SECTION 1086

PAVEMENT MARKERS

1086-1 TEMPORARY RAISED PAVEMENT MARKERS

(A) General

Use raised pavement markers evaluated by NTPEP.

Use raised pavement markers of the prismatic reflector type, or better as approved. The markers shall be constructed either of an injection molded plastic body and base or consist of a plastic shell filled with a mixture of inert thermosetting compound and filler material. Either construction type shall contain one or more integrated prismatic reflective lenses to provide the required color designation.

The minimum reflective area of the lens face is 2.0 sq.in.

The color of the reflective pavement marker housing shall match the pavement marking color, which it supplements.

All raised pavement marker reflective lenses shall be in close conformance with the Federal Standard No. 595 colors as listed below when viewed at night.

Crystal:  Color No. 17886 (White)
Yellow:  Color No. 13538
Red:  Color No. 11302

(B) Adhesives

(1) Epoxy

The epoxy shall meet Section 1081.

The 2 types of epoxy adhesive which may be used are Type 6A, Standard Setting, and Type 6C, Rapid Setting. Use Type 6A when the pavement temperature is above 60°F. Use Type 6C when the pavement temperature is between 50°F and 60°F or when a fast set is desirable. Epoxy adhesive Type 6C, Cold Set, may be used to attach temporary pavement markers to the pavement surface when the pavement temperature is between 32°F and 50°F.

(2) Hot Bitumen

The hot bitumen shall meet Article 1081-3.

(3) Pressure Sensitive

As supplied by the manufacturer.

(C) Material Certification

Furnish a Type 2 material certification in accordance with Article 106-3 for all raised pavement markers before use.

1086-2 PERMANENT RAISED PAVEMENT MARKERS

(A) General

Use raised pavement markers evaluated by NTPEP. The markers shall be constructed either of an injection molded plastic body and base or consist of a plastic shell filled with a mixture of inert thermosetting compound and filler material. Either construction type shall contain one or more integrated prismatic reflective lenses to provide the required color designation. Raised pavement markers (permanent) shall be of the glass or plastic face lens type and meet Subarticle 1086-1(A). Plastic lenses shall have an abrasion resistant coating.
(1) Potted Markers

Potted marker shells shall be made of molded methyl methacrylate conforming to Federal Specification L P 380C, Type I, Class 3. Filling material shall be an inert thermosetting compound selected for strength, resilience, and adhesion adequate to meet physical requirements of the Standard Specifications. Sand or other inert granulars shall be embedded in the surface of the inert thermosetting compound and filler material before its curing to provide a surface, which will readily bond to the adhesive.

(2) Injection-molded Markers

Injection-molded markers shall consist of polymer materials selected for strength and resilience adequate to meet the physical requirements of the Standard Specifications. The bottom surface of the marker shall contain grooves or nonsmooth structure designed to increase bonding with the adhesive.

(B) Optical Requirements

All optical performance for permanent raised pavement markers shall conform to ASTM D4280.

(C) Physical Properties

All physical properties for permanent raised pavement markers shall conform to ASTM D4280.

(D) Hot Bitumen Adhesives

Use hot bitumen adhesive for mounting the pavement markers to asphalt concrete roadways. The hot bitumen adhesive shall meet the requirements of Article 1081-3. Other adhesives such as epoxy or cold bituminous adhesive pads are not acceptable on asphalt concrete roadways for permanent applications.

(E) Epoxy Adhesives

Use epoxy adhesive for mounting the pavement markers to concrete roadways. The epoxy adhesive shall comply with Section 1081. Other adhesives such as hot and cold bituminous or adhesive pads are not acceptable on concrete roadways for permanent applications.

(F) Material Certification

Furnish a Type 2 material certification in accordance with Article 106-3 for all raised pavement markers before use.

1086-3 SNOWPLOWABLE PAVEMENT MARKERS

(A) General

Use snowplowable pavement markers evaluated by NTPEP. The snowplowable pavement marker shall consist of a cast iron housing with one or more glass or plastic face lens type reflective lenses to provide the required color designation. Shape the casting to deflect a snowplow blade upward in both directions without being damaged. Incorporate into the casting 2 parallel keels and a connecting web designed to fit into slots cut into the road surface. Plastic lens faces shall use an abrasion resistant coating.

Use recycled snowplowable pavement which markers that meet all the requirements of new snowplowable pavement markers except Subarticle 1086-3(B)(1). Recycled snowplowable pavement markers with minimal variation in dimensions are acceptable only when the reflector fits in the casting of the recycled snowplowable pavement marker as originally designed.
Section 1086

(B) Castings

1. Dimensions

   The dimension, slope and minimum area of reflecting surface shall conform to dimensions as shown in the plans. The minimum area of each reflecting surface shall be 1.44 sq.in.

2. Materials

   Use nodular iron in accordance with ASTM A536.

3. Surface

   The surface of the keel and web shall be free of scale, dirt, rust, oil, grease or any other contaminant which might reduce its bond to the epoxy adhesive.

4. Identification

   Mark the casting with the manufacturer's name and model number of marker.

(C) Reflectors

1. General

   Laminate the reflector to an elastomeric pad and attach with adhesive to the casting. The thickness of the elastomeric pad shall be 0.04".

2. Reflector Type

   (a) One-direction, one color (crystal)
   (b) Bidirectional, one color (yellow and yellow)
   (c) Bidirectional, two colors (red and crystal)
   (d) Bidirectional, two colors (red and yellow)

   All pavement marker reflective lenses shall be in close conformance with the Federal Standard No. 595 colors as listed below when viewed during night situations.

       Crystal: Color No. 17886 (White)
       Yellow:  Color No. 13538
       Red:     Color No. 11302

3. Reflector Optical Requirements

   (a) Definitions

       Define “horizontal entrance angle” as the angle in the horizontal plane between the direction of incident light and the normal to the leading edge of the marker.

       Define “observation angle” as the angle, at the reflector, between observer's line of sight and the direction of the light incident on the reflector.

       Define “specific intensity (S.I.)” as candlepower of the returned light at the chosen observation and entrance angles for each footcandle of illumination at the reflector.

       \[ S.I. = RL \times (D \times D) \times IL \]

       Where:

       \[ S.I. \quad \text{Specific Intensity} \]
       \[ RL \quad \text{Reflected Light} \]
       \[ IL \quad \text{Incident Light} \]
       \[ D \quad \text{Test Distance} \]
Section 1087

1087-1 GENERAL

Yellow and white pavement markings shall be retroreflective. Black pavement markings shall be matte, non-retroreflective.

The material manufacturer has the option of formulating the pavement marking material according to his own specifications; however, the manufacturer shall meet all the minimum requirements specified herein.

All pavement marking materials, pigments, beads and resins shall be free from all skins, dirt and foreign objects.