

Ø VEHICULAR HAZARD WARNING SIGNAL FLASHER

1. SCOPE: This recommended practice defines the test conditions, procedures and minimum design requirements for nominal 6, 12 and 24 volt hazard warning signal flashers.
2. DEFINITION: The flasher is a device installed in a vehicle lighting system which has the primary function of causing the turn signal lamps to flash when the hazard warning switch is actuated. Secondary functions may include the visible pilot indication for the Hazard System (required by SAE J910) and an audible signal to indicate when the flasher is operating.
3. FLASHER IDENTIFICATION CODE: Flashers conforming to this recommended practice may be identified by the code J945 in accordance with SAE J759, Lighting Identification Code.
4. TESTS:
 - 4.1 Test Equipment: The standard test equipment and circuitry for performing flasher tests shall conform with the specifications in SAE J823, Flasher Test Equipment.
 - 4.2 Test Procedures: All of the following tests shall be performed at 12.8V (or 6.4V and or 25.6V) at the bulbs unless otherwise specified.
 - 4.2.1 Start Time: The start time of a normally closed type flasher is the time to open the circuit after the voltage is applied. The start time of a normally open type flasher is the time to complete one cycle which is to close the circuit, then open the circuit, after voltage is applied. The test shall be made with both the minimum and maximum ampere design load and in an ambient temperature of $24 \pm 5^{\circ}\text{C}$. The start time shall be measured and recorded for three starts, each of which is separated by a cooling interval of at least 5 minutes.

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- 4.2.2 Voltage Drop: The lowest voltage drop across the flasher shall be measured between the input and the load terminals at the flasher and during the "ON" period. The voltage drop shall be measured and recorded during any three cycles after the flasher has been operating for five consecutive cycles. The voltage drop shall be measured with the maximum ampere design load connected. The test shall be made in an ambient temperature of $24 \pm 5^\circ\text{C}$.
- 4.2.3 Flash Rate and Percent Current On Time: The flash rate and percent current on time 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:
- 12.8V (or 6.4V or 25.6V) and $24 \pm 5^\circ\text{C}$
 - 11.0V (or 5.5V or 22.0V) and $-17 \pm 3^\circ\text{C}$
 - 13.0V (or 6.5V or 26.0V) and $-17 \pm 3^\circ\text{C}$
 - 11.0V (or 5.5V or 22.0V) and $50 \pm 3^\circ\text{C}$
 - 13.0V (or 6.5V or 26.0V) and $50 \pm 3^\circ\text{C}$

The flashers shall be temperature stabilized before each test. The tests shall be made with both the minimum and maximum ampere design load connected.

- 4.2.4 Extreme Temperature: The flasher shall be subjected to ambient temperatures of $63 \pm 3^\circ\text{C}$ and $-32 \pm 3^\circ\text{C}$ until stabilized. The start time and flash rate shall be measured and recorded at each extreme temperature. The flash rate measurement must be completed within the first minute of energization. Otherwise the procedure shall be as specified in paragraphs 4.2.1 and 4.2.3a.
- 4.2.5 Durability: The durability test shall be conducted under the following conditions:
- $24 \pm 5^\circ\text{C}$ ambient temperature
 - 13.0V (6.5V or 26.0V) applied to the input terminals of the test circuit
 - Maximum specified ampere design load
 - Continuous flasher operation for 36 h.

5. PERFORMANCE REQUIREMENTS

- 5.1 Start Time: The average of the three start time measurements (paragraph 4.2.1) shall not exceed 1.5 s. No single measurement shall exceed 2.0 s.
- 5.2 Voltage Drop: The average of the three voltage drop measurements (paragraph 4.2.2) shall not exceed 0.5V. No single measurement shall exceed 0.8V.
- 5.3 Flash Rate and Percent Current On Time: The average flash rate and percent current on time shall fall within 60 to 120 flashes per minute and 30 to 75% on under all conditions of paragraph 4.2.3.

- 5.4 Extreme Temperature: At the extreme temperature conditions, start time shall not exceed 3 s and flash rate shall be 50 to 130 flashes per minute.
- 5.5 Durability: The flasher shall conform to paragraphs 5.1, 5.2 and 5.3 (under test condition 4.2.3a only) at the start and conclusion of the test.

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RATIONALE:

The present Hazard Warning Signal Flasher standards are encompassed into two companion documents, SAE J945 entitled Vehicular Hazard Warning Signal Flashers and SAE J1056 entitled Service Performance Requirements for Vehicular Hazard Warning Flashers. SAE J945 is essentially a design standard and describes the performance parameters for the flasher. SAE J1056 essentially 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 J1056 has been interpreted as a quality control type document since it uses sampling plans with allowances for non-conformances to design standards. A request was made by the Lighting Committee and the Motor Vehicle Council to eliminate the sampling plan features of J1056 and to bring the Flasher Standard in line with SAE policy and regulations on scope and content. The revisions proposed incorporates the pertinent features and allowable elements of these two documents into one document, and thus eliminates the need for J1056.

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

Also the document content is being updated to include 24 volt flashers. This was done because many commercial vehicles (buses and trucks) now on the road have 24 volt 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: Standard is revised to Recommended Practice and reference to J1056 is deleted. Since there are major revisions to the standard it should be relegated to "Recommended Practice" until it has been in use for a sufficient period of time.
2. FUNCTION - WAS FORMALLY "DEFINITION": This revision is mainly to bring document into line with SAE guidelines. This paragraph now incorporates some features of J945b paragraph 5 "Pilot Indication".
3. FLASHER IDENTIFICATION CODE: This is a new paragraph and was added to bring document into line with new format.

4. TESTS &

5. PERFORMANCE REQUIREMENTS: Performance Requirements were previously encompassed in paragraphs "6. Performance Requirements" & "7. Durability Test Requirements of J945". This is format change to conform to the recommended structure of SAE specifications. There were some content revisions made during the restructuring. They are:

- a) Start Time: The performance specification was 1.5 seconds for start time based on an average of three measurements with no maximum limit on any of the three readings. A limit of 2.0 seconds was placed on the three readings made in measurement of the 1.5 second specification. This was done to limit the variability of performance.
- b) Voltage Drop: The performance specification was 0.45 volts for voltage drop based on an average of three measurements with no maximum limit on any of the three readings. A limit of 0.8 volts was placed on the three readings made in measurement of the 0.45 volt specification. This was done to limit the variability of performance.
- c) Flash Rate & Percent Current on Time: Removed the restriction of shaded portion of the polygon for normally closed type units. Since the specifications are to describe the minimums of operation it is not consistent to have a dual operating range for different design flashers.
- d) Extreme Temperature: Flash rate at temperature conditions outside the normal range of operating temperatures was revised from 60-120 flashes per minute (fpm) to 50-130 fpm. The intent of this specification is to have the flasher provide a recognizable signal under ambient temperatures somewhat outside the normal operating temperature range. The operating specifications and temperature conditions are consistent with those in International Standards Organization (ISO) Flasher Standards. In addition, a study performed by David Post at the Highway Research Safety Institute on flasher signals showed that signals in the 50-130 fpm range are recognizable.

The Flasher Task Force has responded to the request of the Lighting Committee and the Motor Vehicle Technical Council with substantial effort applied to the drafting of the attached document J945c over the past two year period and now recommends that this draft be adopted as a Recommended Practice. In addition, as a corresponding event, the Task Force also recommends that J1056 "Service Performance Requirements for Vehicular Hazard Warning Signal Flashers" be deleted as an SAE document.

RELATIONSHIP OF SAE STANDARD TO ISO STANDARD:

Not applicable.

REFERENCE SECTION:

SAE J759, Lighting Identification Code

SAE J823, Flasher Test Equipment

SAE J910, Hazard Warning Signal Switch

APPLICATION:

This recommended practice defines the test conditions, procedures and minimum design requirements for nominal 6, 12 and 24 volt hazard warning signal flashers.

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