SURFACE VEHICLE STANDARD

J1654™	JUL2021
Issued 1994-06 Revised 2021-07 Superseding J1654 SEP2016	

Unshielded High Voltage Primary Cable

RATIONALE

This standard has been updated with the following changes:

Revised 2.2.3.

Revised Scope to limit to SAE wire size 22 gauge and larger.

Definitions have been reviewed and updated.

Revised 5.2 with updated minimum voltage for all sizes and 5.3 to read easier.

Added reference to Equation 1.

Revised Table 1 and references listed in 5.4 and 5.5.

TABLE OF CONTENTS

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/J1654_202107

1. SCOPE

This SAE Standard covers unshielded cable, 22 gauge and larger, intended for use at a nominal system voltage up to 600 V or 1000 V (ACrms or DC). It is intended for use 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. 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 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J1127 Low Voltage Battery Cable

SAE J1128 Low Voltage Primary Cable

SAE J1678 Low Voltage Ultra-Thin Wall Primary Cable

SAE Dictionary of Materials and Testing

2.1.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org

ASTM B354 Standard Terminology Relating to Uninsulated Metallic Electrical Conductors

ASTM F1251 Standard Terminology Relating to Polymeric Biomaterials in Medical and Surgical Device

2.1.3 IEC Publications

Available from IEC Central Office, 3, rue de Varembe, P.O. Box 131, CH-1211 Geneva 20, Switzerland, Tel: +41 22 919 02 11, www.iec.ch.

IEC, Electricity, Electronics and Telecommunications, Multilingual Dictionary

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 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J156 Fusible Links

SAE J1673 High Voltage Automotive Wiring Assembly Design

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, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, 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 B174 Standard Specification for Bunch-Stranded Copper Conductors for Electrical Conductors

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

2.2.3 ISO Publications

Copies of these documents are available online at http://webstore.ansi.org/.

ISO 19642 Road Vehicles - Automotive Cables - Parts 1, 2, and 5

3. DEFINITIONS

3.1 ADDITIONAL MASS

See resistance to sandpaper abrasion test.

The mass which is applied to the support rod. The combination of the forces exerted by the additional mass and the 0.63 N exerted by the remaining apparatus (bracket, support rod, and pivoting arm) is applied to the cable.

3.2 COATED WIRE

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

3.3 CABLE

See primary cable.

3.4 CABLE FAMILY

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

3.5 CONDUCTOR

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

3.6 CONDUCTOR SIZE

See SAE conductor size.

3.7 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.

3.8 FLUID COMPATIBILITY

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

3.9 HOT PLATE

An electrically heated device used to test thermoset cables.

3.10 LOW VOLTAGE (LOW TENSION)

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

3.11 MINIMUM WALL (THICKNESS)

The lowest allowable insulation thickness at any point.

3.12 NOMINAL

Name or identifying value of a measurable property by which a conductor or component or property identified, and to which tolerances may be applied.

3.13 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.

3.14 PRIMARY CABLE

The single or multi-stranded, single conductor, insulated cable used to carry electric current, by attachment to the low voltage side of an ignition coil in surface vehicles.

3.15 RESISTANCE TO OZONE

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

3.16 SAE CONDUCTOR SIZE

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

3.17 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 (IEC, Electricity, Electronics and Telecommunications, Multilingual Dictionary).

3.18 STRIP FORCE

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

3.19 STRAND

See wire.

3.20 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.