



Designation: B286 – 07 (Reapproved 2017)

# Standard Specification for Copper Conductors for Use in Hookup Wire for Electronic Equipment<sup>1</sup>

This standard is issued under the fixed designation B286; 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 ( $\epsilon$ ) 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 covers uninsulated metallic-coated copper conductors for use in hookup wire for electronic equipment.

1.2 The SI values for density are to be regarded as standard. For all other properties, the inch-pound values are to be regarded as the standard.

1.3 *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 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:*<sup>2</sup>

- [B33 Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes](#)
- [B189 Specification for Lead-Coated and Lead-Alloy-Coated Soft Copper Wire for Electrical Purposes](#)
- [B193 Test Method for Resistivity of Electrical Conductor Materials](#)
- [B258 Specification for Nominal Diameters and Cross-Sectional Areas of AWG Sizes of Solid Round Wires Used as Electrical Conductors](#)
- [B298 Specification for Silver-Coated Soft or Annealed Copper Wire](#)

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee B01 on Electrical Conductors and is the direct responsibility of Subcommittee B01.04 on Conductors of Copper and Copper Alloys.

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<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.

[B355 Specification for Nickel-Coated Soft or Annealed Copper Wire](#)

## 3. Ordering Information

3.1 Orders for material under this specification shall include the following information:

- 3.1.1 Quantity of each size, designation (Table 1) and type,
- 3.1.2 Conductor size, designation, construction, and type (Table 1).
- 3.1.3 Whether tin, lead alloy, silver-coated, or nickel-coated (see 4.1).
- 3.1.4 For silver-coated conductors and nickel-coated conductors, class of coating (see 4.1), and when required, unannealed (see 4.2),
- 3.1.5 Desired constructions where alternates are given (Table 1, Type II and, 5.1, 6.1, and 6.2),
- 3.1.6 Package size (Section 12).
- 3.1.7 Special package marking if required (Section 11), and
- 3.1.8 Place of inspection (Section 10).

## 4. General Requirements

4.1 *Coating of Wires*—The coating of the solid conductors and the wires composing stranded conductors (before stranding) shall conform to the coating requirements of ASTM Specifications B33, B189, B298, and B355, as indicated on the purchase order.

4.2 *Temper*—Unless otherwise specified, all coated conductors shall be furnished in the annealed temper. When so specified, silver-coated conductors or nickel-coated conductors shall be furnished unannealed (Explanatory Note 1).

NOTE 1—The term unannealed as used in this specification means cold-worked conductor as produced on commercial wire-drawing machines.

4.3 *Elongation*—The elongation of annealed Type I conductors shall be as specified in Specifications B33, B189, B298, and B355 as applicable. The elongation of stranded conductors shall be permitted to vary from the requirements of the applicable Specifications: B33, B189, B298, and B355 by the following amounts:

4.3.1 For stranded conductors 22 AWG and smaller, the test shall be performed on the whole conductor and the elongation



TABLE 1 Details of Conductor Construction

Type I (Solid Conductors)									
Size Designation <sup>a</sup> , AWG	Nominal Area, cmils	Nominal Diameter, in.	D-C Resistance at 20°C, Ω/1000 ft, max (Explanatory Note 2)						
			Annealed Lead-Alloy Coated	Annealed Silver Coated	Class 2 Nickel <sup>A</sup>	Class 10 Nickel	Class 27 Nickel	Class 10 Nickel	Class 27 Nickel
10	10380	0.1019	1.06	1.02	1.05	1.17	1.44	1.17	1.44
12	6530	0.0808	1.69	1.68	1.68	1.84	2.28	1.84	2.28
14	4110	0.0641	2.68	2.58	2.67	2.93	3.63	2.93	3.63
16	2580	0.0508	4.26	4.10	4.27	4.65	5.77	4.65	5.77
18	1620	0.0403	6.78	6.52	6.79	7.39	9.17	7.39	9.17
20	1020	0.0320	10.7	10.3	10.8	11.8	14.6	11.8	14.6
22	640	0.0253	17.2	16.5	17.3	18.8	23.3	18.8	23.3
24	404	0.0201	27.2	26.2	27.3	29.8	36.9	29.8	36.9
26	253	0.0159	44.5	41.9	43.8	47.5	58.9	47.5	58.9
28	159	0.0126	70.8	66.8	69.4	75.4	107.0	75.4	107.0
30	100	0.0100	114.0	106.0	110.0	120.0	149.0	120.0	149.0

  

Type II (Stranded Conductors)										
Size Designation <sup>b</sup>	Conductor Construction		Maximum Allowable Diameter, in. <sup>d</sup>	Length of Lay, in. (Explanatory Note 3)	D-C Resistance at 20°C, Ω/1000 ft, max (Explanatory Note 2)					
	Number of Wires <sup>c</sup>	Nominal Diameter of Each Wire, in.			Annealed Tin or Lead-Alloy Coated	Annealed Silver Coated	Class 10 Nickel	Class 27 Nickel	Class 10 Nickel	Class 27 Nickel
0000-2109	2109 <sup>F</sup>	0.0100	0.635	...	0.0576	0.0537	0.0610	0.0756	0.0610	0.0756
000-1672	1672 <sup>F</sup>	0.0100	0.545	...	0.0727	0.0677	0.0770	0.0954	0.0770	0.0954
00-1330	1330 <sup>F</sup>	0.0100	0.486	...	0.0914	0.0851	0.0967	0.120	0.0967	0.120
0-1064	1064 <sup>F</sup>	0.0100	0.435	...	0.114	0.106	0.121	0.150	0.121	0.150
0-1045	1045 <sup>F</sup>	0.0100	0.431	...	0.116	0.108	0.123	0.153	0.123	0.153
1-836	836 <sup>F</sup>	0.0100	0.386	...	0.145	0.135	0.154	0.191	0.154	0.191
1-817 <sup>E</sup>	817 <sup>F</sup>	0.0100	0.382	...	0.149	0.139	0.158	0.195	0.158	0.195
2-665	665 <sup>F</sup>	0.0100	0.342	...	0.183	0.170	0.194	0.240	0.194	0.240
4-133 <sup>E</sup>	133 <sup>F</sup>	0.0179	0.274	...	0.280	0.263	0.299	0.371	0.299	0.371
4-420	420 <sup>G</sup>	0.0100	0.275	...	0.289	0.270	0.306	0.380	0.306	0.380
6-133 <sup>E</sup>	133 <sup>F</sup>	0.0142	0.217	...	0.444	0.418	0.475	0.589	0.475	0.589
6-266	266 <sup>G</sup>	0.0100	0.220	...	0.457	0.426	0.484	0.600	0.484	0.600
8-133 <sup>E</sup>	133 <sup>F</sup>	0.0113	0.173	...	0.701	0.661	0.751	0.930	0.751	0.930
8-168	168 <sup>G</sup>	0.0100	0.177	...	0.724	0.674	0.766	0.949	0.766	0.949
10-105	105 <sup>G</sup>	0.0100	0.130	1.2 to 1.8	1.15	1.07	1.21	1.50	1.21	1.50
10-104	104 <sup>H</sup>	0.0100	0.130	1.7 to 2.1	1.16	1.08	1.23	1.52	1.23	1.52
10-49 <sup>F</sup>	49 <sup>G</sup>	0.0142	0.132	...	1.21	1.14	1.29	1.60	1.29	1.60
10-37 <sup>F</sup>	37 <sup>E</sup>	0.0159	0.115	1.10 to 1.75	1.26	1.19	1.35	1.67	1.35	1.67
12-65	65 <sup>H</sup>	0.0100	0.099	1.3 to 1.7	1.85	1.73	1.96	2.43	1.96	2.43

  

Type II (Stranded Conductors)										
Size Designation <sup>b</sup>	Conductor Construction		Maximum Allowable Diameter, in. <sup>d</sup>	Length of Lay, in. (Explanatory Note 2)	D-C Resistance at 20°C, Ω/1000 ft, max (Explanatory Note 2)					
	Number of Wires <sup>c</sup>	Nominal Diameter of Each Wire, in.			Annealed Tin or Lead-Alloy Coated	Annealed Silver Coated	Class 10 Nickel	Class 27 Nickel	Class 10 Nickel	Class 27 Nickel
12-37 <sup>E</sup>	37 <sup>E</sup>	0.0126	0.091	0.90 to 1.45	2.01	1.89	2.15	2.66	2.15	2.66
12-19 <sup>F</sup>	19 <sup>J</sup>	0.0179	0.093	0.90 to 1.45	1.92	1.81	2.05	2.55	2.05	2.55
14-41	41 <sup>H</sup>	0.0100	0.081	0.80 to 1.35	2.94	2.74	3.11	3.85	3.11	3.85
14-19 <sup>F</sup>	19 <sup>J</sup>	0.0142	0.073	0.80 to 1.15	3.05	2.87	3.26	4.05	3.26	4.05
16-26	26 <sup>H</sup>	0.0100	0.062	0.60 to 0.90	4.59	4.27	4.86	6.02	4.86	6.02
16-19 <sup>F</sup>	19 <sup>J</sup>	0.0113	0.059	0.60 to 0.90	4.82	4.54	5.15	6.39	5.15	6.39
18-26 <sup>F</sup>	26 <sup>H</sup>	0.0080	0.050	0.50 to 0.70	7.20	6.71	7.63	9.45	7.63	9.45
18-19 <sup>F</sup>	19 <sup>J</sup>	0.0100	0.052	0.50 to 0.70	6.22	5.79	6.58	8.16	6.58	8.16