



SURFACE VEHICLE STANDARD	J1127™	AUG2025
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Low Voltage Battery Cable		

RATIONALE

This document has been revised to update 6.8 (“Resistance to Flame Propagation”).

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1. SCOPE

This SAE Standard covers low voltage battery cable intended for use at a nominal system voltage of 60 VDC (25 VAC) or less in surface vehicle electrical systems. The tests are intended to qualify cables for normal applications with limited exposure to fluids and physical abuse.

2. REFERENCES

2.1 Applicable Documents

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 International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (U.S. and Canada only) or +1 724-776-4970 (Outside U.S. and Canada), www.sae.org.

SAE J311 Fluid for Passenger Car Type Automatic Transmissions

EA-1128 Wire Color Charts

Tomsic, J. (2000). *Dictionary of materials and testing* (2nd ed.). SAE International.

2.1.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9500, www.astm.org.

ASTM B33 Standard Specification for Tinned Soft or Annealed Copper Wire

ASTM B263 Method for Determination of Cross-Sectional Area of Standard Conductors

ASTM B298 Standard Specification for Silver-Coated Soft or Annealed Copper Wire

ASTM B354 Definitions of Terms Relating to Uninsulated Metallic Electrical Conductors

ASTM B355 Standard Specification for Nickel-Coated Soft or Annealed Copper Wire

ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension

ASTM D471 Standard Test Method for Rubber Property - Effect of Liquids

ASTM D573 Standard Test Method for Rubber - Deterioration in an Air Oven

ASTM D833 Standard Terminology Relating to Plastics

ASTM D2765 Standard Test Methods for Determination of Gel Content and Swell Ratio of Crosslinked Ethylene Plastics

ASTM D5374 Standard Test Methods for Forced-Convection Laboratory Ovens for Evaluation of Electrical Insulation

ASTM D5423 Standard Specification for Forced-Convection Laboratory Ovens for Evaluation of Electrical Insulation

2.1.3 IEC Publications

Available from IEC Secretariat, 3 rue de Varembe, PO Box 131, CH-1211 Geneva 20, Switzerland, Tel: +41 22 919 0211, www.iec.ch.

IEC, Electricity, Electronics, and Telecommunications, Multilingual Dictionary

2.1.4 ISO Publications

Copies of these documents are available online at www.iso.org/store.

ISO 19642-2 Road vehicles - Automotive cables - Part 2: Test methods

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (U.S. and Canada only) or +1 724-776-4970 (Outside U.S. and Canada), www.sae.org.

SAE J156 Fusible Links

SAE J1128 Low Voltage Primary Cable

SAE J1654 Unshielded High Voltage Primary Cable

SAE J1673 High Voltage Automotive Wiring Assembly Design

SAE J1678 Low Voltage Ultra-Thin Wall Primary Cable

SAE J2183 60 V and 600 V Single-Core Cables

SAE J2501 Round, Screened and Unscreened, 60 V and 600 V Multi-Core Sheathed Cables

SAE J2840 High Voltage Shielded and Jacketed Cable

2.2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9500, www.astm.org.

ASTM B1 Standard Specification for Hard-Drawn Copper Wire

ASTM B3 Standard Specification for Soft or Annealed Copper Wire

ASTM B8 Concentric-Lay-Stranded Copper conductors, Hard, Medium-Hard, or Soft

ASTM B787 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation

2.2.3 IEC Publications

Available from IEC Secretariat, 3 rue de Varembe, PO Box 131, CH-1211 Geneva 20, Switzerland, Tel: +41 22 919 0211, www.iec.ch.

IEC 60811-2-1 Common Test Methods for Insulating and Sheathing Materials of Electrical Cables - Part 2: Methods Specific to Elastomeric Compounds - Section 1: Ozone Resistance Test - Hot Set Test - Mineral Oil Immersion Test

2.2.4 ISO Publications

Copies of these documents are available online at www.iso.org/store.

ISO 19642-1 Road vehicles - Automotive cables - Parts 1: Vocabulary and design guidelines

ISO 19642-3 Road vehicles - Automotive cables - Part 3: Dimensions and requirements for 30 V a.c. or 60 V d.c. single core copper conductor cables

3. DEFINITIONS

3.1 BATTERY CABLE

An insulated large (6 gauge to 250 MCM) conductor cable designed for high power or current applications.

Examples include connections between battery, starter, power, and ground circuits. Additional applications include connections to the UBEC (underhood bussed electrical center) or PDC (power distribution center). The cable is not limited to these applications and may be used wherever high power or current is needed.

3.2 COATED WIRE

Wire comprised of a given metal covered with a relatively thin application of a different metal (refer to ASTM B354).

3.3 CABLE

See [3.1](#) or [3.15](#).

3.4 CABLE FAMILY

A group with multiple conductor sizes having the same conductor strand coating, insulation formulation, and wall thickness type.

3.5 CIRCULAR MIL

A circular mil is a unit of area equal to the area of a circle with a diameter of 1 mil (one thousandth of an inch).

3.6 CONDUCTOR

A wire or combination of wires not insulated from one another, suitable for carrying an electrical current (refer to ASTM B354).

3.7 CONDUCTOR SIZE

See [3.17](#).

3.8 CORE

One of the components in an assembly. A component may be an uninsulated conductor, an insulated conductor, a twisted pair, a shielded assembly, a coaxial cable, or any finished cable.

3.9 FLUID COMPATIBILITY

The ability of a cable to resist the effects of various fluids found in surface vehicles.

3.10 LOW VOLTAGE (LOW TENSION)

Usually considered to be ≤ 60 VDC (25 VAC).

3.11 MCM

One thousand circular mils.

3.12 MINIMUM WALL (THICKNESS)

The lowest allowable insulation thickness at any point.

3.13 NOMINAL

A suitable approximate value used to designate or identify a component.

3.14 PLASTICS

A material that contains as an essential ingredient one or more organic polymeric substances of large molecular weight, is solid in its finished state, and, at some stage in its manufacture or processing into finished articles, can be shaped by flow (refer to ASTM D833).

3.15 PRIMARY CABLE

An insulated small conductor (24 to 8 gauge) used for signal, low current, or power applications.

Examples include standard wiring harness applications such as body, instrument panel, engine, front end modules, and doors. The cable is not limited to these applications and may be used wherever signal, low current, or power circuits are required.

3.16 RESISTANCE TO OZONE

The ability of a material to withstand the deteriorating effect of ozone (surface cracking) (refer to *Dictionary of Materials and Testing*).

3.17 SAE CONDUCTOR SIZE

A system that indicates the cross-sectional area of the conductor. The metric SAE conductor size is the approximate area of the conductor.

3.18 SEPARATOR

A thin layer used as a barrier to prevent mutually detrimental effects between different components of a cable, such as between the conductor and insulation or between the insulation and the sheath (refer to IEC, Electricity, Electronics, and Telecommunications, Multilingual Dictionary).

3.19 STRIP FORCE

The peak axial force required to overcome the adhesion between the conductor and the insulation.

3.20 STRAND

See [3.24](#).

3.21 TEMPERATURE CLASS RATING (TCR)

A class designation based on the retention of mechanical properties (tensile and elongation) after 168 hours of heat aging at 30 °C above the temperature class rating.

3.22 THERMOPLASTIC

A plastic capable of being softened by heating and hardened by cooling through a temperature range characteristic of the plastic and, in the softened state, capable of being repeatedly shaped by flow into articles by molding, extrusion, or forming (refer to IEC, Electricity, Electronics, and Telecommunications, Multilingual Dictionary).

3.23 THERMOSET

A plastic which, when cured by heat or other means, changes into a substantially infusible and insoluble product.

NOTE: Thermosets are often called thermosetting before curing and thermoset after cure (refer to IEC, Electricity, Electronics, and Telecommunications, Multilingual Dictionary).

3.24 WIRE (STRAND)

A rod or filament of drawn or rolled metal whose length is great in comparison with the major axis of its cross section (refer to ASTM B354).

4. GENERAL

4.1 Cable Types

See [Tables 1A](#) and [1B](#).

Type SGR Starter or ground, general purpose, thermoset elastomer (synthetic rubber) insulated

Type SGT Starter or ground, general purpose, thermoplastic insulated

Type SGX Starter or ground, general purpose, cross (X) linked polyolefin insulated

Type STR Starter or ground, thin wall, thermoset elastomer (synthetic rubber) insulated

Type STT Starter or ground, thin wall, thermoplastic insulated

Type STX Starter or ground, thin wall, cross (X) linked polyolefin insulated

Table 1A - Cable types - legacy SAE battery cable types

Insulation	Thin Wall	General Purpose	Temperature Class Rating ⁽¹⁾
Thermoplastic	STT	SGT	1
Thermoset Elastomer	STR	SGR	1
Cross-Linked Polyolefin	STX	SGX	3

⁽¹⁾ Temperature class rating is defined as 1 = 80 °C and 3 = 125 °C. Existing three-character cable type will default to these temperature classes.