

**SPECIFICATION FOR LOW PROFILE, TWO WAY PLOWABLE, ALL WEATHER,  
ABRASION RESISTANT, PRISMATIC, RETROREFLECTIVE PAVEMENT MARKER**

**GENERAL DESCRIPTION**

Marker shall consist of an iron casting to which is attached a replaceable prismatic retroreflector for reflecting light from a single or opposite directions. Both ends of a bi-directional casting are shaped to deflect a snowplow blade. The bottom of the casting shall incorporate two parallel keels and an arcuately shaped web designed to fit into a grooved surface.

**DETAILED SPECIFICATIONS**

**1. CASTING**

**A. Dimensional Details**

Overall dimensions shall be approximately 10.00 in. long by 5.50 in. wide and 1.76 in. high (25.4 cm x 13.97 cm x 4.47 cm). Installed height shall be approximately 0.25 in. (0.635 cm) above the road surface.

**B. Material**

Nodular iron, conforming to Specification ASTM-A536-84, Grade 72-45-05, hardened to 51-55 RC.

**C. Surface**

Surface of the keel and web shall be free of scale, dirt, rust, oil, grease or any other contaminant which may reduce its bond to the installation adhesive.

**D. Weight**

Approximately 4.9 lbs. (2.23 kg).

**E. Identification**

Casting shall be marked with manufacturer's name and model number of marker.

**2. REFLECTOR**

Reflectors shall consist of an acrylic plastic shell filled with tightly adherent potting compound. The shell shall contain one or two prismatic reflective faces to reflect incident light from a single or opposite directions. The reflector shall be laminated to an elastomeric pad and adhesively attached to the casting.

**A. Design and Fabrication**

1. Construction Details

Dimensions	4 in. x 2 in. x 0.48 in. (nominal) (10.16 cm x 5.08 cm x 1.22 cm)
Slope of Reflecting Surface	30°
Area of Reflecting Surface	1.87 in. <sup>2</sup> (12.06 cm <sup>2</sup> )
Thickness of Elastomeric Pad	.04 in. (1 mm)

2. Material

The shell shall be molded of methyl methacrylate conforming to ASTM D788, Type PMMA0133. The filler shall be a potting compound selected for strength, resilience and adhesion adequate to pass the necessary physical requirements.

3. Surface

Thin untempered glass shall be bonded to the prismatic retroreflective faces to provide an extremely hard and durable abrasion resistant surface. The outer surface of the shell shall be smooth except for purposes of identification.

**B. Optical Requirements**

1. Definitions

Horizontal entrance angle shall mean the angle in the horizontal plane between the direction of incident light and the normal to the leading edge of the reflector.

Observation angle shall mean the angle at the reflector between observer's line of sight and the direction of the light incident on the reflector.

Specific intensity (S.I.) shall mean candlepower of the returned light at the chosen observation and the entrance angles for each foot candle of illumination at the reflector on a plane perpendicular to the incident light.

2. Optical Performance

a) Steel Wool Abrasion Procedure

Form a 1 in. diameter flat pad using #3 coarse steel wool per Federal Specification FF-W-1825. Place the steel wool pad on the reflector lens. Apply a load of 50 pounds (23 kg) and rub the entire lens surface 100 times. (Note: On two color units, the red lens may not be glass covered and if so should not be abraded.)

b) Specific Intensity

After abrading the lens surface, using the above steel wool abrasion procedure, the specific intensity of each white (clear) reflecting surface at 0.2° observation angle shall not be less than the following when the incident light is parallel to the base of the reflector.

Horizontal Entrance Angle	S.I.
0°	3.0
20°	1.2

For yellow reflectors, the specific intensity shall be 60% of the value for white. For red reflectors, the specific intensity shall be 25% of the value for white.

## c) Optical Testing Procedure

A random lot of reflectors shall be tested. The reflector to be tested shall be located with the center of the reflecting face at a distance of 5 feet (1.52 m) from a uniformly bright light source having an effective diameter of 0.2 inches (.51 cm).

The photocell shall be an annular ring .37 in. I.D. x .47 in. O.D. (.94 cm I.D. x 1.19 cm O.D.) It shall be shielded to eliminate stray light. The distance from light source center to the center of the photo active area shall be 0.21 inches (.53 cm). If a test distance of other than 5 feet (1.52 m) is used, the source and receiver dimensions and the distance between source and receiver shall be modified in the same proportion as the test distance.

Failure of more than 4% of the reflecting faces shall be cause for rejection of the lot.

**C. Impact Test**

(Note: On two color units, the red lens may not be glass covered and if so should not be subjected to impact test.)

## 1. Sampling

A random sample of markers, to provide 20 lenses for testing, shall be selected from each lot.

## 2. Impact Testing

Remove reflectors from the castings and scrape adhesive residue from the bottom of the reflectors. Condition the reflectors in a convection oven at 130°F for one hour. While at the elevated temperature, impact the reflective face by allowing a 0.42 lb. (190 gm) dart fitted with a 0.25 in. (0.64 cm) radius spherical head to drop 18 in. (45.7 cm) perpendicularly onto the center of the reflective surface. Cracks in the impact area shall be generally concentric in appearance. There shall be no more than two radial cracks longer than 0.25 in. (0.64 cm). There shall be no radial cracks extending to the edge of the glass.

## 3. Temperature Cycling

Subject samples to 3 cycles of 140°F (60°C) for 4 hours followed by 20°F (-7°C) for 4 hours. There shall be no cracking or delamination of the glass following temperature cycling.

## 4. Tolerances

In either the impact or temperature cycling test, if 90% (18 lenses) of the test samples meet the above requirements, the lot shall be acceptable. Failure of 4 lenses of the sample shall be cause for rejection of the lot. Failure of 3 lenses shall necessitate a resample of 20 additional lenses. Failure of more than one lens of the resample shall be cause for rejection of the lot.