Designation: B743 – 23

Standard Specification for Seamless Copper Tube in Coils[1]

This standard is issued under the fixed designation B743; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification establishes the requirements for seamless copper tube in coils, suitable for use in refrigeration and air conditioning or other uses, such as oil lines and gasoline lines.

1.2 *Units*—The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 The tube shall be produced of the following coppers:

Copper Alloy UNS No.	Previously Used Designation	Type of Copper
C10200	OF	Oxygen-free without residual deoxidants[A]
C10300	...	Oxygen-free, extra low phosphorus[A]
C10800	...	Oxygen-free, low phosphorus[A]
C12000	DLP	Phosphorized, low residual phosphorus
C12200	DHP	Phosphorized, high residual phosphorus

[A] See Classification B224.

1.4 The following safety hazards caveat pertains to the test method portion, Section 17, of this specification. *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

B153 Test Method for Expansion (Pin Test) of Copper and Copper-Alloy Pipe and Tubing
B193 Test Method for Resistivity of Electrical Conductor Materials
B224 Classification of Coppers
B251 Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube (Metric) B0251_B0251M
B577 Test Methods for Detection of Cuprous Oxide (Hydrogen Embrittlement Susceptibility) in Copper
B601 Classification for Temper Designations for Copper and Copper Alloys—Wrought and Cast
B846 Terminology for Copper and Copper Alloys
B950 Guide for Editorial Procedures and Form of Product Specifications for Copper and Copper Alloys
E3 Guide for Preparation of Metallographic Specimens
E8/E8M Test Methods for Tension Testing of Metallic Materials
E18 Test Methods for Rockwell Hardness of Metallic Materials
E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
E53 Test Method for Determination of Copper in Unalloyed Copper by Gravimetry (Withdrawn 2022)[3]
E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)[3]
E112 Test Methods for Determining Average Grain Size
E243 Practice for Electromagnetic (Eddy Current) Examination of Copper and Copper-Alloy Tubes
E255 Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition (Withdrawn 2023)[3]
E2575 Test Method for Determination of Oxygen in Copper and Copper Alloys by Inert Gas Fusion

3. General Requirements

3.1 The following sections of Specification B251 constitute a part of this specification:

3.1.1 Sampling,

3.1.2 Number of tests and retests,

3.1.3 Dimensions and permissible variations,

[1] This specification is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.04 on Pipe and Tube.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

***A Summary of Changes section appears at the end of this standard**

TABLE 1 Chemical Requirements

Element	Composition, %				
	Copper Alloy UNS No.				
	C10200[A]	C10300	C10800	C12000	C12200
Copper,[B] min	99.95	...	...	99.90	99.9
Copper + phosphorus, min	...	99.95	99.95	...	...
Phosphorus	...	0.001–0.005	0.005–0.012	0.004–0.012	0.015–0.040

[A] Oxygen in C10200 shall be 10 ppm max.
[B] Silver counting as copper.

3.1.4 Test specimens, and
3.1.5 Significance of numerical limits.

3.2 In addition, when a section with a title identical to those referenced in 3.1 appears in this specification, it contains additional information that supplements those appearing in Specification B251. In case of conflict, this specification shall prevail.

4. Terminology

4.1 *Definitions*—For the definitions of terms related to copper and copper alloys, refer to Terminology B846.

5. Ordering Information

5.1 Include the following specified choices when placing orders for product under this specification, as applicable:
5.1.1 ASTM designation and year of issue;
5.1.2 Copper UNS No. (for example, C12200);
5.1.3 Temper (see Section 8);
5.1.4 Dimensions, diameter, and wall thickness. Dimensional tolerances, if other than those included in this specification, are required;
5.1.5 How furnished: Straight lengths or coils;
5.1.6 Quantity: Total weight or total length or number of pieces of each size (see 14.1 and Table 2);
5.1.7 Type of coil;
5.1.8 Product purchased for agencies of the U.S. Government, it shall conform to the Supplementary Requirements as defined herein.

5.2 The following options are available and, when required, shall be specified at the time of placing the order:
5.2.1 Embrittlement test (see 13.3),
5.2.2 Cleanness Test (see 13.4),
5.2.3 If coil ends are to be sealed (see 13.4.1.1),
5.2.4 Eddy-current test (see 13.1.1),
5.2.5 Expansion test (see 12.1.1),
5.2.6 Electrical resistivity requirement (see 10.1),
5.2.7 Certification (see Section 21),
5.2.8 Test report (see Section 22),
5.2.9 Product certified for ASME Boiler and Pressure Code Applications (see Section 21), and
5.2.10 Heat identification or traceability.

6. Materials and Manufacture

6.1 *Material:*
6.1.1 The material of manufacture shall be a form (cast billet, bar, tube, etc.) of Copper Alloys Nos. C10200, C10300, C10800, C12000, or C12200 and of such purity and soundness as to be suitable for processing into the product prescribed herein.
6.1.2 When specified in the contract or purchase order that heat identification or traceability is required, the purchaser shall specify the details desired.

NOTE 1—Due to the discontinuous nature of the processing of castings into wrought products, it is not always practical to identify a specific casting analysis with a specific quantity of finished material.

6.2 *Manufacture:*
6.2.1 The product shall be manufactured by such hot working, cold working, and annealing processes as to produce a homogenous, uniform wrought structure in the finished product.
6.2.1.1 The product shall be cold drawn to the finish size and wall thickness.
6.2.1.2 When the cold drawn temper is required, the final drawing operation shall be such as to meet the temper properties specified.
6.2.1.3 When the annealed temper is required, the tube shall be annealed to meet the temper properties specified.

7. Chemical Composition

7.1 The material shall conform to the compositional requirements listed in Table 1 for the copper UNS No. designation specified in the ordering information.
7.1.1 Results of analysis on a product (check) sample shall conform to the composition requirements within the permitted analytical variance specified in Table 1.

7.2 These compositional limits do not preclude the presence of other elements. By agreement between the manufacturer and purchaser, limits may be established and analysis required for unnamed elements.

8. Temper

8.1 The standard tempers for products described in this specification are given in Table 3.

TABLE 2 Coil Length Tolerances (Specific Lengths)

Tube Outside Diameter, in. (mm)	Nominal Length, ft (m)	Shortest Permissible Length, % of Nominal Length	Maximum Permissible Weight of Ends, % of Lot Weight	Tolerance All Plus ft (m)
All sizes	Up to 100 (30.5), incl	100	0	1 (0.3)
All sizes	Over 100 (30.5)	40	20	. . .