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Copper-steel composite sheet and strip

铜-钢复合薄板和带材

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Copper-steel composite sheet and strip

1 Scope

This Standard specifies the requirements, test methods, inspection rules, marking, packaging, transportation, storage, quality certificate and order forms (or contracts) for copper-steel composite sheets and strips.

This Standard applies to copper-steel composite sheets and strips (hereinafter referred to as CSC sheets and strips) for general industrial use.

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 223 (all parts) Iron, steel and alloy

GB/T 228.1-2010 Metallic materials - Tensile testing - Part 1: Method of test at room temperature

GB/T 232 Metallic materials - Bend test

GB/T 235 Metallic materials - Sheet and strip - Reverse bend test

GB/T 351 Metallic materials - Resistivity measurement method

GB/T 700 Carbon structural steels

GB/T 1591 High strength low alloy structural steels

GB/T 4156 Metallic materials - Sheet and strip - Erichsen cupping test

GB/T 5121 (all parts) Methods for chemical analysis of copper and copper alloys

GB/T 5213 Cold rolled low carbon steel sheet and strip

GB/T 5231 Designation and chemical composition of wrought copper and copper alloys

GB/T 6394 Determination of estimating the average grain size of metal

GB/T 8170 Rules of rounding off for numerical values & expression and judgement of limiting values

GB/T 8888 Wrought heavy non-ferrous metal products - Packing, marking, transportation, storing and certificate of quality

GB/T 10561-2005 Steel - Determination of content of nonmetallic inclusions - Micrographic method using standards diagrams

GB/T 13298 Inspection methods of microstructure for metals

GB/T 26303.3 Measuring methods for dimensions and shapes of wrought copper and copper alloys - Part 3: Sheets and strips

GB/T 33948.1 Method for chemical analysis of copper-steel composite metal - Part 1: Determination of copper content- Iodine titration method

GB/T 33948.2 Method for chemical analysis of copper-steel composite metal - Part 2: Determination of zinc content - Na₂ EDTA titration method

GJB 1458B Specification for high quality carbon steel sheets and strips for copper cladding

WJ 643-1994 Copper-clad steel sheets for bullets

YS/T 668 The sampling method of physical and chemical testing for copper and copper alloys

YS/T 815 Preparation method of test pieces for mechanical and technological properties of copper and copper alloys

YS/T 1045-2015 Copper-steel composite sheet and strip for decoration

YS/T 1104-2016 Copper-steel composite sheet and strip for deep drawing

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

3.1

copper-steel composite sheet and strip

Material using carbon steel as the base metal, with copper and copper alloy of a certain thickness integrally and continuously clad on one or both sides by

**Table 14 -- Non-metallic inclusions
of base metal of CSC sheets and strips**

Product code	A, C (sulfide) category	B, D (oxide) category
H90/11Al/H90	≤ grade 2.5	≤ grade 2.5
H90/18Al/H90	≤ grade 2.5	≤ grade 2.5

4.11 Composite quality

The cladding metal and the base metal of CSC sheets and strips shall be firmly bonded and shall not be laminated. The specimen of CSC sheets and strips is repeatedly bent to break in any direction, and the joint between the cladding metal and the base metal at the break shall not have visible lamination to the naked eye.

4.12 Surface and appearance quality

4.12.1 The surface of CSC sheets and strips shall be smooth and clean and shall have no defects affecting use.

4.12.2 The surface of CSC sheets and strips at O60 status is allowed to have slight, local tensile strain marks, oxidation, white spots, black spots and oil marks.

4.12.3 CSC sheets and strips shall be rolled up tidily and tightly, and there shall be not looseness, slump or socket.

4.12.4 For CSC sheets and strips of which the width > 250 mm ~ 600 mm, the height of the roll tower shall not exceed 10 mm; for those of which the width ≤ 250 mm, the height of the roll tower shall not exceed 8 mm.

4.13 Form of delivery

CSC sheets and strips are delivered in rolls, and the recommended roll internal diameters are 300 mm, 400 mm and 500 mm.

5 Test methods

5.1 Chemical composition

5.1.1 The chemical composition of the cladding metal of CSC sheets and strips shall be based on the chemical composition of the cladding metal material before cladding, and the arbitration analysis method shall be carried out in accordance with GB/T 5121 (all parts).

5.1.2 The chemical composition of the base metal of CSC sheets and strips

5.9.1 The microstructure specimen shall be taken along the longitudinal section of CSC sheets and strips in the rolling direction, and the inspection method is carried out in accordance with the specifications of GB/T 13298.

5.9.2 For the pearlite inspection of CSC sheets and strips, etch the inspection surface of the specimen with 2 % ~ 4 % ethanol solution, magnify 400 times, select a representative field of view, carry out grade determination according to Annex A of WJ 643-1994.

5.9.3 For the grain size inspection of CSC sheets and strips, prepare two specimens, deeply etch the inspection surface of the specimens with 2 % ~ 4 % nitric acid solution, magnify 100 times, carry out according to the specifications of GB/T 6394, to measure the average grain size.

5.9.4 For the non-metallic inclusion inspection of CSC sheets and strips, the throwing surface of the specimen is magnified 100 times, select a square field of view of 0.50 mm², and comparatively evaluate according to Method A and Annex A of GB/T 10561-2005:

- a) For Class A and Class C inclusions present in the same field of view, they shall be evaluated in combination, and the corresponding coarse and fine rating pictures shall be selected according to the dominant inclusions and their coarse and fine tendency, evaluate according to the most serious ones;
- b) For Class B inclusions and Class D inclusions of similar size to Class B present in the same field of view, they shall also be evaluated in combination and reported as Class B inclusions, evaluate according to the most serious ones;
- c) For dispersed oxides, it is also reported as Class B inclusions; for coarse and large Class D inclusions, treat as appropriate.

5.10 Composite quality

The composite quality test method for CSC sheets and strips shall be carried out in accordance with the specifications of GB/T 235.

5.11 Surface and appearance quality

5.11.1 The surface and appearance quality of CSC sheets and strips are visually inspected by the naked eye.

5.11.2 For the shape quality of CSC sheets and strips, the tower shape is checked with a tape measure and a ruler, and the rest is visually inspected.

shall be carried out in accordance with the specifications of GB/T 8170.

6.5.2 If the chemical composition of cladding metal and base metal, the cladding ratio, and the cladding metal layer weight ratio are unqualified, the batch is determined to be unqualified.

6.5.3 If the dimensions and surface quality of CSC sheets and strips are unqualified, the roll or the piece is determined to be unqualified.

6.5.4 When the test results of the specimen of mechanical properties, bending test, cupping test, microstructure, electrical properties and composite quality are unqualified, double the quantity of specimen shall be taken from the batch of products (including the unqualified roll or piece) for repeated test. If the repeated test results are all qualified, the whole batch of products is determined to be qualified. If the repeated test results are still unqualified, the batch is determined to be unqualified, or the supply party shall inspect roll by roll or piece by piece and delivery the qualified products.

7 Marking, packaging, transportation, storage and quality certificate

The marking, packaging, transportation, storage and quality certificate of products shall comply with the specifications of GB/T 8888.

8 Order form (or contract) content

The order form (or contract) for ordering the products listed in this Standard shall include the following:

- a) product name;
- b) product code;
- c) status;
- d) weight;
- e) dimensions and their allowable deviation (when it is specific length, high precision level or has special requirements);
- f) product use;
- g) if necessary, indicate the following:

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