



# SLOVENSKI STANDARD

## oSIST prEN 877:2012

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### Cevi, fittingi in pribor iz litega železa za odtok vode iz stavb - Zahteve, preskusne metode in zagotavljanje kakovosti

Cast iron pipes and fittings, their joints and accessories for the evacuation of water from buildings - Requirements, test methods and quality assurance

Rohre und Formstücke aus Gusseisen, deren Verbindungen und Zubehör zur Entwässerung von Gebäuden - Anforderungen, Prüfverfahren und Qualitätssicherung

Tuyaux et raccords en fonte, leurs assemblages et accessoires destinés à l'évacuation des eaux des bâtiments - Prescriptions, méthodes d'essais et assurance qualité

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**Ta slovenski standard je istoveten z: prEN 877 rev**

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#### **ICS:**

23.040.10	Železne in jeklene cevi	Iron and steel pipes
23.040.40	Kovinski fittingi	Metal fittings
91.140.80	Drenažni sistemi	Drainage systems

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 877 rev**

January 2012

ICS 23.040.10; 23.040.40

Will supersede EN 877:1999

English Version

## Cast iron pipes and fittings, their joints and accessories for the evacuation of water from buildings - Requirements, test methods and quality assurance

Tuyaux et raccords en fonte, leurs assemblages et  
accessoires destinés à l'évacuation des eaux des  
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Rohre und Formstücke aus Gusseisen, deren  
Verbindungen und Zubehör zur Entwässerung von  
Gebäuden - Anforderungen, Prüfverfahren und  
Qualitätssicherung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 203.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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## Foreword

This document (prEN 877:2012) has been prepared by Technical Committee CEN/TC 203 “Cast iron pipes, fittings, accessories and their joints”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 877:1999.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of **EU Directive**.

For relationship with EU Directive, see informative Annex ZA, which is an integral part of this document.

It is one of a series of standards for cast iron products for pipelines for various applications.

It deals with subjects covered by the International Standard ISO 6594. The major difference is the inclusion of requirements for joints and for product performance.

This standard is in conformity with the general requirements already established by CEN/TC 165 in the field of waste water engineering, as required by EN 476.

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**prEN 877:2012 (E)****1 Scope**

This European Standard applies to cast iron pipeline components used for the construction of discharge systems for buildings and of drains, normally as gravity systems but also vacuum systems, inside and outside buildings, above and below ground.

The range of nominal sizes extends from DN 40 to DN 600 inclusive.

This standard specifies the requirements for the materials, dimensions and tolerances, mechanical properties, appearance, standard coatings for cast iron pipes, fittings and accessories. It also indicates performance requirements for all components, including joints. Quality assurance is covered in an informative annex.

It covers pipes, fittings and accessories cast by any foundry process or manufactured by fabrication of cast components, as well as the corresponding joints.

The roof gullies used for siphonic systems are not relevant from this standard.

**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 476:2011, *General requirements for components used in drains and sewers.*

EN 598:2007+A1:2009, *Ductile cast iron pipes, fittings, accessories and their joints for sewerage application - Requirements and test methods.*

EN 605:1992; *Paints and varnishes - Standard panels for testing (ISO 1514:1984 modified).*

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

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

EN 10088-1:2005, *Stainless steels - Part 1: List of stainless steels.*

EN 10088-2:2005, *Stainless steels - Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes.*

EN 10088-3:2005, *Stainless steels - Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes.*

EN 10088-4:2009, *Stainless steels - Part 4: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for construction purposes.*

EN 10088-5:2009, *Stainless steels - Part 5: Technical delivery conditions for bars, rods, wire, sections and bright products of corrosion resisting steels for construction purposes.*

EN 10204:2004, *Metallic products - Types of inspection documents.*

EN 45011:1998, *Stainless steels - Part 5: Technical delivery conditions for bars, rods, wire, sections and bright products of corrosion resisting steels for construction purposes.*

EN ISO 6708:1995, *Pipework components - Definition and selection of DN (nominal size) (ISO 6708:1995).*

ISO 185:2005, *Grey cast iron – Classification.*

EN ISO 898-1:2009 *Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs with specified property classes - Coarse thread and fine pitch thread (ISO 898-1:2009).*

EN ISO 898-2:2008, *Plastics - Plasticized poly(vinyl chloride) (PVC-P) moulding and extrusion materials - Part 2: Preparation of test specimens and determination of properties (ISO 2898-2:2008).*

ISO 1817:2011, *Rubber, vulcanised - Determination of the effect of liquids.*

EN ISO 2409:2007, *Paints and varnishes - Cross-cut test.*

EN ISO 3506-1:2009, *Mechanical properties of corrosion-resistant stainless steel fasteners - Part 1: Bolts, screws and studs (ISO 3506-1:2009).*

EN ISO 3506-2:2009, *Mechanical properties of corrosion-resistant stainless steel fasteners - Part 2: Nuts (ISO 3506-2:2009)*

ISO 2808:2007, *Paints and varnishes - Determination of film thickness.*

EN ISO 2812-1:2007, *Paints and varnishes - Determination of resistance to liquids - Part 1: Immersion in liquids other than water (ISO 2812-1:2007).*

ISO 4628-2:2003; *Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 2: Assessment of degree of blistering (ISO 4628-2:2003)*

ISO 4628-3:2003, *Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 3: Assessment of degree of rusting (ISO 4628-3:2003)*

EN ISO 9227:2006, *Corrosion tests in artificial atmospheres - Salt spray tests (ISO 9227:2006).*

ISO 7724-1:1984, *Paints and varnishes - Colorimetry - Part 1: Principles.*

ISO 7724-2:1984, *Paints and varnishes - Colorimetry - Part 2: Colour measurement.*

ISO 7724-3:1984, *Paints and varnishes - Colorimetry - Part 3: Calculation of colour differences.*

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

EN 13501-1, *Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.*

EN 13823, *Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item.*

EN ISO 1716, *Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value) (ISO 1716:2010).*

EN ISO 9001:2008, *Quality management systems - Requirements (ISO 9001:2008)*

EN ISO 11925-2, *Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test (ISO 11925-2)*

### 3 Terms and definitions

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

**3.1 discharge system for buildings**  
system of pipes, fittings, accessories and joints used to collect and drain waste water and rainwater from a building; it comprises discharge pipes, stack ventilation and rainwater pipes, installed within the limits of a building or attached to the building. This includes pipes between the building and the connecting boxes

NOTE This applies to gravity or vacuum, inside and outside buildings, above and below ground.

**3.2 drain**  
system of pipes, fittings, accessories and joints installed outside the limits of a building in order to connect the discharge system of this building to a sewer or a septic tank

**3.3 sewer**  
system of pipes designed to collect waste water and rainwater from buildings and surface water and to convey them to the point of disposal or treatment

**3.4 cast iron**  
alloy of iron and carbon in which graphite can be present in different forms

**3.5 pipe**  
casting of uniform bore, straight in axis, normally having plain ends but which can also be socketed

**3.6 fitting**  
cast iron component, other than a pipe, which allows a deviation, a change of direction or diameter, including flanged and access components

**3.7 accessory**  
any casting other than a pipe or fitting used in a pipeline, e.g. inspection/junction chambers

**3.8 joint**  
connection between the ends of pipes and/or fittings, including the coupling or clamping component, with sealing effected by elastomeric gasket(s)

**3.9 grip collars**  
securing clamps for pipes subjected to internal pressure, providing axial restraint to end thrust coming from a change of direction

**3.10 nominal size (DN)**  
an alphanumeric designation of size for components of a pipework system, which is used for reference purposes. It 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]

NOTE In this standard, it is the bore.



### 3.11 length

effective length of a pipe or fitting

NOTE For flanged pipes and fittings, the effective length is equal to the overall length. For spigot and socket pipes and fittings, the effective length is equal to the overall length minus the spigot insertion depth as given in the manufacturer's catalogues

### 3.12 initial type test

proof of design test which is carried out once to demonstrate compliance with the requirements of this standard and which is repeated only after significant change in manufacture, design or material

### 3.13 manufacturer

legal entity, manufacturing and selling systems as defined in 3.1 and 3.2, presenting them as his own work, i.e. showing on all products his manufacturing mark and/or name

### 3.14 range of products

group of products produced by one manufacturer for which the test results for one or more characteristics from any one product within the range are valid for all other products within this range

### 3.15 system under vacuum

siphonic system for draining rainwater and vacuum system for waste waters

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## 4 Technical requirements

### 4.1 General

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#### 4.1.1 Introduction

The general requirements for pipes, fittings, joints and accessories are defined in 4.1 to 4.8 and in 4.12. Additional requirements are given in 4.10 for buried systems and in 4.11 for rainwater systems to be installed outside buildings.

NOTE Information on manufacturing criteria and quality assurance is given in annex D.

#### 4.1.2 Surface condition

Pipes, fittings and accessories shall be free from defects (superficial and other defects) which could be detrimental to their correct operation or long service life as defined in this standard.

#### 4.1.3 Reaction to fire

Uncoated cast iron pipes and fittings, their joints and accessories are Class A1 CWFT according to CEC Decision 96/603/EC as amended.

Considering the products in their end-use conditions (assembled into a discharge system), even if:

- internal coatings are not relevant as they are not exposed to fire (a very low quantity of smoke is possible but it will go outside buildings through stack vents);

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- gaskets of joints are not relevant either as in the end-use conditions they are not or very few (external edge) exposed to fire and represent a very low quantity of organic material they will be tested according to EN 13823 (SBI) using the mounting adaptations given in Annex H to verify these assumptions.

According to EN 13501-1, as the gross calorific potential (PCS) of the products in their assembled state (pipes, fittings, joints, their components and materials), due to their densities and weight quantities, will always satisfy the requirement on PCS for the product as a whole ( $\leq 2,0$  MJ/kg), the reaction to fire classification shall be obtained as follows:

- external coatings, if containing more than 1 % by weight or volume (whichever is the more onerous) of homogeneously distributed organic material, shall satisfy the requirements of 4.6.3 on ignitability or gross calorific potential, depending on the intended class of reaction to fire

and

- a range (including coated pipes, coated fittings, couplings and possibly grip collars) shall be tested according to EN 13823 (SBI), using the mounting adaptations given in Annex H, and shall satisfy the requirements of classification criteria and additional classifications listed in EN 13501-1 for the intended class of reaction to fire. If a range includes grip collars, as these products are not always installed on the discharge system depending on the expected performances:
  - the test shall be done without them to evaluate the behaviour of the couplings without any protection to the flame;
  - and only if the grip collars include an organic material, the test shall be done again with the grip collars installed on top of the couplings (see Annex H).

To obtain a classification for their joints (for CE marking), a manufacturer of only joints shall test them once according to EN 13823 (SBI) using the mounting adaptations given in Annex H, with pipes and fittings of a cast iron range which already has a reaction to fire classification given by a notified test laboratory, and he shall prove that the existing classification of the range is not changed for a worse one by the substitution of the joints.

NOTE See F.2.

**4.1.4 Noise protection**

For installed networks, there may be national installation regulations concerning noise protection, and manufacturers could provide information about solutions for requirements (see also Annex F).

NOTE 1 For installed networks, there can be national installation regulations concerning noise protection, and manufacturers could provide information about solutions for requirements (see also Annex F).

NOTE 2 Noise protection is not mandated under CPD. There are no national regulations concerning noise in direct relation to the product.

**4.1.5 Dangerous substances (regulated substances)**

The materials which the products are made from shall not release dangerous substances (regulated substances) in excess of the maximum permitted levels specified by a relevant European Standard for the materials or permitted by national regulations in the territory of destination.

**4.2 Dimensions****4.2.1 Nominal size (DN)**

The nominal sizes shall be as given in column 1 of Table 1.

#### 4.2.2 External diameter (DE)

The standard external diameters (DE) of pipes and fittings, as well as the tolerances applicable to these, shall comply with the values given in Table 1, when measured in accordance with 5.2.1. When, by agreement between manufacturer and purchaser, specific coatings are supplied for special applications, other tolerances are permitted. Due regard shall be given to 4.8, in this case.

**Table 1 – Dimensions of pipes and fittings**

Dimensions in millimetres

DN	External diameter DE		Wall thickness	
	Nominal value	Tolerance	Nominal value	Minimum value
40	48	+2 -1	3,0	2,5
50	58	+2 -1	3,5	3,0
70	78	+2 -1	3,5	3,0
75	83	+2 -1	3,5	3,0
100	110	+2 -1	3,5	3,0
125	135	+2 -2	4,0	3,5
150	160	+2 -2	4,0	3,5
200	210	+2,5 -2,5	5,0	4,0
250	274	+2,5 -2,5	5,5	4,5
300	326	+2,5 -2,5	6,0	5,0
400	429	+2 -3	6,3	5,0
500	532	+2 -3,8	7,0	5,2
600	635	+2 -4	7,7	5,8

NOTE 1 In countries where the nominal sizes DN 60 and DN 80 are still mentioned in application standards these nominal sizes can still be used.

NOTE 2 Other dimensions are given in 4.9 for buried systems and in 4.10 for rainwater systems installed outside buildings.

**prEN 877:2012 (E)****4.2.3 Wall thickness**

Wall thicknesses of pipes and fittings shall comply with the values given in Table 1, when measured in accordance with 5.2.2.

**4.2.4 Internal diameter**

In order to ensure the hydraulic function, the internal diameter of pipes when measured in accordance with 5.2.3, shall be not less than:

- 0,975 DN for nominal sizes equal to or greater than DN 70;
- 0,950 DN for nominal sizes less than DN 70.

**4.2.5 Ovality**

When measured in accordance with 5.2.4 the ovality of the pipes and of the sealing zones of fittings (see 4.2.9) shall remain within the tolerances on DE shown in Table 1 for DN 40 to DN 300 and shall not exceed 1 % for DN 400 to DN 600 (see 3.36 of EN 598:2007).

**4.2.6 Straightness of pipes**

When measured in accordance with 5.2.5 the pipes shall be straight with a maximum deviation of:

- 0,15% of their length for nominal sizes greater than DN 70;
- 0,20% of their length for nominal sizes equal to or less than DN 70.

**4.2.7 End faces**

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The end faces of the products shall be free from faults which may impair their fitness for use and their planes shall be perpendicular with the axes of symmetry of the products. When measured in accordance with 5.2.6, the maximum deviation from the right angle shall be:

- 3° for nominal sizes DN 40 to DN 200;
- 2° for nominal sizes DN 250 to DN 600.

**4.2.8 Length of pipes**

Pipes shall be normally produced with a length of 3 m.

NOTE Other lengths are permitted and can be supplied with special identification by agreement between the manufacturer and the purchaser.

When measured in accordance with 5.2.7 the length of all pipes shall be within a tolerance of  $\pm 20$  mm.

**4.2.9 Lengths of fittings and sealing zones**

Lengths of fittings shall be given in the manufacturers' catalogues. When measured in accordance with 5.2.7 the lengths of fittings shall be within a tolerance of  $\pm 5$  mm.

The ends of the fittings shall have sealing zones straight in axis and free from marking and free from defects which could impair the fitness for use.

The length  $T$  (see Figure 1) of this sealing zone shall comply with the values given in Table 2.

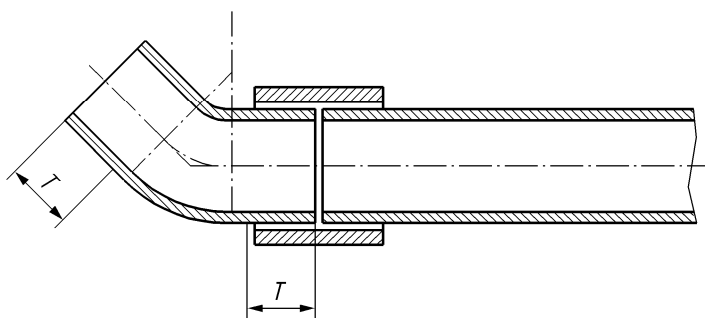


Figure 1

#### 4.2.10 Geometry of fittings and accessories

The geometry of fittings and accessories is not standardized at this stage. Fittings and accessories of geometry presently used in various countries are in conformity with this standard as long as they comply with all other technical requirements of this standard.

Table 2 – Sealing zone of fittings

DN	Length $T$ of sealing zone mm	Lower deviation on $T$ <sup>*)</sup> mm
40	30	- 5
50	30	
70	35	
75	35	
100	40	
125	45	
150	50	
200	60	- 4
250	70	
300	80	
400	80	
500	80	
600	80	

\*) Upper deviations are not given and sealing zones with a length greater than  $T$  are permitted.

#### 4.2.11 Angles of fittings

Fittings shall be designed to the angles specified below with a design tolerance of  $\pm 2^\circ$ :

- bends:  $15^\circ$ ;  $22^\circ$ ;  $30^\circ$ ;  $45^\circ$ ;  $68^\circ$ ;  $88^\circ$ ;
- single/double branches:  $45^\circ$ ;  $68^\circ$ ;  $88^\circ$ .

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#### 4.2.12 Access components and traps

The minimum dimension of the openings of access components up to DN 150 inclusive, shall be at least equal to the whole number of the nominal size in millimetres. For access components over DN 150, the minimum dimension of the opening shall be at least 150 mm.

The height of water seal of traps shall be at least 50 mm.

#### 4.3 Interconnection

Products of the same DN in accordance with this standard (see Table 1) can be connected with each other.

#### 4.4 Mass

The nominal masses of finished products (pipes, fittings and accessories) shall be given in the manufacturers' catalogues. When the mass is measured in accordance with 5.3, the lower deviation shall not exceed 15% of the nominal mass.

#### 4.5 Material characteristics of pipes, fittings and accessories

##### 4.5.1 Cast iron

Pipes, fittings and accessories shall be manufactured from:

- grey cast iron in accordance with ISO 185:2005; or
- spheroidal graphite cast iron in accordance with EN 598:2007; or
- any other type of cast iron in accordance with 4.5.2.

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##### 4.5.2 Mechanical properties

Pipes, fittings and accessories shall have the mechanical properties given in Table 3.

**Table 3 – Mechanical properties of pipes, fittings and accessories**

Type of casting and material <sup>1)2)</sup>	Minimum tensile strength MPa	Minimum ring crush strength MPa	Maximum Brinell hardness HB
Pipes			
— grey cast iron	200	350 <sup>3)</sup>	260
— spheroidal graphite cast iron	420	--	230
Fittings and accessories			
— grey cast iron	150	--	260
— spheroidal graphite cast iron	420	--	250
1) Other types of cast iron shall satisfy the criteria laid down for grey cast iron. 2) Tensile and ring crush strength for other products see Annex A. 3) 332 MPa for nominal sizes equal to or greater than DN 250.			

The modulus of elasticity  $E$  shall be given by the manufacturer. It is normally at least 110 GPa for grey cast iron and at least 170 GPa for spheroidal graphite cast iron.

## 4.6 Coatings for pipes, fittings and accessories

### 4.6.1 General

The cast iron components shall be coated internally and externally. Before applying the coatings, the surfaces shall be dry and free from rust or non-adhering products or foreign matter, e.g. oil, grease.

Points of contact inherent in the coating application systems are permitted.

These coatings shall not become sticky when they are heated to 100°C. They shall maintain an acceptable appearance up to installation and permit the application of additional external finishing coatings.

The manufacturer shall specify the minimum factory applied thicknesses of the dry internal and external coatings on the finished products and shall demonstrate that these coatings conform to 4.6.2 or 4.6.3 respectively.

NOTE Specific requirements for coatings for buried systems and rainwater systems installed outside buildings are given in 4.10.3 and 4.11.2 respectively.

### 4.6.2 Internal coatings

When tested in accordance with 5.7.2 the materials for internal coatings shall conform to the following requirements:

- resistance to salt spray: at least 350 h in accordance with EN ISO 9227;
- resistance to waste water: at least 30 d at 45°C;
- chemical resistance from pH 2 to pH 12: at least 30 d at 23°C.

When tested in accordance with 5.7.2, the internal coatings on finished products shall conform to the following requirements:

- dry coating thickness: not greater than 400  $\mu\text{m}$  (except for specific coatings for special applications), and at least the minimum factory applied thickness to be specified by the manufacturer (see 4.6.1);
- adhesion: in accordance with level 1 of EN ISO 2409;
- resistance to hot water: 24 h at 95°C;
- resistance to temperature cycling: 1500 cycles between 15°C and 93°C.