



**SLOVENSKI STANDARD**  
**oSIST prEN 13941-2:2016**

**01-oktober-2016**

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**Cevi za daljinsko ogrevanje - Projektiranje in vgradnja toplotno izoliranih spojenih eno- in dvocevni sistemov za neposredno zakopana vročevodna omrežja - 2. del: Vgradnja**

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

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

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

**Ta slovenski standard je istoveten z: prEN 13941-2**

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**ICS:**

23.040.07	Cevovodi za daljinsko ogrevanje in njihovi deli	Pipeline and its parts for district heat
91.140.10	Sistemi centralnega ogrevanja	Central heating systems

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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

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 107.

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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## European foreword

This document (prEN 13941-2:2016) 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 document is currently submitted to the CEN Enquiry.

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*.

This document will supersede EN 13941:2009+A1:2010.

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[SIST EN 13941-2:2019](https://standards.iteh.ai/catalog/standards/sist/056b5dda-5239-4f86-86a2-7f5027784c82/sist-en-13941-2-2019)

<https://standards.iteh.ai/catalog/standards/sist/056b5dda-5239-4f86-86a2-7f5027784c82/sist-en-13941-2-2019>

## Introduction

This European Standard 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 pre-insulated bonded pipe systems for underground hot water networks with pipe assemblies coordinated with EN 253, EN 448, EN 488 and EN 489;
- CEN/TC 107/WG 13 also contributes to rules for functional tests for pre-insulated bonded pipe systems for underground hot water networks;
- the basic rules for design, calculation and installation are based on functional requirements;
- the purpose of the work is to provide uniform basis for the design, construction and operation of district heating systems, to ensure that the system is reliable and efficient and safe for the surrounding area, the environment and public health;
- joint assemblies for pipe systems are coordinated with EN 489.

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 volumes:

- EN 13941-1, *Design and installation of bonded pre-insulated pipe systems for district heating — Part 1: Design*;
- EN 13941-2, *Design and installation of bonded pre-insulated pipe systems for district heating — 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.

It is permissible to use alternative rules from the notes given in this standard, provided that it is shown that the alternative rule accords with the relevant principles and it is at least equivalent with regard to the resistance, serviceability and durability achieved by the system.

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

The requirements and regulations contained in this standard 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 standard.



## 1 Scope

This European Standard specifies requirements for design, calculation and installation of factory made thermal insulated bonded single and twin pipe systems for directly buried networks for continuous operation with treated hot water at various temperatures up to 120 °C and occasionally with peak temperatures up to 140 °C 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 and stipulations in this part: prEN 13941-2, form an unbreakable unity with those of prEN 13941-1. This part should therefore exclusively be used in combination with prEN 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 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.

This standard 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, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 253:2009+A2:2015, *District heating pipes — Pre-insulated bonded pipe systems for directly buried hot water networks — 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 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*

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EN 10253-2, *Butt-welding pipe fittings - Part 2: Non alloy and ferritic alloy steels with specific inspection requirements*

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

prEN 13941-1, *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 — Preinsulated bonded twin pipe systems for directly buried hot water networks*

EN ISO 636, *Welding consumables - Rods, wires and deposits for tungsten inert gas welding of non-alloy and fine-grain steels - Classification (ISO 636)*

EN ISO 2560, *Welding consumables - Covered electrodes for manual metal arc welding of non-alloy and fine grain steels - Classification (ISO 2560)*

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)*

EN ISO 14171, *Welding consumables - Solid wire electrodes, tubular cored electrodes and electrode/flux combinations for submerged arc welding of non alloy and fine grain steels - Classification (ISO 14171)*

EN ISO 14174, *Welding consumables - Fluxes for submerged arc welding and electroslag welding - Classification (ISO 14174)*

EN ISO 14175, *Welding consumables - Gases and gas mixtures for fusion welding and allied processes (ISO 14175)*

EN ISO 14341, *Welding consumables - Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels - Classification (ISO 14341)*

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

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)*

CEN ISO/TR 15608:2013, *Welding — Guidelines for a metallic materials grouping system*

EN ISO 16810, *Non-destructive testing - Ultrasonic testing - General principles (ISO 16810:2012)*

EN ISO 17632, *Welding consumables - Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of non-alloy and fine grain steels - Classification (ISO 17632)*

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 18275, *Welding consumables - Covered electrodes for manual metal arc welding of high-strength steels - Classification (ISO 18275)*

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)*

**prEN 13941-2:2016 (E)**

EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025)*

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

**3 Terms and definitions and symbols****3.1 Terms and definitions**

For the purposes of this document, the terms and definitions given in prEN 13941-1 and the following apply.

**3.1.1****above ground installation**

installation method where the pipe is not surrounded by soil

**3.1.2****documents of manufacturer**

documents, in which the manufacturer gives instructions about how to install the system components, also giving some recommendation about handling, storage on site, welding, jointing, backfilling in accordance with Clauses 9, 10, 11 and 12

**3.1.3****protection pipe**

pipe used for protecting the service pipe assembly

**3.1.4****main height network**

system in which height in metre above sea level (ASL) is fixed

Note 1 to entry: The height systems are nationwide fixed, e.g. the German main height network DHHN92.

**3.1.5****supply network**

totality of all lines and equipments of the public utility company

**3.1.6****network documentation**

consistent leading of data in geographic information systems and the graphic presentation of supply networks, including the necessary data acquisition

Note 1 to entry: The network documentation can also be led by hand.

**3.1.7****network information system****NIS**

information systems leading the as-built drawings and as-built data

**3.1.8****operation status**

status which fixes whether a network component is in operation, closed etc

**3.1.9****inoperative pipeline**

pipeline separated from lines located in operation

Note 1 to entry: The final closing can entail the demolition or the whereabouts of parts of the supply network. With a limited closing the putting into operation again is planned by parts or the whole supply network.

**3.1.10****pipe book**

collection of data to ensure the traceability for pipe elements, welds and welders

**3.1.11****pull back operation**

phase in which the pipeline will be pulled into the HDD borehole

**3.2 Symbols****Table 1 — List of symbols**

<b>Symbol</b>	<b>Name</b>	<b>Unit</b>
<i>A</i>	Area	mm <sup>2</sup>
<i>a</i>	difference between Road top layer and borehole	
<i>c</i>	Cohesion of the soil, fabrication tolerance	kN/m <sup>2</sup>
<i>D</i>	Diameter of casing	mm
<i>d</i>	Diameter of service pipe	mm
<i>E</i>	Modulus of elasticity	N/mm <sup>2</sup>
<i>F</i>	Friction force	kN
<i>f</i>	Design stress, friction force per area unit, deflection	mm
<i>G</i>	Self-weight	kg/m
<i>I</i>	Momentum of inertial	mm <sup>4</sup>
<i>h</i>	Misalignment	mm
<i>i</i>	Stress concentration factor	-
<i>L</i>	Friction length	mm
<i>l</i>	Length	mm
<i>M</i>	Bending moment	kNm
<i>N</i>	Normal force, number of full action cycles	N
<i>n</i>	Number	-
<i>p</i>	Internal pressure	N/mm <sup>2</sup>
<i>R<sub>e</sub></i>	Specified minimum upper yield strength	N/mm <sup>2</sup>
<i>R<sub>m</sub></i>	Tensile strength	N/mm <sup>2</sup>
<i>R</i>	Bend radius	mm

## prEN 13941-2:2016 (E)

Symbol	Name	Unit
$r$	Pipe radius	mm
$T$	Temperature	°C
$t$	Pipe wall thickness	mm
$W$	Section modulus	mm <sup>3</sup>
$Z$	Depth of burial (measured to centreline of pipe)	m
$\alpha$	Coefficient of thermal expansion	1/K
$\gamma$	Specific gravity, partial safety coefficient	-
$\delta$	Friction angle between pipe and soil, displacement from thermal expansion	°
$\varepsilon$	Strain	-
$\theta$	Angle	°
$\lambda$	Coefficient of thermal conductivity	W/(mK)
$\mu$	Coefficient of friction between pipe and soil	-
$\rho$	Density	kg/m <sup>3</sup>
$\sigma$	Normal stress	N/mm <sup>2</sup>
$\tau$	Shear stress	N/mm <sup>2</sup>
$\nu$	Poisson's ratio	-
$\varphi$	Internal friction angle of soil	°

Table 2 — Indices

$a$ : Action	$min$ : Minimum
$b$ : Branch pipe (at tee connections)	$n$ : Nominal, number (of fatigue cycles)
$c$ : Casing	$o$ : Outer, outside
$d$ : Design	$r$ : Run pipe (at tees)
$fat$ : Fatigue	$res$ : Resulting
$i$ : Inner, inside	$u$ : Fracture
$j$ : Reference	$v$ : Vertical
$m$ : Mean, membrane, material	
NOTE Separate symbol lists are found in Annexes A, B and C.	

## 4 Procurement

### 4.1 Manufacturer of pipeline components

For the quality control program and documentation for suitable pipeline components see Annex D.

The manufacturer may also have a valid certificate EHP001 for standardized components according to EN 253, EN 448, EN 14419, EN 15698-1 and EN 15698-2.