

**PAVEMENT MARKING MATERIALS – INTEGRATED MULTI-POLYMER MATERIALS.**

**(REV 12-17-20)**

SECTION 971 is expanded by the following new ARTICLE:

**971-11 Integrated Multi-Polymer Material.**

**971-11.1 General:** Integrated multi-polymer pavement marking material shall meet the general requirements of 971-1, with the exception of 971-1.1 and 971-1.4, and the additional requirements of this Specification.

The material shall be homogeneously composed of pigments, resins, polymers (adhesive constituent), glass spheres, and other fillers. The material shall meet the following requirements:

1. Readily extrude at temperatures of 400°F to 425°F, not to exceed 450°F, using equipment meeting the requirements of Section 712.
2. Not exude fumes that are toxic or injurious to people or property when heated to the application temperature.
3. When cooled to normal pavement temperature, materials shall produce an adherent, reflective pavement marking capable of resisting deformation by traffic.

The material shall be available in white, yellow, and black from the same manufacturer. The manufacturer shall have the option of formulating the material according to their own specifications. However, the requirements delineated in this Specification and Section 712 shall apply regardless of the type of formulation used.

**971-11.2 Packaging and Labeling:** The material shall be packaged in suitable thermo-degradable containers which will not adhere to the product during shipment and storage. Each package shall be clearly labeled with name and address of the manufacturer, color, date of manufacture, and lot number. The label shall warn the user that the material shall be heated in the range as recommended by the manufacturer. The container of material shall weigh approximately 50 pounds.

**971-11.2 Composition:**

Component	Test Method	White	Yellow	Black
Glass Spheres	ASTM D4797	46% minimum	46% minimum	n/a
TiO <sub>2</sub> , Type II Rutile		10% minimum	n/a	n/a
Organic Yellow		n/a		n/a
Resin Polymer Content	ASTM D4797	21% - 26%	21% - 26%	21% - 26%
Inert Fillers		16% - 21%	26% to 31%	n/a

**971-11.3 Glass Spheres:** Glass spheres shall meet the requirements of 971-2. The glass spheres in the intermix shall consist of 50% Type 1 and 50% Type 3.

Admin Change 3-7-22: "Integrated" typo in Heading corrected

Sieve Size (US Mesh)	Percent Passing
20	100%
50	0% - 10%

**971-11.4 Physical Properties:** Laboratory samples shall be tested in accordance with ASTM D7307 and ASTM D7308 and meet the following criteria:

Property	Test Method	Minimum	Maximum
Specific Gravity	Water displacement		2.15
Bond Strength	ASTM D4796 or ASTM C321	300 psi	
Low Temperature Stress (Cracking)	AASHTO T250 <sup>(1)</sup>	No cracking	
Gardner Impact (Room Temperature)	ASTM D5420, Section 11 <sup>(2)</sup>	60 inch-pounds	
Gardner Impact (Low Temperature)	ASTM D5420, Section 11 <sup>(3)</sup>	10 inch-pounds	
Tensile Elongation	ASTM D638 <sup>(4)</sup>	30%	
Taber Abrasion	ASTM D4060 <sup>(5)</sup>		350 mg
Flash Point	ASTM D92	500°F	

1. 72-hour freeze cycle at 15 degrees F at an application thickness of 125 mils on concrete.
2. Tested at 73.4°F, plus or minus 3°F on a concrete substrate applied at 125 mils using a 2# weight and a 0.625-inch male indenter.
3. Tested at 32°F, plus or minus 3°F on a concrete substrate applied at 125 mils using a 2# weight and a 0.625-inch male indenter.
4. Type "dog bone" configuration of a width of approximately 0.45 inches and a thickness of 0.10 inches (100 mils) with a pull rate shall be 0.25 inches per minute.
5. At 1000 cycles using CS 17 wheels with a 1,000-gram load. Test specimens shall be conditioned at room temperature for 72 hours before testing.

**971-11.5 Set to Bear Traffic:** When applied at a temperature range of 412.5°F, plus or minus 12.5°F, and at a thickness of 0.90 inch or 90 mils to 0.125 inch or 125 mils, the material shall set to bear traffic in not more than two minutes when the pavement surface temperature is 50°F, plus or minus 3°F, and not more than ten minutes when the pavement surface temperature is 130°F, plus or minus 3°F.

**971-11.6 Retroreflectivity:** The white and yellow pavement markings shall attain an initial retroreflectance of not less than 450 mcd/lx·m<sup>2</sup> and not less than 350 mcd/lx·m<sup>2</sup>, respectively. The markings shall retain a minimum retroreflectance for two years of not less than 300 mcd/lx·m<sup>2</sup> for white and not less than 250 mcd/lx·m<sup>2</sup> for yellow. The retroreflectance of the white and yellow markings at the end of the five-year service life shall not be less than 150 mcd/lx·m<sup>2</sup>. Black pavement markings must have a retroreflectance of less than 5 mcd/lx·m<sup>2</sup>.

**971-11.7 Application Properties:** Application properties shall meet the requirements of Section 712.