

SURFACE VEHICLE RECOMMENDED PRACTICE

An American National Standard

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(R) HEADLAMP AIM TEST MACHINES

Foreword—This Document has also changed to comply with the new SAE Technical Standards Board format.

1. Scope—This SAE Recommended Practice provides laboratory test procedures for testing headlamp aim test machines to determine their ability to aim or to check the aim of headlamps, fog lamps, and auxiliary driving and lower beam lamps. This report does not apply to aiming devices of the kind covered by SAE J602.

2. References

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

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

SAE J575—Tests for Motor Vehicle Lighting Devices and Components

SAE J599—Lighting Inspection Code

SAE J602—Headlamp Aiming Device for Mechanically Aimable Sealed Beam Headlamp Units

SAE J1383—Performance Requirements for Motor Vehicle Headlamps

3. Definitions

3.1 Headlamp Aim Test Machine—A headlamp aim test machine is an optical or photoelectric device used to aim or check the aim of forward lighting devices.

3.2 H and V Readings—The H and V readings are located relative to the H-V axis as defined in paragraph 2.7 in SAE J1383. The H reading is located at H-2R and the V reading at V-1D.

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4. Tests

4.1 Samples for Test

- 4.1.1 Headlamp aim test machines submitted for laboratory tests should be representative of the device as regularly manufactured and marketed, except that in the case of a machine using a track, an abbreviated section of track may be supplied for the test. Each sample shall include all accessory equipment for the device and necessary to its service operation and calibration. Full assembly and operating instructions shall be provided, including information on how to check accuracy and maintain the device in calibration.
- 4.1.2 Sample lamps for test shall include a group of upper (1A) and lower (2B) beam headlamp units which meet SAE specifications. Representative groups of fog lamps and auxiliary driving and lower beam lamps will be obtained in the same manner.

4.2 Laboratory Facilities—The laboratory shall be equipped with facilities to make physical and optical tests required in this report, in accordance with established laboratory practice. It will include a goniometer, a test screen located at 7.6 m from the goniometer and calibrated photocells or equivalent light-detecting devices.

4.3 Test Procedures

4.3.1 SYMMETRICAL BEAM—UPPER BEAM HEADLAMPS AND AUXILIARY DRIVING LAMPS

- 4.3.1.1 The sample lamp shall be mounted on a goniometer which meets the requirement of the Photometry Test in SAE J575.
- 4.3.1.2 The sample lamp should be operated at rated voltage and then kept burning through the end of test.
- 4.3.1.3 The headlamp aim test machine shall be positioned in front of the headlamp according to the manufacturer's instructions.
- 4.3.1.4 The headlamp shall be aimed according to the aim test machine manufacturer's instructions, using the goniometer to position the lamp.
- 4.3.1.5 Goniometer initial readings (H_i , V_i) shall be recorded.
- 4.3.1.6 The aim test machine shall be removed from its position in the front of the headlamp.
- 4.3.1.7 The headlamp upper beam shall then be photoelectrically balanced on the goniometer in accordance with the Beam Pattern Location Test for the upper beam in SAE J1383.
- 4.3.1.8 The final goniometer reading (H_f , V_f) shall be recorded.

4.3.2 ASYMMETRICAL BEAM—LOWER BEAM HEADLAMPS AND AUXILIARY LOWER BEAM LAMPS

- 4.3.2.1 The lower beam headlamps and auxiliary lower beam lamps shall be used to test the headlamp aim test machine in accordance with 3.3.1.1 through 3.3.1.8, substituting lower beam for upper beam.

4.3.3 FOG LAMPS

- 4.3.3.1 Fog lamps shall be used to test the aim test machine in accordance with 4.3.1.1 through 4.3.1.8, substituting fog lamp for upper beam.

5. Requirements

5.1 For Testing With Upper Beam Headlamps and Symmetrical Beam Auxiliary Driving Lamps

- 5.1.1 The headlamp aim test machine shall permit determination of the vertical and horizontal aim of the geometric center of the high intensity zone on the upper beam within specified limits.
- 5.1.2 The final goniometer aim reading (H_f , V_f), when compared to the initial aim reading (H_i , V_i) shall not vary from the initial reading in the vertical direction by more than 0.3 degrees (37 mm at 7.6 m) and in the horizontal direction by more than 0.6 degrees (75 mm at 7.6 m).

5.2 For Testing With Asymmetrical Beam Lower Beam Headlamps and Auxiliary Lower Beam Lamps

- 5.2.1 The headlamp aim test machine shall permit determination of the aim of the top and left edge cutoffs of the high intensity zone of the lower beam of headlamps and auxiliary lower beam lamps.
- 5.2.2 The final goniometer aim reading (H_f , V_f), when compared to the initial aim reading (H_i , V_i) shall not vary from the initial reading in the vertical direction by more than 0.3 degrees (37 mm at 7.6 m) and in the horizontal direction by more than 0.6 degrees (75 mm at 7.6 m).

5.3 For Testing With Fog Lamps

- 5.3.1 The headlamp aim test machine shall permit determination of the vertical aim of the top cutoff of the high intensity zone and the horizontal aim of the geometric center of the high intensity zone.
- 5.3.2 The final goniometer aim reading (H_f , V_f), when compared to the initial aim reading (H_i , V_i) shall not vary from the initial reading in the vertical direction by more than 0.3 degrees (37 mm at 7.6 m) and in the horizontal direction by more than 0.6 degrees (75 mm at 7.6 m).

5.4 General Requirements

- 5.4.1 The headlamp aim test machine shall incorporate a fixed track or equivalent for positioning the aiming device in front of the headlamps.
 - 5.4.1.1 Means shall be provided in the device for compensating within ± 0.05 for variation in the floor slope and the adjustment method shall be clearly explained in the operating instructions.
 - 5.4.1.2 Means shall be provided in the device for lateral alignment within 0.1 degree with respect to the longitudinal axis of the vehicle.
- 5.4.2 Aim test machines using a photoelectric means to determine aim shall also have a visual screen or equivalent upon which the beam pattern is projected proportional to its appearance and aim on a screen at 7.6 m. Such visual screen or equivalent shall be plainly visible to the operator and should have horizontal and vertical reference lines to permit visual appraisal of the aim of the lamp.
- 5.4.3 Design of the headlamp aim test machine shall permit checking the aim of the lamps mounted at heights from 25 to 140 cm and spaced up to 130 cm from the center of the motor vehicle.
- 5.4.4 The device and/or the instructions shall provide a means for calibration and/or verification of calibration.
- 5.4.5 The spirit level or other means provided for indicating vertical aim shall be capable of indicating a deviation of at least 2.5 mm with a 0.2 degree (25 mm at 7.6 m) change in level.

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- 5.4.6 A vertical aim scale shall be provided with numerical gradations in steps, each of which represents 25 mm at 7.6 m to provide for variations in aim at least 100 mm above level to 250 mm below level.
- 5.4.7 A lateral aim scale shall be provided with gradations in steps of not more than 50 mm at 7.6 m from straight ahead to at least 150 mm left and right.
- 5.4.8 The instructions covering use of the device shall include those items in the Preparation for Aiming Section of SAE J599.
- 5.4.9 Instructions furnished by the manufacturer for aiming lamps shall be such that the beam patterns when viewed on the screen will fall within the limits set in SAE J599.
- 5.4.10 Headlamp Aim Test Machines must be capable of operating accurately in service garages with a temperature range of 0 to 40 °C.

6. Notes

- 6.1 **Marginal Indicia**—The change bar (I) located in the left margin is for the convenience of the user in locating areas where technical 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.

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