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GB/T 3195-2016

Replacing GB/T 3195-2008

Aluminum and aluminum alloys drawn round wires

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Issued by: General Administration of Quality Supervision, Inspection and Quarantine;

Standardization Administration Committee.

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Foreword

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard replaces GB/T 3195-2008 *Aluminium and aluminium alloys drawn round wire*. Compared with GB/T 3195-2008, the main technical modifications are as follows:

- added wire for cable weaving, wire for evaporating materials and related requirements;
- added 8017, 8030, 8076, 8130, 8176, 8177, 8C05, 8C12, eight kinds of conductor wires;
- added 2B16, 2017, 2117, 2024, 2219, 7050, six rivet wires;
- added 4043A, 4A47, 4A54, 5087, 5183A, 5356A, six welding wires;
- added 5154, 5154A, 5154C, three wires for weaving cable;
- added Al-Si1 evaporation wire;
- added welding performance of welding wire, mechanical properties of deposited metal and coil requirements for plate delivery;
- added normative Annex B Welding performance requirements and test methods;
- modified dimensional tolerance of welding wire;
- modified the content of normative references;
- deleted requirements for volume conductivity of conductor wire.

This Standard was proposed by China Nonferrous Metals Industry Association.

This Standard shall be under the jurisdiction of National Technical Committee on Nonferrous Metals of Standardization Administration of China (SAC/TC 243).

Main drafting organizations of this Standard: General (Tianjin) Aluminum Products Co., Ltd., Northeast Light Alloy Co., Ltd., Nonferrous Metals Technology and Economic Research Institute, Hangzhou Kunli Welding Materials Co., Ltd., Beijing Institute of Nonferrous Metals and Rare Earth Applications, Longkou Jungle Aluminum Co., Ltd., Beijing Aeronautical Materials Research Institute, Southwest Aluminum (Group) Co., Ltd.

Aluminum and aluminum alloys drawn round wires

1 Scope

This Standard specifies the requirements, test methods, inspection rules and marks, packaging, shipping, storage and quality certificate and order (or contract) of aluminum and aluminum alloys drawn round wires.

This Standard is applicable to aluminum and aluminum alloy wires for conductor, welding, rivet, cable weaving and evaporating material (hereinafter referred to as 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 238, *Metallic materials - Wire - Reverse bend test*

GB/T 2651, *Method of tensile test for welded joint*

GB/T 2652, *Methods of tensile tests for weld and deposited metal*

GB/T 2653, *Methods of bend and compression tests for welded joint*

GB/T 3048.2, *Test methods for electrical properties of electric cables and wires - Part 2: Test of electrical resistivity of metallic materials*

GB/T 3190, *Wrought aluminium and aluminium alloys--Chemical composition limits*

GB/T 3199, *Wrought aluminium and aluminium alloy products-Packing, marking, transporting and storing*

GB/T 3250, *Aluminium and aluminium alloys shear test method for rivet wire and rivets and riveting test method for rivet wire*

GB/T 3323, *Methods for radiographic inspection and classification of radiographs for fusion welded butt joints in steel*

GB/T 3880.1, *Wrought aluminium and aluminium alloy plates, sheets and*

3.1.2 Marks and examples

The mark of the wire is expressed in terms of product name, standard number, designation, supply state, diameter. The marking examples are as follows:

Example 1:

the conductor wire of which the designation is 1350, the state is H14, the diameter is Φ10.0 mm is marked as:

conductor wire GB/T 3195-1350H14-Φ10.0

Example 2:

the welding wire of which the designation is 5A06, the state is H14, the diameter is Φ10.0 mm is marked as:

welding wire GB/T 3195-5A06H14-Φ10.0

Example 3:

the rivet wire of which the designation is 5A02, the state is H14, the diameter is Φ10.0 mm is marked as:

rivet wire GB/T 3195-5A02H14-Φ10.0

Example 4:

the cable weaving wire of which the designation is 5154A, the state is H38, the diameter is Φ0.4 mm is marked as:

cable weaving wire GB/T 3195-5154AH38-Φ0.4

Example 5:

the evaporating material wire of which the designation is Al-Si1, the state is H14, the diameter is Φ2.0 mm is marked as:

evaporating material wire GB/T 3195- Al-Si1H14-Φ2.0

3.2 Chemical composition

The chemical composition of 4A7, 4A54, 5087, 5154C, 5183A, 5356A, 8017, 8030, 8076, 8130, 8176, 8177, 8C05, 8C12, Al-Si1 wires shall comply with the provisions of Table 6. The chemical composition of other designation of wire shall also comply with the provisions of GB/T 3190.

specified in the "Al" and "other impurities" columns in Table 6 are subjected to conventional chemical analysis. When it is suspected that the mass fraction of the unconventional analysis element exceeds the limits of this Standard, the supplier shall analyze these elements.

4.1.3 "Al" content is calculated according to the method specified in GB/T 3190. When calculating the "Al" content, the sum of the values of the elemental analysis and the value of the unconventional analysis element shall be considered as the sum of the "elemental content".

4.1.4 The numerical method is used to determine the numerical value. The numerical rounding rules shall be in accordance with the relevant provisions of GB/T 8170. The rounding digits shall be the same as the limit digits specified in Table 6 of this Standard or GB/T 3190.

4.2 Hydrogen content

The detection method of wire hydrogen content shall be in accordance with the method specified in YS/T 600.

4.3 Diameter deviation

The diameter deviation of the wire shall be measured with a measuring tool with a precision of not less than 0.01 mm.

4.4 Mechanical properties

Test method of tensile strength of wire at room temperature shall be carried out according to the method specified in GB/T 16865.

4.5 Bending resistance

The bending resistance test method of wire shall be carried out according to the method specified in GB/T 238.

4.6 Resistivity

The resistivity test method of the wire shall be carried out according to the method stipulated in GB/T 3048.2.

4.7 Welding performance

The welding performance of the wire shall be tested in accordance with the method specified in Annex B.

4.8 Mechanical properties of deposited metal

4.8.1 Prepare the welding test plate according to the method specified in B.2 of Annex B. The thickness of motherboard for welding test plate is 14mm

~ 20mm. The root gap is 6mm ~ 10mm.

4.8.2 Extract a sample for deposited metal tensile test according to the method specified in GB/T 2652. Carry out the deposited metal tensile test in accordance with the method specified in GB/T 2652.

4.9 Shear strength, riveting performance

The test methods for wire shear strength, riveting performance shall be in accordance with the method specified in GB/T 3250.

4.10 Stress corrosion resistance

The electrical conductivity test method of the stress corrosion resistance of the wire shall be carried out according to the method specified in GB/T 12966.

4.11 Appearance quality

In the natural scattered light, carry out the visual inspection for appearance quality. If necessary, it can use the size measurement tool to define the size of the defect. The depth of the defect can be determined by grinding.

4.12 Reel

The wire size deviation of welding wire is measured with a measuring tool that ensures the corresponding accuracy. Other items shall be visually inspected.

5 Inspection rules

5.1 Inspection and acceptance

5.1.1 The wire shall be inspected by the supplier to ensure that the quality of the wire meets the requirements of this Standard and the order (or contract). Fill the quality certificate.

5.1.2 The purchaser shall inspect the received wire according to the provisions of this Standard. When the inspection results are inconsistent with the provisions of this Standard and the order (or contract), it shall be made in written form to the supplier and solved via negotiation between both parties. Any objection to the appearance quality or diameter deviation shall be made within one month from the date of receipt of the wire. Other objections shall be made within three months from the date of receipt of the wire. For arbitration, an authority may be entrusted by both parties that shall conduct common sampling in the purchaser's.

5.2 Batching

5.6 Determination of inspection results

5.6.1 When the chemical composition of any sample fails, this batch shall be determined as unqualified.

5.6.2 When the diameter deviation of any sample fails, this batch shall be determined as unqualified. But agreed by the supplier and the purchaser, this batch may be inspected by the supplier by rolls (reels). Conduct qualified delivery.

5.6.3 When room temperature tensile mechanical properties, resistivity, welding performance, deposited metal room temperature mechanical properties, shear strength, riveting performance, resistance to stress corrosion performance of any sample fails, a double number of samples shall be taken from the approved wire (including the wires inspected as unqualified) to carry out the re-inspection on unqualified items. This batch of wires shall be determined as qualified only when the results of re-inspection are qualified. If there is still unqualified item in the re-inspection results, this batch of wires shall be determined as unqualified. But agreed by the supplier and the purchaser, this batch of wires may be inspected by the supplier by rolls (reels). Conduct qualified delivery.

5.6.4 When appearance quality of any wire fails, this roll (reel) shall be determined as unqualified. But agreed by the supplier and the purchaser, this batch of wires may be inspected by the supplier by rolls (reels). Conduct qualified delivery.

5.6.5 When any reel fails, this batch of wires shall be determined as unqualified. But agreed by the supplier and the purchaser, this batch of reels may be inspected by the supplier by discs. Conduct qualified delivery.

6 Marks, packaging, transport, storage and quality certificate

6.1 Marks

Print the following mark (or label) on the qualified wire package, indicating:

a) designation;

b) diameter;

c) reference to this Standard;

d) wire melt number, lot number;

Annex A

(Informative)

Matching relationship between wire and aluminum alloy material to be welded

See Table A.1 for the matching relationship between wire and aluminum alloy material to be welded.

Table A.1 -- Matching relationship between wire and aluminum alloy material to be welded

<table>
<tr><td rowspan="2">Designation of aluminum alloy material to be welded</td><td colspan="3">Designation of aluminum alloy material to be welded</td></tr>
<tr><td>5083, 5754</td><td>6005A, 6060, 6061, 6063, 6082</td><td>7004, 7005, 7020, 7B05</td></tr>
<tr><td>Wire designation</td><td colspan="2">5087, 5183, 5183A, 5356, 5356A</td></tr>
<tr><td>5083, 5754</td><td rowspan="3">5087, 5183, 5183A, 5356, 5356A</td><td colspan="2">5087, 5183, 5183A, 5356, 5356A</td></tr>
<tr><td>6005A, 6060, 6061, 6063,6082</td><td>4043, 4043A, 5087,5183, 5183A, 5356, 5356A</td><td>5087, 5183, 5183A, 5356, 5356A</td></tr>
<tr><td>7004,7005,7020,7B05</td><td colspan="2">5087, 5183, 5183A, 5356, 5356A</td></tr>
</table>

B.2.1.2 Preparation of welding test plate

B.2.1.2.1 Place the two boards side by side (as shown in Figure B.1). The root gap shall be in accordance with Table B.3.

B.2.1.2.2 Use wire to conduct butt welding (flat welding PA) to two motherboard sides together so as to make a welding test plate.

B.2.1.2.3 Straight wire uses tungsten inert gas shielded welding (TIG). Disc-shaped wire uses molten inert gas shielded welding (MIG). In the absence of agreement between both parties, it shall use welding process and process welding provided by the supplier.

B.2.1.2.4 The preheating temperature and interlayer temperature of the motherboard (when multi-pass welding is required) shall comply with the requirements in Table B.4.

Table B.4 -- Preheating temperature and interlayer temperature of the motherboard

Motherboard	Preheating temperature / °C	Interlayer temperature / °C
5XXX	≤120	≤120
6XXX	≤120	≤100
7XXX	≤100	≤80

B.2.1.2.5 The protective gas for welding is high purity (99.99%) argon or mixture of argon and helium gas.

B.2.1.2.6 If welding pad is used, pad material shall be same with the motherboard; the first pad shall be removed after the motherboard is welded.

B.2.1.3 Sample for X-ray defect detection

25 mm or 30 mm long ends are cut from the ends of the weld beams (see Figure B.2) and the sample for X-ray defect detection shall be obtained.

B.2.1.4 Preparation of sample for measurement of mechanical properties of welded joints at room temperature

In the area 3 and the area 5 of the welding test plate (shown in Figure B.2), one transverse tensile sample shall be respectively prepared according to requirements of GB/T 2651.

B.2.1.5 Preparation of sample for test of bending performance of welded joints

In the area 3 and the area 5 of the welding test plate (shown in Figure B.2), two curls (1 back bend, 1 face bend) shall be respectively prepared according to requirements of GB/T 2653.

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