SAE International

SURFACE VEHICLE STANDARD

SAE J1495 FEB2013

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Test Procedure for Battery Flame Retardant Venting Systems

RATIONALE

This standard is being revised to correct errors in the numerical references contained within.

1. SCOPE

This SAE Standard details procedures for testing lead-acid SLI (starting, lighting, and ignition), Heavy-Duty, EV (electric vehicle) and RV (recreational vehicle) batteries to determine the effectiveness of the battery venting system to retard the propagation of an externally ignited flame of battery gas into the interior of the battery where an explosive mixture can be present.

NOTE: At this time 2011, there is no known comparable ISO Standard.

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 724-776-4970 (outside USA), www.sae.org.

SAE J537 Storage Batteries

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
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http://www.sae.org/technical/standards/J1495_201302

3. SAFETY PRECAUTIONS AND PROCEDURES

WARNING: Testing of a battery venting system can result in an explosion. Extreme caution must be exercised to avoid personal injury. Absolutely no testing should be permitted where the prescribed safety precautions and procedures are not followed or exceeded.

3.1 All test apparatus, except the charging source, must be fully contained in an externally vented explosion test chamber, for example, Figure 1.

3.2 The battery-charging source must be located outside the explosion test chamber convenient to the control of the testing personnel. The charging circuit must have two emergency disconnect switches located (1) readily accessible to the testing personnel and (2) at a remote position at least 3 m from the explosion test chamber. These disconnect switches are intended for emergency use only, since their use may damage some types of chargers.

3.3 A suitable test area should be designated, for example, 3 m^2 or more. Signs restricting unauthorized persons from this area should be posted and observed while any electrical circuit in the explosion test chamber is or could be energized.

3.4 During testing, entry to the area in which the explosion test chamber is located should be clearly marked to restrict all persons not fully familiar with all safety requirements and not wearing full protection from the hazard to be encountered.

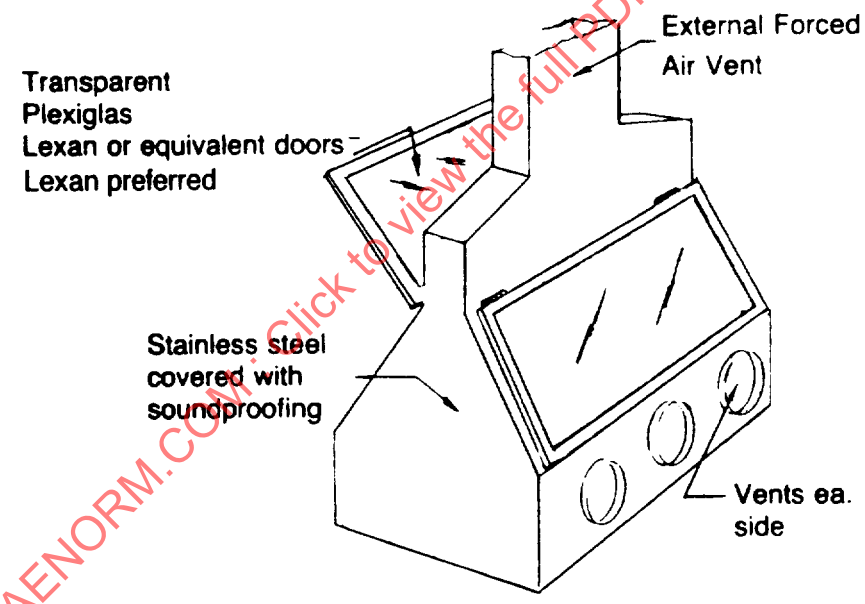

FIGURE 1 - TEST CHAMBER

3.5 Smoking, open flames, unprotected lights, or other spark sources must not be permitted in the area during testing.

3.6 Full face protection devices must be worn by all persons within the restricted area.

3.7 The battery spark source circuit must have an emergency disconnect switch readily available to the testing personnel.

3.8 The exhaust fan of the explosion test chamber, if so equipped, should be operated during the entire spark test procedure. A damper in the exhaust fan stack may be used during the test to avoid removing the gas to the extent that the spark does not ignite the hydrogen. On completion of any test sequence, all charging and sparking circuits used for the testing must be interrupted for at least 5 min (with the exhaust fan operating if available) before anyone is permitted access to the chamber. This time interval allows any hydrogen to be purged from the chamber and to preclude the possibility of a delayed explosion occurring due to a sustained "hidden" flame.

WARNING: HYDROGEN GAS CAN BURN WITHOUT VISIBLE FLAME.

4. EQUIPMENT REQUIRED FOR SPARK TEST

4.1 Spark testing conducted using a battery; Spark testing is always conducted with the vent (s) installed on a battery for final design verification testing.

4.1.1 An explosion chamber, for example, Figure 1, recommended to be equipped with an explosion-proof fan of adequate size to produce approximately one chamber volume change per minute, vented directly to the exterior of the building.

4.1.2 A battery-charging source capable of current control, with an output current of 40 – 100 A at 18.0 V

4.1.3 A fully-charged 12-V battery equipped with a functional flame retardant venting system to serve as an ignition source for 12 V spark source systems

4.1.4 Battery on which the test is to be performed.

4.1.5 Wiring and fixture equivalent to those shown in Figures 2A or 2B.

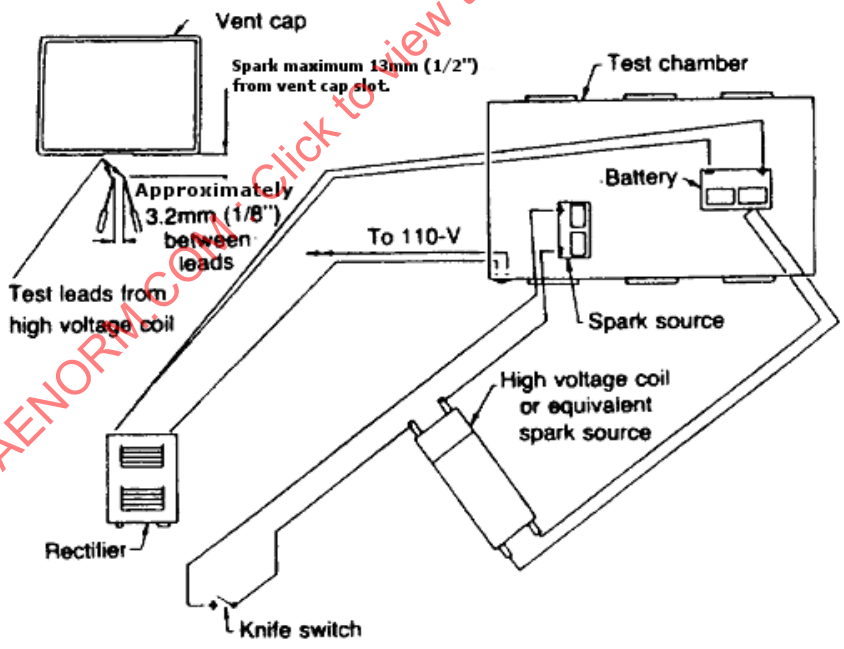

FIGURE 2A - SCHEMATIC FOR TEST ON BATTERY

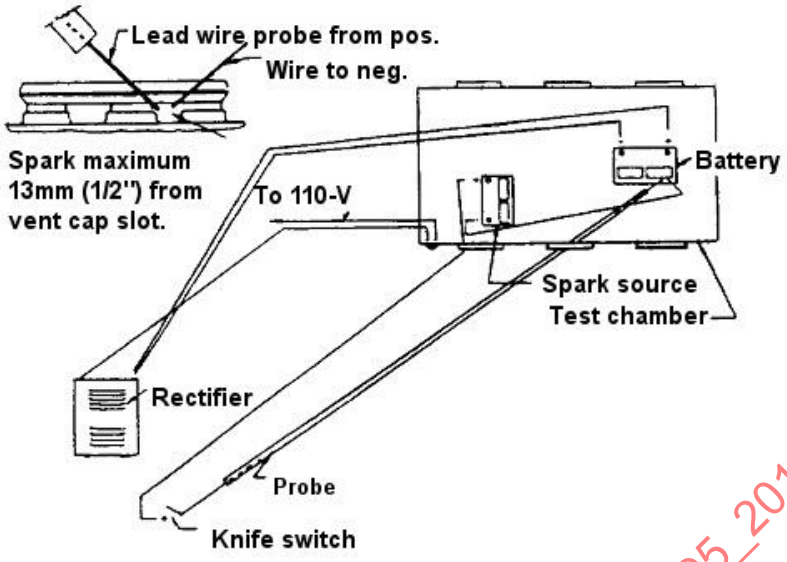

FIGURE 2B - SCHEMATIC FOR TEST ON BATTERY

4.2 Spark testing conducted using a fixture; Spark testing can be conducted on a test fixture for research and development, and initial design verification activities. Fixture testing is not to be used for final design verification testing.

4.2.1 An explosion chamber, for example, Figure 1, recommended to be equipped with an explosion-proof exhaust fan of adequate size to produce approximately one chamber volume change per minute, vented directly to the exterior of the building.

4.2.2 A charging source capable of current control, with an output current of 40 - 100 A at 18 V

4.2.3 A fully charged 12-V battery equipped with a functional flame retardant venting system to serve as an ignition source for 12 V spark source systems.

4.2.4 A second fully charged battery to serve as a gas mixture source. This battery must be vented only through the test fixture or functional flame retardant venting system.

4.2.5 A test fixture, similar to that shown in Figure 3.

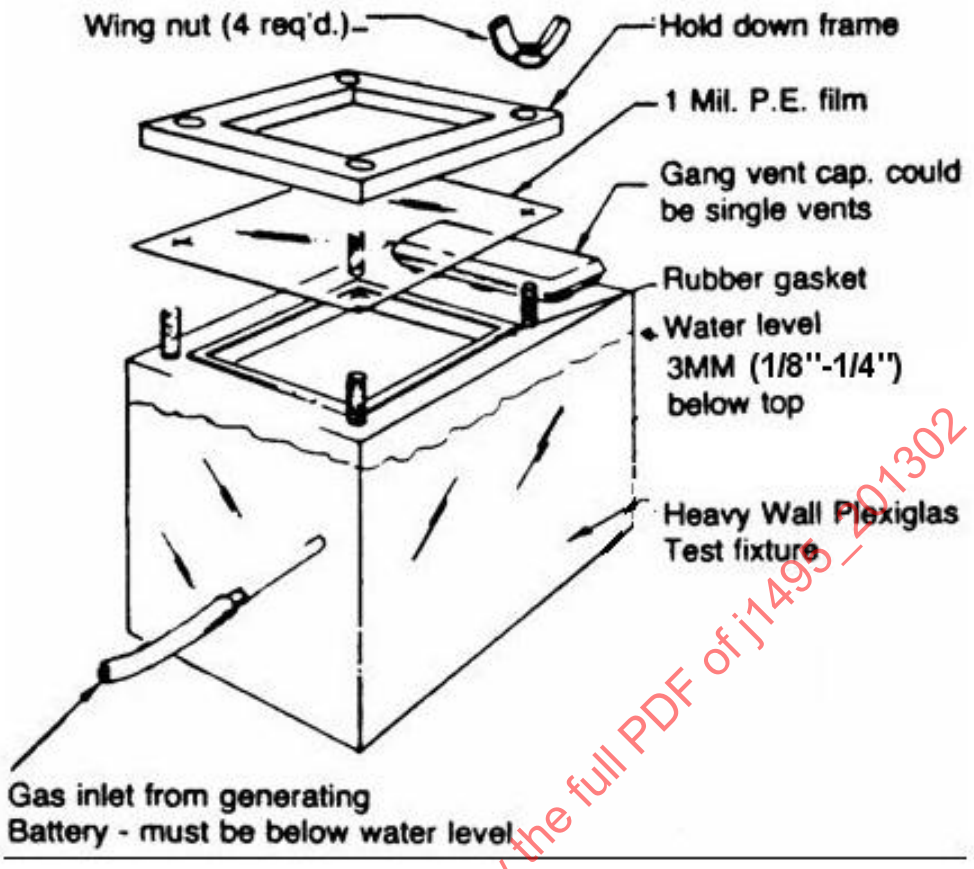

FIGURE 3 - TEST FIXTURE

4.2.6 Tubing and fittings equivalent to those shown in Figure 4.

5. EQUIPMENT ARRANGEMENT AND SPARK TEST PREPARATION

5.1 Spark testing conducted using a battery; Spark testing is always conducted with the vent (s) installed on a battery for final design verification testing.

5.1.1 Arrange test apparatus as shown in Figure 2A or alternate 2B.

5.1.2 Before spark testing, the test battery system should be checked for gas leakage at any place other than the vent opening, for example, with a soap solution.

5.1.3 Prior to the start of the test, the spark source battery must be fully charged.

5.1.4 Prior to the start of the test, the battery to which the test vent is affixed must be fully charged and gassing vigorously.

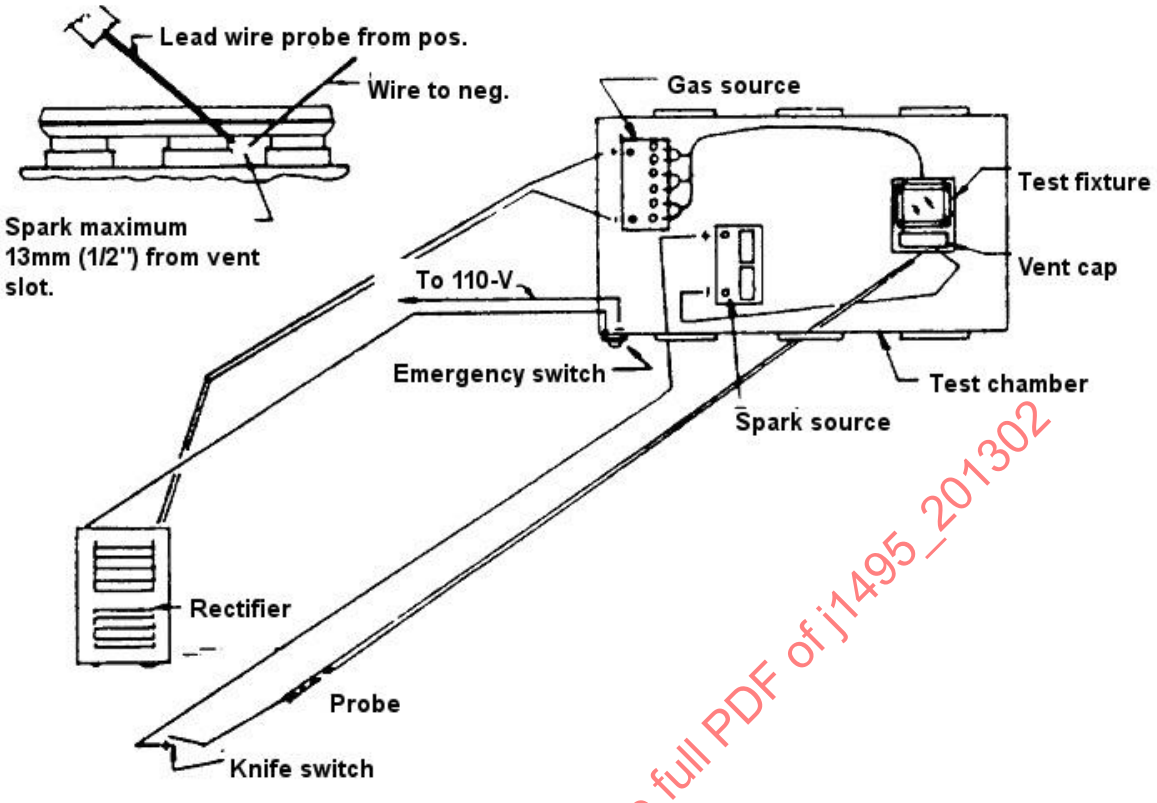

FIGURE 4 - SCHEMATIC FOR TEXT FIXTURE

5.1.5 Prior to the start of the test, the test vent must be preconditioned as in 6.1.

5.2 Spark testing conducted using a fixture; Spark testing can be conducted on a test fixture for research and development, and initial design verification activities. Fixture testing is not to be used for final design verification testing.

5.2.1 Arrange the test apparatus as shown in Figure 4. Note that the gas inlet to the test fixture must be well below the water level as shown in Figure 3 to prevent ignited gases from entering the gas-generating battery.

5.2.2 Fill the test fixture with water to a level 3 – 6 mm (1/8 – 1/4 in) below the underside of the top. The water should be at a level that will avoid splashing water up into the vent if there is a wave action at high charge current levels Place the hold-down frame over a 25 µm (1-mil) thickness of polyethylene film cut as shown in Figure 3. Place the frame, with film in place, over the four studs so that the film covers the open area between the fixture and the frame. Tighten the frame down finger tight with wing nuts to insure a gas-tight seal around the gasket. Fit the vent system to be tested into the fixture.

5.2.3 Before spark testing, the whole system should be checked for gas leakage at any place other than the vent opening, for example, with a soap solution.

5.2.4 Prior to the start of the test, the spark source battery must be fully charged.

5.2.5 Prior to the start of the test, the gas-generating battery must be fully charged and gassing vigorously.

5.2.6 Prior to the start of the test, the test vent must be preconditioned as in 6.1.