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AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
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Standard Specification for Copper-Nickel-Tin Spinodal Alloy Strip[1]

This standard is issued under the fixed designation B 740; 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 copper-nickel-tin alloy strip. The following alloys are covered:[2]

Copper Alloy UNS No.[2]	Nominal Composition Weight %		
	Copper	Nickel	Tin
C72700	85	9	6
C72900	77	15	8
C72650	87.5	7.5	5

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

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 248 Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar[3]

B 598 Practice for Determining Offset Yield Strength in Tension for Copper Alloys[3]

B 601 Practice for Temper Designations for Copper and Copper Alloys—Wrought and Cast[3]

E 3 Methods of Preparation of Metallographic Specimens[4]

E 8 Test Methods of Tension Testing of Metallic Materials[4]

E 290 Test Method for Semi-Guided Bend Test for Ductility of Metallic Materials[4]

E 527 Practice for Numbering Metals and Alloys (UNS)[5]

3. Ordering Information

3.1 Orders for materials under this specification should include the following information:

3.1.1 Quantity,

3.1.2 Copper Alloy UNS number (see 1.1),

3.1.3 Form of material: strip,

3.1.4 Temper (see 5.1),

3.1.5 Dimensions: thickness and width, and length if applicable,

3.1.6 How furnished: rolls or coils, stock lengths with or without ends, specific lengths with or without ends,

3.1.7 Type of edge other than slit, for example, rounded corners, rounded edges, or full-rounded edges (see Section 10).

3.1.8 Width and straightness tolerances, if different from those required in Specification B 248 (see Section 10).

3.1.9 Special thickness tolerances if required (see Section 10),

3.1.10 Certification if required,

3.1.11 Mill test report if required,

3.1.12 Specification number and date, and

3.1.13 Special tests or exceptions, if any.

3.2 When material is purchased for agencies of the U.S. Government, this shall be specified in the contract or purchase order, and the material shall conform to the Supplementary Requirements as defined in the current issue of Specification B 248.

4. Chemical Composition

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

4.2 These specification limits do not preclude the presence of other elements. Limits for unnamed elements may be established by agreement between manufacturer or supplier and purchaser. Copper may be given as remainder and taken as the difference between the sum of all elements analyzed and 100 %. When all the elements in the table including copper are analyzed, their sum shall be 99.7 % min.

5. Temper

5.1 The standard tempers of material are as designated in Table 2, Table 3, and Table 4. Tempers are as follows: TB00 (solution heat treated), or with varying additional degrees of cold rolling TD01 to TD12 (solution heat treated with varying degrees of cold rolling); spinodal hardened from these appropriate tempers TX00 or TS01 to TS12 (spinodal hardened from the appropriate solution heat treated or solution heat treated and cold rolled temper); or: Mill Hardened TM00 to TM08 (mill hardened).

[1] This specification is under the ASTM Committee B-5 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.01 on Plate, Sheet, and Strip.

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[2] The UNS system for copper alloys (see Practice E 527) 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.

[3] *Annual Book of ASTM Standards*, Vol 02.01.

[4] *Annual Book of ASTM Standards*, Vol 03.01.

[5] *Annual Book of ASTM Standards*, Vol 01.01.

TABLE 1 Chemical Requirements

Copper Alloy UNS No.	Previous Designation	Composition, %								
		Copper, incl Silver	Lead[A], max	Iron[A], max	Zinc[A], max	Nickel, incl Cobalt	Tin	Manganese[A], max	Niobium[A], max	Magnesium[A], max
C72650	Cu-7.5Ni-5Sn	remainder	0.01	0.50	0.20	7.0–8.0	4.5–5.5	0.10	...	...
C72700	Cu-9Ni-6Sn	remainder	0.02	0.50	0.50	8.5–9.5	5.5–6.5	0.30	0.10	0.15
C72900	Cu-15Ni-8Sn	remainder	0.02	0.50	0.50	14.5–15.5	7.5–8.5	0.30	0.10	0.15

[A] The total of the elements Pb, Fe, Zn, Mn, Cb, and Mg not to exceed 0.7 %.

TABLE 2 Tensile Property Requirements

Tempers: Solution Heat-Treated
Solution Heat-Treated and Cold Worked

Copper Alloy UNS No.	Temper Designations		Tensile Strength, ksi[A] (MPa)[B] min–max[C]	Yield[D] Strength (0.05 % Offset), ksi[A] (MPa)[B] min–max[C]	Elongation in 2 in., %
	Standard[E]	Former			
C72650	TB00	Solution HT	55–70 (379—482)	21—32 (145–220)	32
C72650	TD01	¼ Hard	60–75 (413–517)	45–60 (310–413)	18
C72650	TD02	½ Hard	75—85 (517—586)	55–75 (379–516)	5
C72650	TD03	¾ Hard	80–90 (551–620)	68–82 (468–565)	4
C72650	TD04	Hard	85–95 (586–655)	77–90 (530–620)	2
C72700	TB00	Solution HT	60–80 (410–550)	23–33 (160–230)	30
C72700	TD01	¼ Hard	72–95 (500–660)	48–64 (330–440)	12
C72700	TD02	½ Hard	82–108 (570–740)	57–80 (390–550)	6
C72700	TD04	Hard	97–125 (670–860)	77–100 (530–690)	3
C72700	TD08	Spring	110–140 (760–970)	95–115 (660–790)	2
C72700	TD12	Special Spring	115–150 (790–1030)	105–125 (720–860)	...
C72900	TB00	Solution HT	64–85 (440–590)	24–40 (170–280)	32
C72900	TD01	¼ Hard	74–100 (510–690)	50–66 (340–460)	18
C72900	TD02	½ Hard	85–110 (590–760)	65–84 (450–580)	8
C72900	TD04	Hard	100–130 (690–900)	85–108 (590–740)	...
C72900	TD08	Spring	122–145 (840–1000)	100–125 (690–860)	...
C72900	TD12	Special Spring	135–155 (930–1070)	110–130 (760–900)	...

[A] 1 ksi = 1000 psi.
[B] See Appendix.
[C] Max for reference.
[D] As per Practice B 598.
[E] As per Practice B 601.

5.2 Special or nonstandard tempers are available and are subject to agreement between supplier or manufacturer and purchaser.

6. Tensile Property Requirements

6.1 The solution heat-treated or solution heat-treated and cold-worked material shall conform to the tensile property requirements specified in Table 2.

6.2 The spinodal heat-treated material shall conform to the tensile property requirements specified in Table 3. Spinodal heat-treatment parameters are given in 9.1.

6.3 The mill-hardened material shall conform to the tensile property requirements specified in Table 4.

7. Bend Test Requirements

7.1 The bend test is a method for evaluating the ductility of mill-hardened copper-nickel-tin spinodal alloy strip in thicknesses of 0.004 to 0.020 in. (0.102 to 0.508 mm), inclusive.

7.1.1 Material in tempers TM00, TM02, TM04, and TM06 shall conform to the bend test requirements specified in Table 4 when tested in accordance with 7.2.

7.2 Three specimens, ½ ± 1⁄16 in. (12.70± 1.59 mm) in width of any convenient length, with the rolling direction perpendicular to the ½ in. dimension shall be prepared and tested in accordance with Test Method E 290. The axis of the bend shall be at an angle of 90° to the direction of rolling