



Standard Specification for Preformed Retroreflective Pavement Marking Tape for Limited Service Life¹

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1. Scope

1.1 This specification covers white or yellow preformed retroreflective pavement marking tapes that are designed to provide a service life of typically 3 to 6 months, on roads with up to 15 000 average daily traffic count (ADT).

1.2 The tapes are intended for use as longitudinal, transverse, or word/symbol pavement markings that provide delineation day and night. The tapes may be either removable or nonremovable.

1.3 The values stated in SI units are to be regarded as the standard.

2. Referenced Documents

2.1 ASTM Standards:

D 1000 Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications²

D 1898 Practice for Sampling Plastics³

D 4061 Test Method for Retroreflectance of Horizontal Coatings⁴

D 6628 Specification for Color of Pavement Marking Materials⁵

E 303 Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester⁵

E 1710 Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer⁴

2.2 Federal Standard:⁶

Fed Std Test Method 141

2.3 CIE Publications:⁷

No. 15.2 Colorimetry

No. 39.2 Recommendations for Surface Colours for Visual Signaling

3. Terminology

3.1 Definitions:

3.1.1 *limited service life or period*—a minimum service period of three months when placed in accordance with the manufacturer's recommended procedures on pavement surfaces having no more than 15 000 average daily traffic/lane.

NOTE 1—15 000 ADT per lane is typical of heavily traveled roads such as interstate highways through major urban areas.

3.1.2 *preformed tape*—continuous, flexible pavement marking material that is essentially complete and that may be affixed to or imbedded in the road surface without fundamentally altering its configuration.

3.1.3 *retroreflection*—reflection in which radiation is returned in directions close to the direction from which it came, this property being maintained over wide variations of the direction of the incident radiation.

3.1.4 *retroreflector*—surface or device that reflects and returns a relatively high proportion of light in a direction close to the light source. This characteristic is maintained over a wide variation of the angle made by the incident light ray and the normal to the retroreflective surface.

3.1.5 *surface pattern*—a pattern on the surface, in which the raised areas are a minimum of 0.8 mm (31 mils) high and occupy approximately 50 % of the surface area, presenting a substantial area of nearly vertical face to traffic from any approach.

4. Classification

4.1 Pavement marking tape manufactured according to this specification shall be identified as Type I or Type II:

4.1.1 *Type I (Removable)*—Marking tapes, after serving the intended limited service life, shall be removable from asphalt or portland cement concrete surfaces at pavement temperatures above 4°C (40°F) intact or in pieces no less than about 600 cm² in area, either manually or with a mechanical device without the use of heat, solvents, grinding, or blasting that would damage or discolor the pavement so as to leave an impressed traffic lane mark.

¹ This specification is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.38 on Highway Traffic Control Materials.

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² *Annual Book of ASTM Standards*, Vol 10.01.

³ Discontinued; See 1997 *Annual Book of ASTM Standards*, Vol 08.01.

⁴ *Annual Book of ASTM Standards*, Vol 06.01.

⁵ *Annual Book of ASTM Standards*, Vol 04.03.

⁶ Available from Naval Publications and Forms Center, 5801 Tabor Ave, Philadelphia, PA 19120.

⁷ Available from USNC-CIE Publications Office, TLA Lighting Consultants, Inc., 7 Pond Street, Salem, MA 01970.

4.1.2 *Type II (Non-Removable)*—This type of tape shall not be required to have removal characteristics as in 4.1.1.

NOTE 2—Type II tapes are most often used for short term applications in which markings are paved over during successive road construction operations.

5. Ordering Information

5.1 The purchaser using this specification shall include the following information:

- 5.1.1 ASTM designation (D 4592),
- 5.1.2 Classification Type (I or II; see 4.1),
- 5.1.3 Daytime color (See 6.3),
- 5.1.4 Width and length of rolls, and
- 5.1.5 Any additional information.

6. Requirements

6.1 Physical Requirements:

6.1.1 The marking tape shall be a reflective film coated with a pressure-sensitive adhesive with or without a protective liner.

6.1.2 The marking tape shall be flexible and shall conform to the typical road pavement surface.

6.1.3 The marking tape shall adhere to asphalt or portland cement concrete roadway surfaces when applied according to the manufacturer's recommended procedures on pavement surfaces having temperatures down to 10°C (50°F) at the time of application.

6.1.4 Immediately following application, the tape shall not require a cure or set time prior to opening to traffic.

6.1.5 The tape as supplied shall be free of cracks, and have true, straight, and unbroken edges. The actual width of rolls of preformed marking tape used for striping shall be no less than the nominal (stated) width and no more than 3 mm (1/8 in.) greater than the nominal width. The length shall be no less than the stated length.

6.2 Retroreflectance:

6.2.1 The marking tape shall be retroreflective, reflecting white or yellow, respectively, and shall be readily visible when viewed with automobile headlights at night and shall have minimum reflective values as shown in Table 1 when measured in accordance with the photometric testing procedures of Test Method D 4061 or E 1710. Reflective values shall be expressed as coefficient of retroreflected luminance (R_L) in millicandelas per square metre per lux.

6.3 Color:

6.3.1 The white and yellow marking tape shall conform to the requirements of Specification D 6628.

6.4 Adhesion:

6.4.1 A sample of tape, 25.4 mm in width, applied according to the manufacturer's recommended procedure and tested in accordance with Test Methods D 1000, shall have minimum adhesion values as shown in Table 2.

TABLE 2 Adhesion

Application Temperature °C (°F)	Test Temperature °C (°F)	Minimum Adhesion, N
10 (50)	10 (50)	4.88
24 (75)	24 (75)	4.88
46 (115)	46 (115)	4.88

6.5 Skid Resistance:

6.5.1 The Type I marking tape shall have an average minimum frictional resistance value of 45 BPN (British Pendulum Number) when tested according to Test Method E 303.

NOTE 3—Skid resistance is not required for Type II non-removable tapes that are typically applied for a short duration and then paved over.

NOTE 4—Skid resistance levels of 45 BPN correspond to tapes having exposed retroreflective glass beads. Higher levels of skid resistance are achievable with the addition of skid-resistant elements.

NOTE 5—For tapes with a surface pattern, results are often quite variable. These tapes may be tested in a direction parallel to the flow of traffic and 45° from the direction of traffic, and the results averaged.

7. Durability and Wear Resistance

7.1 Factors Affecting Durability and Wear Resistance:

7.1.1 Features of the pavement marking tape, such as thickness and wear surface material, may affect durability. In general, thicker materials wear longer than thinner materials of the same composition. Wear surfaces composed of harder materials, such as urethanes, may be more durable than those made of softer materials, like vinyl.

7.1.2 Roadway characteristics affect durability. Rough road surfaces, porous surfaces, and high traffic volumes tend to decrease service life of markings. A high percentage of large vehicles tends to decrease service life. Locations where vehicles encroach or turn on the markings decrease service life. Techniques and materials used for control of ice and snow also affect durability.

7.2 Because no practical laboratory procedures have been determined to provide complete, reliable, predictive information on durability and wear resistance, the user is encouraged to seek information from alternate sources.

NOTE 6—The National Transportation Product Evaluation Program, administered by AASHTO, publishes data on the durability of many pavement marking tapes gathered from various annual test decks. These decks feature a wide variety of conditions, which may or may not be applicable to the user's needs.

8. Storage

8.1 *Storage Characteristics*—The marking tape as supplied shall have a minimum shelf life of one year from the date of purchase when stored at temperatures between 10 and 38°C (50° and 100°F).

9. Packaging and Marking

9.1 The marking tape shall be packaged in rolls and there shall be no more than 3 splices/50 m (164 ft) of length.

9.2 The tape shall be packaged in accordance with accepted commercial standards.

TABLE 1 Reflective Values for Dry Samples (mcd m^{-2}) lx-1 ($\text{mcd ft}^{-2}(\text{fc})^{-1}$)

Entrance Angle	Observation Angle	Minimum Reflective Value, (RL)	
		White	Yellow
88.76°	1.05°	500	300

10. Keywords

10.1 pavement marking; pavement marking tape; retroreflectance; tape

ANNEX

(Mandatory Information)

A1. DISCUSSION OF “30-METRE” GEOMETRY

A1.1 The European Committee for Standardization (CEN) originally developed the geometry used in this standard for measuring the retroreflectance of preformed tape (entrance angle 88.76° and observation angle 1.05°). The angles were derived using theoretically typical heights for headlamps and drivers’ eyes. These heights were further simplified by assum-

ing a single headlamp is mounted directly under the driver’s eye (see Fig. A1.1). The geometry is considered a good approximation for drivers viewing preformed tape on a flat road, 30 m ahead of a car. Practical measures of retroreflectance at distances beyond 30 m have not yet been developed.

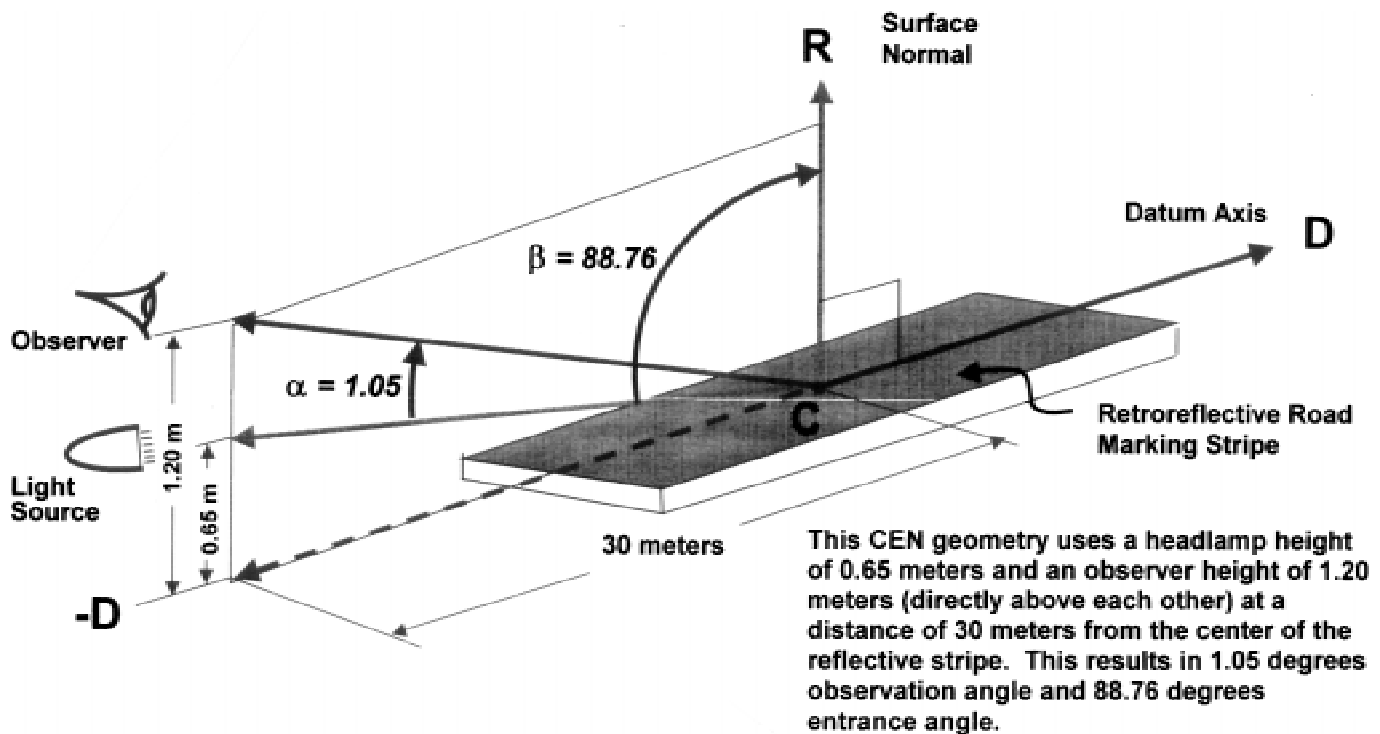


FIG. A1.1 CEN 30 Metre Geometry—Observation and Entrance Angles for Simplified CEN Car

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