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Superseding J2041 JUN1999

Reflex Reflectors for Use on Vehicles 2032 mm or More in Overall Width

Foreword—This SAE Standard has been developed to provide signaling and marking device manufacturers with requirements for reflex reflectors that allows broader application. This document provides physical test requirements which are more stringent than requirements levied on Type 1 reflex reflectors, thus, introducing Type 2 reflex reflectors with the same photometric characteristics as Type 1 reflex reflectors, however, better suited for heavy-duty vehicles and the environment of their operation. Also, this document introduces Type 3 reflex reflector. It matches all requirements of Type 2 device and has additional photometric requirements which allow Type 3 reflex reflector to be used for conspicuity treatment for trailers 2032 mm or more in overall width and GVWR over 4536 kg and truck tractors.

1. Scope—This SAE Standard provides test procedures, requirements, and guidelines for reflex reflectors used on vehicles 2032 mm or more in overall width. Reflex reflectors conforming to these requirements may also be used on vehicles less than 2032 mm in overall width.

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.

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

SAE J578—Color Specifications

SAE J594—Reflex Reflectors

SAE J759—Lighting Identification

SAE J2139—Test Methods and Equipment for Lighting Devices and Components for Use on Vehicles 2032 mm or More in Overall Width

2.2 Related Publications—The following publication is provided for information purposes only and is not a required part of this document.

2.2.1 NHTSA PUBLICATION—Available from the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402-9371, www.nhtsa.dot.gov.

Code of Federal Regulations 49-part 571.108 (FMVSS 108)

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3. Definitions

3.1 Reflex Reflectors—Reflex reflectors are marking devices that indicate the presence and parameters of a vehicle by reflecting light in a mirror-like fashion in the direction of illuminating source.

3.1.1 TYPE 1 REFLEX REFLECTORS—Type 1 reflex reflectors are devices described in SAE J594.

3.1.2 TYPE 2 REFLEX REFLECTORS—Type 2 reflex reflectors are devices that have the same photometric requirements as Type 1 reflex reflectors and that are built to higher physical standards described in this document.

3.1.3 TYPE 3 REFLEX REFLECTORS—Type 3 reflex reflectors are devices that have the physical characteristics of Type 2 reflex reflector and comply with higher photometric requirements described in this document.

3.2 Observation Angle—The observation angle is the angle formed by a line from the observation point to the center of the reflective area and a second line from the center of the reflective area to the center of the source of illumination in the vertical plane only.

3.3 Entrance Angle—The entrance angle is the angle between the axis of the reflex reflector and a line from the center of the reflective area to the center of the source of illumination, with both horizontal and vertical coordinates.

The entrance angle shall be designated left, right, up, and down in accordance with the position of the source of illumination with respect to the axis of the reflex reflector as viewed from behind the reflector.

4. Identification Code

4.1 Type 2 reflex reflectors may be identified by the code "A2" in accordance with SAE J759.

4.2 Type 3 reflex reflectors may be identified by the code "A3" in accordance with SAE J759.

Code A3 is equivalent to DOT-C marking.

5. Tests

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

5.1.1 VIBRATION

5.1.1.1 The device shall be mounted on the test fixture in accordance with the manufacturer's instruction.

5.1.1.2 The device shall be conditioned in a circulating air oven with the temperature controlled at 46 °C to 49 °C for 60 min. The device and test fixture shall be removed from the oven and immediately, without remounting, repressing of adhesive tape, or tightening of mounting screws, placed on the vibration test machine and vibrated for 60 min.

5.1.2 MOISTURE

5.1.2.1 Either the Water Spray Moisture Test or Water Submersion Test shall be used to test reflex reflectors.

5.1.2.2 Water Spray Moisture Test

5.1.2.2.1 If the reflex reflector is a separate unit and not combined with a lighting device, the light source on-off cycle during the water spray moisture test is not applicable.

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5.1.2.2.2 Upon completion of the drain period, the interior of the device shall be observed for moisture accumulation that can be determined by tapping or tilting the device.

5.1.2.3 *Water Submersion Test*

5.1.2.3.1 The device shall be mounted on the test fixture in its in-use position.

5.1.3 DUST

5.1.3.1 Dust test does not have to be performed if the device passed the water submersion test.

5.1.3.2 If the reflex reflector is a separate unit and not combined with a lighting device, the light source on-off cycle during the dust test is not applicable.

5.1.4 CORROSION

5.1.4.1 If the reflex reflector is a separate unit and not combined with a lighting device, the light source on-off cycle during the corrosion test is not applicable.

5.1.5 PHOTOMETRY

5.1.5.1 *Type 2 Reflex Reflector*—In addition to the test procedures in SAE J2139, the photometry test procedures in SAE J594 also apply.

5.1.5.2 *Type 3 Reflex Reflector*—In addition to the test procedures in SAE J2139, the photometry test procedures in SAE J594 also apply.

5.1.5.3 Type 3 reflex reflector shall be also tested at an observation angle of 0.2 degree, at all light entrance angles between 45 degrees left and 45 degrees right.

5.1.5.4 Any reflex reflector which is combined with other lighting device shall be photometered independently by masking from the other function(s).

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

5.2.1 The test sample may be either the reflex reflector or a disc of the same material, technique of fabrication, and dye formulation as the reflex reflector.

5.2.2 If a disc is used for color determination by the transmission technique, the thickness should be twice the thickness of the reflector as measured from the face of the lens to the apexes of the reflecting elements. For either sample, a source "A" illumination shall be used for color measurement.

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

6. *Requirements*

6.1 Performance Requirements—A device when tested in accordance with the test procedures of this document shall meet the requirements of SAE J2139, except where noted.

6.1.1 VIBRATION

6.1.1.1 Upon completion of the vibration test, the integrity of the reflex reflector's seal shall not have been compromised and the reflex reflector shall not have become separated from its mounting means.

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6.1.1.2 Type 2 reflex reflector that is directional and requires a fixed orientation when mounted on the vehicle shall not rotate more than 2 degrees, unless the reflex reflector meets all photometric requirements of SAE J594 at all angles between 2 degrees and the angle of maximum rotation.

6.1.1.3 Type 3 reflex reflector that is directional and requires a fixed orientation when mounted on the vehicle shall not rotate more than 2 degrees, unless the reflex reflector meets all photometric requirements of 6.1.5.2, at all angles between 2 degrees and the angle of maximum rotation.

6.1.1.4 If a condition is observed that could result in a failure of any other test contained in this document, such other test shall be performed on this test sample to ensure compliance to that test requirements.

6.1.2 MOISTURE

6.1.2.1 No evidence of moisture is permitted inside of the reflex reflector.

6.1.2.2 Upon completion of the moisture test, the integrity of the reflex reflector's seal shall not have been compromised and the reflex reflector shall not have become separated from its mounting means.

6.1.2.3 If a condition is observed that could result in a failure of any other test contained in this document, such other test shall be performed on this tested sample to ensure compliance to that test requirements.

6.1.3 DUST

6.1.3.1 No evidence of dust is permitted inside of the reflex reflector.

6.1.3.2 If a condition is observed that could result in a failure of any other test contained in this document, such other test shall be performed on this tested sample to ensure compliance to that test requirements.

6.1.4 CORROSION

6.1.4.1 Upon completion of the corrosion test, the integrity of the reflex reflector's seal shall not have been compromised and the reflex reflector shall not have become separated from its mounting means.

6.1.4.2 If a condition is observed that could result in a failure of any other test contained in this document, such other test shall be performed on this tested sample to ensure compliance to that test requirements.

6.1.5 PHOTOMETRY

6.1.5.1 Type 2 reflex reflectors shall meet the photometric performance requirements of SAE J594.

6.1.5.2 Type 3 reflex reflectors shall meet the photometric performance requirements of SAE J594 and:

6.1.5.2.1 Red reflex reflector shall also provide, at an observation angle of 0.2 degree, not less than 300 millicandela/lux at any light entrance angle between 30 degrees left and 30 degrees right, including an entrance angle of 0 degree, and not less than 75 millicandela/lux at any light entrance angle between 45 degrees left and 45 degrees right;

6.1.5.2.2 White reflex reflector shall also provide, at an observation angle of 0.2 degree, not less than 1250 millicandela/lux at any light entrance angle between 30 degrees left and 30 degrees right, including an entrance angle of 0 degree, and not less than 300 millicandela/lux at any light entrance angle between 45 degrees left and 45 degrees right.

6.2 Color—The color of the reflected light shall be red, yellow, or white, per application, as specified in SAE J578.