

**Specification
for
QM-375
Fiber Glass Composite
Single Piece, Driveable,
Flexible, Utility Marker**

I. SCOPE:

This document specifies the physical, material, mechanical, and performance requirements of the QM-375. The intended use for this product includes single sided or dual sided, ground mount marker to identify buried utilities. The QM-375 may also be used for delineation of highways and roadways in daytime and nighttime in areas which require long-term outdoor durability, vandal resistance, and vehicular impact resistance.

II. GENERAL

A. CONSTRUCTION

The QM-375 shall be a single piece capable of being driven into the soil on a utility right of way or roadway shoulder using a manual driver operated by a single person. The installed marker shall resist dislocation due to vandalism, wind loads, and vehicle impact.

B. DESIGN

The QM-375 shall be a three longitudinal rib design for mechanical stiffness and stability as shown in figure 1. The center rib shall be incorporated into the web section of the marker to provide symmetry. The outer ribs shall provide protection for retro-reflective sheeting or warning decals placed on the web section. The web section shall accommodate sheeting or decals up to three inches wide. One end of the marker shall be pointed to ease ground penetration.

C. MATERIAL

QM-375 shall consist of continuous glass fiber reinforcements entirely imbedded in durable, fully cured, unsaturated polyester resin. The resulting composite shall function as a single material which shall be resistant to its intended environment including outdoor temperature extremes, ultra-violet radiation, ozone, moisture, and hydrocarbons.

D. WORKMANSHIP

The QM-375 shall exhibit good workmanship and shall be free of internal cracks, voids, uncoated fibers, burns, discolorations, contamination, and other objectionable marks or defects which would adversely affect the appearance, performance or serviceability of the marker.

E. QUALITY CONTROL

1. Raw Materials

All raw materials used in the construction of the QM-375 shall be tested and certified as complying to established standards.

2. Processing

All processing conditions shall be maintained to within established limits and recorded on a regular basis. Those records shall be monitored by supervision and management for compliance.

3. Inspection

Finished product shall be inspected by the responsible production personnel and their supervision. Samples of product shall be tested for compliance to this specification on a regular basis.

III. PHYSICAL REQUIREMENTS

A. DIMENSIONS

The QM-375 shall conform to the drawing in figure 1.

1. Width

The nominal width of the QM-375 shall be 3 15/16 inches with 3.0 inches minimum between the outside rails so as to accommodate retro-reflective sheeting or warning decals.

2. Length

The QM-375 shall be of such length to accommodate the customer specified above ground height and a minimum burial depth of 18 inches. Typical height is 48 inches, and depth is 18 inches, thus marker is typically 66 inches long. Marker length shall be held to +/- 0.25 inch of specified length.

B. BASE ANCHORING

The QM-375 shall facilitate permanent installation in typical roadway shoulder soils while resisting overturning, twisting and displacement from wind, or impact forces or from vandalism. The marker shall be held in place by the frictional resistance and hydrostatic force over 18 to 24 inch burial depth. Detailed installation instruction shall be made available.

C. COLOR

The QM-375 shall be available in a variety of colors to be specified and approved by the customer. Typically markers are white, yellow, orange, red, green, or brown. White markers shall not exceed a yellowness index of 12 when tested in accordance with ASTM D-1925 or E-313. The daylight 45 degrees, 0 degrees luminous directional reflectance shall be a minimum of 70% when tested in accordance with ASTM E-97. The QM-375 shall be uniform color throughout its construction.

D. COLOR FASTNESS

The resin for the QM-375 shall be formulated to resist cracking, chalking and color change outdoors. Marker samples may be exposed to 1000 hr of weatherometer exposure with negligible color change.

E. MECHANICAL PROPERTIES

The QM-375 shall have the following minimum mechanical properties:

<u>Property</u>	<u>ASTM Test Method</u>	<u>Minimum Value</u>
Tensile Strength	D-638	65,000 psi
Compressive Strength	D-695	45,000 psi
Wt. % Reinforcement	D-2584	50%
Barcol Hardness	D-2583	45

F. CHEMICAL RESISTANCE

The QM-375 shall show no change in color, flexibility, or integrity when left coated for 48 hrs with commonly used herbicides.

IV. PERFORMANCE REQUIREMENTS

A. TEMPERATURE RESISTANCE

The QM-375 shall remain functional in the temperature range of -40 to +140 F for long term exposure and short term excursions to 500F.

1. Heat Resistance

A marker shall be capable of being conditioned for two hours in an oven set for 140 F, minimum. Following the conditioning, the marker shall be bent through an angle of 180 degrees at its midpoint, and released so that it returns to its original attitude in five repetitions within 5 minutes while maintained at that elevated temperature.

2. Cold Resistance

A marker shall be capable of being conditioned for two hours at -40 F, maximum and shall pass either or both of the following evaluations:

a. Flexibility: The marker shall be bent through an angle of 180 degrees at its midpoint, and released so that it returns to its original attitude in five repetitions within 5 minutes of being removed from the conditioning chamber.

b. Impact: A steel ball weighing 5 pounds shall be dropped a distance of 5 feet through a virtually frictionless guide to impact the horizontally fixed surface of the marker. The marker shall be impacted five times within 5 minutes of being removed from the conditioning chamber without any indication of cracking, splitting or other evidence of damage, or,

A marker shall be struck flush against a flat solid surface three times within two minutes of removal from the conditioning chamber without fracture, cracking, splintering or other damage.

3. Flame Resistance

When tested as per ASTM D 3801, Standard Test Method for Measuring the Comparative Extinguishing Characteristics of Solid Plastics in a Vertical Position, a marker shall have a flaming time of less than 5 seconds and shall not drip molten or flaming material.

B. DEFLECTION

A marker shall be capable of having a 48 inch long section freely cantilevered horizontally and supporting a 2 pound weight attached to the free end. The deflection at the free end shall not exceed 10 inches.

C. IMPACT RESISTANCE

A properly installed marker shall be capable of being impacted by a common passenger sedan, under the conditions listed below and return upright while retaining 60% of the sheeting area.

1. Slow Speed Impact: Ten impacts at 35 mph with the marker facing the traffic, or,
2. High Speed Impact: Five impacts at 55 mph with the marker turned 15 degrees from the traffic to simulate an errant vehicle.

D. DITCH BURN

Markers shall remain functional following exposure to small grass fires or controlled ditch burns.

V. REFLECTORS and DECALS

Reflectors and decals will typically be impact resistant with pressure sensitive adhesive in the color, type, and configuration as specified by the customer.

VI. PACKAGING

Markers will generally be packaged in bundles of 20 pieces each wrapped with plastic stretch wrap. Shipping units shall be adequately marked to identify item, description, and quantity. Specific customer requirements will be honored.

Quantum Flex QM - 375 Specifications

Material:	Glass Reinforced Polyester Composite
Weight:	0.62 lbs per foot
*Standard Lengths:	62, 66, 72, 78, 84 & 90 inch
Width:	3 15/16 inch
* Standard Colors:	White, Orange, Yellow, Blue, Green, Red & Brown

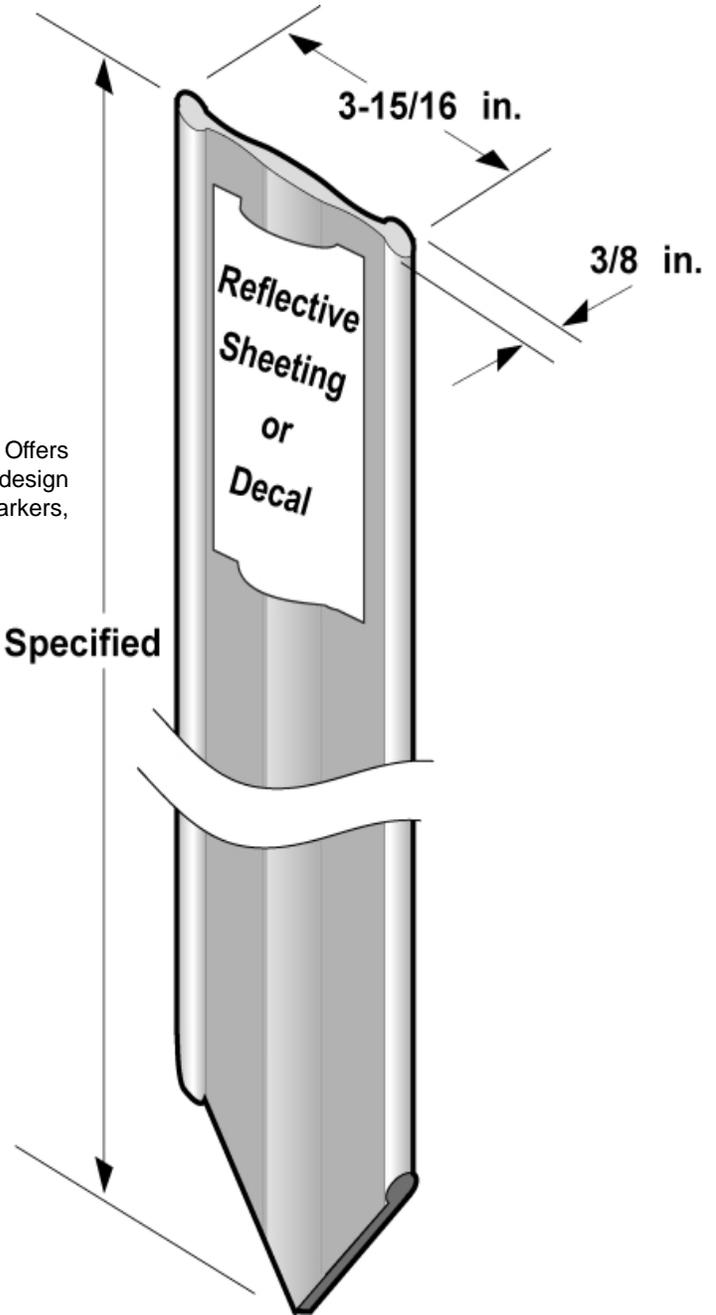
A high performance marker designed for roadside delineation applications. Offers the best choice for overall visibility and flexibility. The unique symmetrical design combines the strength and installation characteristics of standard flat markers, with the lower bending radius associated with curved type markers.

EASY INSTALLATION



Installation is easy as 1, 2, 3!

1. Insert marker into driver.
2. Rotate driver with marker into position.
3. Drive marker with a series of light taps.
(Brace your foot against marker to stabilize during installation)



The symmetrical three rib profile optimizes rigidity, stability and flexibility. This provides an unobstructed recessed message area on both sides of the marker, offering protection of the warning message.

* Custom colors or lengths available upon request