



**Designation: B 135M – 96
METRIC**

Standard Specification for Seamless Brass Tube [Metric]¹

This standard is issued under the fixed designation B 135M; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers seamless round and rectangular including square copper alloy tube in straight lengths. Ten alloys are specified having the following nominal compositions:

Copper Alloy UNS No.	Previously Used Designation ^A	Nominal Composition, %			
		Copper	Zinc	Lead	Tin
C22000	7	90.0	10.0	...	...
C23000	1	85.0	15.0	...	...
C26000	2	70.0	30.0	...	...
C27000	9	65.0	35.0	...	...
C27200	8	63.0	37.0	...	...
C27400	...	62.5	37.5	...	...
C28000	5	60.0	40.0	...	...
C33000	3	66.0	33.5	0.5	...
C33200	4	66.0	32.4	1.6	...
C37000	6	60.0	39.0	1.0	...
C44300	...	71	27.5	...	1.00

^AAlloy Designations of ASTM Specification B 135 – 63 which was published in the 1966 Book of ASTM Standards, Part 5.

NOTE 1—This specification is the metric companion of Specification B 135.

1.2 **Warning**—Mercury is a definite health hazard in use and disposal. (See 9.1.)

2. Referenced Documents

2.1 The following documents of the issue in effect on date of material purchase form a part of this specification to the extent referenced herein:

2.2 ASTM Standards:

B 153 Test Method for Expansion (Pin Test) of Copper and Copper-Alloy Pipe and Tubing²

B 154 Test Method for Mercurous Nitrate Test for Copper and Copper Alloys²

B 251M Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube [Metric]²

¹ This specification is under the jurisdiction of ASTM Committee B-5 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.04 on Pipe and Tube.

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² Annual Book of ASTM Standards, Vol 02.01.

B 601 Practice for Temper Designations for Copper and Copper Alloys—Wrought and Cast²

E 243 Practice for Electromagnetic (Eddy-Current) Examination of Copper and Copper-Alloy Tubes³

E 527 Practice for Numbering Metals and Alloys (UNS)⁴

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *capable of*—as used in this specification, the test need not be performed by the producer of the material. However, should subsequent testing by the purchaser establish that the material does not meet these requirements the material shall be subject to revision.

4. Ordering Information

4.1 Orders for material under this specification shall include the following information:

4.1.1 Alloy (Section 1),

4.1.2 Temper (Section 6),

4.1.3 Whether tension tests are required (for drawn tempers only (see 7.1)),

4.1.4 Dimensions, the diameter or distance between parallel surfaces and wall thickness (see 10.2 and 10.3),

4.1.5 Length (see 11.4),

4.1.6 Mercurous nitrate test, if required (Section 9),

4.1.7 Total length of each size,

4.1.8 Hydrostatic pressure test, when specified, and

4.1.9 Pneumatic test, when specified.

5. Chemical Composition

5.1 The material shall conform to the chemical requirements specified in Table 1.

5.2 These specification limits do not preclude the presence of other elements. Limits for unnamed elements are to be established by agreement between manufacturer or supplier and purchaser.

5.2.1 For copper alloys in which zinc is specified as the remainder, either copper or zinc shall be permitted to be taken as the difference between the sum of all the elements analyzed and 100 %.

³ Annual Book of ASTM Standards, Vol 03.03.

⁴ Annual Book of ASTM Standards, Vol 01.01.

TABLE 1 Chemical Requirements

Copper Alloy UNS No.	Composition, %					
	Copper	Lead	Arsenic	Tin	Iron, max	Zinc
C22000	89.0–91.0	0.05 max	...	...	0.05	remainder
C23000	84.0–86.0	0.05 max	...	...	0.05	remainder
C26000	68.5–71.5	0.07 max	...	...	0.05	remainder
C27000	63.0–68.5	0.10 max	...	...	0.07	remainder
C27200	62.0–65.0	0.07 max	...	...	0.07	remainder
C27400	61.0–64.0	0.10 max	...	...	0.05	remainder
C28000	59.0–63.0	0.30 max	...	...	0.07	remainder
C33000	65.0–68.0	0.25 ^A –0.7	...	...	0.07	remainder
C33200	65.0–68.0	1.5–2.5	...	...	0.07	remainder
C37000	59.0–62.0	0.9–1.4	...	...	0.15	remainder
C44300	70.0–73.0	0.07 max	0.02–0.06	0.9–1.2	0.06	remainder

^AIn the case of Copper Alloy UNS No. C33000 or tube sizes greater than 127 mm in outside diameter, or distance between outside parallel surfaces, it is permissible to furnish tube with a lead content less than 0.20 %.

5.2.1.1 When all the elements in Table 1 are analyzed, their sum shall be as shown in the following table.

Copper Alloy UNS No.	Copper Plus Named Elements, % min
C22000	99.8
C23000	99.8
C26000	99.7
C27000	99.7
C27200	99.7
C27400	99.7
C28000	99.7
C33000	99.6
C33200	99.6
C37000	99.6
C44300	99.6

6. Temper

6.1 *Drawn Tempers, H*—The tempers of drawn tube shall be designated as light-drawn (H55), drawn (H58), and hard-drawn (H80) (see Table 2). Light-drawn (bending) temper is used only when a tube of some stiffness but yet capable of being bent is

needed. Drawn temper is for general purposes and is most commonly used where there is no specific requirement for high strength on the one hand or for bending qualities on the other. Hard-drawn temper is used only where there is need for a tube as strong as is commercially feasible for the sizes indicated. For any combination of diameter and wall thickness not covered under hard-drawn temper, the values given for drawn temper shall be used. Rectangular including square tubes shall normally be supplied only in drawn (general purpose) temper. When there is a need for light-drawn or hard-drawn tempers these are to be supplied as agreed upon between the manufacturer and the purchaser.

6.2 *Annealed Tempers, O*—The tempers of annealed tube shall be designated as light anneal (O50) and soft anneal (O60) (Table 3).

NOTE 2—Tube of Copper Alloy UNS No. C23000, when specified to meet the requirements of the *ASME Boiler and Pressure Vessel Code*, shall have in the annealed condition a minimum tensile strength of 275 MPa

<https://standards.iteh.ai/catalog/standards/sist/b8737715-03af-4c9e-a19a-5ac35020883f/astm-b135m-96>

TABLE 2 Mechanical Property Requirements of Drawn Temper Tube

Copper Alloy UNS No.	Temper Designations ^A		Outside Diameter, mm or Major Distance Between Outside Parallel Surfaces, mm	Wall Thickness, mm	Tensile Strength MPa	Rockwell Hardness ^B 30T
	Standard	Former				
C22000	{ H58	drawn (general purpose)	all	all	275 min	38 min
	H80	hard-drawn ^C	{ up to 25, incl over 25 to 40, incl over 50 to 100, incl	{ 0.50 to 3.0, incl 0.90 to 5.0, incl 1.5 to 6.0, incl		
C23000	{ H55	light-drawn ^C	all	all	305–400 305 min	43–75 43 min
	H58	drawn (general purpose)	all	all		
C26000, C27000, C27200, C27400, C33000 and C33200	{ H80	hard-drawn ^C	{ up to 25, incl over 25 to 50, incl over 50 to 100, incl	{ 0.50 to 3.0, incl 0.90 to 5.0, incl 1.5 to 6.0, incl	395 min	65 min
	H58	drawn (general purpose)	all	all		
C28000 and C3700 C44300	{ H58	drawn (general purpose)	all	all	370 min	55 min
	H58	drawn (general purpose)	all	all		
	{ H80	hard-drawn ^C	all	all	455 min	70 min

^AStandard designations defined in Practice B 601.

^BRockwell hardness values shall apply only to tubes having a wall thickness of 0.30 mm or over and to round tubes having an inside diameter of 8.0 mm or over and to rectangular including square tubes having an inside major distance between parallel surfaces of 5.0 mm or over. Rockwell hardness shall be made on the inside surface of the tube. When suitable equipment is not available for determining the specified Rockwell hardness, other Rockwell scales and values are permitted to be specified subject to agreement between the manufacturer and the purchaser.

^CLight-drawn and hard-drawn tempers are normally available in round-tube only.