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IS 4736 (1986): Hot-dip Zinc Coatings on Mild Steel Tubes  
[MTD 7: Light Metals and their Alloys]



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IS : 4736 - 1986  
( Reaffirmed 1998 )

*Indian Standard*  
SPECIFICATION FOR  
HOT-DIP ZINC COATINGS ON  
MILD STEEL TUBES  
( *First Revision* )

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**BUREAU OF INDIAN STANDARDS**  
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**AMENDMENT NO. 1 MAY 1989**  
**TO**  
**IS : 4736 - 1986 SPECIFICATION FOR HOT-DIP**  
**ZINC COATINGS ON MILD STEEL TUBES**

*( First Revision )*

*( Page 4, Note under clause 5.1 )* — Substitute the following for the existing note:

**'NOTE — Mass of zinc coating shall not be less than 400 g/m<sup>2</sup> as determined from the average result of two specimens taken from opposite ends of tube selected for testing. The lower of the two values shall not be less than 360 g/m<sup>2</sup>.'**

**( SMDC 28 )**

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**Reprography Unit, BIS, New Delhi, India**

**AMENDMENT NO. 2 JANUARY 2001  
TO  
IS 4736 : 1986 SPECIFICATION FOR HOT-DIP ZINC  
COATINGS ON MILD STEEL TUBES**

*( First Revision )*

*( Page 4, clause 3.1 )* — Substitute the following for the existing:

**'3.1 Quality of Zinc — Zinc used for galvanizing shall conform to any of the grades specified in IS 209 : 1992 Zinc ingot ( *fourth revision* ) or IS 13229 : 1991 Zinc for galvanizing.'**

**( MTD 20 )**

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Reprography Unit, BIS, New Delhi, India

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**AMENDMENT NO. 3 MAY 2002**  
**TO**  
**IS 4736 : 1986 SPECIFICATION FOR HOT-DIP ZINC**  
**COATINGS ON MILD STEEL TUBES**

( *First Revision* )

( *Amendment No 1* ) — Withdrawn

( *Page 4, clause 5.1* ) — Substitute the following for the existing

**'5.1 Mass of Zinc Coating** — For tubes with thickness up to 6 mm, the minimum mass of zinc coating, when determined on a 100 mm long test piece ( *see 6.2* ) in accordance with IS 6745 1972‡ shall be  $360 \text{ g/m}^2$

NOTE — Mass of zinc coating shall not be less than  $360 \text{ g/m}^2$  when tested on two specimens taken from opposite ends of the tube selected for testing

( *Page 5, clause 5.4* ) — Substitute the following for the existing

**'5.4 Uniformity of Galvanized Coating** — The galvanized coating when determined on a 100 mm long test piece ( *see 6.2* ) in accordance with IS 2633 1986\* shall withstand 5 one minute dips '

( MTD 24 )

**AMENDMENT NO. 4 NOVEMBER 2007  
TO  
IS 4736 : 1986 SPECIFICATION FOR HOT-DIP ZINC  
COATINGS ON MILD STEEL TUBES**

**( *First Revision* )**

*(Page 3, clause 1.1)* — Delete ‘covered in IS 1239 : (Part 1)-1979† and IS : 1161-1979‡’.

*[Page 4, clause 5.1, first line (see also Amendment No. 3)]* — Substitute ‘tubes of any thickness’ *for* ‘tubes with thickness up to 6 mm’.

(MTD 24)

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Reprography Unit, BIS, New Delhi, India



# *Indian Standard*

## SPECIFICATION FOR HOT-DIP ZINC COATINGS ON MILD STEEL TUBES ( *First Revision* )

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SMDC 28

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# *Indian Standard*

## SPECIFICATION FOR HOT-DIP ZINC COATINGS ON MILD STEEL TUBES ( *First Revision* )

### 0. FOREWORD

**0.1** This Indian Standard ( First Revision ) was adopted by the Indian Standards Institution on 28 August 1986, after the draft finalized by the Hot Dip Sprayed and Diffusion Coatings Sectional Committee had been approved by the Structural and Metals Division Council.

**0.2** The hot-dip galvanizing process is very widely used for obtaining protection against corrosion of a large variety of ferrous products. This standard has been formulated with a view to achieving efficient and economic protection of steel tube by a hot-dip galvanized coating of adequate and uniform thickness.

**0.3** This standard was first published in 1968. In this revision, the requirement of the quality of zinc for the purpose of galvanizing has been modified and also the purity of zinc in the galvanizing bath has been specified to ensure the better quality of zinc coatings. Reference has also been made for the guidance of manufacturer and purchaser for rejection/acceptance of the galvanizing defects, in 5.2.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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### 1. SCOPE

**1.1** This standard covers the requirements for zinc coating applied by hot-dip galvanizing on mild steel tubes covered in IS : 1239 ( Part 1 )-1979† and IS : 1161-1979‡.

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\*Rules for rounding off numerical values ( *revised* ).

†Mild steel tubes, tubulars and other wrought steel fittings: Part 1 Mild steel tubes ( *fourth revision* ).

‡Steel tubes for structural purposes ( *third revision* ).

## 2. SUPPLY OF MATERIAL

2.1 General requirements relating to the supply of material shall conform to IS : 1387-1967\*.

## 3. GENERAL REQUIREMENTS

3.1 **Quality of Zinc** — Zinc containing at least 98.5 percent by mass should be used for the purpose of galvanizing, or the molten metal in galvanizing bath shall contain not less than 98.5 percent by mass of zinc.

3.2 **Galvanizing** — The steel tubes may, as far as practicable, be galvanized in accordance with IS : 2629-1985†.

## 4. MANUFACTURE

4.1 **Basis Metal for Tubes** — Unless specified at the time of ordering, tubes shall be manufactured from mild steel and shall satisfy the conditions laid down in the relevant standards for tubes. Some alloy steels and carbon steels other than mild steel may present special difficulties in galvanizing. In such cases, the standard shall be applicable only after agreement between the galvanizer and the purchaser.

## 5. COATING REQUIREMENTS

5.1 **Mass of Zinc Coating** — For tubes with thickness up to 6 mm, the minimum mass of zinc coating, when determined on a 100 mm long test piece ( see 6.2 ) in accordance with IS : 6745-1972‡, shall be 400 g/m<sup>2</sup>.

NOTE — The mass of zinc coating shall be not less than 400 g/m<sup>2</sup> as determined from the average result of two specimens taken from opposite ends of tube selected for testing.

5.1.1 The mass of coating expressed in grams per square metre shall be calculated by dividing the total mass of zinc ( inside plus outside ) by the total area ( inside plus outside ) of the coated surface.

5.2 **Freedom from Defects** — The zinc coating shall be reasonably smooth and free from such imperfections as flux, ash and dross inclusions, bare patches, black spots, pimples, lumpiness, runs, rust stains, bulky white deposits and blisters. Guidance for rejection/acceptance of these defects have been prescribed in Appendix A of IS : 2629-1985†.

5.2.1 Small black spots may be repaired as prescribed in Appendix A of IS : 2629-1985†.

5.2.2 Unless a passivation treatment is specified, some white rust may be found on the tubes. Guidance for rejection/acceptance has been prescribed in Appendix A of IS : 2629-1985†.

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\*General requirements for the supply of metallurgical materials ( *first revision* ).

†Recommended practice for hot-dip galvanizing of iron and steel ( *first revision* ).

‡Methods for determination of mass of zinc coating on zinc coated iron and steel articles.

**5.3 Free Bore Test** — If required by the purchaser, a rod 230 mm long and of appropriate diameter as given below shall be passed through relevant nominal bores of the sample tubes to ensure a free bore:

<i>Nominal Bore of Tube After Galvanizing</i>	<i>Diameter of Rod to be Used</i>
mm	mm
8	4
10	6
15	11
20	16
25	21

**5.4 Uniformity of Galvanized Coating** — The galvanized coating when determined on a 100 mm long test piece ( *see* 6.2 ) in accordance with IS : 2633-1986\*, shall withstand 4 one-minute dips.

**5.5 Adhesion Test** — Galvanized tubes up to and including 50 mm nominal bore, when bent cold through 90° round grooved former having radius at the bottom of the groove equal to 8 times its outside diameter, shall not develop any crack in the coating.

**5.5.1** The adherence of zinc coating on tubes above 50 mm nominal bore, shall be determined by the pivoted hammer test given in IS : 2629-1985†.

## 6. SAMPLING AND PREPARATION OF TEST SPECIMEN

**6.1** The sampling shall be as given below:

<i>Nominal Bore</i>	<i>Sample Size</i>
Up to 25 mm	1 tube/1 000 tubes or part thereof
Above 25 mm	1 tube/500 tubes or part thereof

**6.2** Test specimens shall be cut approximately 100 mm in length from opposite ends of the lengths of tube selected for testing. Before cutting the test specimen, 50 mm from both ends of the sample shall be discarded.

## 7. RETEST

**7.1** Should any of the test pieces fail to pass the requirements of this standard ( *see* 5 ), two further samples, from the same batch, shall be selected for testing. Should the test pieces from both these additional samples pass, the batch represented by the test samples shall be deemed to comply with the standard. Should the test pieces from either of these additional samples fail, the batch represented by the test samples shall be deemed not to comply with this standard.

\*Method for testing uniformity of coating on zinc coated articles ( *second revision* ).

†Recommended practice for hot-dip galvanizing of iron and steel ( *first revision* ).

**IS : 4736 - 1986**

*( Continued from page 2 )*

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