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SAE J1133 JUL89

School Bus Stop Arm

SAE Recommended Practice
Revised July 1989

Submitted for Recognition as
an American National Standard

The Engineering Society For Advancing Mobility Land Sea Air and Space®
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HIGHWAY VEHICLE RECOMMENDED PRACTICE

Submitted for recognition as an American National Standard

SAE J1133

Issued April 1976
Revised July 1989

Superseding J1133 APR84

Ø SCHOOL BUS STOP ARM

1. SCOPE:

This document provides test procedures, requirements, and guidelines for school bus stop arms.

2. DEFINITION:

A school bus stop arm is an auxiliary device used to signal that a school bus has stopped to load or discharge passengers. It supplements devices specified by SAE J887.

3. Lamps for use on school bus stop arms may be identified by the code "W6" in accordance with SAE J759.

4. TESTS:

4.1 SAE J575 is a part of this document. The following tests are applicable, with the modifications indicated:

4.1.1 Vibration Test:

4.1.2 Moisture Test:

4.1.3 Dust Test:

4.1.4 Corrosion Test:

4.1.5 Photometry: In addition to the test procedures in SAE J575, the following apply:

4.1.5.1 Photometric measurements shall be made with the light source(s) of the lamp(s) at least 18 m from the photometer. The H-V axis shall be taken as parallel to the longitudinal axis of the vehicle.

4.1.5.2 Photometric measurements shall be made with the bulb filament steadily burning.

4.1.5.3 An optional alternate measure of photometric performance can be made using flash energy.

4.1.5.3.1 Photometric measurements shall be made with the device in its normal operating position and all flash energy measurements shall be made with the light source at least 18 m from the photometer sensor. The H-V axis shall be taken as parallel to the longitudinal axis of the vehicle.

4.1.5.3.2 The voltage applied to the input wires or terminals of the device shall be 12.8 V for nominal 12 V electrical systems and 25.6 V for nominal 24 V electrical systems.

4.1.5.3.3 Photometric luminous intensity measurements (candela seconds) shall be taken as the average of ten consecutive flash cycles.

4.1.6 Warpage Test for Devices With Plastic Components:

4.2 Color Test: SAE J578 is a part of this document.

4.3 Durability: The device shall be subjected to a test of 45 000 cycles at a rate not to exceed 0.2 Hz and at a temperature of 25°C ± 3. A cycle shall consist of movement from the parked or retracted position to the fully extended position and return to the parked position.

5. REQUIREMENTS:

5.1 Performance Requirements: A device, when tested in accordance with the test procedures specified in section 4, shall meet the following requirements:

5.1.1 Vibration: SAE J575

5.1.2 Moisture: SAE J575

5.1.3 Dust: SAE J575

5.1.4 Corrosion: SAE J575

5.1.5 Photometry: In addition to the requirements of SAE J575, the school bus stop arm lamps shall meet the following photometric performance requirements:

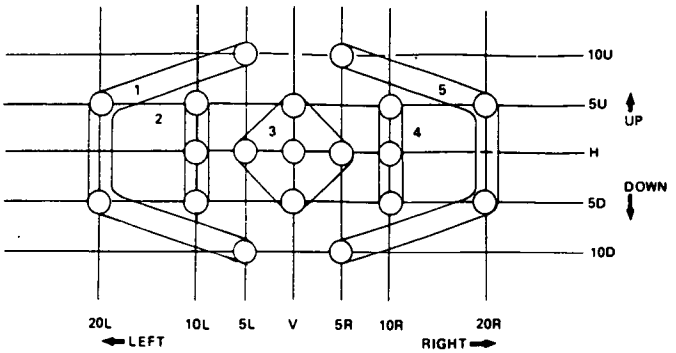
5.1.5.1 The summation of the luminous intensity readings of the specific test points in a zone shall meet the values in Table 1.

TABLE 1 - Photometric Performance Requirements

Zone	Test Points (deg)	Total Zonal Luminous Intensity (cd)
1	10U-5L 5U-20L 5D-20L 10D-5L	52
2	5U-10L H-10L 5D-10L	100
3	5U-V H-5L H-V H-5R 5D-V	380
4	5U-10R H-10R 5D-10R	100
5	10U-5R 5U-20R 5D-20R 10D-5R	52

NOTES:
1. For the lamp to conform to the photometric zonal performance requirements, the summation of the candela measurements at the specific test points in a zone shall meet or exceed the values specified for that zone in Table 1.
2. When calculating the zone total, the measured candela for a test point shall not be less than 60% of the value specified for that test point in Table 2.
3. See Fig. 1 for a graphical description of the Zonal Boundaries.

GRAPHICAL DESCRIPTION OF THE ZONAL BOUNDARIES



The line formed by the intersection of a vertical plane through the light source of the device and normal to the test screen is designated V. The line formed by the intersection of a horizontal plane through the light source and normal to the test screen is designated H. The point of intersection of these two lines is designated H-V. The other points on the test screen are measured in terms of degree from these two lines. Degrees to the right (R) and to the left (L) are regarded as being to the right and left of the vertical line when the observer stands behind the lighting device and looks in the direction of the emanating light beam when the device is properly aimed for photometry with respect to the H-V point. Similarly, the upward angles designated as U and the downward angles designated D, refer to light emanating at angles above and below the horizontal line, respectively.

FIGURE 1

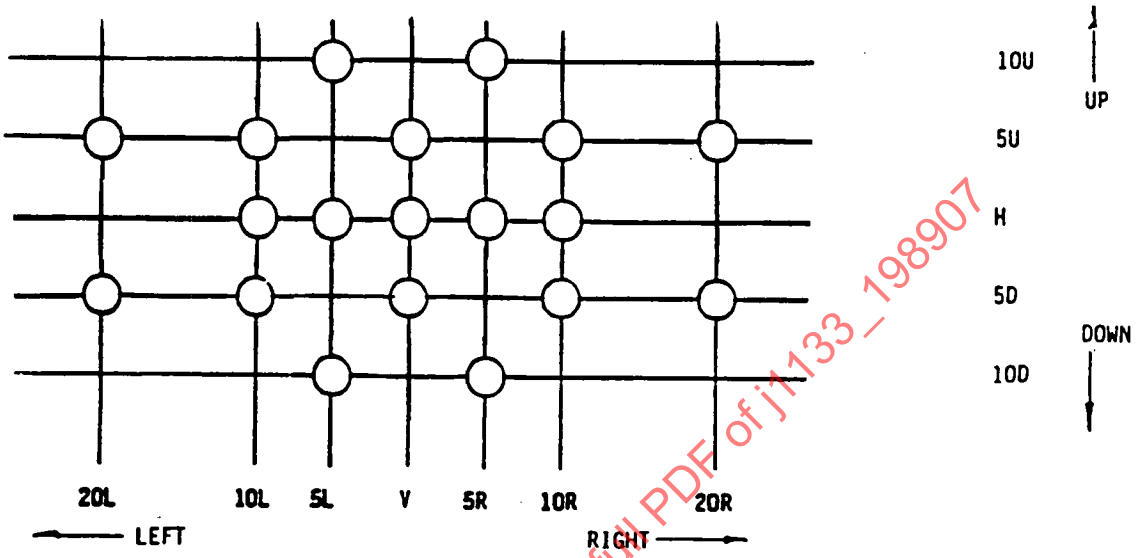
5.1.5.2 When calculating the zone total, the measured luminous intensity for a test point shall not be less than 60% of the value specified for that test point in Table 2.

TABLE 2 – Photometric Design Guidelines

Test Points (deg)	Luminous Intensity (cd)
10U, 10D 5L, 5R	16
V	70
5U, 5D 10L, 10R	30
20L, 20R	10
V	80
H 5L, 5R	80
10L, 10R	40

NOTES:
1. Any photometric measurements that fall below 60% of the test point value given in Table 2 shall not be used in the calculation of zone totals.
2. The luminous intensity values (candela) specified in Table 2 have been established by empirical and field evaluation techniques for lighting devices to perform their intended function in field service.
3. See Fig. 2 for a graphical description of Photometric Design Guidelines.

The Circles Indicate the Test Points for Distribution of Light.



The line formed by the intersection of a vertical plane through the light source of the device and normal to the test screen is designated V. The line formed by the intersection of a horizontal plane through the light source and normal to the test screen is designated H. The point of intersection of these two lines is designated H-V. The other points on the test screen are measured in terms of degree from these two lines. Degrees to the right (R) and to the left (L) are regarded as being to the right and left of the vertical line when the observer stands behind the lighting device and looks in the direction of the emanating light beam when the device is properly aimed for photometry with respect to the H-V point. Similarly, the upward angles designated as U and the downward angles designated D, refer to light emanating at angles above and below the horizontal line, respectively.

FIGURE 2 - Graphical Description of the Photometric Guidelines

5.1.5.3 Alternate Method: The lamp under test shall meet the photometric performance requirements contained in Table 3. The summation of the flash energy measurements at the specified test points in a zone shall be at least the value shown. When calculating the zone total, the measured flash energy for a test point shall not be less than 60% of the value specified for that test point in Table 4.

TABLE 3 - Photometric Performance Requirements

Zone	Test Points (deg)	Total Zonal Flash Energy Candela-Second
1	10U-5L 5U-20L 5D-20L 10D-5L	14
2	5U-10L H-10L 5D-10L	26
3	5U-V H-5L H-V H-5R 5D-V	96
4	5U-10R H-10R 5D-10R	26
5	10U-5R 5U-20R 5D-20R 10D-5R	14

NOTES:
1. For the lamp to conform to the photometric zonal performance requirements, the summation of the candela-second measurements at the specific test points in a zone shall meet or exceed the values specified for that zone in Table 3.
2. When calculating the zone total, the measured candela-second for a test point shall not be less than 60% of the value specified for that test point in Table 4.
3. See Fig. 1 for a graphical description of the Zonal Boundaries.

TABLE 4 - Photometric Design Guidelines

Test Points (deg)	Flash Energy Candela-Second
10U, 10D 5L, 5R	4
V	18
5U, 5D 10L, 10R	8
20L, 20R	3
V	20
H 5L, 5R	20
10L, 10R	10

NOTES:
1. Any photometric measurements that fall below 60% of the test point value given in Table 4 shall not be used in the calculation of zone totals.
2. The flash energy values (candela-seconds) specified in Table 4 have been established by empirical and field evaluation techniques for lighting devices to perform their intended function in field service and calculations.
3. See Fig. 2 for a graphical description of Photometric Design Guidelines.

5.1.6 Warpage: SAE J575

5.1.7 Color: The color of light emitted from the school bus stop arm lamps shall be red as specified in SAE J578.

5.1.8 Durability: Failure of the device to operate in the intended electrical or mechanical manner during or at the conclusion of the test shall constitute a failure. Internal bulb failure shall not be considered a failure of the device.

5.1.9 Flash Rate:

5.1.9.1 For circuit-interrupted incandescent devices, the two lamps on each face shall flash alternately with the rate and percent "on" time as required in SAE J1054.

5.1.9.2 For gaseous discharge lamps, the two lamps on each face shall flash alternately with the flash rate not less than 0.80 Hz nor more than 2.2 Hz. There shall be an off time before each flash of at least 50% of the total flash cycle time.

5.2 Material Requirements: Plastic materials used in the optical parts shall meet the requirements of SAE J576.

5.3 Design Requirements:

5.3.1 A school bus stop arm shall have on both the front and rear the word "STOP" in letters which are at least 150 mm in height and have a stroke width of at least 20 mm.

5.3.2 School bus stop arms shall have a minimum of two lamps to the front and two lamps to the rear, or two double-faced lamps may be used.

5.3.3 Lamps shall be activated at the commencement of the stop arm extension cycle and deactivated when the stop arm is retracted.

5.3.4 The functional lighted lens area shall not be less than 75 cm^2 (12 in^2).

6. GUIDELINES:

6.1 Photometric design guidelines for lamps used on school bus stop arms, when tested in accordance with 4.1.5, are contained in Table 2 or in Table 4.

6.2 Installation Guidelines: The following apply to school bus stop arms as used on the vehicle, and shall not be considered part of the requirements.

6.2.1 The school bus stop arm should be installed on the left outside of the bus body and be mounted so as to be seen readily by motorists approaching from either the front or rear of the bus.

6.2.2 If the device is operated by a manual switch, that switch shall be located so as to be easily accessible to the driver.

6.3 Design Guidelines:

6.3.1 The lamps should be located in the extreme top and bottom portions of the stop arm, one above the other.

6.3.2 It is recommended that the word "STOP" be displayed as white letters against a red background, and that the stop arm have the shape of a regular octagon which is at least 450 x 450 mm. The octagon should have a white border at least 12 mm wide. The maximum extension should not exceed 560 mm beyond the left side of the vehicle. The school bus stop arm may also optionally be reflectorized.

6.3.3 The two lamps on each face should flash alternately with a flash rate of 1-2 Hz.

7. TEST EQUIPMENT GUIDELINES:

The following apply to photometric test equipment and is not part of the technical requirements:

7.1 A pulse integrating photometer or other accepted means of measuring pulsed light signals should have the following:

a. Response Time - 1 μs or less.

b. Sensor Response - Sensor should be corrected to that of the 1931 CIE standard observer (2 deg) photopic response curve. Sensor should be calibrated for the color of the light being measured.

c. Range Linearity - Linearity of the sensor and photometer system should be verified over the range of the luminous intensities being tested. Linearity deviation should not deviate more than 2.5% from the calibration level to the extreme luminous intensity values measured.

7.2 The regulated DC power supply should have the following minimum requirements:

a. Line Regulations - ±0.1%

b. Load Regulation - ±0.1%

c. Ripple Voltage - ±1.4%

d. Stability - ±0.1% during test

The phi (Ø) 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.