideration of the development taking place in the field it concerns. It is therefore assumed that the user of the standard has the requisite technical insight and that the user of the standard has adequate knowledge of legal and other external regulations that are of consequence to the practical application of the document.

NOTE Some paragraphs of this standard are possibly covered by national regulations in some countries which naturally apply instead of this standard.

1 Scope

This document specifies requirements for design, calculation and installation of factory made thermal insulated bonded single and twin pipe systems for buried hot water networks for continuous operation with treated water at various temperatures up to 120 °C and occasionally peak temperatures up to 140 °C for maximum 300 h/a, and maximum internal pressure 2,5 MPa.

Flexible pipe systems according to the EN 15632 series are not under the scope of this standard.

The standard EN 13941, *Design and installation of thermal insulated bonded single and twin pipe systems for directly buried hot water networks* consists of two parts:

- a) EN 13941-1: *Design*;
- b) EN 13941-2: *Installation*.

The requirements in this part, EN 13941-2, form a unity with those of EN 13941-1.

The principles of the standard may be applied to thermal insulated pipe systems with pressures higher than 2,5 MPa, provided that special attention is paid to the effects of this higher pressure.

Adjacent pipes, not buried, but belonging to the network (e.g. pipes in ducts, valve chambers, road crossings above ground etc.) may be designed and installed according to this standard.

This standard presupposes the use of treated water, which by softening, demineralization, de-aeration, adding of chemicals, or otherwise has been treated to effectively prevent internal corrosion and deposits in the pipes.

NOTE For further information on water qualities to be used in district heating pipe systems, see bibliographic entry [8].

This document is not applicable for such units as:

- a) pumps;
- b) heat exchangers;
- c) boilers, tanks;
- d) systems behind domestic substations.

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 253, *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 outer casing of polyethylene*

EN 448, *District heating pipes - Preinsulated bonded pipe systems for directly buried hot water networks - Fitting assemblies of steel service pipes, polyurethane thermal insulation and outer casing of polyethylene*

EN 488, *District heating pipes - Preinsulated bonded pipe systems for directly buried hot water networks - Steel valve assembly for steel service pipes, polyurethane thermal insulation and outer casing of polyethylene*

EN 489, *District heating pipes - Preinsulated bonded pipe systems for directly buried hot water networks - Joint assembly for steel service pipes, polyurethane thermal insulation and outer casing of polyethylene*

EN 10204, *Metallic products - Types of inspection documents*

EN 13018, *Non-destructive testing - Visual testing - General principles*

EN 13480-5, *Metallic industrial piping - Part 5: Inspection and testing*

prEN 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 14419:2009, *District heating pipes - Preinsulated bonded pipe systems for directly buried hot water networks - Surveillance systems*

EN 15698 (all parts), *District heating pipes — Bonded twin pipe systems for directly buried hot water networks*

EN 17248,¹ *District heating and district cooling pipe systems - Terms and definitions*

EN ISO 3452-1, *Non-destructive testing - Penetrant testing - Part 1: General principles (ISO 3452-1)*

EN ISO 3834-1, *Quality requirements for fusion welding of metallic materials - Part 1: Criteria for the selection of the appropriate level of quality requirements (ISO 3834-1)*

EN ISO 3834-3, *Quality requirements for fusion welding of metallic materials - Part 3: Standard quality requirements (ISO 3834-3)*

EN ISO 3834-4, *Quality requirements for fusion welding of metallic materials - Part 4: Elementary quality requirements (ISO 3834-4)*

EN ISO 5579, *Non-destructive testing - Radiographic testing of metallic materials using film and X- or gamma rays - Basic rules (ISO 5579)*

EN ISO 5817:2014, *Welding - Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) - Quality levels for imperfections (ISO 5817:2014)*

EN ISO 9606-1, *Qualification testing of welders - Fusion welding - Part 1: Steels (ISO 9606-1)*

EN ISO 9712, *Non-destructive testing - Qualification and certification of NDT personnel (ISO 9712)*

EN ISO 9934-1, *Non-destructive testing - Magnetic particle testing - Part 1: General principles (ISO 9934-1)*

EN ISO 10675-1, *Non-destructive testing of welds - Acceptance levels for radiographic testing - Part 1: Steel, nickel, titanium and their alloys (ISO 10675-1)*

EN ISO 11666, *Non-destructive testing of welds - Ultrasonic testing - Acceptance levels (ISO 11666:2018)*

EN ISO 14731:2006, *Welding coordination - Tasks and responsibilities (ISO 14731:2006)*

¹ Under preparation. Stage at time of publication: prEN 17248:2018.

EN ISO 14732, *Welding personnel - Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials (ISO 14732)*

EN ISO 15609-1, *Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 1: Arc welding (ISO 15609-1)*

EN ISO 15609-2, *Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 2: Gas welding (ISO 15609-2)*

EN ISO 15610, *Specification and qualification of welding procedures for metallic materials - Qualification based on tested welding consumables (ISO 15610)*

EN ISO 15613, *Specification and qualification of welding procedures for metallic materials - Qualification based on pre-production welding test (ISO 15613)*

EN ISO 15614-1, *Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys (ISO 15614-1)*

EN ISO 16810, *Non-destructive testing - Ultrasonic testing - General principles (ISO 16810)*

EN ISO 17636-1, *Non-destructive testing of welds - Radiographic testing - Part 1: X- and gamma-ray techniques with film (ISO 17636-1)*

EN ISO 17636-2, *Non-destructive testing of welds - Radiographic testing - Part 2: X- and gamma-ray techniques with digital detectors (ISO 17636-2)*

EN ISO 17637, *Non-destructive testing of welds - Visual testing of fusion-welded joints (ISO 17637)*

EN ISO 17638, *Non-destructive testing of welds - Magnetic particle testing (ISO 17638)*

EN ISO 17640, *Non-destructive testing of welds - Ultrasonic testing - Techniques, testing levels, and assessment (ISO 17640)*

EN ISO 23277, *Non-destructive testing of welds - Penetrant testing - Acceptance levels (ISO 23277)*

EN ISO 23278, *Non-destructive testing of welds - Magnetic particle testing - Acceptance levels (ISO 23278)*

ISO 6761, *Steel tubes — Preparation of ends of tubes and fittings for welding*

HD 308 S2, *Identification of cores in cables and flexible cords*