

**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**

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 489:2009 sisaldab Euroopa standardi EN 489:2009 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 30.09.2009 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 11.03.2009.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 489:2009 consists of the English text of the European standard EN 489:2009.

This standard is ratified with the order of Estonian Centre for Standardisation dated 30.09.2009 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 11.03.2009.

The standard is available from Estonian standardisation organisation.

ICS 23.040.01

### Standardite reprodutseerimis- ja levitamiseõigus kuulub Eesti Standardikeskusele

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

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:  
Aru 10 Tallinn 10317 Eesti; [www.evs.ee](http://www.evs.ee); Telefon: 605 5050; E-post: [info@evs.ee](mailto:info@evs.ee)

### Right to reproduce and distribute Estonian 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 permission in writing from Estonian Centre for Standardisation.

If you have any questions about standards copyright, please contact Estonian Centre for Standardisation:  
Aru str 10 Tallinn 10317 Estonia; [www.evs.ee](http://www.evs.ee); Phone: +372 605 5050; E-mail: [info@evs.ee](mailto:info@evs.ee)

English Version

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

This European Standard was approved by CEN on 31 January 2009.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

## Contents

|  | page      |
|--|-----------|
| Foreword.....  | 4         |
| Introduction.....  | 5         |
| <b>1</b> <b>Scope</b> .....  | <b>7</b>  |
| <b>2</b> <b>Normative references</b> .....   | <b>7</b>  |
| <b>3</b> <b>Terms and definitions</b> .....  | <b>8</b>  |
| <b>4</b> <b>Requirements</b> .....   | <b>8</b>  |
| <b>4.1</b> <b>General requirements</b> .....   | <b>8</b>  |
| <b>4.1.1</b> <b>General requirements for the joint</b> .....                         | <b>8</b>  |
| <b>4.1.2</b> <b>Installation of the joint</b> .....                                  | <b>9</b>  |
| <b>4.1.3</b> <b>Competence of the welder and fitter</b> .....                        | <b>9</b>  |
| <b>4.1.4</b> <b>Expected thermal life and long term temperature resistance</b> ..... | <b>9</b>  |
| <b>4.1.5</b> <b>Steel service pipe weld</b> .....                                    | <b>9</b>  |
| <b>4.1.6</b> <b>Polyurethane rigid foam insulation (PUR)</b> .....                   | <b>9</b>  |
| <b>4.1.7</b> <b>Joint casing</b> .....   | <b>9</b>  |
| <b>4.2</b> <b>Type test requirements</b> .....                                       | <b>10</b> |
| <b>4.2.1</b> <b>Water tightness</b> .....  | <b>10</b> |
| <b>4.2.2</b> <b>Soil stress test</b> .....   | <b>10</b> |
| <b>4.2.3</b> <b>Polyurethane rigid foam insulation (PUR) properties</b> .....        | <b>10</b> |
| <b>4.2.4</b> <b>Weld joint stress crack resistance</b> .....                         | <b>10</b> |
| <b>4.3</b> <b>Installation instructions</b> .....                                    | <b>11</b> |
| <b>4.3.1</b> <b>General</b> .....  | <b>11</b> |
| <b>4.3.2</b> <b>Work environment</b> .....   | <b>11</b> |
| <b>4.3.3</b> <b>Cleaning</b> .....   | <b>11</b> |
| <b>4.3.4</b> <b>Surveillance system</b> .....  | <b>11</b> |
| <b>4.3.5</b> <b>Steel site weld</b> .....  | <b>11</b> |
| <b>4.3.6</b> <b>Joint casing</b> .....   | <b>11</b> |
| <b>4.3.7</b> <b>Joint insulation</b> .....   | <b>11</b> |
| <b>5</b> <b>Methods for type tests</b> .....   | <b>12</b> |
| <b>5.1</b> <b>Soil stress test</b> .....   | <b>12</b> |
| <b>5.2</b> <b>Water impermeability test</b> .....                                    | <b>15</b> |
| <b>5.3</b> <b>Weld joint stress crack resistance test</b> .....                      | <b>15</b> |
| <b>5.4</b> <b>Polyurethane rigid foam insulation (PUR)</b> .....                     | <b>15</b> |
| <b>5.4.1</b> <b>General</b> .....  | <b>15</b> |
| <b>5.4.2</b> <b>Test specimens</b> .....   | <b>15</b> |
| <b>5.4.3</b> <b>Sampling</b> .....   | <b>16</b> |
| <b>5.4.4</b> <b>Ageing resistance</b> .....  | <b>16</b> |
| <b>5.4.5</b> <b>Cell structure</b> .....   | <b>16</b> |
| <b>5.4.6</b> <b>Foam density</b> .....   | <b>16</b> |
| <b>5.4.7</b> <b>Water absorption at elevated temperature</b> .....                   | <b>17</b> |
| <b>6</b> <b>Marking</b> .....  | <b>17</b> |
| <b>6.1</b> <b>General</b> .....  | <b>17</b> |
| <b>6.2</b> <b>Joint casing</b> .....   | <b>17</b> |
| <b>6.3</b> <b>Plugs</b> .....  | <b>17</b> |
| <b>6.4</b> <b>Joint insulation system</b> .....                                      | <b>18</b> |
| <b>Annex A (normative) Fusion welding of steel service pipes on site</b> .....       | <b>19</b> |
| <b>A.1</b> <b>General</b> .....  | <b>19</b> |
| <b>A.2</b> <b>Material</b> .....   | <b>19</b> |
| <b>A.3</b> <b>Welding process</b> .....  | <b>19</b> |

|                     |  |           |
|---------------------|--|-----------|
| <b>A.4</b>          | <b>Preparation for welding and lining up</b> .....   | <b>19</b> |
| <b>A.5</b>          | <b>Qualification of welders</b> .....  | <b>19</b> |
| <b>A.6</b>          | <b>Steel weld inspection</b> .....   | <b>20</b> |
| <b>A.6.1</b>        | <b>General</b> .....   | <b>20</b> |
| <b>A.6.2</b>        | <b>Leak-tightness test with air/gas</b> .....  | <b>20</b> |
| <b>A.6.3</b>        | <b>Leak-tightness test with water</b> .....  | <b>20</b> |
| <b>A.6.4</b>        | <b>Radiographic examination</b> .....  | <b>20</b> |
| <b>A.6.5</b>        | <b>Ultrasonic examination</b> .....  | <b>20</b> |
| <b>Annex B</b>      | <b>(informative) General guidelines for inspection of the joint on site</b> .....                          | <b>21</b> |
| <b>Annex C</b>      | <b>(informative) Qualification of fitters installing joints in preinsulated bonded pipe networks</b> ..... | <b>23</b> |
| <b>C.1</b>          | <b>Knowledge and skills</b> .....  | <b>23</b> |
| <b>C.2</b>          | <b>Background for training and testing</b> .....   | <b>23</b> |
| <b>C.3</b>          | <b>Subjects for training and testing</b> .....   | <b>23</b> |
| <b>C.3.1</b>        | <b>General</b> .....   | <b>23</b> |
| <b>C.3.2</b>        | <b>Casing of polyethylene (PE)</b> .....   | <b>24</b> |
| <b>C.3.3</b>        | <b>Surveillance</b> .....  | <b>25</b> |
| <b>C.3.4</b>        | <b>PUR-foam system</b> .....   | <b>25</b> |
| <b>C.3.5</b>        | <b>Joint types/jointing systems</b> .....  | <b>26</b> |
| <b>C.3.6</b>        | <b>Installation of joints</b> .....  | <b>27</b> |
| <b>Bibliography</b> | .....  | <b>31</b> |

## 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.

This document supersedes EN 489:2003.

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.

## 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.

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

This document is a preview generated by EVS



## 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)*