GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 77.150.30

H 62

GB/T 2529-2012

Replacing GB/T 2529-2005

Copper sheets and bars for electrical conduction purpose

Issued on: December 31, 2012 **Implemented on: October 1, 2013**

Issued by: General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China;

Standardization Administration of the People's Republic of China.

Table of Contents

Foreword

This Standard is drafted according to the rules given in GB/T 1.1-2009.

The major technical specifications of the bars in this Standard reference to and adopt the contents of the bars in ASTM B 187M-2006 *Copper bars, rods and shapes for bus bars*.

This Standard replaces GB/T 2529-2005 *Copper sheets and bars for electrical conduction purpose*.

Compared with GB/T 2529-2005, the major changes in this Standard are as follows:

— ADD “TU2” and “TU3” to the alloy designations of the products.

— USE the new edition of *Temper designations for copper and copper alloys* to represent the product state.

— ADD GB/T 26303.3 *Measuring methods for dimensions and shapes of wrought copper and copper alloys - Part 3: Sheets and strips*, YS/T 478 *The method for electrical conductivity measurement of copper and copper alloys by use of eddy current*, and YS/T 482 *Methods for analysis of copper and copper alloys - The atomic emission spectrometry* to normative references.

— DELETE “1/8 hard” from the state of the sheets and bars.

— INCREASE the maximum length of the sheets and bars from “8,000mm” to “12,000mm”.

— DIVIDE the straightness of longitudinal edge according to the state as required.

— ADD the requirements for rounding off to the contents of the edge appearance.

— For the percentage elongation after fracture in the mechanical properties of the sheets and bars, MODIFY the “long specimen $A_{11.3}$” to “short specimen A”.

— ADD the property indicators of the resistivity to the electrical property of the sheets and bars.

— ADD the following contents: For the electrical property, USE the test methods in YS/T 478 *The method for electrical conductivity measurement*

Copper sheets and bars for electrical conduction purpose

1 Scope

This Standard specifies the requirements, test methods, inspection rules, symbols, packaging, transportation, storage, and contents of the quality certificate and contract (or order form) of the copper sheets and bars for electrical conduction purpose.

This Standard **is applicable to** the copper sheets and bars for electrical conduction purpose used in industrial sectors, such as smelting sector, electric power sector, chemical sector, plating sector, etc.

2 Normative references

The following documents are essential to the application of this document. For dated references, only the editions with the dates indicated are applicable to this document. For undated references, only the latest editions (including all the amendments) are applicable to this document.

GB/T 228.1-2010 *Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1:2009, MOD)*

GB/T 230.1 *Metallic materials - Rockwell hardness test - Part 1: Test method*

GB/T 232 *Metallic materials - Bend test*

GB/T 351 *Metallic materials - Resistivity measurement method*

GB/T 4340.1 *Metallic materials - Vickers hardness test - Part 1: Test method (ISO 6507-1:2005, MOD)*

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

GB/T 5231 *Wrought copper and copper alloys chemical composition limits and forms of wrought products*

GB/T 8888 *Wrought heavy non-ferrous metal products - Packing, marking, transporting and storing*

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

YS/T 478 *The method for electrical conductivity measurement of copper and copper alloys by use of eddy current*

YS/T 482 *Methods for analysis of copper and copper alloys - The atomic emission spectrometry*

3 Term and definition

The following term and definition are applicable to this document.

3.1 Straightness of longitudinal edge

It refers to the deviation of the absolute straightness of any longitudinal surface or edge, including side curvature and flatness.

4 Requirements

4.1 Product classification

4.1.1 Designations, state and specifications

4.1.1.1 The designations, state and specifications of the sheets shall conform to the provisions in Table 1.

Table 1 Designations, State and Specifications of the Sheets

Designation	State	Specifications / mm		
		Thickness	Width	Length
T2, TU2, TU3	Hot rolling (M20) Hot rolling + rerolling (M25)	4~100	50~650	≤ 12,000
	Soft (O60)	4~20		
	1/2 Hard (H02)			
	Hard (H04)			
Note: After the negotiation between supply and demanding parties, it is allowed to supply the sheets with other designations, state and specifications.				

4.1.1.2 The designations, state and specifications of the bars shall conform to the provisions in Table 2.

4.3.3 Length and their tolerances

4.3.3.1 The lengths and their tolerances of the sheets shall conform to the provisions in Table 8.

4.3.3.2 The lengths and their tolerances of the bars shall conform to the provisions in Table 9.

Table 8 Lengths and Their Tolerances of the Sheets

Unit: mm

Thickness	Length of the cold-rolled sheet					Hot-rolled sheet
	≤3 500	>3 500~5 000	>5 000~6 000	>6 000~8 000	>8 000~12 000	
	Length Tolerance (+)					
4.0~20.0	12	15	20	25	30	25
>20.0	15	20	25	30	35	30

Table 9 Lengths and Their Tolerances of the Bars

Unit: mm

Length	Length Tolerance (+)
≤2 000	3
>2 000~4 500	6
>4 500~8 000	13
>8 000~12 000	25

4.3.4 Straightness of longitudinal edge

The sheets shall be straight, and are allowed to have slight waves. For the sheets and bars in M25, H02 and H04 states, the straightness of longitudinal edge shall conform to the provisions in Table 10.

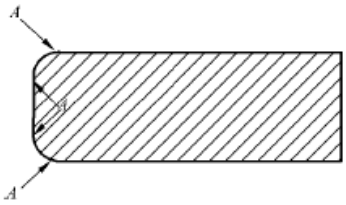
Table 10 Straightness of Longitudinal Edge of the Sheets and Bars

State	Straightness of longitudinal edge, ≤
M25	4 mm/m
H02, H04	3 mm/m

4.3.5 Edge appearance

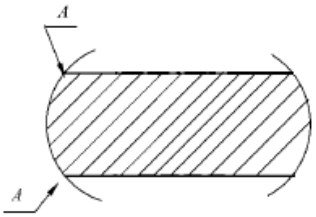
4.3.5.1 Right angle

When the edge appearance of the bars is right angle, the edges shall have no cracks and folds. The maximum allowable chamfer radius shall conform to the provisions in Table 11.



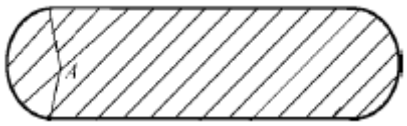
Note: The fillet arc is not always tangent to the "A" points, but the angle's "A" points shall be rounding off.

Figure 1 Schematic Diagram of the Fillet



Note: The arcs of the rounded edge shall be symmetric with the product axis. The angle's "A" points shall be rounding off.

Figure 2 Schematic Diagram of the Rounded Edge



Note: The arcs of the rounded edge are not necessary to be tangent to the "A" point, but they shall be symmetric with the product axis. Furthermore, the angle's "A" point shall be rounding off.

Figure 3 Schematic Diagram of the Full Rounded Edge

4.3.5.5 When the user has requirements on the edge appearance of the sheets and bars, the specific shape of the corresponding edge appearance shall be indicated in the contract. If not indicated, the sheet edges shall be in the shapes of the sheared or sawed edges.

4.4 Mechanical property

For the products with the thicknesses of not greater than 10mm, CONDUCT the tensile test at room temperature. For the products with the thicknesses of greater than 10mm, CONDUCT the Vickers or Rockwell hardness test. The test results shall conform to the provisions in Table 14.

Table 14 Mechanical Property of the Sheets and Bars

Designation	Supply state	Tensile test		Hardness test	
		Tensile strength R_m MPa	Percentage elongation after fracture A %	Vickers hardness HV	Rockwell hardness HRF
T2, TU2, TU3	Hot rolling (M20) Hot rolling + rerolling (M25)	≥ 195	≥ 38	-	-
	Soft (O60)	≥ 195	≥ 42	-	-
	1/2 hard (H02)	245~335	≥ 14	75~120	≥ 80
	Hard (H04)	≥ 295	≥ 6	≥ 80	≥ 65
Note: For the sheets and bars whose thicknesses exceed the specified range, the major properties shall be agreed upon by the supply and demanding parties.					

4.7.3 The hot-rolled sheets and bars shall be pickled. However, those whose lengths are greater than 3,000mm do not have to be pickled.

5 Test methods

5.1 Arbitration and analysis methods for the chemical compositions

ANALYZE the chemical compositions of the sheets and bars according to the provisions of GB/T 5121 or YS/T 482. ARBITRATE according to the provisions of GB/T 5121.

5.2 Measurement method for the appearance dimensions

MEASURE the appearance dimensions of the sheets and bars according to the provisions of GB/T 26303.3.

5.3 Test method for the mechanical property at room temperature

CONDUCT the tensile test at room temperature to the sheets and bars according to the provisions of GB/T 228.1. CONDUCT the test to the specimens according to the provisions of the Section P04 in Table A1 of the Appendix A and the Section P01 in Table B2 of the Appendix B. CONDUCT the hardness test according to the provisions of GB/T 230.1 and GB/T 4340.1.

5.4 Test method for the bending property

The bending properties of the sheets and bars shall be in accordance with the provisions of GB/T 232.

5.5 Test method for the electrical property

CONDUCT the electrical conductivity test to the sheets and bars according to GB/T 351 or YS/T 478. ARBITRATE according to the provisions of GB/T 351.

5.6 Inspection method for the surface quality

USE the visual observation method to inspect the surface quality of the sheets and bars.

6 Inspection rules

6.1 Inspection and acceptance

6.1.1 The technology supervision department of the supplier shall inspect the sheets and bars, so as to ensure that the product quality conforms to the

	sample from each piece at random along the rolling direction.		
Hardness	Respectively TAKE 2 pieces from each batch and 1 test sample from each piece at random.	4.4	5.3
Bending property	PREPARE bending test samples according to the provisions of GB/T 232. TAKE 2 pieces from each batch. TAKE one test sample from each piece along the rolling direction.	4.5	5.4
Electrical property	PREPARE the test samples of the electrical property according to the provisions of GB/T 351 or YS/T 478. TAKE 2 pieces from each batch. TAKE one test sample from each piece at random.	4.6	5.5

6.5 Determination of inspection results

6.5.1 When the chemical compositions are unqualified, DETERMINE this batch of products as non-conforming products.

6.5.2 When the appearance dimensions and surface quality of the products are unqualified, DETERMINE this product as non-conforming product.

6.5.3 When some of the test sample's test results of the mechanical property, bending property and electrical property are unqualified, DOUBLE the number of samples taken from this batch of products (including the original product failing to pass the inspection, or the product represented by this substandard test sample) for retesting. If all the retesting results are qualified, DETERMINE the entire batch of products as conforming products. If some of the test sample's test results are still unqualified, DETERMINE this batch of products as non-conforming products. Or INSPECT piece by piece by the supplier. DELIVER the conforming products afterwards.

7 Symbols, packaging, transportation, storage and quality certificate

The product symbols, packaging, transportation, storage and quality certificate shall conform to the provisions of GB/T 8888.

8 Contents of the contract (or order form)

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

a) product name;

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------