



Designation: B116 – 95(Reapproved 2007)

# Standard Specification for Figure-9 Deep-Grooved and Figure-8 Copper Trolley Wire for Industrial Haulage<sup>1</sup>

This standard is issued under the fixed designation B116; 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.

## 1. Scope

1.1 This specification covers figure-9 deep-section grooved and figure-8 copper trolley wire for use in industrial haulage (Explanatory **Note 1**).

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

## 2. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

**B9** Specification for Bronze Trolley Wire

**B47** Specification for Copper Trolley Wire

**B49** Specification for Copper Rod Drawing Stock for Electrical Purposes

**B193** Test Method for Resistivity of Electrical Conductor Materials

## 3. Ordering Information

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

3.1.1 Quantity of each size and section,

3.1.2 Wire size: circular-mil area (Section 6, **Fig. 1** or **Fig. 2**),

3.1.3 Shape of section (Section 1),

3.1.4 Type of copper, if special (Section 4),

3.1.5 Package size (see 14.3),

3.1.6 Lagging, if required (see 14.1),

3.1.7 Relation between vertical axis of grooved wire and axis of reel (see 14.1),

3.1.8 Size of arbor hole if other than for a 2½-in. (64-mm) shaft (see 14.2),

3.1.9 Special package marking, if required (see 14.4), and

3.1.10 Place of inspection (Section 12).

## 4. Materials and Manufacturer

4.1 The material shall be copper of such quality and purity that the finished product shall have the properties and characteristics prescribed in this specification.

NOTE 1—Specification **B49** defines the materials suitable for use.

4.2 Copper bars of special qualities, forms, or types, as may be agreed upon between the manufacturer and the purchaser, and that will conform to the requirements prescribed in this specification may also be used.

## 5. Tensile Properties

5.1 Figure-8 wire shall conform to the requirements as to tensile properties specified in **Table 1**.

5.2 Figure-9 deep-section grooved wire shall conform to the requirements as to tensile properties specified in **Table 2**.

5.3 Tests on a specimen of wire containing a joint shall show at least 95 % of the tensile strength specified in **Table 1** or **Table 2**, as may be applicable. Elongation tests shall not be made on specimens containing joints.

5.4 Tension tests shall be made on representative samples. The elongation shall be determined as the permanent increase in length, due to the breaking of the wire in tension, measured between gage marks placed originally 10 in. apart upon the test specimen (Explanatory **Note 1**). The fracture shall be between the gage marks and not closer than 1 in. (25 mm) to either gage mark.

5.5 The twist test shall be omitted.

## 6. Sections

6.1 Standard sections of figure-8 trolley wire shall be those shown in **Fig. 1**.

6.2 Standard sections of figure-9 deep-section grooved trolley wire shall be those shown in **Fig. 2**.

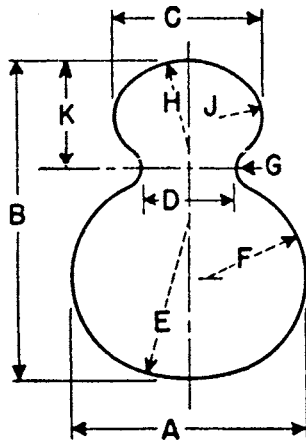
## 7. Dimensions and Permissible Variations

7.1 The size shall be expressed as the nominal area of cross section in circular mils.

<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.



NOTE—For dimensions E, F and H the dimensional tolerance is  $\pm 0.016$  in. (0.406 mm); for dimensions G and J the dimensional tolerance is  $\pm 0.008$  in. (0.203 mm).

|   |         |         |         |         |         |
|---|---------|---------|---------|---------|---------|
| Nominal Size, cmils                         | 105 600 | 133 100 | 167 800 | 211 600 | 350 000 |
| Area, in. <sup>2</sup> (Explanatory Note 5) | 0.0829  | 0.1045  | 0.1318  | 0.1662  | 0.2750  |
| Area, cmils (Explanatory Note 5)            | 105 600 | 133 100 | 167 800 | 211 600 | 350 100 |
| Weight, lb/mile (Explanatory Note 5)        | 1687    | 2127    | 2682    | 3382    | 5597    |

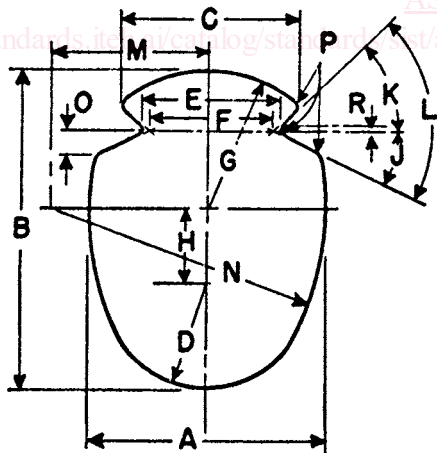
Dimensions for Inspection, in.

|   |                          |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| A | 0.312 + 0.006<br>- 0.012 | 0.352 + 0.006<br>- 0.012 | 0.400 + 0.006<br>- 0.012 | 0.450 + 0.006<br>- 0.012 | 0.570 + 0.010<br>- 0.020 |
| B | 0.420 $\pm$ 0.008        | 0.480 $\pm$ 0.009        | 0.540 $\pm$ 0.011        | 0.600 $\pm$ 0.012        | 0.754 $\pm$ 0.015        |
| C | 0.175 $\pm$ 0.004        | 0.196 $\pm$ 0.004        | 0.222 $\pm$ 0.005        | 0.250 $\pm$ 0.005        | 0.300 $\pm$ 0.007        |
| D | 0.106 + 0.004<br>- 0.006 | 0.108 + 0.004<br>- 0.006 | 0.130 + 0.004<br>- 0.006 | 0.150 + 0.004<br>- 0.006 | 0.185 + 0.004<br>- 0.006 |

Dimensions for Reference, in.

|          |                   |                   |                   |                   |                   |
|----------|-------------------|-------------------|-------------------|-------------------|-------------------|
| E—Radius | 0.210             | 0.240             | 0.300             | 0.300             | 0.359             |
| F—Radius | 0.090             | 0.100             | 0.110             | 0.130             | 0.205             |
| G—Radius | 0.050             | 0.050             | 0.060             | 0.075             | 0.075             |
| H—Radius | 0.110             | 0.140             | 0.160             | 0.175             | 0.188             |
| J—Radius | 0.060             | 0.070             | 0.070             | 0.075             | 0.075             |
| K        | 0.170 $\pm$ 0.004 | 0.200 $\pm$ 0.004 | 0.210 $\pm$ 0.005 | 0.220 $\pm$ 0.005 | 0.253 $\pm$ 0.005 |

FIG. 1 Standard Sections Figure-8 Trolley Wire



NOTE—Dimension R is defined by two center lines of which the upper is the center line of the radius of the groove, and the lower is the center line of the groove.

|   |         |         |
|---|---------|---------|
| Nominal size, cmils                         | 350 000 | 400 000 |
| Area, in. <sup>2</sup> (Explanatory Note 5) | 0.2740  | 0.3120  |
| Area, cmils (Explanatory Note 5)            | 348 900 | 397 200 |
| Weight, lb/mile (Note 5)                    | 5576    | 6347    |

Dimensions for Inspection, in.

|   |                          |                          |
|---|--------------------------|--------------------------|
| A | 0.496 + 0.008<br>- 0.016 | 0.552 + 0.010<br>- 0.020 |
| B | 0.707 $\pm$ 0.014        | 0.745 $\pm$ 0.015        |
| C | 0.376 $\pm$ 0.007        | 0.376 $\pm$ 0.007        |

Dimensions for Reference, in.

|          |                   |                   |
|----------|-------------------|-------------------|
| D—radius | 0.208 $\pm$ 0.005 | 0.232 $\pm$ 0.005 |
| E        | 0.267 $\pm$ 0.010 | 0.267 $\pm$ 0.010 |
| F        | 0.250             | 0.250             |
| G—radius | 0.310 $\pm$ 0.005 | 0.310 $\pm$ 0.005 |
| H        | 0.189 $\pm$ 0.005 | 0.203 $\pm$ 0.005 |
| J        | 27 $\pm$ 2 deg    | 27 $\pm$ 2 deg    |
| K        | 51 $\pm$ 2 deg    | 51 $\pm$ 2 deg    |
| L        | 78 deg            | 78 deg            |
| M        | 0.423 $\pm$ 0.008 | 0.423 $\pm$ 0.008 |
| N—radius | 0.671 $\pm$ 0.016 | 0.700 $\pm$ 0.016 |
| O        | 0.066 $\pm$ 0.005 | 0.080 $\pm$ 0.005 |
| P—radius | 0.015 $\pm$ 0.010 | 0.015 $\pm$ 0.010 |
| R        | 0.005 - 0.005     | 0.005 - 0.005     |

FIG. 2 Standard Sections Figure-9 Deep-Section Grooved Trolley Wire

7.2 The standard sizes of figure-8 trolley wire shall be as specified in Fig. 1.

7.3 The standard sizes of figure-9 deep-section grooved trolley wire shall be as specified in Fig. 2.