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Ductile iron pipes and fittings for pressure and non-pressure pipelines — Cement mortar lining

*Tuyaux et raccords en fonte ductile pour canalisations avec et sans
pression — Revêtement interne de mortier de ciment*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 5, *Ferrous metal pipes and metallic fittings*, Subcommittee SC 2, *Cast iron pipes, fittings and their joints*.

This fourth edition cancels and replaces the third edition (ISO 4179:2005), which has been technically revised.

The main changes are as follows:

- definitions of additives and admixtures have been added;
- the following tests and performance requirements have been introduced:
 - a) check for organic impurities;
 - b) check for silt and clay;
 - c) compressive strength of cement mortar lining;
 - d) ring bending test for mortar disbanding;
- the requirement of internal diameter of pipe has been added;
- the list of performance test and routine tests has been added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Ductile iron pipes and fittings for pressure and non-pressure pipelines — Cement mortar lining

1 Scope

This document specifies the nature, the method of application, the surface condition, performance requirements and the minimum thickness of internal linings of cement mortar for ductile iron pipes and fittings for pressure and non-pressure pipelines as defined in ISO 2531, ISO 7186 and ISO 16631.

It covers cement mortar linings which are used to improve the hydraulic properties of pipes and fittings compared to un-lined pipes and fittings and/or to prevent corrosion damage and includes special requirements for linings of gravity sewers operating partially filled.

It also covers linings used for the conveyance of particularly aggressive fluids, where the following solutions can be used either separately or in combination:

- a) an increase in the thickness of the lining;
- b) a change of the type of cement;
- c) a coating over the lining.

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.

ISO 679, *Cement — Test methods — Determination of strength*

ISO 2531:2009, *Ductile iron pipes, fittings, accessories and their joints for water applications*

ISO 7186:2011, *Ductile iron products for sewerage applications*

ISO 10803:2011, *Design method for ductile iron pipes*

ISO 16132, *Ductile iron pipes and fittings — Seal coats for cement mortar linings*

ISO 16631:2016, *Ductile iron pipes, fittings, accessories and their joints compatible with plastic (PVC or PE) piping systems, for water applications and for plastic pipeline connections, repair and replacement*

ISO 21051:2020, *Construction and installation of ductile iron pipeline system*

ISO 20290-5, *Aggregates for concrete — Test methods for mechanical and physical properties — Part 5: Determination of particle size distribution by sieving method*

EN 545:2010, *Ductile iron pipes, fittings, accessories and their joints for water pipelines – Requirements and test methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 additives

finely divided mineral material (e.g. ground granulated blast furnace slag, coal fly ash, ground limestone, silica fume, mineral fillers and metakaolin, mineral pigments) or polymeric material used in order to improve certain properties of fresh mortar or hardened lining or that can be added to cement mortar in order to achieve specific properties

3.2 admixtures

organic or inorganic material added during the mixing process of mortar in a quantity not more than 5 % of dry matter by mass of the cement content of the mortar to modify the properties of the mix in the fresh and/or hardened state

Note 1 to entry: Admixtures in cement mortar is used to enhance properties of the mortar in terms of plasticizing, set accelerating, workability etc. meeting the requirements of this document.

4 Materials

4.1 Cement

The cement used for the lining shall comply with the cement standard(s) in application in the country of pipe manufacture or equivalent ISO standard.

Unless otherwise specified, the type of cement shall be selected by the manufacturer in order to be suitable for the nature of the fluid to be transported in accordance with ISO 2531:2009, Annex B, ISO 7186:2011, Annex B and ISO 16631:2016, Annex B.

4.2 Aggregates

The aggregate is a granular mineral constituent suitable for use in cementitious mortar. Aggregate can be natural, artificial or recycled from material previously used in construction. The aggregate shall have a controlled granulometric distribution from fine particles (sand) to coarser elements (gravel).

The aggregate shall meet requirements for materials in contact with drinking water when lining used for drinking water applications.

4.3 Mixing water

The water used for the preparation of the mortar shall be either potable water or water free from substances deleterious either to the mortar or to the water to be transported in the pipeline. The presence of solid mineral particles is, however, admissible provided that the above-mentioned requirements are still fulfilled. Existing national hygienic requirements shall be complied with.

4.4 Mortar

The fresh mortar of the lining shall be composed of cement, aggregates and water complying with [4.1](#), [4.2](#) and [4.3](#) respectively.

The respective proportions of aggregates and water to cement shall be selected and controlled by the manufacturer in order to achieve compliance with this document. The methods of determination of the ratios aggregates/cement and water/cement shall be specified by the manufacturer.

Manufacturers shall submit the hygienic certificate of mortar meeting the requirement of ISO 2531:2009, 4.1.4 for the material in contact with water intended for human consumption, in case the pipes are to be used for water application.