STIMSONITE MODEL C80

SPECIFICATION

SPECIFICATION FOR ABRASION RESISTANT, HIGH BRIGHTNESS PRISMATIC RETROREFLECTIVE PAVEMENT MARKER **SMC80 – June 2007**

GENERAL DESCRIPTION

Markers shall consist of a durable all-thermoplastic housing. The housing shall have one or two, abrasion resistant coated prismatic retroreflecting lenses to reflect incident light from a single or opposite directions.

DETAILED SPECIFICATIONS

1. DESIGN AND FABRICATION

A. Dimensions and Construction Details

1) Housing 11.6 cm × 8.1 cm × 1.8 cm (nominal)

4.55 in × 3.20 in × 0.66 in (nominal)

2) Lens shall comprise a series of integral cells containing unmetallized prismatic cubes capable of providing total internal reflection of the light entering the lens face.

Slope of Lens	35° to base
Normal Area of Each Lens Face	16.8 sq. cm. (2.60 sq. in.)

3) The lenses will be permanently welded to the housing creating a hermetic seal for each cell.

B. Material

The marker shall be comprised of materials with adequate chemical, water and UV resistance for the intended use.

C. Surface

A coating shall be applied to the lens faces to provide a hard, durable abrasion resistant surface. The remainder of the base's outer surface shall be smooth except for purposes of identification.

The base of the marker shall be substantially free from gloss and substances that may reduce its bond to adhesive.

2. OPTICAL REQUIREMENTS

A. DEFINITIONS

Retroreflector Axis shall mean the line from the center of the lens that is in a plane parallel to the base of the marker and also in a plane perpendicular to the leading edge of the marker.

Illumination Axis shall mean the line from the center of the lens to the source of illumination.

Observation Axis shall mean the line from the center of the lens to the point of observation.

Entrance Angle shall mean the angle formed between the Retroreflector Axis and the Illumination Axis.

Observation Angle shall mean the angle formed between the Illumination Axis and the Observation Axis.

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Coefficient of Luminous Intensity (R_I) shall mean the ratio of the luminous intensity of the marker lens in the direction of observation to the illuminance at the marker lens on a plane perpendicular to the direction of the incident light. R_I is expressed in millicandelas per incident lux (mcd/lx). The corresponding English measure is Specific Intensity (SI) expressed in candles per foot candle (cd/fc). One cd/fc is equivalent to 92.9 mcd/lx.

B. OPTICAL PERFORMANCE

1) Coefficient of Luminous Intensity

For each lot select 30 markers at random for Coefficient of Luminous Intensity check. Photometer in accordance with procedure 2C. Coefficient of Luminous Intensity of each marker lens shall be not less than shown in Table 1. Failure of more than 10% of the lenses shall be cause for rejection of the lot. In this event, and at the discretion of the purchaser, a resample may be taken consisting of 40 markers at random. Failure of more than 10% of their lenses shall then be cause for rejection of the lot.

TABLE 1 COEFFICIENT OF LUMINOUS INTENSITY REQUIREMENTS

Observation Angle (degrees)	Entrance Angle (degrees)	Coefficient of Luminous Intensity mcd/lx					Specific Intensity cd/fc				
		White	Yellow	Red	Green	Blue	White	Yellow	Red	Green	Blue
0.2	0	279	167	70	93	26	3.0	1.8	0.75	1.0	0.28
0.2	20	112	67	28	37	10	1.2	0.72	0.30	0.4	0.11

2) Abrasion Resistance

Select at random five retroreflective lenses that previously passed the Coefficient of Luminous Intensity requirements as stated in Table 1. Place each retroreflective face beneath the sand drop apparatus and allow 2.5 $\pm$ 0.05 kilograms of natural silica sand from the St. Peters or Jordan sandstone deposits fall 3.00 $\pm$ 0.03 meters. The sand shall fall uniformly onto the abrasion resistive retroreflective surface of the lens at a rate of 0.4 to 1.0 kilograms per minute. Measure the Coefficient of Luminous Intensity of each abraded lens. The Coefficient of Luminous Intensity shall be not less than shown in Table 2. The failure of more than one retroreflective face shall be cause for rejection of the lot. (Note: On two color units the red lens may not be covered with the abrasion resistant coating and if so should not be abraded.)

TABLE 2 COEFFICIENT OF LUMINOUS INTENSITY REQUIREMENTS AFTER ABRASION RESISTANCE TESTING

Observation Angle (degrees)	Entrance Angle (degrees)	Coefficient of Luminous Intensity mcd/lx					Specific Intensity cd/fc				
		White	Yellow	Red	Green	Blue	White	Yellow	Red	Green	Blue
0.2	0	140	84	35	47	13	1.5	0.90	0.38	0.50	0.14
0.2	20	56	34	14	19	5	0.60	0.36	0.15	0.20	0.06

3) Optical Testing Procedure

When Coefficient of Luminous Intensity is measured at 15 m (50 ft) test distance, receptor diameter and source diameter shall each be 2.6 cm (1.0 in.). Other test distances may be used, provided they are no shorter than 7.5 m (25 ft), and provided that the receptor and source apertures each subtend 0.1° at the marker.

The testing arrangement shall have the entrance angle in a plane parallel to the base of the marker and the observation angle in a plane perpendicular to that plane. The test shall include both possible 20° entrance angles, left and right. This geometry is consistent with that in ASTM D 4280, Specification for Extended Life Type, Nonplowable, Raised Retroreflective Pavement Markers, which includes illustrations.

C. COLOR

Retroreflected color shall conform to the requirements of ASTM D 4280, when tested according to the test method therein.

3. PHYSICAL PROPERTIES

A. LONGITUDINAL FLEXURAL STRENGTH REQUIREMENTS

A random sample of three markers shall be selected for test purposes.

Condition markers at 23°±2°C (73.4°±3.6°F) for 4 h prior to testing.

In accordance with ASTM D 4280, place two 12.7 mm × 25.4 mm (0.5 in. × 1.0 in.) steel bars, each longer than the width of the marker base, on their 12.7 mm (0.5 in.) faces, onto the platen of the compression apparatus. Place durometer 70 Shore A elastomeric pads approximately 3 mm (0.12 in.) thick onto the bars. Place the marker base down onto the pads. Marker shall have its lengthwise (roadway) direction perpendicular to the two bars. Spacing of the bars shall depand on the length of the marker base, being as great as possible without the bars protruding beyond the lengthwise points of the marker base. Place a durometer 70 Shore A elastomeric pad approximately 25 mm (1 in.) thick and larger than the marker top on top of the marker. Place a third 12.7 mm × 25.4 mm (0.5 in. × 1.0 in.) steel bar, longer than the width of the marker top, on its 12.7 mm (0.5in.) face onto the top of the pad, positioned parallel to the other bars and centered over the marker top.

Apply load to the top of the marker at a rate of 5.0 mm (0.2 in.) per min through the top steel until the marker breaks. Breakage shall constitute complete rupture or other loss of integrity evidenced by a sudden decrease in load. Each marker shall withstand a load of 909 kg (2000 lb) without breakage.

B. COMPRESSIVE STRENGTH REQUIREMENTS

A random sample of three markers shall be selected for test purposes.

Condition markers at 23°±2°C (73.4°±3.6°F) for 4 h prior to testing.

In accordance with ASTM D 4280, position marker base down at the center of a 13 mm (0.5 in.) thick steel plate larger than the marker. Place a 9.5 mm (3/8 in.) thick Shore A 60 rubber pad larger than the marker atop the marker. Apply a load to the top of the marker through a 13 mm (0.5 in.) thick steel plate larger than the marker that is placed atop the rubber pad. Rate of loading shall be 2.5 mm (0.1 in.) per minute. Each marker shall withstand a load of 2727 kg (6000 lbs) without either breakage or significant deformation.