

SLOVENSKI STANDARD

SIST EN 489:2009

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Nadomešča:
SIST EN 489:2004

Cevi za daljinsko ogrevanje - Izolirani vezani cevni sistemi za podzemeljska toplovodna omrežja - Sestav spojev za jeklene cevi, poliuretanske toplotne izolacije in zunanji polietilenski plašč

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

Fernwärmerohre - Werkmäßig gedämmte Verbundmantelrohrsysteme für direkt erdverlegte Fernwärmenetze - Rohrverbindungen für Stahlmediumrohre mit Polyurethan-Wärmedämmung und Außenmantel aus Polyethylen

Tuyaux de chauffage urbain - Systemes bloqués de tuyaux préisolés pour les réseaux d'eau chaude enterrés directement - Assemblage préisolé pour tube de service en acier, isolation thermique en polyuréthane et tube de protection en polyéthylène

Ta slovenski standard je istoveten z: EN 489:2009

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91.140.65	Oprema za ogrevanje vode	Water heating equipment

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EUROPEAN STANDARD

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**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**

Tuyaux de chauffage urbain - Systèmes bloqués de tuyaux
préisolés pour les réseaux d'eau chaude enterrés
directement - Assemblage préisolé pour tube de service en
acier, isolation thermique en polyuréthane et tube de
protection en polyéthylène

Fernwärmerohre - Werkmäßig gedämmte
Verbundmantelrohrsysteme für direkt erdverlegte
Fernwärmenetze - Rohrverbindungen für Stahlmediumrohre
mit Polyurethan-Wärmedämmung und Außenmantel aus
Polyethylen

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EN 489:2009 (E)**Foreword**

This document (EN 489:2009) 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of an identical text or by endorsement, at the latest by September 2009, and conflicting national standards shall be withdrawn at the latest by September 2009.

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.

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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, 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.

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Introduction

The first edition of EN 489 was approved in 1994 and updated in 2003. The main areas of this revision are the following:

- Requirements for welded joints have been added;
- Requirements for joints insulated with prefabricated joint insulation have been added;
- Requirements and test methods for PUR foam properties have been lifted from EN 253 into this standard;
- Requirements for marking of joints have been added.

This specification is part of the series of standards for bonded systems using polyurethane foam thermal insulation applied to bond to a steel service pipe and a polyethylene casing.

For information on the minimum expected thermal life with operation at various temperatures with respect to PUR foam performance see EN 253:2009, Annex B.

The other standards from TC 107 are:

- 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 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 488:2003, *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 13941:2003, *Design and installation of preinsulated bonded pipe systems for district heating*;
- EN 14419:2009, *District heating pipes – Preinsulated bonded pipe systems for directly buried hot water networks – Surveillance systems*.

As information to the users of this standard CEN/TC 107 has decided to mention that at the time of publication of this European Standard CEN/TC 107 had already concluded on the investigation and further preparation of the following topics:

- appropriate short- and long-term type tests for all jointing systems;
- incorporation of the findings of running research activities to introduce new test procedures and requirements;
- further preparation of Annex C aiming at making this annex normative;
- further preparations of Annex B concerning on site joint inspection and establish suitable methods for field tests;
- requirements and test methods regarding the closure of foaming hole plugs.

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The abovementioned items should be dealt with and the intention is to include the results in the next revision of this European Standard.

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1 Scope

This European Standard specifies requirements for joints made under field conditions between adjacent preinsulated pipes and/or fittings in district heating networks. The specified general requirements are also valid for field-made T-branches, bends, reducers, caps, etc.

This European Standard covers jointing of steel service pipes by means of fusion welding, the connecting of casing ends with joint casings and the thermal insulation with poured rigid PUR foam or prefabricated PUR-foam insulation.

This European Standard specifies methods for type tests of complete joints and PUR-foam for joints under laboratory conditions.

The requirements of this European Standard can also be applied to casing pipe weldings/connections of on site made fittings.

The requirements of this European Standard aim to obtain a technical life of the joints of at least 30 years.

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 1435, *Non-destructive examination of welds – Radiographic examination of welded joints*

EN 12517-1:2006, *Non-destructive testing of welds – Part 1: Evaluation of welded joints in steel, nickel, titanium and their alloys by radiography – Acceptance levels*

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

EN 14419, *District heating pipes – Preinsulated bonded pipe systems for directly buried hot water networks – Surveillance systems*

EN ISO 845, *Cellular plastics and rubbers – Determination of apparent (bulk) density (ISO 845:1988)*

EN ISO 4590:2003, *Rigid cellular plastics – Determination of the volume percentage of open cells and of closed cells (ISO 4590:2002)*

EN ISO 5817:2007, *Welding – Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) – Quality levels for imperfections (ISO 5817:2003, corrected version:2005, including Technical Corrigendum 1:2006)*

EN ISO 6520-1, *Welding and allied processes – Classification of geometric imperfections in metallic materials – Part 1: Fusion welding (ISO 6520-1:2007)*

EN ISO 9692 (all parts), *Welding and allied processes – Recommendations for joint preparation (ISO 9692)*

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

EN 489:2009 (E)**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 253:2009 and the following apply.

3.1**joint**

complete construction of the connection between adjacent pipes and/or fittings

3.2**joint casing**

part that connects the two pipe casing ends in a joint

3.3**joint insulation**

thermal insulation that fills the volume confined by the steel service pipe, the joint casing and the ends of the two connecting pipes

3.4**on site poured joint insulation**

joint insulation manufactured by pouring the liquid polyurethane foam components¹⁾ into the joint volume at the work site

3.5**prefabricated joint insulation**

joint insulation manufactured by installing prefabricated elements of polyurethane foam in the joint volume prior to installation of the joint casing²⁾

3.6**steel weld**

connection between the steel service pipes by welding [EN 489:2009](#)

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3.7**polyethylene weld**

fusion jointing of polyethylene to polyethylene under influence of heat, pressure and time

3.8**double sealing**

two-sealing systems independently installed on the same joint, not influencing each other negatively and thus independently functioning during the service life of the joint

3.9**surveillance system**

system that consists of measuring sections and measuring instruments for surveillance of pipe systems

4 Requirements**4.1 General requirements**

NOTE The assumptions of EN 13941 have been taken as the base for these requirements.

4.1.1 General requirements for the joint

The joint shall be:

1) Ernst Kaufmann, 050715.

2) Ernst Kaufmann, 050715.

- watertight;
- able to withstand axial forces initiated by axial movements of the pipe in the ground;
- able to withstand radial forces and bending moments;
- able to withstand effects of temperature and temperature variations.

In case of double sealing each one of the sealing systems and the combination of both systems shall fulfil the requirements of the type test as described in Clause 5.

4.1.2 Installation of the joint

Each individual step in the installation of a joint shall follow the system supplier's installation instructions in order to ensure that the joint obtained is equivalent to the joint as previously type-tested.

4.1.3 Competence of the welder and fitter

Persons installing joints on preinsulated pipe networks shall possess a valid evidence of qualification stating that they have received training relevant to the system and the type of joint.

Steel service pipe welders shall possess a valid certificate in accordance with EN 287-1.

Polyethylene welders shall possess a valid evidence of qualification which documents their ability to reproduce welding of the quality specified.

Recommended subjects for training are given in Annex C.

4.1.4 Expected thermal life and long term temperature resistance

The requirements for expected life and long term temperature resistance shall be in accordance with 5.4.4 of EN 253:2009.

4.1.5 Steel service pipe weld

The steel service pipe weld shall:

- be tight when tested in accordance with A.6;
- have mechanical properties equivalent to those of the service pipe.

4.1.6 Polyurethane rigid foam insulation (PUR)

The foaming of a joint on site shall be carried out in a confined space.

The insulation shall completely fill the joint.

The requirements for the rigid PUR foam insulation shall be in accordance with 4.2.3.2, 4.2.3.3, 4.2.3.4 and with EN 253:2009, 4.4.3 for the compressive strength.

4.1.7 Joint casing

The joint casing shall be tight against external water pressure.

Casings for welded joints shall fulfil Clause 4.3.1 of EN 253:2009.

All joints shall be subject to a leak-test. If this is not possible, a type specific procedure of 100 % visual test in combination with a destructive spot test scheme shall be described in the manufacturer's documentation.

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NOTE Leakage testing of joints should be carried out with air or another suitable gas. The test pressure of 20 kPa should be applied at a temperature of ≤ 40 °C for a minimum of 2 min. The leak-tightness should be checked by means of a suitable indicator liquid or a leakage detector. The indicator liquid should be detrimental neither to the casing and joint material, nor to the environment.

Proper handling and installation procedures and type specific test procedures for the verification of leak-tightness of installed joint casings shall be described in the manufacturer's documentation.

4.2 Type test requirements**4.2.1 Water tightness**

No water ingress shall be detected after the water impermeability test in accordance with 5.2.

Both welded and non-welded joints shall be tested.

4.2.2 Soil stress test

Non-welded joints shall pass the soil stress test in accordance with 5.1 before the water impermeability test in accordance with 5.2 is carried out.

4.2.3 Polyurethane rigid foam insulation (PUR) properties**4.2.3.1 General**

The polyurethane rigid foam insulation (PUR) material for joint assemblies shall, when tested as a pipe assembly³⁾, meet the requirements of EN 253 regarding voids and bubbles, compressive strength, long term temperature resistance and thermal conductivity in addition to 4.2.3.2, 4.2.3.3 and 4.2.3.4.

When tested according to 5.4.4 the joint insulation shall not shrink more than 2 mm in the axial or the radial direction.

4.2.3.2 Cell structure

The average size of the cells in a radial direction shall be less than 0,5 mm, determined in accordance with 5.4.5.1.

The closed cell content determined in accordance with 5.4.5.2 shall be not less than 88 %.

4.2.3.3 Foam density

The density of the foam at any position shall be not less than 60 kg/m³ when measured in accordance with 5.4.6.

No specimen may have a density below 60 kg/m³.

4.2.3.4 Water absorption at elevated temperature

When tested in accordance with 5.4.7, the water absorption after 90 min of immersion in boiling water shall not exceed 10 % of the original volume.

4.2.4 Weld joint stress crack resistance

When tested in accordance with 5.3 the time until failure shall be at least 300 hours.

3) Ernst Kaufmann, 050715.