INTERNATIONAL STANDARD

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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

Reference number
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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 4179 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 third edition cancels and replaces the second edition (ISO 4179:1985), which has been technically revised.

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

1 Scope

This International Standard specifies the nature, the method of application, the surface condition 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 and ISO 7186.

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 may 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 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.

ISO 2531:1998, *Ductile iron pipes, fittings, accessories and their joints for water or gas applications*

ISO 7186:1996, *Ductile iron products for sewage applications*

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

3 Materials

3.1 Cement

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

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, with due consideration to ISO 2531:1998, Annex B, and ISO 7186:1996, Annex B.

3.2 Sand

The sand used shall have a controlled granulometric distribution from fine to coarser elements; it shall be clean and shall be composed of inert, hard, strong and stable granular particles. The granulometric curve for the sand shall be appropriate to the lining method, the lining thickness and the surface conditions required in Clause 6.

Sampling shall be carried out in accordance with national standards for the testing of construction materials.

The cleanliness of the sand shall be evaluated in terms of organic impurities and clay-bearing substances according to the methods described below.

The test for organic impurities shall be carried out by a colorimetric method in accordance with the standards in force in the producing country; the sand shall not produce any coloration darker than that of the reference solution.

The determination of the content of clay-bearing substances in the sand (having dimensions less than 63 μm to 90 μm depending on the country) shall be carried out in accordance with the standards in force in the producing country; it shall not exceed 2 % by mass.

3.3 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 these requirements are still fulfilled. Existing national hygienic requirements have to be complied with.

3.4 Mortar

The fresh mortar of the lining shall be composed of cement, sand and water complying with 3.1, 3.2 and 3.3 respectively.

Additives may be used, provided that

— they do not prejudice the quality of the lining and that of the transported water,

— the lining remains in accordance with all the requirements of this International Standard, and

— they comply with the hygienic requirements of the country where the pipes and fittings are to be installed.

The mortar shall contain at least one part of cement to 3,5 parts of sand by mass (i.e. S/C $\leqslant$ 3,5 by mass in the mortar).

The respective proportions of sand and water to cement (S/C and W/C) shall be selected and controlled by the manufacturer in order to achieve compliance with this standard. The methods of determination of the ratios S/C and W/C shall be specified by the manufacturer.

4 Application of lining

4.1 Condition of interior surface of pipe before application of lining

All foreign bodies, loose scale or any other material which could be detrimental to good adhesion between the metal and the lining shall be removed from the surface to which the lining shall be applied.

The inner surface of the pipe and fitting shall also be free of any metal projections likely to protrude beyond 50 % of the thickness of the lining.

4.2 Method of application

The mortar shall be thoroughly mixed in order to achieve the appropriate consistency and homogeneity.

For pipes, the mortar is centrifugally cast inside the pipes or projected onto the wall by means of a rotating projection head or using a combination of both methods depending on the manufacturer's decision. For fittings, the mortar is projected onto the wall by means of a rotating projection head, or may be placed by hand using appropriate trowels.