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

SURFACE VEHICLE STANDARD

SAE J156 | REV. JUN94

Issued 1970-02
Revised 1994-06

Submitted for recognition as an American National Standard

Superseding J156 DEC88

(R) FUSIBLE LINKS

1. ***Scope***—This SAE Standard covers the design and evaluation of fusible links for use at a nominal system voltage of 50 V or less in surface vehicle electrical systems.

2. ***References***

2.1 Applicable Documents—The following publications form a part of this specification to the extent specified herein. 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

2.2 Definition—A fusible link is 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. ***General***

3.1 Conductor

3.1.1 When bare or plated copper conductor is used, the conductor shall meet the requirements of SAE J1128.

3.1.2 When conductors other than copper or plated copper are used, the conductors must meet the functional requirements described in Section 4.

3.2 Insulation—The fusible link shall meet the requirements of the closest wire size in SAE J1128, Type STS for dielectric, cold bend, flame, oil absorption, pinch, and abrasion.

4. ***Testing***—Designs are to be verified through mathematical modeling or experimentally in the vehicle or with an equivalent laboratory setup. The procedure for the laboratory setups are described as follows:

4.1 Short Circuit—10 mm (0.5 in) of insulation shall be removed from each end of a 150 mm (6 in) sample of fusible link. The sample shall be terminated to a 4.3 m (15 ft) length of cable which simulates the circuit being protected (see 5.1). 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 (0 °F) 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. 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.

4.2 Controlled Current Test

4.2.1 Prepare a 300 mm (12 in) sample by removing 10 mm (0.5 in) of insulation from each end and suitably terminate. The sample shall be mounted vertically in an electrically isolated fixture. The fixture shall be placed in a test enclosure that minimizes air currents. The test is to be performed at room temperature.

4.2.2 Current from a constant current DC power supply shall be applied to the sample in two stages. The sample shall first be conditioned through the application of the initial current level as shown by Table 1. After 2 min, the current level shall be increased to the second level shown in Table 1, at a rate of no less than 20 A/s. This current level shall be maintained until the sample fails.

TABLE 1—TEST CURRENTS

SAE Wire Size mm^2	SAE Wire Size No.	DC Initial Current (Amps)	DC Current After 2 min and Until Failure (Amps)
0.35	22	TBD	TBD
0.5	20	35	75
0.8	18	40	90
1	16	55	110
2	14	70	150
3	12	90	200
5	10	120	260
8	8	160	325
13	6	200	375

4.2.3 No flame is permitted at any point in the test. After the circuit has opened, no subsequent current flow is allowed.

5. Application

5.1 Construction—The fusible link shall have a higher resistance per unit length than any other cable in the circuit. For bare or plated copper, this is typically two wire sizes smaller than the circuit it protects. The length of the link should be between 70 mm (3 in) and 220 mm (9 in). However, other wire sizes and lengths may be used if they meet the functional requirements described in Section 4.

5.2 Termination—Splices shall be insulated. During the destruction of the fusible link, the terminations shall not open circuit before the link.

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

5.4 **Location**—Fusible links shall be located such that any fumes generated during their destruction will not cause undue discomfort to any passenger, and no damage will occur to adjacent components, combustible material, or other circuits.

6. Notes

6.1 **Marginal Indicia**—The (R) is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. If the symbol is next to the report title, it indicates a complete revision of the report.

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