



Designation: B837 – 01 (Reapproved 2009)

Standard Specification for Seamless Copper Tube for Natural Gas and Liquefied Petroleum (LP) Gas Fuel Distribution Systems¹

This standard is issued under the fixed designation B837; 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 Type GAS seamless Copper UNS No. C12200 tube for use in above ground natural gas and liquefied petroleum (LP) gas fuel distribution systems, commonly assembled with flared fittings or brazed joints.

1.2 O60 (soft annealed) temper gas tube is produced in the range of standard sizes $\frac{3}{8}$ – to $\frac{7}{8}$ –in. outside diameter; H58 (drawn general purpose) temper gas tube is produced in the range of standard sizes $\frac{3}{8}$ – to $1\frac{1}{8}$ –in. outside diameter.

1.3 O60 (soft annealed) temper gas tube systems are normally assembled with single 45° flared fittings, although brazed connections using wrought or cast fittings may be permitted by local or code requirements. H58 (drawn general purpose) temper gas tube systems are assembled with brazed connections.

NOTE 1—Tube temper and applicable size are determined by installation code requirements.

1.4 Flared fittings used with seamless copper tube for natural gas and liquefied petroleum (LP) gas fuel distribution systems shall be free of residual stresses.

1.5 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.

2. Referenced Documents

2.1 ASTM Standards:²

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.

Current edition approved Oct. 1, 2009. Published January 2010. Originally approved in 1993. Last previous edition approved in 2001 as B837 – 01. DOI: 10.1520/B0837-01R09.

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.

B153 Test Method for Expansion (Pin Test) of Copper and Copper-Alloy Pipe and Tubing
B601 Classification for Temper Designations for Copper and Copper Alloys—Wrought and Cast
B846 Terminology for Copper and Copper Alloys
E3 Guide for Preparation of Metallographic Specimens
E8 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
E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods)
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

3. Terminology

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

3.2 Definitions:

3.2.1 *coil, n*—a length of tube formed into a series of connected turns. The unqualified term “coil” as applied to tube usually refers to a bunch coil.

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

3.2.1.2 *coil, double-layer flat, n*—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 (a double-layer pancake coil or a double-layer spirally wound coil).

3.2.1.3 *coil, level or traverse wound, n*—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 adjoining one another (sometimes called a helical coil).



3.2.1.4 *coil, single-layer flat, n*—a coil in which the product is spirally wound into a single disk-like layer (a pancake coil or a single-layer spirally wound coil).

3.2.2 *liquified petroleum (LP) gas, n*—any of the following hydrocarbons or mixtures of them: propane, propylene, butane (normal butane or isobutane) and butylene.

3.2.3 *tube, gas, n*—tube specifically intended for use in above ground and natural gas and liquified petroleum gas fuel distribution systems and conforming to the particular dimensions known as Type GAS.

3.3 Definitions of Terms Specific to This Standard:

3.3.1 “*capable of*”, *adj*—as used in this specification the test need not be performed by the producer of the material to confirm capability. However, should subsequent testing by the purchaser establish that the material did not conform to the requirements of this specification, the material shall be subject to rejection.

4. Ordering Information

- 4.1 Include the following information in orders for product.
 - 4.1.1 Type GAS tube (Table 1),
 - 4.1.2 Standard size (Table 1),
 - 4.1.3 Temper (Sections 5 and 7),
 - 4.1.4 Whether tension tests, Rockwell Hardness tests, and grain size determinations are required (Section 8),
 - 4.1.5 Whether an expansion test is required (Section 9),
 - 4.1.6 Length (11.5—Table 2),
 - 4.1.7 Whether the tube is to be furnished in straight lengths or coils,
 - 4.1.8 Quantity: number of straight lengths or coils required,
 - 4.1.9 Certification, if required (Section 20), and
 - 4.1.10 Mill test report, if required (Section 21).
- 4.2 In addition, when material is purchased for agencies of the U.S. government, it shall conform to the Supplementary Requirements as defined herein, when specified in the contract or purchase order.

5. Materials and Manufacture

5.1 The material shall be of such quality and purity that the finished tube shall have the properties and characteristics prescribed in this specification and shall be cold drawn to size.

5.2 The tube shall be finished by such cold-working and annealing operations as are necessary to produce the required temper and surface finish.

5.3 Tubes furnished in coils shall be annealed after coiling.

TABLE 2 Standard Lengths^A and Tolerances

Standard Size, in.	Standard Length		Tolerance, all plus	
	ft.	(m)	in.	(mm)
Tubes Furnished in Straight Lengths				
3/8 – 1 1/8	12	(3.7)	1	(25)
	20	(6.1)	1	(25)
Tubes Furnished in Coils				
3/8 – 7/8	60	(18)	24	(600)
	100	(30.5)	24	(600)

^ALonger lengths are subject to agreement between the manufacturer or supplier and purchaser.

5.4 Tubes in straight lengths shall be furnished in the H58 (Drawn General Purpose) temper, except when the O60 (Soft Anneal) temper is specified in the purchase order or contract.

6. Chemical Composition

6.1 The material shall conform to the following chemical requirements of Copper UNS No. C12200:

Copper (incl. silver)	99.9 % min.
Phosphorus	0.015 to 0.040 %

6.2 These composition limits do not preclude the presence of other elements. Limits for unnamed elements may be established by agreement between the manufacturer or supplier and the purchaser.

7. Temper

7.1 Type GAS copper tube shall be furnished in either of the following tempers as defined in Classification B601.

Soft anneal	O60
Drawn general purpose	H58

8. Mechanical Property Requirements

8.1 The tube shall conform to the mechanical property requirements specified in Table 3. Tension tests and grain size determination need not be made except when requested by the purchaser in the ordering document. Where agreement on Rockwell Hardness tests cannot be reached, the tensile strength and grain size requirements of Table 3 shall be the basis for acceptance or rejection.

9. Expansion Test

9.1 The soft anneal (O60) temper tube shall be capable of being expanded in accordance with Test Method B153 with expansion of the outside diameter in the following amount:

TABLE 1 Dimensions, Mass and Tolerances in Diameter and Wall Thickness for Standard Sizes of Type GAS Seamless Copper Tube for Natural Gas and Propane Fuel Distribution Systems (All Tolerances in This Table Are Plus and Minus)

Standard Size, in.	Actual Outside Diameter		Average Outside Diameter ^A Tolerances				Wall Thickness and Tolerance				Theoretical Mass	
	in.	(mm)	Annealed		Drawn		Wall Thickness		Tolerance ^B		lbs/ft	(kg/m)
			in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)		
3/8	0.375	(9.52)	0.002	(0.051)	0.001	(0.025)	0.030	(0.762)	0.003	(0.076)	0.126	(0.187)
1/2	0.500	(12.7)	0.0025	(0.064)	0.001	(0.025)	0.035	(0.889)	0.004	(0.10)	0.198	(0.146)
5/8	0.625	(15.9)	0.0025	(0.064)	0.001	(0.025)	0.040	(1.02)	0.004	(0.10)	0.285	(0.424)
3/4	0.750	(19.1)	0.0025	(0.064)	0.001	(0.025)	0.042	(1.07)	0.004	(0.10)	0.362	(0.539)
7/8	0.875	(22.3)	0.003	(0.076)	0.001	(0.025)	0.045	(1.14)	0.004	(0.10)	0.455	(0.677)
1 1/8	1.125	(29)	...	...	0.0015	(0.038)	0.050	(1.27)	0.005	(0.13)	0.655	(0.975)

^AThe average outside diameter of a tube is the average of the maximum and minimum outside diameter, as determined at any one cross section of the tube.

^BMaximum permissible deviation at any one point.

