

GLASFORMS PRODUCT SPECIFICATION FOR (FLEX-TOUGH) REINFORCED COMPOSITE MARKER

1 SCOPE

This specification covers the minimum material, mechanical and performance requirements of Glasforms continuous glass fiber reinforced FLEX-TOUGH Composite Marker. This product may be used to provide daytime and nighttime delineation for utilities or other marking applications requiring assured long-term outdoor durability, vandal resistance, and impact resistance.

2 GENERAL REQUIREMENTS

DESIGN & MATERIAL

The FLEX-TOUGH Marker shall be a single piece marker capable of simple, permanent installation by one person using a manual driving tool. The FLEX-TOUGH upon proper installation shall resist displacement from wind and vehicle impact forces. The FLEX-TOUGH shall be of a constant I-Beam design with thicker middle cross sectional design with reinforcing support ribs incorporated longitudinally along each edge to provide sheeting protection and structural rigidity. The bottom end of the marker shall be pointed for ease of ground penetration.

The FLEX-TOUGH Marker will 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 -80°F to +160°F.

3 PHYSICAL AND MECHANICAL REQUIREMENTS

3.1 DIMENSIONS

The FLEX-TOUGH Marker shall conform to the shape and overall dimensions shown in the approved drawing. The nominal FLEX-TOUGH Marker width shall be 3.84 inches in order to accommodate a three inch wide reflector or 2.875" decal and provide adequate daytime visibility. The FLEX-TOUGH shall be of such length to provide the required height above the road surface with a minimum embedment depth of 18 inches.

3.2 MECHANICAL PROPERTIES

The FLEX-TOUGH shall have the minimum mechanical properties as follows:

<u>PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>MINIMUM VALUE</u>
Ultimate Tensile Strength	D-638/D-3916	75,000 psi
Ultimate Compressive Strength	D-695	50,000 psi
Specific Gravity	D-792	1.8
Weight % Glass Reinforcement	D-2584	60%
Barcol Hardness	D-2583	50
Flexural Strength	D-4476/D-790	60,000 psi
Flexural Modulus	D-4476/D-790	3,300,000 psi

3.3 COLOR FASTNESS

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

3.4 TEMPERATURE RESISTANCE

3.4.1 Hot Resistance/Flexibility

A four foot FLEX-TOUGH Marker shall be conditioned for a minimum of two hours at $140^{\circ}\text{F} \pm 3^{\circ}\text{F}$. 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.

3.4.2 Cold Resistance/Flexibility

A four foot FLEX-TOUGH Marker shall be conditioned for a minimum of two hours at $-40^{\circ}\text{F} \pm 3^{\circ}\text{F}$. 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.

3.4.3 Cold Impact Resistance

The FLEX-TOUGH shall be conditioned a minimum of two hours at $-40^{\circ}\text{F} \pm 3^{\circ}\text{F}$. 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 mid section. 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. Excessive 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 marker it should be manually swung through a 90° arc, and the marker shall not fracture or shatter upon impact.

3.5 VEHICLE IMPACT RESISTANCE

The Glasforms FLEX-TOUGH Marker shall be capable of self-erecting and remain functional after being subjected to a series of ten impacts by a typical passenger sedan at 35 m.p.h. The FLEX-TOUGH shall retain a minimum of 60% of its sheeting.