SAE International

SURFACE VEHICLE RECOMMENDED PRACTICE

J1765

REV. JUL2006

Issued 1995-05
Revised 2006-07

Superseding J1765 MAY1995

SAE Miniature Bulb Vibration Test

RATIONALE

2.1.1 - Removed reference to SAE J759.
2.2.1 - Removed reference to SAE J575.
2.2.2 - Revised website references.
3.1 - Formatted G_{rms}
4. - Revised title.
4.1 - Removed reference to SAE J759
5. - Removed reference to Figure 1.
5.2 - Removed reference to section 2.2.
5.7 - Revised wording for clarity. Changed 600 Hz to 650 Hz to match USCAR testing parameters. Rounded 5.75 to 5.8 (G_{rms}).
6.1 - Removed requirements reference to SA J573 (only required to be functional).
Figure 1 - Removed figure (redundant to description in 5.7).
Revised approval authority.

1. SCOPE

This SAE Recommended Practice was designed to be an accelerated vibration test that subjects bulbs to critical vibration/shock loading typically observed in normal vehicle service and can be employed for conformance of production (COP) testing. The test was designed for external vehicle applications.

2. REFERENCES

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, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J573 Miniature Lamp Bulbs

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 Publication

Available from SAE, 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 J1455 Joint SAE/TMC Recommended Environmental Practices for Electronic Equipment Design (Heavy-Duty Trucks)

2.2.2 FMVSS Publication

Available from the National Highway Traffic Safety Administration, 400 Seventh Street SW, Washington, DC 20024-0002, www.access.gpo.gov/nara/cfr/cfr-table-search.html#page1.

FMVSS108 Lamps, Reflective Devices, and Associated Equipment (Available as 49 CFR 571.108)

2.2.3 IEC Publication

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org or www.IEC.com.

IEC 810 Lamps for Road Vehicles—Performance Requirements

3. DEFINITIONS

3.1 Power Spectral Density (PSD)

The product of the real and imaginary Fourier coefficients of a signal divided by the frequency interval. The square root of the integral of PSD over all measured frequencies will yield the root-mean-square acceleration (G_{rms}).

3.2 Wide Band Random

Random vibration whose power spectral density has a relatively broad frequency range. All frequencies in the test range are excited simultaneously as opposed to the "narrow-band" where only a small portion of the frequencies in the test frequency range are excited at any one time.

3.3 Filament Mount Structure

The filament mount structure consists of the filament, electrical lead wires, clamps or welds, and any filament or lead supports that comprise the active structure inside the bulb.

3.4 Closed-Loop Dynamic Vibration Equipment

A laboratory test system consisting of an electromagnetic exciter (shaker), a feedback transducer (accelerometer), and a control unit with necessary power amplifiers capable of reproducing, within prescribed statistical limits, a predetermined vibration profile for the purpose of performing environmental stress screening. Figure 1.

3.5 Natural Frequency

A vibration frequency of a mechanical system when the system is allowed to freely oscillate following an initial displacement. Real mechanical systems have numerous natural frequencies corresponding to distinct natural modes of vibration. Natural frequencies are inherent properties of a mechanical system, determined by the distribution of mass and stiffness of the system, and by boundary conditions imposed upon the system.

3.6 Resonant Frequency

A frequency at which the ratio of the steady-state response amplitude (at the point of excitation) to harmonic excitation magnitude reaches a relative maximum. Resonant frequencies closely (but not necessarily exactly) coincide with natural frequencies.

Resonant frequencies are dependent upon the type and location of harmonic excitation (e.g., force, displacement, or velocity), as well as the mechanical properties and boundary conditions of the mechanical system. For example, displacement resonance and velocity resonance occur at different frequencies for any system with damping. (Ordinarily the difference is not significant.) A system will not exhibit a resonant frequency corresponding to a particular natural frequency if the point of excitation is at a node of the modeshape for the natural frequency; however, an antiresonance will be exhibited at that frequency (i.e., zero vibration amplitude at the point of excitation).

3.7 G_{rms}

The root-mean-square acceleration equivalent as a ratio with respect to gravity.

4. USAGE

4.1 Bulbs identified for use in vehicle exterior applications, typical bulb listing in SAE J573, shall meet this document.

5. TEST PROCEDURE

5.1 Seasoning

Bulbs are seasoned as specified in SAE J573 prior to being subjected to testing.

5.2 Voltage

Test shall be conducted at the voltage specified in SAE J573 or as specified by the manufacturer.

5.3 Test Equipment

The test equipment shall be closed-loop dynamic vibration equipment and controller (or equivalent) capable of vibrating in random modes, produce variable vibration from 10 to 2000 Hz with a tolerance of ±4 dB and a minimum of 500 pounds force.

5.4 Test Fixture Mounting

The bulb shall be fastened rigidly to a fixture on the vibration table. This may be achieved by clamping, soldering, or embedding. Electrical connections shall be made such that the connection is assured during the whole test.

Fixtures shall be designed and verified such that their natural frequencies (fully loaded or unloaded) do not occur below 1200 Hz, in the appropriate test axis.

5.5 Control Point

Attach the transducer used to measure and maintain the specified vibration characteristics at a control point location as close to the test bulb as possible on the test fixture without interfering with the bulb resonance frequencies.

5.6 Axis of Vibration

With the filament mounting structure horizontal, a direction of excitation normal to the filament(s) axis is used for testing.