

District heating pipes — Pre-insulated flexible pipe systems

Part 1: Classification, general requirements and test methods

ICS 23.040.01

National foreword

This British Standard is the UK implementation of EN 15632-1:2009+A1:2014. It supersedes BS EN 15632-1:2009, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee RHE/9, Insulated underground pipelines.

A list of organizations represented on this committee can be obtained on request to its secretary.

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préisolés - Partie 1: Classification, prescriptions générales
et méthodes d'essai

Fernwärmerohre - Werkmäßig gedämmte flexible
Rohrsysteme - Teil 1: Klassifikation, allgemeine
Anforderungen und Prüfungen

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Contents

Page

Foreword.....	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	7
4 Classification.....	12
5 Requirements	12
5.1 Thermal insulation properties	12
5.2 Flexibility	12
5.3 Resistance to external actions	13
5.4 Insulation Layer	13
5.4.1 Compressive creep.....	13
5.4.2 Water absorption at elevated temperatures.....	13
5.5 Casing	13
5.5.1 UV stability	13
5.5.2 Thermal stability	13
5.5.3 Stress crack resistance.....	13
5.5.4 Use of rework material	14
5.6 Surveillance systems	14
6 Test methods.....	14
6.1 General.....	14
6.2 Flexibility	14
6.3 Compressive creep.....	15
6.3.1 General.....	15
6.3.2 Principles of testing	16
6.3.3 Test apparatus	16
6.3.4 Test sample	17
6.3.5 Test procedure.....	18
6.3.6 Calculation and expression of results.....	18
7 Marking	20
7.1 General marking aspects	20
7.2 Minimum marking information	20
8 Manufacturer's information	20
Annex A (normative)  Thermal conductivity of pre-insulated pipes – Test procedure 	21
A.1 General.....	21
A.2 Requirements	21
A.2.1 Test specimen	21
A.2.2 Operating temperature	21
A.2.3 Types of apparatus	21
A.3 Apparatus	21
A.3.1 Guarded end apparatus	21

A.3.2	Calibrated end apparatus	22
A.3.3	Dimensions	22
A.3.4	Heater pipe surface temperature	22
A.4	Test specimens.....	22
A.4.1	Conditioning	22
A.4.2	Surface temperature measurement	22
A.4.3	Location of temperature sensors	22
A.5	Procedure	22
A.5.1	Test length	22
A.5.2	Diameter and dimension measurement	22
A.5.3	Thickness of casing	23
A.5.4	Ambient requirements	23
A.5.5	Test pipe temperature	24
A.5.6	Power supply	24
A.5.7	Axial heat loss	24
A.5.8	Test period and stability	24
A.6	Calculations - Thermal conductivity.....	24
Annex B	(normative)  Calculation of the heat flow from the medium to the ambient loss of pre-insulated buried district heating pipes 	26
B.1	General	26
B.2	Calculations	26
B.2.1	Single pipe system (SPS)	26
B.2.2	Twin pipe system (TPS)	27
B.2.3	Radial thermal resistance of the surrounding soil	27
B.3	Declared values of the radial thermal resistance of buried pipe systems	27
Annex C	( informative ) Determination of design values for the radial thermal resistance.....	28
Annex D	(informative)  Guideline for testing 	29
D.1	General	29
D.2	Tests	29
D.2.1	Type test (Qualification test)	29
D.2.2	Quality surveillance test	30
D.2.3	Production test	30
	Bibliography.....	31

Foreword

This document (EN 15632-1:2009+A1:2014) 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 June 2015, and conflicting national standards shall be withdrawn at the latest by June 2015.

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 supersedes EN 15632-1:2009.

This document includes Amendment 1 approved by CEN on 2014-11-08.

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

This document is one of a series of standards which form several parts of EN 15632, *District heating pipes — Pre-insulated 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*.

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Introduction

Flexible pipe systems in district heating networks are of common technical usage. In order to assure quality including product-related lifetime, to assure safety in use, economical energy usage and to facilitate comparability in the market, CEN/TC 107 decided to set up standards for these products.

1 Scope

This European Standard provides classification, general requirements and test methods for flexible, pre-insulated, directly buried district heating pipe systems.

It is intended to be used in conjunction with parts 2, 3, 4, and 5.

Depending on the pipe assembly (see Table 4), this European Standard is valid for maximum operating temperatures of 95 °C to 140 °C and operating pressures of 6 bar to 25 bar.

The pipe systems are designed for a lifetime of 30 years. For pipe systems with plastic service pipes, the respective temperature profiles are defined in EN 15632-2 and EN 15632-3.

NOTE For the transport of other liquids, for example potable water, additional requirements may be applicable.

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+A1:2013, *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 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 728, *Plastics piping and ducting systems — Polyolefin pipes and fittings — Determination of oxidation induction time*

EN 744, *Plastics piping and ducting systems — Thermoplastics pipes — Test method for resistance to external blows by the round-the-clock method*

EN 1605, *Thermal insulating products for building applications — Determination of deformation under specified compressive load and temperature conditions*

EN 1606, *Thermal insulating products for building applications — Determination of compressive creep*

EN 12085, *Thermal insulating products for building applications — Determination of linear dimensions of test specimens*

EN 12667, *Thermal performance of building materials and products — Determination of thermal resistance by means of guarded hot plate and heat flow meter methods — Products of high and medium thermal resistance*

EN 13941, *Design and installation of preinsulated bonded pipe systems for district heating*

EN 14419:2003, *District heating pipes — Pre-insulated bonded pipe systems for directly buried hot water networks — Surveillance systems*

EN 60811-4-1:2004, *Insulating and sheathing of electric and optical cables — Common test methods Part 4-1: Methods specific to polyethylene and polypropylene compounds — Resistance to environmental stress cracking — Measurement of the melt flow index — Carbon black and/or mineral filler content measurement in*

polyethylene by direct combustion — Measurement of carbon black content by thermogravimetric analysis (TGA) — Assessment of carbon black dispersion in polyethylene using a microscope (IEC 60811-4-1:2004)

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

EN ISO 9967, *Thermoplastics pipes — Determination of creep ratio (ISO 9967:2007)*

EN ISO 9969, *Thermoplastics pipes — Determination of ring stiffness (ISO 9969:2007)*

EN ISO 16871, *Plastics piping and ducting systems — Plastics pipes and fittings — Method for exposure to direct (natural) weathering (ISO 16871:2003)*

EN ISO 23993, *Thermal insulation products for building equipment and industrial installations — Determination of design thermal conductivity (ISO 23993:2008)*

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

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in [A1](#) EN 253:2009+A1:2013 [A1](#), EN 14419:2003 and the following apply.

3.1

lifetime

time during which the flexible pipe system operates without failure at the designated operating temperature

3.2

continuous operating temperature

temperature of the heat medium for which the system has been designed to operate continuously

NOTE See Table 4

3.3

maximum operating temperature

exceptionally high operating temperature occurring for short periods only

3.4

operating pressure

pressure at which the hot water network is designed to operate continuously

3.5

service pipe

medium carrying pipe which is in contact with warm water

3.6

outer casing

separately applied outer layer of the pipe assembly, protecting the construction during installation and protecting the construction against external influences (after installation)

3.7

insulation layer

layer which provides the designated thermal characteristics of the pipe assembly

3.8

pipe assembly

assembled product, consisting of at least one service pipe, insulating material and casing

3.9

pipe system

pipe assembly, plus service pipe fittings, casing joints, and other components like surveillance elements

3.10

single pipe system

SPS

pipe system with one service pipe

3.11

twin pipe system

TPS

pipe system with two service pipes

3.12

bonded system

service pipe, insulating material and casing which are bonded by the insulating material

3.13

non bonded system

service pipe, insulating material and casing which are not bonded by the insulating material

3.14

casing joint assembly

casing joint

assembled product, consisting of at least insulating material and casing, designed to protect and thermally insulate a service pipe joint

3.15

ageing factor

f_a

factor without a dimension which expresses the ageing of the insulating layer in relation to the expected lifetime

3.16

moisture factor

f_m

factor without a dimension for the influence of moisture on the insulating layer in relation to the expected lifetime

NOTE The term 'moisture' as it is used here is not identical with the term 'moisture' as it is used in EN 14419.

3.17

ovality

difference between the maximum and minimum diameter at a cross section expressed as a percentage of the minimum diameter

Table 1 — Symbols, definitions and dimensions

Symbol	Description	Unit
A	projected area of the service pipe	m ²
d ₁	inner diameter of the service pipe	m
d _{1,c}	inner diameter of the service pipe at the crest of a corrugation	m
d _{1,t}	inner diameter of the service pipe at the trough of a corrugation	m
d ₂	outer diameter of the service pipe	m
d _{2,c}	outer diameter of the service pipe at the crest of a corrugation	m
d _{2,t}	outer diameter of the service pipe at the trough of a corrugation	m
d ₃	inner diameter of the casing	m
d _{3,c}	inner diameter of the casing at the crest of a corrugation	m
d _{3,t}	inner diameter of the casing at the trough of a corrugation	m
d ₄	outer diameter of the casing	m
d _{4,c}	outer diameter of the casing at the crest of a corrugation	m
d _{4,t}	outer diameter of the casing at the trough of a corrugation	m
F	force	N
f _a	ageing factor	/
f _{cor}	corrective factor for differences between calculated and measured thermal conductivities	/
F _{exp}	force resulting from heat expansion	N
f _m	moisture factor	/
F _{weight}	weight force	N
g	acceleration due to gravity	m/s ²
H	earth covering	m
L	length of the test specimen	m
M	mass of the pipe inclusively the water inside	kg
P _{exp}	area related load on the insulation resulting from heat expansion of the service pipe	Pa
P _{test}	test load	Pa
P _{weight}	area related load on the cross section of the test specimen of the insulation material	Pa
q	heat flow rate	W/m
q _f	radial heat flow rate for buried single pipe system in the flow pipe	W/m
q _{f+r}	radial heat flow rate for buried single pipe system in the flow and return pipe	W/m
q _r	radial heat flow rate for buried single pipe system in the return pipe	W/m
q _{TPS}	radial heat flow rate for buried twin pipe system	W/m
Q	heat flow	W
r	bending radius in the axis of the pipe	m
R	radial thermal resistance	mK/W
R ₀	thermal transmittance factor from earth surface to ambient air	m ² K/W
R _{design}	design value for the radial resistance	mK/W