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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Specification for Copper-Zirconium Alloy Sheet and Strip[1]

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1. Scope *

1.1 This specification establishes the requirements for sheet and strip of Copper Alloy UNS C15100.

1.2 Values stated in inch-pound units are the standard. SI values given in parentheses are for information only.

2. Referenced Documents

2.1 *ASTM Standards:*

B 193 Test Method for Resistivity of Electrical Conductor Materials[2]

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

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

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

E 53 Test Methods for Chemical Analysis of Copper[5]

E 62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods)[5]

E 112 Test Methods for Determining Average Grain Size[4]

E 478 Test Methods for Chemical Analysis of Copper Alloys[5]

E 527 Practice for Numbering Metals and Alloys (UNS)[6]

3. Ordering Information

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

3.1.1 ASTM designation number and year of issue,

3.1.2 Quantity (of each size),

3.1.3 Copper Alloy UNS No. (see 1.1),

3.1.4 Form of material (sheet or strip),

3.1.5 Temper (see 6.1),

3.1.6 Dimensions (thickness, width, length, if applicable),

3.1.7 How furnished (rolls, specific lengths with or without ends, stock lengths with or without ends),

3.1.8 Type of edge, if required (slit, sheared, sawed, square corners, rounded corners, rounded edges, or full-rounded edges, see 10.1.6),

3.1.9 Type of width and straightness tolerances, if required (slit metal tolerances, square sheared metal tolerances, sawed metal tolerances, straightened or edge-rolled metal tolerances, see Section 10), and

3.2 When product is purchased for agencies of the U.S. Government.

4. Material and Manufacture

4.1 *Material*:

4.1.1 The material of manufacture shall be a cast bar, slab, cake, billet, etc. of Copper Alloy UNS No. C15100 of such purity and soundness as to be suitable for processing in to the products prescribed herein.

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

NOTE 1—Due to the discontinuous nature of the processing of castings into wrought products, it is not always practical to identify a specific casting analysis with a specific quantity of finished material.

4.2 *Manufacture*:

4.2.1 The product shall be manufactured by such hotworking, cold-working, and annealing processes as to produce a uniform wrought structure in the finished product.

4.2.2 The product shall be hot- or cold-worked to the finished size and subsequently annealed, when required, to meet the temper properties specified.

4.3 *Edges*:

4.3.1 Slit edges shall be furnished unless otherwise specified in the contract or purchase order.

5. Chemical Composition

5.1 The product shall conform to the chemical composition prescribed in Table 1.

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

5.2 Copper, given as the remainder, is the difference between the sum of results for all elements analyzed and 100 %.

5.3 When all elements listed in Table 1 are analyzed, the sum of results shall be 99.94 % minimum.

6. Temper

6.1 The tempers, as defined in Practice B 601, available

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[2] *Annual Book of ASTM Standards*, Vol 02.03.

[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 03.05.

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

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

TABLE 1 Chemical Requirements

Element	Composition, %
	Copper Alloy UNS No. C15100
Copper	remainder
Zirconium	0.05–0.15
Iron, max	0.005
Manganese, max	0.005
Aluminum, max	0.005
Aluminum + manganese + iron, max	0.01

under this specification are as designated in Table 2.

7. Grain Size for Annealed Temper

7.1 Grain size for OS015 temper product shall be as given in Table 2 when tested in accordance with Test Methods E 112.

8. Physical Property Requirements

8.1 *Electrical Resistivity Requirements*:

8.1.1 The product shall conform to the requirements of Table 3 by temper when tested in accordance with Test Method B 193.

9. Mechanical Property Requirements

9.1 *Tensile Strength Requirements*:

9.1.1 Tempers H01, H02, H03, H04, H05, H06, and H08 shall conform to the requirements prescribed in Table 2 when tested in accordance with Test Methods E 8. Tensile strength shall be the basis for acceptance or rejection of product in these tempers.

10. Dimensions, Mass, and Permissible Variations

10.1 The following titled sections and tables in Specification B 248 are a part of this specification:

10.1.1 *Thickness*—See 5.2, Table 1.

10.1.2 *Width:* Slit metal and slit metal with rolled edges—See 5.3, Table 4.

10.1.3 *Square Sheared Metal*—See 5.3, Table 5; *Sawed Metal*—See 5.3, Table 6.

TABLE 2 Tensile Strength and Grain Size Requirements

Temper Designation[A]		Tensile Strength, ksi[B] (MPa)[C]		Grain Size, mm[D]
Standard[E]	Former	Min	Max	
OS015	annealed	...	...	0.030 max
H01	quarter hard	40 (275)	45 (310)	...
H02	half hard	43 (295)	51 (350)	...
H03	three-quarter hard	47 (325)	56 (385)	...
H04	hard	53 (365)	62 (430)	...
H06	extra hard	59 (405)	65 (450)	...
H08	spring	64 (445)	71 (490)	...

[A] Standard designations defined in Practice B 601.
[B] ksi = 1000 psi.
[C] See Appendix X1.
[D] Although no minimum grain size is required, this material must be fully recrystallized.
[E] The Rockwell B scale applies to metal 0.020 in. and over in thickness. The Superficial 30T scale applies to metal 0.012 in. and over in thickness.

TABLE 3 Electrical Resistivity

Temper	Electrical Resistivity at 20°C (68°F), max, $\Omega \cdot g/m^2$	Equivalent Conductivity at 20°C (68°F), % IACS
Annealed (OS015)	0.16136	95
Rolled (H01, H02, H03, H04, H06, H08)	0.17031	90

10.1.4 *Length*:

10.1.4.1 *Length Tolerances for Specific and Stock Lengths With and Without Ends*—See 5.4, Table 7.

10.1.4.2 *Schedule of Lengths (Specific and Stock) With Ends*—See 5.4, Table 8.

10.1.4.3 *Length Tolerances for Square Sheared Metal*—See 5.4, Table 9.

10.1.4.4 *Length Tolerances for Sawed Metal*—See 5.4, Table 10.

10.1.5 *Straightness*:

10.1.5.1 *Slit Metal or Slit Metal Either Straightness or Edge Rolled*—See 5.5, Table 11.

10.1.5.2 *Square Sheared Metal*—See 5.5, Table 12.

10.1.5.3 *Sawed Metal*—See 5.5, Table 13.

10.1.6 *Edges*—See 5.6:

10.1.6.1 *Square Edges*—See 5.6.1, Table 15.

10.1.6.2 *Rounded Corners*—See 5.6.2, Table 16.

10.1.6.3 *Rounded Edges*—See 5.6.3, Table 17.

10.1.6.4 *Full Rounded Edges*—See 5.6.4, Table 18.

11. Test Methods

11.1 The properties and chemical compositions enumerated in the specifications shall, in case of disagreement, be determined in accordance with the following ASTM test methods:

Test	ASTM Designation
Chemical Analysis	E 53, E62, E478
Tension	E 8
Grain	E 112
Electrical Resistivity	B 193

12. General Requirements

12.1 The following sections of Specification B 248 constitute a part of this specification:

12.1.1 Terminology,
12.1.2 Workmanship, Finish, and Appearance,
12.1.3 Sampling,
12.1.4 Number of Tests and Retests,
12.1.5 Specimen Preparation,
12.1.6 Significance of Numerical Limits,
12.1.7 Inspection,
12.1.8 Rejection and Rehearing,
12.1.9 Certification,
12.1.10 Test Reports,
12.1.11 Packaging and Package Marking, and
12.1.12 Supplementary Requirements.

13. Keywords

13.1 copper-zirconium; sheet and strip

SUPPLEMENTARY REQUIREMENTS

An extensive five-year review was conducted. Most sections were revised in order to conform to Society requirements and to improve clarity of product requirements.

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 ($N = kg\ m/s^2$). 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.