Fusible Links —SAE J156a

SAE Standard
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LAND SEA AIR SPACE

PREPRINT

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1. Scope—This SAE Recommended Practice covers the details, use, and design evaluation testing of fusible links for motor vehicle electrical wiring protection. The specifications as listed are known good practice and are not intended to restrict new materials or construction.

2. Definition—A fusible link is a special 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 accidentally in those circuits protected by the fusible link.

3. General Specifications

3.1 Conductors—Conductors shall conform to the specifications shown in Table 1 of SAE J1128.

φ **3.2 Insulation**—The insulating material shall meet the requirements shown in SAE J1128 Type HTS. A special insulation with a tensile strength of 1000 psi (6900 kPa) minimum and STS wall may also be used.

φ **3.3 Wire Size**—The fusible link must be of a smaller wire size than any connecting cable in the circuits being protected. Wire sizes are to be determined experimentally with the vehicle wiring system based on the type of harness wire insulation, circuit loads, and physical locations. This may be done either in the vehicle or with an equivalent laboratory set up.

φ **3.4 Length**—The length of each fusible link for effective protection is to be determined in the same manner as for the wire size.

3.5 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.

φ **3.6 Terminations**—The conductor and insulation at each end of a fusible link shall be securely fastened to its termination. If spliced to a connecting cable, the splice joint must either be welded or mechanically secured and soldered. The splice must then be properly insulated.

φ **3.7 Identification**—Each fusible link shall be permanently marked with the wire size and identification that it is a fusible link. After a link has fused and opened the circuit, sufficient identification shall still be present to establish this information for replacement.

φ **4. Testing**—Design evaluation testing is to be conducted to verify the ability of a specified fusible link to conduct the maximum design load of the electrical circuit and to ascertain that the link will open *under extreme current overload* without causing damage to the protected wiring, associated harness, or adjacent components.

φ **4.1 Charging Circuit Protection**—Fusible links located in circuits which conduct battery charging currents are to be tested either in the vehicle or in a duplicating laboratory set up. The specified generator and battery should be operating at maximum charge current and the battery shall have been completely discharged before the test began. Electrical accessory loads are to be such as would cause maximum current through the fusible link that could occur in a vehicle. In a laboratory set up, the generator may be duplicated by an equivalent current producing source.

At the start of the test, the generator temperature is to be 75 ± 5°F (24 ± 3°C) and the battery electrolyte temperature 110 ± 5°F (43 ± 3°C). The test shall be conducted for at least 5 min after the maximum fusible link core temperature attainable in the vehicle can be reached. After the test is completed, the fusible link insulation shall show no deterioration due to heat.

φ **4.2 Short Circuit Protection**—Fusible links are to be tested for design evaluation by grounding the conductor of the protected circuit at a point which is the most electrically remote from the fusible link. The point selected must not have any intervening circuit protecting devices, such as fuses or circuit breakers between it and the fusible link. Under extreme current overload conditions, the fusible link must open the circuit within a period of time such that no damage to the protected wiring, associated harness, or adjacent components occurs. After the link has opened, there shall be no exposed conductor in a location to cause subsequent short circuiting of the battery or generator.

φ **4.3 Observations and Conclusions**—At the conclusion of each test, visual inspection of the wiring is to be made. Other than opened fusible link sections, there shall be no evidence of cable insulation deformation or damage regardless of the type of insulation used. Any fusible link tested for maximum design current load shall show no insulation deterioration after the test.