

**704 CERAMIC PAVEMENT MARKERS.**  
**(REV 12-17-93) (FA 8-4-98) (7-00)**

PAGE 772. The following new Section is added after Section 701.

**SECTION 704**  
**CERAMIC PAVEMENT MARKERS**

**704-1 Description.**

Furnish and install non-reflective and reflective ceramic pavement markers which appear on the Qualified Products List, at locations designated in the plans.

(a) Types:

Provide Type 1 Markers having amber bi-directional reflective faces.

Provide Type 2 Markers having bi-directional reflective faces, with one face that is colorless and the other face colored red.

Provide Type 3 Markers having bi-directional reflective faces, with one face colored red and the other face colored amber.

Provide Type 4 Markers having an amber mono-directional reflective face.

Provide Type 5 Markers having a colorless mono-directional reflective face.

(b) Class:

For Class A Markers, meet the coefficient of luminous intensity requirements of ASTM D 4280, without abrasion.

For Class B Markers, meet the coefficient of luminous intensity requirement of ASTM D 4280, after abrasion.

Class C Markers are non-reflective.

**704-2 Materials.**

**704-2.1 General:** The markers shall consist of heat fired, vitreous, ceramic body with a heat-fired, opaque, glazed top surface. The marker shall be manufactured from a mixture of intimately mixed clays. The markers shall be thoroughly and evenly matured with uniform shrinkage.

The markers shall have a maximum width of 5 inches [125 mm] with the exception that markers specified outside the traveled way may have a maximum width of 6 inches [150 mm]. Each marker shall have a maximum installed height of 1 inch [25 mm]. The minimum area of each reflective face shall be 1 in<sup>2</sup> [645 mm<sup>2</sup>].

**704-2.2 Strength Requirements:** The markers shall meet the following compressive load test:

A random sample of five markers shall be tested in accordance with Florida Test Method FM 5-541. Markers tested shall have a compressive strength as follows:

A. Minimum average of five markers, 6,000 lbs [27 kN].

B. Minimum for any individual marker, 5,000 lbs [22 kN].

**704-2.3 Color Requirements:** The diffuse day color shall comply with the following color requirements. Color requirements are defined by an enclosed area formed by using the following CIE chromaticity coordinates as corner points and the listed Y reflectance limits.

COLOR	CHROMATICITY POINTS		REFLECTIVE LIMITS
	x	y	Y
White	0.290	0.316	70 minimum
	0.310	0.296	70 minimum
	0.330	0.321	70 minimum

	0.310	0.342	70 minimum
Yellow	0.435	0.485	50 minimum to 70 maximum
	0.445	0.435	50 minimum to 70 maximum
	0.544	0.456	50 minimum to 70 maximum
	0.516	0.484	50 minimum to 70 maximum
Black	0.320	0.490	
	0.330	0.380	
	0.400	0.430	
	0.400	0.510	
The color shall be determined in accordance with Florida Test Method FM 5-541.			

**704-2.4 Physical Requirements:** The markers shall meet the following physical requirements:

A. Glaze Thickness: The top glazed surface shall have a mean thickness of not less than 0.005 inch [0.13 mm] when measured not closer than 0.25 inch [6 mm] from the edge of the marker. The thickness shall be measured on a fractured edge with a calibrated scale microscope.

B. Autoclave: The glazed surface shall not craze, spall or peel when subjected to one cycle of the autoclave test ASTM C 424 at 250 psi [1.7 MPa].

C. Water Absorption: The water absorption of the marker shall not exceed 1.0% of the original dry weight when tested in accordance with the ASTM C 373.

**704-2.5 Certification Required:** Furnish the Engineer with six certified copies of a test report from the producer with certification that the material meets these Specifications.

### **704-3 Installation Requirements.**

Place the ceramic markers in accordance with the plans and as directed by the Engineer. Prior to applying the adhesive, remove all material which would adversely affect the bond of the adhesive to the pavement, using a method approved by the Engineer.

Use an adhesive recommended by the marker manufacturer which appears on the Qualified Products List to bond the markers to the pavement.

Do not place markers when the pavement surface temperature is lower than 60°F [15°C].

Mix the adhesive with a fixed ratio positive displacement metering system supplied by pumps for accurately dispensing quantities of dual components in ratios of 1:1 by volume. The Engineer will not permit hand mixing.

Apply the adhesive in sufficient quantity to ensure the following:

A. 100% of the bonding area of the marker is in contact with the adhesive.

B. The marker does not contact the pavement surface but sits on an adhesive “cushion”.

C. The adhesive will be forced out and around the entire edges and corners of the marker, when the marker is pressed onto the pavement.

Remove any excess adhesive or other foreign material on the markers immediately after placement.

Ensure, that when the project is complete, the markers are firmly bonded to the pavement, lines formed by the markers are true, and the entire installation presents a neat appearance.

### **704-4 Replacement Requirements.**

If more than 2% of the markers fail in adhesion within the first 45 days under traffic, replace all failed markers at no cost to the Department.

If more than 5% of the markers fail in adhesion during the initial 45 day period, the Engineer will extend the replacement period an additional 45 days from the installation date of all replacement markers. At the end of the additional 45 day period, if more than 2% of all markers (initial installation and 45 day replacements combined) fail in adhesion, replace all failed markers at no cost to the Department.

**704-5 Method of Measurement.**

**704-5.1 Furnish and Install:** The Contract unit price for markers, furnished and installed, will include all equipment, labor and materials necessary to make a complete and accepted installation.

**704-5.2 Furnish:** The Contract unit price for markers, furnished will include the cost of the markers plus the cost of delivery to a place designated.

**704-5.3 Install:** The Contract unit price for markers, installed will include all equipment, labor, and material (except the markers) necessary to make a complete and accepted installation.

**704-6 Basis of Payment.**

Prices and payments will be full compensation for all work specified in this Section.

Payment will be made under:

Item No. 704- 1- Ceramic Pavement Marker - each.

Item No. 2704- 1- Ceramic Pavement Marker - each.