

SPECIFICATION**MULTI-COLOR INTERCONNECTED PREFORMED THERMOPLASTIC PAVEMENT MARKING MATERIAL**

1. **USE:** A durable, multi-color pavement overlay marking material suitable for streetscape and traffic calming purposes on public roads and private properties. The material shall be equally suitable for concrete and asphalt surfaces. The multi-color segments shall consist of a variety of colored pieces that form a pattern, oriented in such a way that no two of the same color pieces in the segment touch one another, to allow the individually colored pieces to be distinguishable from each other in order to form the pattern design. There shall be no need for a contrasting colored grout line framework to distinguish the individual pieces within a patterned material segment.

- 1.1. The material must be a resilient preformed thermoplastic product which contains a minimum of thirty percent (30%) intermixed anti-skid/anti-slip elements and where the top surface contains anti-skid/anti-slip elements. These anti-skid/anti-slip elements must have a minimum hardness of 8 (Mohs scale) and meet the following gradation:

Size Gradation		Intermix		Drop - On	
US Mesh	µm	Retained, %	Passing, %	Retained, %	Passing, %
10	2000	0 - 10%	90 - 100%		
12	1700	5 - 25%	75 - 95%		
14	1400	15 - 50%	50 - 85%		
16	1180	15 - 50%	50 - 85%	0 - 5%	95 - 100%
18	1000	10 - 30%	70 - 90%	0 - 10%	90 - 100%
20	850	0 - 5%	95 - 100%	5 - 25%	75 - 95%
25	710	0 - 2%	98 - 100%	15 - 50%	50 - 85%
30	600			15 - 50%	50 - 85%
35	500			5 - 25%	75 - 95%
40	425			0 - 10%	90 - 100%

- 1.2. The material must be resistant to the detrimental effects of motor fuels, antifreeze, lubricants, hydraulic fluids, etc.
- 1.3. The material shall be capable of being applied on bituminous and/or portland cement concrete pavements primarily by the use of an infrared heater supplied by the material manufacturer. A handheld propane heat torch supplied by the material manufacturer may be used in isolated areas. The use of a compactor or similar equipment shall not be necessary. The material must be able to be applied to asphalt and concrete surfaces without preheating the application surface to a specific temperature. The material must be capable of being affixed to green concrete (concrete that has set but not appreciably hardened). The material shall not require the portland cement concrete application areas to be cured or dried out.
- 1.4. The material must be capable of conforming to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures. It shall not be necessary to use a grid template or to make pattern grooves or other indentations in the asphalt or concrete surface prior to applying the material. It shall not be necessary to inlay the material in grooves or indentations. It shall not be necessary to heat the pavement or application surface to a specific temperature.
- 1.5. The material is typically supplied in segments measuring 24 in. (61cm) by 24 in. (61cm). The material must be factory assembled and interconnected with a compatible material, so that it is unnecessary to assemble the individual "brick" pieces at the jobsite.
- 1.6. The material must be able to be applied in temperatures down to 45°F (7.2°C) without any special storage, preheating or treatment of the material before application.
- 1.7. The material must be able to be applied to asphalt and concrete surfaces without using a grid template and without forming a pattern in the pavement substrate. Heating indicators must be evenly distributed on the surface of the material in order to ensure correct application.
- 1.8. The material must cover the entire application area and be flush across the surface. Once applied, no part of the pavement surface should be visible in the application area.
2. **MANUFACTURING CONTROL AND ISO CERTIFICATION:** The manufacturer must be ISO 9001:2008 certified for design, development and manufacturing of preformed thermoplastic, and provide proof of current certification.
3. **MATERIAL:** Must be composed of an ester modified rosin impervious to degradation by motor fuels, lubricants, etc. in conjunction with aggregates, pigments, binders, and anti-skid/anti-slip elements. Pigments and anti-skid/anti-slip elements must be uniformly distributed throughout the material. The thermoplastic material conforms to AASHTO designation M249, with the exception of the relevant differences due to the material being supplied in a preformed state, being non-reflective, and potentially being of a color different from white or yellow.

- 3.1. **Pigments:**
 - 3.1.1. **White:** The material shall be manufactured with sufficient titanium dioxide pigment to meet FHWA Docket No. FHWA-99-6190 Table 5 and Table 6 as revised and corrected.
 - 3.1.2. **Red, Blue, and Yellow:** The material shall be manufactured with sufficient pigment to meet FHWA Docket No. FHWA-99-6190 Table 5 and Table 6 as revised and corrected. The pigment system must not contain heavy metals nor any carcinogen, as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations.
 - 3.1.3. **Other Colors:** The pigment system must not contain heavy metals nor any carcinogen, as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations.
 - 3.2. **Heating indicators:** The top surface of the material shall have regularly spaced indents. These indents shall act as a visual cue during application that the material has reached a molten state allowing for satisfactory adhesion and proper embedment of anti-skid/anti-slip elements, and a post-application visual cue that the application procedures have been followed.
 - 3.3. **Skid Resistance:** The surface of the preformed thermoplastic material shall contain factory applied anti-skid material with a minimum hardness of 8 (Mohs scale). Upon application the material shall provide a minimum skid resistance value of 60 BPN when tested according to ASTM E 303.
 - 3.4. **Slip Resistance:** The surface of the preformed thermoplastic material shall contain factory applied anti-skid material with a minimum hardness of 8 (Mohs scale). Upon application the material shall provide a minimum static friction of coefficient of 0.6 when tested according to ASTM C 1028 (wet and dry), and a minimum static coefficient of friction of 0.6 when tested according to ASTM D 2047.
 - 3.5. **Thickness:** The material must be supplied at a minimum thickness of 125 mil (3.18mm).
 - 3.6. **Environmental Resistance:** The material must be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to oil and gasoline.
 - 3.7. **Interconnected:** The multi-color segments shall consist of a variety of colored pieces that form a pattern, oriented in such a way that no two of the same color pieces in the segment touch one another, to allow the individually colored pieces to be distinguishable from each other in order to form the pattern design. The individual pieces in each material segment, typically 24 in. (61cm) by 24 in. (61cm), must be factory assembled and interconnected with a compatible material so that in the field it is not necessary to assemble the individual pieces within a material segment. There shall be no need for a contrasting colored grout line framework to distinguish the individual pieces within a patterned material segment.
4. **APPLICATION:**
- 4.1. **Manufacturer Certified Applicator Requirement:** The material shall be supplied and applied only by an applicator certified by the material manufacturer. The applicator shall provide proof of current certification before commencing work. The Certified Applicator shall follow the material manufacturer's current published application procedures.
 - 4.2. **Asphalt:** The material shall be applied primarily by using an infrared heater supplied by the material manufacturer. A handheld propane heat torch supplied by the material manufacturer may be used in isolated areas. The material must be able to be applied at ambient and road temperatures down to 45°F (7.2°C) without any preheating of the pavement to a specific temperature. A sealer specified and supplied by the material manufacturer must be applied to the substrate prior to material application to ensure proper adhesion, and to provide bond reinforcement for larger volumes of material. The sealer must be supplied by the material manufacturer in 300/600ml cartridges along with sealer application supplies. A thermometer shall not be required during the application process. The pavement shall be clean, dry and free of debris. The supplier must provide current application instructions to the Certified Applicator.
 - 4.3. **Portland Cement Concrete:** The same application procedure shall be used as described under Section 4.2.
5. **PACKAGING:** The preformed thermoplastic material shall be placed in protective plastic film with cardboard stiffeners where necessary to prevent damage in transit. The cartons in which packed shall be non-returnable and shall not exceed 25 in. (64cm) in length and 25 in. (64cm) in width. Packages shall be labeled for ease of identification. The weight of the individual carton must not exceed fifty (50) pounds (23kg). A protective film around the box must be applied in order to protect the material from rain or premature aging.
6. **TECHNICAL SERVICES:** The successful bidder shall provide technical services as required.
7. **PERFORMANCE:** The preformed thermoplastic pavement overlay marking material shall meet state specifications and be approved for use by the appropriate state agency.