

**EELISOLEERITUD TORUDEST KAUGKÜTTESÜSTEEMIDE
PROJEKTEERIMINE JA PAIGALDAMINE
KONSOLIDEERITUD TEKST**

**Design and installation of preinsulated bonded pipe
systems for district heating CONSOLIDATED TEXT**

EESTI STANDARDI EESSÕNA**NATIONAL FOREWORD**

See Eesti standard EVS-EN 13941:2009+A1:2010 sisaldab Euroopa standardi EN 13941:2009+A1:2010 ingliskeelset teksti.	This Estonian standard EVS-EN 13941:2009+A1:2010 consists of the English text of the European standard EN 13941:2009+A1:2010.
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 14.07.2010.	Date of Availability of the European standard is 14.07.2010.
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ICS 23.040.10, 91.140.10

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English Version

Design and installation of preinsulated bonded pipe systems for district heating

Conception et installation des systèmes bloqués de tuyaux préisolés pour les réseaux enterrés d'eau chaude

Auslegung und Installation von werkmäßig gedämmten Verbundmantelrohren für die Fernwärme

This European Standard was approved by CEN on 23 May 2009 and includes Corrigendum 1 issued by CEN on 11 November 2009 and Amendment 1 approved by CEN on 15 May 2010.

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Contents

Page

Foreword	5
Introduction.....	6
1 Scope	8
2 Normative references	8
3 Terms and definitions, units and symbols	10
3.1 Terms and definitions	10
3.2 Units and symbols	15
3.2.1 Units	15
3.2.2 Symbols	16
4 General considerations for system design	18
4.1 General requirements	18
4.2 Service life	18
4.3 Preliminary investigations	18
4.4 Determination of project class	19
4.4.1 Risk assessment	19
4.4.2 Project classes	20
4.5 Design documentation	22
4.5.1 General	22
4.5.2 Operational data	22
4.5.3 Data related to the pipeline	22
4.5.4 Specifications for quality control	24
5 Components and materials	25
5.1 Basic requirements	25
5.1.1 General	25
5.1.2 Non standardised components	25
5.2 Steel pipe components	25
5.2.1 General	25
5.2.2 Technical delivery conditions and documentation	26
5.2.3 Characteristic values for steel	26
5.2.4 Specific requirements for bends and tees	27
5.2.5 Specific requirements for reducers and extensions	28
5.2.6 Specific requirements for other components	28
5.3 Polyurethane foam insulation	28
5.4 PE casing	29
5.5 Expansion cushions	29
5.6 Valves and accessories	29
5.6.1 General requirements	29
5.6.2 Marking and documentation	29
6 Actions and limit states	30
6.1 General	30
6.2 Simplified analysis procedure	32
6.3 Actions	32
6.3.1 General	32
6.3.2 Classification of actions	32
6.4 Limit states	34
6.4.1 General	34
6.4.2 Limit states for service pipes of steel	34
6.4.3 Composite stress conditions	42

6.4.4	Limit states for PUR and PE.....	43
6.4.5	Limit state for PE.....	43
6.4.6	Limit states for valves	44
7	Installation	44
7.1	General	44
7.2	Transportation and storage	45
7.3	Excavation of pipe trench	45
7.4	Installation of pipes and components.....	45
7.4.1	General	45
7.4.2	Steel pipes	46
7.4.3	PUR-PE Joints	46
7.4.4	Accessories	46
7.4.5	Expansion zones	46
7.5	Welding of the steel pipe and testing of the steel welds	46
7.5.1	General	46
7.5.2	Quality system for the different project classes	47
7.5.3	Qualification of the welding procedures	49
7.5.4	Welding consumables	49
7.5.5	Place and position of the weld.....	49
7.5.6	Performance of welding work.....	49
7.5.7	Special procedures	52
7.5.8	Documentation	54
7.6	Strength pressure test and leak tightness test.....	54
7.7	Assembly of casing pipes, joint installation and site insulation	55
7.8	Backfilling of trench.....	55
7.9	Pipe bends and other components	56
7.9.1	Pipe bends	56
7.9.2	Branches	56
7.9.3	Valves and accessories.....	57
7.10	Setting into operation	57
7.10.1	General	57
7.10.2	Filling with water for initial operation	57
7.10.3	Surveillance system.....	57
7.11	Special constructions.....	58
7.11.1	Special components	58
7.11.2	Above-ground pipelines with preinsulated pipes.....	58
7.11.3	Insertion into casing pipe.....	58
7.12	Construction work during the operation stage.....	58
Annex A	(normative) Design of piping components under internal pressure	60
A.1	General	60
A.2	Symbols	60
A.3	Straight pipe and bends	61
A.4	Tees and branch connections	61
A.5	Reducers and extensions.....	64
A.6	Dished ends.....	65
Annex B	(informative) Geotechnics and pipe-soil interaction	67
B.1	Scope.....	67
B.2	Symbols and units	67
B.3	Soil parameters for global analysis (pipe-soil interaction).....	68
B.4	Characteristic values for soil loads and soil parameters	78
B.5	Specific requirements for stability	79
B.6	Specific requirements for parallel excavations	82
B.7	Requirements for soft soils and settlement areas.....	82
B.8	Ovalization and circumferential stresses from top load.....	82
Annex C	(informative) Global- and cross sectional analysis	89
C.1	General	89
C.2	Symbols	89

C.3	Survey of limit states for steel	91
C.4	Locations to be assessed	92
C.5	Actions	95
C.6	Global analysis	96
C.7	Calculation of stresses	103
C.8	Fatigue analysis	119
C.9	Further actions	120
Annex D	(informative) Calculation of heat losses	121
D.1	General	121
D.2	Heat loss per pipe pair	121
D.3	Insulance of the soil	122
D.4	Insulance of the insulation material	122
D.5	Insulance of the heat exchange between flow and return pipe	123
Annex E	(informative)  National A-deviations 	124
Bibliography	125

Foreword

This document (EN 13941:2009+A1:2010) has been prepared by Technical Committee CEN/TC 107 "Prefabricated district heating 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 January 2011, and conflicting national standards shall be withdrawn at the latest by January 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document includes Corrigendum 1 issued by CEN on 11 November 2009 and Amendment 1 approved by CEN on 15 May 2010.

This document supersedes $\boxed{A_1}$ EN 13941:2009 $\langle A_1 \rangle$.

The start and finish of text introduced or altered by amendment is indicated in the text by tags $\boxed{A_1}$ $\langle A_1 \rangle$.

The modifications of the related CEN Corrigendum have been implemented at the appropriate places in the text and are indicated by the tags \boxed{AC} $\langle AC \rangle$.

According to the CEN/CENELEC Internal Regulations, the national standards organizations 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

The standard has been prepared by JWG1, a joint working group with CEN/TC 267 "Industrial piping and pipelines".

According to the scope from CEN/TC 107:

- The task of CEN/TC 107/TC267/JWG1 is to specify rules for design, calculation and installation for preinsulated bonded pipe systems for underground hot water networks with pipe assemblies co-ordinated with EN 253, EN 448, EN 488 and EN 489.
- CEN/TC 107/TC267/JWG1 may also specify rules for functional tests for preinsulated bonded pipe systems for underground hot water networks.
- The basic rules for design, calculation and installation should be 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 dealt with should be co-ordinated with EN 489.

This standard takes account of experience acquired, of new knowledge available, of the behaviour of material and of distribution of stresses and allowable deformations and also evolution in installation techniques.

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

The standard consists of a main part and four annexes.

Depending on the character of the individual clauses, distinction is made in this standard between Principles and Application Rules.

The principles comprise:

- general statements, definitions and requirements, for which there is no alternative, as well as
- requirements and analytical models for which no alternative is permitted unless specifically stated.

The principles are printed in normal typeface (10 point font).

The application rules are generally recognised rules, which follow the principles and satisfy their requirements.

Application rule:

The application rules and comments to principles and application rules are printed in a 8 point font. This is an application rule.

It is permissible to use alternative design rules from the application rules 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.

Annex A is part of the standard (principles). Annexes B, C and D have status as application rules.

This standard contains a number of requirements aimed at ensuring the sound execution of distribution networks for district heating. To the extent possible, the requirements specified in this standard are functional requirements.

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.

Special cases may occur within the scope of this standard in which its contents do not cover. An evaluation whether the contents cover shall be made in any specific case where the standard is used.

Presently CEN/TC 107 "Pre-fabricated district heating pipe systems" is preparing standards for preinsulated flexible pipes and surveillance systems.

1 Scope

This European Standard specifies rules for design, calculation and installation for preinsulated bonded pipe systems for buried hot water distribution and transmission networks (cf. Figure 2) with pipe assemblies in accordance with EN 253, for continuous operation with hot water at various temperatures up to 120°C and occasionally with peak temperatures up to 140°C and maximum internal pressure 25 bar (overpressure).

Application rule:

For larger pipe dimensions and pressures below 25 bar wall thickness bigger than specified in EN 253 can be required for straight pipes, bends and tees.

The principles of the standard can be applied to preinsulated pipe systems with pressures higher than 25 bar, provided that special attention is paid to the effects of pressure. Adjacent pipes belonging to the network (e.g. pipes in ducts, valve chambers, road crossings above ground etc.) can be designed and installed according to this standard.

The standard assumes use of treated water, which by softening, demineralisation, deaeration, adding of chemicals, or otherwise has been treated to prevent internal corrosion and deposits in the pipes.

This standard is not applicable for such units as:

- a) pumps,
- b) exchangers,
- c) boiler installations, tank installations,
- d) consumer installations.

However, the full functional ability and durability of such units should be ensured in consideration of the impacts from the district heating system and other impacts occurring from the conditions under which they have been installed.

Guidelines for product quality inspection and in situ tests of joints are given in Annex A of EN 448:2009, Annex D of EN 253:2009, Annex A of EN 488:2009 and Annex B of EN 489:2009.

Guidelines for welding of polyethylene casing are given in Annex B of EN 448:2009.

The estimation of expected life with continuous operation at various temperatures is outlined in Annex B of EN 253:2009.

2 Normative references

The following referenced documents are indispensable for the application 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 253:2009, *District heating pipes — Preinsulated bonded pipe systems for directly buried hot water networks — Pipe assembly of steel service pipe, polyurethane thermal insulation and outer casing of polyethylene*

EN 287-1, *Qualification test of welders — Fusion welding — Part 1: Steels*

EN 444, *Non-destructive testing — General principles for radiographic examination of metallic materials by X- and gamma-rays*

- EN 448:2009, *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 473, *Non-destructive testing — Qualification and certification of NDT personnel — General principles*
- 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 489:2009, *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 571-1, *Non-destructive testing — Penetrant testing — Part 1: General principles*
- EN 583-1, *Non-destructive testing — Ultrasonic examination — Part 1: General principles*
- EN 970, *Non-destructive examination of fusion welds — Visual examination*
- EN 1289, *Non-destructive examination of welds — Penetrant testing of welds — Acceptance levels*
- EN 1290, *Non-destructive examination of welds — Magnetic particle examination of welds*
- EN 1291, *Non-destructive examination of welds — Magnetic particle testing of welds — Acceptance levels*
- EN 1418, *Welding personnel — Approval testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials*
- EN 1435, *Non-destructive examination of welds — Radiographic examination of welded joints*
- EN 1712, *Non-destructive examination of welds — Ultrasonic examination of welded joints — Acceptance levels*
- EN 1714, *Non-destructive examination of welds — Ultrasonic examination of welded joints*
- 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 10217-1, *Welded steel tubes for pressure purposes — Technical delivery conditions — Part 1: 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 10217-5, *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 13018, *Non-destructive testing — Visual testing — General principles*
- EN 13480-3:2002, *Metallic industrial piping — Part 3: Design and calculation*
- EN 25817:1992, *Arc-welded joints in steel — Guidance on quality levels for imperfections (ISO 5817:1992)*
- 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 3834-1:2005)*
- EN ISO 3834-2, *Quality requirements for fusion welding of metallic materials — Part 2: Comprehensive quality requirements (ISO 3834-2:2005)*

EN ISO 3834-3, *Quality requirements for fusion welding of metallic materials — Part 3: Standard quality requirements (ISO 3834-3:2005)*

EN ISO 3834-4, *Quality requirements for fusion welding of metallic materials — Part 4: Elementary quality requirements (ISO 3834-4:2005)*

EN ISO 9692-2, *Welding and allied processes — Joint preparation — Part 2: Submerged arc welding of steels (ISO 9692-2:1998)*

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

EN ISO 15607:2003, *Specification and qualification of welding procedures for metallic materials — General rules (ISO 15607:2003)*

EN ISO 15609-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding (ISO 15609-1:2004)*

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 15614-1:2004)*

ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units*

ISO 3419, *Non-alloy and alloy steel butt-welding fittings*

ISO/TR 15608:2000, *Welding — Guidelines for a metallic materials grouping system*

3 Terms and definitions, units and symbols

3.1 Terms and definitions

For the purpose of this European Standard, the terms and definitions given in EN 253:2009 and the following apply.

3.1.1 action

set of concentrated or distributed forces acting on the pipe system (force-controlled action), or cause of imposed or constrained deformations in the system (displacement-controlled action). Actions are often referred to as “loads”.

3.1.2 action cycle

impact with a given stress range. An action cycle comprises one full action course (which is twice the action amplitude calculated from an average value).