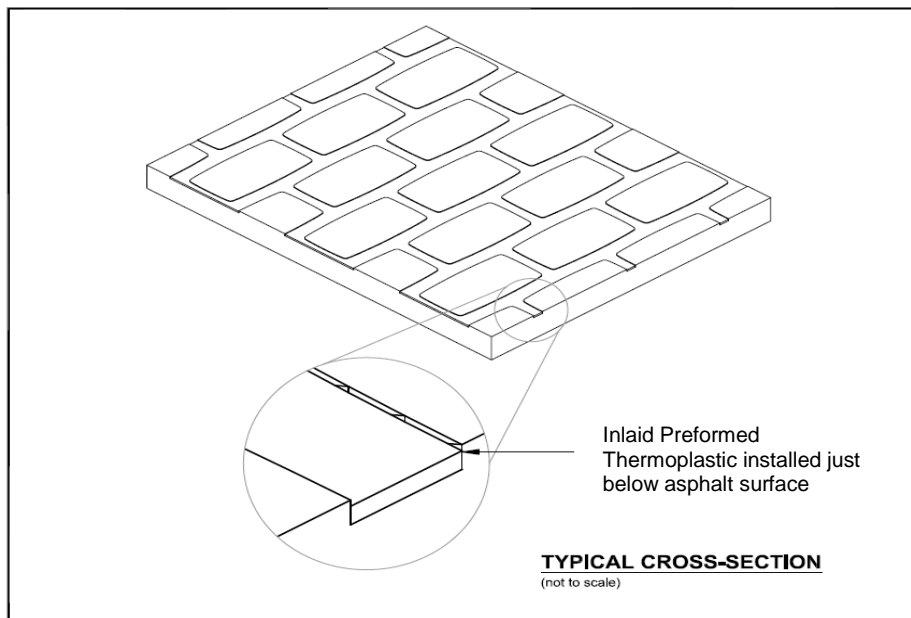


## SPECIFICATION

### Inlaid Preformed Thermoplastic Asphalt Pavement Marking System

1. **Use:** A durable preformed thermoplastic asphalt pavement marking system, inlaid just below the asphalt pavement surface to create colorized patterns within the asphalt for streetscape and traffic calming purposes on public roads and private property. The inlaid preformed thermoplastic asphalt pavement marking system is typically used on public roadway crosswalks between white crosswalk lines and on residential and commercial areas open to pedestrian and vehicular traffic.
  - 1.1. The preformed thermoplastic is inlaid into asphalt pavement using proprietary infrared heating equipment designed specifically to elevate the temperature of the asphalt without it being adversely affected. A specialized template is imprinted into the heated asphalt pavement to create depressions to match the desired pattern. The preformed thermoplastic, precut by the material manufacturer to match the imprinted pattern, is laid to fit within the depressions and melted in place using the proprietary infrared heater.
  - 1.2. As shown below in the typical cross-section, the top of the inlaid preformed thermoplastic lies slightly below the surface level of the surrounding asphalt pavement allowing the pavement to absorb the physical effects of the traffic:



- 1.3. When applied in accordance with the manufacturer's application guidelines by an applicator certified by the manufacturer, the inlaid preformed thermoplastic will wear at a similar rate as the surrounding asphalt pavement. Therefore, the life of the inlaid preformed thermoplastic is dependent upon using a long lasting, durable and stable asphalt pavement to prevent premature wear.
- 1.4. The inlaid preformed thermoplastic is available in a variety of standard patterns and colors. The primary pattern shall be created using precut preformed thermoplastic sheets that are 24 in. (.6 m) x 24 in. (.6 m). The precut patterned border pieces shall measure either 8 in. (.2 m) or 12 in. (.3 m) wide x 24 in. (.6 m) long. These sizes ensure the specified patterns are created with a minimal number of seams between the preformed thermoplastic sheets. The use of individual preformed thermoplastic strips inlaid into standard imprinted patterns to create the design shall not be allowed.
- 1.5. The inlaid preformed thermoplastic is manufactured without glass beads. The inlaid preformed thermoplastic material must be a resilient preformed thermoplastic product, which contains intermixed anti-skid/anti-slip elements with a minimum hardness of 6 (Mohs scale), and where the top surface contains factory applied anti-skid/anti-slip elements with a minimum hardness of 8 (Mohs scale).

## SPECIFICATION

### Inlaid Preformed Thermoplastic Asphalt Pavement Marking System

2. **MANUFACTURING CONTROL AND ISO CERTIFICATION:** The manufacturer must be ISO 9001:2015 certified for design, development and manufacturing of preformed thermoplastic, and provide proof of current certification.
3. **PREFORMED THERMOPLASTIC 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. 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. 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.

3.3. 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.

3.4. Thickness: The material must be supplied at a minimum thickness of 90 mil (2.3 mm).

3.5. 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.

3.6. Storage Life: The material may be stored for 12 months, if stored indoors and protected from the elements.

3.7. Transverse Lines for Inlaid Preformed Thermoplastic Crosswalk Application: Supplied as white, retroreflective preformed thermoplastic linear striping material in 90 mil (2.3 mm) or 125 mil (3.2 mm) thickness, material is available in 6 in. (.15 m), 8 in. (.20 m) or 12 in. (.30 m) widths. This material may be supplied and applied by the certified applicator in conjunction with the inlaid preformed thermoplastic system and is available from the inlaid preformed thermoplastic manufacturer. (Consult the manufacturer's published application instructions for the preformed thermoplastic linear striping material selected for proper application methods.)

#### 4. **SPECIALIZED APPLICATION EQUIPMENT:**

4.1. Stamping Templates: Designed and constructed for imprinting the specified pattern into the asphalt pavement, templates are supplied by the inlaid preformed thermoplastic manufacturer in 150 mil (3.81 mm) thickness. Standard patterned templates are designed to create crosswalks ranging from 6 ft. (1.8 m) to 20 ft. (6.1 m) wide, in 2 ft. (.6 m) width increments. Template layout drawings shall be supplied by the inlaid preformed thermoplastic manufacturer to illustrate proper template placement to create the specified pattern. Certain templates may be field assembled as needed using the manufacturer supplied template assembly kit. For crosswalk widths less than 6 ft. (1.8 m) or more than 20 ft. (6.1 m), custom templates may be designed and constructed in 2 ft. (.6 m) width increments.

## SPECIFICATION

### Inlaid Preformed Thermoplastic Asphalt Pavement Marking System

- 4.2. Heating Equipment: The inlaid preformed thermoplastic manufacturer shall distribute reciprocating infrared heating equipment designed specifically to elevate the temperature of the asphalt pavement without adversely affecting it, as well as the inlaid preformed thermoplastic material. The primary asphalt heating unit must employ a bank of propane-fired infrared heaters, mounted on a track device that allows the heater bank to reciprocate back and forth over a designated area, thereby allowing the operator to monitor the temperature of the asphalt pavement and the inlaid preformed thermoplastic at all times during the pavement heating process.
- 4.2.1. A smaller, mobile infrared heater distributed by the inlaid preformed thermoplastic manufacturer is designed specifically to heat areas such as borders and narrow areas that are inaccessible to the primary heater. This secondary heater also allows the operator to monitor the temperature of the asphalt pavement and the inlaid preformed thermoplastic at all times during the heating process.
- 4.2.2. An approved hand-held propane heat torch distributed by the inlaid preformed thermoplastic manufacturer shall be used to heat isolated areas of the asphalt pavement or inlaid preformed thermoplastic.
- 4.3. Hand Held Finishing Tool: Enables the applicator to complete the imprinting of the asphalt pavement in areas around permanent structures, such as curbs and manholes covers, which may be inaccessible to the stamping template. The hand held finishing tools are distributed by the inlaid preformed thermoplastic manufacturer.
- 4.4. Vibratory Plate Compactor (700-900 lb. / 318-408 kg): Shall be used for pressing the stamping template into the heated asphalt to create the specified pattern. The inlaid preformed thermoplastic manufacturer does not supply vibratory plate compactors.

#### 5. APPLICATION (Asphalt Substrate Only):

- 5.1. Manufacturer Certified Applicator Requirement: The material shall be supplied and applied only by an applicator certified by the manufacturer. The applicator shall provide proof of current certification before commencing work. The Certified Applicator shall follow the manufacturer's current published application guidelines.
- 5.2. Substrate Condition: The material must only be applied to a stable, high quality asphalt pavement substrate over a stable base that is free of defects per the manufacturer's published substrate guide. The asphalt pavement surface shall be dry and free from all foreign matter, including but not limited to dirt, dust, de-icing materials, and chemical residue.
- 5.3. Procedure: The asphalt pavement surface is heated with the primary reciprocating infrared heater to the appropriate temperature range to allow for surface imprinting. The stamping template in the specified pattern is imprinted into the heated asphalt pavement using the 700-900 lb. vibratory plate compactor. The preformed thermoplastic sheets, precut at the factory by the material manufacturer to match the template pattern, are laid into the pattern created by the stamping template, and heated until thoroughly molten with the primary reciprocating infrared heater. The mobile infrared heater or approved propane heat torch may be used in areas inaccessible to the primary reciprocating infrared heater. The material is then allowed to cool thoroughly before being opened to vehicle or pedestrian traffic. (Consult the manufacturer's published application procedures for complete information.)
- 5.4. The inlaid preformed thermoplastic asphalt pavement marking system shall not be applied to Portland Cement Concrete.

**5. PACKAGING:** The preformed thermoplastic material shall be vacuum sealed in protective plastic film with cardboard stiffeners to prevent damage in transit. The cartons in which standard preformed thermoplastic patterned sheets are packed shall be non-returnable and shall not exceed 25 in. in length and 25 in. in width. The cartons shall be labeled for ease of identification. The weight of an individual carton must not exceed fifty (50) pounds. The carton must be wrapped with a protective film to protect the material from rain or premature aging.

6. **TECHNICAL SERVICES:** The successful bidder shall provide technical services as required.

7. **PERFORMANCE:** The inlaid preformed thermoplastic pavement material shall meet state specifications and be approved for use by the appropriate state agency.