

ITEM 100 CURVED DRIVEABLE FLEXIBLE DELINEATORS

1. Description

This specification covers the minimum material, mechanical and performance requirements of a continuous glass reinforced Composite Marker. This product may be used to provide daytime and nighttime delineation for roadways or other marking applications requiring assured long - term outdoor durability, vandal resistance as well as vehicle and direct tire impact resistance.

2. General Requirements

2.1 Design

The composite marker shall be a single piece marker capable of simple, permanent installation by one person using a manual driving tool. The composite marker upon proper installation shall resist displacement from wind and vehicle impact forces. The composite marker shall be of a constant curved cross sectional design which provides sheeting protection and structural rigidity. The bottom end of the marker shall be pointed for ease of ground penetration.

2.2 Material

The composite marker shall be constructed of a durable, UV resistant, continuous glass fiber reinforced, thermosetting composite material which is resistant to impact, ozone, and hydrocarbons within a service temperature range of -40 F to +140 F.

2.3 Workmanship

The composite marker shall exhibit good workmanship and shall be free of bums, discoloration, cracks, bulges or other objectionable marks which would adversely affect the marker's performance or serviceability.

2.4 Marking

Each composite marked shall be permanently identified with the manufacturer's name and the month and year of fabrication. The letters shall be a minimum of 3/8-inch in height, and permanently affixed to the rear of the marker. A black line shall be stamped horizontally across the front of the marker near the bottom to indicate proper burial depth.

3. Physical And Mechanical Requirements

3.1 Dimensions

The composite marker shall conform to the shape and overall dimensions shown in Figure 1.

3.1.1 Width

The nominal composite marker width shall be 4.0 inches in order to accommodate a three-inch wide reflector and provide adequate daytime delineation.

3.1.2 Length

The composite marker shall have a length of 62 inches and provide the required height above the road surface with a minimum embedment depth of 18 inches.

3.2 Mechanical properties

The composite marker shall have the minimum mechanical properties as follows:

PROPERTY	ASTM TEST METHOD	MINIMUM VALUE
Ultimate Tensile Strength	D-638	75,000 psi
Ultimate Compressive Strength	D-638	60,000 psi
Specific Gravity	D-792	1.7
Weight & Glass Reinforcement	D-2584	50%
Barcol Hardness	D-2583	47

3.3 Color Fastness

The composite marker shall be white and pigmented throughout the entire cross-section so as to produce a uniform color which is an integral part of the material. Ultraviolet resistant materials shall be incorporated in the construction to inhibit fading or cracking of the delineator upon field exposure.

3.4 Deflection

Deflection tests shall consist of a two-pound load suspended from one end of the composite marker while the other end is clamped to a support in cantilevered fashion, Horizontally, the distance from the fulcrum to the weight shall be 48 inches. The maximum allowable free end deflection shall be seven inches.

3.5 Temperature Resistance

3.5.1 Hot Resistance Flexibility

A four foot composite marker shall be conditioned for a minimum of two hours at $140^{\circ} \text{ F} + 3^{\circ} \text{ F}$. The unit shall be held at the bottom end in a vertical position and the top end bent 90° such that it parallels the floor. The marker shall return to within 5° of the upright position within 30 seconds. The bend test shall be repeated three times in quick succession, completing the test within 2.5 minutes of post removal from the conditioning temperature.

3.5.2 Cold Resistance / Flexibility

A four foot composite marker shall be conditioned for a minimum of two hours at $-40^{\circ} + 3^{\circ} \text{ F}$. The unit shall then be held at the bottom end in a vertical position and the top end bent 90° such that it parallels the floor. The marker shall return to within 5° of the upright position within 30 seconds. The bend test shall be repeated three times in quick succession, completing the test within 2.5 minutes of post removal from the conditioning temperature.

3.5.3 Cold Impact Resistance

The composite marker shall be conditioned a minimum of two hours at $-40^{\circ} \text{ F} + 3^{\circ} \text{ F}$. A minimum two pound spherical weight shall be dropped a distance of five feet through a virtually frictionless vertical guide to impact the surface of the marker at midsection. The surface of the post being struck by the steel ball shall be in a horizontal position with the post supported and held in position at both ends. The post shall be subjected to five impact tests concentrated near the middle of the post within 10 minutes from the removal from the environmental chamber. Fracturing, cracking, or splitting of the posts shall constitute failure.

Another marker shall be struck flush against a flat solid surface three times within two minutes after removal from the conditioning chamber. To strike the delineator it should be manually swung through a 90° arc, and the delineator shall not fracture or shatter upon impact.

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3.6 Vehicle Impact Resistance

The composite marker shall be capable of self-erecting and remain functional after being subjected to a series of ten head-on impacts by a typical passenger sedan at 55 m.p.h. The composite marker shall retain a minimum of 60% of its sheeting. The marker shall also be capable of self-erecting after a direct tire rollover.

4. Reflectors

4.1 Description

The reflector shall be white and be of impact resistant, pressure sensitive high-intensity retroreflective sheeting which shall be subject to approval by the ordering agency.

4.2 Mounting

The retroreflective sheeting shall consist of a minimum of a twelve inch long and a three-inch wide strip placed a maximum of two inches from the top of the post.

5. Specification Summary

- a) Material - Composite
- b) Width - 4"
- c) Length - 62"
- d) Color - White
- e) Sheeting - 3" x 12' White - High Intensity