

**SURFACE  
 VEHICLE  
 RECOMMENDED  
 PRACTICE**

Submitted for recognition as an American National Standard

**(R) Side Turn Signal Lamps for Long Vehicles**

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1. **Scope**—This SAE Recommended Practice provides test procedures, requirements, and guidelines for side turn signal lamps intended for use on trailers 12 m or more in overall length except pole trailers. Side turn signal lamps conforming to the requirements of this document may be used on other large vehicles such as trucks, truck tractors, buses, and other applications where this type of lighting device is desirable.

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## 2. References

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

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or [www.sae.org](http://www.sae.org).

SAEJ387—Terminology—Motor Vehicle Lighting

SAEJ576—Plastic Material for Use in Optical Parts Such as Lenses and Reflectors of Motor Vehicle Lighting Devices

SAEJ578—Color Specification

SAE J588—Turn Signal Lamps for Use on Vehicles Less than 2032 mm in Overall Width

SAEJ759—Lighting Identification Code

SAE J1690—Flashers

SAEJ2139—Tests for Lighting Devices, Reflective Devices, and Components Used on Vehicles 2032 mm or More in Overall Width

SAE J2261—Stop Lamps and Front and Rear Turn Signal Lamps for Use on Motor Vehicles 2032 mm or More in Overall Length

**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 or [www.sae.org](http://www.sae.org).

SAEJ567—Lamp Bulb Retention System for Requirements and Gages Used in Retention System Design

SAEJ759—Lighting Identification Code

SAEJ1395—Front and Rear Turn Signal Lamps Used on Vehicles 2032 mm or More in Overall Width

SAEJ1889—LED Lighting Devices

SAEJ2042—Clearance, Sidemarker, and Identification Lamps for Use on Motor Vehicles 2032 mm or More in Overall Width

2.2.2 TMC PUBLICATIONS—Available from The American Trucking Association, Alexandria, VA.

TMC#RP-702A—Trailer Lamp and Reflector Placement

TMC#RP-704B—Heavy-Duty Lighting Systems for Trailers

TMC#AV7-1—Heavy-Duty Lighting Systems for Trailers

2.2.3 TMC PUBLICATIONS—Available from TTMA, 1020 Princess Street, Alexandria, VA 22314.

TTMA #RP-9—Location of Lighting Devices for Trailers

## 3. Definitions

**3.1 Side Turn Signal Lamp**—is the signaling element of a turn signal system which indicates a change in direction by giving a flashing light on the side toward which the turn or lane change will be made. Side turn signal lamps are supplemental to, and should not be confused with front- and rear-mounted turn signal lamps described in SAE J588 or J2261. See SAE J1690 for flash rate and percent on time.

**4. Lighting Identification Code**—Side turn signal lamps for use on trailers 12 m or more in overall length or for other large vehicles may be identified by the Code "E" 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 as the horizontal line through the light source and normal 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 steadily burning.

5.1.6 WARPAGE TEST ON DEVICES WITH PLASTIC COMPONENTS

**5.2 Color**—The lamp assembly color shall be measured in accordance with SAE J578.

**5.3 Plastic Materials**—The plastic (optical) materials shall be tested in accordance with SAE J576.

**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

6.1.5.1 The lamp shall be designed to conform to the zone total photometric requirements of Table 1 and its footnotes. The summation of the luminous intensity measurements at the test points in a zone shall be at least the value shown.

6.1.5.2 When a sidemarker lamp is combined with the side turn signal lamp, the side turn lamp intensity shall not be less than five times the luminous intensity of the sidemarker lamp at any test point of Table 1.

6.1.6 WARPAGE

TABLE 1—SIDE TURN SIGNAL LAMP PHOTOMETRIC PERFORMANCE REQUIREMENTS<sup>(1)</sup>

Zone	Curbside Lamps <sup>(2)</sup> (Right Hand) Test Point Degrees	Minimum Luminous Intensity Candela <sup>(3)</sup>	Zone Total Luminous Intensity, Candela <sup>(4)</sup>
1	35U-45R	12	96
	-30R	12	
	20U-60R	20	
	10D-60R	20	
	15D-45R	16	
2	20D-30R	16	98
	35U-V	12	
	H-30R	40	
	H-V	30	
3	20D-V	16	120
	20U-75R	20	
	H-45R	50	
	H-85R	30	
Maximum Luminous Intensity, Candela <sup>(5)</sup> (within the photometric pattern)	5D-75R	20	200
Maximum Luminous Intensity, Candela <sup>(5)(6)</sup>	85L-90L H and above		50

- Ratio requirements of 6.1.5.2 apply.
- This table shows the zone totals for the curbside lamp requirements. The roadside lamp zone total requirements are symmetrically opposite.
- The measured values at each individual test point shall not be less than 60% of the required minimum value shown for that individual test point location.
- The sum of the luminous intensity measurements at each test point within a zone shall not be less than the Zone Total Luminous Intensity shown.
- The listed maximum shall not be exceeded over any area larger than that generated by a 0.5 degree radius within the solid angle defined by the test points.
- The forward maximum intensity applies throughout the zone of 85 degrees left to 90 degrees left and horizontal and above.

**6.2 Color**—The color of the light from the side turn signal lamp shall be yellow 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 side turn signal lamp is optically combined with a sidemarker 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 lens area, as defined in SAE J387, shall be at least 20 cm<sup>2</sup>.

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

6.5.1 Visibility of each side turn signal lamp shall not be obstructed by any part of the vehicle throughout the photometric test pattern of Table 1 unless the lamp is designed to comply with all photometric and visibility requirements with these obstructions considered. The visibility and photometric requirements below the lamp horizontal axis are not applicable when the lower lighted edge of the lamp is less than 750 mm above the ground.

6.5.2 To be considered visible, the lamp shall meet the requirements of Figure 1 by providing a minimum of 13 cm<sup>2</sup> of unobstructed projected area when the light emitting surface of the lens, excluding reflex reflector, is projected parallel to a horizontal plane in any direction from 0 degrees to 85 degrees right for curbside lamp and to a vertical plane in any direction from 35degrees above to 20 degrees below the horizontal with respect to the lamp H-V axis as defined in 5.1.5.2 (see Figure 1).

The roadside lamp shall meet the same requirements except the spatial limits shall be from 0 degrees to 85degrees left and 35 degrees above to 20 degrees below the horizontal, respectively.

6.5.3 The side turn signal lamp shall flash in conjunction with the required front and rear turn signal lamps.

6.5.4 The side turn signal lamp shall be wired so that when it is in its flashing mode it shall continue to flash even with the vehicle brakes applied.

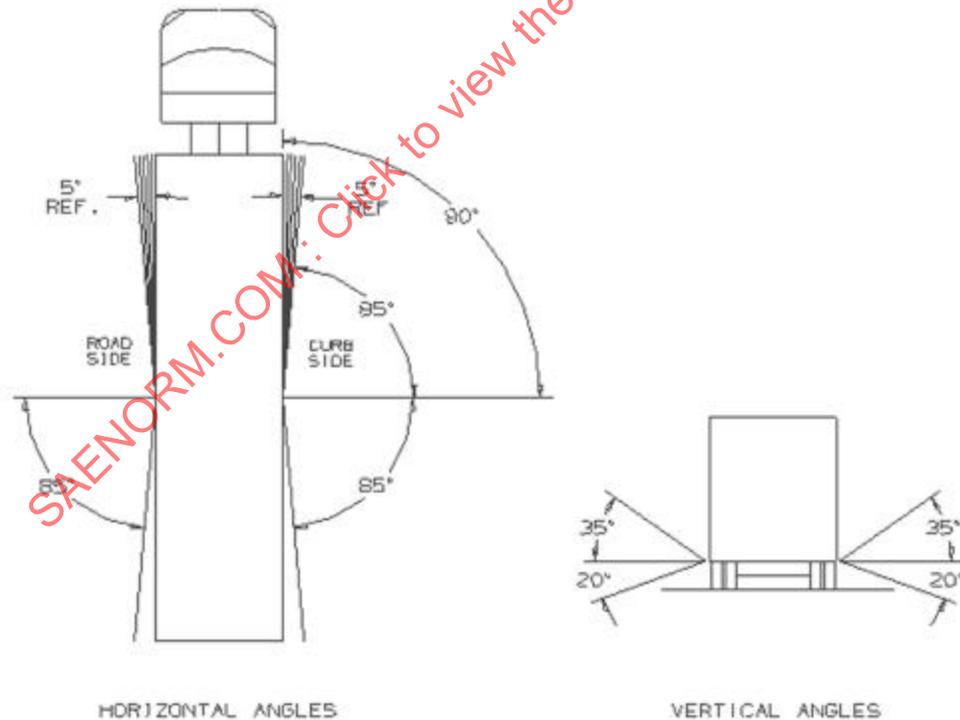


Figure 1—VISIBILITY REQUIREMENTS

**7. Guidelines**

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

7.1.1 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.

7.1.2 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.

7.1.3 The side turn signal lamp should be mounted, one on each side of the trailer, with the optical center of the lamp mounted on or forward of the midpoint of the trailer and at a height not less than 380 mm and not more than 1650 mm.

**8. Notes**

**8.1 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.

PREPARED BY THE SAE HEAVY-DUTY LIGHTING STANDARDS COMMITTEE  
APPROVED BY THE SAE LIGHTING COORDINATING COMMITTEE

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APPENDIX A

- A.1 As a matter of information, attention is called to SAE J576 for requirements and gages to be used in socket design.
- A.2 The test point development for the three zones in Table 1 is shown in the Rationale - Attachment B.

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## SAE J2039 Revised MAY2001

**Rationale**—SAE J2039 MAY2001 is a major revision of the photometric requirements of the 1994 standard. The forward test points and zonal requirements forward of the mid point of the trailer are removed. For a driver overtaking a trailer traveling in the same direction the forward signal is meaningless once he passes the mounting location of the side turn signal lamp. At that point the driver will only pick up the signal in the side view mirror but will be alongside the tractor before the signal appears.

By the time the forward signal appears in the side view mirror of a vehicle alongside the tractor/trailer the vehicle is even with the tractor driver and should be seen in mirrors, cab ports, etc.

The visibility lines generated by min/max heights and the lamp photometric distribution are carried forward from the previous document to arrive at line of sight calculations. The same lamp mounting height range is used.

While the visibility lines generated by the min./max. heights are all inclusive it has been deduced that not all extremes need to be covered by an auxiliary turn signal lamp. For instance, the maximum 50 degrees up angle would only apply to a cab over tractor passing a low boy trailer with the lamp mounted at its minimum height. But this situation would represent two professional drivers and a large vehicle alongside the low boy trailer which is highly likely to be seen either directly or in side view/rear view mirrors. Therefore the 35 degrees upward angle was chosen which represents a typical SUV passing a low boy trailer.

This document modifies the 50 degrees up to 20 degrees down range of "eye heights" while more closely aligning with SAE J914 for horizontal angles. This document requires greater horizontal angles than SAE J914; 85 degrees included angle versus 40 degrees.

The existing SAE J2039 document places the maximum signal value at the H-V of the lamp and the midpoint of the trailer where it is needed least. The driver is in closest proximity to the lamp at this point.

The new proposal places the maximum intensity at 45 degrees toward the rear of the trailer. This results in greater conspicuity for the oncoming driver and coincides with existing practice of many trucking fleets who have the lamp oriented 30 degrees to 45 degrees toward the rear and use a standard turn signal lamp for this location.

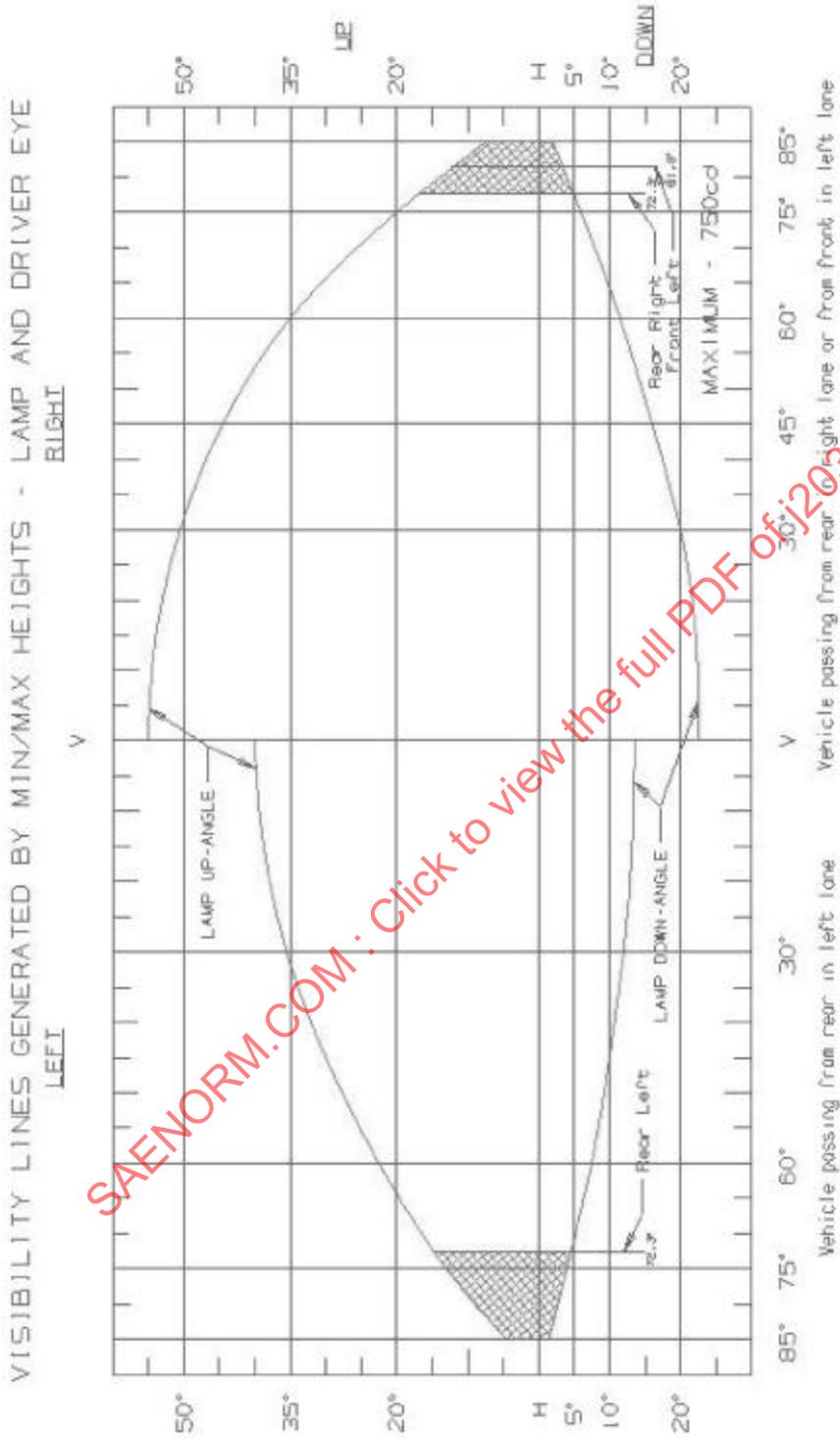
The 5 degrees rearward angle is derived from the recommended mounting position as far forward as practical. Attachment C shows that if the side turn signal lamp is mounted near the front of a 53 foot trailer then it is slightly over 5 degrees to the oncoming driver's line of sight after he passes the rear of the trailer.

The situation of a tractor/trailer turning onto a highway would not be as visible without the forward angles was proposed as a detriment to the new standard. The attached series of sketches should clarify that the tractor front turn signal and tractor side turn signal are the predominant signal. Forward angles on the trailer side turn signal are insignificant in regard to alerting approaching drivers.

The attached sketches show some typical situations where a side turn signal may be effective and some where it will not.

The prime use is to signal a right turn or lane change to vehicles moving in the same direction as the trailer and to the right side of the trailer.

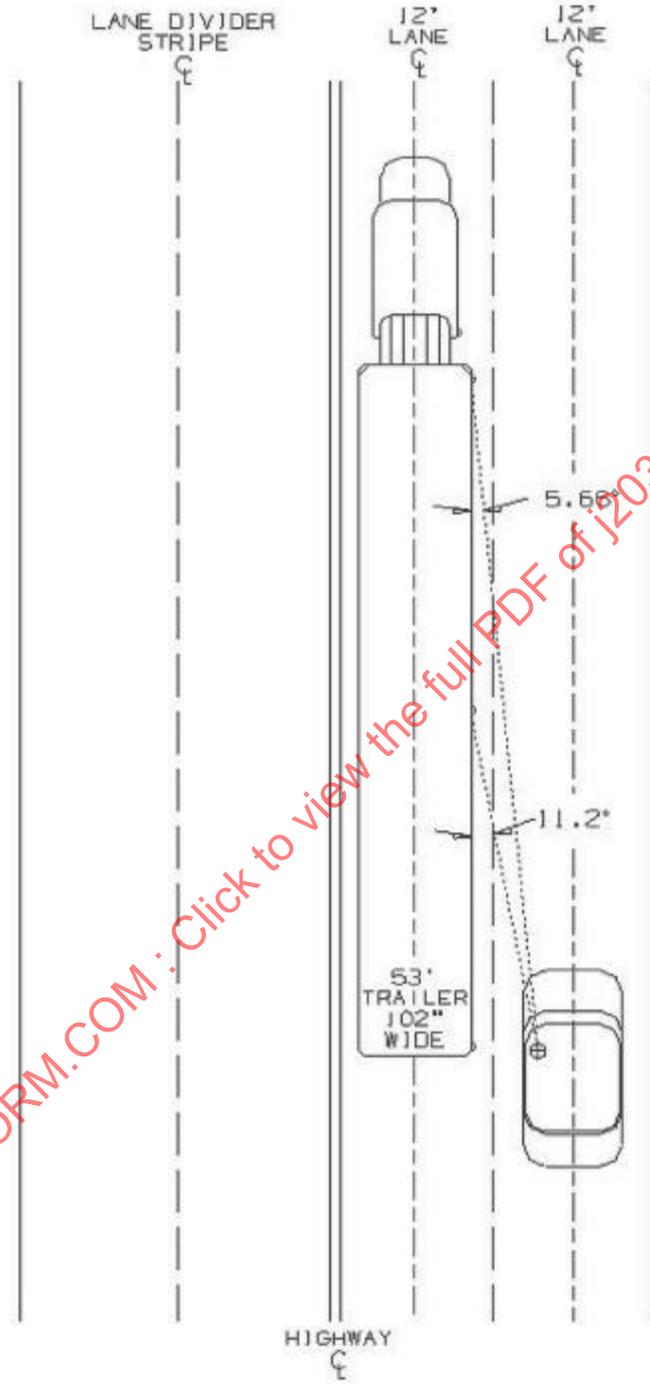
The sketches of right angle intersections with turns to both right and left are shown to demonstrate that there is little value of the side turn signal in these situations. The truck tractor front turn signal and side turn signal will be evident to oncoming vehicles long before the trailer side turn signal comes into view.



SIDE TURN SIGNAL LAMP  
SAE J2039 RATIONALE  
ATTACHMENT A

Calculations Assumptions:  
 2232mm x 12.2m - trailer width/length.  
 2232mm 4.3m - truck tractor width/length.  
 3.7m highway lane width.  
 914 - 1651mm min-max driver's eyeheight above ground.  
 381 - 1651mm min-max side turn signal lamp mounting height.  
 Side turn signal lamp "up-angle" (max eye-min lamp height).  
 Side turn signal lamp "down-angle" (min eye-max lamp height).  
 Note: Shaded area denotes photometric overlap between side turn  
 Signal lamp and either front or rear turn signal lamp.





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ATTACHMENT C