SLOVENSKI STANDARD
SIST EN 15655:2009

01-april-2009

Cevi, fitingi in dodatni deli iz nodularne litine - Notranja poliuretanska prevleka cevi in fitingov - Zahteve in preskusne metode

Ductile iron pipes, fittings and accessories - Internal polyurethane lining for pipes and fittings - Requirements and test methods

Rohre, Formstücke und Zubehörteile aus duktilem Gusseisen - Polyurethan-Auskleidung von Rohren und Formstücken - Anforderungen und Prüfverfahren

Tuyaux, raccords er accessoires en fonte ductile - Revetement intérieur en polyuréthanne des tuyaux et raccords - Prescriptions et méthodes d'essais

Ta slovenski standard je istoveten z: **EN 15655:2009**

ICS:

23.040.10	Železne in jeklene cevi	Iron and steel pipes
23.040.40	Kovinski fitingi	Metal fittings

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Ductile iron pipes, fittings and accessories - Internal polyurethane lining for pipes and fittings - Requirements and test methods

Tuyaux, raccords et accessoires en fonte ductile - Revêtement intérieur en polyuréthane des tuyaux et raccords - Prescriptions et méthodes d'essais

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Foreword

This document (EN 15655:2009) 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of an identical text or by endorsement, at the latest by July 2009, and conflicting national standards shall be withdrawn at the latest by July 2009.

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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) no information is provided 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.

1 Scope

This European Standard defines the requirements and test methods applicable to factory applied internal polyurethane high duty corrosion protection of buried ductile iron pipes and fittings conforming to EN 545, EN 598 and EN 969 for use at permanent operating temperatures up to 45 °C.

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, *Ductile iron pipes, fittings, accessories and their joints for water pipelines — Requirements and test methods*

EN 598:2007, *Ductile iron pipes, fittings, accessories and their joints for sewerage applications — Requirements and test methods*

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

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

ISO 62:2008, *Plastics — Determination of water absorption*

ISO 527–3:1995, *Plastics — Determination of tensile properties – Part 3: Test conditions for films and sheets*

ISO 868, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness)*

ISO 8501–1:2007, *Representative photographic examples of the change of appearance imparted to steel when blast-cleaned with different abrasives*

ISO 8503–1:1988, *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*

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 perpendicular to the surface, which is necessary to separate the lining from its substrate

3.3
indirect impact strength
impact energy applied from outside of the pipe with deformation to which a lining can withstand without damage under defined test conditions

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

3.5
minimum lining thickness
lower limit calculated for the polyurethane lining thickness by the mean value (x) minus two times the standard deviation (σ)

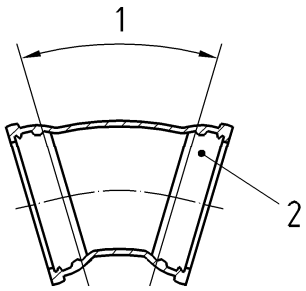
3.6
non porosity
absence of holidays in a high voltage test under defined test conditions

3.7
polyurethane lining
factory applied lining which consists of polyurethane on the inside of the pipe or fitting

Key

1 gasket seat
2 pipe barrel
3 spigot end
4 lining
5 internal socket profile

Figure 1 — Location of the defined pipe areas



Key

1 lining
2 internal socket profile

Figure 2 — Location of the defined fitting areas

3.9
specific lining resistance
surface related electric resistance of the lining perpendicular to the pipe wall

3.10
performance test
test which is done once and is repeated according to a schedule or after relevant change of lining material and/or material supplier or change in process application

3.11
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 supplied to the manufacturer by the purchaser.

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

— 5 000 m of ductile iron pipe DN 300 according to EN 545, internal polyurethane lining according to EN 15655; or

— 10 pieces of ductile cast iron fittings DN 300 according to EN 598, internal PUR-lining according to EN 15655.

5 Technical Requirements

5.1 Surface preparation

Prior to application of the polyurethane lining, the surface of the pipes or fittings to be lined shall be clean, free of rust, loose constituent materials, dirt, oil, grease and moisture.

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

The surface shall be prepared by grinding (only for pipes) and grit blasting and be in compliance with level Sa 2-2.5 of ISO 8501-1 when checked according to 7.1.1. The surface roughness R_a in accordance with ISO 8503-1 shall be at least 12,5 micrometers which is equivalent to an anchored profile R_z of 63 micrometers or higher if required by the lining material provider or manufacturer.

5.2 Finished polyurethane lining

5.2.1 Appearance and continuity

The polyurethane lining shall be of:

— uniform colour, except the spigot end and the internal socket profile which may be of a different colour and different coating material;

— 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.

5.2.2 Minimum lining thickness

When measured in accordance with 7.1.3, the lining thickness shall be as indicated in Table 1a for drinking water application and in Table 1b for waste water application.

Table 1a — Lining thickness of pipes and fittings for drinking water transport according to EN 545

DN	mean value x μm	(x-2σ) μm
80 - 200	≥ 1 300	≥ 800
> 200	≥ 1 500	

Table 1b — Lining thickness of pipes and fittings for waste water transport according to EN 598

DN	mean value x μm	(x-2σ) μm
80 - 200	≥ 1 300	≥ 800
250 - 700	≥ 1 500	≥ 800
700 – 1 000	≥ 1 800	≥ 1 000
> 1 000	≥ 2 000	≥ 1 000

5.3 Pipe ends

Spigot end and internal socket profile (see Figure 1) shall be coated with one of the following:

— epoxy lining in accordance with EN 14901;

— polyurethane in accordance with this standard with a minimum lining thickness of 150 μm;

— bituminous paint (only for drinking water);

— multilayer of epoxy, PUR-Epoxy.

When spigot end and socket entrance are coated with epoxy or polyurethane, the manufacturer shall ensure that the joint can be assembled. The coating thickness shall be checked according to 7.1.4.

5.4 Repairs

In case of holidays or damage, repairs shall be carried out in accordance with the manufacturer's written instructions. Repairs shall be checked according to 7.1.5.

Fresh surfaces of pipes cut on site shall be protected by appropriate coatings according to the manufacturer's written instructions.

5.5 Marking

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

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

This shall be checked according to 7.1.6.

5.6 Non porosity

When tested in accordance with the test method described in 7.1.7 with a tension of 3,0 kV for mean lining thickness up to 1 500 μm and 4 kV for mean lining thickness greater than 1 500 μm, the lining shall be free from porosity.

5.7 Hardness

When assessed by testing in accordance with 7.1.8, the hardness of the polyurethane lining shall be at minimum 70 Shore D. Testing temperature shall be within the range of 10 °C to 30 °C.

5.8 Adhesion

The 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 lining. When tested in accordance with 7.2.1, the weight increase resp. weight loss shall meet the requirements given in Table 2 when compared to the original weight.

Table 2 — Weight changes requirements

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

6.2 Indirect Impact strength

Due to handling activities, the PU-lined pipes may fall or get impacts from outside with minor plastic deformations which can cause damages on the lining.

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 50 joules.

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

6.3 Resistance to ovalization

When tested according to 7.2.3, the pipe shall comply with the requirements of 6.3.1 and subsequently 6.3.2.