

Ductile iron pipes, fittings, accessories and their joints for sewerage applications — Requirements and test methods

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- Adhesive Tape Manufacturers' Association
- British Foundry Association
- Ductile Iron Pipe Committee
- Institute of British Foundrymen
- Institution of Mechanical Engineers
- Institution of Water and Environmental Management
- Pipeline Protection Association
- Society of British Water Industries
- Water Companies Association
- Water Research Centre
- Water Services Association of England and Wales

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National foreword

This British Standard has been prepared under the direction of the Piping Systems Components Standards Policy Committee and is the English language version of EN 598:1994 *Ductile iron pipes, fittings, accessories and their joints for sewerage application — Requirements and test methods*, published by the European Committee for Standardization (CEN).

EN 598 was produced as a result of international discussion in which the UK took an active part.

Cross-references

International standard	Corresponding British Standard
EN 196-1:1989	BS EN 196 <i>Methods of testing cement</i> Part 1:1987 <i>Determination of strength</i>
EN 545:1994	BS EN 545:1995 <i>Ductile iron pipes, fittings, accessories and their joints for water pipelines</i>
EN 10002-1:1990	BS EN 10002 <i>Tensile testing of metallic materials</i> Part 1:1990 <i>Method of test at ambient temperature</i>
EN 29002:1987	BS 5750 <i>Quality systems</i> Part 2:1987 <i>Specification for production and installation</i>
EN 45012:1989	BS 7512:1989 <i>General criteria for certification bodies operating quality system certification</i>

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 28, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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English version

Ductile iron pipes, fittings, accessories and their joints for sewerage applications – Requirements and test methods

Tuyaux, raccords et accessoires en fonte ductile et leurs assemblages pour l'assainissement – Prescriptions et méthodes d'essai

Rohre, Formstücke, Zubehörteile aus duktilem Gußeisen und ihre Verbindungen für die Abwasser-Entsorgung – Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 1994-09-06. 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.

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European Committee for Standardization
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Foreword

This European Standard was prepared by AHG2, Sewerage pipelines, of CEN/TC 203, Cast iron pipes, fittings and their joints, of which the secretariat is held by AFNOR.

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

This European Standard has been prepared under a Mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements or EC Directive(s).

It deals with the subjects covered by the International Standards ISO 7186, ISO 4179 and ISO 8179. The major differences are the presentation in one single standard and the addition of product performance specifications.

This standard is in conformity with the general requirements already established by CEN/TC 165 in the field of sewerage.

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 1995, and conflicting national standards shall be withdrawn at the latest by March 1995.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

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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 drains and sewers outside buildings:

- Operating without pressure, or with positive or negative pressure.
- Installed below or above ground.
- For conveyance of surface water, domestic waste water and certain types of industrial effluents, either in separate systems or in mixed systems.

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

This standard specifies products for gravity sewerage pipelines, for negative pressure pipelines and for pipelines operating at pressures which do not normally exceed 6 bar. For higher-pressure applications, special pipe thickness may be required by agreement between manufacturer and purchaser.

This 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.

This standard covers pipes, fittings and accessories cast by any type of foundry process or manufactured by fabrication of cast components, as well as corresponding joints, of a size range extending from DN 100 to DN 2000 inclusive.

This standard applies to pipes, fittings and accessories which are:

- manufactured with socketed, flanged or spigot ends for jointing by means of various types of gaskets which are not within the scope of this standard;
- normally delivered externally and internally coated;
- suitable for fluid temperatures up to 50 °C excluding frost.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 196-1:1989, *Methods of testing cement — Determination of strength*.

prEN 476:1991, *General requirements for components used in discharge pipes, drains and sewers for gravity systems*.

EN 545:1994, *Ductile iron pipes, fittings, accessories and their joints for water pipelines. Requirements and test methods*.

EN 10002-1:1990, *Metallic materials — Tensile testing — Part 1: Method of test (at ambient temperature)*.

EN 29002:1987, *Quality systems — Model for quality assurance in production and installation*.

EN 45012:1989, *General criteria for certification bodies operating quality system certification*.

ISO 4633:1983, *Rubber seals — Joint rings for water supply, drainage and sewerage pipelines — Specification for materials*.

ISO 6506:1981, *Metallic materials — Hardness tests — Brinell test*.

ISO 6708:1980, *Pipe components — Definition of nominal size*.

ISO 7268:1983, *Pipe components — Definition of nominal pressure*.

ISO 7268/A1 1984, *Pipe components — Definition of nominal pressure — Amendment 1*.

ISO 7483:1991, *Dimensions of gaskets for use with flanges to ISO 7005*.

3 Definitions

For the purposes of this standard, the following 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 either 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. In addition flanged-socket pieces, flanged-spigot pieces and collars are also classified as fittings

3.4**accessory**

any casting other than a pipe or fitting which is used in a pipeline, e.g.

- inspection chambers (see 3.5);
- manholes (see 3.6);
- glands and bolts for mechanical flexible joints (see 3.15);
- glands, bolts and locking rings for restrained flexible joints (see 3.16);
- adjustable flanges and flanges to be welded or screwed-on.

3.5**inspection chamber**

component of a discharge system, of a drain or of a sewer providing access from the ground surface for inspection and maintenance equipment

3.6**manhole**

component of a sewer of sufficient size to provide access from the ground surface for inspection and maintenance operations by personnel and equipment

3.7**flange**

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

NOTE A flange may be fixed (e.g. integrally cast or welded-on) 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 pipe axis before jointing.

3.8**collar; coupling**

connecting piece used to join together the spigots of mating pipes or fittings

3.9**spigot**

male end of a pipe or fitting

3.10**socket**

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

3.11**gasket**

sealing component of a joint

3.12**joint**

connection between the ends of two pipes and/or fittings in which a gasket is used to effect a seal

3.13**flexible joint**

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

3.14**push-in flexible joint**

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

3.15**mechanical flexible joint**

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

3.16**restrained flexible joint**

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

3.17**flanged joint**

joint between two flanged ends

3.18**nominal size DN**

numerical designation of size which is common to all components in a piping system. It is a convenient round number for reference purposes and is only loosely related to manufacturing dimensions (See ISO 6708.)

3.19**nominal pressure PN**

numerical designation expressed by a number which is used for reference purposes. All components of the same nominal size DN designated by the same PN number have compatible mating dimensions. (See ISO 7268 and ISO 7268/A1.)

3.20**diametral stiffness of a pipe**

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

3.21**discharge system**

system of pipes, fittings, accessories and joints used to collect and drain waste water and rainwater of a building; it comprises discharge pipes, stack ventilation pipes and rainwater downpipes, installed within the limits of a building or attached to the building

3.22 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

3.23 sewer

pipeline designed to collect waste water and rainwater from buildings and surface water and to convey them to the point of disposal or treatment

3.24 gravity sewer

sewer operating normally under free flowing conditions

3.25 pressure sewer; pumping sewer

sewer (or section of a sewer) operating under positive pressure

3.26 vacuum sewer

sewer operating under negative pressure

3.27 combined system

sewerage system collecting together rainwater, surface water and waste water

3.28 separate system

sewerage system where are separately collected:

- rainwater and surface water;
- waste water.

3.29 batch

quantity of castings from which a sample is taken for testing purposes during manufacture

3.30 type test

proof of design test which is done once and is repeated only after change of design

3.31 length

effective length of a pipe or fitting (see Figure in 9.1)

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

3.32 ovality

out of roundness of a pipe section; 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.

4 Technical requirements

4.1 General

4.1.1 Ductile iron pipes and fittings

Nominal sizes, thicknesses, lengths and coatings are specified in clause 4. When, by agreement between manufacturer and purchaser, pipes and fittings with different wall thicknesses, lengths and/or coatings and other types of fittings than those given in 9.2 and 9.3, are supplied with reference to this standard, they shall comply with all the other requirements of this standard.

NOTE 1 Other types of fittings include tees and tapers with other combinations DN × dn, draining tees, etc.

The standardized nominal sizes, DN of pipes and fittings are as follows: 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1 000, 1 100, 1 200, 1 400, 1 500, 1 600, 1 800, 2 000.

NOTE 2 These DN values are DN/ID in the meaning of prEN 476.

The functional properties of ductile iron pipes and fittings shall be as given in clause 5.

NOTE 3 When installed and operated under the conditions for which they are designed (see annexes A to C) ductile iron pipes, fittings, accessories and their joints maintain all their functional characteristics over their operating life, due to the constant material properties, to the stability of their cross section and to their design with high safety factors.

4.1.2 Surface condition and repairs

Pipes, fittings and accessories shall be free from defects and surface imperfections which could lead to non-compliance with clauses 4 and 5.

When necessary, pipes and fittings may be repaired, for example by welding, in order to remove surface imperfections and localized defects which do not affect the entire wall thickness, provided that:

- the repairs are carried out according to a written procedure included in the manufacturer's quality assurance system;
- the repaired pipes and fittings shall comply with all the requirements of clauses 4 and 5.