



SLOVENSKI STANDARD
SIST EN 15189:2007

01-april-2007

Litoželezne cevi, fittingi in pribor - Zunanja poliuretanska prevleka cevi - Zahteve in metode preskušanja

Ductile iron pipes, fittings and accessories - External polyurethane coating for pipes - Requirements and test methods

Rohre, Formstücke und Zubehör aus duktilem Gusseisen - Polyurethanumhüllung von Rohren - Anforderungen und Prüfverfahren

Tuyaux, raccords et accessoires en fonte ductile - Revêtement extérieur polyuréthane des tuyaux - Exigences et méthodes d'essai

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Ta slovenski standard je istoveten z: EN 15189:2006

ICS:

77.140.75	Jeklene cevi in cevni profili za posebne namene	Steel pipes and tubes for specific use
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EUROPEAN STANDARD

EN 15189

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2006

ICS 23.040.01; 25.220.60

English Version

Ductile iron pipes, fittings and accessories - External polyurethane coating for pipes - Requirements and test methods

Tuyaux, raccords et accessoires en fonte ductile -
Revêtement extérieur polyuréthane des tuyaux -
Exigences et méthodes d'essai

Rohre, Formstücke und Zubehör aus duktilem Gusseisen -
Polyurethanumhüllung von Rohren - Anforderungen und
Prüfverfahren

This European Standard was approved by CEN on 11 September 2006.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, 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.

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Contents

Page

Foreword.....	3
Introduction	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	6
4 Ordering information	7
5 Technical Requirements	7
6 Performance Requirements	8
7 Test Methods	9
Annex A (normative) Quality assurance	14
Annex B (normative) Coating application process	16
Annex C (informative) Packaging	18
Bibliography	19

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(standards.iteh.ai)

SIST EN 15189:2007

<https://standards.iteh.ai/catalog/standards/sist/f0602e0e-81aa-483f-b543-512cd8723403/sist-en-15189-2007>

Foreword

This document (EN 15189:2006) has been prepared by Technical Committee CEN/TC 203 "Cast iron pipes, fittings and their joints", the secretariat of which is held by AFNOR.

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 May 2007, and conflicting national standards shall be withdrawn at the latest by May 2007.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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.

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Introduction

This standard is in conformity with the general requirements already established by CEN/TC 164 in the field of water supply (e.g. potable water) and CEN/TC 165 in the field of waste water.

In respect of potential adverse effects on the quality of water intended for human consumption caused by the product covered by this standard:

- a) this standard provides no information as to whether the product may be used without restriction in any of the member states of the EU or EFTA;
- b) it should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

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1 Scope

This European standard defines the requirements and test methods applicable to factory applied external polyurethane based coatings for heavy duty (Annex D.3 of EN 545:2002) corrosion protection of buried ductile iron pipes conforming to EN 545, EN 598 and EN 969 for use at operating temperatures up to 50 °C.

This standard does not cover ductile iron pipes protected with zinc with a finishing layer of polyurethane.

This standard does not cover special activities on site such as tapping, clamping, etc., which could affect the corrosion protection properties of the polyurethane coating. These operations should be covered in the laying instructions supplied by manufacturers of clamps, house connection saddles, etc. and any relevant user procedures.

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 545:2002, *Ductile iron pipes, fittings, accessories and their joints for water pipelines - Requirements and test methods*

EN 598, *Ductile iron pipes, fittings, accessories and their joints for sewerage application - Requirements and test methods*

EN 969, *Ductile iron pipes, fittings, accessories and their joints for gas pipelines - Requirements and test methods*

EN 14901, *Ductile iron pipes, fittings and accessories - Epoxy coating (heavy duty) of ductile iron fittings and accessories - Requirements and test methods* [SIST EN 15189:2007](https://standards.iteh.ai/catalog/standards/sist/f0602e0e-81aa-483f-b543-51234972403/iso-14901-2007)

EN ISO 62, *Plastics - Determination of water absorption (ISO 62:1999)*

EN ISO 527-3, *Plastics - determination of tensile properties – Part 3: Test conditions for films and sheets (ISO 527-3:1995)*

EN ISO 868, *Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868:2003)*

EN ISO 4624, *Paints and varnishes; Pull-off test for adhesion (ISO 4624:2002)*

EN ISO 8501–1, *Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings (ISO 8501-1:1988)*

EN ISO 8503–1, *Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast-cleaned steel substrates - Part 1: Specifications and definitions for ISO surface profile comparators for the assessment of abrasive blast-cleaned surfaces (ISO 8503-1:1988)*

EN 15189:2006 (E)

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 ductile iron
cast iron used for pipes, fittings and accessories in which graphite is present; substantially in spheroidal form

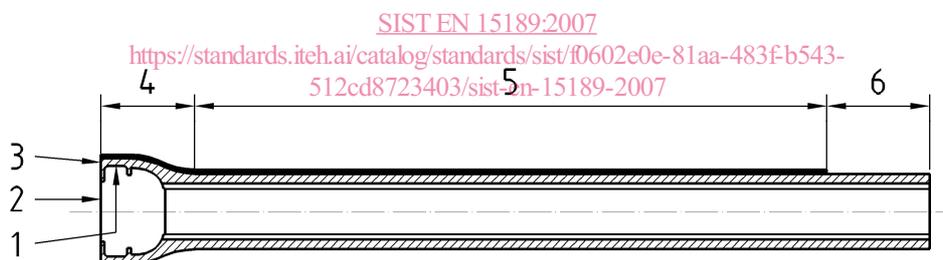
3.2 adhesion
force per unit area, applied perpendicularly to the surface, which is necessary to separate the coating from its substrate

3.3 impact strength
impact energy which a coating can withstand without damage under defined test conditions

3.4 hardness
resistance of the coating to penetration of a ball under defined test conditions

3.5 non-porosity
absence of holidays in a high voltage test under defined test conditions

3.6 polyurethane coating
factory applied coating which consists of polyurethane on the outside of the pipe barrel and external socket



Key

- 1 Gasket seat
- 2 Socket entrance
- 3 Socket face
- 4 External socket
- 5 Pipe barrel
- 6 Spigot end

Figure 1 — Location of the defined pipe areas

Pipe ends such as the spigot end, the socket face, the socket entrance and gasket seat may be coated differently (see 5.3)

3.7 specific coating resistance
surface related electric resistance of the coating perpendicular to the pipe wall

3.8

performance test

test which is done once and is repeated according to a schedule or after a relevant change of coating material and/or coating supplier or change in process application

3.9

routine test

test carried out to control the manufacturing process with a frequency defined by the manufacturer

4 Ordering information

The following information shall be obtained by the manufacturer.

Ductile iron pipes according to EN 545, EN 598 or EN 969, but externally coated in accordance with this European Standard shall be specified in the purchaser enquiry and order by reference to this standard.

EXAMPLE: 5 000 m of ductile iron pipe DN 300 according to EN 545;

external polyurethane coating according to EN 15189.

The manufacturer shall obtain from the purchaser the type of coating to be used for pipe ends (see 5.3).

5 Technical Requirements

5.1 Surface preparation

Prior to application of the polyurethane coating, the surface of the pipes shall be technically clean, free of rust, loose constituent materials, dirt, oil, grease and moisture.

In cold weather, or anytime when moisture tends to condense on the surface of the pipe, the pipe shall be uniformly warmed for a sufficient time to dry the pipe prior to cleaning. The pipe temperature shall be maintained at at least 5 °C above the dew point.

The surface shall be prepared by grit blasting and be in compliance with level Sa 2.5 of EN ISO 8501-1. The surface roughness Ra, in accordance with EN ISO 8503-1, shall be at least 10 micrometers which is equivalent to an anchored profile, Rz of 50 micrometers or higher if required by the coating material provider or manufacturer.

5.2 Finished polyurethane coating

5.2.1 Appearance and continuity

The polyurethane coating shall be:

- uniform in colour, except the spigot and the socket which may be of a different colour for permitted marking;
- uniform appearance and smoothness except for admissible repairs;
- free of visible defects (pinholes, bubbles, blisters, wrinkles, cracks or voids).

Slight superficial variations of colour or brilliance, due to repairs or prolonged exposure to sunlight or contact with other pipes are permissible.

EN 15189:2006 (E)**5.2.2 Minimum coating thickness**

When measured in accordance with 7.1.3, the minimum coating thickness ($x - 2\sigma$) shall be 700 μm .

5.3 Pipe ends

Spigot end, socket face, socket entrance and gasket seat shall be coated with one of the following:

- a) epoxy coating in accordance with EN 14901;
- b) polyurethane in accordance with this standard except gasket seat, socket face and socket entrance with a minimum coating thickness of 100 μm ;
- c) bituminous paint; in this case these designated zones shall be protected after laying using appropriate measures, e.g. heat shrinkable sleeves, which are not within the scope of this standard.

When the spigot end and socket entrance are coated with polyurethane or epoxy, the manufacturer shall ensure that the corresponding diameters are such that the joint can be assembled.

5.4 Repairs

In case of holidays or damage, repairs shall be carried out in accordance with the manufacturer's written instructions. All repairs shall subsequently meet the non-porosity test requirements.

5.5 Marking

All pipes shall be marked legibly and durably according to pipe standards EN 545, EN 598 or EN 969.

Reference to this standard shall be legibly and durably applied by any method upon the external surface of the polyurethane coating.

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5.6 Non-porosity

When tested in accordance with the test method described in 7.1.7, the polyurethane coating shall be free from porosity. The test tension shall be 4,2 kV when using wire mesh electrodes and 6 kV when using conductive rubber electrodes. For thicker coatings, a higher test voltage may be used by agreement between the manufacturer and the purchaser.

5.7 Hardness

When assessed by testing in accordance to EN ISO 868 the hardness of the polyurethane coating shall be at a minimum 70 Shore D.

5.8 Adhesion

Adhesion shall be at least 8 MPa when tested in accordance with 7.1.9.

6 Performance Requirements**6.1 Chemical resistance**

The chemical resistance is determined by the change in weight of the polyurethane coating. When tested in accordance to 7.2.1, the weight increase and weight loss shall meet the requirements given in Table 1 when compared to the original weight.

Table 1 — Weight change requirements

Property	Unit	Test method	Clause	Requirement
Mass change in deionised water, 100 days at 50 °C	%	Immersion test	7.2.1.1	Less than 15 % weight increase
subsequent drying 100 days at 23 °C	%	EN ISO 62 method 2		Less than 2 % weight loss
Mass change in 10 % sulphuric acid, 100 days at 50 °C	%	Immersion test	7.2.1.2	Less than 10 % weight increase
subsequent drying 100 days at 23 °C	%	EN ISO 62 method 2		Less than 4 % weight loss

6.2 Impact strength

The minimum impact strength shall be determined in accordance with the test method defined in 7.2.2 with an impact energy, E of at least 8 J/mm.

The coating shall show no damage when tested in accordance with 7.1.7.

6.3 Indentation resistance

The coating shall have a maximum static indentation of 10 % when subjected to a pressure of 10 MPa in accordance with 7.2.3.

6.4 Elongation at break

The elongation at break shall be assessed by testing in accordance with the test method defined in 7.2.4.

The coating shall have a minimum elongation at break of 2,5 %.

6.5 Specific coating resistance

The specific coating resistance of the polyurethane coating shall be assessed by testing in accordance with the test method defined in 7.2.5.

The specific coating resistance of the polyurethane coating after immersion in a 0,1 M NaCl solution for 100 days shall be at least $10^8 \Omega \text{ m}^2$.

The ratio (resistance after 100 days)/(resistance after 70 days) shall not be less than 0,8 if the specific resistance of the coating is only one decimal power above the minimum permissible value for 100 days.

7 Test Methods

7.1 Routine tests

The following routine tests shall be carried out to control the coating production process to obtain a coating of high and stable quality.