Designation: ~~B251 – 10~~ B251/B251M – 17

Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube[1]

This standard is issued under the fixed designation ~~B251;~~B251/B251M; 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 U.S. Department of Defense.

1. Scope*

1.1 This specification covers a group of general requirements common to several wrought product specifications. Unless otherwise specified in the purchase order, or in an individual specification, these general requirements shall apply to copper and copper-alloy tube supplied under Specifications ~~B68~~B68/B68M, ~~B75~~B75/B75M, ~~B135~~B135/B135M, B466/B466M, B643 and B743.

~~NOTE 1—This specification B251 is the inch-pound companion to B251M; therefore, no SI equivalents are presented in the specification.~~

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 *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 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*:[2]

~~B68~~B68/B68M Specification for Seamless Copper Tube, Bright Annealed
~~B75~~B75/B75M Specification for Seamless Copper Tube
~~B135~~B135/B135M Specification for Seamless Brass Tube ~~[Metric] B0135_B0135M~~
B153 Test Method for Expansion (Pin Test) of Copper and Copper-Alloy Pipe and Tubing
B154 Test Method for Mercurous Nitrate Test for Copper Alloys
B170 Specification for Oxygen-Free Electrolytic Copper—Refinery Shapes
B193 Test Method for Resistivity of Electrical Conductor Materials
B428 Test Method for Angle of Twist in Rectangular and Square Copper and Copper Alloy Tube
B466/B466M Specification for Seamless Copper-Nickel Pipe and Tube
B643 Specification for Copper-Beryllium Alloy Seamless Tube
B743 Specification for Seamless Copper Tube in Coils
B846 Terminology for Copper and Copper Alloys
E3 Guide for Preparation of Metallographic Specimens
~~E8~~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

[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~~standard's Document Summary page on the ASTM website.

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

E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)[3]
E112 Test Methods for Determining Average Grain Size
E255 Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition
E478 Test Methods for Chemical Analysis of Copper Alloys

3. Terminology

~~3.1 *Definitions:*~~

~~3.1.1 *average diameter (for round tubes only)*—the average of the maximum and minimum outside diameters, or maximum and minimum inside diameters, whichever is applicable, as determined at any one cross section of the tube.~~

~~3.1.2 *coil*—a length of the product wound into a series of connected turns. The unqualified term "coil" as applied to tube usually refers to a bunched coil.~~

~~3.1.2.1 *bunched*—a coil in which the turns are bunched and held together such that the cross section of the bunched turns is approximately circular.~~

~~3.1.2.2 *double layer flat*—a coil in which the product is spirally wound into two connected disk-like layers such that one layer is on top of the other. (Sometimes called "double layer pancake coil" or "double layer spirally wound coil.")~~

~~3.1.2.3 *level or traverse wound*—a coil in which the turns are wound into layers parallel to the axis of the coil such that successive turns in a given layer are next to one another. (Sometimes called "helical coil.")~~

~~3.1.2.4 *level or traverse wound on a reel or spool*—a coil in which the turns are positioned into layers on a reel or spool parallel to the axis of the reel or spool such that successive turns in a given layer are next to one another.~~

~~3.1.2.5 *single layer flat*—a coil in which the product is spirally wound into a single disk-like layer. (Sometimes called "pancake coil" or "single layer spirally wound coil.")~~

~~3.1.2.6 *stagger wound*—a coil in which the turns are positioned into layers approximately parallel to the axis of the coil, but not necessarily with the fixed regularity of a level or traverse wound coil.~~

~~3.1.3 *lengths*—straight pieces of the product.~~

~~3.1.3.1 *ends*—straight pieces, shorter than the nominal length, left over after cutting the product into mill lengths, stock lengths, or specific lengths. They are subject to minimum length and maximum weight requirements.~~

~~3.1.3.2 *mill*—straight lengths, including ends, that are conveniently manufactured in the mills. Full-length pieces are usually 10, 12, or 20 ft and subject to established length tolerances.~~

~~3.1.3.3 *multiple*—straight lengths of integral multiples of a base length, with suitable allowance for cutting, if and when specified.~~

~~3.1.3.4 *random*—run of mill lengths without any indicated preferred length.~~

~~3.1.3.5 *specific*—straight lengths that are uniform in length, as specified, and subject to established length tolerances.~~

~~3.1.3.6 *specific with ends*—specific lengths, including ends.~~

~~3.1.3.7 *standard*—uniform lengths recommended in a Simplified Practice Recommendation or established as a Commercial Standard.~~

~~3.1.3.8 *stock*—straight lengths that are mill cut and stored in advance of orders. They are usually 10, 12, or 20 ft and subject to established length tolerances.~~

~~3.1.3.9 *stock with ends*—stock lengths, including ends.~~

~~3.1.4 *reel or spool*—a cylindrical device that has a rim at each end and an axial hole for a shaft or spindle, and on which the product is wound to facilitate handling and shipping.~~

~~3.1.5 *tube*—a hollow product of round or any other cross section, having a continuous periphery.~~

~~3.1.5.1 *tube, automotive and general service*—a seamless copper tube of small diameter conforming to a standard series of sizes commercially known as Automotive and General Service Tube.~~

~~3.1.5.2 *tube, seamless*—a tube produced with a continuous periphery in all stages of the operations.~~

3.1 For definitions of terms related to copper and copper alloys, refer to Terminology B846.

4. Materials and Manufacture

4.1 The material shall be of such quality and purity that the finished product shall have the properties and characteristics prescribed in the applicable product specification listed in Section 1.

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

4.2 The material shall be produced by either hot or cold working operations, or both. It shall be finished, unless otherwise specified, by such cold working and annealing or heat treatment as necessary to meet the properties specified.

5. Dimensions and Permissible Variations

5.1 *General:*

5.1.1 The standard method of specifying wall thickness shall be in decimal fractions of an ~~inch.~~inch or millimeter.

5.1.2 For the purpose of determining conformance with the dimensional requirements prescribed in this specification, any measured value outside the specified limiting values for any dimension shall be cause for rejection.

5.1.3 Tolerances on a given tube shall be specified with respect to any two, but not all three, of the following: outside diameter, inside diameter, wall thickness.

5.1.4 When round tube is ordered by outside and inside diameters, the maximum plus and minus deviation of the wall thickness from the nominal at any point shall not exceed the values given in Table 1 by more than 50 %.

NOTE 1—Blank spaces in the tolerance tables indicate either that the material is not generally available or that no tolerances have been established.

5.2 *Wall Thickness Tolerances for Copper and Copper-Alloy Tube*—Wall thickness tolerances applicable to Specifications ~~B68~~B68/B68M, ~~B75~~B75/B75M, ~~B135~~B135/B135M, and B743 for round tubes only shall be in accordance with Table 1 or Table 2. Wall thickness tolerances for rectangular including square tube applicable to Specifications ~~B75~~B75/B75M and ~~B135~~B135/B135M shall be in accordance with Table ~~2~~3 or Table 4.

5.3 *Diameter or Distance between Parallel Surfaces, Tolerances for Copper and Copper-Alloy Tube*—Diameter tolerances applicable to Specifications ~~B68~~B68/B68M, ~~B75~~B75/B75M, ~~B135~~B135/B135M, and B743 for round tubes only shall be in accordance with Table ~~3~~5 or Table 6. Tolerances on distance between parallel surfaces for rectangular including square tube applicable to Specifications ~~B75~~B75/B75M and ~~B135~~B135/B135M shall be in accordance with Table ~~4~~7 and Table 8.

TABLE 1 Wall Thickness Tolerances for Copper and Copper-Alloy ~~Tube~~
(Applicable to Specifications ~~B68~~, ~~B75~~, ~~B135~~, and B743)

NOTE 1—*Maximum Deviation at Any ~~Point:~~*The following tolerances are plus and minus; if tolerances all plus or all minus are desired, double the values given.

Wall Thickness, in.	Outside Diameter, in.[A]						
	1/32 to 1/8, incl	Over 1/8 to 5/8, incl	Over 5/8 to 1, incl	Over 1 to 2, incl	Over 2 to 4, incl	Over 4 to 7, incl	Over 7 to 10, incl
~~Up to 0.017, incl~~	~~0.002~~	~~0.001~~	~~0.0015~~	~~0.002~~	...	...	...
~~Over 0.017–0.024, incl~~	~~0.003~~	~~0.002~~	~~0.002~~	~~0.0025~~	...	...	...
~~Over 0.024–0.034, incl~~	~~0.003~~	~~0.0025~~	~~0.0025~~	~~0.003~~	~~0.004~~	...	...
~~Over 0.034–0.057, incl~~	~~0.003~~	~~0.003~~	~~0.0035~~	~~0.0035~~	~~0.005~~	~~0.007~~	...
~~Over 0.057–0.082, incl~~	...	~~0.0035~~	~~0.004~~	~~0.004~~	~~0.006~~	~~0.008~~	~~0.010~~
~~Over 0.082–0.119, incl~~	...	~~0.004~~	~~0.005~~	~~0.005~~	~~0.007~~	~~0.009~~	~~0.011~~
~~Over 0.119–0.164, incl~~	...	~~0.005~~	~~0.006~~	~~0.006~~	~~0.008~~	~~0.010~~	~~0.012~~
~~Over 0.164–0.219, incl~~	...	~~0.007~~	~~0.009~~	~~0.009~~	~~0.011~~	~~0.012~~	~~0.014~~
~~Over 0.219–0.283, incl~~	...	...	~~0.011~~	~~0.012~~	~~0.014~~	~~0.015~~	~~0.016~~
~~Over 0.283–0.379, incl~~	...	...	~~0.014~~	~~6[B] %~~	~~6[B] %~~	~~7[B] %~~	~~7[B] %~~
~~Over 0.379~~	...	...	...	~~6[B] %~~	~~6[B] %~~	~~7[B] %~~	~~7[B] %~~

TABLE 1 Wall Thickness Tolerances for Copper and Copper-Alloy Tube—Inch-Pound Values
(Applicable to Specifications B68/B68M, B75/B75M, B135/B135M, and B743)

NOTE 1—*Maximum Deviation at Any Point*—The following tolerances are plus and minus; if tolerances all plus or all minus are desired, double the values given.

Wall Thickness, in.	Outside Diameter, in.[A]						
	1/32 to 1/8, incl	Over 1/8 to 5/8, incl	Over 5/8 to 1, incl	Over 1 to 2, incl	Over 2 to 4, incl	Over 4 to 7, incl	Over 7 to 10, incl
Up to 0.017, incl	0.002	0.001	0.0015	0.002	...	...	...
Over 0.017 to 0.024, incl	0.003	0.002	0.002	0.0025	...	...	...
Over 0.024 to 0.034, incl	0.003	0.0025	0.0025	0.003	0.004	...	...
Over 0.034 to 0.057, incl	0.003	0.003	0.0035	0.0035	0.005	0.007	...
Over 0.057 to 0.082, incl	...	0.0035	0.004	0.004	0.006	0.008	0.010
Over 0.082 to 0.119, incl	...	0.004	0.005	0.005	0.007	0.009	0.011
Over 0.119 to 0.164, incl	...	0.005	0.006	0.006	0.008	0.010	0.012
Over 0.164 to 0.219, incl	...	0.007	0.009	0.009	0.011	0.012	0.014
Over 0.219 to 0.283, incl	...	...	0.011	0.012	0.014	0.015	0.016
Over 0.283 to 0.379, incl	...	...	0.014	6[B] %	6[B] %	7[B] %	7[B] %
Over 0.379	...	...	...	6[B] %	6[B] %	7[B] %	7[B] %

[A] When round tube is ordered by outside and inside diameters, the maximum plus and minus deviation of the wall thickness from the nominal at any point shall not exceed the values given in the table by more than 50 ~~percent.~~%.
[B] Percent of specified wall expressed to the nearest 0.001 in.

TABLE 2 Wall Thickness Tolerances for Copper and Copper-Alloy Tube—SI Values
(Applicable to Specifications B68/B68M, B75/B75M, and B135/B135M)

NOTE 1—*Maximum Deviation at Any Point*—The following tolerances are plus and minus; if tolerances all plus or all minus are desired, double the values given.

Wall Thickness, mm	Outside Diameter, mm[A]						
	0.80 to 3.0, incl	Over 3.0 to 16, incl	Over 16 to 25, incl	Over 25 to 50, incl	Over 50 to 100, incl	Over 100 to 180, incl	Over 180 to 250, incl
Up to 0.40, incl	0.05	0.03	0.04	0.05	...	...	...
Over 0.40 to 0.60, incl	0.08	0.05	0.05	0.06	...	...	...
Over 0.60 to 0.90, incl	0.08	0.06	0.06	0.08	0.10	...	...
Over 0.90 to 1.5, incl	0.08	0.08	0.09	0.09	0.12	0.20	...
Over 1.5 to 2.0, incl	...	0.09	0.10	0.10	0.15	0.20	0.25
Over 2.0 to 3.0, incl	...	0.10	0.12	0.12	0.20	0.20	0.28
Over 3.0 to 4.0, incl	...	0.12	0.15	0.15	0.20	0.25	0.30
Over 4.0 to 5.5, incl	...	0.20	0.20	0.20	0.25	0.30	0.35
Over 5.5 to 7.0, incl	...	...	0.25	0.25	0.30	0.35	0.40
Over 7.0 to 10, incl	...	...	0.30	5[B] %	5[B] %	6[B] %	6[B] %
Over 10	...	...	...	5[B] %	5[B] %	6[B] %	6[B] %

[A] When round tube is ordered by outside and inside diameters, the maximum plus and minus deviation of the wall thickness from the nominal at any point shall not exceed the values given in the table by more than 50 %.
[B] Percent of specified wall expressed to the nearest 0.025 mm.

TABLE 2 Wall Thickness Tolerances for Copper and Copper-Alloy Rectangular and Square ~~Tube~~
(Applicable to Specifications ~~B75~~, ~~B135~~, and B743)

NOTE 1—*Maximum ~~deviation~~ at ~~any point.~~* The following tolerances are plus and minus; if tolerances all plus or all minus are desired, double the values given.

~~Wall~~ Thickness, in.	Distance Between Outside Parallel Surface, in.[A]						
	1/32 to 1/8, incl	Over 1/8 to 5/8, incl	Over 5/8 to 1, incl	Over 1 to 2, incl	Over 2 to 4, incl	Over 4 to 7, incl	Over 7 to 10, incl
~~Up to 0.017, incl~~	~~0.002~~	~~0.002~~	~~0.0025~~	~~0.003~~	~~...~~	~~...~~	~~...~~
~~Over 0.017–0.024, incl~~	~~0.003~~	~~0.0025~~	~~0.003~~	~~0.0035~~	~~...~~	~~...~~	~~...~~
~~Over 0.024–0.034, incl~~	~~0.0035~~	~~0.0035~~	~~0.0035~~	~~0.004~~	~~0.006~~	~~...~~	~~...~~
~~Over 0.034–0.057, incl~~	~~0.004~~	~~0.004~~	~~0.0045~~	~~0.005~~	~~0.007~~	~~0.009~~	~~...~~
~~Over 0.057–0.082, incl~~	~~...~~	~~0.005~~	~~0.006~~	~~0.007~~	~~0.008~~	~~0.010~~	~~0.012~~
~~Over 0.082–0.119, incl~~	~~...~~	~~0.007~~	~~0.008~~	~~0.009~~	~~0.010~~	~~0.012~~	~~0.014~~
~~Over 0.119–0.164, incl~~	~~...~~	~~0.009~~	~~0.010~~	~~0.011~~	~~0.012~~	~~0.014~~	~~0.016~~
~~Over 0.164–0.219, incl~~	~~...~~	~~0.011~~	~~0.012~~	~~0.013~~	~~0.015~~	~~0.017~~	~~0.019~~
~~Over 0.219–0.283, incl~~	~~...~~	~~...~~	~~0.015~~	~~0.016~~	~~0.018~~	~~0.020~~	~~0.022~~

TABLE 3 Wall Thickness Tolerances for Copper and Copper-Alloy Rectangular and Square Tube—Inch-Pound Values
(Applicable to Specifications B75/B75M, B135/B135M, and B743)

NOTE 1—*Maximum Deviation at Any Point*—The following tolerances are plus and minus; if tolerances all plus or all minus are desired, double the values given.

Wall Thickness, in.	Distance Between Outside Parallel Surface, in.[A]						
	1/32 to 1/8, incl	Over 1/8 to 5/8, incl	Over 5/8 to 1, incl	Over 1 to 2, incl	Over 2 to 4, incl	Over 4 to 7, incl	Over 7 to 10, incl
Up to 0.017, incl	0.002	0.002	0.0025	0.003	...	...	...
Over 0.017 to 0.024, incl	0.003	0.0025	0.003	0.0035	...	...	...
Over 0.024 to 0.034, incl	0.0035	0.0035	0.0035	0.004	0.006	...	...
Over 0.034 to 0.057, incl	0.004	0.004	0.0045	0.005	0.007	0.009	...
Over 0.057 to 0.082, incl	...	0.005	0.006	0.007	0.008	0.010	0.012
Over 0.082 to 0.119, incl	...	0.007	0.008	0.009	0.010	0.012	0.014
Over 0.119 to 0.164, incl	...	0.009	0.010	0.011	0.012	0.014	0.016
Over 0.164 to 0.219, incl	...	0.011	0.012	0.013	0.015	0.017	0.019
Over 0.219 to 0.283, incl	...	...	0.015	0.016	0.018	0.020	0.022

[A] In the case of rectangular tube the major dimension determines the thickness tolerance applicable to all walls.

5.4 *Roundness (Applicable to Specifications ~~B75~~B75/B75M, ~~B135~~B135/B135M, and B466/B466M)*—For drawn unannealed tube in straight lengths, the roundness tolerances shall be as follows:

~~t/D (Ratio of Wall Thickness to Outside Diameter)~~	~~Roundness Tolerance as Percent of Outside Diameter (Expressed to the Nearest 0.001 in.)~~
~~0.01–0.03, incl~~	~~1.5~~
~~Over 0.03–0.05, incl~~	~~1.0~~
~~Over 0.05–0.10, incl~~	~~0.8 or 0.002 in. whichever is greater~~
Over 0.10	0.7 or 0.002 in. whichever is greater

TABLE 4 Wall Thickness Tolerances for Copper and Copper-Alloy Rectangular and Square Tube—SI Values
(Applicable to Specifications B75/B75M and B135/B135M)

NOTE 1—*Maximum Deviation at Any Point*—The following tolerances are plus and minus; if tolerances all plus or all minus are desired, double the values given.

Wall Thickness, mm	Distance Between Outside Parallel Surface, mm[A]						
	0.80 to 3.0, incl	3.0 to 16, incl	16 to 25, incl	25 to 50, incl	50 to 100, incl	100 to 180, incl	180 to 250, incl
Up to 0.40, incl	0.05	0.05	0.06	0.08	...	...	...
Over 0.40 to 0.60, incl	0.08	0.06	0.08	0.09	...	...	...
Over 0.60 to 0.90, incl	0.09	0.09	0.09	0.10	0.15	...	...
Over 0.90 to 1.5, incl	0.10	0.10	0.12	0.12	0.20	0.25	...
Over 1.5 to 2.0, incl	...	0.12	0.15	0.20	0.20	0.25	0.30
Over 2.0 to 3.0, incl	...	0.20	0.20	0.25	0.25	0.30	0.35
Over 3.0 to 4.0, incl	...	0.25	0.25	0.28	0.30	0.36	0.40
Over 4.0 to 5.5, incl	...	0.28	0.30	0.33	0.38	0.45	0.50
Over 5.5 to 7.0, incl	...	...	0.38	0.40	0.45	0.50	0.55

[A] In the case of rectangular tube, the major dimension determines the thickness tolerance applicable to all walls.

TABLE 35 Average Diameter Tolerances for Copper and Copper-Alloy Tube[A] —Inch-Pound Values
(Applicable to Specifications ~~B68~~B68/B68M, ~~B75~~B75/B75M, ~~B135~~B135/B135M, and B743)

Specified Diameter, in.	Tolerance, Plus and Minus, in.
Up to ⅛, incl	0.002
~~Over ⅛ – ⅝, incl~~	~~0.002~~
Over ⅛ to ⅝, incl	0.002
~~Over ⅝ – 1, incl~~	~~0.0025~~
Over ⅝ to 1, incl	0.0025
~~Over 1–2, incl~~	~~0.003~~
Over 1 to 2, incl	0.003
~~Over 2–3, incl~~	~~0.004~~
Over 2 to 3, incl	0.004
~~Over 3–4, incl~~	~~0.005~~
Over 3 to 4, incl	0.005
~~Over 4–5, incl~~	~~0.006~~
Over 4 to 5, incl	0.006
~~Over 5–6, incl~~	~~0.007~~
Over 5 to 6, incl	0.007
~~Over 6–8, incl~~	~~0.008~~
Over 6 to 8, incl	0.008
~~Over 8–10, incl~~	~~0.010~~
Over 8 to 10, incl	0.010

[A] Applicable to inside or outside diameter.

TABLE 6 Average Diameter Tolerances for Copper and Copper-Alloy Tube[A] —SI Values
(Applicable to Specifications B68/B68M, B75/B75M, and B135/B135M)

Specified Diameter, mm	Tolerance, Plus and Minus, mm
Up to 3.0, incl	0.05
Over 3.0 to 16, incl	0.05
Over 16 to 25, incl	0.06
Over 25 to 50, incl	0.08
Over 50 to 75, incl	0.10
Over 75 to 100, incl	0.12
Over 100 to 125, incl	0.15
Over 125 to 150, incl	0.18
Over 150 to 200, incl	0.20
Over 200 to 250, incl	0.25

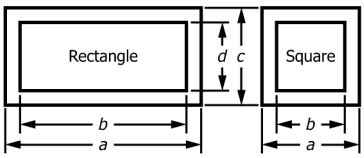
[A] Applicable to inside or outside diameter.

TABLE 47 Tolerances on Distance Between Parallel Surfaces for Copper and Copper-Alloy Rectangular and Square ~~Tube~~Tube—Inch-Pound Values

(Applicable to Specifications ~~B75~~B75/B75M, ~~B135~~B135/B135M, and B743)

NOTE 1—The following tolerances are plus and minus; if tolerances all plus or all minus are desired, double the values given.

Dimension *a* or *b* (see sketches), in.	Tolerances, in.
Up to ⅛, incl	0.003
Over ⅛ –⅝, incl	0.004
~~Over ⅝ –1, incl~~	~~0.005~~
Over ⅝ to 1, incl	0.005
~~Over 1–2, incl~~	~~0.006~~
Over 1 to 2, incl	0.006
~~Over 2–3, incl~~	~~0.007~~
Over 2 to 3, incl	0.007
~~Over 3–4, incl~~	~~0.008~~
Over 3 to 4, incl	0.008
~~Over 4–5, incl~~	~~0.009~~
Over 4 to 5, incl	0.009
~~Over 5–6, incl~~	~~0.010~~
Over 5 to 6, incl	0.010
~~Over 6–8, incl~~	~~0.011~~
Over 6 to 8, incl	0.011
~~Over 8–10, incl~~	~~0.012~~
Over 8 to 10, incl	0.012



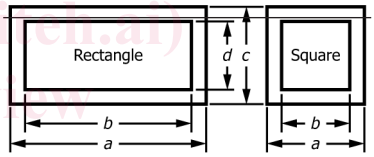
Nominal dimension *a* determines tolerance applicable to both *a* and *c*.
Nominal dimension *b* determines tolerance applicable to both *b* and *d*.

TABLE 8 Tolerances on Distance Between Parallel Surfaces for Copper and Copper-Alloy Rectangular and Square Tube—SI Values

(Applicable to Specifications B75/B75M and B135/B135M)

NOTE 1—The following tolerances are plus and minus; if tolerances all plus or all minus are desired, double the values given.

Dimension *a* or *b* (see sketches), mm	Tolerances, mm
Up to 3.0, incl	0.08
Over 3.0 to 16, incl	0.10
Over 16 to 25, incl	0.12
Over 25 to 50, incl	0.15
Over 50 to 100, incl	0.20
Over 100 to 120, incl	0.25
Over 150 to 200, incl	0.30
Over 200 to 250, incl	0.30



t/D (Ratio of Wall Thickness to Outside Diameter)	Roundness Tolerance as Percent of Outside Diameter (Expressed to the Nearest 0.001 in. [0.025 mm])
0.01 to 0.03, incl	1.5 [1.5]
Over 0.03 to 0.05, incl	1.0 [1.0]
Over 0.05 to 0.10, incl	0.8 or 0.002 in. [mm] whichever is greater
Over 0.10	0.7 or 0.002 in. [mm] whichever is greater

5.4.1 Compliance with the roundness tolerances shall be determined by taking measurements on the outside diameter only, irrespective of the manner in which the tube dimensions are specified. The deviation from roundness is measured as the difference between major and minor diameters as determined at any one cross section of the tube. The major and minor diameters are the diameters of two concentric circles just enclosing the outside surface of the tube at the cross section.

5.4.2 No tolerances have been established for as-extruded tube, redraw tube, annealed tube, any tube furnished in coils or drawn tube whose wall thickness is under 0.016 in. [0.4 mm].

5.5 *Length Tolerances:*

5.5.1 *Straight Lengths*—Length tolerances, straight lengths, applicable to Specifications ~~B68~~B68/B68M, ~~B75~~B75/B75M, ~~B135~~B135/B135M, and B466/B466M shall be in accordance with Table ~~5~~9 or Table 10.

5.5.2 *Schedule of Tube Lengths*—Specific and stock lengths of tube with ends, applicable to Specifications ~~B68~~B68/B68M, ~~B75~~B75/B75M, ~~B135~~B135/B135M, and B466/B466M, shall be in accordance with Table ~~6~~11 or Table 12. Tube in straight lengths shall be furnished in stock lengths with ends, unless the order requires specific lengths or specific lengths with ends.

5.6 *Squareness of Cut (Applicable to Specifications ~~B68~~B68/B68M, ~~B75~~B75/B75M, ~~B135~~B135/B135M, and B466/B466M)*—For tube in straight lengths, the departure from squareness of the end of any tube shall not exceed the following:

5.6.1 *Round Tube:*