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The measuring method for copper and copper alloys soften temperature

铜及铜合金软化温度的测定方法

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Foreword

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

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).

Responsible drafting organizations of this Standard: China Aluminum Luoyang Copper Co., Ltd., Heze Guangyuan Copper Belt Co., Ltd., Anhui Xinke New Materials Co., Ltd., Tongling Jinwei Copper Co., Ltd., National Copper and Aluminum Smelting and Processing Product Quality Supervision and Inspection Center, Ningbo Xingye Shengtai Group Co., Ltd., Anhui Chujiang Technology New Materials Co., Ltd., Taiyuan Jinxi Chunlei Copper Co., Ltd., Suzhou Nonferrous Metals Research Institute Co., Ltd., Shaoxing Libo Electric Co., Ltd.

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The measuring method for copper and copper alloys soften temperature

1 Scope

This standard specifies the terminology, test requirements, test steps, test methods and test reports for the softening temperature determination method of copper and copper alloys.

This standard is applicable to the determination of the softening temperature of copper and copper alloy materials or products in a laboratory environment.

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 231.1 Metallic materials - Brinell hardness test - Part 1: Test method

GB/T 4340.1 Metallic materials - Vickers hardness test - Part 1: Test method

3 Terms and definitions

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

3.1

soften temperature

The copper and copper alloy materials are taken out of the furnace after being kept warm for 1 hour and naturally cooled to room temperature. The corresponding holding temperature when the hardness drops to 80% of the original hardness.

Note: The softening temperature is a quantitative indicator for evaluating the high-temperature softening resistance of alloy materials.

3.2

original hardness

The hardness of the original sample measured at room temperature.

3.3

soften temperature behavior curve

A curve used to reflect the high-temperature softening resistance of copper and copper alloy materials, with the heating temperature as the horizontal axis and the corresponding sample hardness as the vertical axis.

4 Method principle

Using an annealing furnace with corresponding accuracy, the copper and copper alloy samples are annealed at different temperatures for a specified time of 1 hour. After the annealing is completed, the hardness test is carried out together with the original sample. The softening annealing curve is drawn with the holding temperature as the horizontal axis and the hardness value as the vertical axis. Through the softening annealing curve, it is determined that the holding temperature corresponding to the hardness dropping to 80% of the original hardness is the softening temperature of the sample.

5 Instruments and equipment

5.1 Annealing furnace

5.1.1 The accuracy of the annealing furnace shall not exceed ±0.5 ℃.

5.1.2 The temperature variation of the constant temperature zone in the annealing furnace is less than 5 ℃.

5.2 Hardness tester

5.2.1 Vickers hardness tester.

5.2.2 Brinell hardness tester.

6 Test specimen

6.1 The material of the specimen shall be uniform and free of internal defects.

6.2 After the copper and copper alloy bars with a nominal outer diameter ≥15 mm are subjected to insulation annealing, their Brinell hardness shall be measured to determine the softening temperature of the material. After the copper and copper alloy bars with a nominal outer diameter <15 mm are subjected to insulation annealing, their Vickers hardness shall be measured to determine the softening temperature of the material.

6.3 After the copper and copper alloy pipes with a nominal outer diameter ≥15 mm and a wall thickness ≥4 mm are subjected to insulation annealing, their Brinell hardness

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