SAE International™ SURFACE VEHICLE STANDARD

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Life Test for Automotive Storage Batteries

1. ***Scope—***This SAE Standard applies to 12 V, automotive storage batteries of 180 min or less reserve capacity. This life test simulates automotive service when the battery operates in a voltage regulated charging system. It subjects the battery to charge and discharge cycles comparable to those encountered in automotive service. Other performance and dimensional information is contained in the latest issue of SAE J537.

This document is intended as a guide toward standard practice, but may be subject to change to keep pace with experience and technical advances.

2. ***Reference***

2.1 **Applicable Publication—**The following publication forms a part of the specification to the extent specified herein. Unless otherwise indicated, the latest revision of SAE publications shall apply.

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

SAE J537—Storage Batteries

3. ***Testing Procedure***

3.1 Cycle life testing shall begin within sixty days of the final nondestructive test as shown in 3.3 of SAE J537 (Table 1).

3.2 The battery is tested in a water bath maintained at 41 °C ± 3 °C (105 °F ± 5 °F).

3.3 Water level of the bath specified in 3.2 is to be maintained at a height equal to or greater than 75% of the overall height of the battery container or within 12 mm (1/2 in) of the metal bushing of side terminal batteries.

3.4 The test cycle is performed as follows:

Discharge 4 min ± 1 s at 25 A ± 0.1 A.

Charge:

a. Maximum voltage (at battery cable terminals): 14.8 V ± 0.03 V
b. Maximum rate: 25 A ± 0.1 A
c. Time: 10 min ± 3 s

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3.5 Battery is continuously cycled for 100 (+10, –0) h (example: Monday noon until 4:00 p.m. Friday). A switching delay of not more than 10 s is permitted from termination of charge to start of discharge and termination of discharge to start of charge.

3.6 The battery is given a 60 to 72 h stand on open circuit in the 41 °C (105 °F) water bath.

3.7 With the battery at the temperature obtained in 3.6, discharge at a rate equal to its –18 °C (0 °F) cold cranking rate in amperes (see SAE J537) to 1.20 V per cell, or a minimum discharge time of 30 s, whichever occurs first.

3.8 Replace battery on the life test without a separate recharge. Start on the “charge” portion of the cycle.

3.9 The life test shall be considered complete when the battery fails to maintain 1.2 V per cell for a minimum of 30s on the manual discharge (3.7) for two consecutive 100 to 110 h test periods.

3.10 Water should be added to the electrolyte as required during the cycling portion of the test except to those batteries described as maintenance free.

3.11 Optionally, this test may be conducted with the water bath temperature maintained as high as 75 °C ± 3 °C (167 °F ± 5 °F) depending on the temperature and severity of the application. Shortening of time and of number of cycles to failure point can be expected. However, this test option may change the types and distribution of failure modes depending on the battery design technology. The battery supplier and the automotive user should concur that this test option will produce failure modes that correlate with application life and the temperature required to produce these failure modes.

4. Notes

4.1 **Marginal Indicia—**The change bar (l) located in the left margin is for the convenience of the user in locating areas where revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE STORAGE BATTERY STANDARDS COMMITTEE