Designation: B172 – 01a (Reapproved 2007)ε1

Standard Specification for Rope-Lay-Stranded Copper Conductors Having Bunch-Stranded Members, for Electrical Conductors[1]

This standard is issued under the fixed designation B172; 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.

ε[1] NOTE—Table 1 was editorially corrected in March 2007.

1. Scope

1.1 This specification covers bare rope-lay-stranded conductors having bunch-stranded members made from round copper wires, either uncoated or coated with tin, lead, or lead-alloy for use as electrical conductors (Explanatory Notes 1 and 2).

1.2 Coated wires shall include only those wires with finished diameters and densities substantially equal to the respective diameters and densities of uncoated wires.

1.3 The values stated in inch-pound or SI units are to be regarded separately as standard. Each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the specification. For conductor sizes designated by AWG or kcmil, the requirements in SI units have been numerically converted from corresponding values, stated or derived, in inch-pound units. For conductor sizes designated by SI units only, the requirements are stated or derived in SI units.

1.3.1 For density, resistivity, and temperature, the values stated in SI units are to be regarded as standard.

2. Referenced Documents

2.1 The following documents of the issue in effect at the time of reference form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards:*[2]

B3 Specification for Soft or Annealed Copper Wire

B33 Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes

B173 Specification for Rope-Lay-Stranded Copper Conductors Having Concentric-Stranded Members, for Electrical Conductors

B189 Specification for Lead-Coated and Lead-Alloy-Coated Soft Copper Wire for Electrical Purposes

B263 Test Method for Determination of Cross-Sectional Area of Stranded Conductors

B354 Terminology Relating to Uninsulated Metallic Electrical Conductors

2.3 *American National Standard:*

ANSI C42.35 Definitions of Electrical Terms[3]

3. Classification

3.1 For the purpose of this specification rope-lay-stranded conductors having bunch-stranded members are classifed as follows:

3.1.1 *Class I*—Conductors consisting of wires 0.0201-in. (0.511-mm) diameter (No. 24 AWG) to produce rope-lay-stranded conductors up to 2 000 000 cmil (1013 mm^2) in total cross-sectional area. (Typical use is for special apparatus conductor.)

3.1.2 *Class K*—Conductors consisting of wires 0.0100-in. (0.254-mm) diameter (No. 30 AWG) to produce rope-lay-stranded conductors up to 1 000 000 cmil (507 mm^2) in total cross-sectional area. (Typical use is for special portable cord and conductors.)

3.1.3 *Class M*—Conductors consisting of wires 0.0063-in. (0.160-mm) diameter (No. 34 AWG) to produce rope-lay-stranded conductors up to 1 000 000 cmil (507 mm^2) in total cross-sectional area. (Typical use is for welding conductors.)

4. Ordering Information

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

4.1.1 Quantity of each size and class,

4.1.2 Conductor size: circular-mil area or AWG (see 7.1),

[1] 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.

Current edition approved March 15, 2007. Published April 2007. Originally approved in 1942 to replace portions of B158–41 T. Last previous edition approved in 2001 as B172 – 01a. DOI: 10.1520/B0172-01AR07E01.

[2] 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.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

4.1.3 Class (Section 4 and Table 1),

4.1.4 Whether coated or uncoated; if coated, designate type of coating (see 11.1),

4.1.5 Details of special-purpose lays, if required (see 6.2, 6.3, and Explanatory Note 3),

4.1.6 Package size (see 15.1),

4.1.7 Special package marking, if required (Section 14),

4.1.8 Lagging, if required (see 15.2), and

4.1.9 Place of inspection (Section 13).

5. Joints

5.1 Necessary joints in wires or in groups of wires shall be made in accordance with accepted commercial practice, taking into account the size of the wire or group of wires as related to the size of the entire conductor.

TABLE 1 Construction Requirements of Rope-Lay Stranded Copper Conductors Having Bunch-Stranded Members[A]

Area of Cross Section		Size AWG	Class I				Class K				Class M			
			Wire Diameter 0.0201 in. (0.511 mm)		Approximate Mass[B]		Wire Diameter 0.0100 in. (0.254 mm)		Approximate Mass[B]		Wire Diameter 0.0063 in. (0.160 mm)		Approximate Mass[B]	
cmil	mm²†		Nominal Number of Wires	Strand Construction[C]	lb/ 1000 ft.	kg/ km	Nominal Number of Wires	Strand Construction[C]	lb/ 1000 ft.	kg/ km	Nominal Number of Wires	Strand Construction[C]	lb/ 1000 ft.	kg/ km
2 000 000	1013	...	4921	19 by 7 by 37	6439	9583	...	...	...	...	...	...	...	...
1 900 000	963	...	4788	19 by 7 by 36	6265	9324	...	...	...	...	...	...	...	...
1 800 000	912	...	4522	19 by 7 by 34	5917	8806	...	...	...	...	...	...	...	...
1 750 000	887	...	4389	19 by 7 by 33	5743	8547	...	...	...	...	...	...	...	...
1 700 000	861	...	4256	19 by 7 by 32	5569	8288	...	...	...	...	...	...	...	...
1 600 000	811	...	3990	19 by 7 by 30	5221	7770	...	...	...	...	...	...	...	...
1 500 000	760	...	3724	19 by 7 by 28	4873	7252	...	...	...	...	...	...	...	...
1 400 000	709	...	3458	19 by 7 by 26	4525	6734	...	...	...	...	...	...	...	...
1 300 000	659	...	3192	19 by 7 by 24	4177	6216	...	...	...	...	...	...	...	...
1 250 000	633	...	3059	19 by 7 by 23	4003	5957	...	...	...	...	...	...	...	...
1 200 000	608	...	2926	19 by 7 by 22	3829	5698	...	...	...	...	...	...	...	...
1 100 000	557	...	2793	19 by 7 by 21	3655	5439	...	...	...	...	...	...	...	...
1 000 000	507	...	2527	19 by 7 by 19	3307	4921	10 101	37 by 7 by 39	3272	4869	25 193	61 by 7 by 59	3239	4819
900 000	456	...	2261	19 by 7 by 17	2959	4403	9065	37 by 7 by 35	2936	4369	22 631	61 by 7 by 53	2909	4329
800 000	405	...	1995	19 by 7 by 15	2611	3885	7980	19 by 7 by 60	2585	3846	20 069	61 by 7 by 47	2580	3839
×750 000	380	...	1862	19 by 7 by 14	2436	3626	7581	19 by 7 by 57	2455	3654	18 788	61 by 7 by 44	2415	3594
700 000	355	...	1729	19 by 7 by 13	2262	3367	6916	19 by 7 by 52	2240	3333	17 507	61 by 7 by 41	2251	3349
650 000	329	...	1596	19 by 7 by 12	2088	3108	6517	19 by 7 by 49	2111	3141	16 226	61 by 7 by 38	2086	3104
600 000	304	...	1470	7 by 7 by 30	1906	2836	5985	19 by 7 by 45	1938	2885	14 945	61 by 7 by 35	1921	2859
550 000	279	...	1372	7 by 7 by 28	1779	2647	5453	19 by 7 by 41	1766	2628	13 664	61 by 7 by 32	1757	2614
500 000	253	...	1225	7 by 7 by 25	1588	2363	5054	19 by 7 by 38	1637	2436	12 691	37 by 7 by 49	1631	2428
450 000	228	...	1127	7 by 7 by 23	1461	2174	4522	19 by 7 by 34	1465	2180	11 396	37 by 7 by 44	1465	2180
400 000	203	...	980	7 by 7 by 20	1270	1891	3990	19 by 7 by 30	1292	1923	10 101	37 by 7 by 39	1298	1932
350 000	177	...	882	7 by 7 by 18	1143	1701	3458	19 by 7 by 26	1120	1667	8806	37 by 7 by 34	1132	1685
300 000	152	...	735	7 by 7 by 15	953	1418	2989	7 by 7 by 61	959	1427	7581	19 by 7 by 57	975	1450
250 000	127	...	637	7 by 7 by 13	826	1229	2499	7 by 7 by 51	802	1193	6384	19 by 7 by 48	821	1221
211 600	107	0000	532	19 by 28	683	1017	2107	7 by 7 by 43	676	1006	5320	19 by 7 by 40	684	1018
167 800	85.0	000	418	19 by 22	537	799	1666	7 by 7 by 34	535	795	4256	19 by 7 by 32	547	814
133 100	67.4	00	342	19 by 18	439	654	1323	7 by 7 by 27	424	632	3325	19 by 7 by 25	427	636
105 600	53.5	0	266	19 by 14	342	508	1064	19 by 56	338	503	2646	7 by 7 by 54	337	501
83 690	42.4	1	210	7 by 30	267	397	836	19 by 44	266	395	2107	7 by 7 by 43	268	399
66 360	33.6	2	161	7 by 23	205	305	665	19 by 35	211	315	1666	7 by 7 by 34	212	316
52 620	26.7	3	133	7 by 19	169	252	532	19 by 28	169	252	1323	7 by 7 by 27	168	251
41 740	21.1	4	105	7 by 15	134	199	420	7 by 60	132	197	1064	19 by 56	134	200
33 090	16.8	5	84	7 by 12	107	159	336	7 by 48	106	157	836	19 by 44	105	157
26 240	13.3	6	63	7 by 9	80	119	266	7 by 38	84	125	665	19 by 35	84	125
20 820	10.5	7	...	...	...	...	210	7 by 30	66	98	532	19 by 28	67	100
16 510	8.37	8	...	...	...	...	168	7 by 24	53	79	420	7 by 60	52	78
13 090	6.63	9	...	...	...	...	133	7 by 19	42	62	336	7 by 48	42	62
10 380	5.26	10	...	...	...	...	...	...	...	...	259	7 by 37	32	48
6530	3.31	12	...	...	...	...	...	...	...	...	168	7 by 24	21	31

†Editorially corrected.

[A] The constructions shown in this table are typical of those used in the industry. It is not intended that this table preclude other constructions which may be desireable for specific applications. The constructions shown provide for a finished, non-covered, stranded conductor approximately of the area indicated. When specified by the purchaser, the number or size of wires may be increased to provide additional area to compensate for draw-down during subsequent processing.

[B] Values for the mass of the completed conductor are approximate. The mass values are based upon the standard stranding increments listed in Explanatory Note 6.

[C] Strand Construction—#A by #B by #C: where #C is the number of wires in each bunch-stranded member; #B is the number of bunch stranded members which make-up each rope-stranded member; and #A (where used) is the number of rope-stranded members in the conductor. Where #A is not given, the conductor consists of one rope-stranded member. For example, 19 by 7 by 32 indicates a construction consisting of 19 rope-stranded members, each of which consists of 7 bunch-stranded members with 32 wires each.