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Cooperative Engineering Program

SAE J1054 OCT89

**Warning Lamp
Alternating Flashers**

**SAE Recommended Practice
Revised October 1989**

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Submitted for Recognition as
an American National Standard

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Ø WARNING LAMP ALTERNATING FLASHERS

1. SCOPE:

This document defines the test conditions, procedures, and minimum design requirements for nominal 6, 12, and 24 V warning lamp alternating flashers.

2. DEFINITION:

The flasher is a device installed in a vehicle lighting system which has the primary function of causing warning lamps to alternately flash when the system is activated. Secondary functions may include the visible pilot(s) indication for the warning system and an audible signal to indicate when the flasher is operating (recommended by SAE J887 and J595).

3. FLASHER IDENTIFICATION CODE:

Flashers conforming to this document may be identified in accordance with SAE J759.

4. TESTS:

4.1 Test Equipment: The standard test equipment and circuitry for performing flasher tests shall conform with the specifications in SAE J823.

4.2 Test Procedures: All the following tests shall be performed at 12.8 V (or 6.4 V or 25.6 V) at the bulbs unless otherwise specified.

4.2.1 Start Time: The start time is the time to complete one cycle (both load circuits have been energized and de-energized) after voltage is applied to the flasher. For fixed-load flashers, the test shall be made with the specific ampere design loads connected. For variable-load flashers, the test shall be made with both the minimum and maximum ampere design loads connected. The test shall be made in an ambient temperature of $24^{\circ}\text{C} \pm 5$. The start time shall be measured and recorded for three starts, each of which is separated by a cooling interval of at least 5 min at $24^{\circ}\text{C} \pm 5$.

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- 4.2.2 Voltage Drop: The lowest voltage drop across the flasher shall be measured between the input and each load terminal at the flasher and during the "on" period. The test shall be made with the specific maximum ampere design load connected and in an ambient temperature of $24^{\circ}\text{C} \pm 5$. The voltage drop shall be measured and recorded during any three cycles after the flasher has been operating for five consecutive cycles.
- 4.2.3 Flash Rate and Percent Current On Time: The flash rate and percent current on time of each load terminal shall be measured and recorded after the flasher has completed five consecutive cycles and shall be an average of at least three consecutive cycles at each of the following bulb voltages and ambient temperature conditions:
- 12.8 V (or 6.4 V or 25.6 V) and $24^{\circ}\text{C} \pm 5$
 - 12.0 V (or 6.0 V or 24.0 V) and $-17^{\circ}\text{C} \pm 3$
 - 15.0 V (or 7.5 V or 30.0 V) and $-17^{\circ}\text{C} \pm 3$
 - 11.0 V (or 5.5 V or 22.0 V) and $50^{\circ}\text{C} \pm 3$
 - 14.0 V (or 7.0 V or 28.0 V) and $50^{\circ}\text{C} \pm 3$

The flashers shall be temperature stabilized before each test. The test shall be made with the specific ampere design load connected for each circuit.

- 4.2.4 Extreme Temperature Tests: The flasher shall be subjected to ambient temperatures of $63^{\circ}\text{C} \pm 3$ and $-32^{\circ}\text{C} \pm 3$ until stabilized. The start time and flash rate shall be measured and recorded at each extreme temperature. The measurements must be completed within the first minute of energization, otherwise the procedure shall be as specified in 4.2.1 and 4.2.3a.
- 4.2.5 Durability: The durability test shall be conducted under the following conditions:
- $24^{\circ}\text{C} \pm 5$ ambient temperature
 - 13.0 V (6.5 V for 6.0 V nominal system or 26.0 V for 26.0 V nominal system) applied to the input terminal of the test circuit.
 - Specific maximum ampere design load.
 - 100 h of intermittent flashing (15 s on, 15 s off) followed by 50 h of continuous flashing.

5. PERFORMANCE REQUIREMENTS

- 5.1 Start Time: The average and maximum of the three start time measurements (4.2.1) for the flasher shall not exceed 1.5 and 2.0 s respectively.
- 5.2 Voltage Drop: The average of the three voltage drop measurements (4.2.2) shall not exceed 0.5 V. No single measurement may exceed 0.8 V.
- 5.3 Flash Rate and Percent Current On Time: At each load terminal, the flash rate shall be a minimum of 60 and a maximum of 120 per minute and the percent current "on" time shall be a minimum of 30 and a maximum of 75. The total of the percent current "on" times for the two terminals shall be a minimum of 90 and a maximum of 110.

- 5.4 Extreme Temperature: At the extreme temperature conditions, start time shall not exceed 5 s and flash rate shall be not less than 30 nor more than 150 flashes per minute.
- 5.5 Durability: The flasher shall conform to 5.1, 5.2, and 5.3 (under test procedure 4.2.3a only) at the start and conclusion of test.

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The phi (ϕ) symbol is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. If the symbol is next to the report title, it indicates a complete revision of the report.

RATIONALE:

The present warning lamp alternating flasher documents are encompassed into two companion documents. SAE J1054 is essentially a design document and describes the performance parameters for the flasher. SAE J1104 describes how to assure that a particular flasher design conforms to the design specification by use of a specific number of flashers submitted to group testing. The format of SAE J1104 has been interpreted as a quality control type document since it uses sampling plans with allowances for nonconformances to design document. A request was made by the Lighting Committee and the Motor Vehicle Council to eliminate the sampling plan features of SAE J1104 and to bring the flasher document in line with SAE policy and regulations on scope and content. The revisions proposed incorporate the pertinent features and allowable elements of these two documents into one document and, thus, eliminates the need for SAE J1104.

In addition, new SAE guidelines for the writing of documents have been used and, thus, the format of the existing documents has been modified to suit these guidelines.

Also, the document content is being updated to include 6 and 24 V flashers. This was done because many commercial vehicles (buses and trucks) now on the road have 24 V electrical systems and guidelines were needed for describing the operating characteristics for the flashers used on these vehicles.

Because of the complexity of the revisions made and the extensive reformatting required, the rationale will be presented by paragraph as it relates to the newly drafted document.

1. Scope - The contents of this paragraph have been changed to be in conformance with SAE guidelines and other flasher documents.
Also included are 6 and 24 V flashers because of the need to describe characteristics for flashers designed for those voltages.
2. Definition - Revised to conform to SAE guidelines with secondary functions included.
3. Flasher Identification Code - Replaces "Identification and Code Marking" paragraph. Rewritten to agree with format used in other flasher documents.
4. Tests - This is a new section per SAE guidelines. The test procedures are listed in this paragraph and the requirements listed in Section 5.
 - 4.2.1 Start Time - This procedure has been modified to include fixed load in addition to variable load devices. Also, the format has been improved.
 - 4.2.2 Voltage Drop - The paragraph has been rewritten to agree with the SAE recommended structure. The procedure is essentially identical to that previously specified.
 - 4.2.3 Flash Rate and percent On Time - This paragraph has been modified to agree to the SAE recommended structure.

RATIONALE (Continued):

4.2.4 Extreme Temperature - This paragraph has been modified to agree to the SAE recommended structure.

4.2.5 Durability - This paragraph has been modified to agree to the SAE recommended structure.

5. Performance Requirements - This is a new section per SAE guidelines. The test procedures are listed in this paragraph and the requirements listed in Section 4.

5.1 Start Time - Lists the requirements. The paragraph adds an additional requirement limiting the maximum "ON" time to 2.0 s to ensure all flashes are adequate to signify the intent of the signal.

5.2 Voltage Drop - Lists the requirement that has been changed to be consistent to those required in SAE J590 and J945.

5.3 Flash Rate and Percent Current On Time - Lists the requirements that are unchanged from previous document.

5.4 Extreme Temperature - Lists the requirement that is unchanged from previous document.

5.5 Durability - Lists the requirement that is unchanged from previous document.

The Flasher Task Force has responded to the request of the Lighting Committee and the Motor Vehicle Council with substantial effort applied to the drafting of this document and now recommends that this draft be adopted as a recommended practice. In addition, as a corresponding event, the Task Force also recommends that SAE J1104 "Service Performance Requirements for Turn Signal Flasher" be deleted as an SAE document.

REFERENCE SECTION:

SAE J588 NOV84, Turn Signal Lamps for Use on Motor Vehicles Less Than 2032 mm in Overall Width

SAE J595 AUG83, Flashing Warning Lamps for Authorized Emergency, Maintenance, and Service Vehicles

SAE J759 DEC87, Lighting Identification Code

SAE J823 OCT87, Flasher Test

SAE J887 AUG87, School Bus Warning Lamps

APPLICATION:

This document defines the test conditions, procedures, and minimum design requirements for nominal 6, 12, and 24 V turn signal flashers.