

	<b>SURFACE VEHICLE STANDARD</b>	
	<b>SAE</b>	<b>J1625 MAY2013</b>
	Issued Cancelled	1993-07 2013-05
Superseding J1625 SEP2004		
Heavy-Duty Circuit Breakers		

#### RATIONALE

The test specification for SAE J553 and SAE J1625 are almost identical with variation only in the test lead sizes and interrupt test currents that change as the value of the circuit breaker amperage increases.

Manufacturers have adopted the SAE J553 spec in their literature in practice.

One standard will fully support all 12V/24V circuit breaker requirements up to 200A. This will simplify the research for the engineer using SAE standards and remove the possibility of one spec not matching the other.

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## **1. Scope**

This SAE Standard defines the test conditions, procedures, and performance requirements for circuit breakers in ratings from 50 to 200 A. This document covers automatic reset, modified reset and manual reset types of circuit breakers for low voltage DC systems (12 V and 24 V).

NOTE—It is technically feasible for circuit breakers in this general class to be provided in amperage ratings below 50 A. In those instances, the procedures as detailed herein may be used provided compensation is made for test currents, test leads, and power supply requirements. Additional guidance may be obtained from SAE J553 – Circuit Breakers.

- 1.1** Operational requirements for 42V vehicular electrical systems are under development as of this revision. The electrical environment is not completely defined, particularly as it relates to other components that would influence circuit breaker function (such as storage battery technology, charging system design and operational characteristics). The test and evaluation requirements of this standard are sufficient to determine relative performance concerning current carrying capability, environmental durability, and general requirements regardless of maximum voltage rating. It is anticipated that a separate technical document will be created to capture requirements unique to 42V electrical system architecture and load characteristics.

## **2. References**

### **2.1 Applicable Publications**

The following publications form a part of this specification to the extent specified herein. Unless otherwise specified, 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 J1127—Battery Cable

SAE J1128—Low Tension Primary Cable

SAE J1171—External Ignition Protection of Marine Electrical Devices

SAE J1211—Recommended Environmental Practices for Electronic Equipment Design

SAE J1428—Marine Circuit Breakers

## 2.2 Related Publications

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

### 2.2.1 SAE PUBLICATIONS

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J258—Circuit Breaker—Internal Mounted—Automatic Reset

SAE J554—Electric Fuses (Cartridge Type)

SAE J1284—Blade Type Electric Fuses

SAE J1888—High Current Time Lag Electric Fuses

SAE TSB 002—Preparation of SAE Technical Reports

### 2.2.2 CSA PUBLICATIONS

Available from CSA Sales Department, 178 Rexdale Boulevard, Etobicoke, Ontario, M9W 1R3.

CSA C22.2 No. 14-M1987—Industrial Control Equipment

CSA C22.2 No. 235-M89—Supplementary Protectors

### 2.2.3 U.S. GOVERNMENT PUBLICATIONS

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-202F—Test Methods for Electronic and Electrical Component Parts

### 2.2.4 UNDERWRITERS LABORATORIES PUBLICATIONS

Available from Underwriter Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.

U.L. 1077—Standard for Supplementary Protectors for use in Electrical Equipment

## 2.2.5 APPENDICES

Appendix A Circuit Protection Application Guidelines

Appendix B Glossary of Document Terminology

### 3. Definitions

**3.1 Circuit Breakers** – are overcurrent protective devices, responsive to electric current and to temperature.

NOTE—There are no implied restrictions on circuit breaker design as to component form or ornamental housing designs provided the circuit breaker exhibits performance characteristics within the scope of this standard. This standard has been developed for use by the ground transportation industry, however other users of DC circuit protection may find the test and performance requirements of benefit.

**3.2 Externally Mounted Circuit Breakers** – are defined as self-contained devices, which are mounted individually or in assemblies via brackets, bus bars, electrical centers, compatible fuse holders, or mechanically in or through panels.

**3.3 Internally Mounted Circuit Breakers** – are defined as protection sub-assemblies that are most often integrated with other electrical devices, such as part of a switch with circuit breaker function or in a motor housing to provide overload protection to the motor windings.

**3.4** There are three general classes of breaker, defined as follows:

**3.4.1 Type 1 – Automatic reset** – is defined as cycling or continuously self-resetting unit, which is opened by overcurrent. The terms “cycling” and “continuously self-resetting” refer to the functional characteristic in which the reset feature is not dependent upon any deliberate action or intervention by the user or user’s application system to initiate the reset of the tripped circuit breaker. These terms do not imply that the trip and reset function can continue unabated without consequence to either the life of the circuit breaker or potentially adverse effects to an electrical system wiring and/or components, if a fault condition persists undetected and uncorrected.

NOTE—Type 1 automatic reset circuit breakers are best utilized in applications that provide for other self-limiting or non-resettable means (such as after a main fuse, main manual reset circuit breaker, or momentary switch). Intermittent electrical short circuit operation, which may be observed during a cycling event on a Type 1 automatic reset circuit breaker after overload or short, could be misinterpreted as loose connections by operators if self-limiting means are not in place, which in turn may lead to delayed service of a fault.

**3.4.2 Type 2 – Modified Reset** – is defined as a device that is opened by overcurrent and remains open as long as a minimum voltage and current is available to the affected circuit (as established in this standard). A sequence of trip and reset cycles may occur prior to achieving the steady-state open condition as defined in the test and performance requirements.

NOTE—As of this revision, there are no commercially available Type 2 heavy-duty circuit breakers. There are no specified tests or requirements in this standard. Type 2 tests and requirements are published in SAE J553, which may be relied upon as a general guideline for evaluation until such time that specifications would be included in this document.