SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE STANDARD

SAE J156

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Submitted for recognition as an American National Standard

(R) FUSIBLE LINKS

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1. ***Scope—***This SAE Standard covers supplemental requirements for low-tension primary cable intended for use as Fusible Links (Fuse Links) at a nominal system voltage of 60 V DC (25 V AC) or less in surface vehicle electrical systems. These supplemental requirements are intended to qualify cables for an extreme current overload.

2. ***References***

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J537—Storage Batteries
SAE J1128—Low Tension Primary Cable
SAE J1678—Low Tension, Ultra Thin Wall Primary Cable

2.1.2 ASTM PUBLICATION—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 354—Definitions of Terms Relating to Uninsulated Metallic Electrical Conductors

2.2 Related Publications—The following publications are provided for information purposes only and are not a required part of this document.

2.2.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1127—Low Tension Battery Cable
SAE J1292—Automobile, Truck, Truck-Tractor, Trailer, and Motor Coach Wiring

2.2.2 ASTM PUBLICATIONS—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 1—Standard Specification for Hard-Drawn Copper Wire
ASTM B 3—Standard Specification for Soft or Annealed Copper Wire
ASTM B 8—Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B 33—Standard Specification for Tinned Soft or Annealed Copper Wire
ASTM B 174—Standard Specification for Bunch-Stranded Copper Conductors for Electrical Conductors
ASTM B 263—Method for Determination of Cross-Sectional Area of Standard Conductors
ASTM B 298—Standard Specification for Silver-Coated Soft or Annealed Copper Wire
ASTM B 355—Standard Specification for Nickel-Coated Soft or Annealed Copper Wire
ASTM B 452—Standard Specification for Copper-Clad Steel Wire for Electronic Application
ASTM B 787—19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation
ASTM D 412—Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension
ASTM D 573—Standard Test Method for Rubber—Deterioration in an Air Oven
ASTM E 145—Standard Specification for Gravity—Convection and Forced—Ventilation Ovens
ASTM F 1251—Standard Terminology Relating to Polymeric Biomaterials in Medical and Surgical Device

3. Definitions

3.1 Coated Wire—Wire comprised of a given metal covered with a relatively thin application of a different metal. (See ASTM B 354.)

3.2 Fusible Link (Fuse Link)—A section of low tension cable designed to open the circuit when subjected to an extreme current overload. Its purpose is to minimize wiring system damage when such an overload occurs.

3.3 Low Voltage—Usually considered to be ≤60 V DC (25 V AC).

3.4 Short Circuit—An accidental electrical connection between a feed circuit and a return circuit resulting in an extreme current overload.

4. General Requirements—The cable should meet the applicable requirements of SAE J1128, J1654, or J1678. Cables other than those defined in SAE J1128 or J1678 may be used if they meet the functional requirements described in 5.1 and 5.2.

4.1 Conductor—When bare or coated copper conductor is used, the conductor shall meet the requirements of SAE J1128 or J1678. When conductors other than copper or coated copper are used, the conductors must meet the functional requirements described in Section 5.

4.2 Insulation—Regardless of the type of insulating material used, the fusible link shall meet the performance requirements of SAE J1128, Type TWP for dielectric (withstand voltage), cold bend, flame, fluid compatibility, pinch, and abrasion. When the wire size of the fusible link does not match one found in SAE J1128 or J1678, the next larger size shall be used.

5. Additional Requirements—Applications of fusible links are to be verified through mathematical modeling or experimentally in the vehicle or with an equivalent laboratory set up. The procedure for the laboratory set ups are described as follows. The fusible link cable must meet the requirements of the laboratory set up.

5.1 Short Circuit, Flame Test—10 mm of insulation shall be removed from each end of a 150 mm sample of fusible link cable. The fusible link shall be terminated to a 4.3 m length of cable which simulates the circuit being protected. The fusible link shall be connected to a fully charged battery as defined by SAE J537. The battery shall have an electrical value of between 500 and 600 cold cranking amps at −18 °C when tested per SAE J537. Connect the opposite end of the protected circuit to the battery through a suitable relay. The fusible link shall open in 10 s or less. If the fusible link does not open in 10 s, the test procedure shall be modified by adding an additional battery in parallel with the battery described previously. The number of batteries used in the test shall be recorded. No flame is permitted before the link opens. Upon opening, the link shall not continue to burn for more than 5 s. After the circuit has opened, no subsequent current flow is permitted in the circuit.

5.2 Identification—Each fusible link shall be permanently marked with sufficient information for replacement. This information must be legible after the fusible link has opened the circuit.

6. Notes

6.1 Marginal Indicia—The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE CABLE TASK FORCE OF THE SAE ELECTRICAL DISTRIBUTION SYSTEMS STANDARDS COMMITTEE

SAE J156 Revised MAY2000

Rationale—This document was revised to include the following:

a. Remove the “Controlled Current Test.”
b. Remove the section on circuit design.

Relationship of SAE Standard to ISO Standard—This document is not covered by ISO.

Application—This SAE Standard covers supplemental requirements for low tension primary cable intended for use as Fusible Links (Fuse Links) at a nominal system voltage of 60 V DC (25 V AC) or less in surface vehicle electrical systems. These supplemental requirements are intended to qualify cables for an extreme current overload.

Reference Section

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ASTM D 471—Standard Test Method for Rubber Property—Effect of Liquids

ASTM D 573—Standard Test Method for Rubber—Deterioration in an Air Oven

ASTM E 145—Standard Specification for Gravity—Convection and Forced—Ventilation Ovens