Designation: B42 – 15a

Standard Specification for Seamless Copper Pipe, Standard Sizes[1]

This standard is issued under the fixed designation B42; 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[2] establishes the requirements for seamless copper pipe in all nominal or standard pipe sizes, both regular and extra-strong, suitable for use in plumbing, boiler feed lines, and for similar purposes.[3]

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

1.3 The following safety hazard caveat pertains only to the test methods described in this specification.

1.3.1 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[4]

B153 Test Method for Expansion (Pin Test) of Copper and Copper-Alloy Pipe and Tubing

B170 Specification for Oxygen-Free Electrolytic Copper—Refinery Shapes

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

B968/B968M Test Method for Flattening of Copper and Copper-Alloy Pipe and Tube

E8/E8M Test Methods for Tension Testing 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E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)[5]

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

E478 Test Methods for Chemical Analysis of Copper Alloys

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

3. Terminology

3.1 *Definitions:*

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

4. Ordering Information

4.1 Include the following specified choices when placing orders for product under this specification as applicable:

4.1.1 ASTM designation and year of issue,

4.1.2 Copper UNS No. designation, if required, (see Chemical Composition section),

4.1.3 Temper (see Temper section and Table 2),

4.1.4 Pipe size, regular or extra-strong, (see Dimensions section and Table 3),

4.1.5 Length (see 10.3) if different than standard,

4.1.6 Total length of each size,

4.2 The following options are available, but may not be included unless specified at the time of placing of the order when required:

[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 July 1, 2015. Published July 2015. Originally approved in 1922. Last previous edition approved in 2015 as B42 – 15. DOI: 10.1520/B0042-15A.

[2] For *ASME Boiler and Pressure Vessel Code* applications, see related Specification SB-42 in Section II of that Code.

[3] The UNS system for copper and copper alloys (see Practice E527) is a simple expansion of the former standard designation system accomplished by the addition of a prefix "C" and a suffix "00." The suffix can be used to accommodate composition variations of the base alloy.

[4] 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.

[5] 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**

4.2.1 If product is ordered for ASME Boiler and Pressure Vessel Code Application (See Certification Section).

4.2.2 If product is required for bending (see 6.2) and the temper to be furnished,

4.2.3 Certification, if required (see Certification section),

4.2.4 Test report, if required (see Test Report section),

4.2.5 Hydrostatic test, if required (see Nondestructive Testing section),

4.2.5.1 If hydrostatic test pressure above 1000 psi is required,

4.2.6 Pneumatic test, if required (see Nondestructive Testing section).

4.2.7 If product is purchased for agencies of the U.S. Government (see the Other Requirements section of this specification, and

4.2.8 If specification number is required to be shown on each shipping unit (see Packaging and Package Marking section)

5. Chemical Composition

5.1 The material shall conform to the following chemical requirements:

Copper (incl silver), min, %	99.9
Phosphorus, max, %	0.04

5.2 The pipe shall be produced from one of the following coppers, and unless otherwise specified, anyone of them is permitted to be furnished:

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

5.3 When the copper UNS No. designation is specified, the material shall conform to the chemical requirements specified in Table 1.

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

6. Temper

6.1 The standard tempers as prescribed in Classification B601, for products described in this specification are:

6.1.1 Annealed O61

6.1.2 Light Drawn H55

6.1.3 Hard Drawn H80

6.2 When pipe is required for bending, it shall be so specified in the purchase order, and the pipe shall be furnished in the temper agreed upon between the manufacturer or supplier and the purchaser.

TABLE 1 Chemical Requirements

Copper UNS No.	Copper (incl Silver), min, %	Phosphorus, %
C10200[A]	99.95	...
C10300	99.95[B]	0.001 to 0.005
C10800	99.95[B]	0.005 to 0.012
C12000	99.90	0.004 to 0.012
C12200	99.9	0.015 to 0.040

[A] Oxygen in C10200 shall be 10 ppm max.
[B] Copper + silver + phosphorus.

7. Mechanical Property Requirements

7.1 *Tensile Strength Requirements:*

7.1.1 Product furnished under this specification shall conform to the tensile requirements prescribed in Table 2, when tested in accordance with Test Methods E8/E8M.

8. Performance Requirements

8.1 *Expansion Test:*

8.1.1 Pipe ordered in the annealed (O61) temper, selected for test, shall withstand an expansion of 25 % of the outside diameter when expanded in accordance with Test Method B153. The expanded pipe shall show no cracking or rupture visible to the unaided eye. Pipe ordered in the drawn tempers H55 or H80 are not subject to this test.

NOTE 1—The term "unaided eye," as used herein, permits the use of corrective spectacles necessary to obtain normal vision.

8.2 *Flattening Test:*

8.2.1 As an alternative to the expansion test for pipe over 4 in. (102 mm) in diameter in the annealed temper, a flattening test in accordance with Test Method B968/B968M shall be performed.

8.3 *Microscopical Examination:*

8.3.1 The pipe shall be made from copper that is free of cuprous oxide as determined by microscopical examination in accordance with Method A of Test Methods B577 at a 75× magnification.

8.3.2 When Copper UNS No. C12200 is supplied, microscopical examination for cuprous oxide is not required.

9. Other Requirements

9.1 *Nondestructive Testing:*

9.1.1 The material shall be tested in the final size but is permitted to be tested before the final anneal or heat treatment, when these thermal treatments are required, unless otherwise agreed upon by the manufacturer or supplier and purchaser.

TABLE 2 Tensile Requirements

Temper Designation		Pipe Size Nominal or Standard, in.	Tensile Strength, min, ksi[A] (MPa)[B]	Yield Strength,[C] min. ksi[A] (MPa)[B]
Code	Name			
O61	annealed	all	30 (205)	9 (60)[D]
H80	hard drawn	⅛ –2, incl	45 (310)	40 (275)
H80	hard drawn	over 2	38 (260)	32 (220)
H55	light drawn	2–12, incl	36 (250)	30 (205)

[A] ksi = 1000 psi.
[B] See Appendix X1.
[C] At 0.5 % extension under load.
[D] Light-straightening operation is permitted.

9.2 *Eddy-Current Test*—Each piece of material from ⅛-in. up to and including 2½-in. nominal outside diameter, or within the capabilities of the eddy-current tester, shall be subjected to an eddy-current test. Testing shall follow the procedures of Practice E243, except for determination of "end effect." The material shall be passed through an eddy-current testing unit adjusted to provide information on the suitability of the material for the intended application.

9.2.1 Notch-depth standards rounded to the nearest 0.001 in. (0.025 mm) shall be 10 % of the nominal wall thickness. The notch depth tolerance shall be ±0.0005 in. (0.013 mm). Alternatively, when a manufacturer uses speed-insensitive equipment that allows the selection of a maximum imbalance signal, a maximum imbalance signal of 0.3 % is permitted to be used.

9.2.2 Material that does not actuate the signaling device of the eddy-current test shall be considered as conforming to the requirements of this test. Material with discontinuities indicated by the testing unit is permitted to be reexamined or retested, at the option of the manufacturer, to determine whether the discontinuity is cause for rejection. Signals that are found to have been caused by minor mechanical damage, soil, or moisture shall not be cause for rejection of the material provided the dimensions of the material are still within prescribed limits and the material is suitable for its intended application.

9.3 *Hydrostatic Test*—When specified, the material shall stand, without showing evidence of leakage, an internal hydrostatic pressure sufficient to subject the material to a fiber stress of 6000 psi (41 MPa), determined by the following equation for thin hollow cylinders under tension. The material need not be tested at a hydrostatic pressure of over 1000 psi (6.9 MPa) unless so specified.

$$P = 2St/(D - 0.8t) \quad (1)$$

where:

P = hydrostatic pressure, psi (or MPa);
t = wall thickness of the material, in. (or mm);
D = outside diameter of the material in. (or mm); and
S = allowable stress of the material, psi (or MPa).

9.4 *Pneumatic Test*—When specified, the material shall be subjected to an internal air pressure of 60 psi (415 kPa) minimum for 5 s without showing evidence of leakage. The test method used shall permit easy visual detection of any leakage, such as by having the material under water or by the pressure-differential method. Any evidence of leakage shall be cause for rejection.

9.5 *Purchases for U.S. Government*—If the product is purchased for agencies of the U.S. Government, when specified in the contract or purchase order, the product furnished shall conform to the conditions specified in the Supplementary Requirements of this specification.

10. Dimensions and Permissible Variations

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

10.2 *Standard Dimensions, Wall Thickness, and Diameter Tolerances*—The standard dimensions, wall thickness, and diameter tolerances shall be in accordance with Table 3.

10.3 *Length and Length Tolerances*—The standard length of copper pipe is 12 ft (3.66 m) with a tolerance of ±½ in. (13 mm).

10.4 *Roundness:*

10.4.1 For pipe of H (drawn) tempers in straight lengths, the roundness tolerances shall be as follows:

t/d (ratio of Wall Thickness to Outside Diameter)	Roundness Tolerances as Percent of Outside Diameter (Expressed to the Nearest 0.001 in. (0.025 mm))
0.01 to 0.03, incl	1.5
Over 0.03 to 0.05, incl	1.0
Over 0.05 to 0.10, incl	0.8
Over 0.10	0.7

10.4.2 Compliance with the roundness tolerance shall be determined by taking measurements on the outside diameter only, irrespective of the manner in which the pipe dimensions are specified.

10.4.3 The deviation from roundness is measured as the difference between major and minor diameters as determined at any one cross section of the tube.

10.5 *Squareness of Cut*—The departure from squareness of the end of any pipe shall not exceed the following:

Outside Diameter, in. (mm)	Tolerance
Up to ⅝ (15.9), incl	0.010 in. (0.25 mm)
Over ⅝ (15.9)	0.016 in./in. (0.016 mm/mm) of diameter

10.6 *Straightness Tolerance*—For pipe of H (drawn) tempers of Nominal Pipe Sizes from ¼ to 12 in. inclusive, the maximum curvature (depth of arc) shall not exceed ½ in. (13 mm) in any 10-ft portion of the total length. For H temper pipe of other sizes, and for the O61 (annealed) temper, no numerical values are established, however, the straightness of the pipe shall be suitable for the intended application.

11. Workmanship, Finish, and Appearance

11.1 The product shall be free of defects, but blemishes of a nature that do not interfere with the intended application are acceptable. It shall be well cleaned and free of dirt.

12. Sampling

12.1 *Sampling*—The lot size, portion size, and selection of sample pieces shall be as follows:

12.1.1 *Lot Size*—The lot size shall be as follows:

Pipe Size, in.	Lot Weight, lb (kg)
Up to 1½ , incl	5 000 (2270) or fraction thereof
Over 1½ to 4, incl	10 000 (4550) or fraction thereof
Over 4	40 000 (18 100) or fraction thereof

12.1.2 *Portion Size*—Sample pieces shall be taken for test purposes from each lot according to the following schedule:

TABLE 3 Standard Dimensions, Weights, and Tolerances

NOTE 1—All tolerances plus and minus except as otherwise indicated.

Nominal or Standard Pipe Size, in.	Outside Diameter, in. (mm)	Average Outside Diameter Tolerance,[A] in. (mm) All Minus	Wall Thickness, in. (mm)	Tolerance,[B] in. (mm)	Theoretical Weight, lb/ft (kg/m)
			Regular		
⅛	0.405 (10.3)	0.004 (0.10)	0.062 (1.57)	0.004 (0.10)	0.259 (0.385)
¼	0.540 (13.7)	0.004 (0.10)	0.082 (2.08)	0.005 (0.13)	0.457 (0.680)
⅜	0.675 (17.1)	0.005 (0.13)	0.090 (2.29)	0.005 (0.13)	0.641 (0.954)
½	0.840 (21.3)	0.005 (0.13)	0.107 (2.72)	0.006 (0.15)	0.955 (1.42)
¾	1.050 (26.7)	0.006 (0.15)	0.114 (2.90)	0.006 (0.15)	1.30 (1.93)
1	1.315 (33.4)	0.006 (0.15)	0.126 (3.20)	0.007 (0.18)	1.82 (2.71)
1¼	1.660 (42.2)	0.006 (0.15)	0.146 (3.71)	0.008 (0.20)	2.69 (4.00)
1½	1.900 (48.3)	0.006 (0.15)	0.150 (3.81)	0.008 (0.20)	3.20 (4.76)
2	2.375 (60.3)	0.008 (0.20)	0.156 (3.96)	0.009 (0.23)	4.22 (6.28)
2½	2.875 (73.0)	0.008 (0.20)	0.187 (4.75)	0.010 (0.25)	6.12 (9.11)
3	3.500 (88.9)	0.010 (0.25)	0.219 (5.56)	0.012 (0.30)	8.76 (13.0)
3½	4.000 (102)	0.010 (0.25)	0.250 (6.35)	0.013 (0.33)	11.4 (17.0)
4	4.500 (114)	0.012 (0.30)	0.250 (6.35)	0.014 (0.36)	12.9 (19.2)
5	5.562 (141)	0.014 (0.36)	0.250 (6.35)	0.014 (0.36)	16.2 (24.1)
6	6.625 (168)	0.016 (0.41)	0.250 (6.35)	0.014 (0.36)	19.4 (28.9)
8	8.625 (219)	0.020 (0.51)	0.312 (7.92)	0.022 (0.56)	31.6 (47.0)
10	10.750 (273)	0.022 (0.56)	0.365 (9.27)	0.030 (0.76)	46.2 (68.7)
12	12.750 (324)	0.024 (0.61)	0.375 (9.52)	0.030 (0.76)	56.5 (84.1)
			Extra Strong		
⅛	0.405 (10.3)	0.004 (0.10)	0.100 (2.54)	0.006 (0.15)	0.371 (0.552)
¼	0.540 (13.7)	0.004 (0.10)	0.123 (3.12)	0.007 (0.18)	0.625 (0.930)
⅜	0.675 (17.1)	0.005 (0.13)	0.127 (3.23)	0.007 (0.18)	0.847 (1.26)
½	0.840 (21.3)	0.005 (0.13)	0.149 (3.78)	0.008 (0.20)	1.25 (1.86)
¾	1.050 (26.7)	0.006 (0.15)	0.157 (3.99)	0.009 (0.23)	1.71 (2.54)
1	1.315 (33.4)	0.006 (0.15)	0.182 (4.62)	0.010 (0.25)	2.51 (3.73)
1¼	1.660 (42.2)	0.006 (0.15)	0.194 (4.93)	0.010 (0.25)	3.46 (5.15)
1½	1.900 (48.3)	0.006 (0.15)	0.203 (5.16)	0.011 (0.28)	4.19 (6.23)
2	2.375 (60.3)	0.008 (0.20)	0.221 (5.61)	0.012 (0.30)	5.80 (8.63)
2½	2.875 (73.0)	0.008 (0.20)	0.280 (7.11)	0.015 (0.38)	8.85 (13.2)
3	3.500 (88.9)	0.010 (0.25)	0.304 (7.72)	0.016 (0.41)	11.8 (17.6)
3½	4.000 (102)	0.010 (0.25)	0.321 (8.15)	0.017 (0.43)	14.4 (21.4)
4	4.500 (114)	0.012 (0.30)	0.341 (8.66)	0.018 (0.46)	17.3 (25.7)
5	5.562 (141)	0.014 (0.36)	0.375 (9.52)	0.019 (0.48)	23.7 (35.3)
6	6.625 (168)	0.016 (0.41)	0.437 (11.1)	0.027 (0.69)	32.9 (49.0)
8	8.625 (219)	0.020 (0.51)	0.500 (12.7)	0.035 (0.89)	49.5 (73.7)
10	10.750 (273)	0.022 (0.56)	0.500 (12.7)	0.040 (1.0)	62.4 (92.9)

[A] The average outside diameter of a tube is the average of the maximum and minimum outside diameters as determined at any one cross section of the pipe.
[B] Maximum deviation at any one point.

Number of Pieces in Lot	Number of Sample Pieces to be Taken[A]
1 to 50	1
51 to 200	2
201 to 1500	3
Over 1500	0.2 % of total number of pieces in the lot, but not to exceed ten sample pieces

[A] Each sample piece shall be taken from a separate tube.

13. Number of Tests and Retests

13.1 *Chemical Analysis*—Samples for chemical analysis shall be taken in accordance with Practice E255. Drillings, millings, and so forth shall be taken in approximately equal weight from each of the sample pieces selected in accordance with 12.1.2 and combined into one composite sample. The minimum weight of the composite sample that is to be divided into three equal parts shall be 150 g.

13.1.1 Instead of sampling in accordance with Practice E255, the manufacturer shall have the option of determining conformance to chemical composition as follows: Conformance shall be determined by the manufacturer by analyzing samples taken at the time the castings are poured or samples taken from the semifinished product. If the manufacturer determines the chemical composition of the material during the course of manufacture, he shall not be required to sample and analyze the finished product. The number of samples taken for determination of chemical composition shall be as follows:

13.1.1.1 When samples are taken at the time the castings are poured, at least one sample shall be taken for each group of castings poured simultaneously from the same source of molten metal.

13.1.1.2 When samples are taken from the semifinished product, a sample shall be taken to represent each 10 000 lb (4550 kg) or fraction thereof, except that not more than one sample shall be required per piece.

13.1.1.3 Because of the discontinuous nature of the processing of castings into wrought products, it is not practical to identify specific casting analysis with a specific quantity of finished material.

13.1.1.4 In the event that heat identification or traceability is required, the purchaser shall specify the details desired.

13.2 *Retests:*

13.2.1 If any test specimen shows defective machining or develops flaws, it shall be discarded and another specimen substituted.

13.2.2 If a bend test specimen fails because of conditions of bending more severe than required by the specification, a retest shall be permitted on a new sample piece or on the remaining portion of the first sample piece.

13.2.3 If the results of the test on one of the specimens fail to meet the specified requirements, two additional specimens shall be taken from different sample pieces and tested. The results of the tests on both of these specimens shall meet the specified requirements. Failure of more than one specimen to meet the specified requirements for a particular property shall be cause for rejection of the entire lot.

13.2.4 If the chemical analysis fails to conform to the specified limits, analysis shall be made on a new composite sample prepared from additional pieces selected in accordance with 12.1. The results of this retest shall comply with the specified requirements.

14. Test Methods

14.1 *Chemical Analysis:*

14.1.1 In cases of disagreement, test methods for chemical analysis shall be subject to agreement between the manufacturer or supplier and the purchaser. The following table is a list of published methods, some of which may no longer be viable, which along with others not listed, may be used subject to agreement:

Test	ASTM Designation[A]
Chemical analysis	B170[B], E53, E62, E478

[A] See 2.1.

[B] Reference to Specification B170 is to the suggested chemical methods in the annex thereof. When Committee E01 has tested and published methods for assaying the low-level impurities in copper, the Specification B170 annex will be eliminated.

14.1.2 Test method(s) to be followed for the determination of element(s) resulting from contractual or purchase order agreement shall be as agreed upon between the manufacturer or supplier and purchaser.

14.2 The product furnished shall conform to the specified requirements when subjected to test in accordance with the following applicable test methods:

Test	ASTM Designation[A]
Tensile Strength	E8/E8M
Expansion (pin test)	B153
Eddy current	E243
Microscopical Examination	B577
Flattening Test	B968/B968M

[A] See 2.1.

14.3 *Tensile Strength Requirements:*

14.3.1 Tensile test specimens shall be of the full section of the pipe and shall conform to the requirements of the Specimens for Pipe and Tube section of Test Methods E8/E8M unless the limitations of the testing machine preclude the use of such a specimen. Test specimens conforming to Type No. 1 of Fig. 13, Tension Test Specimens for Large-Diameter Tubular Products, of Test Methods E8/E8M is permitted to be used when a full-section specimen cannot be tested.

14.3.2 Whenever tensile test results are obtained from both full-size and machined test specimens and they differ, the results obtained from full-size test specimens shall be used to determine conformance to the specification requirements.

14.3.3 Tensile test results on material covered by this specification are not seriously affected by variations in speed of testing. A considerable range of testing speed is permissible; however, it is recommended that the rate of stressing to the yield strength not exceed 100 ksi (700 MPa)/min. Above the yield strength, it is recommended that the movement per minute of the testing machine head under load not exceed 0.5 in./in. (0.5 mm/mm) of gage length (or distance between grips for full-section specimens).

15. Significance of Numerical Limits

15.1 For purposes of determining compliance with the specified limits for requirements of the properties listed in the following table, an observed value or a calculated value shall be rounded as indicated in accordance with the rounding method of Practice E29.

Property	Rounded Unit for Observed or Calculated Value
Chemical composition	nearest unit in the last right-hand place of figures of the specified limit
Tensile strength Yield strength	nearest ksi (nearest 5 MPa)

16. Inspection

16.1 The manufacturer, or supplier, shall inspect and make tests necessary to verify the furnished product conforms to the specification requirements.

16.2 The manufacturer shall afford the inspector representing the purchaser all reasonable facilities, without charge, to satisfy him that the material is being furnished in accordance with the specified requirements.

17. Rejection and Rehearing

17.1 *Rejection:*

17.1.1 Product that fails to conform to the specification requirements when tested by the purchaser or purchaser's agent, shall be subject to rejection.

17.1.2 Rejection shall be reported to the manufacturer or supplier promptly. In addition, a written notification of rejection shall follow.

17.1.3 In case of dissatisfaction with results of the test upon which rejection is based, the manufacturer, or supplier, shall have the option to make claim for a rehearing.

17.2 *Rehearing:*

17.2.1 As a result of product rejection, the manufacturer, or supplier, shall have the option to make claim for a retest to be conducted by the manufacturer, or supplier, and the purchaser. Samples of the rejected product shall be taken in accordance with the product specification and subjected to test by both parties using the test method(s) specified in the product specification, or alternately, upon agreement of both parties, an independent laboratory may be selected for the test(s) using the test method(s) specified in the product specification.

18. Certification

18.1 When specified in the purchase order or contract, the purchaser shall be furnished certification that samples representing each lot have been tested and inspected as directed in this specification and the requirements have been met.

18.2 When specified in the purchase order or contract that product is purchased for *ASME Boiler and Pressure Vessel Code* applications, certification to this specification is mandatory.

19. Test Report

19.1 When specified in the purchase order or contract, a report of test results shall be furnished.

20. Packaging and Package Marking

20.1 The material shall be separated by size, composition, and temper and prepared for shipment in such a manner as to ensure acceptance by common carrier for transportation and to afford protection from the normal hazards of transportation.

20.2 Each shipping unit shall be legibly marked with the purchase order number, metal or alloy designation, temper, size, total length or piece count or both, and name of supplier.

20.3 When specified in the purchase order or contract, the product specification number shall be shown.

21. Keywords

21.1 copper pipe; extra strong; regular; standard sizes ; UNS No. C10200; UNS No. C10300; UNS No. C10800; UNS No. C12000; UNS No. C12200

SUPPLEMENTARY REQUIREMENTS

S1. Scope

S1.1 The following supplementary requirements shall apply only when specified by the purchaser in the inquiry, contract, or order, for agencies of the U. S. Government.

S2. Referenced Documents

S2.1 The following documents of the issue in effect on date of material purchase form a part of this specification to the extent referenced herein:

S2.1.1 *ASTM Standards:*

B900, Practice for Packaging of Copper and Copper Alloy Mill Products for U.S. Government Agencies

S2.1.2 *Federal Standards:*[6]

Fed. Std. No. 102 Preservation, Packaging and Packing Levels

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)

Fed. Std. No. 185 Identification Marking of Copper and Copper-Base Alloy Mill Products

S2.1.3 *Military Standard:*[6]

MIL-STD-129 Marking for Shipment and Storage

S3. Quality Assurance

S3.1 *Responsibility for Inspection:*

S3.1.1 Unless otherwise specified in the contract or purchase order, the manufacturer is responsible for the performance of all inspection and test requirements specified. Except as otherwise specified in the contract or purchase order, the manufacturer shall use his own or any other suitable facilities for the performance of the inspection and test requirements unless disapproved by the purchaser at the time the order is placed. The purchaser shall have the right to perform any of the inspections or tests set forth when such inspections and tests are deemed necessary to assure that the material conforms to prescribed requirements.

S4. Identification Marking

S4.1 All material shall be properly marked for identification in accordance with Fed. Std. No. 185 except that the ASTM specification number and the alloy number shall be used.

S5. Preparation for Delivery

S5.1 *Preservation, Packaging, Packing:*

S5.1.1 *Military Agencies*—The material shall be separated by size, composition, grade, or class and shall be preserved and packaged, Level A or C, and packed, Level A, B, or C, as specified in the contract or purchase order, in accordance with the requirements of Practice B900.

S5.1.2 *Civil Agencies*—The requirements of Fed. Std. No. 102 shall be referenced for definitions of the various levels of packaging protection.

S5.2 *Marking:*

S5.2.1 *Military Agencies*—In addition to any special marking required by the contract or purchase order, marking for shipment shall be in accordance with MIL-STD-129.

S5.2.2 *Civil Agencies*—In addition to any special marking required by the contract or purchase order, marking for shipment shall be in accordance with Fed. Std. No. 123.

S6. Part or Identifying Numbers (PINs)

S6.1 Part numbers are essential to maintain the integrity of the Department of Defense cataloging system as multiple National Stock Numbers (NSN) exist for this product. The following information is provided for cross-reference purposes. The pipe previously described in WW-P-377 and MS14302 corresponds to ASTM B42 copper pipe of copper UNS No. C12000 with a regular wall thickness.

S6.2 Part identifying numbers, for government use, shall be formulated by selecting from the options in this specification as shown in Table S6.1.

[6] Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, http://quicksearch.dla.mil.

TABLE S6.1 Part or Identifying Numbers

B42	XXXXXX	XXX	-XX	X	X	XXX	X
			Size (See Table 3)			Length	
Document Identifier	Alloy (See Table 1)	Temper (See 6.1)	inches	eighths of an inch	Wall thickness (R = regular, S = extra strong)	inches	eighths of an inch

S6.3 An example of a PIN follows: A part identifying number of B42C12000H80-030R1264 indicates an ASTM B42 pipe of copper UNS No. C12000 in the hard drawn (H80) temper, 3-in. standard pipe size, regular wall thickness, and it is 10 ft 6½ in. (3213 mm) in length.

APPENDIX

(Nonmandatory Information)

X1. METRIC EQUIVALENTS

X1.1 The SI unit for strength properties now shown is in accordance with the International System of Units (SI). The derived SI unit for force is the newton (N), which is defined as that force which when applied to a body having a mass of one kilogram gives it an acceleration of one metre per second squared ($N = kg{\cdot}m/s^2$). The derived SI unit for pressure or stress is the newton per square metre (N/m^2), which has been named the pascal (Pa) by the General Conference on Weights and Measures. Since 1 ksi = 6 894 757 Pa, the metric equivalents are expressed as megapascal (MPa), which is the same as MN/m^2 and N/mm^2.

SUMMARY OF CHANGES

Committee B05 has identified the principal changes to this specification that have been incorporated since the 2015 issue as follows:

(1) Table 2 was revised.

Committee B05 has identified the principal changes to this specification that have been incorporated since the 2010 issue as follows:

(1) Editorial revisions have been made in accordance with Guide B950.