INTERNATIONAL STANDARD

ISO 8179-1

Second edition
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Ductile iron pipes — External zinc-based coating —

Part 1: Metallic zinc with finishing layer

Tuyaux en fonte ductile — Revêtement extérieur à base de zinc —

Partie 1: Zinc métallique avec couche de finition

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 8179-1 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 second edition cancels and replaces the first edition (ISO 8179-1:1995), which has been technically revised.

ISO 8179 consists of the following parts, under the general title *Ductile iron pipes — External zinc-based coating*:

— *Part 1: Metallic zinc with finishing layer*

— *Part 2: Zinc rich paint with finishing layer*

Ductile iron pipes — External zinc-based coating —

Part 1: Metallic zinc with finishing layer

1 Scope

This part of ISO 8179 deals with an external protective coating system which is factory applied to centrifugally cast ductile iron pipes as specified in ISO 2531 and ISO 7186. This coating system comprises a metallic zinc layer followed by a finishing layer.

NOTE ISO 8179-2 deals with zinc rich paint with finishing layer.

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 2808:1997, *Paints and varnishes — Determination of film thickness*

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

3 Materials

The coating materials shall be metallic zinc with a zinc content of at least 99,99 % by mass, and bituminous paint or synthetic resin compatible with zinc.

4 Zinc coating

4.1 Pipe surface condition

The pipe surface shall be dry and free from rust or any non-adhering particles or foreign matter such as oil or grease.

The zinc shall be applied to the as-cast annealed external surface of the pipe, or to a blast-cleaned or ground surface, at the manufacturer's discretion.

4.2 Method of application

The metallic zinc coating shall be applied by a spraying process in which metallic zinc is heated to a molten state and projected in small droplets by spray guns on to the pipe surface.

The design and construction of the spray equipment is not within the scope of this part of ISO 8179.

4.3 Coating characteristics

The metallic zinc coating shall cover the outside cylindrical surface of the pipe and shall be free from defects such as bare patches or lack of adhesion.

A spiralled appearance is permissible provided that the zinc coating masses comply with the requirements of 4.4.

The manufacturer shall define those coating irregularities which are considered not detrimental to the performance of the coating system.

Damaged areas of zinc coating caused by handling are acceptable, provided that the area of damage is less than 5 cm^2 per square metre and that the minor dimension of the damaged area does not exceed 5 mm.

Greater areas of damage shall be repaired in accordance with 4.5.

4.4 Zinc coating mass

The mean mass of zinc coating measured in accordance with 6.1 shall be not less than 130 g/m^2 with a local minimum of 110 g/m^2.

The manufacturer shall visually inspect each pipe for quality and uniformity of coating and shall carry out regular measurements of zinc coating masses in accordance with the method described in 6.1.

4.5 Repairs to the zinc coating

Areas left uncoated, e.g. under the test token, and coating damage in excess of that permitted in 4.3 shall be repaired by one of the following methods:

a) metallic zinc spray complying with 4.2;

b) application of zinc-rich paint containing more than 85 % zinc, by mass, in the dried film; the mean mass of the applied paint shall be not less than 150 g/m^2.

5 Finishing layer

After zinc coating, the pipe shall be given a finishing layer of bituminous paint or synthetic resin compatible with the zinc coating.

Application of this finishing layer may be done by any proven process such as spraying or brush coating at the manufacturer's discretion. It shall uniformly cover the zinc coating and be free from bare patches or lack of adhesion.

The mean dry film thickness of the finishing layer measured in accordance with 6.2 shall be not less than 70 μm with a local thickness not less than 50 μm.

In order to avoid blistering, the mean dry film thickness of the finishing layer shall not exceed 250 μm.

6 Test methods

6.1 Zinc coating mass

A rectangular token is attached along the pipe axis before passing it through the zinc coating equipment. After coating and trimming, the minimum token sizes shall be either

a) 250 mm × 100 mm or

b) 500 mm × 50 mm.

The token shall be a film of consistent thickness and density, morphologically stable at the temperature of the substrate during zinc application and used as a surrogate surface for the measurement of coating thicknesses.

The mean mass of zinc coating, m, expressed in grams per square metre, is calculated from the mass difference of the token before and after zinc coating using the following formula:

$$m = \frac{C(m_2 - m_1)}{A}$$

where

C is a correction factor depending on the material of the token, taking into account the difference in surface roughness between the token and the pipe surface;

m_1 and m_2 are masses, in grams, before and after zinc coating, measured to an accuracy of 0,1 g;

A is the area of the token, in square metres.

The value of C shall be determined by the manufacturer and specified when required in test documents.

NOTE For information, C lies between 1,0 and 1,2 for sand-blasted steel sheet or polyester sheet.

The uniformity of the zinc coating is checked by visual inspection of the token. In the event of lack of uniformity, pieces 50 mm × 50 mm shall be cut from the token in those zones which appear to have the lower coating mass and the local minimum mass of zinc shall be determined according to the above method.

6.2 Thickness of finishing layer

The dry film thickness of the finishing layer shall be measured indirectly after coating on a sample token which is attached to the pipe before coating.

A rectangular token is attached along the pipe axis before coating. After coating and trimming, the minimum token sizes shall be either

a) 250 mm × 100 mm or

b) 500 mm × 50 mm.

The token shall be a film of consistent thickness and density, morphologically stable at the temperature of the substrate during the coating application and used as a surrogate surface for the measurement of coating thicknesses.

The dry film thickness is measured either by means of a micrometer or by a weighing method similar to 6.1.

The mean dry film thickness is either

— the average of ten or more micrometer readings evenly distributed over the surface of the token (after substraction of the mean thickness of the bare token from each reading) or

— the thickness calculated from the mean mass of finishing layer (measured on the token) and the density of the dry film.

The uniformity of the coating is checked by visual inspection of the token. In the event of lack of uniformity, pieces 50 mm × 50 mm shall be cut from the token in those zones which appear to have the lower coating mass and the local minimum thickness shall be determined according to the above method. The local minimum thickness is either:

— the average of four micrometer readings evenly distributed on the surface of a 50 mm × 50 mm piece or

— the thickness calculated from the mass of finishing layer (measured on a 50 mm × 50 mm piece).

As an alternative to the above reference method, the dry film thickness may also be measured directly on the pipes by means of suitable gauges, e.g. magnetic, or by using a “wet film” thickness gauge where a correlation between wet film thickness and dry film thickness can be demonstrated, or by any appropriate method as defined in ISO 2808.

NOTE The method of measurement is at the manufacturer's discretion.