

Kõrgtugevast malmist torud, toruarmatuur, lisaseadmed ja nende liitmikud veetorustikele. Nõuded ja katsemeetodid

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 545:2010 sisaldab Euroopa standardi EN 545:2010 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 31.10.2010 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 22.09.2010.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 545:2010 consists of the English text of the European standard EN 545:2010.

This standard is ratified with the order of Estonian Centre for Standardisation dated 31.10.2010 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 22.09.2010.

The standard is available from Estonian standardisation organisation.

ICS 23.040.10, 23.040.40

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; Telefon: 605 5050; E-post: info@evs.ee

Right to reproduce and distribute 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; Phone: 605 5050; E-mail: info@evs.ee

English Version

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

Tuyaux, raccords et accessoires en fonte ductile et leurs assemblages pour canalisations d'eau - Prescriptions et méthodes d'essai

Rohre, Formstücke, Zubehörteile aus duktilem Gusseisen und ihre Verbindungen für Wasserleitungen - Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 12 August 2010.

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, Croatia, 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.....	6
1 Scope	7
2 Normative references	7
3 Terms and definitions	8
4 Technical requirements	12
4.1 General	12
4.2 Pressure class	13
4.3 Dimensional requirements	14
4.4 Material characteristics	18
4.5 Coatings and linings for pipes	19
4.6 Coatings for fittings and accessories	21
4.7 Marking of pipes, fittings and accessories	22
4.8 Leak tightness	23
5 Performance requirements for joints and pipe saddles	23
5.1 General	23
5.2 Flexible joints	23
5.3 Restrained flexible joints	25
5.4 Flanged joints as cast, screwed, welded and adjustable	25
5.5 Pipe saddles	26
6 Test methods	27
6.1 Pipe dimensions	27
6.2 Straightness of pipes	28
6.3 Tensile testing	28
6.4 Brinell hardness	30
6.5 Works leak tightness test for pipes and fittings	30
6.6 Zinc mass	30
6.7 Thickness of paint coatings	31
6.8 Thickness of cement mortar lining	31
7 Performance test methods	32
7.1 Compressive strength of the cement mortar lining	32
7.2 Leak tightness of flexible joints	32
7.3 Leak tightness and mechanical resistance of flanged joints	35
7.4 Leak tightness and mechanical resistance of pipe saddles	36
8 Tables of dimensions	37
8.1 Socket and spigot pipes	37
8.2 Flanged pipes	40
8.3 Fittings for socketed joints	40
8.4 Fittings for flanged joints	56
9 Evaluation of conformity	73
9.1 General	73
9.2 Initial performance testing	73
9.3 Factory production control (FPC)	75
Annex A (normative) Allowable pressures	80
A.1 General	80
A.2 Socket and spigot pipes (see 8.1)	80
A.3 Fittings for socketed joints (see 8.3)	80
A.4 Flanged pipes (see 8.2) and fittings for flanged joints (see 8.4)	81
A.5 Accessories	81

Annex B (informative) Longitudinal bending resistance of pipes	82
Annex C (informative) Diametral stiffness of pipes	83
Annex D (informative) Specific coatings, field of use, characteristics of soils	86
D.1 Alternative coatings	86
D.2 Field of use in relation to the characteristics of soils	87
Annex E (informative) Field of use, water characteristics	89
Annex F (informative) Calculation method of buried pipelines, heights of cover	90
F.1 Calculation method	90
F.2 Heights of cover	92
Bibliography	93

Tables

Table 1 — Limit deviations on thickness of fittings	14
Table 2 — Limit deviation on internal diameter	15
Table 3 — Maximum DN for limit deviations on internal diameter for pressure classes	15
Table 4 — Standardized lengths of socket and spigot pipes	15
Table 5 — Standardized lengths of flange pipes	16
Table 6 — Permissible deviation on lengths of fittings	16
Table 7 — Limit deviations on length	18
Table 8 — Tensile properties	18
Table 9 — Thickness of cement mortar lining	21
Table 10 — DN groupings for performance tests	23
Table 11 — Performance tests for joints	24
Table 12 — Bending moments for flange joint performance tests	26
Table 13 — Performance tests for pipe saddles	27
Table 14 — Dimensions of test bar	29
Table 15 — Works test pressure for pipes not centrifugally cast, fittings and accessories	30
Table 16 — Dimensions of pipes of preferred pressure classes	38
Table 17 — Dimensions of pipes	39
Table 18 — Dimensions of flanged sockets	41
Table 19 — Dimensions of flanged spigots and collars	43
Table 20 — Dimensions of double socket 90° and 45° bends	45
Table 21 — Dimensions of double socket 22,5° and 11,25° bends	47
Table 22 — Dimensions of all socket tees	49
Table 23 — Dimensions of double socket tees with flanged branch, DN 40 to 250	51
Table 24 — Dimensions of double socket tees with flanged branch, DN 300 to DN 700	52
Table 25 — Dimensions of double socket tees with flanged branch, DN 800 to DN 2 000	53
Table 26 — Dimensions of double socket tapers	55
Table 27 — Dimensions of double flanged 90° and 90° duckfoot bends	57

Table 28 — Dimensions of double flanged 45° bends	59
Table 29 — Dimensions of double flanged 22,5° and 11,25° bends	61
Table 30 — Dimensions of all flanged tees, DN 40 to DN 250	62
Table 31 — Dimensions of all flanged tees, DN 300 to DN 700	63
Table 32 — Dimensions of all flanged tees, DN 800 to DN 2000	64
Table 33 — Dimensions of double flanged tapers	66
Table 34 — Dimensions of PN 10 and PN 16 blank flanges	68
Table 35 — Dimensions of PN 25 and PN 40 blank flanges	70
Table 36 — Dimensions of PN 10 and PN 16 reducing flanges	71
Table 37 — Dimensions of PN 25 and PN 40 reducing flanges	73
Table 38 — Number of test samples for initial performance testing	75
Table 39 — Minimum frequency of product testing as part of FPC	77
Table 40 — Maximum batch sizes for tensile testing.....	78
Table A.1 — Fittings pressure class	81
Table A.2 — Flanged pipe and fittings pressures	81
Table B.1 — Longitudinal bending moment resistance of pipes.....	82
Table C.1 — Diametral stiffness of pipes of preferred pressure classes	85
Table E.1 — Field of use for cement mortar linings.....	89
Table F.1 — Heights of cover for pipes of preferred pressure classes	92
Figures	
Figure 1 — Leak tightness test of joints (internal pressure).....	33
Figure 2 — Leak tightness test of joints (external pressure).....	34
Figure 3 — Strength and leak tightness test for flanged joints	35
Figure 4 — Leak tightness test for pipe saddles.....	36
Figure 5 — Socket and spigot pipes.....	37
Figure 6 — Flanged sockets	40
Figure 7 — Flanged spigots.....	42
Figure 8 — Collars	42
Figure 9 — Double socket 90° (1/4) bends	44
Figure 10 — Double socket 45° (1/8) bends	44
Figure 11 — Double socket 22°30' (1/16) bends	46
Figure 12 — Double socket 11°15' (1/32) bends	46
Figure 13 — All socket tees	48
Figure 14 — Double socket tees with flanged branch	50
Figure 15 — Double socket tapers.....	54
Figure 16 — Double flanged 90° (1/4) bends.....	56
Figure 17 — Double flanged duckfoot 90° (1/4) bends	57

Figure 18 — Double flanged 45° (1/8) bends	58
Figure 19 — Double flanged 22°30' (1/16) bends	60
Figure 20 — Double flanged 11°15' (1/32) bends	60
Figure 21 — All flanged tees	61
Figure 22 — Double flanged tapers	65
Figure 23 — Blank flanges PN 10	67
Figure 24 — Blank flanges PN 16	67
Figure 25 — Blank flanges PN 25	69
Figure 26 — Blank flanges PN 40	69
Figure 27 — Reducing flanges PN 10	70
Figure 28 — Reducing flanges PN 16	71
Figure 29 — Reducing flanges PN 25	72
Figure 30 — Reducing flanges PN 40	72

Foreword

This document (EN 545:2010) 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 March 2011, and conflicting national standards shall be withdrawn at the latest by March 2011.

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 545:2006.

In this standard Annex A is normative and Annexes B, C, D, E and F are informative.

This standard is in conformity with the general requirements already established by CEN/TC 164 in the field of water supply.

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

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

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, Croatia, 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.

1 Scope

This European Standard specifies the requirements and associated test methods applicable to ductile iron pipes, fittings, accessories and their joints for the construction of pipelines outside buildings:

- to convey different types of water (e.g. raw water, treated water, re-used water) for all types of applications (e.g. water intended for human consumption, for fire protection, for snow making, for irrigation, for hydro-electricity etc.);
- with or without pressure;
- to be installed below or above ground.

This European Standard is applicable to pipes, fittings and accessories which are:

- manufactured with socketed, flanged or spigot ends;
- supplied externally and internally coated;
- suitable for fluid temperatures between 0 °C and 50 °C, excluding frost;
- not intended for use in areas subject to reaction to fire regulations.

This does not preclude special arrangements for the products to be used at higher temperatures.

This European Standard covers pipes and fittings cast by any type of foundry process or manufactured by fabrication of cast components, as well as corresponding joints and accessories, in a size range extending from DN 40 to DN 2 000, inclusive.

This European Standard specifies requirements for materials, dimensions and tolerances, mechanical properties and standard coatings of ductile iron pipes and fittings. It also gives performance requirements for all components including joints. Joint design and gasket shapes are outside the scope of this standard.

In addition, reference is made to the minimum performance requirements of couplings, flange adaptors and saddles manufactured for use with ductile iron pipes and fittings.

NOTE In this European Standard, all pressures are relative pressures, expressed in bars (100 kPa = 1 bar).

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 196-1, *Methods of testing cement — Part 1: Determination of strength*

EN 197-1, *Cement – Part 1: Composition, specifications and conformity criteria for common cements*

EN 681-1, *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber*

EN 805:2000, *Water supply — Requirements for systems and components outside buildings*

EN 1092-2, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 2: Cast iron flanges*

EN 1333:2006, *Flanges and their joints — Pipework components — Definition and selection of PN*

EN 14901, *Ductile iron pipes, fittings and accessories — Epoxy coating (heavy duty) of ductile iron fittings and accessories — Requirements and test methods*

EN ISO 4016, *Hexagon head bolts — Product grade C (ISO 4016:1999)*

EN ISO 4034, *Hexagon nuts — Product grade C (ISO 4034:1999)*

EN ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method (ISO 6506-1:2005)*

EN ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature (ISO 6892-1:2009)*

EN ISO 7091, *Plain washers — Normal series — Product grade C (ISO 7091:2000)*

EN ISO 9001:2000, *Quality management systems — Requirements (ISO 9001:2000)*

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

pipe

casting of uniform bore, straight in axis, having socket, spigot or flanged ends, except for flanged socket pieces, flanged spigot pieces and collars which are classified as fittings

3.3

fitting

casting other than a pipe which allows pipeline deviation, change of direction or bore

NOTE In addition flanged socket pieces, flanged spigot pieces and collars are also classified as fittings.

3.4

accessory

any casting/fabrication other than a pipe or fitting which is intended for use in a ductile iron pipeline including:

- Glands and bolts for mechanical flexible joints (see 3.14);
- Glands, bolts and locking rings for restrained flexible joints (see 3.15);
- Pipe saddles for service pipe connections;
- Adjustable flanges and flanges to be welded or screwed;
- Flange adaptors for use with ductile iron pipes and fittings (see 4.1.3.2);
- Couplings for use with ductile iron pipes and fittings (see 4.1.3.2)

NOTE 1 Valves of all types are not covered by the term accessory.

NOTE 2 Wide tolerance flange adaptors and couplings are covered by EN 14525.