

ASTM B280 Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service

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

1. Standard Overview & Scope

ASTM B280 is the globally recognized standard that specifies the requirements for seamless copper tube used specifically in the air conditioning (ACR) and refrigeration field service. The tube is designed for connecting components in refrigeration and air-conditioning systems, including for conveying refrigerant, oil, and other fluids.

Key Characteristics: The tube is supplied in the "annealed" (soft) temper, allowing it to be easily bent and flared in the field. It is also supplied with clean, dry, and capped ends to prevent contamination from moisture and debris during storage and handling, which is critical for refrigeration system integrity.

Common Name: Often referred to as "ACR Tube" in the industry.

2. Material Requirements

Copper UNS Number: C12200 (DHP – Phosphorus Deoxidized High Residual Phosphorus Copper) is the primary and most common material specified.

Chemical Composition: Complies with the requirements of ASTM B170 for Copper UNS No. C12200. Typical composition: Cu (min. 99.9%), P (0.015–0.040%), with very low limits on impurities like iron, lead, and oxygen.

3. Dimensions, Tolerances, and Tempers

The ASTM B280 standard defines three wall-thickness grades: K, L, and M. All three types share the same Outside Diameters (OD), but differ in Wall Thickness and Inside Diameter (ID), which directly affects working pressure, bendability, and cost.

Type K: The thickest wall. Used for the highest pressure applications, commercial/industrial refrigeration, or where physical damage is a concern.

Type L: Medium wall. The most common and widely used type for ACR field service. It offers the best balance of pressure rating, ease of bending/flaring, cost, and availability.

Type M: The thinnest wall. Rarely used in refrigeration field service due to its lower pressure rating and greater susceptibility to damage during handling, bending, and flaring. It is sometimes specified for low-pressure or pre-fabricated applications.

3.1 Complete Dimension Table for Types K, L, and M

The following table lists the common sizes covered by ASTM B280 with wall thicknesses for all three types. Dimensions are for nominal outside diameters.

Nominal OD (inch)	Nominal OD (mm)	Type K Wall Thickness	Type L Wall Thickness	Type M Wall Thickness
1/4	6.35	0.035 in (0.89 mm)	0.030 in (0.76 mm)	0.025 in (0.64 mm)
3/8	9.52	0.035 in (0.89 mm)	0.030 in (0.76 mm)	0.025 in (0.64 mm)
1/2	12.70	0.049 in (1.24 mm)	0.035 in (0.89 mm)	0.028 in (0.71 mm)
5/8	15.88	0.049 in (1.24 mm)	0.040 in (1.02 mm)	0.032 in (0.81 mm)
3/4	19.05	0.049 in (1.24 mm)	0.042 in (1.07 mm)	0.032 in (0.81 mm)

Nominal OD (inch)	Nominal OD (mm)	Type K Wall Thickness	Type L Wall Thickness	Type M Wall Thickness
7/8	22.22	0.065 in (1.65 mm)	0.045 in (1.14 mm)	0.035 in (0.89 mm)
1 1/8	28.58	0.065 in (1.65 mm)	0.050 in (1.27 mm)	0.040 in (1.02 mm)
1 3/8	34.93	0.065 in (1.65 mm)	0.055 in (1.40 mm)	0.042 in (1.07 mm)
1 5/8	41.28	0.072 in (1.83 mm)	0.060 in (1.52 mm)	0.049 in (1.24 mm)
2 1/8	53.98	0.083 in (2.11 mm)	0.070 in (1.78 mm)	0.058 in (1.47 mm)
2 5/8	66.68	0.095 in (2.41 mm)	0.080 in (2.03 mm)	0.065 in (1.65 mm)
3 1/8	79.38	0.109 in (2.77 mm)	0.090 in (2.29 mm)	0.072 in (1.83 mm)
3 5/8	92.08	0.120 in (3.05 mm)	0.100 in (2.54 mm)	0.083 in (2.11 mm)
4 1/8	104.78	0.134 in (3.40 mm)	0.110 in (2.79 mm)	0.095 in (2.41 mm)

Important Selection Note: While all three types are within the standard, Type L is the de facto industry standard for field installation in HVAC/R due to its optimal combination of properties. Type K is specified for critical high-pressure systems. Consult engineering specifications and applicable local codes before selecting Type M for any refrigeration pressure application.

3.2 Dimensional Tolerances:

Outside Diameter: ± 0.004 inches (± 0.10 mm) for sizes up to 1-5/8" OD.

Wall Thickness: $\pm 10\%$ of the specified nominal wall thickness.

Length: For straight lengths, tolerance is typically +1/4 inch, -0 inch.

3.3 Temper:

Annealed (O61 Temper): Supplied in a soft condition to allow for field bending and flaring.

4. Mechanical and Performance Properties

Tensile Strength: Minimum 30 ksi (205 MPa)

Yield Strength (at 0.5% extension under load): Minimum 8 ksi (55 MPa)

Elongation: Minimum 40% in 2 inches (50 mm) – indicates high ductility.

Pressure Rating: The tube must withstand a hydrostatic test pressure that produces a fiber stress of 3,000 psi (20.7 MPa) for at least 5 seconds without leakage. This is a proof test, not the maximum working pressure.

Flaring Test: The tube must be capable of being flared to form a 45° flare without cracking. The flare diameter increase is specified based on tube OD.

Cleanliness and Dryness: Tube ends are capped. Internally, the tube must be clean, dry, and free of harmful contaminants like moisture, oxides, or drawing compounds.

5. Testing and Inspection (Summary)

Chemical Analysis: Performed to verify material grade.

Tension Test: To verify mechanical properties.

Hydrostatic Test: Every length is pressure tested.

Flaring Test: Performed on samples.

Visual and Dimensional Inspection: Checks for straightness, surface defects, and conformance to size tolerances.

6. Related and Complementary Standards

ASTM B88: Standard for Seamless Copper Water Tube. Similar but for plumbing, not typically capped/clean for refrigeration.

ASME B16.22 / ANSI/ASME B16.26: Standards for wrought copper and copper alloy fittings for solder joints, used with ACR tube.

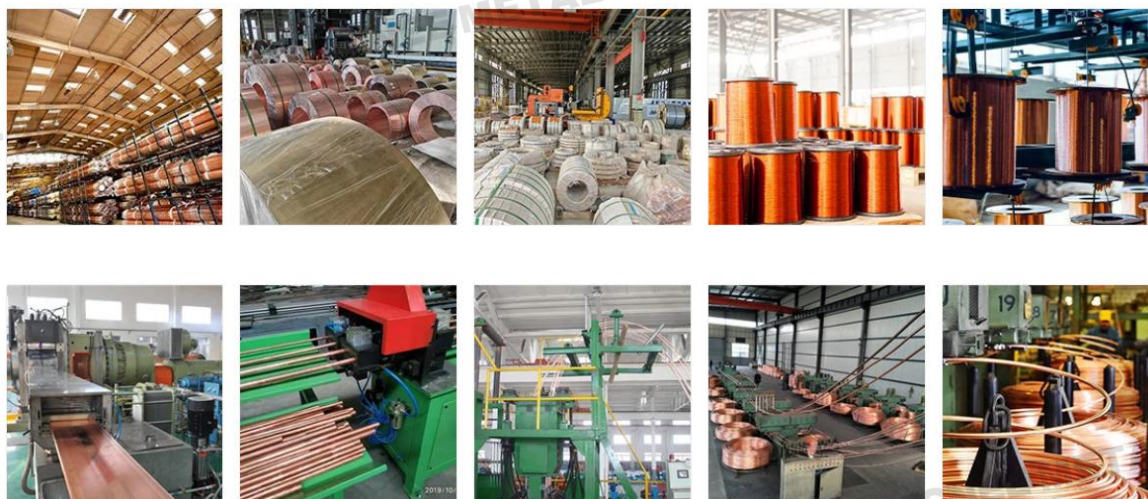
SAE J512: Automotive standard for refrigeration fittings, often referenced alongside B280.

UL 207: Standard for Safety for Refrigerant-Containing Components and Accessories, which may require testing with B280 tube.

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

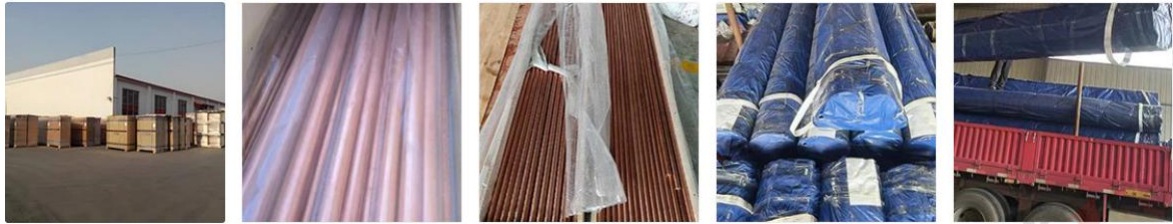
To ensure our products arrive in perfect condition, we use robust packaging:

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.

