INTERNATIONAL STANDARD

**ISO 8179-2**



Second edition
2017-07

# Ductile iron pipes, fittings, accessories and their joints — External zinc-based coating —

## Part 2: Zinc-rich paint

*Tuyaux, raccords et accessoires en fonte ductile et leurs assemblages — Revêtement extérieur à base de zinc —*

*Partie 2: Peinture riche en zinc*

Reference number
ISO 8179-2:2017(E)



ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

# Contents

Page

# 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 documents 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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: 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 second edition cancels and replaces the first edition (ISO 8179-2:1995), which has been technically revised. The following changes have been made:

— the minimum quantity of Zn has been increased from 130 g/m$^2$ to 200 g/m$^2$;

— the revision recognizes the technological advancements in the field regarding zinc-based coatings to increase the lifetime and reliability of ductile iron pipelines, improving protection to different types of corrosion (including general and localized) and the use of new alloy enrichments.

A list of all parts in the ISO 8179 series can be found on the ISO website.

# Ductile iron pipes, fittings, accessories and their joints — External zinc-based coating —

## Part 2: Zinc-rich paint



## 1 Scope

This document specifies an external protective coating system which is factory-applied to ductile iron pipeline components as specified in ISO 2531, ISO 7186 and ISO 16631. This coating system comprises a zinc-rich paint followed by a finishing layer that can be bituminous paint or synthetic resin compatible with zinc rich paint coating.

NOTE ISO 8179-1 addresses metallic zinc-based coatings.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

No terms and definitions are listed in this document.

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

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

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

## 4 Materials

The coating materials shall be zinc-rich paint with organic or/and inorganic binder and zinc content of at least a mass fraction of 85 % in the dry film followed by a finishing layer that can be bituminous paint or synthetic resin compatible with zinc-rich paint coating.

## 5 Zinc-rich paint coating

### 5.1 Pipeline component surface condition

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

The zinc-rich paint coating shall be applied to the as-cast annealed external surface of the pipeline component or to a blast-cleaned or ground surface at the manufacturer's discretion.

### 5.2 Method of application

The zinc-rich paint coating shall be applied by a spraying or brushing process onto the pipeline component surface.

The design and construction of the spray equipment are not within the scope of this document.

### 5.3 Coating characteristics

The zinc-rich paint coating shall cover the outside cylindrical surface of the pipeline component and shall be free from such defects as bare patches or lack of adhesion.

A spiralled appearance is permissible provided that the zinc-rich paint coating masses comply with the requirements of 5.4.

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

Damaged areas of zinc-rich paint 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 5.5.

### 5.4 Zinc-rich paint coating mass

The mean mass of zinc-rich paint coating measured in accordance with 7.1 shall be as follows:

— not less than 235 $g/m^2$ with a local minimum of 210 $g/m^2$;

— in low corrosive areas, by agreement between the purchaser and the supplier, 150 $g/m^2$ with a local minimum of 130 $g/m^2$.

NOTE The masses of zinc-rich paint coating are equivalent to 200 $g/m^2$ with a local minimum of 180 $g/m^2$ of metallic zinc coating (first case) and 130 $g/m^2$ with a local minimum of 110 $g/m^2$ of that (second case).

Where there are very corrosive soils the manufacturer and the purchaser may decide to use an additional coating mass of zinc-rich paint. For the selection of coatings in relation to the characteristics of soils Annex B can be consulted.

The manufacturer shall visually inspect each pipeline component for quality and uniformity of coating and shall carry out regular measurements of zinc-rich paint coating masses in accordance with the method described in 7.1.

The factory quality control tests ensure conformity to the standard. Where informative field verification is required, one of the methods described in Annex A shall be agreed upon between the manufacturer and the purchaser.

### 5.5 Repairs to the zinc-rich paint coating

The manufacturer is permitted to carry out repairs by zinc-rich paint containing more than 85 % zinc in the dry film provided that the requirements of Clause 4, 5.3 and 5.4 are met.

## 6 Finishing layer

After the zinc-rich paint coating has been applied, the pipeline component shall be given a finishing layer of bituminous paint or synthetic resin compatible with the zinc-rich paint 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-rich paint coating and be free from bare patches or lack of adhesion.

The mean dry film thickness of the finishing layer measured in accordance with 7.2 shall be not less than 70 µm with a local minimum thickness of 50 µm.

The method of coating thickness is at the manufacturer's discretion.

# 7 Test methods

## 7.1 Determination of zinc-rich paint coating mass

A rectangular token is attached along the pipeline component axis before passing it through the zinc-rich paint 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-based application, and used as a surrogate surface for the measurement of coating thicknesses.

The mean mass of zinc-rich paint coating, $m$, expressed in grams per square metre ($g/m^2$), is calculated from the mass difference of the token before and after zinc-rich paint coating using Formula (1):

$$m = \frac{C\left(m_2 - m_1\right)}{A} \tag{1}$$

where

$m_1$ is the mass before zinc coating, measured to an accuracy of 0,1 g, in grams;

$m_2$ is the mass after zinc coating, measured to an accuracy of 0,1 g, in grams;

$A$ is the area of the token, in square metres;

$C$ is a correction factor depending on the material of the token, taking into account the difference in surface roughness between the token and the pipeline component surface.

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 value for $m_2$ should be measured after the sample has been dried.

The uniformity of the zinc-rich paint coating is checked by visual inspection of the token. In the event of lack of uniformity, pieces sized 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 determined according to the above method.

## 7.2 Determination of the dry film thickness of the finishing layer

The dry film thickness of the finishing layer shall be measured

a) directly on the pipeline component 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

b) indirectly on a sample token, which is attached to the pipeline component before coating and is used after coating to measure the dry film thickness by appropriate means, e.g. micrometer, magnetic thickness gauge or by a weight method similar to 7.1.

The method of coating thickness is at the manufacturer's discretion.

# Annex A
(informative)

# Field verification of the zinc-rich paint coating mass on a finished product

## A.1 General

Accurate measurement of zinc-rich coating mass can only be carried out during production due to the absence of finishing layer.

If the purchaser requests at the time of order to carry out a test on a finished product, the method in A.2 can be used by agreement (in the presence and under recommendation of the manufacturer), with factory patterns used as a reference and including measurement accuracy and correlations.

Care should be taken when removing the finishing layer, otherwise, results may be affected (due to the risk of epoxy inclusion or burn off of zinc during test preparation). The ways to remove the finishing coatings (i.e. solvents) should be agreed upon.

## A.2 Method

**A.2.1** Cut off test samples from the subject pipes.

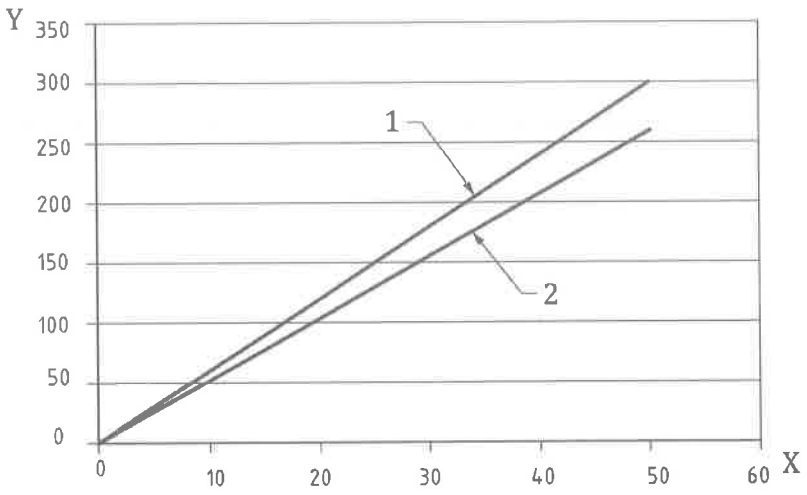
The size of each test sample shall not be less than 150 mm length × 70 mm width.

**A.2.2** Measure the zinc-rich paint coating thickness of the test sample at 10 points by microscope.

Each measuring point shall be placed at a distance of more than 5 mm.

**A.2.3** Calculate the zinc-rich paint coating mass from the average coating thickness of 10 points.

The correlation between zinc-rich paint coating masses and coating thicknesses shall be verified with technical data by each manufacturer. An example is shown in Figure A.1.




**Key**

1 zinc-rich paint

2 metallic zinc

X coating thickness (µm)

Y zinc-rich paint coating mass ($g/m^2$)

**Figure A.1 — Example of correlation between zinc-rich paint coating mass and coating thickness, defined by the manufacturer**

# Annex B
(informative)

# Field of use in relation to the characteristics of soils: Standard coating

NOTE A standard coating comprises zinc-rich paint coating 235 g/m$^2$ with finishing layer.

Ductile iron pipes may be buried in contact with a large number of soils, which can be identified by soil studies on site, except for the following:

— soils with a low resistivity, less than 1 500 ohm·cm when laid above the water table or less than 2 500 ohm·cm when laid below the water table;

— mixed soils, i.e. comprising two or more soil natures;

— soils with a pH below 6 and a high reserve of acidity;

— soils containing refuse, cinders, slags or polluted by wastes or industrial effluents.

In such soils, and also in the occurrence of stray currents, it is recommended that an additional protection is used (such as polyethylene sleeving) or other types of external coatings as appropriate.

A thicker finishing layer (e.g. 100 µm local minimum of polyurethane or epoxy) may extend the field of use to a resistivity of 1 000 ohm·cm when laid above the water table and to 1 500 ohm·cm when laid below the water table.

# Bibliography

[1] ISO 2531, *Ductile iron pipes, fittings, accessories and their joints for water applications*

[2] ISO 7186, *Ductile iron products for sewerage applications*

[3] ISO 8179-1, *Ductile iron pipes, fittings, accessories and valves — External zinc-based coatings — Part 1: Metallic zinc-based coatings with finishing layer*

[4] ISO 16631, *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*

**ICS 23.040.10**

Price based on 7 pages