The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE STANDARD

Submitted for recognition as an American National Standard

SAE J2261

Issued 1996-03

STOP LAMPS AND FRONT- AND REAR-TURN SIGNAL LAMPS FOR USE ON MOTOR VEHICLES 2032 mm OR MORE IN OVERALL WIDTH

1. ***Scope***—This SAE Standard provides test procedures, requirements, and guidelines for stop lamps and turn signal lamps intended for use on vehicles 2032 mm or more in overall width. Stop lamps and front- and rear-turn signal lamps conforming to the requirements of this document may be used on vehicles less than 2032 mm in overall width.

2. ***References***

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

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

SAE J576—Plastic Material for Use in Optical Parts Such as Lenses and Reflectors of Motor Vehicle Lighting Devices
SAE J578—Color Specification
SAE J1050—Describing and Measuring the Drivers Field of View
SAE J1889—LED Lighting Devices
SAE J2139—Tests for Lighting Devices, Reflective Devices and Components Used on Vehicles 2032 mm or More in Overall Width

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

SAE J387—Terminology—Motor Vehicle Lighting
SAE J567—Lamp Bulb Retention System for Requirements and Gages Used in Retention System Design
SAE J586—Stop Lamps for Use on Motor Vehicles Less Than 2032 mm in Overall Width
SAE J588—Turn Signal Lamps for Use on Motor Vehicles Less Than 2032 mm in Overall Width
SAE J590—Turn Signal Flashers
SAE J759—Lighting Identification Code
SAE Technical Paper 830566—"Motor Vehicle Conspicuity," R.L. Henderson, K. Ziedman, W.J. Burger, and K.E. Cavey, National Highway Traffic Safety Administration

2.2.2 FMVSS PUBLICATION—Available from The Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Federal Motor Vehicle Safety Standard 49CFR 571.108

2.2.3 OTHER

Federal Highway Administration 49CFR Part 393 Subpart B
Truck Trailer Manufacturers Association RP-9
The Maintenance Council RP-702

3 Definitions

3.1 Effective Projected Luminous Lens Area—That area of the light emitting surface projected on a plane at right angles to the axis of a lamp, excluding reflex reflectors (but including congruent reflexes), which is not obstructed by opaque objects such as mounting screws, mounting rings, bezels, or trim, or similar ornamental feature areas. Areas of optical or other configurations, for example, molded-optical rings or markings, shall be considered part of the total effective projected luminous lens area. The axis of the lamp corresponds to the H-V axis used for photometric requirements.

3.2 Stop Lamp—A lamp giving a steady light to the rear of a vehicle to indicate the intention of the operator of the vehicle to stop or diminish speed by application of the service brakes.

3.3 Turn Signal Lamp—The signaling element of a turn signal system which indicates intent to change vehicle direction by giving a flashing light on the side toward which the turn or lane change will be made. See SAE J590 for flash rate and percent on time.

4. Lighting Identification Code

4.1 Turn signal lamps for use on vehicles 2032 mm or more in overall width may be identified by the code:

a. "I6" for a rear-mounted turn signal lamp and for a front-turn signal lamp mounted 100 mm or more from the headlamp.
b. "I7" for a front-mounted turn signal lamp mounted less than 100 mm from the headlamp, in accordance with SAE J759.

4.2 Stop lamps for use on vehicles 2032 mm or more in overall width may be identified by the code "S2" in accordance with SAE J759.

5. Tests

5.1 SAE J2139 is a part of this document. The following tests are applicable with modification as indicated.

5.1.1 VIBRATION

5.1.2 MOISTURE

5.1.3 DUST

5.1.4 CORROSION

5.1.5 PHOTOMETRY

5.1.5.1 Photometric measurements shall be made with the light source of the device at least 3 m from the photometer.

5.1.5.2 The H-V axis of the device shall be taken to be parallel to the longitudinal axis of the vehicle when the device is mounted in its design position.

5.1.5.3 Photometric measurement shall be made with the light source steady burning. Photometric measurements of multiple lamp arrangements may be made by either of the following methods.

5.1.5.3.1 All lamps of a multiple lamp arrangement shall be photometered together provided that a line from the light source of each lamp to the center of the photometer sensing device does not make an angle of more than 0.6 degrees with the photometer H-V axis. When lamps are photometered together, the H-V axis shall intersect the midpoint between the light sources of the lamps on the extremities of a multiple lamp arrangement.

5.1.5.3.2 Each lamp of a multiple lamp arrangement shall be photometered separately. The photometric value for the entire multiple lamp arrangement at any test point shall be determined by adding the photometric outputs from each individual lamp at the corresponding test point.

5.1.6 WARPAGE TEST ON DEVICES WITH PLASTIC COMPONENTS

5.2 Color—SAE J578 is a part of this document.

5.3 Plastic Materials—SAE J576 is a part of this document.

6. Requirements

6.1 Performance Requirements—The device when tested in accordance with the test procedures of this document shall meet the requirements of SAE J2139 or as indicated.

6.1.1 VIBRATION

6.1.2 MOISTURE

6.1.3 DUST

6.1.4 CORROSION

6.1.5 PHOTOMETRY—The device tested shall meet the photometric performance requirements of Table 1 and its footnotes.

The summation of the luminous intensity measurements at the specified test points in a zone shall be at least the value shown.

TABLE 1—STOP AND TURN SIGNAL LAMP PHOTOMETRIC PERFORMANCE REQUIREMENTS

Zone	Test Point Degrees	Zone Total Luminous Intensity Candela, Yellow Front-Turn Lamp	Zone Total Luminous Intensity Candela, Red Rear Stop or Turn Lamp	Zone Total Luminous Intensity Candela, Yellow Rear-Turn Lamp
1	20U-45L 20U-20L 10D-20L 10D-45L	30	12	20
2	10U-5L 5U-20L 5D-20L 10D-5L	130	50	84
3	5U-10L H-10L 5D-10L	250	100	165
4	5U-V H-5L H-V H-5R 5D-V	950	380	610
5	5U-10R H-10R 5D-10R	250	100	165
6	10U-5R 5U-20R 5D-20R 10D-5R	130	50	84
7	20U-45R 20U-20R 10D-20R 10D-45R	30	12	20
	MAXIMUM LUMINOUS INTENSITY, CANDELA	—	300	750

1 The maximum luminous intensity shall not be exceeded over any area larger than that generated by a 0.5 degree radius within the area defined by the test point pattern of Table 2.

2 The measured values at each test point shall not be less than 60% of the minimum value in Table 2.

3 The summation of the luminous intensity measurements at the specified test points in the zone shall be at least the values shown.

4 When a tail lamp or a clearance lamp is combined with a stop or turn signal lamp, or a parking lamp is combined with a turn signal lamp, see 6.1.5.2 of this document for luminous intensity ratio requirements.

5 Photometric requirements beyond 20 degrees inboard do not apply to turn signal lamps. Adjust zone totals accordingly.

6.1.5.1 Any multiple lamp arrangement may be used to meet the photometric requirements of a stop or turn signal lamp. If multiple lamp arrangements are used and the distance between adjacent light sources does not exceed 560 mm for two-lamp arrangements and does not exceed 410 mm for multiple lamp arrangements, then the combination of the lamps may be used to meet the photometric requirements of Table 1 (see 5.1.5.3.2). If the distance between adjacent light sources exceeds the above dimensions, each lamp shall comply with the photometric requirements of Table 1.

6.1.5.2 When a tail lamp, or clearance lamp is combined with the stop or turn signal lamp, or a parking lamp is combined with a turn signal lamp, the lamp's intensity shall be not less than three times the luminous intensity of the tail lamp, clearance lamp, or a parking lamp at any test point, except that at H-V, H-5L, H-5R, and 5U-V the stop or turn signal lamp's intensity shall be not less than five times the luminous intensity of the tail lamp, clearance lamp, or parking lamp.

When a tail lamp or a clearance lamp is combined with a stop or turn signal lamp and the maximum intensity of the tail lamp or clearance lamp is located below the horizontal and is within an area generated by a 1.0 degree radius around the test point, the ratio for the test point may be computed using the lowest value of the tail lamp or clearance lamp luminous intensity within the generated area.

6.1.5.3 Rear signals from a forward mounted double-faced turn signal lamp need only meet the performance requirements contained in Table 1 from directly to the rear to the left for a left-hand lamp, and from directly to the rear to the right for a right-hand lamp. The intent is to permit the manufacturer to provide glare protection for the driver.

6.1.5.4 When a front-turn signal lamp is mounted less than 100 mm from the low beam headlamp as measured from the closest lighted edge of the low beam headlamp (or any additional lamp used to supplement or used in lieu of the low beam, such as a daytime running lamp, auxiliary low beam or fog lamp) to the optical center of the turn signal lamp, the turn signal lamps luminous intensity shall not be less than 2.5 times the values specified in Table 1 for a front-turn signal lamp.

6.1.5.5 When a front-turn signal lamp is mounted less than 100 mm from a daytime running lamp, as measured from the closest lighted edge of the daytime running lamp to the optical center of the turn signal lamp, the daytime running lamp shall not have more than 2600 candela throughout the pattern and the turn signal lamps luminous intensity shall not be less than 2.5 times the values specified in Table 1 for a front-turn signal lamp.

6.1.5.6 Paragraph 6.1.5.5 does not apply if the daytime running lamp adjacent to the turn signal lamp is deactivated when that turn signal lamp is activated.

6.1.6 WARPAGE

6.2 Color—The color of the light from the front-turn signal lamp shall be yellow and the color from the rear-turn signal lamp may be red or yellow as specified in SAE J578. The color of the light from the stop lamp shall be red as specified in SAE J578.

6.3 Plastic Materials—The plastic materials used in the optical parts shall meet the requirements of SAE J576.

6.4 Design Requirements

6.4.1 If a stop lamp or a turn signal lamp is combined with a tail lamp or a clearance lamp (or a parking lamp is combined with a turn signal lamp), and a replaceable multiple light source is used, the light source retention system shall be designed with an indexing means so that the light source is properly indexed. Removable light source retention systems shall have an indexing feature so that they cannot be reinserted into the lamp housing in a random position, unless the lamp will perform its intended function with random light source orientation.

6.4.2 The effective projected luminous lighted area of a lamp shall be at least 75 cm^2.

6.5 Installation Requirements—The stop or turn signal lamp shall meet the following requirements as installed on the vehicle.

6.5.1 The stop or turn signal lamps, facing rearward for the rear lamp and the turn signal lamp facing forward for the front lamp, shall be rigidly mounted on the permanent structure of the vehicle, at the same height, and spaced as far apart laterally as practicable, so that the signal will be clearly visible.

6.5.2 Each stop lamp and front and rear-turn signal lamp shall be designed to comply with all photometric requirements of Table 1 with all vehicular obstructions considered.

6.5.3 Each front- and rear-turn signal lamp shall be designed to comply with one of the following visibility requirements.

6.5.3.1 The lamp must provide a minimum of 13 cm^2 of unobstructed projected area when the light emitting surface of the lens, excluding reflex reflector area, is projected parallel to a horizontal plane in any direction from 45 degrees outboard to 20 degrees inboard of the vehicle longitudinal axis, and parallel to a longitudinal, vertical plane in any direction from 15 degrees above to 15 degrees below (see 6.5.5) the horizontal (see Figure 1):

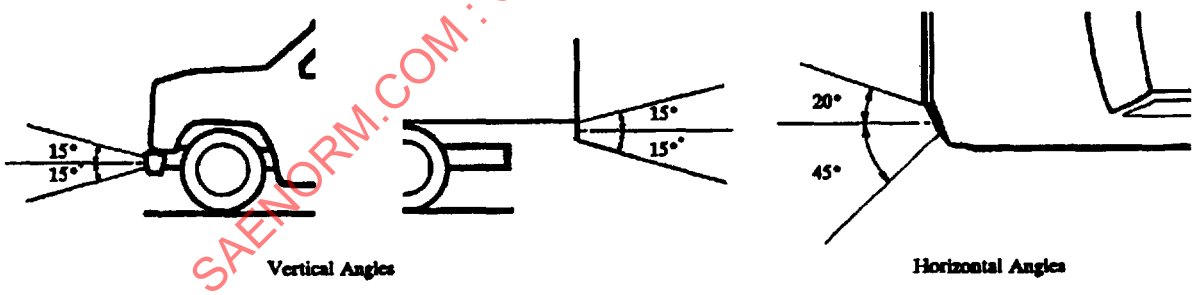

FIGURE 1—LEFT SIDE SHOWN RIGHT SIDE SYMMETRICAL

6.5.3.2 The lamp must provide a luminous intensity not less than 0.3 candela throughout the photometric pattern defined by the corner points specified as follows and as shown in Figure 2:

a. Driver side front lamp and passenger side rear lamp: 15U-80L, 15U-45R, 15D-80L, 15D-45R (see 6.5.5).
b. Passenger side front lamp and drivers side rear lamp: 15U-45L, 15U-80R, 15D-45L, 15D-80R (see 6.5.5).

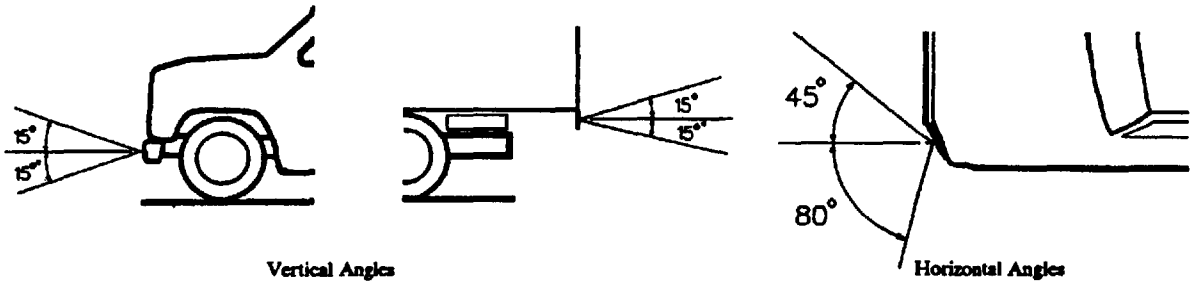

FIGURE 2—LEFT SIDE SHOWN RIGHT SIDE SYMMETRICAL

6.5.4 Each stop lamp shall be designed to comply with one of the following visibility requirements.

6.5.4.1 The lamp must provide a minimum of 13 cm^2 of unobstructed projected area when the light emitting surface area of the lens, excluding reflex reflector area, is projected parallel to a horizontal plane in any direction from 45 degrees outboard to 45 degrees inboard of the vehicle longitudinal axis, and parallel to a longitudinal, vertical plane in any direction from 15 degrees above to 15 degrees below (see 6.5.5) the horizontal (see Figure 3):

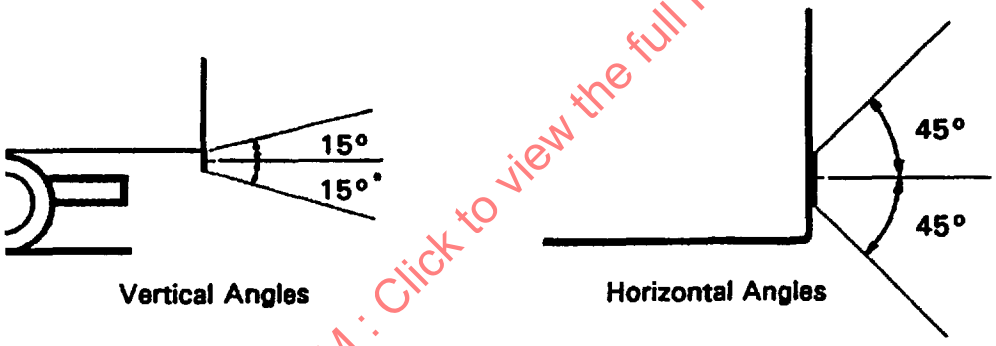

FIGURE 3—LEFT SIDE SHOWN RIGHT SIDE SYMMETRICAL

6.5.4.2 The lamp must provide a luminous intensity not less than 0.3 candela throughout the photometric pattern defined by the corner points 15U,-45L, 15U-45R, 15D-45L, 15D-45R (see 6.5.5). See Figure 4.

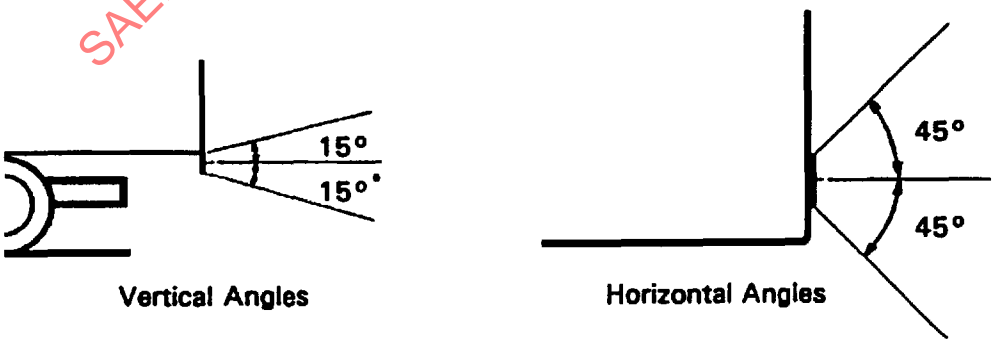

FIGURE 4—LEFT SIDE SHOWN RIGHT SIDE SYMMETRICAL

6.5.5 The downward angle (see 6.5.3.1, 6.5.3.2, 6.5.4.1, and 6.5.4.2) may be reduced to 5 degrees if the lower lighted edge of the lamp is less than 750 mm above the ground.

6.5.6 Where more than one stop lamp or front- or rear-turn signal lamp or optical area is lighted on each side of the vehicle, only one such area need comply.

6.5.7 TURN SIGNAL PILOT INDICATOR

6.5.7.1 If one right and one left turn signal lamp are not readily visible to the driver, there shall be an illuminated indicator provided to give a clear and unmistakable indication that the turn signal system is activated. The illuminated indicator shall consist of one or more lights flashing at the same frequency as the turn signal lamps.

6.5.7.2 If the illuminated indicator is located inside the vehicle, it shall emit a green colored light and have a minimum functional lighted area of 18 mm^2.

6.5.7.3 If the illuminated indicators are located outside of the vehicle, they shall emit a yellow colored light and have a minimum functional lighted area of 60 mm^2.

6.5.7.4 The minimum required illuminated lighted area of the indicators shall be visible according to the procedures described in SAE J1050.

The steering wheel shall be turned to a straight-ahead driving position and in the design location for an adjustable wheel or column.

7. Guidelines

7.1 Design Guidelines

7.1.1 Photometric design guidelines are contained in Table 2 and its footnotes.

7.2 Installation Guidelines—The following guidelines apply to stop and turn signal lamps as used on the vehicle and shall not be considered part of the requirements.

7.2.1 Performance of lamps may deteriorate significantly as a result of dirt, grime, snow, and ice accumulation on the optical surfaces. Installation of the device on the vehicle should be considered to minimize the effects of these factors.

7.2.2 Where it is expected that the device must perform in extremely severe environments, or where it is expected to be totally immersed in water, the user should specify devices specifically designed for such use.

7.2.3 The luminous intensity of the light source will vary with applied voltage. The electrical wiring in the vehicle should be designed to supply adequate voltage to the lamp.

7.2.4 When designing the wiring circuit for the stop lamps the extra load that anti-lock braking systems (ABS) contribute must be considered and wiring should be sized accordingly so that adequate power is provided for the lamps to function as well as the braking system.

TABLE 2—STOP AND TURN SIGNAL LAMP PHOTOMETRIC DESIGN GUIDELINES

Test Point Degrees	Minimum Luminous Intensity Candela, Yellow Front-Turn Lamp	Minimum Luminous Intensity Candela, Red Rear Stop or Turn Lamp	Minimum Luminous Intensity Candela, Yellow Rear-Turn Lamp
20U-45L	2.5	1	2
20L	12.5	5	8
20R	12.5	5	8
45R	2.5	1	2
10U-5L	40	16	27
5R	40	16	27
5U-20L	25	10	15
10L	75	30	50
V	175	70	110
10R	75	30	50
20R	25	10	15
H-10L	100	40	65
5L	200	80	130
V	200	80	130
5R	200	80	130
10R	100	40	65
5D-20L	25	10	15
10L	75	30	50
V	175	70	110
10R	75	30	50
20R	25	10	15
10D-45L	2.5	1	2
20L	12.5	5	8
5L	40	16	27
5R	40	16	27
20R	12.5	5	8
45R	2.5	1	2
MAXIMUM LUMINOUS INTENSITY	—	300	750

1 The maximum luminous intensity shall not be exceeded over any area larger than that generated by a 0.25 degree radius within the area defined by the test point pattern of Table 2.

2 When a tail lamp or a clearance lamp is combined with a stop or turn signal lamp, or a parking lamp is combined with a turn signal lamp, see 6.1.5.2 of this document for luminous intensity ratio requirements.

3 Photometric requirements beyond 20 degrees inboard do not apply to turn signal lamps.

4 When making photometric measurements at specific test points, the candela values between test points shall not be less than the lower specified value of the two closest adjacent test points on a horizontal or vertical line for minimum values.