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# SURFACE VEHICLE STANDARD

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## TURN SIGNAL LAMPS FOR USE ON MOTOR VEHICLES LESS THAN 2032 MM IN OVERALL WIDTH

*1. Scope*—This SAE Standard provides test procedures, requirements, and guidelines for turn signal lamps intended for use on vehicles of less than 2032 mm in overall width.

(R) *2. References*

**2.1 Applicable Documents**—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 J567—Lamp Bulb Retention System

SAE J575—Tests for Motor Vehicle Lighting Devices and Components

SAE J576—Plastic Materials for Use in Optical Parts such as Lenses and Reflectors of Motor Vehicle Lighting Devices

SAE J578—Color Specification

SAE J759—Lighting Code Identification

SAE J1050—Describing and Measuring the Driver's Field of View

**2.2 Definitions**

2.2.1 TURN SIGNAL LAMPS—The signalling elements of a turn signal system which indicate an intention to turn by giving a flashing light on the side toward which the turn will be made.

*3. Lighting Identification Code*—Turn signal lamps for use on vehicles less than 2032 mm in overall width may be identified by the codes I, I2, I3, I4, or I5 in accordance with SAE J759.

*4. Tests*

4.1 SAE J575 is a part of this document. The following tests are applicable with modifications as 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 TEST

4.1.5.1 Photometric measurements shall be made with the light source of the signal lamp at least 3 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. Photometric measurements of multiple compartment lamps or multiple lamp arrangements shall be made by either of the following methods by aligning the axis of each lamp or compartment with the photometer:

4.1.5.2.1 All compartments or lamps shall be photometered together provided that a line from the light source of each compartment or 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 compartments or lamps are photometered together, the H-V axis shall intersect the midpoint between their light sources.

4.1.5.2.2 Each compartment or lamp shall be photometered separately. The photometric measurement for the entire multiple compartment lamp or multiple lamp arrangement shall be determined by adding the photometric outputs from each individual lamp or component at corresponding test points.

4.1.6 WARPAGE TEST FOR DEVICES WITH PLASTIC COMPONENTS

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

***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—SAE J575

5.1.5.1 The lamp under test shall meet the photometric performance requirements contained in 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.

5.1.5.2 A multiple compartment lamp or multiple lamps may be used to meet the photometric requirements of a turn signal lamp. If a multiple compartment or multiple lamps are used and the distance between adjacent light sources does not exceed 560 mm for two compartments or lamp arrangements and does not exceed 410 mm for three compartments or lamp arrangements, then the combination of the compartments or lamps must be used to meet the photometric requirements for the corresponding number of lighted sections (see Table 1). If the distance between adjacent light sources exceeds the above dimensions, each compartment or lamp shall comply with the photometric requirements for one lighted section (see Table 1).

5.1.5.3 When a tail lamp or parking lamp is combined with the turn signal lamp, the signal lamp shall not be less than three times the luminous intensity (a) of the tail lamp at any test point, or (b) of the parking lamp at any test point on or above horizontal except that at H-V, H-5L, H-5R, and 5U-V, the signal lamp shall not be less than five times the luminous intensity of the tail lamp or parking lamp. If a multiple compartment or multiple lamp arrangement is used and the distance between optical axis for both the tail lamp (parking lamp) and the turn signal is within the dimensions specified in 5.1.5.2, the ratio of the signal to the tail lamp (parking lamp) shall be computed with all the compartments or lamps lighted. If a multiple compartment or multiple lamp arrangement is used and the distance between optical axis for one of the functions exceeds the dimensions specified in 5.1.5.2, the ratio shall be computed for only those compartments or lamps where the tail lamp (parking lamp) and turn signal are optically combined. Where the tail lamp is combined with the turn signal lamp, and the maximum luminous intensity of the tail lamp is located below horizontal and within an area generated by a 0.5 degree radius around a test point, the ratio for the test

(R) TABLE 1—PHOTOMETRIC REQUIREMENTS[3]

| Zone Lighted Sections | Test Points[1] (deg) Lighted Sections | Minimum Luminous Intensity (cd)[4] Front Signals Yellow 1 | Front Signals Yellow 2 | Front Signals Yellow 3 | Rear Signals Red 1 | Rear Signals Red 2 | Rear Signals Red 3 | Rear Signals Yellow 1 | Rear Signals Yellow 2 | Rear Signals Yellow 3 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10U—5L<br>5U—20L<br>5D—20L<br>10D—5L | 130 | 155 | 180 | 50 | 60 | 70 | 80 | 100 | 120 |
| 2 | 5U—10L<br>H—10L<br>5D—10L | 250 | 295 | 340 | 100 | 115 | 135 | 165 | 185 | 220 |
| 3 | 5U—V<br>H—5L<br>H—V<br>H—5R<br>5D—V | 950 | 1130 | 1295 | 380 | 445 | 520 | 610 | 710 | 825 |
| 4 | 5U—10R<br>H—10R<br>5D—10R | 250 | 295 | 340 | 100 | 115 | 135 | 165 | 185 | 220 |
| 5 | 10U—5R<br>5U—20R<br>5D—20R<br>10D—5R | 130 | 155 | 180 | 50 | 60 | 70 | 80 | 100 | 120 |
| **Maximum Luminous Intensity (cd)** | | | | | | | | | | |
| Rear Lamps Only[2] | | ———— | | | 300 | 360 | 420 | 750 | 900 | 1050 |

[1] The measured values at each test point shall not be less than 60% of the minimum value in Table 3.
[2] 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 in Table 1.
[3] Ratio requirements of 5.1.5.3 apply.
[4] Multipliers of Table 2 are applicable per 5.1.5.4.

point may be computed using the lowest value of the tail lamp luminous intensity within the generated area.

5.1.5.4 In the case where the front turn signal is mounted in close proximity to the low beam headlamp or any additional lamp used to supplement or used in lieu of the low beam, such as an auxiliary low beam or fog lamp, Table 2 shall be used to modify Table 1 as follows:

5.1.5.4.1 Spacing for a direct light source type design front turn signal lamp, that is, a lamp primarily employing a lens to meet photometric requirements (for example, a lamp that does not employ a reflector) shall be measured from the light source to the lighted edge of the low beam headlamp or any additional lamp used to supplement or used in lieu of the lower beam, such as an auxiliary low beam or fog lamp.

5.1.5.4.2 Spacing for a front turn signal lamp which primarily employs a reflector (for example, one of parabolic section) in conjunction with a lens to meet photometric requirements, shall be measured from the geometric centroid of the front turn signal functional lighted area to the lighted edge of the low beam headlamp or any additional lamp used to supplement or used in lieu of the lower beam, such as an auxiliary low beam or fog lamp.

TABLE 2—LUMINOUS INTENSITY MULTIPLIERS FOR FRONT TURN SIGNAL SPACINGS

| Spacing to Lighted Edge of Low Beam Headlamp[1] | Multiplier of Table 1 and 3 Values to Obtain Required Minimum Luminous Intensities |
|---|---|
| 100 mm or greater | 1.0 |
| 75 mm to less than 100 mm | 1.5 |
| 60 mm to less than 75 mm | 2.0 |
| Less than 60 mm | 2.5 |

[1] See 5.1.5 for methods to be used for measurements of spacings.

5.1.6 WARPAGE—SAE J575

5.1.7 COLOR—The color of light from the turn signal lamps shall be red or yellow to the rear and yellow to the front of the vehicle as specified in J578.

**5.2 Materials Requirements**—Plastic materials used in the optical parts shall meet the requirements of SAE J576.

**5.3 Design Requirements**

5.3.1 If a turn signal is optically combined with the tail lamp and a two-filament bulb used, the bulb shall have an indexing base and the socket shall be designed so that bulbs with nonindexing bases cannot be used. Removable sockets shall have an indexing feature so that they cannot be reinserted into lamp housings in random positions, unless the lamp will perform its intended function with random light source orientation.

5.3.2 The functional lighted lens area of a single compartment lamp shall be at least 37.5 $cm^2$ for a rear lamp and at least 22 $cm^2$ for a front lamp.

5.3.3 If a multiple compartment lamp or multiple lamps are used to meet the photometric requirements of a rear turn signal lamp, the functional lighted lens area of each compartment or lamp shall be at least 22 $cm^2$ provided the combined area is at least 37.5 $cm^2$.

**5.4 Installation Requirements**—The turn signal lamp shall meet the following requirements as installed on the vehicle:

5.4.1 Visibility of the signal shall not be obstructed by any part of the vehicle throughout the photometric test angles for the lamps unless the lamp is designed to comply with all photometric and visibility requirements with these obstructions considered. Signals from lamps mounted on the left side of the vehicle shall be visible through a horizontal angle of 45 degrees to the left and signals from lamps mounted on the right side of the vehicle shall be visible through a horizontal angle of 45 degrees to the right. To be considered visible, the lamp must provide an unobstructed view of the outer lens surface, excluding reflex reflectors, of at least 12.5 $cm^2$ measured at 45 degrees to the longitudinal axis of the vehicle.

5.4.2 When a stop signal is optically combined with the turn signal, the circuit shall be such that the stop signal cannot be turned on if the turn signal is flashing.

5.4.3 TURN SIGNAL PILOT INDICATOR

5.4.3.1 If one right and one left turn signal 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 signal lamps.

5.4.3.2 If the illuminated indicator is located inside the vehicle, it should emit a green colored light and have a mimimum area of 18 $mm^2$.

5.4.3.3 If the illuminated indicators are located on the outside of the vehicle, for example on the front fenders, they should emit a yellow colored light and have a minimum projected illuminated area of 60 $mm^2$.

5.4.3.4 The minimum required illuminated area of the indicators specified in 5.4.3.2 and 5.4.3.3 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.

## *6. Guidelines*

(R) **6.1 Photometric Design Guidelines**—Guidelines for turn signal lamps, when tested in accordance with 4.1.5 of this document, are contained in Table 3 and its footnotes. Depending on the spacing of the front turn signal relative to the forward illumination lamps as defined in 5.1.5 of this document, the multipliers specified in Table 2 are applicable to the values to Table 3.

**(R) TABLE 3—PHOTOMETRIC DESIGN GUIDELINES**

| Test Points (deg) Lighted Sections | | Minimum Luminous Intensity (cd) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Front Signals Yellow 1 | Front Signals Yellow 2 | Front Signals Yellow 3 | Rear Signals Red 1 | Rear Signals Red 2 | Rear Signals Red 3 | Rear Signals Yellow 1 | Rear Signals Yellow 2 | Rear Signals Yellow 3 |
| 10U, 10D | 5L, 5R | 40 | 48 | 55 | 16 | 19 | 22 | 26 | 30 | 35 |
| | 20L, 20R | 25 | 30 | 35 | 10 | 12 | 15 | 15 | 20 | 25 |
| 5U, 5D | 10L, 10R | 75 | 88 | 100 | 30 | 35 | 40 | 50 | 55 | 65 |
| | V | 175 | 205 | 235 | 70 | 82 | 95 | 110 | 130 | 150 |
| | 10L, 10R | 100 | 120 | 140 | 40 | 47 | 55 | 65 | 75 | 90 |
| H | 5L, 5R | 200 | 240 | 275 | 80 | 95 | 110 | 130 | 150 | 175 |
| | V | 200 | 240 | 275 | 80 | 95 | 110 | 130 | 150 | 175 |
| **Maximum Luminous Intensity (cd)** | | | | | | | | | | |
| Rear Lamps Only[1] | | ————— | | | 300 | 360 | 420 | 750 | 900 | 1050 |

[1] The maximum design value of a lamp intended for the rear of the vehicle should not exceed the listed design maximum over any area larger than that generated by 0.25 degree radius within the solid angle defined by the test points in Table 3.

**6.2 Installation Guidelines**—The following guidelines apply to front and/or rear signal lamps as used on the vehicle and shall not be considered part of the requirements.

6.2.1 Signal lamps on the front and rear of the vehicle should be spaced as far apart laterally as practicable, so that the direction of turn will be clearly understood.

6.2.2 The luminous intensity of incandescent filament bulbs will vary with applied voltage. The electrical power system of the vehicle should, under normal running conditions, provide design voltage to the lamp as closely as practical bearing in mind the inherent variability of such systems.

6.2.3 Performance of lamps may deteriorate significantly as a result of dirt, grime, and/or snow accumulation on the optical surfaces. Installation of lamps on vehicles should be considered to minimize the effect of these factors.

6.2.4 Where it is expected that lamps must perform in severe environments, e.g., be totally immersed in water periodically, the user should specify lamps designed for such use.

***7. Additional Information***—As a matter of additional information, attention is called to SAE J567 for requirements and gages to be used in socket design.

***8. Notes***

**8.1 Marginal Indicia**—The (R) 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.



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