



JIS G 3547:2015
Zinc-coated low carbon steel wires

Approved by

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Quality Control Manager

Zinc-Coated low carbon steel wires

Introduction

This Standard has been prepared based on the first edition of ISO 7989-1 published in 2006, and the first edition of ISO 7989-2 published in 2007 with some modifications of the technical contents.

The portions given sideliners or dotted underlines are the matters in which the contents of the corresponding International Standards have been modified. A list of modifications with explanations is given in Annex JA.

1 Scope

This Standard specifies zinc-coated low carbon steel wires (hereafter referred to as “steel wires”).

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.
ISO 7989-1 : 2006 steel wire and wire products---Non-ferrous metallic coatings on steel wire - Part 1 : General principles
ISO 7989-2 : 2007 steel wire and wire products---Non-ferrous metallic coatings on steel wire - Part 2 : Zinc or zinc-alloy coating (Overall evaluation : MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standards and JIS are IDT (identical), MOD (modified), and NEQ (not equivalent) according to ISO/IEC Guide 21-1.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS G 0201 Glossary of terms used in iron and steel (Heat treatment)

JIS G 0404 Steel and steel products---General technical delivery Requirements

JIS G 0415 Steel and steel products---Inspection documents

JIS G 3505 Low carbon steel wire rods

JIS H 0401 Test methods for hot dip galvanized coatings

JIS Z 2241 Metallic materials---Tensile testing---Method of test at room temperature

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in JIS G 0201 apply.

4 Classification, Symbol and applicable wire diameters

Steel wires are classified by manufacturing method in clause 6, into zinc-coated low carbon steel wires (S) and zinc-coated low carbon steel wires (H), which are further divided by the zinc coating mass (Table 3) into seven grades of Grade 1 to Grade 7, and four grades of Grade 1 to Grade 4, respectively. Symbols of respective grade and applicable thicknesses are shown in table 1.

Table 1 Classification, symbols and applicable wire diameters

Unit : mm.

Classification		Symbol	Applicable wire diameters
Zinc-coated low carbon steel wire (S)	Grade 2	SWMGS-2	0.70 or over up to and incl. 5.00
Zinc-coated low carbon steel wire (H)	Grade 2	SWMGH-2	0.70 or over up to and incl. 5.00

5 Material

The material used for manufacture of steel wires shall be in accordance with JIS G 3505.

6 Manufacturing method

The manufacturing method of steel wires shall be as follows.

- a) Zinc-coated low carbon steel wires (S) shall be manufactured by drawing and annealing the materials, and then performing hot-dip zinc coating or electrolytic zinc coating. Steel wires of SWMGS-2 with a diameter 0.10 mm. or over to and excl. 0.70 mm. may be manufactured by after coating.
- b) Zinc-coated low carbon steel wires (H) shall be manufactured by drawing the materials, and then performing hot-dip zinc coated or electrolytic zinc coating. Where necessary, intermediate annealing may be performed during the drawing process. If specified by the purchaser, drawing may be performed after coating.

7 Mechanical properties

The mechanical properties of steel wires shall be as follows. However, the following mechanical properties do not apply to steel wires manufactured by drawing after coating.

- a) **Tensile Strength** The steel wires shall be tested in accordance with **11.2** and the results shall satisfy the requirements given in table 2.

Table 2 Mechanical properties (Tensile strength)

Standard wire diameter mm.	Tensile strength ^{a)} N/mm. ²	
	SWMGS-2	SWMGH-2
0.10 or over to and excl. 0.90	_b)	_b)
0.90		
1.00		
1.20		
1.40		
1.60		
1.80	290 to 540	590 to 880
2.00		
2.30		
2.60		
2.90		590 to 880
3.20		
3.50		490 to 780
4.00		390 to 780
4.50		
5.00		
NOTE : 1 N/mm. ² = 1 MPa		
Notes		
a) For steel wires with a diameter other than the listed standard diameters, the values of the tensile strength for the nearest larger standard diameter shall apply.		
a) The mechanical properties requirements do not apply.		

8 Zinc coating characteristics

8.1 Zinc coating mass

The steel wires shall be tested in accordance with 11.4 and the result shall satisfy the requirements given in table 3.

Table 3 Zinc coating massUnit : g/m.²

Standard wire diameter mm.	Zinc coating mass ^{a)}	
	SWMGS-2	SWMGH-2
0.10 or over to and excl. 0.90	-e)	-e)
0.90		
1.00		
1.20		
1.40	20 min.	20 min.
1.60		
1.80		
2.00	25 min.	25 min.
2.30		
2.60		
2.90	30 min.	30 min.
3.20		
3.50	35 min.	35 min.
4.00		
4.50	40 min.	40 min.
5.00	45 min.	45 min.
Notes		
a) For steel wires with a diameter other than the listed standard diameters, the values of the zinc coating mass for the nearest smaller standard diameter shall apply.		
e) Outside the applicable wire diameter range covered by this Standard.		

9 Standard wire diameters and tolerances on wire diameters

9.1 Standard wire diameters

The steel wires shall be designated by the wire diameter expressed in millimetres. The standard wire diameters are shown in table 4.

Table 4 Standard wire diameters

Unit : mm.

0.70	0.80	0.90	1.00	1.20	1.40	1.60	1.80	2.00
2.30	2.60	2.90	3.20	3.50	4.00	4.50	5.00	

9.2 Tolerances on wire diameters

The steel wires shall be measured in accordance with **11.6** and the measured value shall not exceed the tolerance given in table 5.

Table 5 Tolerance wire diameters

Unit : mm.

Wire diameter	Tolerance on wire diameter	
	SWMGS-2	SWMGH-2
Over 0.55 up to and incl. 0.80	±0.03	_a)
Over 0.80 up to and incl. 1.20	±0.04	±0.04
Over 1.20 up to and incl. 2.00	±0.05	±0.05
Over 2.00 up to and incl. 3.20	±0.07	±0.06
Over 3.20 up to and incl. 4.50	±0.08	±0.07
Over 4.50 up to and incl. 5.00	±0.10	±0.08
Notes		
a) Outside the applicable wire diameter range covered by this standard.		

10 Appearance

The steel wires shall be free from corrosion, flaws, cracks, or other detrimental defects on surface. Processing for shipment in coils does not afford the manufacturer the opportunity to observe the whole length for defects or to remove defective portions. For this reason, coiled products can include some irregular portions. Treatment of defects detrimental to service that are found in coils, where necessary, shall be subjected to the agreement between the purchaser and the manufacturer.

11 Tests

11.1 Sampling

For the tensile test, torsion test, zinc coating mass test and winding test, one test piece shall be taken from one end of a coil representing a lot manufactured under the same conditions.

NOTE : A lot manufacturer under the same conditions is a group of zinc-coated low carbon steel wires of the same grade that have been manufactured by a continuous processing of the steel wires of the same grade under the same conditions.

11.2 Tensile test

The tensile test shall be as follows.

- a) The test piece shall be No. 9A or No.9B test piece specified in **JIS Z 2241**.
- b) The method shall be as specified in **JIS Z 2241**.

The gauge length shall be as shown in table 2.

- c) If the test piece fractures near the grip, regard the test invalid, and carry out the test from the start using a new test piece taken from the same coil. If the test piece fractures outside 1/4 of the gauge length from the centre between gauge marks, and the result does not satisfy the specified value, regard the test invalid, and carry out the test from the start using a new test piece taken from the same coil.

11.3 Zinc coating mass test

The zinc coating mass test shall be as follows.

- a) The test piece shall be cut out from a coated product to have a length of 300 mm. to 600 mm.
- b) The test liquid shall be in accordance with **5.2.3** of **JIS H 0401**.
- c) The cleaning of test piece shall be in accordance with **5.2.4** of **JIS H 0401**.
- d) Weigh the cleaned test piece to the nearest 0.01 g. If the test piece is unproportionally long compared to the container, bend it or wind it appropriately so that it can be entirely immersed in the test liquid. When the generation of hydrogen diminishes and coating is removed, take out the test piece, wash with water, wipe with a cotton cloth, and dry thoroughly. Weigh the test piece again to the nearest 0.01 g, and then measure the diameter at the same position in mutually perpendicular direction to the nearest 0.01 mm, and calculate the mean value.
The test liquid may be re-used as long as it is capable of easily removing the coating.
- e) Calculate the zinc coating mass according to the following formula. Round the calculated result to an integer.

$$A = \frac{W_1 - W_2}{W_2} \times d \times 1960$$

Where,	A	:	coating mass (g/m ²)
	W ₁	:	mass of test piece before removal of coating (g)
	W ₂	:	mass of test piece after removal of coating (g)
	d	:	diameter of test piece after removal of coating (mm)
	1960	:	constant [g/(mm m ²)]

11.4 Measurement of wire diameter

Measure the maximum and minimum diameters of the wire at any position on the same cross-section.

12 Inspection

The inspection shall be as follows.

- a) The mechanical properties shall conform to the requirements of clause 7.
- b) The zinc coating characteristics shall conform to the requirements of clause 8.
- c) Tolerance on wire diameter shall conform to the requirements of 9.2.
- d) The appearance shall conform to the requirements of clause 10.

13 Designation of products

The products shall be designated by the grade or its symbol, and wire diameter.

Example 1 Zinc-coated low carbon steel wire (S) Grade 2, 4.00
[For zinc-coated low carbon steel wire (S) of Grade 2 having a diameter of 4.00 mm]

Example 2 SWMGH-2, 5.00
[For zinc-coated low carbon steel wire (H) of Grade 2 having a diameter of 5.00 mm]

14 Marking

Each steel wire that has passed the inspection shall be marked with the following information.

- a) Grade of its symbol
- b) Wire diameter
- c) Net mass
- d) Month and year of manufacture or their abbreviation
- e) Manufacturer's name or its identifying brand

15 Report

If requested by the purchaser, the manufacturer shall submit the inspection document to the purchaser. The report shall be in accordance with clause 13 of **JIS G 0404**. Unless otherwise specified in the order, the type of the inspection document to be submitted shall be the standard designation 3.1 in table 1 of **JIS G 0415**.