This document is not an ASTM standard and is intended only to provide the user of an ASTM standard an indication of what changes have been made to the previous version. Because it may not be technically possible to adequately depict all changes accurately, ASTM recommends that users consult prior editions as appropriate. In all cases only the current version of the standard as published by ASTM is to be considered the official document.



## Designation: B150/B150M - 12 (Reapproved 2017) B150/B150M - 19

# Standard Specification for Aluminum Bronze Rod, Bar, and Shapes<sup>1</sup>

This standard is issued under the fixed designation B150/B150M; 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 ( $\varepsilon$ ) indicates an editorial change since the last revision or reapproval.

#### 1. Scope\*

1.1 This specification establishes the requirements for aluminum bronze rod, bar, and shapes for Copper Alloys UNS Nos. C61300, C61400, C61900, C62300, C62400, C63000, C63020, C63200, C64200, and C64210.

Note 1—Product intended for hot forging is described in Specification B124/B124M.

Note 2—Warning—Mercury has been designated by many regulatory agencies as a hazardous materialsubstance that can cause serious medical issues. Mercury, or its vapor, has been demonstrated to be hazardous to health and corrosive to materials. Caution should be taken Use caution when handling mercury and mercury containing mercury-containing products. See the applicable product Safety Data Sheet (SDS) for additional information. Users should be aware-The potential exists that selling mercury and/or mercury containing products into your state or country may be prohibited by law.or mercury-containing products, or both, is prohibited by local or national law. Users must determine legality of sales in their location.

- 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 are not benecessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other. Combining other, and values from the two systems may result in non-conformance with the standard. shall not be combined.
- 1.3 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 safety, health, and health environmental practices and determine the applicability of regulatory requirements prior to use.
- 1.4 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 ASTM Standards:<sup>2</sup>

B124/B124M Specification for Copper and Copper Alloy Forging Rod, Bar, and Shapes

B154 Test Method for Mercurous Nitrate Test for Copper Alloys and 4 fed-adfe-a7195

B249/B249M Specification for General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, Shapes and Forgings

B601 Classification for Temper Designations for Copper and Copper Alloys—Wrought and Cast

B858 Test Method for Ammonia Vapor Test for Determining Susceptibility to Stress Corrosion Cracking in Copper Alloys

E8/E8M Test Methods for Tension Testing of Metallic Materials

E18 Test Methods for Rockwell Hardness of Metallic Materials

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)<sup>3</sup>

E118 Test Methods for Chemical Analysis of Copper-Chromium Alloys (Withdrawn 2010)<sup>3</sup>

E478 Test Methods for Chemical Analysis of Copper Alloys

### 3. General Requirements

- 3.1 The following sections of Specification B249/B249M constitute a part of this specification:
- 3.1.1 Terminology, Terminology;

<sup>&</sup>lt;sup>1</sup> This specification is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.02 on Rod, Bar, Wire, Shapes and Forgings.

Current edition approved April 1, 2017 April 1, 2019. Published April 2017 April 2019. Originally approved in 1941. Last previous edition approved in 2012 as B150/B150M-12.—12 (2017). DOI: 10.1520/B0150\_B0150M-12R17.10.1520/B0150\_B0150M-19.

<sup>&</sup>lt;sup>2</sup> 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.

<sup>&</sup>lt;sup>3</sup> The last approved version of this historical standard is referenced on www.astm.org.



- 3.1.2 Materials and Manufacture; Manufacture;
- 3.1.3 Workmanship, Finish, and Appearance; Appearance;
- 3.1.4 Sampling, Sampling;
- 3.1.5 Number of Tests and Retests; Retests;
- 3.1.6 Specimen Preparation, Preparation;
- 3.1.7 Test Methods, Methods;
- 3.1.8 Significance of Numerical Limits, Limits;
- 3.1.9 Inspection, Inspection;
- 3.1.10 Rejection and Rehearing, Rehearing;
- 3.1.11 Certification, Certification;
- 3.1.12 Mill Test Report, Report;
- 3.1.13 Packaging and Package Marking, Preservation and <del>Delivery, Delivery; and</del>
- 3.1.14 Supplementary Requirements.
- 3.2 In addition, when a section with a title identical to those referenced in 3.1, appears in this specification, it contains additional requirements that supplement those appearing in Specification B249/B249M.

## 4. Ordering Information

- 4.1 Include the following information when placing orders for product under this specification, as applicable:
- 4.1.1 Specification designation and year of issue,
- 4.1.2 Copper alloy UNS No. (See Table 1),
- 4.1.3 Temper (see Temper section),
- 4.1.3.1 When Alloy UNS No. C63000 is specified, specify standard strength or high strength temper (See Table 2),
- 4.1.4 Product cross-section (for example round, hexagonal, square, and so forth),
- 4.1.5 Dimensions (diameter or distance between parallel surfaces and length) and permissible variations (Section 10),
- 4.1.5.1 When product of Copper Alloy UNS No. C63020 is specified, the tolerances for diameter, thickness, width, and length shall be part of the contract or purchase order and shall be agreed upon between the supplier and the purchaser.
- 4.1.5.2 *Shapes*—When product is shapes, the dimensional tolerances shall be as agreed upon between the manufacturer and the purchaser and shall be specified.
  - 4.1.6 Quantity, total weight, footage, or number of pieces for each size.
  - 4.1.7 If product is being purchased for agencies of the U.S. government.
  - 4.2 The following options are available and should be specified at the time of placing the order when required:
  - 4.2.1 If Copper Alloy C61300 material is intended for subsequent welding applications (See Note B, Table 2),
  - 4.2.2 Certification,
  - 4.2.3 Mill test reports,
  - 4.2.4 Residual stress test (Performance Requirements section)
  - 4.2.4.1 Ammonia Vapor Test or Mercurous Nitrate Test,

**TABLE 1 Chemical Requirements** 

						·					
	Composition, %										
Elements	Copper Alloy UNS No.										
	C61300	C61400	C61900	C62300	C62400	C63000	C63020	C63200	C64200	C64210	
Aluminum	6.0-7.5	6.0-8.0	8.5-10.0	8.5-10.0	10.0-11.5	9.0-11.0	10.0-11.0	8.7–9.5	6.3-7.6	6.3–7.0	
Copper, incl silver	remainder	remainder	remainder	remainder	remainder	remainder	74.5 min	remainder	remainder	remainder	
Iron	2.0-3.0	1.5-3.5	3.0-4.5	2.0-4.0	2.0-4.5	2.0-4.0	4.0-5.5	3.5-4.3 <sup>A</sup>	0.30 max	0.30 max	
Nickel, incl cobalt	0.15 max			1.0 max		4.0–5.5	4.2–6.0	4.0–4.8 <sup>A</sup>	0.25 max	0.25 max	
Manganese	0.20 max	1.0 max		0.50 max	0.30 max	1.5 max	1.5 max	1.2-2.0	0.10 max	0.10 max	
Silicon	0.10 max			0.25 max	0.25 max	0.25 max		0.10 max	1.5-2.2	1.5-2.0	
Tin	0.20-0.50		0.6 max	0.6 max	0.20 max	0.20 max	0.25 max		0.20 max	0.20 max	
Zinc, max	0.10 <sup>B</sup>	0.20	0.8			0.30	0.30		0.50	0.50	
Lead, max	0.01	0.01	0.02				0.03	0.02	0.05	0.05	
Arsenic, max	<del></del>			<del></del>		<del></del>	<del></del>		<del>0.15</del>	<del>0.15</del>	
Arsenic, max	<u></u>		<u></u>	<u></u>	<u></u>	<u></u>	<u></u>	<u></u>	0.09	0.09	
Phosphorus, max	0.015	0.015									
Other named elements	В	<u></u>	<u></u>	<u></u>	<u></u>	<u></u>	С	<u></u>	<u></u>	<u></u>	

<sup>&</sup>lt;sup>A</sup> Iron content shall not exceed nickel content.

<sup>&</sup>lt;sup>B</sup> When the product is for subsequent welding applications and is so specified by the purchaser, chromium shall be 0.05 % max, cadmium 0.05 % max, zirconium 0.05 % max, and zinc 0.05 % max.

<sup>&</sup>lt;sup>C</sup> Chromium shall be 0.05 max and cobalt shall be 0.20 max.



# **TABLE 2 Tensile Requirements**

Name			IABLE 2 Tensile Re	quirements		
Copper Allay LUNS No. C61300	Code			Strength,	min ksi [MPa], at 0.5 % Extension	Elongation in 4 × Diameter or Thickness of
HR50   drawn and stress relieved   Vi [12] and under   Vi [12] a		Name			Officer Education	Specimen min, % <sup>E</sup>
12 and under	LDEO	drawn and atroop ralioused		o. C61300		
over 1/28 to 2 (50) incl	กกอบ	drawir and stress relieved		80 [550]	50 [345]	30
over 1 (25) to 3 (05) incl						
HR50   drawn and stress relieved   rod (flexagonal) and clagonal) and clagonal) and clagonal)   40 [275]   30   30   30 [275]   30   30   30 [275]   30   30   30 [275]   30   30   30 [275]   30 [275]   30 [2						
**\frac{1}{12} and under						30
Over 1   12   10   12   15   15   15   15   15   15   15	HR50	drawn and stress relieved				
Copper Alloy UNS No. C8200   S2 [220]   30   Copper Alloy UNS No. C8200   S2 [220]   S3   S2 [220]   S4   S2 [240]   S4   S4   S4   S4   S4   S4   S4   S						
Copper Alloy UNS No. C61400   Transmit Stress relieved   Value   Transmit Stress   Value   Value   Transmit Stress   Value   Val						
HR50   drawn and stress relieved   rod (round only):   Ve   12  and under   over 1   12  in   12 , incl   75   15    35   240    30   30   205    30					32 [220]	30
1	HR50	drawn and stress relieved		0. 001 100		
Over 1 (25) to 2 (50), Incl				80 [550]	40 [275]	30
Over 2   50  to 3   60 , incl			over ½ [12] to 1 [25], incl	75 [515]	35 [240]	30
Copper Alloy UNS No. C61900   Tod (round only):						
HR50   drawn and stress relieved   rod (round only):					30 [205]	30
1/2   not uninder	LIDEO	drawn and atreas relieved		o. C61900		
Note   1/25    10   1/25    1/2	กนอบ	urawn and stress relieved	1 37	gn [620]	50 [345]	15
Note   1/25  to 2   50 , incl   85   585   40   275   20						
Over 2   50  to 3   80 , incl						
M20						
M30	M20	as hot rolled	L 1 L 1			
M30	M20	as hot rolled		-		
Shapes, all sizes   75 [515]   30 [205]   20						
According to the controlled and annealed drawn and stress relieved   Copper Alloy UNS No. C62300   Copper Alloy UNS No. C62400   Copper Alloy UNS No. C62300   Copper Alloy UNS No. C62400   Copper Alloy UNS No. C624			shanes all sizes	75 [515]	30 [205]	20
Copper Alloy UNS No. C62300   Copper Alloy UNS No. C62400   Copp		,	en Stan	70 [0:0]	55 [255]	20
HR50   drawn and stress relieved   Copper Alloy UNS No. C62300   HR50   drawn and stress relieved   Fig. 12   and under   90 (620)   50 (345)   12   12   12   12   12   12   12   1						
Copper Alloy UNS No. C62300   HR50   drawn and stress relieved   rod (round only):   V2 [12] and under   90 [620]   50 [345]   12   12   12   12   12   12   12   1						
HR50   drawn and stress relieved   rod (round only):   12   and under   90   620	HR50	drawn and stress relieved				
12  and under   90 (820)   50 (345]   12 over   2 (12) to 1 (25) incl   88 (605)   44 (305)   15 over 1 (25) to 2 (50), incl   84 (580)   40 (275)   15 over 1 (25) to 2 (50), incl   84 (580)   40 (275)   15 over 2 (50) to 3 (80), incl   76 (525)   37 (255)   20	-		Copper Alloy UNS N	o. C62300		
Note	HR50	drawn and stress relieved		Pravio	PW	
over 1 [25] to 2 [50], incl						
Note of the controlled   Note of the control						
M30						
M30	M20	as hot rolled	over 2 [30] to 3 [00]; mor	50171-12	37 [233]	20
Note of the controlled and annealed helps   Note of the controlled			c/standron1s/sist/510d0/f9 - 4/s	o 15 the office	07105507boltoget/out 1515	0 1.15000 10
Not rolled and annealed hot extruded and annealed HR50 drawn and stress relieved   HR50 drawn and stress relieved   Frod (hexagonal and octagonal) and bar:   1 [25] and under   80 [550]   35 [240]   15   15   15   15   15   15   15   1		5.// Staffual US. ItCH. al/ Catal	over 3 [80] 5/815/31 900418-640	a-4/5 [515]u10	-a/19330 /30 [205] astiff 013	U-013(20F19
Not extruded and annealed drawn and stress relieved   Fod (hexagonal and octagonal) and bar:   1   25   and under   80   550   35   240   15   50   50   15   50   50   15   50   50		,	•			
HR50   drawn and stress relieved   HR50   drawn and stress relieved						
HR50 drawn and stress relieved						
1 [25] and under 80 [550] 35 [240] 15 over 1 [25] to 2 [50], incl 78 [540] 32 [220] 15  M20 as hot rolled over 2 [50] 75 [515] 30 [205] 20  M20 as hot rolled M30 as hot extruded O25 hot rolled and annealed HR50 drawn and stress relieved   Copper Alloy UNS No. C62400  Copper Al			red (haverenel and estaronal) and have			
over 1 [25] to 2 [50], incl         78 [540]         32 [220]         15           M20         as hot rolled         over 2 [50]         75 [515]         30 [205]         20           M20         as hot rolled         as hot extruded         As hot forged and annealed on the open color of the color	HR50	drawn and stress relieved		90 [550]	25 [240]	15
M20         as hot rolled         over 2 [50]         75 [515]         30 [205]         20           M20         as hot rolled         M30         as hot extruded         as hot forged and annealed hot of rolled and annealed hot extruded and annealed drawn and stress relieved         shapes, all sizes         75 [515]         30 [205]         20           Copper Alloy UNS No. C62400           HR50         Copper Alloy UNS No. C62400           HR50         drawn and stress relieved         rod (round only):           ½ [12] and under over ½ [12] to 1 [25], incl spices         95 [655] 45 [310] 10 over ½ [310] 12 over 1 [25] to 2 [50], incl spices         95 [655] 45 [310] 12 over 1 [25] to 2 [50] to 3 [80], incl spices         90 [620] 43 [295] 12 over 2 [50] to 3 [80], incl spices         90 [620] 40 [275] 12 over 3 [80] to 5 [125] incl spices         90 [620] 35 [240] 12           O20         hot forged and annealed hot rolled and annealed hot rolled and annealed hot orled and annealed hot extruded and annealed hot e						
M30       as hot extruded         O20       hot forged and annealed         O25       hot rolled and annealed         O30       hot extruded and annealed         HR50       drawn and stress relieved     Tod (round only):  \[ \frac{1}{2} \text{ [12] and under over \(\frac{1}{2}\) [5 [5], incl 95 [655] 45 [310] 12 over 1 [25] to 2 [50], incl 90 [620] 43 [295] 12 over 1 [25] to 2 [50], incl 90 [620] 40 [275] 12 \]  M20         M20       as hot rolled M30       as hot extruded \(\frac{1}{2}\) over 3 [80] to 5 [125] incl 90 [620] 35 [240] 12 \]  O20       hot forged and annealed hot rolled and annealed hot rolled and annealed hot extruded and extruded and extruded annealed hot extruded and extruded and extruded and extruded and extruded	M20	as hot rolled				
M30       as hot extruded         O20       hot forged and annealed         O25       hot rolled and annealed         O30       hot extruded and annealed         HR50       drawn and stress relieved     Tod (round only):  \[ \frac{1}{2} \text{ [12] and under over \(\frac{1}{2}\) [5 [5], incl 95 [655] 45 [310] 12 over 1 [25] to 2 [50], incl 90 [620] 43 [295] 12 over 1 [25] to 2 [50], incl 90 [620] 40 [275] 12 \]  M20         M20       as hot rolled M30       as hot extruded \(\frac{1}{2}\) over 3 [80] to 5 [125] incl 90 [620] 35 [240] 12 \]  O20       hot forged and annealed hot rolled and annealed hot rolled and annealed hot extruded and extruded and extruded annealed hot extruded and extruded and extruded and extruded and extruded	M20	as hot rolled				
O20       hot forged and annealed hot rolled and annealed hot rolled and annealed hot extruded and annealed drawn and stress relieved       shapes, all sizes       75 [515]       30 [205]       20         Copper Alloy UNS No. C62400         HR50       drawn and stress relieved       Copper Alloy UNS No. C62400         HR50       drawn and stress relieved       rod (round only):         ½ [12] and under       95 [655]       45 [310]       10         over ½ [12] to 1 [25], incl       90 [620]       43 [295]       12         M20       as hot rolled         M30       as hot extruded       over 3 [80] to 5 [125] incl       90 [620]       35 [240]       12         O20       hot forged and annealed hot rolled and annealed hot rolled and annealed hot rolled and annealed hot extruded annealed h						
Sapes   Not rolled and annealed   Not extruded and annealed   HR50   HR50   drawn and stress relieved   Copper Alloy UNS No. C62400						
Copper Alloy UNS No. C62400		- >	shapes, all sizes	75 [515]	30 [205]	20
Copper Alloy UNS No. C62400						
Copper Alloy UNS No. C62400	O30					
HR50 drawn and stress relieved rod (round only):  1/2 [12] and under 95 [655] 45 [310] 10  1/2 [12] to 1 [25], incl 95 [655] 45 [310] 12  1/2 over 1 [25] to 2 [50], incl 90 [620] 43 [295] 12  1/2 over 2 [50] to 3 [80], incl 90 [620] 40 [275] 12  1/2 mathematical powers as hot rolled over 3 [80] to 5 [125] incl 90 [620] 35 [240] 12  1/2 mathematical powers as hot extruded over 3 [80] to 5 [125] incl 90 [620] 35 [240] 12  1/2 mathematical powers are invertible and annealed hot rolled and annealed hot rolled and annealed hot extruded and extruded a	HR50	drawn and stress relieved				
HR50 drawn and stress relieved rod (round only):  ½ [12] and under 95 [655] 45 [310] 10  over ½ [12] to 1 [25], incl 95 [655] 45 [310] 12  over 1 [25] to 2 [50], incl 90 [620] 43 [295] 12  over 2 [50] to 3 [80], incl 90 [620] 40 [275] 12  M20 as hot rolled  M30 as hot extruded over 3 [80] to 5 [125] incl 90 [620] 35 [240] 12  O20 hot forged and annealed hot rolled and annealed hot rolled and annealed hot extruded and annealed hot extruded and annealed hot extruded and annealed hot extruded and annealed 90 hot extruded and annealed 90 [620] 35 [240] 12			Copper Alloy LINS No	o. C62400		
½ [12] and under     95 [655]     45 [310]     10 over ½ [12] to 1 [25], incl     95 [655]     45 [310]     12 over 1 [25] to 2 [50], incl     90 [620]     43 [295]     12 over 2 [50] to 3 [80], incl     90 [620]     40 [275]     12 over 2 [50] to 3 [80], incl     90 [620]     35 [240]     12 over 3 [80] to 5 [125] incl     90 [620]     35 [240]     12 over 3 [80] to 5 [125], incl     90 [620]     35 [240]     12 over 3 [80] to 5 [125], incl     90 [620]     35 [240]     12 over 3 [80] to 5 [125], incl     90 [620]     35 [240]     12 over 3 [80] to 5 [125], incl     90 [620]     35 [240]     12 over 3 [80] to 5 [125], incl     90 [620]     35 [240]     12 over 3 [80] to 5 [125], incl     90 [620]     35 [240]     12 over 3 [80] to 5 [125], incl     90 [620]     35 [240]     12 over 3 [80] to 5 [125], incl     90 [620]     35 [240]     12 over 3 [80] to 5 [125], incl     90 [620]     35 [240]     12 over 3 [80] to 5 [125], incl     12 over 3 [80] to 5 [125], incl     90 [620]     35 [240]     12 over 3 [80] to 5 [125], incl     12 over 3 [80] to 5 [125], incl     90 [620]     35 [240]     12 over 3 [80] to 5 [125], incl     12 over 3 [80] to 5 [125], in	HR50	drawn and stress relieved				
over ½ [12] to 1 [25], incl     95 [655]     45 [310]     12       over 1 [25] to 2 [50], incl     90 [620]     43 [295]     12       over 2 [50] to 3 [80], incl     90 [620]     40 [275]     12       M20     as hot rolled       M30     as hot extruded     over 3 [80] to 5 [125] incl     90 [620]     35 [240]     12       O20     hot forged and annealed hot rolled and annealed hot rolled and annealed     hot rolled and annealed hot extruded and annealed     1/2 [12] to 5 [125], incl     90 [620]     35 [240]     12				95 [655]	45 [310]	10
over 2 [50] to 3 [80], incl         90 [620]         40 [275]         12           M20         as hot rolled         over 3 [80] to 5 [125] incl         90 [620]         35 [240]         12           O20         hot forged and annealed hot rolled and annealed hot extruded and annealed hot extruded and annealed hot extruded and annealed         rod (hexagonal and octagonal) and bar:         90 [620]         35 [240]         12           O30         hot extruded and annealed         ½ [12] to 5 [125], incl         90 [620]         35 [240]         12			over 1/2 [12] to 1 [25], incl	95 [655]	45 [310]	12
M20       as hot rolled         M30       as hot extruded       over 3 [80] to 5 [125] incl       90 [620]       35 [240]       12         O20       hot forged and annealed hot rolled and annealed       rod (hexagonal and octagonal) and bar:         O25       hot rolled and annealed hot extruded and annealed       ½ [12] to 5 [125], incl       90 [620]       35 [240]       12						
M30 as hot extruded  over 3 [80] to 5 [125] incl 90 [620] 35 [240] 12  O20 hot forged and annealed		and heat well and	over 2 [50] to 3 [80], incl	90 [620]	40 [275]	12
O25 hot rolled and annealed O30 hot extruded and annealed 1/2 [12] to 5 [125], incl 90 [620] 35 [240] 12		}	over 3 [80] to 5 [125] incl	90 [620]	35 [240]	12
O30 hot extruded and annealed 1/2 [12] to 5 [125], incl 90 [620] 35 [240] 12	O20	hot forged and annealed	rod (hexagonal and octagonal) and bar:			
	O25	hot rolled and annealed				
shapes, all sizes 90 [620] 35 [240] 12	O30	hot extruded and annealed				12
			shapes, all sizes	90 [620]	35 [240]	12