Designation: B986 – 13 (Reapproved 2019)

Standard Test Method for Determination of Tensile Strength by Mass Method for Stranded Conductors Intended for use in Electronic Application[1]

This standard is issued under the fixed designation B986; 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 test method covers the procedure for determining the tensile strength by a mass method for uninsulated stranded electrical conductors intended for use in electronic application (Explanatory Note 1).

1.1.1 The test method is intended for conductors that are one type of wire (non-composite). The wire type being plain, clad, or coated and stranded together to operate mechanically and electrically as a single conductor.

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.

1.3 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use. Some specific hazards statements are given in Section 7 on Hazards.*

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:*[2]

B354 Terminology Relating to Uninsulated Metallic Electrical Conductors

B800 Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes—Annealed and Intermediate Tempers

E4 Practices for Force Verification of Testing Machines

E8/E8M Test Methods for Tension Testing of Metallic Materials

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this test method, refer to Terminology B354.

4. Significance and Use

4.1 This test method is designed as an inspection or acceptance test of tensile strength for stranded metallic conductors.

5. Apparatus

5.1 *Tensile Testing Machine*—Machines used for tension testing shall conform to the requirements of Practices E4.

5.2 *Balance,* for measurement of mass, accurate to 0.1 %.

5.3 *Steel Scale,* for measurement of length, with smaller divisions, not greater than 1⁄32 in. (1 mm).

5.4 *Jig, or equivalent equipment,* for cutting the conductor to length and at right angles to its axis.

6. Procedure

6.1 *Breaking Load:*

6.1.1 Conduct tensile test in accordance with Test Methods E8/E8M and with a rate of loading not to exceed 10 in./min (250 mm/min.) (Explanatory Note 2 and Note 3).

6.2 *Specimen Mass/Unit Length:*

6.2.1 Cut the test specimens, making sure that the ends are at right angles to the axis of the conductor. The length of test specimens shall be 2 ft (610 mm) minimum (Explanatory Note 2).

6.2.2 Measure the length of the specimen at room temperature (see Note 1) to the nearest 1⁄32 in. (1 mm) and measure the mass to within ±0.1 % accuracy, converting to lb/1000 ft or kg/km, if weighed in other units.

[1] This practice is under the jurisdiction of ASTM Committee B01 on Electrical Conductors and is the direct responsibility of Subcommittee B01.02 on Methods of Test and Sampling Procedure.

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[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.

NOTE 1—Correction for temperature variation need not be made, since the error introduced in the length measurement by the temperature variation is less than the required accuracy of the length measurement.

7. Calculation

7.1 Calculate the tensile strength of the stranded conductor as follows (Explanatory Note 1):

$$TS = (BL / CM) \times MF \times [(100 + k) / 100]$$

where:

TS = tensile strength of the stranded conductor, lb/in.^{2} (N/mm^2),
BL = breaking load measurement read directly from the tensile tester, lb (N),
CM = mass of conductor per unit length, lb/1000 ft (kg/km),
MF = material factor, lb/in^2 · 1000 ft (kg/mm^2 · km), (Table 1 and Explanatory Note 4 and Note 5), and
k = increment (increase) in mass and electrical resistance (from product specification), %. If no *k* value is given, the use *k* = 0.

8. Precision and Bias

8.1 *Precision and Bias*—The precision and bias of this test method for tensile strength are essentially as specified in Test Methods E8/E8M.

9. Keywords

9.1 breaking loads; mass methods; metallic conductors; tensile strength