

ANSI/ASAE S279.17 JUL2013 (R2017)
Lighting and Marking of Agricultural Equipment on Highways



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Revision approved August 2013; reaffirmed December 2017 as an American National Standard

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Supersedes ASAE S213, Safety Lighting for Combinations of Farm Tractors and Implements, adopted February 1954. Proposed by the Engineering Committee of the Farm and Industrial Equipment Institute; approved by SAE Power and Machinery Division Technical Committee; adopted by ASAE December 1964; revised December 1965, June 1966, June 1967, December 1969, June 1971, March 1974; approved as an American National Standard November 1976; revised April 1977, March 1982; revision approved by ANSI July 1984; reaffirmed December 1986; revised April 1988; editorially revised July 1989; revision approved by ANSI April 1990; reaffirmed by ASAE December 1992; reaffirmed by ANSI July 1993; reaffirmed by ASAE December 1997; revised April 1998; revision approved by ANSI and revised editorially October 1998; revised February 2001; revision approved by ANSI April 2001; reaffirmed by ASAE December 2001; revised December 2002; revision approved by ANSI February 2003; revised January 2006, August 2008, September 2010, February 2012, August 2013; reaffirmed December 2017.

Keywords: Lighting, Marking, Safety, Vehicle

1 Purpose

1.1 This Standard provides specifications for lighting and marking of agricultural equipment whenever such equipment is operating or is traveling on a highway.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including amendments) applies.

ANSI/ASAE S276.7 W/Corr. 1, Slow-Moving Vehicle Identification Emblem (SMV Emblem)

ANSI/ASAE S390.5, Definitions and Classifications of Agricultural Field Equipment

ANSI/ASAE S584.3, Agricultural Equipment: Speed Identification Symbol (SIS)

ASABE S608, Headlamps for Agricultural Equipment

SAE J560 200902, Primary and Auxiliary Seven Conductor Electrical Connector for Truck-Trailer Jumper Cable

SAE J575 201204, Test Methods and Equipment for Lighting Devices for Use on Vehicles Less Than 2032 mm in Overall Width

SAE J585 200802, Tail Lamps (Rear Position Lamps) for Use on Motor Vehicles Less Than 2032 mm in Overall Width

SAE J586 201106, Stop Lamps for Use on Motor Vehicles Less Than 2032 mm in Overall Width

SAE J588 201108, Turn Signal Lamps for Use on Motor Vehicles Less Than 2032 mm in Overall Width

SAE J594 201002, Reflex Reflectors

SAE J845 200712, Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles

SAE J974 201104, Flashing Warning Lamp for Agricultural Equipment

SAE J2040 201004, Tail Lamps (Rear Position Lamps) for Use on Vehicles 2032 mm or More in Overall Width

SAE J1889 201106, L.E.D. Signal and Marking Lighting Devices

SAE J2041 200410, Reflex Reflectors for Use on Vehicles 2032 mm or More in Overall Width.

SAE J2261 201001, Stop Lamps and Front- and Rear-Turn Signal Lamps for Use On Motor Vehicles 2032 mm or more in Overall Width

ASTM D1014-09, Standard Practice for Conducting Exterior Exposure Tests of Paints and Coatings on Metal Substrates

ASTM D4956-11a, Standard Specification for Retroreflective Sheeting for Traffic Control

ASTM E991-11, Standard Practice for Color Measurement of Fluorescent Specimens Using the One-Monochromator Method

ASTM E308-08, Standard Practice for Computing the Colors of Objects by Using the CIE System

ASTM D3330/D3330M Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape

FMVSS (Federal Motor Vehicle Safety Standard) PART 571.108, Lamps, reflective devices, and associated equipment

EU Directive 76/758/EEC, 27 July 1976 on the approximation of the laws of the Member States relating to End-outline marker lamps, front position (side) lamps, rear position (side) lamps, stop lamps, daytime running lamps and side marker lamps for motor vehicles and their trailers

EU Directive 76/757/EEC, 27 July 1976 on the approximation of the laws of the Member States relating to Reflex reflectors for motor vehicles and their trailers

ECE Regulation No. 7, Position, stop and end-outline lamps

ECE Regulation No. 65, Uniform Provisions Concerning the Approval of Special Warning Lamps for Power-driven Vehicles and Their Trailers

ECE Regulation No. 48 Installation of lighting and light-signalling devices

ECE Regulation No. 86 Installation of lighting and light-signalling devices for agricultural tractors

ECE Regulation No. 112 Headlamps emitting an asymmetrical passing-beam

ECE Regulation No. 113 Headlamps emitting a symmetrical passing-beam

ISO 16154: 2007, Tractors and machinery for agriculture and forestry — Installation of lighting, light signalling and marking devices for travel on public roadways

ISO 11783-1:2007, Tractors and machinery for agriculture and forestry — Serial control and communication data network — Part 1: General standard for mobile data communications

ISO 11783-2:2012, Tractors and machinery for agriculture and forestry — Serial control and communication data network — Part 2: Physical layer

3 Definitions and material specifications

3.1 Agricultural equipment. Refer to ASAE S390 for definitions of agricultural equipment.

3.2 Highway. A highway is defined as the entire width between the boundary lines of every way publicly maintained, when any part thereof is open to the use of the public for purposes of vehicular travel (Uniform Vehicle Code).

3.3 Retroreflective devices

3.3.1 Retroreflective material meeting the performance requirements of clause 3.5 or FMVSS (Federal Motor Vehicle Safety Standard) PART 571.108. Retroreflective material size shall be 50 mm (2 in.) wide by 115 mm (4.5 in.) long for machines 2 m (6.7 ft) or less in width, and 50 mm (2 in.) by 230 mm (9 in.) long for machines wider than 2 m (6.7 ft).

3.3.2 Reflex reflectors meeting the performance requirements of SAE J594 or SAE J2041 Type 1.

3.4 Lamp location. Dimensions in this Standard, unless specified otherwise, are based on measurements to the nearest edge of the lens (filament cover).

3.5 Retroreflective material

3.5.1 Visibility. The material shall be visible at night from all distances between 305 and 30 m (1000 and 100 ft) when directly in front of lawful vehicle low beam headlamps.

3.5.2 Construction. Retroreflective sheeting shall consist of a smooth, flat, transparent exterior film with retroreflective elements embedded or suspended beneath the film so as to form a non-exposed retroreflective optical system.

3.5.3 Performance requirements. Retroreflective sheeting shall meet requirements of ASTM D-4956 for type V sheeting, except that the photometric requirements shall meet the minimum photometric performance requirements specified in Table 1. The sheeting shall meet the color specification limits in Table 2.

Table 1 – Minimum photometric performance $\text{cd} / (\text{lx} \times \text{m}^2)$

Observation Angle, °	Entrance Angle, °	Requirements	
		Red	Yellow
0.2	–4	60	168
0.2	30	60	168
0.2	45	15	40
0.5	–4	15	29
0.5	30	15	29
0.5	45	4	11

Table 2 – Color specification limits (daytime)

Color	1		2		3		4	
	X	Y	X	Y	X	Y	X	Y
Red	0.613	0.297	0.708	0.292	0.636	0.364	0.557	0.352
Yellow	0.498	0.412	0.557	0.442	0.479	0.520	0.438	0.472

3.5.4 Exterior durability. Samples mounted on backing material specified in this Standard shall be exposed to the sun for a minimum test period of 36 months outside in south Florida at an angle of 45° to horizontal facing upward and south, per ASTM D-1014. After exterior durability testing, the material shall show no cracking, crazing, blistering, loss of adhesion, or dimensional change, and shall meet the requirements in Tables 1 and 2 when measured at 0.2° observation angle, and –4° entrance angle in accordance with ASTM D-4956 clause 8.3.

3.5.5 Corrosion resistance. Material shall be tested per SAE J575 and show no corrosion or edge fading and shall meet requirements of Table 1 measured at 0.2° observation angle, and –4° entrance angle in accordance with ASTM D-4956 clause 8.3.

3.5.6 Adhesion. Backing material shall meet adhesive systems as specified in ASTM D-4956.

3.6 Nonreflective red-orange Fluorescent material

3.6.1 Visibility. The material shall be visible in the daylight as a nonreflective red-orange fluorescent strip from all distances between 305 and 30 m (1000 and 100 ft).

3.6.2 Dimensional requirement. The nonreflective red-orange fluorescent material size shall be 50 mm (2 in.) wide by 230 mm (9 in.) long.

3.6.3 Performance requirements. The red-orange color, purity, luminance, and peak reflectance of the nonreflective red-orange fluorescent material shall be within the values shown in Table 3 before and after the durability test.

Table 3 – Fluorescent values

	Before Exposure Test	After Exposure Test
Dominant wavelength, nm	602 - 610	585 min
Purity, %	84 min	77 min
Luminance, %	28 min	50 max
Peak reflectance observable at wavelength nearest dominant, %	> 100	75 min

3.6.4 Exterior durability. Samples shall be exposed to the sun for a test period of at least 36 months outside in south Florida at an angle of 45° to horizontal facing upward and south, per ASTM D-1014. After the durability test, the material shall show no cracking, crazing, blistering, loss of adhesion, or dimensional change, and shall meet the requirements set forth in this Standard.

3.6.5 Color measurement. The spectrophotometric color values of the nonreflective red-orange fluorescent material shall be determined by using a colorimetric spectrophotometer conforming to the requirements of ASTM E-991. Luminance shall be compared to that of a NIST (National Institute of Standards and Technology)-defined perfect reflecting diffuser (PRD) for CIE (Color Institute) illuminant D65. Because the nonreflective red-orange fluorescent identification material can be expected to be viewed with an angular subtend of < 4° at the eye, it is recommended that the CIE X Y Z values be calculated using the CIE 1931 (2°) standard observer and CIE illuminant D65. The CIE chromaticity coordinates, x and y, shall be calculated as given below and defined in clause 7.3 of ASTM E-308.