
**Cevi, fittingi, pribor in spoji iz nodularne litine za vodovodno omrežje –
Zahteve in preskusne metode**

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

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NACIONALNI UVOD

Standard SIST EN 545 ((sl)en; de; fr), Cevi, fittingi, pribor in spoji iz nodularne litine za vodovodno omrežje – Zahteve in preskusne metode, 2011, ima status slovenskega standarda in je po metodi ponatisa z nacionalnim dodatkom privzet evropski standard EN 545 (en; de; fr), Ductile iron pipes, fittings, accessories and their joints for water pipelines – Requirements and test methods, 2010.

NACIONALNI PREDGOVOR

Evropski standard EN 545:2010 je pripravil tehnični odbor Evropskega komiteja za standardizacijo CEN/TC 203 Cevi in fittingi iz litega železa ter njihovi spoji, katerega sekretariat vodi AFNOR.

Slovenski standard SIST EN 545:2011 je po metodi ponatisa z nacionalnim dodatkom privzet evropski standard EN 545:2010. Slovensko izdajo standarda je pripravil tehnični odbor SIST/TC TLP Tlačne posode.

Odločitev za privzem tega standarda je dne 22. februarja 2011 sprejel tehnični odbor SIST/TC TLP Tlačne posode.

NACIONALNI DODATEK

V nacionalnem dodatku v nadaljevanju je podana informativna preglednica, ki prikazuje povezavo med nekdanjimi K-razredi in sedanjimi tlačnimi razredi.

ZVEZA Z NACIONALNIMI STANDARDI

S privzemom tega evropskega standarda veljajo za omejeni namen referenčnih standardov vsi standardi, navedeni v izvirniku, razen standardov, ki so že sprejeti v nacionalno standardizacijo:

SIST EN 196-1 (en)	Metode preskušanja cementa – 1. del: Določanje trdnosti
SIST EN 197-1 (sl, en, fr, de)	Cement – 1. del: Sestava, zahteve in merila skladnosti za običajne cimente
SIST EN 681-1 (en)	Elastomerna tesnila – Zahteve za materiale za tesnila za uporabo v napeljavah za vodo in kanalizacijo – 1. del: Vulkanizirana guma
SIST EN 805:2000 (en)	Oskrba z vodo – Zahteve za zunanje vodovode in dele
SIST EN 1092-2 (en)	Prirobnice in prirobnični spoji – Okrogle prirobnice za cevi, ventile, vezne elemente (fitinge) in dodatke z oznako PN – 2. del: Prirobnice iz litega železa
SIST EN 1333:2006 (en)	Prirobnice in spojni elementi – Komponente cevovodov – Definicija in izbira tlačne stopnje PN
SIST EN 14901 (en)	Litoželezne cevi, oblikovni kosi in pribor – Epoksidni premaz (za visoke obremenitve) litoželeznih oblikovnih kosov in pribora – Zahteve in preskusne metode
SIST EN ISO 4016 (en)	Vijaki s šestrobo glavo – Razred izdelave C (ISO 4016:1999)
SIST EN ISO 4034 (en)	Šestrobe matice – Razred izdelave C (ISO 4034:1999)
SIST EN ISO 6506-1 (en)	Kovinski materiali – Preskus trdote po Brinellu – 1. del: Preskusna metoda (ISO 6506-1:2005)
SIST EN ISO 6892-1 (en; fr; de)	Kovinski materiali – Natezni preskus – 1. del: Metoda preskušanja pri sobni temperaturi (ISO 6892-1:2009)
SIST EN ISO 7091 (en)	Okrogle ravne podloške – Normalne vrste – Razred izdelave C (ISO 7091:2000)
SIST EN ISO 9001:2000 (sl, en)	Sistemi vodenja kakovosti – Zahteve (ISO 9001:2000)

OSNOVA ZA IZDAJO

- privzem evropskega standarda EN 545:2010 (en; de; fr)

PREDHODNA IZDAJA

- SIST EN 545:2010 (en), Cevi, fittingi, pribor in spoji iz nodularne litine za vodovodno omrežje – Zahteve in preskusne metode

OPOMBE

- Povsod, kjer se v besedilu standarda uporablja izraz “evropski standard”, v SIST EN 545:2011 to pomeni “slovenski standard”.
- Nacionalni uvod in nacionalni predgovor nista sestavni del standarda.
- Ta nacionalni dokument je istoveten EN 545:2010 in je objavljen z dovoljenjem

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Nacionalni dodatek (informativni)

Preglednica ND.1: Povezava med nekdanjimi K-razredi in trenutnimi tlačnimi razredi

DN	Zunanji premer DE mm		Primerjava z nekdanjim K7	Primerjava z nekdanjim K8	Primerjava z nekdanjim K9	Primerjava z nekdanjim K10
	Imenski	Mejna odstopanja	Tlačni razredi			
			OPOMBA: Spodaj navedene vrednosti tlaka so v vseh primerih večje kot pri enakovredni cevi K-razreda. Večje tlačne vrednosti pri manjših dimenzijah so posledica tovarniških omejitev zaradi nekdanjih K-razredov.			
40	56	+1/-1,2	Kot K9	Kot K9	100	Kot K9
50	66	+1/-1,2	Kot K9	Kot K9	100	Kot K9
60	77	+1/-1,2	Kot K9	Kot K9	100	Kot K9
65	82	+1/-1,2	Kot K9	Kot K9	100	Kot K9
80	98	+1/-2,7	Kot K9	Kot K9	100	Kot K9
100	118	+1/-2,8	Kot K9	Kot K9	100	Kot K9
125	144	+1/-2,8	Kot K9	Kot K9	100	Kot K9
150	170	+1/-2,9	Kot K9	Kot K9	100	Kot K9
200	222	+1/-3,0	64	64	64	100
250	274	+1/-3,1	50	50	64	64
300	326	+1/-3,3	50	50	50	64
350	378	+1/-3,4	40	40	50	64
400	429	+1/-3,5	40	40	50	50
450	480	+1/-3,6	30	40	40	50
500	532	+1/-3,8	30	40	40	50
600	635	+1/-4,0	30	40	40	50
700	738	+1/-4,3	25	30	40	40
800	842	+1/-4,5	25	30	40	40
900	945	+1/-4,8	25	30	40	40
1000	1048	+1/-5,0	25	30	30	40
1100	1152	+1/-6,0	25	30	30	40
1200	1255	+1/-5,8		25	30	40
1400	1462	+1/-6,6		25	30	40
1500	1565	+1/-7,0		25	30	40
1600	1668	+1/-7,4		25	30	40
1800	1875	+1/-8,2		25	30	30
2000	2082	+1/-9,0		25	30	30

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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.

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EN 545:2010 (E)**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 545:2010 (E)

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.

3.5**component**

any product defined in 3.2 to 3.4

3.6**flange**

end of a pipe, fitting or accessory extending perpendicular to its axis, with bolt holes equally spaced on a circle

NOTE A flange can be fixed (e.g. integrally cast, screwed or welded) or adjustable; an adjustable flange comprises a ring, in one or several parts assembled together, which bears on an end joint hub and can be freely rotated around the barrel axis before jointing.

3.7**spigot**

male end of a pipe or fitting

3.8**spigot end**

maximum insertion depth of the spigot plus 50 mm

3.9**socket**

female end of a component to make the connection with the spigot of the next component

3.10**gasket**

sealing component of a joint

3.11**joint**

connection between the ends of two components in which a gasket is used to effect a seal

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3.12**flexible joint**

joint which permits significant angular deflection both during and after installation and which can accept a slight offset of the centreline

3.13**push-in flexible joint**

flexible joint assembled by pushing the spigot through the gasket in the socket of the mating component

3.14**mechanical flexible joint**

flexible joint in which sealing is obtained by applying pressure to the gasket by mechanical means, e.g. a gland

3.15**restrained flexible joint**

flexible joint in which a means is provided to prevent separation of the assembled joint

3.16**flanged joint**

joint between two flanged ends

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EN 545:2010 (E)**3.17****nominal size****DN**

alphanumerical designation of size for components of a pipework system, to be used for reference purposes, which comprises the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections

[EN ISO 6708:1995]

3.18**nominal pressure****PN**

alphanumerical designation related to a combination of mechanical and dimensional characteristics of a component of a pipework system, to be used for reference purposes, which comprises the letters PN followed by a dimensionless number

[EN 1333:2006]

NOTE All components of the same nominal size DN and designated by the same PN number have compatible mating dimensions.

3.19**leak tightness test pressure**

pressure applied to a component during manufacture in order to ensure its leak tightness

3.20**allowable operating pressure****PFA**

maximum hydrostatic pressure that a component is capable of withstanding continuously in service

[EN 805:2000]

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3.21**pressure class****C**

alphanumerical designation of a family of components, including their joints, relating to their operating pressures as verified by all the performance tests described in this standard, which includes the letter C followed by a dimensionless number equal to the maximum PFA in bars of the family of components

3.22**allowable maximum operating pressure****PMA**

maximum pressure occurring from time to time, including surge, that a component is capable of withstanding in service

[EN 805:2000]

3.23**allowable test pressure****PEA**

maximum hydrostatic pressure that a newly installed component is capable of withstanding for a relatively short duration, in order to insure the integrity and tightness of the pipeline

[EN 805:2000]

NOTE This test pressure is different from the system test pressure (STP), which is related to the design pressure of the pipeline and is intended to ensure its integrity and leak tightness.

3.24**diametral stiffness of a pipe**

characteristic of a pipe which allows it to resist ovalization under loading when installed

3.25**performance test**

proof of design test which is done once and must be repeated after each change of design

3.26**laying length**

length by which a pipeline progresses when an additional pipe or fitting is installed

NOTE For socketed pipes and fittings the laying length L_e is equal to the overall length (OL) minus the maximum spigot insertion depth (X) as given by the manufacturer. For flanged pipes and fittings, the laying length is equal to the overall length.

3.27**standardized length**

length of pipe barrel and fitting body or branch, as specified in this standard (see 4.3.3)

NOTE For socketed pipes (see Figure 5) and socketed fittings, the standardized length, L_u (l_u for branches), is equal to the overall length (OL) minus the depth of the socket (DOS) as given by the manufacturer. For flanged pipes and fittings, the standardized length, L (l for branches), is equal to the overall length.

3.28**deviation**

design length allowance with respect to the standardized length of a pipe or a fitting

3.29**ovality**

out of roundness of a pipe section

[SIST EN 545:2011](https://standards.iteh.ai/catalog/standards/sist/24c5f433-6e59-446b-b0a2-838b9163a2a6/sist-en-545-2011)

[https://standards.iteh.ai/catalog/standards/sist/24c5f433-6e59-446b-b0a2-](https://standards.iteh.ai/catalog/standards/sist/24c5f433-6e59-446b-b0a2-838b9163a2a6/sist-en-545-2011)

[838b9163a2a6/sist-en-545-2011](https://standards.iteh.ai/catalog/standards/sist/24c5f433-6e59-446b-b0a2-838b9163a2a6/sist-en-545-2011)

NOTE It is equal to: $100 \left(\frac{A_1 - A_2}{A_1 + A_2} \right)$

where:

A_1 is the maximum axis, in millimetres;

A_2 is the minimum axis, in millimetres.

3.30**pipe minimum thickness**

minimum thickness at any point of the pipe (see Tables 16 and 17) used in the calculation of its PFA and pressure class

3.31**thickness for pipe stiffness calculation**

thickness based on the pipe minimum thickness and the DN used in the calculation of the pipe diametral stiffness