Designation: B524/B524M – 99 (Reapproved 2016)

# Standard Specification for Concentric-Lay-Stranded Aluminum Conductors, Aluminum-Alloy Reinforced (ACAR, 1350/6201)[1]

This standard is issued under the fixed designation B524/B524M; 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.

## 1. Scope

1.1 This specification covers concentric-lay-stranded conductors made from round aluminum 1350-H19 (extra hard) wires and round aluminum-alloy 6201-T81 (hard: solution heat treated, cold worked, and then artificially aged) core wires for use as overhead electrical conductors (Explanatory Note 1).

NOTE 1—The aluminum, alloy, and temper designations conform to ANSI H35.1/ANSI H35.1[M]. Aluminum 1350 and Alloy 6201 correspond to unified numbering system A91350 and A96201, respectively, in accordance with Practice E527.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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

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 and health practices and determine the applicability of regulatory limitations prior to use.*

## 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:*[2]

B230/B230M Specification for Aluminum 1350–H19 Wire for Electrical Purposes

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

B354 Terminology Relating to Uninsulated Metallic Electrical Conductors

B398/B398M Specification for Aluminum-Alloy 6201-T81 and 6201-T83 Wire for Electrical Purposes

B682 Specification for Metric Sizes of Electrical Conductors

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

2.3 *ANSI Standard:*

ANSI H35.1 American National Standard for Alloy and Temper Designation Systems for Aluminum[3]

ANSI H35.1[M] American National Standard for Alloy and Temper Designation Systems for Aluminum[3]

2.4 *NIST Document:*

*NBS Handbook 100* —Copper Wire Tables[4]

## 3. Ordering Information

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

3.1.1 Quantity of each size and stranding;

3.1.2 Conductor size (see 7.1);

3.1.3 Total number of wires, aluminum 1350 and aluminum alloy 6201 (Table 1 or Table 2);

3.1.4 Direction of lay of outer layer of wires if other than right-hand (see 6.2);

3.1.5 Special tension test, if required (see 8.2);

3.1.6 Place of inspection (see 14.1);

3.1.7 Package size and type (see 16.1);

3.1.8 Heavy wood lagging, if required (Section 16); and

3.1.9 Special package marking, if required (Section 15).

## 4. Requirement for Wires

4.1 Before stranding, the 1350-H19 wire used shall meet the requirements of Specification B230/B230M.

4.2 Before stranding, the 6201-T81 wire used shall meet the requirements of Specification B398/B398M.

[1] This specification is under the jurisdiction of ASTM Committee B01 on Electrical Conductors and is the direct responsibility of Subcommittee B01.07 on Conductors of Light Metals.

Current edition approved Oct. 1, 2016. Published October 2016. Originally approved in 1970. Last previous edition approved in 2011 as B0524/B524M – 99 (2011). DOI: 10.1520/B0524_B0524M-99R16.

[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] Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, http://www.nist.gov.

**TABLE 1 Construction Requirements of Concentric-Lay-Stranded Aluminum Conductors, Aluminum Alloy Reinforced**

| Conductor Size | | | Required Construction | | | | | Recommended Package Sizes[A] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Number of Wires[B] | Diameter of Wires | | Nominal Outside Diameter | | Reel Designation | Approximate Length of Each Piece | | Approximate Mass of Each Length[C] | |
| cmil | AWG | $mm^2$ | | in. | mm | in. | mm | | ft | m | lb | kg |
| 3 000 000 | | 1520 | 91 | 0.1816 | 4.613 | 1.998 | 50.74 | RMT 90.45 | 3 200 | 975 | 9 100 | 4130 |
| 2 750 000 | | 1393 | 91 | 0.1738 | 4.415 | 1.912 | 48.56 | RMT 90.45 | 3 490 | 1065 | 9 100 | 4130 |
| 2 500 000 | | 1267 | 91 | 0.1657 | 4.209 | 1.823 | 46.30 | RMT 90.45 | 3 840 | 1170 | 9 100 | 4130 |
| 2 493 000 | | 1263 | 91 | 0.1655 | 4.204 | 1.8207 | 46.25 | RMT 96.60 | 6 500 | 1981 | 15 400 | 6970 |
| 2 338 000 | | 1185 | 61 | 0.1958 | 4.973 | 1.7620 | 44.75 | RMT 96.60 | 7 500 | 2286 | 16 700 | 7540 |
| 2 250 000 | | 1140 | 91 | 0.1572 | 3.993 | 1.729 | 43.92 | RMT 90.45 | 4 270 | 1300 | 9 100 | 4130 |
| 2 000 000 | | 1013 | 91 | 0.1482 | 3.764 | 1.630 | 41.40 | RMT 90.45 | 4 850 | 1480 | 9 100 | 4130 |
| 2 000 000 | | 1013 | 61 | 0.1811 | 4.600 | 1.630 | 41.40 | RMT 90.45 | 5 200 | 1585 | 9 760 | 4425 |
| 1 933 000 | | 979 | 61 | 0.1780 | 4.522 | 1.6021 | 40.69 | RMT 96.60 | 9 200 | 2804 | 16 700 | 7570 |
| 1 900 000 | | 963 | 61 | 0.1765 | 4.483 | 1.588 | 40.35 | RMT 90.45 | 5 470 | 1665 | 9 760 | 4425 |
| 1 800 000 | | 912 | 61 | 0.1718 | 4.364 | 1.546 | 39.28 | RMT 90.45 | 5 780 | 1760 | 9 760 | 4425 |
| 1 798 000 | | 911 | 61 | 0.1717 | 4.361 | 1.5452 | 39.25 | RMT 96.60 | 9 200 | 2804 | 15 600 | 7040 |
| 1 750 000 | | 887 | 61 | 0.1694 | 4.303 | 1.525 | 38.73 | RMT 90.45 | 5 940 | 1810 | 9 760 | 4425 |
| 1 703 000 | | 863 | 61 | 0.1671 | 4.244 | 1.8380 | 46.68 | RMT 96.60 | 9 000 | 2743 | 14 400 | 6530 |
| 1 700 000 | | 861 | 61 | 0.1669 | 4.239 | 1.502 | 38.15 | RMT 90.45 | 6 120 | 1865 | 9 760 | 4425 |
| 1 600 000 | | 811 | 61 | 0.1620 | 4.115 | 1.458 | 37.04 | RMT 90.45 | 6 500 | 1980 | 9 760 | 4425 |
| 1 534 400 | | 777 | 61 | 0.1586 | 4.028 | 1.4274 | 36.26 | RMT 96.60 | 10 000 | 3048 | 14 400 | 6530 |
| 1 500 000 | | 760 | 61 | 0.1568 | 3.983 | 1.411 | 35.85 | RMT 90.45 | 6 930 | 2110 | 9 760 | 4425 |
| 1 400 000 | | 709 | 61 | 0.1515 | 3.848 | 1.364 | 34.63 | RMT 90.45 | 7 430 | 2265 | 9 760 | 4425 |
| 1 361 500 | | 690 | 61 | 0.1494 | 3.795 | 1.3446 | 34.15 | RMT 96.60 | 11 250 | 3429 | 14 400 | 6530 |
| 1 300 000 | | 659 | 61 | 0.1460 | 3.708 | 1.314 | 33.37 | RMT 90.45 | 8 000 | 2440 | 9 760 | 4425 |
| 1 300 000 | | 659 | 37 | 0.1874 | 4.760 | 1.312 | 33.32 | RMT 84.45 | 6 065 | 1850 | 7 400 | 3355 |
| 1 277 000 | | 647 | 61 | 0.1447 | 3.675 | 1.3022 | 33.08 | RMT 96.60 | 12 000 | 3658 | 14 400 | 6520 |
| 1 250 000 | | 633 | 61 | 0.1431 | 3.635 | 1.288 | 32.72 | RMT 90.45 | 8 320 | 2535 | 9 760 | 4425 |
| 1 250 000 | | 633 | 37 | 0.1838 | 4.669 | 1.287 | 32.70 | RMT 84.45 | 6 310 | 1920 | 7 400 | 3355 |
| 1 200 000 | | 608 | 61 | 0.1403 | 3.564 | 1.263 | 32.08 | RMT 90.45 | 8 660 | 2640 | 9 760 | 4425 |
| 1 200 000 | | 608 | 37 | 0.1801 | 4.575 | 1.261 | 32.02 | RMT 84.45 | 6 565 | 2000 | 7 400 | 3355 |
| 1 198 000 | | 607 | 37 | 0.1799 | 4.570 | 1.2596 | 31.99 | RMT 96.60 | 12 850 | 3917 | 14 500 | 6550 |
| 1 172 000 | | 594 | 37 | 0.1780 | 4.521 | 1.2458 | 31.64 | RMT 96.60 | 14 400 | 4389 | 15 900 | 7180 |
| 1 109 000 | | 562 | 37 | 0.1731 | 4.397 | 1.2119 | 30.78 | RMT 96.60 | 13 850 | 4221 | 14 500 | 6540 |
| 1 100 000 | | 557 | 61 | 0.1343 | 3.411 | 1.209 | 30.70 | RMT 90.45 | 9 450 | 2880 | 9 760 | 4425 |
| 1 100 000 | | 557 | 37 | 0.1724 | 4.379 | 1.207 | 30.65 | RMT 84.45 | 7 160 | 2180 | 7 400 | 3355 |
| 1 080 600 | | 548 | 37 | 0.1709 | 4.341 | 1.1963 | 30.39 | RMT 96.60 | 15 600 | 4755 | 15 800 | 7170 |
| 1 024 500 | | 519 | 37 | 0.1664 | 4.227 | 1.1648 | 29.59 | RMT 96.60 | 15 000 | 4572 | 14 500 | 6540 |
| 1 000 000 | | 507 | 61 | 0.1280 | 3.251 | 1.152 | 29.26 | RMT 90.45 | 10 400 | 3170 | 9 760 | 4425 |
| 1 000 000 | | 507 | 37 | 0.1644 | 4.176 | 1.151 | 29.23 | RMT 84.45 | 7 880 | 2400 | 7 400 | 3355 |
| 950 000 | | 481 | 37 | 0.1602 | 4.069 | 1.121 | 28.48 | RMT 84.45 | 8 300 | 2530 | 7 400 | 3355 |
| 927 200 | | 470 | 37 | 0.1583 | 4.021 | 1.1081 | 28.15 | RMT 90.45 | 10 400 | 3170 | 9 050 | 4110 |
| 900 000 | | 456 | 37 | 0.1560 | 3.962 | 1.092 | 27.73 | RMT 84.45 | 8 760 | 2670 | 7 400 | 3355 |
| 853 700 | | 433 | 37 | 0.1519 | 3.858 | 1.0633 | 27.01 | RMT 96.60 | 18 000 | 5486 | 14 500 | 6540 |
| 850 000 | | 431 | 37 | 0.1516 | 3.851 | 1.061 | 26.96 | RMT 84.45 | 9 270 | 2825 | 7 400 | 3355 |
| 800 000 | | 405 | 37 | 0.1470 | 3.734 | 1.029 | 26.14 | RMT 84.45 | 9 850 | 3000 | 7 400 | 3355 |
| 750 000 | | 380 | 37 | 0.1424 | 3.617 | 0.997 | 25.32 | RMT 84.45 | 10 510 | 3200 | 7 400 | 3355 |
| 739 800 | | 375 | 37 | 0.1414 | 3.592 | 0.9898 | 25.14 | RMT 90.45 | 13 010 | 3965 | 9 020 | 4090 |
| 700 000 | | 355 | 37 | 0.1375 | 3.493 | 0.962 | 24.45 | RMT 84.45 | 11 260 | 3430 | 7 400 | 3355 |
| 653 100 | | 331 | 19 | 0.1854 | 4.709 | 0.9270 | 23.55 | RMT 84.45 | 9 910 | 3021 | 6 070 | 2760 |
| 650 000 | | 329 | 37 | 0.1325 | 3.366 | 0.928 | 23.56 | RMT 84.45 | 12 130 | 3695 | 7 400 | 3355 |
| 649 500 | | 329 | 37 | 0.1325 | 3.365 | 0.9274 | 23.56 | NR 66.28 | 6 890 | 2100 | 4 200 | 1910 |
| 600 000 | | 304 | 37 | 0.1273 | 3.233 | 0.891 | 22.63 | RMT 84.45 | 13 140 | 4005 | 7 400 | 3355 |
| 600 000 | | 304 | 19 | 0.1777 | 4.513 | 0.888 | 22.56 | RM 66.32<br>NR 66.28 | 6 750 | 2060 | 3 800 | 1725 |
| 587 200 | | 298 | 19 | 0.1758 | 4.465 | 0.8790 | 22.33 | NR 66.28 | 8 030 | 2448 | 4 430 | 2010 |
| 550 000 | | 279 | 37 | 0.1219 | 3.096 | 0.853 | 21.67 | RMT 84.45 | 14 330 | 4365 | 7 400 | 3355 |
| 550 000 | | 279 | 19 | 0.1701 | 4.321 | 0.850 | 21.60 | RM 66.32<br>NR 66.28 | 7 360 | 2245 | 3 800 | 1725 |
| 503 600 | | 255 | 19 | 0.1628 | 4.135 | 0.8140 | 20.68 | NR 66.28 | 8 030 | 2448 | 3 800 | 1730 |
| 500 000 | | 253 | 37 | 0.1162 | 2.951 | 0.813 | 20.66 | RMT 84.45 | 15 765 | 4805 | 7 400 | 3355 |
| 500 000 | | 253 | 19 | 0.1622 | 4.120 | 0.811 | 20.60 | RM 66.32<br>NR 66.28 | 8 100 | 2470 | 3 800 | 1725 |
| 450 000 | | 228 | 19 | 0.1539 | 3.909 | 0.770 | 19.54 | RM 66.32<br>NR 66.28 | 9 000 | 2745 | 3 800 | 1725 |
| 400 000 | | 203 | 19 | 0.1451 | 3.685 | 0.726 | 18.42 | RM 66.32<br>NR 66.28 | 10 120 | 3085 | 3 800 | 1725 |
| 350 000 | | 177 | 19 | 0.1357 | 3.447 | 0.678 | 17.24 | RM 66.32<br>NR 66.28 | 11 560 | 3530 | 3 800 | 1725 |
| 300 000 | | 152 | 19 | 0.1257 | 3.193 | 0.628 | 15.96 | RM 66.32<br>NR 66.28 | 13 490 | 4115 | 3 800 | 1725 |
| 250 000 | | 127 | 19 | 0.1147 | 2.913 | 0.574 | 14.56 | RM 66.32<br>NR 66.28 | 16 190 | 4940 | 3 800 | 1725 |

**TABLE 1** *Continued*

| Conductor Size | | | Required Construction | | | | | Recommended Package Sizes[A] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Number of Wires[B] | Diameter of Wires | | Nominal Outside Diameter | | Reel Designation | Approximate Length of Each Piece | | Approximate Mass of Each Length[C] | |
| cmil | AWG | $mm^2$ | | in. | mm | in. | mm | | ft | m | lb | kg |
| 246 900 | | 125 | 7 | 0.1878 | 4.770 | 0.563 | 14.31 | NR 36.22 | 3 020 | 920 | 700 | 318 |
| 211 600 | 4/0 | 107 | 7 | 0.1739 | 4.417 | 0.522 | 13.25 | NR 36.22 | 3 525 | 1075 | 700 | 318 |
| 195 700 | | 99.1 | 7 | 0.1672 | 4.247 | 0.502 | 12.74 | NR 36.22 | 3 810 | 1165 | 700 | 318 |
| 167 800 | 3/0 | 85.0 | 7 | 0.1548 | 3.932 | 0.464 | 11.80 | NR 36.22 | 4 445 | 1355 | 700 | 318 |
| 155 400 | | 78.7 | 7 | 0.1490 | 3.785 | 0.447 | 11.35 | NR 36.22 | 4 800 | 1465 | 700 | 318 |
| 133 100 | 2/0 | 67.4 | 7 | 0.1379 | 3.503 | 0.414 | 10.52 | NR 36.22 | 5 605 | 1710 | 700 | 318 |
| 123 300 | | 62.5 | 7 | 0.1327 | 3.371 | 0.398 | 10.11 | NR 36.22 | 6 050 | 1845 | 700 | 318 |
| 105 600 | 1/0 | 53.5 | 7 | 0.1228 | 3.119 | 0.368 | 9.35 | NR 36.22 | 7 065 | 2155 | 700 | 318 |
| 77 470 | | 39.3 | 7 | 0.1052 | 2.672 | 0.316 | 8.03 | NR 36.22 | 9 630 | 2940 | 700 | 318 |
| 66 360 | 2 | 33.6 | 7 | 0.0974 | 2.474 | 0.292 | 7.42 | NR 36.22 | 11 235 | 3430 | 700 | 318 |
| 48 690 | | 24.7 | 7 | 0.0834 | 2.118 | 0.250 | 6.35 | NR 36.22 | 15 315 | 4675 | 700 | 318 |
| 41 740 | 4 | 21.2 | 7 | 0.0772 | 1.961 | 0.232 | 5.89 | NR 36.22 | 17 855 | 5455 | 700 | 318 |
| 30 580 | | 15.5 | 7 | 0.0661 | 1.679 | 0.198 | 5.03 | NR 36.22 | 24 390 | 7445 | 700 | 318 |

[A] See Table 4 for dimensions of standard reels.
[B] Recommended standard stranding combinations are shown in Table 5.
[C] See Table 7 for mass per unit length for each stranding.

## 5. Joints

5.1 In conductors composed of seven wires, only cold-pressure welds and electric butt, cold-upset welds may be made in the six outer finished wires. No welds are permitted in the center core wire. In other conductors, cold-pressure welds, electric-butt, cold-upset welds, or electric-butt welds may be made in the finished wires. Such joints in the same wire or any other wire in the conductor shall be not closer than prescribed in Table 3. Following welding, electric-butt welds in 6201 wires shall be annealed for a distance of at least 6 in. (150 mm) on each side of the weld (Explanatory Note 2).

## 6. Lay

6.1 The preferred lay of a layer of wires is 13.5 times the outside diameter of that layer, but the lay shall be not less than 10 nor more than 16 times this diameter.

6.2 The direction of lay of the outer layer shall be right-hand unless specified otherwise by the purchaser. The direction of lay shall be reversed in successive layers.

## 7. Construction

7.1 The number and diameter of wires and the areas of cross section of conductors shall conform to the requirements prescribed in Table 1 or Table 2.

7.2 Recommended standard strandings are as shown in Table 4.

## 8. Strength of Conductor

8.1 The rated strength of completed conductors shall be taken as the aggregate strength of the aluminum 1350 and the aluminum-alloy 6201 components, calculated as follows. The strength contribution of the aluminum 1350 wires shall be taken as the percentage indicated in Table 6, of the sum of the strengths of the aluminum 1350 wires, calculated from their specified nominal wire diameter and the appropriate specified minimum average tensile strength given in Specification B230/B230M. The strength contribution of the aluminum-alloy 6201 wires shall be taken as that percentage, according to the number of layers of aluminum-alloy 6201 wires, indicated in Table 6, of the sum of the strengths of the aluminum-alloy 6201 wires, calculated from their specified nominal wire diameter and the minimum stress at 1 % extension. This shall be considered to be 95 % of the minimum average tensile strength specified for the wire diameter in Specification B398/B398M.

8.2 Tests for determining the rated strength of the completed conductor are not required by this specification but may be made if agreed upon by the manufacturer and the purchaser at the time of placing an order. If tested, the breaking strength of the completed conductor shall be not less than the rated strength if failure occurs in the free length at least 1 in. (25 mm) beyond the end of either gripping device, or shall be not less than 95 % of the rated strength if failure occurs inside, or within 1 in. (25 mm) of the end of, either gripping device (Explanatory Note 3).

8.3 Rated strength and breaking strength values shall be rounded to three significant figures, in the final value only, in accordance with the rounding method in Practice E29.

8.4 Rated strength of conductors is given in Table 2 or Table 7.

## 9. Density

9.1 For the purpose of calculating mass, mass per unit length, cross sections, and so forth, the density of 1350-H19 is 2705 $kg/m^3$ (0.0975 $lb/in.^3$) at 20°C and the density of 6201-T81 is 2690 $kg/m^3$ (0.097 $lb/in.^3$) at 20°C.

## 10. Mass Electrical Resistance

10.1 The mass and electrical resistance of a unit length of stranded conductor are a function of the length of lay. The approximate mass per unit length and electrical resistance may be determined using the standard increments shown in Table 8.

**TABLE 2 Construction Requirements, Mass, Mass Per Unit Length, Recommended Reel Sizes, and Shipping Lengths of Conductors**

NOTE 1—The sizes in boldface type indicate those preferred sizes from Specification B682.

| Conductor Size, mm² | Diameter of Wires, mm | Conductor Diameter, mm | Mass per Unit Length[A] | | | Related Strength kN | Recommended Package Sizes[B] | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1350, kg/km | 6201, kg/km | Total, kg/km | | Reel Designation[C] | Nominal Length of Each Piece, m | Nominal Mass of Each Length, kg |
| | | | | | Stranding 72/19 | | | | |
| **1600** | 4.73 | 52.03 | 3559 | 934 | 4493 | 283 | RMT 90.45 | 960 | 4315 |
| 1400 | 4.43 | 48.73 | 3092 | 812 | 3904 | 248 | RMT 90.45 | 1060 | 4140 |
| **1250** | 4.18 | 45.98 | 2753 | 723 | 3476 | 221 | RMT 90.45 | 1185 | 4120 |
| 1120 | 3.96 | 43.56 | 2471 | 648 | 3119 | 198 | RMT 90.45 | 1320 | 4120 |
| **1000** | 3.74 | 41.14 | 2204 | 578 | 2782 | 180 | RMT 90.45 | 1495 | 4160 |
| | | | | | Stranding 63/28 | | | | |
| **1600** | 4.73 | 52.03 | 3114 | 1377 | 4491 | 300 | RMT 90.45 | 960 | 4310 |
| 1400 | 4.43 | 48.73 | 2705 | 1196 | 3901 | 263 | RMT 90.45 | 1060 | 4135 |
| **1250** | 4.18 | 45.98 | 2409 | 1065 | 3474 | 234 | RMT 90.45 | 1185 | 4115 |
| 1120 | 3.96 | 43.56 | 2162 | 956 | 3118 | 210 | RMT 90.45 | 1320 | 4115 |
| **1000** | 3.74 | 41.14 | 1928 | 852 | 2780 | 190 | RMT 90.45 | 1495 | 4155 |
| | | | | | Stranding 54/37 | | | | |
| **1600** | 4.73 | 52.03 | 2669 | 1819 | 4488 | 323 | RMT 90.45 | 960 | 4310 |
| 1400 | 4.43 | 48.73 | 2319 | 1580 | 3899 | 283 | RMT 90.45 | 1060 | 4135 |
| **1250** | 4.18 | 45.98 | 2065 | 1407 | 3472 | 253 | RMT 90.45 | 1185 | 4115 |
| 1120 | 3.96 | 43.56 | 1853 | 1263 | 3116 | 226 | RMT 90.45 | 1320 | 4115 |
| **1000** | 3.74 | 41.14 | 1653 | 1126 | 2779 | 204 | RMT 90.45 | 1495 | 4155 |
| | | | | | Stranding 54/7 | | | | |
| **1000** | 4.57 | 41.13 | 2468 | 318 | 2786 | 166 | RMT 90.45 | 1495 | 4165 |
| 900 | 4.33 | 38.97 | 2194 | 214 | 2478 | 148 | RMT 90.45 | 1785 | 4425 |
| **800** | 4.09 | 36.81 | 1957 | 252 | 2209 | 133 | RMT 90.45 | 2000 | 4420 |
| 710 | 3.85 | 34.64 | 1734 | 224 | 1958 | 118 | RMT 90.45 | 2260 | 4425 |
| **630** | 3.63 | 32.67 | 1542 | 199 | 1741 | 107 | RMT 90.45 | 2540 | 4420 |
| 560 | 3.42 | 30.78 | 1369 | 176 | 1545 | 96.1 | RMT 9 .45 | 2860 | 4420 |
| **500** | 3.23 | 29.07 | 1221 | 157 | 1378 | 86.5 | RMT 90.45 | 3210 | 4425 |
| | | | | | Stranding 48/13 | | | | |
| **1000** | 4.57 | 41.13 | 2194 | 591 | 2786 | 178 | RMT 90.45 | 1495 | 4165 |
| 900 | 4.33 | 38.97 | 1950 | 525 | 2475 | 159 | RMT 90.45 | 1785 | 4420 |
| **800** | 4.09 | 36.81 | 1740 | 469 | 2209 | 142 | RMT 90.45 | 2000 | 4420 |
| 710 | 3.85 | 34.65 | 1542 | 415 | 1957 | 126 | RMT 90.45 | 2260 | 4425 |
| **630** | 3.63 | 32.67 | 1371 | 369 | 1740 | 114 | RMT 90.45 | 2540 | 4420 |
| 560 | 3.42 | 30.78 | 1217 | 328 | 1545 | 102 | RMT 90.45 | 2860 | 4420 |
| **500** | 3.23 | 29.07 | 1085 | 292 | 1377 | 93.6 | RMT 90.45 | 3210 | 4420 |
| | | | | | Stranding 42/19 | | | | |
| **1000** | 4.57 | 41.13 | 1919 | 864 | 2783 | 192 | RMT 90.45 | 1495 | 4160 |
| 900 | 4.33 | 38.97 | 1706 | 768 | 2474 | 773 | RMT 90.45 | 1785 | 4415 |
| **800** | 4.09 | 36.81 | 1522 | 685 | 2207 | 154 | RMT 90.45 | 2000 | 4415 |
| 710 | 3.85 | 34.65 | 1349 | 607 | 1956 | 137 | RMT 90.45 | 2260 | 4420 |
| **630** | 3.63 | 32.67 | 1199 | 540 | 1739 | 123 | RMT 90.45 | 2540 | 4415 |
| 560 | 3.42 | 30.78 | 1065 | 479 | 1544 | 110 | RMT 90.45 | 2860 | 4415 |
| **500** | 3.23 | 29.07 | 950 | 427 | 1377 | 100 | RMT 90.45 | 3210 | 4420 |
| | | | | | Stranding 33/28 | | | | |
| **1000** | 4.57 | 41.13 | 1508 | 1273 | 2781 | 206 | RMT 90.45 | 1495 | 4160 |
| 900 | 4.33 | 38.97 | 1341 | 1131 | 2472 | 187 | RMT 90.45 | 1785 | 4415 |
| **800** | 4.09 | 36.81 | 1196 | 1009 | 2205 | 167 | RMT 90.45 | 2000 | 4410 |
| 710 | 3.85 | 34.65 | 1060 | 894 | 1954 | 148 | RMT 90.45 | 2260 | 4415 |
| **630** | 3.63 | 32.67 | 942 | 795 | 1737 | 133 | RMT 90.45 | 2540 | 4410 |
| 560 | 3.42 | 30.78 | 836 | 706 | 1542 | 119 | RMT 90.45 | 2860 | 4410 |
| **500** | 3.23 | 29.07 | 746 | 630 | 1376 | 109 | RMT 90.45 | 3210 | 4415 |
| | | | | | Stranding 33/4 | | | | |
| **630** | 4.66 | 32.62 | 1553 | 187 | 1740 | 104 | RMT 90.45 | 2540 | 4420 |
| 560 | 4.39 | 30.73 | 1378 | 166 | 1544 | 92.4 | RMT 90.45 | 3860 | 4415 |
| **500** | 4.15 | 29.05 | 1232 | 148 | 1380 | 82.6 | RMT 84.45 | 2430 | 3355 |
| 450 | 3.94 | 27.58 | 1110 | 134 | 1244 | 74.4 | RMT 84.45 | 2695 | 3355 |
| **400** | 3.71 | 25.97 | 984 | 119 | 1103 | 67.3 | RMT 84.45 | 3040 | 3355 |
| 355 | 3.50 | 24.50 | 876 | 106 | 982 | 60.8 | RMT 84.45 | 3415 | 3355 |
| **315** | 3.29 | 23.03 | 774 | 93 | 867 | 53.7 | RMT 84.45 | 3865 | 3350 |
| 280 | 3.10 | 21.70 | 687 | 83 | 770 | 48.1 | RMT 84.45 | 4350 | 3350 |
| **250** | 2.93 | 20.51 | 614 | 74 | 688 | 42.9 | RMT 84.45 | 4875 | 3355 |
| | | | | | Stranding 30/7 | | | | |
| **630** | 4.66 | 32.62 | 1412 | 328 | 1740 | 113 | RMT 90.45 | 2540 | 4420 |
| 560 | 4.39 | 30.73 | 1253 | 291 | 1544 | 100 | RMT 90.45 | 2860 | 4415 |
| **500** | 4.15 | 29.05 | 1119 | 260 | 1379 | 89.5 | RMT 84.45 | 2430 | 3350 |
| 450 | 3.94 | 27.58 | 1009 | 234 | 1243 | 80.6 | RMT 84.45 | 3415 | 3350 |
| **400** | 3.71 | 25.97 | 895 | 208 | 1103 | 72.7 | RMT 84.45 | 3040 | 3355 |
| 355 | 3.50 | 24.50 | 796 | 185 | 981 | 65.5 | RMT 84.45 | 3415 | 3350 |
| **315** | 3.29 | 23.03 | 704 | 163 | 867 | 57.9 | RMT 84.45 | 3865 | 3350 |
| 280 | 3.10 | 21.70 | 625 | 145 | 770 | 52.1 | RMT 84.45 | 4350 | 3350 |
| **250** | 2.93 | 20.51 | 558 | 130 | 688 | 46.6 | RMT 84.45 | 4875 | 3355 |
| | | | | | Stranding 24/13 | | | | |

**TABLE 2** *Continued*

| Conductor Size, mm² | Diameter of Wires, mm | Conductor Diameter, mm | Mass per Unit Length[A] | | | Related Strength kN | Recommended Package Sizes[B] | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1350, kg/km | 6201, kg/km | Total, kg/km | | Reel Designation[C] | Nominal Length of Each Piece, m | Nominal Mass of Each Length, kg |
| **630** | 4.66 | 32.62 | 1129 | 608 | 1737 | 125 | RMT 90.45 | 2540 | 4410 |
| 560 | 4.39 | 30.73 | 1002 | 540 | 1542 | 111 | RMT 90.45 | 2860 | 4410 |
| **500** | 4.15 | 29.05 | 896 | 483 | 1379 | 98.8 | RMT 84.45 | 2430 | 3350 |
| 450 | 3.94 | 27.58 | 807 | 435 | 1242 | 89.0 | RMT 84.45 | 2695 | 3345 |
| **400** | 3.71 | 25.97 | 716 | 386 | 1102 | 79.9 | RMT 84.45 | 3040 | 3350 |
| 355 | 3.50 | 24.50 | 637 | 343 | 980 | 71.7 | RMT 84.45 | 3415 | 3345 |
| **315** | 3.29 | 23.03 | 563 | 303 | 866 | 63.4 | RMT 84.45 | 3865 | 3345 |
| 280 | 3.10 | 21.70 | 500 | 269 | 769 | 57.6 | RMT 84.45 | 4350 | 3345 |
| **250** | 2.93 | 20.51 | 446 | 240 | 686 | 51.4 | RMT 84.45 | 4875 | 3360 |
| | | | | | Stranding 18/19 | | | | |
| **630** | 4.66 | 32.62 | 847 | 889 | 1736 | 139 | RMT 90.45 | 2540 | 4410 |
| 560 | 4.39 | 30.73 | 752 | 789 | 1541 | 123 | RMT 90.45 | 2860 | 4410 |
| **500** | 4.15 | 29.05 | 672 | 705 | 1377 | 110 | RMT 84.45 | 2430 | 3345 |
| 450 | 3.94 | 27.58 | 606 | 636 | 1242 | 99.2 | RMT 84.45 | 2695 | 3345 |
| **400** | 3.11 | 25.97 | 537 | 563 | 1100 | 88.7 | RMT 84.45 | 3040 | 3345 |
| 355 | 3.50 | 24.50 | 478 | 501 | 979 | 79.5 | RMT 84.45 | 3415 | 3345 |
| **315** | 3.29 | 23.03 | 422 | 443 | 865 | 70.2 | RMT 84.45 | 3865 | 3345 |
| 280 | 3.10 | 21.70 | 375 | 393 | 768 | 64.2 | RMT 84.45 | 4350 | 3340 |
| **250** | 2.93 | 20.51 | 335 | 352 | 687 | 57.4 | RMT 84.45 | 4875 | 3350 |
| | | | | | Stranding 12/7 | | | | |
| 280 | 4.33 | 21.65 | 488 | 283 | 771 | 57.6 | RM 66.32 | 2235 | 1725 |
| | | | | | | | NR 66.28 | 2235 | 1725 |
| **250** | 4.09 | 20.45 | 435 | 252 | 687 | 51.4 | RM 66.32 | 2505 | 1720 |
| | | | | | | | NR 66.28 | 2505 | 1720 |
| 224 | 3.87 | 19.35 | 389 | 226 | 615 | 46.0 | RM 66.32 | 2795 | 1720 |
| | | | | | | | NR 66.28 | 2795 | 1720 |
| **200** | 3.66 | 18.30 | 348 | 202 | 550 | 41.6 | RM 66.32 | 3125 | 1720 |
| | | | | | | | NR 66.28 | 3125 | 1720 |
| 180 | 3.47 | 17.35 | 313 | 182 | 495 | 37.8 | RM 66.32 | 3480 | 1725 |
| | | | | | | | NR 66.28 | 3480 | 1725 |
| **160** | 3.27 | 16.35 | 278 | 161 | 439 | 33.5 | RM 66.32 | 3920 | 1720 |
| | | | | | | | NR 66.28 | 3920 | 1720 |
| 140 | 3.06 | 15.30 | 242 | 141 | 384 | 30.1 | RM 66.32 | 4470 | 1715 |
| | | | | | | | NR 66.28 | 4470 | 1715 |
| | | | | | Stranding 15/4 | | | | |
| 280 | 4.33 | 21.65 | 609 | 162 | 771 | 50.8 | RM 66.32 | 2235 | 1725 |
| | | | | | | | NR 66.28 | 2235 | 1725 |
| **250** | 4.09 | 20.45 | 544 | 144 | 688 | 45.3 | RM 66.32 | 2505 | 1725 |
| | | | | | | | NR 66.28 | 2505 | 1725 |
| 224 | 3.87 | 19.35 | 487 | 129 | 616 | 40.6 | RM 66.32 | 2795 | 1720 |
| | | | | | | | NR 66.28 | 2795 | 1720 |
| **200** | 3.66 | 18.30 | 435 | 115 | 550 | 36.9 | RM 66.32 | 3125 | 1720 |
| | | | | | | | NR 66.28 | 3125 | 1720 |
| 180 | 3.47 | 17.35 | 391 | 104 | 495 | 33.6 | RM 66.32 | 3480 | '725 |
| | | | | | | | NR 66.28 | 3480 | 1725 |
| **160** | 3.27 | 16.35 | 348 | 92 | 440 | 29.8 | RM 66.32 | 3920 | 1725 |
| | | | | | | | NR 66.28 | 3920 | 1725 |
| 140 | 3.06 | 15.30 | 304 | 81 | 385 | 26.5 | RM 66.32 | 4470 | 1720 |
| | | | | | | | NR 66.28 | 4470 | 1720 |
| | | | | | Stranding 4/3 | | | | |
| **125** | 4.77 | 14.31 | 197.2 | 147.1 | 344.3 | 26.7 | NR 36.22 | 930 | 320 |
| 112 | 4.51 | 13.53 | 176.3 | 131.5 | 307.8 | 23.9 | NR 36.22 | 1040 | 320 |
| **100** | 4.26 | 12.78 | 157.3 | 117.3 | 274.6 | 17.2 | NR 36.22 | 1160 | 320 |
| 80.0 | 3.81 | 11.43 | 125.8 | 93.9 | 219.7 | 17.2 | NR 36.22 | 1455 | 320 |
| **63.0** | 3.39 | 10.17 | 99.6 | 74.3 | 173.9 | 13.7 | NR 36.22 | 1835 | 320 |
| 50.0 | 3.02 | 9.06 | 79.1 | 59.0 | 138.1 | 11.2 | NR 36.22 | 2315 | 320 |
| **40.0** | 2.70 | 8.10 | 63.2 | 47.1 | 110.3 | 8.95 | NR 36.22 | 2895 | 320 |
| 31.5 | 2.39 | 7.17 | 49.5 | 36.9 | 86.4 | 7.01 | NR 36.22 | 3695 | 320 |
| **25.0** | 2.13 | 6.39 | 39.3 | 29.3 | 68.6 | 5.57 | NR 36.22 | 4650 | 320 |
| 20.0 | 1.91 | 5.73 | 31.6 | 23.6 | 55.2 | 4.48 | NR 36.22 | 5785 | 320 |
| **16.0** | 1.71 | 5.13 | 25.3 | 18.9 | 44.2 | 3.59 | NR 36.22 | 7205 | 320 |

[A] Mass per Unit Length is based on a density of 2705 kg/m$^3$ for 1350 and 2690 kg/m$^3$ for 6201.
[B] For information only.
[C] Recommended standard stranding combination are shown in Table 4.

**TABLE 3 Minimum Distance Between Joints in the Completed Conductor**

| Number of Wires in Conductor[A] | Distance Between Joints, min. ft (m) |
|---|---|
| 7 | 50[B] (15) |
| 19 | 50 (15) |
| 37 | 25 (7.5) |
| 61 and over | 25 (7.5) |

[A] Conductors of an intermediate number of wires shall conform to those having the next smaller number.
[B] Only cold-pressure welds and electric-butt, cold-upset welds are permitted in the six outer wires of conductors composed of seven wires.

**TABLE 4 Recommended Standard Strandings**

| Total No. of Wires | No. of 1350-H19 Wires/No. of 6201-T81 Wires | | | |
|---|---|---|---|---|
| 7 | 4/3 | ... | ... | ... |
| 19 | 15/4 | 12/7 | ... | ... |
| 37 | 33/4 | 30/7 | 24/13 | 18/19 |
| 61 | 54/7 | 48/13 | 42/19 | 33/28 |
| 91 | ... | 72/19 | 63/28 | 54/37 |

When standard accuracy is desired, the increment based on the specific lay of the conductor may be calculated (Explanatory Note 4).

10.2 In the calculation of the electrical resistance of a completed conductor, the resistance of both the aluminum 1350 and the aluminum-alloy 6201 wires must be taken into consideration.

## 11. Variation in Area

11.1 The total area of cross section of the conductor shall be not less than 98 % of the area specified in Table 1 or Table 2. Unless otherwise specified by the purchaser, the manufacturer may have the option of determining the cross-sectional area by either of the following methods, except that in case of question regarding area compliance, the method given in 11.1.2 shall be used.

11.1.1 The area of cross section may be determined by calculations from diameter measurements, expressed to four decimal places, of the component wires at any point when measured perpendicularly to their axes.

11.1.2 The area of cross section of the wires of a conductor may be determined by Test Method B263. In applying that method, the increment in mass per unit length resulting from stranding may be the applicable value specified in 10.1 or may be calculated from the measured component dimensions of the sample under test. In case of question regarding area compliance, the actual mass increment due to stranding shall be calculated.

## 12. Finish

12.1 The conductor shall be free of all imperfections not consistent with good commercial practice.

## 13. Mechanical and Electrical Tests

13.1 Tests for mechanical and electrical properties of component wires shall be made before stranding (Explanatory Note 1).

13.2 Routine testing after stranding is not required. When requested by the purchaser at the time of placing the order, tension tests on wires before stranding may be waived and tests may be made of wires removed from the completed conductor. When so tested, the wires of aluminum 1350 and aluminum-alloy 6201 shall have tensile strengths not less than 95 % of the minimum tensile strengths prescribed for individual tests in Specification B230/B230M in the case of aluminum 1350 and in Specification B398/B398M in the case of aluminum-alloy 6201 (Explanatory Note 5).

13.2.1 The aluminum 1350 wires removed from a completed conductor shall be capable of meeting the bending properties stated in Specification B230/B230M.

13.2.2 The aluminum-alloy 6201 wires removed from a completed conductor shall be capable of meeting the bending properties stated in Specification B398/B398M.

## 14. Inspection

14.1 All tests and inspection shall be made at the place of final manufacture unless otherwise agreed upon between the manufacturer and the purchaser at the time of purchase. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities to satisfy him that the material is being manufactured in accordance with this specification.

## 15. Marking

15.1 The net mass, length, size, kind of conductor, stranding, and any other necessary identification shall be marked on a tag attached to the end of the conductor inside the package. This same information, together with the purchaser's order number, the manufacturer's serial number (if any), and all shipping marks and other information required by the purchaser shall appear on the outside of the package.

NOTE 2—Multiple lengths per package are allowable only when the bare conductor is intended for remanufacture, such as adding a covering or insulation. In such cases the position of each end of a length is to be clearly marked and the length of each portion shall be shown on the attached to the end of the conductor.

## 16. Packaging and Shipping

16.1 Package sizes and kind of package, reels or coils, shall be agreed upon between the manufacturer and the purchaser. Recommended package sizes are shown in Table 1 or Table 2.

16.2 There shall be only one length of conductor on a reel.

16.3 The conductors shall be protected against damage in ordinary handling and shipping. If heavy wood lagging is required, it shall be specified by the purchaser at the time of placing the purchase order.

## 17. Keywords

17.1 aluminum alloy electrical conductors; aluminum electrical conductors; concentric-lay stranded aluminum conductors; aluminum alloy reinforced (ACAR, 1350/6201); electrical conductors; electrical conductors - aluminum; electrical conductors - aluminum alloy; overhead electrical conductors; stranded conductors

**TABLE 5 Dimensions of Standard Reels**
**(For Information Only)**

| Reel Designation[A,B] | Reel Capacity | | Reel Dimensions | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Flange Diameter | | Drum Diameter | | Width | | | | Arbor Hole Diameter | |
| | | | | | | | Inside | | Outside | | | |
| | $in.^3$ | $m^3$ | in. | m | in. | m | in. | m | in. | m | in. | mm |
| NR 36.22 | 16 800 | 0.275 | 36 | 0.91 | 18 | 0.46 | 22 | 0.56 | 25 | 0.64 | 3 to 3¼ | 76 to 83 |
| NR 66.28[C] | 76 000 | 1.245 | 66 | 1.68 | 30 | 0.76 | 28 | 0.71 | 32½ | 0.83 | 3 to 3¼ | 76 to 83 |
| RM 66.32[D] | 76 900 | 1.260 | 66 | 1.68 | 36 | 0.91 | 32 | 0.81 | 38 | 0.97 | 3 to 3¼ | 76 to 83 |
| RM 68.38[D] | 99 300 | 1.627 | 68 | 1.73 | 36 | 0.91 | 38 | 0.97 | 44 | 1.12 | 3 to 3¼ | 76 to 83 |
| RMT 84.45[E] | 152 700 | 2.502 | 78 (84) | 1.98 (2.13) | 42 | 1.07 | 45 | 1.14 | 52 | 1.32 | 5 to 5¼ | 127 to 133 |
| RMT 90.45[E] | 187 000 | 3.064 | 84 (90) | 2.13 (2.29) | 42 | 1.07 | 45 | 1.14 | 52 | 1.32 | 5 to 5¼ | 127 to 133 |

[A] Prefix "NR" denotes wooden nonreturnable reel, "RM" metal returnable reel, and "RMT" metal returnable reel with I-beam tires.
[B] Reels are not designed to withstand the forces required for breaking during tension stringing operations.
[C] Reel RM 66.32 has flat rims.
[D] Reels RM 66.32 and RM 68.38 have flat rims.
[E] Reels RMT 84.45 and RMT 90.45 have 3-in. (76 mm) I-beam tires. Reels with similar dimensions except without I-beam tires are sometimes used.

**TABLE 6 Rating Factors**

| Stranding | | | | Rating Factor, % | |
|---|---|---|---|---|---|
| Number of Wires | | Number of Layers[A] | | 1350-H19 | 6201-T81 |
| 1350-H19 | 6201-T81 | 1350-H19 | 6201-T81 | | |
| 4 | 3 | 1 | 1 | 96 | 96 |
| 15 | 4 | 2 | 1 | 93 | 96 |
| 12 | 7 | 1 | 1 | 96 | 96 |
| 33 | 4 | 3 | 1 | 91 | 96 |
| 30 | 7 | 2 | 1 | 93 | 96 |
| 24 | 13 | 2 | 2 | 93 | 93 |
| 18 | 19 | 1 | 2 | 96 | 93 |
| 54 | 7 | 3 | 1 | 91 | 96 |
| 48 | 13 | 3 | 2 | 91 | 93 |
| 42 | 19 | 2 | 2 | 93 | 93 |
| 33 | 28 | 2 | 3 | 93 | 91 |
| 72 | 19 | 3 | 2 | 91 | 93 |
| 63 | 28 | 3 | 3 | 91 | 91 |
| 54 | 37 | 2 | 3 | 93 | 91 |

[A] For purposes of determining strength rating factors, mixed layers are considered to be full layers for each material.

**TABLE 7 Conductor Mass Per Unit Length and Rated Strength**

NOTE 1— Metric values represent a soft conversion and may not be the same as those metric masses that are calculated from the basic metric density.

| Conductor Size | | | Mass Per Unit Length | | | | | | Rated Strength | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1350 | | 6201 | | Total | | | |
| cmil | AWG | $mm^2$ | lb/1000 ft | kg/km | lb/1000 ft | kg/km | lb/1000 ft | kg/km | kips | kN |
| | | | | | Stranding 72/19 | | | | | |
| 3 000 000 | | 1520 | 2247 | 3343 | 590 | 878 | 2837 | 4221 | 60.7 | 270 |
| 2 750 000 | | 1393 | 2058 | 3063 | 543 | 808 | 2601 | 3871 | 55.6 | 247 |
| 2 500 000 | | 1267 | 1871 | 2784 | 491 | 731 | 2362 | 3515 | 50.6 | 225 |
| 2 493 000 | | 1263 | 1871 | 2785 | 491 | 731 | 2362 | 3515 | 50.4 | 224 |
| 2 250 000 | | 1140 | 1640 | 2506 | 442 | 658 | 2126 | 3164 | 45.5 | 202 |
| 2 000 000 | | 1013 | 1482 | 2206 | 389 | 579 | 1871 | 2785 | 41.0 | 182 |
| | | | | | Stranding 63/28 | | | | | |
| 3 000 000 | | 1520 | 1966 | 2926 | 869 | 1290 | 2835 | 4216 | 64.5 | 287 |
| 2 750 000 | | 1393 | 1801 | 2680 | 796 | 1180 | 2597 | 3860 | 59.1 | 263 |
| 2 500 000 | | 1267 | 1637 | 2436 | 724 | 1080 | 2361 | 3516 | 53.7 | 239 |
| 2 250 000 | | 1140 | 1474 | 2193 | 652 | 970 | 2126 | 3163 | 48.3 | 215 |
| 2 000 000 | | 1013 | 1297 | 1930 | 573 | 853 | 1870 | 2783 | 43.4 | 193 |
| | | | | | Stranding 54/37 | | | | | |
| 3 000 000 | | 1520 | 1686 | 2508 | 1150 | 1710 | 2836 | 4218 | 69.3 | 308 |
| 2 750 000 | | 1393 | 1544 | 2297 | 1050 | 1570 | 2594 | 3867 | 63.5 | 282 |
| 2 500 000 | | 1267 | 1403 | 2088 | 957 | 1420 | 2360 | 3508 | 57.7 | 257 |
| 2 493 000 | | 1263 | 1403 | 2089 | 956 | 1423 | 2360 | 3512 | 57.6 | 256 |
| 2 250 000 | | 1140 | 1263 | 1879 | 861 | 1280 | 2124 | 3159 | 52.0 | 231 |
| 2 000 000 | | 1013 | 1112 | 1654 | 758 | 1130 | 1870 | 2784 | 46.6 | 207 |
| | | | | | Stranding 54/7 | | | | | |
| 2 000 000 | | 1013 | 1660 | 2470 | 214 | 318 | 1874 | 2788 | 37.9 | 169 |
| 1 900 000 | | 963 | 1577 | 2346 | 203 | 303 | 1781 | 2649 | 36.0 | 160 |
| 1 800 000 | | 912 | 1494 | 2223 | 193 | 287 | 1687 | 2510 | 34.1 | 152 |
| 1 750 000 | | 887 | 1452 | 2161 | 187 | 288 | 1639 | 2439 | 33.2 | 148 |
| 1 700 000 | | 861 | 1410 | 2098 | 182 | 271 | 1592 | 2369 | 32.2 | 143 |
| 1 600 000 | | 811 | 1328 | 1976 | 171 | 255 | 1499 | 2231 | 30.4 | 135 |
| 1 500 000 | | 760 | 1244 | 1852 | 161 | 239 | 1405 | 2090 | 28.4 | 127 |
| 1 400 000 | | 709 | 1162 | 1729 | 150 | 223 | 1312 | 1952 | 26.6 | 118 |
| 1 361 500 | | 690 | 1132 | 1685 | 146 | 217 | 1278 | 1902 | 26.3 | 117 |
| 1 300 000 | | 659 | 1079 | 1605 | 139 | 207 | 1218 | 1812 | 25.5 | 112 |
| 1 277 000 | | 647 | 1062 | 1580 | 137 | 204 | 1199 | 1784 | 24.6 | 110 |
| 1 250 000 | | 633 | 1036 | 1542 | 134 | 199 | 1170 | 1741 | 24.1 | 107 |
| 1 200 000 | | 608 | 996 | 1482 | 128 | 191 | 1124 | 1673 | 23.2 | 104 |
| 1 100 000 | | 557 | 913 | 1358 | 118 | 176 | 1031 | 1534 | 21.6 | 95.9 |
| 1 000 000 | | 507 | 829 | 1234 | 107 | 159 | 936 | 1393 | 19.8 | 87.9 |
| | | | | | Stranding 48/13 | | | | | |
| 2 338 000 | | 1185 | 1745 | 2597 | 470 | 700 | 2215 | 3297 | 47.5 | 211 |
| 2 000 000 | | 1013 | 1476 | 2196 | 398 | 592 | 1874 | 2788 | 4.6 | 181 |
| 1 900 000 | | 963 | 1402 | 2086 | 378 | 562 | 1780 | 2648 | 38.6 | 172 |
| 1 800 000 | | 912 | 1328 | 1976 | 358 | 532 | 1686 | 2508 | 36.5 | 163 |
| 1 750 000 | | 887 | 1291 | 1921 | 347 | 516 | 1638 | 2437 | 35.5 | 158 |
| 1 703 000 | | 863 | 1259 | 1873 | 339 | 505 | 1598 | 2378 | 34.6 | 154 |
| 1 700 000 | | 861 | 1253 | 1865 | 338 | 502 | 1591 | 2367 | 34.5 | 153 |
| 1 600 000 | | 811 | 1181 | 1757 | 318 | 473 | 1499 | 2230 | 32.5 | 145 |
| 1 500 000 | | 760 | 1106 | 1646 | 298 | 443 | 1404 | 2089 | 30.4 | 135 |
| 1 400 000 | | 709 | 1033 | 1536 | 278 | 414 | 1311 | 1950 | 28.4 | 126 |
| 1 300 000 | | 659 | 959 | 1427 | 258 | 384 | 1217 | 1811 | 26.8 | 119 |
| 1 250 000 | | 633 | 921 | 1371 | 248 | 369 | 1169 | 1740 | 25.7 | 114 |
| 1 200 000 | | 608 | 886 | 1318 | 239 | 355 | 1125 | 1673 | 24.7 | 110 |
| 1 100 000 | | 557 | 811 | 1207 | 219 | 326 | 1030 | 1533 | 23.0 | 102 |
| 1 000 000 | | 507 | 737 | 1097 | 199 | 296 | 936 | 1393 | 21.1 | 94.1 |
| | | | | | Stranding 42/19 | | | | | |
| 2 338 000 | | 1185 | 1527 | 2273 | 687 | 1022 | 2214 | 3295 | 51.5 | 229 |
| 2 000 000 | | 1013 | 1291 | 1921 | 581 | 865 | 1872 | 2786 | 44.0 | 196 |
| 1 933 000 | | 979 | 1250 | 1861 | 562 | 837 | 1813 | 2698 | 42.5 | 189 |
| 1 900 000 | | 963 | 1226 | 1825 | 552 | 821 | 1778 | 2646 | 41.8 | 186 |
| 1 800 000 | | 912 | 1162 | 1729 | 523 | 778 | 1685 | 2507 | 39.6 | 176 |
| 1 798 000 | | 911 | 1163 | 1731 | 523 | 779 | 1686 | 2509 | 39.6 | 176 |
| 1 750 000 | | 887 | 1130 | 1681 | 508 | 757 | 1638 | 2438 | 38.5 | 171 |
| 1 700 000 | | 861 | 1097 | 1632 | 494 | 735 | 1591 | 2367 | 37.4 | 166 |
| 1 600 000 | | 811 | 1033 | 1537 | 465 | 692 | 1498 | 2229 | 35.2 | 157 |
| 1 534 400 | | 777 | 993 | 1477 | 446 | 664 | 1439 | 2141 | 33.8 | 150 |
| 1 500 000 | | 760 | 968 | 1440 | 436 | 649 | 1404 | 2089 | 33.0 | 147 |
| 1 400 000 | | 709 | 904 | 1344 | 407 | 605 | 1311 | 1950 | 30.8 | 137 |
| 1 300 000 | | 659 | 839 | 1249 | 378 | 562 | 1217 | 1811 | 29.0 | 129 |
| 1 277 000 | | 647 | 826 | 1229 | 372 | 553 | 1198 | 1782 | 28.4 | 126 |
| 1 250 000 | | 633 | 806 | 1199 | 363 | 540 | 1169 | 1739 | 27.8 | 124 |
| 1 200 000 | | 608 | 775 | 1153 | 349 | 519 | 1124 | 1672 | 26.7 | 119 |
| 1 100 000 | | 557 | 710 | 1056 | 319 | 475 | 1029 | 1531 | 24.8 | 110 |
| 1 000 000 | | 507 | 645 | 960 | 290 | 431 | 935 | 1391 | 22.9 | 102 |

**TABLE 7** *Continued*

| Conductor Size | | | Mass Per Unit Length | | | | | | Rated Strength | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1350 | | 6201 | | Total | | kips | kN |
| cmil | AWG | $mm^2$ | lb/1000 ft | kg/km | lb/1000 ft | kg/km | lb/1000 ft | kg/km | | |
| | | | | | Stranding 33/28 | | | | | |
| 2 000 000 | | 1013 | 1014 | 1509 | 856 | 1274 | 1870 | 2783 | 47.7 | 212 |
| 1 900 000 | | 963 | 964 | 1434 | 813 | 1210 | 1777 | 2644 | 45.3 | 201 |
| 1 800 000 | | 912 | 913 | 1358 | 771 | 1147 | 1684 | 2505 | 42.9 | 191 |
| 1 750 000 | | 887 | 888 | 1321 | 749 | 1115 | 1637 | 2436 | 41.7 | 186 |
| 1 700 000 | | 861 | 862 | 1282 | 727 | 1082 | 1589 | 2364 | 40.5 | 180 |
| 1 600 000 | | 811 | 812 | 1208 | 685 | 1020 | 1497 | 2228 | 38.1 | 160 |
| 1 500 000 | | 760 | 760 | 1131 | 642 | 955 | 1402 | 2086 | 35.7 | 159 |
| 1 400 000 | | 709 | 710 | 1056 | 599 | 892 | 1309 | 1948 | 33.4 | 148 |
| 1 300 000 | | 659 | 659 | 981 | 557 | 828 | 1216 | 1809 | 31.2 | 139 |
| 1 250 000 | | 633 | 633 | 942 | 535 | 796 | 1168 | 1738 | 30.0 | 133 |
| 1 200 000 | | 608 | 609 | 906 | 514 | 765 | 1123 | 1671 | 28.8 | 128 |
| 1 100 000 | | 557 | 558 | 830 | 471 | 701 | 1029 | 1531 | 26.6 | 119 |
| 1 000 000 | | 507 | 507 | 754 | 428 | 657 | 935 | 1391 | 24.8 | 110 |
| | | | | | Stranding 33/4 | | | | | |
| 1 300 000 | | 659 | 1086 | 1616 | 131 | 195 | 1217 | 1811 | 24.5 | 109 |
| 1 250 000 | | 633 | 1045 | 1555 | 126 | 187 | 1171 | 1742 | 23.6 | 105 |
| 1 200 000 | | 608 | 1003 | 1493 | 121 | 180 | 1124 | 1673 | 22.6 | 101 |
| 1 100 000 | | 557 | 919 | 1367 | 111 | 165 | 1030 | 1532 | 20.7 | 92.3 |
| 1 000 000 | | 507 | 836 | 1244 | 101 | 150 | 937 | 1394 | 18.9 | 83.9 |
| 950 000 | | 481 | 794 | 1181 | 95.7 | 142 | 890 | 1323 | 17.5 | 79.7 |
| 900 000 | | 456 | 753 | 1120 | 90.8 | 135 | 844 | 1255 | 17.0 | 75.5 |
| 850 000 | | 431 | 711 | 1058 | 85.7 | 127 | 796 | 1185 | 16.0 | 71.3 |
| 800 000 | | 405 | 668 | 994 | 80.6 | 120 | 749 | 1114 | 15.3 | 68.2 |
| 750 000 | | 380 | 627 | 933 | 75.6 | 112 | 703 | 1045 | 14.5 | 64.0 |
| 700 000 | | 355 | 585 | 870 | 70.5 | 105 | 656 | 975 | 13.6 | 60.7 |
| 650 000 | | 329 | 543 | 808 | 65.5 | 97.4 | 608 | 905 | 12.7 | 56.3 |
| 600 000 | | 304 | 501 | 746 | 60.4 | 89.9 | 561 | 835 | 11.8 | 52.4 |
| 550 000 | | 279 | 460 | 684 | 55.4 | 82.6 | 515 | 767 | 10.8 | 48.1 |
| 500 000 | | 253 | 418 | 621 | 50.4 | 74.9 | 468 | 696 | 10.0 | 44.4 |
| | | | | | Stranding 30/7 | | | | | |
| 1 300 000 | | 659 | 988 | 1469 | 229 | 341 | 1217 | 1810 | 26.6 | 118 |
| 1 250 000 | | 633 | 950 | 1413 | 220 | 328 | 1770 | 1741 | 25.6 | 114 |
| 1 200 000 | | 608 | 912 | 1357 | 212 | 315 | 1124 | 1672 | 24.5 | 109 |
| 1 198 000 | | 607 | 913 | 1358 | 212 | 315 | 1124 | 1673 | 24.5 | 109 |
| 1 172 000 | | 594 | 893 | 1329 | 207 | 308 | 1100 | 1637 | 24.0 | 107 |
| 1 109 000 | | 562 | 845 | 1257 | 196 | 292 | 1041 | 1549 | 22.7 | 101 |
| 1 100 000 | | 557 | 836 | 1244 | 194 | 289 | 1030 | 1533 | 22.5 | 100 |
| 1 024 500 | | 519 | 780 | 1161 | 181 | 269 | 961 | 1431 | 20.9 | 93.2 |
| 1 000 000 | | 507 | 760 | 1131 | 176 | 262 | 936 | 1393 | 20.4 | 91.0 |
| 950 000 | | 481 | 722 | 1074 | 167 | 249 | 889 | 1323 | 19.4 | 86.4 |
| 900 000 | | 456 | 684 | 1018 | 159 | 236 | 843 | 1254 | 18.4 | 81.9 |
| 853 700 | | 433 | 650 | 968 | 151 | 225 | 801 | 1192 | 17.5 | 77.6 |
| 850 000 | | 431 | 646 | 962 | 150 | 223 | 796 | 1185 | 17.4 | 77.3 |
| 800 000 | | 405 | 608 | 904 | 141 | 210 | 749 | 1114 | 16.6 | 73.8 |
| 750 000 | | 380 | 570 | 848 | 132 | 197 | 702 | 1045 | 15.6 | 69.2 |
| 700 000 | | 355 | 532 | 791 | 123 | 184 | 655 | 975 | 14.7 | 65.5 |
| 650 000 | | 329 | 494 | 735 | 115 | 171 | 609 | 906 | 13.7 | 60.8 |
| 600 000 | | 304 | 456 | 678 | 106 | 158 | 562 | 836 | 12.8 | 56.8 |
| 550 000 | | 279 | 418 | 622 | 97.0 | 144 | 515 | 766 | 11.7 | 52.1 |
| 500 000 | | 253 | 380 | 565 | 88.1 | 131 | 468 | 696 | 10.8 | 48.0 |
| | | | | | Stranding 24/13 | | | | | |
| 1 300 000 | | 659 | 790 | 1176 | 426 | 633 | 1216 | 1809 | 29.3 | 131 |
| 1 250 000 | | 633 | 760 | 1131 | 410 | 610 | 1170 | 1741 | 28.2 | 126 |
| 1 200 000 | | 608 | 730 | 1086 | 393 | 585 | 1123 | 1671 | 27.1 | 121 |
| 1 198 000 | | 607 | 730 | 1086 | 393 | 585 | 1123 | 1672 | 27.1 | 120 |
| 1 109 000 | | 562 | 676 | 1006 | 364 | 542 | 1040 | 1547 | 25.0 | 111 |
| 1 100 000 | | 557 | 669 | 995 | 360 | 536 | 1029 | 1531 | 24.8 | 111 |
| 1 080 600 | | 548 | 658 | 980 | 355 | 528 | 1013 | 1508 | 24.4 | 109 |
| 1 024 500 | | 519 | 624 | 929 | 336 | 500 | 961 | 1430 | 23.1 | 103 |
| 1 000 000 | | 507 | 608 | 905 | 328 | 488 | 936 | 1393 | 22.6 | 101 |
| 950 000 | | 481 | 577 | 858 | 311 | 463 | 888 | 1321 | 21.4 | 95.4 |
| 927 200 | | 470 | 565 | 841 | 304 | 453 | 869 | 1294 | 20.9 | 93.2 |
| 900 000 | | 456 | 547 | 814 | 295 | 439 | 842 | 1253 | 20.3 | 90.5 |
| 853 700 | | 433 | 520 | 774 | 280 | 417 | 800 | 1191 | 19.3 | 85.8 |
| 850 000 | | 431 | 517 | 769 | 279 | 415 | 796 | 1184 | 19.2 | 85.4 |
| 800 000 | | 405 | 486 | 723 | 262 | 390 | 748 | 1113 | 18.2 | 81.2 |
| 750 000 | | 380 | 456 | 679 | 246 | 366 | 702 | 1045 | 17.1 | 76.2 |
| 700 000 | | 355 | 425 | 632 | 229 | 341 | 654 | 973 | 16.1 | 71.8 |
| 650 000 | | 329 | 395 | 588 | 213 | 317 | 608 | 905 | 15.0 | 66.6 |
| 600 000 | | 304 | 365 | 542 | 196 | 292 | 561 | 834 | 14.1 | 62.8 |
| 550 000 | | 279 | 334 | 497 | 180 | 268 | 514 | 765 | 12.9 | 57.6 |

**TABLE 7** *Continued*

| Conductor Size | | | Mass Per Unit Length | | | | | | Rated Strength | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1350 | | 6201 | | Total | | kips | kN |
| cmil | AWG | $mm^2$ | lb/1000 ft | kg/km | lb/1000 ft | kg/km | lb/1000 ft | kg/km | | |
| 500 000 | | 253 | 304 | 452 | 164 | 244 | 468 | 696 | 11.7 | 52.9 |
| Stranding 18/19 | | | | | | | | | | |
| 1 300 000 | | 659 | 593 | 882 | 622 | 926 | 1215 | 1808 | 32.7 | 146 |
| 1 250 000 | | 633 | 570 | 848 | 598 | 890 | 1168 | 1738 | 31.5 | 140 |
| 1 200 000 | | 608 | 547 | 814 | 575 | 855 | 1122 | 1669 | 30.3 | 135 |
| 1 172 000 | | 594 | 536 | 797 | 562 | 837 | 1098 | 1634 | 29.5 | 131 |
| 1 100 000 | | 557 | 501 | 746 | 547 | 784 | 1028 | 1530 | 27.7 | 123 |
| 1 080 600 | | 548 | 494 | 735 | 518 | 771 | 1012 | 1506 | 27.2 | 121 |
| 1 000 000 | | 507 | 456 | 678 | 479 | 713 | 935 | 1391 | 25.2 | 112 |
| 950 000 | | 481 | 433 | 644 | 455 | 677 | 888 | 1321 | 23.9 | 106 |
| 900 000 | | 456 | 411 | 611 | 431 | 642 | 842 | 1253 | 22.7 | 101 |
| 850 000 | | 431 | 388 | 577 | 407 | 606 | 795 | 1183 | 21.4 | 95.3 |
| 800 000 | | 405 | 365 | 543 | 383 | 570 | 748 | 1113 | 20.3 | 90.3 |
| 750 000 | | 380 | 342 | 509 | 359 | 534 | 701 | 1043 | 19.0 | 84.7 |
| 739 800 | | 375 | 338 | 503 | 355 | 528 | 693 | 1031 | 18.8 | 83.5 |
| 700 000 | | 355 | 319 | 475 | 335 | 498 | 654 | 973 | 17.9 | 79.5 |
| 650 000 | | 329 | 296 | 440 | 311 | 463 | 607 | 903 | 16.6 | 73.8 |
| 649 500 | | 329 | 297 | 442 | 312 | 464 | 608 | 905 | 16.6 | 73.8 |
| 600 000 | | 304 | 273 | 406 | 287 | 427 | 560 | 833 | 15.8 | 70.1 |
| 550 000 | | 279 | 251 | 373 | 263 | 392 | 514 | 765 | 14.4 | 64.3 |
| 500 000 | | 253 | 228 | 339 | 239 | 356 | 467 | 695 | 13.2 | 58.8 |
| Stranding 15/4 | | | | | | | | | | |
| 600 000 | | 304 | 444 | 661 | 118 | 175 | 562 | 836 | 12.5 | 55.4 |
| 587 200 | | 298 | 436 | 648 | 115 | 172 | 551 | 820 | 12.2 | 54.3 |
| 550 000 | | 279 | 407 | 606 | 108 | 161 | 515 | 767 | 11.4 | 50.8 |
| 503 600 | | 255 | 374 | 556 | 99 | 147 | 473 | 703 | 10.5 | 46.5 |
| 500 000 | | 263 | 370 | 550 | 98.1 | 146 | 468 | 696 | 10.4 | 46.2 |
| 450 000 | | 228 | 333 | 496 | 88.3 | 131 | 421 | 627 | 9.35 | 41.6 |
| 400 000 | | 203 | 296 | 440 | 78.5 | 117 | 375 | 557 | 8.43 | 37.5 |
| 350 000 | | 177 | 359 | 385 | 68.7 | 102 | 328 | 487 | 7.47 | 33.2 |
| 300 000 | | 152 | 222 | 331 | 58.9 | 87.7 | 281 | 418 | 6.50 | 28.9 |
| 250 000 | | 127 | 185 | 225 | 49.1 | 73.0 | 234 | 348 | 5.49 | 24.4 |
| Stranding 12/7 | | | | | | | | | | |
| 653 100 | | 331 | 388 | 577 | 225 | 335 | 612 | 911 | 15.4 | 68.5 |
| 600 000 | | 304 | 355 | 528 | 206 | 307 | 561 | 835 | 14.1 | 62.9 |
| 550 000 | | 279 | 325 | 483 | 189 | 281 | 514 | 764 | 13.0 | 57.6 |
| 500 000 | | 253 | 296 | 440 | 172 | 256 | 468 | 696 | 11.8 | 52.4 |
| 450 000 | | 228 | 266 | 396 | 155 | 230 | 421 | 626 | 10.6 | 47.2 |
| 400 000 | | 203 | 237 | 352 | 137 | 204 | 374 | 556 | 9.52 | 42.4 |
| 350 000 | | 177 | 207 | 308 | 120 | 179 | 327 | 487 | 8.41 | 37.4 |
| 300 000 | | 152 | 178 | 265 | 103 | 153 | 281 | 418 | 7.38 | 32.8 |
| 250 000 | | 127 | 148 | 220 | 85.9 | 128 | 234 | 348 | 6.20 | 27.6 |
| Stranding 4/3 | | | | | | | | | | |
| 246 900 | | 125 | 132 | 197 | 98.7 | 147 | 231 | 344 | 6.04 | 26.9 |
| 211 600 | 4/0 | 107 | 113 | 168 | 84.6 | 126 | 198 | 294 | 5.18 | 23.0 |
| 195 700 | | 99.1 | 105 | 156 | 78.2 | 116 | 183 | 272 | 4.79 | 21.3 |
| 167 800 | 3/0 | 85.0 | 89.8 | 134 | 67.0 | 99.7 | 157 | 234 | 4.11 | 18.3 |
| 155 400 | | 78.7 | 83.2 | 124 | 62.1 | 92.4 | 145 | 216 | 3.84 | 17.1 |
| 133 100 | 2/0 | 67.4 | 71.3 | 106 | 53.2 | 79.1 | 124 | 185 | 3.31 | 14.7 |
| 123 300 | | 62.5 | 66.0 | 98.2 | 49.3 | 73.3 | 115 | 171 | 3.07 | 13.65 |
| 105 600 | 1/0 | 53.5 | 56.5 | 84.1 | 42.2 | 62.8 | 98.7 | 147 | 2.69 | 12.0 |
| 77 470 | | 39.3 | 41.5 | 61.7 | 31.0 | 46.1 | 72.5 | 108 | 2.01 | 8.94 |
| 66 360 | 2 | 33.6 | 35.6 | 52.9 | 26.5 | 39.5 | 62.1 | 92.4 | 1.75 | 7.79 |
| 48 690 | | 24.7 | 26.1 | 38.8 | 19.5 | 29.0 | 45.6 | 67.8 | 1.29 | 5.76 |
| 41 740 | 4 | 21.2 | 22.3 | 33.2 | 16.7 | 24.8 | 39.0 | 58.0 | 1.12 | 4.97 |
| 30 580 | | 15.5 | 16.4 | 24.4 | 12.2 | 18.2 | 28.6 | 42.6 | 0.826 | 3.67 |

Conversion Factors:

1 cmil = 5.067 E – 04 $mm^2$
1 mil = 2.54 E – 02 mm
1 lb/1000 ft = 1.488 E + 00 kg/km
1 ft = 3.048 E – 01 m
1 lb = 4.536 E – 01 kg
1 lbf = 4.448 E – 03 kN

**TABLE 8 Standard Increments Due to Stranding**

| Size of Conductor, cmil (mm$^2$) | Increment (Increase) of Linear Density and Electrical Resistance, % |
|---|---|
| 4 000 000 to 3 000 001 (2027 to 1521), incl | 4 |
| 3 000 000 to 2 000 001 (1520 to 1014), incl | 3 |
| 2 000 000 (1013) and under | 2 |

## EXPLANATORY NOTES

NOTE 1—For definitions of terms relating to conductors, reference should be made to Terminology B354.

NOTE 2—The behavior of properly spaced wire joints in stranded conductors is related to both their tensile strength and elongation. Because of its higher elongation properties, the lower-strength electric-butt weld gives equivalent overall performance to that of a cold-pressure weld or an electric-butt, cold-upset weld in stranded conductors with more than seven wires.

NOTE 3—To test aluminum conductors, aluminum alloy reinforced, for breaking strength successfully as a unit requires special devices for gripping the ends of the wires without causing damage that may result in failure below the actual strength of the conductor. Various special dead-end devices are available, such as compression sleeves and split sleeves, but ordinary jaws or clamping devices usually are not suitable.

NOTE 4—The increment of mass per unit length or electrical resistance of a completed concentric-lay-stranded conductor ($k$) in percent is as follows:

$$k = 100\,(m - 1)$$

where $m$ is the stranding factor, and is also the ratio of the mass or electrical resistance of a unit length of stranded conductor to that of a solid conductor of the same cross-sectional area or of a stranded conductor with infinite length of lay; that is, all wires parallel to the conductor axis. The stranding factor $m$ for the completed stranded conductor is the*numerical average* of the stranding factors for each of the individual wires in the conductor, including the straight core wire, if any (for which the lay factor is unity). The stranding factor ($m_{ind}$) for any given wire in a concentric-lay-stranded conductor is as follows:

$$m_{ind} = \sqrt{1 + (9.8696/n^2)}$$

where:

$$n = \frac{\text{length of lay}}{\text{diameter of helical path of the wire}}$$

The derivation of the above is given in *NBS Handbook 100*. The factors $k$ and $m$ are to be determined separately for the 1350-H19 wires and for the 6201-T81 wires.

NOTE 5—Wire unlaid from conductor may have different physical properties from those of the wire before stranding. This may be caused by laying and straightening.