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Ductile iron pipes, fittings, accessories and their joints for sewerage applications - Guidelines for Pipelines Installation

Rohre, Formstücke, Zubehörteile aus duktilem Gusseisen und ihre Verbindungen für Wasserleitungen - Richtlinien für die Installation von Rohrleitungen

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Ductile iron pipes, fittings, accessories and their joints for sewerage applications - Guidelines for Pipelines Installation

Rohre, Formstücke, Zubehörteile aus duktilem Gusseisen und ihre Verbindungen für Wasserleitungen - Richtlinien für die Installation von Rohrleitungen

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European foreword

This document (FprCEN/TR 17996:2023) 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 document is currently submitted to the Vote on TR.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s)/Regulation(s).

1 Scope

This document is a complementary document for the installation of ductile iron pipes, fittings, accessories and their joints, covered by EN 598:2009 harmonized standard. It is intended to describe, in a wider perspective, installation technologies, tools and pipelines particular examples, applicable for the construction, outside buildings, of:

— drainage pipeline systems;

— raw water pipeline systems;

— sewage pipeline systems;

— water reuse pipeline systems;

— pipeline systems conveying surface water (e.g. rainwater), domestic wastewater and/or certain types of industrial effluents, either in separate systems or in combined systems;

— operating without pressure (gravity sewers) or with positive or negative pressure;

— below or above ground installation types.

It also gives some site operation/site instructions for the application of fittings, intended to be used for the connection of ductile iron drains and sewers to other materials as plastic, concrete, vitrified clay, etc.

This document is not intended to cover:

— hydraulic design of drains and sewers systems outside buildings. For this purpose, EN 16933-2 applies;

— construction and site testing of drains and sewers. For this purpose, EN 1610 applies;

— trenchless construction and testing of drains and sewers. For this purpose, EN 12889 applies.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 545:2010, *Ductile iron pipes, fittings, accessories and their joints for water pipelines - Requirements and test methods*

EN 598:2009, *Ductile iron pipes, fittings, accessories and their joints for sewerage applications – Requirements and test methods*

EN 752:2017, *Drain and sewer systems outside buildings - Sewer system management*

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

EN 1610:2015, *Construction and testing of drains and sewers*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 598:2009, EN 476:2011, EN 1333:2006, EN 773:1999 and EN 1610:2015 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at https://www.electropedia.org/

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

— inspection chambers (see 3.5);

— manholes (see 3.6);

— glands and bolts for mechanical flexible joints (sec 3.16);

— glands, bolts and locking rings for restrained flexible joints (see 3.17);

— adjustable flanges and flanges to be welded or screwed;

— pipe saddles for service pipe connections;

— flange adaptors for use with ductile iron pipes and fittings;

— couplings for use with ductile iron pipes and fittings;

— valves for use with ductile iron pipes and fittings

3.5
inspection chamber
structure with a removable cover, constructed on a drain or sewer that permits the introduction of cleaning and inspection equipment from surface level, but does not provide access for personnel

[SOURCE EN 16323:2014]

3.6
manhole
structure with a removable cover, constructed on a drain or sewer to permit entry by personnel

[SOURCE EN 16323:2014]

3.7
access chamber
component of a sewer, with one or two side inlets set at a variety of angles, ideal for making single connections

3.8
flange
flat circular end of a pipe or fitting extending perpendicular to its axis, with bolt holes equally spaced on a circle

Note 1 to entry: A flange is either 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.

3.9
spigot
male end of a pipe or fitting

3.10
spigot end length
spigot over a length equal to maximum insertion depth plus 50 mm

3.11
socket
female end of a pipe or fitting to make the connection with the spigot of the next component

3.12
gasket
sealing component of a joint

3.13
joint
connection between the ends of two pipes and/or fittings in which a gasket is used to effect a seal

3.14
flexible joint
joint which permits significant angular deflection both during and after installation and which can accept a slight offset of the centreline

3.15
push-in flexible joint
flexible joint assembled by pushing the spigot through the gasket in the socket of the mating component

3.16
mechanical flexible joint
flexible joint in which sealing is obtained by applying pressure to the gasket by mechanical means, e.g. a gland

3.17
restrained flexible joint
flexible joint in which a means is provided to prevent separation of the assembled joint

3.18
flanged joint
joint between two flanged ends

3.19
nominal size (DN)
alphanumerical designation of size for components of a pipework system, which is used for reference purposes

Note 1 to entry: 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

[SOURCE EN ISO 6708:1995]

3.20
nominal pressure (PN)
alphanumerical designation used for reference purposes related to a combination of mechanical and dimensional characteristics of a component of a pipework system

Note 1 to entry: It comprises the letters PN followed by a dimensionless number

Note 1 to entry: All equipment of the same nominal size DN designated by the same PN number have compatible mating dimensions.

[SOURCE EN 1333:2006]

3.21
leak tightness test pressure
pressure applied to a component during manufacture in order to ensure its leak tightness

3.22
allowable operating pressure (PFA)
maximum hydrostatic pressure that a component can withstand continuously in service

[SOURCE EN 773:1999]

3.23
allowable maximum operating pressure (PMA)
maximum hydrostatic pressure, including surge, that a component can withstand from time to time in service

[SOURCE EN 773:1999]

3.24
allowable test pressure (PEA)
maximum hydrostatic pressure that a newly installed component can withstand for a relatively short duration, when either fixed above ground level or laid and backfilled underground, in order to ensure the integrity and tightness of the pipeline

Note 1 to entry: 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.

[SOURCE EN 773:1999]

3.25
working pressure
WP
P_W
highest pressure that occurs at a time and a point in the pipeline when operating continuously under stable conditions, without surge

[SOURCE ISO 10802:2020]

3.26
maximum working pressure
MWP
P_{MW}
maximum pressure to which a pipeline is subjected under surge conditions

[SOURCE ISO 10802:2020]

3.27
maximum design pressure
MDP
P_{MD}
maximum operating pressure of the system or of the pressure zone fixed by the designer considering future developments and including surge to which a pipeline is subjected under surge conditions

Note 1 to entry: It is the maximum pressure considering the design pressure and surge together, where:

— MDP is designated MDPa, P_{MDa}, fixed allowance for surge (secondary distribution networks);

— MDP is designated MDPc, P_{MDc}, surge is calculated (pumping and water mains).

[SOURCE ISO 10802:2020]

3.28
system test pressure
STP
P_{ST}
pressure to which a pipeline or a pipeline section is subjected for testing purposes

[SOURCE ISO 10802:2020]

3.29
diametral stiffness of a pipe
characteristic of a pipe which allows it to resist ovalization under loading when installed

3.30
discharge system
system of pipes, fittings, accessories and joints used to collect and drain wastewater and rainwater of a building

Note 1 to entry: It comprises discharge pipes, stack ventilation pipes and rainwater downpipes, installed within the limits of a building or attached to the building.

3.31
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

3.32
sewer
pipeline designed to collect wastewater and rainwater from buildings and surface water and to convey them to the point of disposal or treatment

3.33
gravity sewer
sewer operating normally under free flowing conditions

3.34
pressure sewer; pumping sewer
sewer (or section of a sewer) operating under positive pressure

3.35
vacuum sewer
sewer operating under negative pressure

3.36
combined system
sewerage system collecting together rainwater, surface water and wastewater

3.37
separate system
sewerage system which collects wastewater separately from rainwater and surface water

3.38
length
effective length of a pipe or fitting

Note 1 to entry: Lengths are :

- as shown on Figure 6 and given in table 2 of the EN 598:2009, for socket and spigot pipes;

- as given by EN 545:2010, clause 4.3.3.2, for flanged pipes;

- as given by EN 545:2010, clauses 8.3, 8.4, and 4.3.3.3, for pressure fittings

Note 2 to entry: the length of fittings used for gravity sewers are available by the manufacturer.

3.39
deviation
design length allowance with respect to the standardized length of a pipe

3.40
ovality
out of roundness of a pipe section

Note 1 to entry: 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

3.41
bentonite
clay mineral, primarily montmorillonite, with high swelling properties, which forms the primary component in drilling muds used in horizontal directional drilling technology

[SOURCE ISO 13470:2012

3.42
bore
cavity that is created to receive a pipe or conduit

[SOURCE ISO 13470:2012]

3.43
casing
continuous structural shell that acts as an envelope and support for the service pipeline during construction and service

[SOURCE ISO 13470:2012]

3.44
casing method
method in which a casing is put into place and then a pipe is inserted into the casing

[SOURCE ISO 13470:2012]

3.45
horizontal directional drilling
steerable method for the underground installation of pipes using a surface launched drilling rig

[SOURCE ISO 13470:2012]

3.46
pilot bore
initial hole drilled along the drill path

3.47
pipe bursting method
method for replacement of an existing pipe by longitudinal splitting

[SOURCE ISO 13470:2012]

3.48
pipe jacking method
system of directly installing pipes behind a cutting head and/or shield, by hydraulic thrust

[SOURCE ISO 13470:2012]

3.49
microtunnelling
trenchless steerable remote-control method for drain and sewage pipelines installation, using microtunnel boring machines

3.50
pulling head
reusable component mounted at the beginning of the pipe string, which transmits the pulling force from the drilling rod to the pipes

[SOURCE ISO 13470:2012]

3.51
service pipeline
ductile iron pipeline intended to carry water or wastewater, operated with or without pressure

[SOURCE ISO 13470:2012]

3.52
overcut
the annular space around the pipe deliberately created by using a cutting head or shield of greater dimension than the outside dimension of the pipe

[SOURCE EN 12889:2000]

3.53
water reuse
wastewater that has been treated to meet specific water quality for intended beneficial use

[SOURCE ISO 20678:2018]

4 Assembling methods for pipes and fittings

4.1 General

The assembling can be done by several different methods as given below:

4.2 Crowbar method

For small diameter pipes, usually up to DN 125, the assembling of pipes can be achieved by pushing the pipe with a crowbar against a timber held against the face of the socket of the entering pipe. The crowbar takes support on the ground. In case of the assembly of fittings, the crowbar pushes the fitting in the direction of the spigot, keeping the socket of the fitting centred and perpendicular with the spigot end (see Figures 1 and 2).