



SURFACE VEHICLE STANDARD

J3008™

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Superseding J3008 MAY2017

Sealed Trailer Tow Connector

RATIONALE

To provide an auxiliary interface for future needs offering additional optional functionality between a (towed trailer and light truck or other vehicle), as to improve the towing experience.

SAE J3008 has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE

This SAE Standard provides the auxiliary requirements for automotive or RV, additional 12 position, sealed Trailer Tow Connector Plug and Receptacle. The information included within this specification is intended to cover the test methods, design, and performance requirements of optional features for additional power, clean ground for electronic functions, video, data communication, and supplementary electric brake control.

2. REFERENCES

2.1 Applicable Documents

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

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/USCAR-2 Performance Standard for Automotive Electrical Connection Systems

SAE/USCAR-21 Performance Specification for Cable-to-Terminal Electrical Crimps

SAE J1939-1 On-Highway Equipment Control and Communication Network

SAE J1939DA Digital Annex

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 B117-94 Standard Method of Salt Spray (Fog) Testing

ASTM G154 Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

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For more information on this standard, visit https://www.sae.org/standards/content/J3008_202307/

2.1.3 AIAG Publication

Available from Automotive Industry Action Group, Box 77000, Detroit, MI 48277-0839, Tel: 248-358-3570, www.aiag.org.

Measurement Systems Analysis Reference Manual

3. DEFINITIONS

3.1 ACCEPTANCE CRITERIA

Generally the final section in each test description. It specifies the requirements that all test samples must meet during or at the conclusion of that test.

3.2 AIAG

Automotive Industry Action Group.

3.3 AUTHORIZED PERSON

One person will be responsible as the final authority for releasing a given part for production and/or for testing that part. Such person may delegate authority for testing that part, or may retain the authority. The Authorized Person, as used in the specification, is the person with authority for making the final decision as to any question arising during testing to this specification or for any deviations from any requirement of this specification. Such Authorized Person is responsible for documenting any deviation he/she authorizes from this specification. This documentation must be included in the final test report.

3.4 BENCHMARK

Performance measurements of a specific design which serve as a standard by which the performance of other connector systems and terminals can be compared.

3.5 BULK RESISTANCE

That part of total connection resistance attributed to the terminal body. Bulk resistance does not include crimp resistance or interface resistance.

3.6 CT (Continuity Tester)

A made-up test device composed of a data analyzer and a continuity monitor.

3.7 CUT

Component Under Test.

3.8 CRITICAL DIMENSION

Any dimension noted on the part drawing or otherwise specified that can adversely affect the performance or function of the part or assembly if it exceeds the applicable tolerance.

3.9 CROSS AXIS RESONANCE

Resonance measured on a vibration set up at right angles to the intentionally induced axis of motion. Example: X or Y measured resonance when shaker is operating in the Z axis.

3.10 DEVICE CONNECTOR

An electrical connector that mates with the electrical interface of a device (e.g., headlamp, switch, horn, etc.).

3.11 DIRECT CONNECT TYPE CONNECTION

A connector that is fixed to a module or panel that a plug or wired connector is mated with to provide an electrical interface. Typically direct connect type connectors will contain the male terminals. Syn: Panel mount.

3.12 DMM

Digital Multimeter.

3.13 DUE CARE

The proper use of sound engineering judgment to assure a part is fit for its intended use and meets all applicable FMVSS requirements. The intent is to assure that design specifications and test plans satisfy all applicable FMVSS requirements. Use of sound, accepted engineering and laboratory practice to safeguard the integrity of all data and to ensure that no degradation of any sample occurs in any fashion except as specified in actual testing.

3.14 ENGAGING FORCE

The force required to mate a separate pair of contacts (terminals) or a contact and mating test gage.

3.15 EXTRACTION FORCE

The force required to completely remove an individual contact (terminal) from its cavity in a connector.

3.16 FEMALE CONNECTOR

The connector that houses the female terminal(s).

3.17 FEMALE TERMINAL

The electrical receptacle that receives the male blade or pin.

3.18 FMVSS

Federal Motor Vehicle Safety Standard.

3.19 FS

Full Scale.

3.20 GD&T (Geometric Dimensioning and Tolerancing)

A method required by the USCAR companies for representing dimensions and their tolerances on all part drawings.

3.21 IACS

International Annealed Copper Standard.

3.22 ISOLATION RESISTANCE

Isolation resistance, expressed in ohms, measures the electrical resistance between circuits in a connection system. This test is conducted to verify that there is sufficient spacing to prevent detrimental electrical conductivity between any circuits, terminals, shield, or housing in that connector for its intended application.

3.23 MALE CONNECTOR

The connector that houses the Male Terminal(s).

3.24 MALE TERMINAL

The metal blade or pin that inserts into the Female Terminal.

3.25 MATING FORCE

The force required to mate male and female connector halves or to completely seat a connector in a receptacle.

3.26 MAXIMUM CURRENT CAPABILITY

The maximum current carrying capability at room temperature of the specific combination of terminal size, conductor gage, insulation type, etc., as determined in 5.2.2. This value must be de-rated for actual conditions in the expected application.

3.27 NOMINAL CURRENT

The current causing a 30 °C temperature rise over ambient based on given wire size.

3.28 PANEL MOUNT CONNECTOR

This type of connection system serves to pass a circuit or group of circuits through a panel, bracket, or other obstruction. It can be configured with connectors plugged into both ends or can be attached directly to a harness or circuit board on one end with a separable connector on the other end.

3.29 POWER CIRCUIT

Any electrical circuit expected to carry in excess of 5 A continuously for more than 1 minute.

3.30 RETENTION FORCE

The maximum force that can be exerted on an individual contact (terminal) without dislodging it from its proper position in its connector cavity. This force may have two different values; one with the associated Wedge (TPA, PLK, etc.) installed and a second value without such assistance.

3.31 RH

Relative Humidity.

3.32 ROA

Rise over ambient (temperature).

3.33 ROOM TEMPERATURE

23 °C ± 5 °C.

3.34 SEPARATING FORCE

The force required to disengage a mated pair of contacts (terminals) or a contact and a mating test gage.

3.35 SIGNAL CIRCUIT

Any electrical circuit expected to carry 5 A or less at all times.

3.36 SOAK

Refers to a time period during which the device under test is exposed to stated environmental conditions, such as temperature, humidity, current flow, etc. This exposure may be for the purpose of conditioning the sample prior to another test, or may itself form part of a given test.

3.37 SPRUNG

Describes any portion or component of a motor vehicle that is supported by the suspension system. Sprung components do not include tires, wheels, hubs, or outboard disc or drum brake assemblies.

3.38 STEADY STATE

A condition of environment or current flow that remains stable for 1 minute or more.

3.39 TOTAL CONNECTION RESISTANCE

Electrical resistance of one terminal to terminal interface plus the resistance of the conductor to terminal grip for each terminal. For direct connect type connections, only the resistance of the one conductor to terminal grip is included. Included is the "bulk resistance" of the terminal material itself.

3.40 TUT

Terminal Under Test.

3.41 UNMATING FORCE

The force required to un-mate male and female connector halves or a connector from a direct connect or panel mount connector or receptacle.

3.42 UN-SPRUNG

Describes any component of a motor vehicle that is not supported by the suspension system (see Sprung).

3.43 USCAR

United States Council for Automotive Research LLC. A consortium of representatives from Ford, General Motors, and Chrysler to promote joint research in noncompetitive areas that can strengthen the U.S. automotive industry.

3.44 VOLTAGE DROP (VD)

The difference in potential between two points in an electrical circuit caused by resistance at nominal current. Voltage drop may be used to calculate resistance when the current value is known.

4. GENERAL REQUIREMENTS

General requirements of this specification follow the requirements specified in SAE/USCAR-2, Section 4.

5. TEST AND ACCEPTANCE REQUIREMENTS

5.1 Test Sequence

Tests sequences 5.2.3, 5.2.4, 5.2.5, and 5.2.6 must be run and meet the acceptance criteria for a connector to pass SAE J3008.

Run tests per the test sequences of 5.2.3. When tests reference SAE/USCAR-2, use the current revision level and test in accordance with Temperature Class 2, Vibration Level 1, and Sealing Class 3 or as defined by test requestor.

5.2 Test Requirement Structure

5.2.1 Global Variances to SAE/USCAR-2 Tests

SAE/USCAR-2 is the basis for this test specification. However, there are some differences that apply. The list below identifies the differences that apply in every case a test is applied. These exceptions apply due to the specific needs of the 12-way trailer tow connector.

1. Connector mate and unmate cycling shall be 2000 durability cycles rather than 10 cycles called out in SAE/USCAR-2 wherever SAE/USCAR-2, Section 5.1.7 conditioning is called out. This is to match the expected life use of 2000 mate/unmate cycles.
2. When a resistance or voltage drop criteria is made, use the values for 2.8 mm blade as the acceptance criteria. This is needed since round pins are used in the SAE J3008 design, but only flat blades are identified in the SAE/USCAR-2 specification. 2.8 mm was selected since the surface area of the 1.5 mm round pin is very close in size to the 2.8 x 0.8 mm flat blade.
4. The wire size to be used for electrical testing shall be 1.5 mm².
5. Current rating 12 shall be amperes minimum (to align with promise of availability of at least 12 A to trailer-side electrical loads).
6. Sealing effectiveness: Sealing tests are to be performed in both the mated and unmated conditions. This is a unique configuration where the connector is moved while not in use and the holder must be evaluated.

5.2.2 Test Table

Table 1 lists the tests called-out in this specification. Test paths with a letter designation are from SAE/USCAR-2. When exceptions from the SAE/USCAR-2 method are listed in the far right column, they apply as a mandatory change from the published SAE/USCAR-2 test.