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Aluminum matrix composite wafers

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Aluminum matrix composite wafers

1 Scope

This document specifies the product classification, requirements, test methods, inspection rules and marking, packaging, transportation, storage, and quality certificates and order form (or contract) contents of aluminum matrix composite wafers.

This document applies to aluminum matrix composite wafers for cooking pots and pans, including aluminum matrix composite wafers produced by rolling composite and explosive composite methods (hereinafter referred to as composite wafers).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 223 (all parts), Methods for chemical analysis of iron, steel and alloy

GB/T 700, Carbon structural steels

GB/T 3190, Wrought aluminum and aluminum alloy - Chemical composition

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

GB/T 3246.1, Inspection method for structure of wrought aluminum and aluminum alloy products - Part 1: Inspection method for microstructure

GB/T 3880.3, Wrought aluminium and aluminium alloy plates, sheets and strips for general engineering - Part 3: Tolerances on forms and dimensions

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

GB/T 7999, Optical emission spectrometric analysis method of aluminum and aluminum alloys

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

GB/T 16865, Test pieces and method for tensile test for wrought aluminium and magnesium alloys products

GB/T 17432, Methods of sampling for analyzing the chemical composition of wrought aluminum and aluminum alloys

GB/T 20066, Steel and iron - Sampling and preparation of samples for the determination of chemical composition

GB/T 20878, Stainless and heat-resisting steels - Designation and chemical composition

GB/T 20975 (all parts), Methods for chemical analysis of aluminium and aluminium alloys

3 Terms and definitions

The following terms and definitions are applicable to this document.

3.1

clad layer

Other single-layer metals other than aluminum and aluminum alloy matrix in aluminum matrix composite wafers.

3.2

clad ratio

The metal thickness of the clad layer (3.1) as a percentage of the total thickness of the aluminum matrix composite wafer (3.3).

3.3

aluminum matrix composite wafers

A circular sheet made of two or more metal materials (aluminum and aluminum alloys as the matrix) after rolling composite or explosive composite.

4 Product classification

4.1 Designation, food contact layer, clad ratio and dimensions

According to the number of layers, composite wafers are divided into three types: multi-layer (steel/multi-layer aluminum/steel), three-layer (steel/aluminum/steel) and two-layer (steel/aluminum), where the typical designation, food contact layer, clad ratio and dimensions are shown in Table 1. Where the buyer has special requirements on the number of layers, designation, food contact layer, clad ratio, designations, and the state

6.2.3 Diameter

Use a steel tape with an accuracy of 0.1 mm or a tool with corresponding accuracy for the measurement.

6.2.4 Unevenness

6.2.4.1 Total unevenness

Take a whole piece of composite wafer and use a tool with a resolution of 1 mm to measure its diameter. Then, put it freely on the platform, according to the provisions of GB/T 3880.3; use a feeler gauge with a resolution of 0.1 mm to measure the wave height; the ratio of the wave height to the diameter is the total unevenness of the composite wafer.

6.2.4.2 Local unevenness

For a composite wafer with a diameter of not less than 300 mm, take the entire composite wafer and place it freely on the platform. According to the method specified in GB/T 3880.3, use a tool with a resolution of 1 mm to measure any chord length; use a feeler gauge with a resolution of 0.1 mm to measure the corresponding wave height; the ratio of the wave height to the chord length is the local unevenness of the composite wafer.

6.3 Clad ratio

First, measure the thickness of each layer according to the provisions of GB/T 3246.1, then, calculate the clad ratio F_i according to Formula (1); express the value in % (see Figure 1 for the cross-sectional diagram of the composite wafer):

$$F_i = \frac{t_i}{h} \times 100\% \quad \dots\dots\dots (1)$$

Where:

t_i – thickness of a single clad layer, in millimeters (mm);

h – total thickness of the aluminum matrix composite wafer, in millimeters (mm).

7.1.1 The product shall be inspected by the supplier to ensure that the product quality conforms to the provisions of this document and the order form (or contract); the quality certificate shall be filled out.

7.1.2 The buyer shall inspect the received products according to the provisions of this document. If the inspection result does not conform to the provisions of this document and the order form (or contract), it shall be submitted to the supplier in written form, and the supplier and the buyer shall negotiate and resolve. Objections of appearance quality and dimensional deviation shall be filed within one month from the date of receipt of the product; objections of other performances shall be filed within three months from the date of receipt of the product. Arbitration, if required, may be carried out by an organization which is recognized by both the supplier and the buyer; the sampling shall be jointly done at the buyer.

7.2 Batch

Products shall be submitted for acceptance in batches, and each batch shall be composed of products of the same designation, state of aluminum and aluminum alloy, food contact layer, clad ratio, and dimensions. There is no limit to the weight of each batch.

7.3 Weight

The product shall be weighed on the scales.

7.4 Inspection items

7.4.1 Each batch of composite wafers shall be inspected for chemical composition, dimensional deviation, clad ratio, tensile mechanical properties at room temperature, peel strength between layers, cup drawing performance and appearance quality.

7.4.2 The cooling and heating cycle performance shall be guaranteed by the supplier's process. When the buyer requests the testing of the cooling and heating cycle performance, the inspection frequency shall be negotiated between the supplier and the buyer, and shall be indicated in the order form (or contract).

7.5 Sampling

Sampling shall be in accordance with Table 9.

results of sample properties are still unsatisfactory in the repeated test, then, judge the batch of products to be unqualified.

7.6.6 When the cooling and heating cycle performance of any product is unqualified, a double number of samples shall be taken from the batch of products for a repeated test. If all the repeated test results are qualified, judge the batch of products to be qualified. If the results of sample properties are still unsatisfactory in the repeated test, then, judge the batch of products to be unqualified.

7.6.7 When the cup drawing performance of any sample is unqualified, a double number of samples shall be taken from the batch of products for a repeated test. If all the repeated test results are qualified, judge the batch of products to be qualified. If the results of sample properties are still unsatisfactory in the repeated test, then, judge the batch of products to be unqualified.

7.6.8 When the burrs of any product are unqualified, judge the batch of products as unqualified. After negotiation between the supplier and the buyer, one-by-one inspection is allowed, and the qualified ones will be delivered. When other appearance quality of any product is unqualified, judge the piece of product as unqualified.

8 Marking, packaging, transportation, storage and quality certificate

8.1 Marking

8.1.1 Product marking

8.1.1.1 A mark (or label) shall be printed on the top wafer of the qualified stack:

- a) product name;
- b) designation;
- c) state of aluminum and aluminum alloy;
- d) clad ratio;
- e) dimensions;
- f) product batch number;
- g) net weight;
- h) the inspection seal of the supplier's quality inspection department (or the signature or seal of the quality inspector).

8.1.1.2 The food contact layer of the composite wafer shall be marked (e.g. scribed).

8.1.2 Package marking

The package marking of the product shall comply with the provisions of GB/T 3199.

8.2 Packaging, transportation and storage

The composite wafers shall not be oiled or packed with paper. When the buyer requires oiling or padding, it shall be determined through negotiation between the supplier and the buyer, and shall be indicated in the order form (or contract). Other requirements are in accordance with the provisions of GB/T 3199.

8.3 Quality certificate

Each batch of composite wafers shall be accompanied by a product quality certificate, which shall include the following:

- a) name of the supplier;
- b) product name;
- c) designation, state of aluminum and aluminum alloy, dimensions and clad ratio;
- d) batch number;
- e) net weight and quantity;
- f) number of this document;
- g) results of each analysis and inspection, and the inspection seal from the supplier's quality inspection department;
- h) date of packaging (or date of manufacture).

9 Order form (or contract) contents

An order form (or contract) for the products listed in this document shall include the following:

- a) product name;
- b) designation;
- c) state of aluminum and aluminum alloy;
- d) clad ratio;
- e) dimensions;
- f) weight (or number of sheets);

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