ASTM B152 / B152M Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar

GNEE's main copper products include copper tubes, copper rods, copper plates, copper wires, copper strips, etc.

Website：chinacopperalloys.com

Email: sales@gneemetal.com

1. Standard Overview & Scope

ASTM B152 (inch-pound units) / B152M (SI units) is the fundamental North American standard covering flat-rolled and solid copper products in the form of sheet, strip, plate, and rolled bar (square, rectangular, and hexagonal cross-sections). These products are used for general engineering applications where high electrical/thermal conductivity, corrosion resistance, formability, or appearance are required.

Critical Distinction: This specification does NOT cover copper tube or pipe. For tubular products, see ASTM B75 (general tube), B88 (water tube), or B280 (ACR tube).

Key Forms Covered:
Sheet & Strip: Flat products of rectangular cross-section supplied in coils or cut lengths.
Plate: Flat product of rectangular cross-section with greater thickness than sheet/strip.
Rolled Bar: Solid product of square, rectangular, or hexagonal cross-section, produced by hot or cold rolling.

2. Material (Copper) Grades and Tempers

B152 covers a wide range of commercially pure copper grades, each with specific characteristics.

2.1 Standard Copper UNS Numbers and Key Characteristics

UNS Number	Common Name	Oxygen Content	Key Characteristics & Typical Applications
C11000	Electrolytic Tough Pitch (ETP)	0.02 - 0.04%	Most common general-purpose copper. Excellent electrical conductivity (100% IACS min.). Susceptible to "hydrogen embrittlement" if heated in reducing atmospheres. Roofing, electrical busbars, gaskets, decorative.
C10100	Oxygen-Free Electronic (OFE)	≤ 0.0005%	Highest purity. Superior ductility, excellent resistance to hydrogen embrittlement. High-vacuum electronics, glass-to-metal seals, waveguides.
C10200	Oxygen-Free (OF)	≤ 0.0010%	Very high purity, similar to C10100 but slightly more tolerant oxygen level. Same applications as C10100.
C10300	Oxygen-Free with Silver (OFS)	≤ 0.0010%	Contains small, controlled silver addition for improved elevated temperature strength without sacrificing conductivity.
C12000	Phosphorus Deoxidized, Low Residual P (DLP)	Deoxidized	Good weldability and brazability. Good cold workability. Plumbing fittings, heat exchangers.
C12200	Phosphorus	Deoxidized	Most common deoxidized

UNS Number	Common Name	Oxygen Content	Key Characteristics & Typical Applications
	Deoxidized, High Residual P (DHP)		copper. Excellent resistance to hydrogen embrittlement, superior brazing and soldering properties. Plumbing tube, water distribution, refrigeration tube.
C14200	Phosphorus Deoxidized, Arsenical (DArS)	Deoxidized	Contains arsenic for improved corrosion resistance in certain environments, especially under stress.

2.2 Tempers (Temper Designations)

The standard covers a full range of tempers, from fully annealed (soft) to full-hard, defined by cold working and/or thermal treatment.

Annealed Tempers (Oxx): e.g., O50 (Light Anneal), O60 (Soft Annealed). High ductility, low strength.

Cold-Rolled Tempers (Hxx): e.g., H00 (1/8 Hard), H01 (1/4 Hard), H02 (1/2 Hard), H03 (3/4 Hard), H04 (Hard), H06 (Extra Hard), H08 (Spring Hard). Strength increases with temper level.

As-Fabricated (Hot Rolled): M20.

3. Dimensions, Tolerances, and Forms

3.1 Thickness Ranges by Product Form

Product Form	Typical Thickness Range (Imperial)	Typical Thickness Range (Metric)
Strip	0.005 in to 0.188 in	0.13 mm to 4.78 mm
Sheet	0.010 in to 0.249 in	0.25 mm to 6.32 mm
Plate	0.250 in and greater	6.35 mm and greater

Product Form	Typical Thickness Range (Imperial)	Typical Thickness Range (Metric)
Rolled Bar (Width/Thickness)	Varies by cross-section; rectangular bars up to several inches.	

3.2 Width and Length Tolerances (Representative)

Tolerances are extensive and vary by product, dimension, and temper. Below are key examples:

Thickness Tolerances: Vary with width and thickness. For example, for cold-rolled sheet/strip:

Thickness ≤ 0.025 in: Tolerance typically ± 0.001 in.

Thickness 0.031 - 0.125 in: Tolerance typically ± 0.003 to ± 0.005 in.

Width Tolerances (Slit Edge): For widths up to 12 in, tolerance is often ± 0.005 in.

Length Tolerances (Cut Lengths): For lengths ≤ 10 ft, tolerance is typically +1/8 in, -0 in.

Flatness (Straightness): Specified for strip and sheet; varies with thickness, width, and temper. Hard tempers are straighter.

3.3 Rolled Bar Cross-Sectional Dimensions (Common Sizes)

Bar Type	Typical Size Range (Across Flats or Width)
Square Bar	1/4 in to 4 in (6.35 mm to 101.6 mm)
Rectangular Bar (Flat Bar)	Widths: 1/2 in to 12 in (12.7 mm to 305 mm); Thickness: 1/8 in to 3 in (3.2 mm to 76 mm)
Hexagonal Bar	1/4 in to 3 in (6.35 mm to 76.2 mm)

4. Mechanical and Physical Properties

Properties are dependent on Copper Grade and Temper. The following table provides representative values for C11000 (ETP Copper).

Temper	Tensile Strength (min, ksi)	Yield Strength (0.5% Ext, min, ksi)	Elongation (min, % in 2 in)	Typical Hardness (Rockwell F)
O60 (Annealed)	32	10	40	40-65
H00 (1/8 Hard)	34	30	30	65-75
H01 (1/4 Hard)	36	32	20	70-80
H02 (1/2 Hard)	38	35	15	75-85
H04 (Hard)	40	38	5	85-92
H08 (Spring)	44	42	2	92+

Conductivity (Electrical): C11000 has a minimum conductivity of 100% IACS (International Annealed Copper Standard). Oxygen-free grades (C10100, C10200) can be 101%+ IACS. Deoxidized grades (C12200) are slightly lower (~98% IACS).

Density: Approximately 0.323 lb/in³ (8.94 g/cm³).

5. Testing and Inspection

Chemical Analysis: Performed to verify conformance to specified copper grade.

Tension Test: To determine mechanical properties (tensile strength, yield strength, elongation).

Rockwell Hardness Test: Often used for temper verification, especially for harder tempers.

Electrical Resistivity Test: For verification of conductivity, especially for electrical grades.

Metallographic Examination (Hydrogen Embrittlement Test): For ETP copper (C11000)

to ensure suitability for applications involving heating (e.g., brazing, welding).

Dimensional Inspection: Verification of thickness, width, length, and flatness.

Visual Inspection: For surface finish, edge condition, and freedom from detrimental defects.

6. Purchasing Information and Applications

6.1 How to Order/Specify:

A precise purchase order should include:

Standard: ASTM B152 or B152M (units).

Material: Copper UNS Number (e.g., C11000, C12200).

Form: Sheet, Strip, Plate, or Rolled Bar (specify shape: square, rectangular, hex).

Temper: (e.g., O60, H02, H04).

Dimensions:

Sheet/Strip/Plate: Thickness x Width x Length.

Rolled Bar: Cross-sectional dimensions (e.g., 1" x 2" Rectangular Bar, 3/4" Hex Bar) and Length.

Quantity: Number of pieces or total weight.

Edge Condition: Slit edge, sheared edge, mill edge, etc.

Surface Finish: e.g., hot-rolled, cold-rolled, polished, buffed.

Certification: Requirement for a Mill Test Report (MTR) certifying chemical and mechanical properties.

6.2 Typical Applications by Form and Grade

Product Form	Copper Grade (Example)	Common Applications
Sheet/Strip	C11000 (ETP)	Electrical components, busbars, radiator cores, architectural flashing, decorative trim, RFI shielding.
Sheet/Strip	C12200 (DHP)	Plumbing fixtures, heat exchanger fins, formed gaskets, applications requiring brazing.
Sheet/Strip	C10100 (OFE)	Semiconductor leadframes, vacuum chamber parts, waveguide components.
Plate	C11000, C12200	Chemical process equipment bases, machine tool wear plates, large grounding busbars.
Rolled Bar (Flat)	C11000	Electrical grounding bars, switchgear components, fabrication stock for machining.
Rolled Bar (Hex/Square)	C11000, C36000*	Machined parts, fasteners (nuts/bolts), electrode stock for resistance welding.

7. Related Standards

ASTM B248 / B248M: Standard Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar. This is the mandatory companion specification to B152, covering test methods, sampling, and additional requirements.

ASTM B187: Specification for Copper Bus Bar, Rod, and Shapes (for specialized electrical shapes).

ASTM B370: Specification for Copper Sheet and Strip for Building Construction.

SAE-AMS 4502: Aerospace Material Specification for Copper Sheet and Strip (similar to B152 but with tighter controls).

About Us

Plant And Equipment

We rely on a full-process production line of melting, extrusion, drawing, heat treatment and finishing. Our core equipment includes medium-frequency induction furnaces, extruders, cold drawing machines and annealing furnaces, and are equipped with intelligent detection systems to ensure that the copper we produce is of first-class quality and stable performance.



Packaging And Shipping

To ensure our products arrive in perfect condition, we use robust packaging:
Protective End Caps: Prevent damage to tube ends.
Waterproof Wrapping: Protects against moisture and corrosion during transit.
Secured Bundling: Tubes are bundled and strapped onto wooden crates or pallets.
Clear Labeling: Each bundle is clearly labeled with material grade, heat number, and dimensions.



Founded in 2008, GNEE has many years of experience in copper product export. Headquartered in Henan Province, China, adjacent to the Beijing-Hong Kong-Macao Expressway, the company has over 200 dedicated employees, registered capital of RMB 10 million, and covers an area of over 350,000 square meters. GNEE is SGS-certified.

We provide high-quality copper products, excellent service, and highly competitive pricing. We specialize in the production and manufacturing of copper tubes, rods, sheets, coils, and wire.

Our products are exported to over 160 countries worldwide and are widely used in

key sectors such as large-scale pipeline construction, petrochemicals, shipbuilding, the automotive industry, and large power plants.

Website：chinacopperalloys.com

Email: sales@gneemetal.com

