



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 17101-2019

**Hot-dip zinc or zinc-aluminium coated steel wires for bridge
cables**

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1 Scope

This Standard specifies terms and definitions, classification and labels, order content, size, mass and allowable deviation, technical requirements, test methods, inspection rules, packaging, marks and quality certificate of hot-dip zinc or zinc-aluminium coated steel wires for bridge cables.

This Standard is applicable to hot-dip galvanized or zinc-5% aluminum alloy steel wire that is for bridge cable (pull) cable, for anchor tension member, for lifting and fixing tension member for buildings and other applications in civil engineering (hereinafter referred to as steel wire).

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.

GB/T 239.1, Metallic materials - Wire - Part 1: Simple torsion test

GB/T 470, Zinc ingots

GB/T 1839, Information technology - Specification and standardization of data elements

GB/T 2103-2008, General requirements for acceptance, packing, marking and quality certification of steel wire

GB/T 2972, Test method for uniformity of zinc coating on zinc-coated steel wire by the copper sulphate dip

GB/T 2976, Metallic materials - Wire - Wrapping test

GB/T 12689.1, Methods for chemical analysis of zinc and zinc alloys - Part 1: Determination of aluminum content - Chrome azurol S polyethylene glycol octyl phenylether - cetylpyridine bromine spectrophotometry, Chrome azurol S spectrophotometric method and EDTA titrimetry Example 1: Hot-dip zinc coated steel wire, of which nominal diameter is 5 mm, coating category is Zn, strength level is 1670 MPa, and relaxation level is Level I, is labeled as:

5.00-Zn-1670-I-GB/T 17101-2019.

Example 2: hot-dip zinc-5%aluminium coated steel wire, of which nominal diameter is 7 mm, coating category is Zn-5%Al, strength level is 1770 MPa, and relaxation level is Level II, is labeled as:

7.00-Zn-5%Al-1770-II-GB/T 17101-2019.

5 Order content Contract of order according to this Standard shall contain the following information:

- a) reference to this Standard;
- b) product name;
- c) coating category;
- d) size;
- e) strength level;
- f) relaxation level;
- g) quantity;
- h) usage;
- i) other requirements by purchaser.

6 Size, mass and allowable deviation

6.1 Dimensions and allowable deviation, nominal cross-sectional area, reference mass per meter of steel wire shall comply with provisions in Table 1.

Table 1 - Size and allowable deviation, nominal cross-sectional area,

reference mass per meter a Nominal diameter of steel wire d_n mm Allowable diameter deviation mm Out of roundness Nominal cross-sectional area S_n mm² Reference mass per meter b g/m $5.00 \pm 0.06 \leq 0.06$ $19.6 \pm 0.153 S_n$ - Nominal cross-sectional area of steel wire, in square millimeters (mm²);

$2\Delta F_a$ - Load value of pulsating stress amplitude, in Newtons (N).

7.3.4 Special requirements If purchaser requires, it shall perform upset head test.

7.4 Coating properties

7.4.1 Coating mass per unit area

7.4.1.1 Hot-dip zinc coated steel wire: coating mass per unit area is not less than 300 g/m².

7.4.1.2 hot-dip zinc-aluminium coated steel wire: coating mass per unit area is not less than 260 g/m².

7.4.1.3 Agreed by supplier and purchaser, steel wire of another coating mass per unit area can be supplied.

7.4.2 Coating adhesion After winding test is performed to steel wire according to requirements of 8.9, there shall be no peeling-off in outer coating of spiral circle or peeling-off caused by finger rubbing (avoid to use fingernails).

7.4.3 Coating uniformity

7.4.3.1 For hot-dip zinc coated steel wire sample, it shall perform copper sulfate solution test not less than 4 times (60s for each time).

7.4.3.2 For hot-dip zinc-aluminium coated steel wire sample, it shall perform copper sulfate solution test not less than 2 times (45s for each time).

7.4.4 Aluminium content of zinc-aluminium coating In hot-dip zinc-aluminium steel wire coating, aluminium content shall be within 4.2%~7.2%. Agreed by supplier and purchaser, steel wire of another aluminium content coating can be supplied.

7.5 Straightening performance

7.5.1 The length direction of steel wire shall not be wavy. There must be no defects such as bending or twisting.

7.5.2 Natural sagittal height of steel wire: Take 1m long steel wire. The maximum natural sagittal height of string and arc shall be no more than 30mm.

14 Coating uniformity

15 Aluminium content of zinc-aluminium steel wire coating Take 1 from 100 coils Any end of coil a When there are less than 10 coils in the same batch, perform sampling according to 10 coils.

9.2.2 For Level-I relaxation steel wire test, take 1 sample per 1000t. For Level-II relaxation steel wire test, take 1 sample per 500t. For tensile fatigue test, take

1 sample per 2000t. When delivery quantity is insufficient, it can take one sample according to the above requirements or provide test report of similar products within 12 months based on agreement between supplier and purchaser.

9.2.3 For purchaser's purchase inspection, perform sampling according to 5% of supplier's sampling quantity per batch for test.

9.3 Re-inspection and determination rules In exit-factory inspection, if one item fails to comply with corresponding provisions of this Standard, this coil shall be rejected. Perform double sampling to re-inspect rejected item. If it still fails, this batch shall be rejected. But it can perform coil-to-coil inspection. Only accepted products are delivered. Supplier can classify and process steel wires that are rejected in re-inspection before they are re-submitted for acceptance.

10 Packaging, marks and quality certificate

10.1 Generally, 5mm-series steel wire for delivery uses shaft-less packaging with a minimum inner diameter of 1500mm; 7mm-series uses shaft-less packaging with a minimum inner diameter of 1700mm. If there are other requirements for packaging size, it shall be agreed by supplier and purchaser.

10.2 Minimum coil weight of steel wire is 400 kg. The proportion of 800kg or more in delivery batch shall be greater than 95%. When there are fixed lengths, multiple feet and other requirements, it can be agreed by supplier and purchaser.

10.3 Other packaging, marks and quality certificate of steel wire shall comply with provisions of GB/T 2103. Where, packaging shall comply with provisions on Category B packaging in GB/T 2103-2008.

Annex B (Normative) Upset head test method and requirements

B.1 Principle Use particular clamping apparatus to extrude the ends of hot-dip zinc coated steel wire or hot-dip zinc-aluminium coated steel wire to a drumstick shape.

B.2 Test steps Upset head test steps are as follows:

- a) Cut a 200mm~300mm long, unprocessed steel wire. End face of steel wire shall be perpendicular to parent metal.
- b) Center steel wire and send it into bottom of pier head mould of upset head machine.
- c) Push piston to perform upset heading to steel wire.
- d) Unload when it reaches rated pressure. Reset. Complete upset heading.
- e) If upset head is too small, second upset heading is allowed.