

**SPECIFICATION****Imprinted Aggregate Reinforced Preformed Thermoplastic Pavement Marking System**

1. **Use:** A durable imprinted aggregate reinforced preformed thermoplastic pavement marking system (herein “System”) that provides a textured, highly attractive and durable topical treatment to the surface of asphalt pavement. Typically the system replicates, in relief, the grout lines common to brick or other types of unit pavers, but may also be used to create other patterns. It is intended for use on asphalt pavements to create traffic calming solutions and decorative crosswalks, medians, intersections and through areas in parking lots. It provides a seamless, aesthetic look without the trip hazards and ongoing maintenance often associated with pavers and stamped concrete.
  - 1.1 The aggregate reinforced preformed thermoplastic is typically supplied in panels measuring 2 ft. x 2 ft. [ $\pm\frac{1}{8}$  in.] (.61m x .61m [ $\pm 3$ mm])
  - 1.2 The System must be able to be applied to asphalt surfaces without preheating the application surface to a specific temperature.
  - 1.3 The System must be able to be applied in temperatures down to 45°F (7°C) without any special storage, preheating or treatment of the material before application.
  - 1.4 The System is applied to asphalt pavement using proprietary reciprocating infrared heating equipment. A two-part epoxy sealer specified by the manufacturer must be applied to the substrate prior to preformed thermoplastic application to ensure proper adhesion, and to provide reinforcement for larger volumes of material. Immediately following sealer application, panels of aggregate reinforced preformed thermoplastic are positioned properly on the asphalt substrate. The preformed thermoplastic is then heated to the required melting temperature. Additional aggregate may be applied to the preformed thermoplastic surface as needed following the melting process, to achieve added friction properties and a uniform surface appearance. As the material is cooling, it is imprinted with a vibratory plate compactor and a template made from 3/8 in. (9.5 mm) flexible wire rope in the required design to create crisp, clean lines which define the pattern. For crosswalks, it is typically demarcated by applying white preformed thermoplastic transverse lines on both sides of the installation.
  - 1.5 The System is available in a variety of standard colors and patterns. Color can be used to create patterns within the crosswalk area to reflect the typical white “continental” crosswalk bars for additional visibility and awareness. Within certain limitations, custom patterns and colors are available upon request.
  - 1.6 The System shall utilize a resilient, aggregate reinforced 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 6 (Mohs scale).
  - 1.7 The System must be resistant to the detrimental effects of motor fuels, antifreeze, lubricants, hydraulic fluids, etc.
2. **MANUFACTURING CONTROL AND ISO CERTIFICATION:** The System manufacturer must be ISO 9001:2008 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 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.

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- 3.2 **Skid Resistance:** The surface of the material shall contain factory applied anti-skid/anti-slip elements with a minimum hardness of 6 (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 material shall contain factory applied anti-skid/anti-slip elements with a minimum hardness of 6 (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 150 mil (3.8mm).
- 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 to Supplement System Application:** Supplied as white, retroreflective preformed thermoplastic line stripe material in 90 mil (2.3 mm) or 125 mil (3.2 mm) thicknesses, material is available in 6 in. (.15m), 8 in. (.20m) or 12 in. (.30m) widths. This preformed thermoplastic material may be supplied and applied by the certified applicator in conjunction with the System, and is available from the System manufacturer. (Consult the manufacturer's published application instructions for the preformed thermoplastic line stripe material selected, for proper application methods.)

**4. SPECIALIZED APPLICATION EQUIPMENT:**

- 4.1 **Stamping Templates:** A wire rope template is required in the execution of the System. The template is used for imprinting the defined pattern once the preformed thermoplastic has been applied. The wire rope diameter for the imprinting template used for the specified pattern is 3/8 in. (9.5mm). The stamping templates are distributed by the System manufacturer.
- 4.2 **Heating Equipment:** The System manufacturer shall distribute reciprocating infrared heating equipment designed specifically to elevate the temperature of the preformed thermoplastic material and asphalt pavement without adversely affecting it. The primary 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 preformed thermoplastic at all times during the pavement heating process.
- 4.2.1 A smaller, mobile infrared heater distributed by the System manufacturer is designed specifically to heat areas such as borders and narrow areas that are inaccessible to the primary heaters. This secondary heater also allows the operator to monitor the temperature of the preformed thermoplastic at all times during the heating process.
- 4.2.2 An approved hand-held propane heat torch distributed by the System manufacturer shall be used to heat isolated areas of the preformed thermoplastic.
- 4.3 **Sealer:** A two-part epoxy sealer specified and distributed by the System manufacturer must be applied to the substrate prior to material application to ensure proper adhesion, and to provide reinforcement for larger volumes of material.
- 4.4 **Specialized Sealer Dispensing Gun:** Used to dispense the required two-part epoxy sealer onto the substrate. The sealer dispensing guns are distributed by the System manufacturer.
- 4.5 **Hand Held Finishing Tool:** Enables the applicator to complete the imprinting of the thermoplastic 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 System manufacturer.

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- 4.6 Aggregate: Supplemental anti-skid/anti-slip elements to be applied to the surface of the molten thermoplastic as needed, if the factory applied anti-skid/anti-slip elements embed too deeply into the surface of the molten thermoplastic material during the heating process. (Embedded aggregate is exposed upon wear for extended skid resistance.) The aggregate is distributed by the System manufacturer.
- 4.7 Air Powered Spray Hopper: Used to spray supplemental anti-skid/anti-slip elements (aggregate) on the surface of the molten preformed thermoplastic in a uniform manner. The air powered spray hoppers are distributed by the System manufacturer.
- 4.8 Vibratory Plate Compactor (700-900 lb.): Shall be used for pressing the 3/8" (9.5mm) wire rope stamping templates into the thermoplastic to create the specified pattern in both the thermoplastic and asphalt substrate. The System manufacturer does not supply vibratory plate compactors.

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

- 5.1 Manufacturer Certified Applicator Requirement: The System shall be supplied and applied only by an applicator certified by the System manufacturer. The applicator shall provide proof of current certification before commencing work. The Certified Applicator shall follow the System manufacturer's current published application procedures.
- 5.2 Substrate Condition: The System must only be applied to a stable, high quality asphalt pavement substrate over a stable base that is free of defects, as per the manufacturer 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 System is applied to asphalt pavement using proprietary reciprocating infrared heating equipment. The material must be able to be applied at ambient and road temperatures down to 45°F (7°C) without any preheating of the pavement to a specific temperature. A two-part epoxy sealer specified by the manufacturer must be applied to the substrate prior to preformed thermoplastic application. Immediately following sealer application, the panels of aggregate reinforced preformed thermoplastic are positioned properly on the asphalt substrate with the aggregate side facing up. The preformed thermoplastic is then heated to the required melting temperature. Additional aggregate may be applied to the preformed thermoplastic surface as needed following the melting process. As the material is cooling, it is imprinted with a stamping template made from 3/8 in. (9.5 mm) flexible wire rope in the required design using a vibratory plate compactor. The preformed thermoplastic 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 System shall not be applied to Portland Cement Concrete.

**6. PACKAGING:** The preformed thermoplastic material shall be packaged in cardboard cartons with a plastic sheet between each layer of preformed thermoplastic. The cartons in which packed shall be non-returnable and shall not exceed 25 in. (.64m) in length and 25 in. (.64m) in width. The cartons shall be labeled for ease of identification. The weight of the individual carton must not exceed seventy (70) pounds (32 kg). A protective film around the carton must be applied in order to protect the material from rain or premature aging.

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

**8. PERFORMANCE:** Where applicable, the preformed thermoplastic pavement overlay material shall meet state specifications and be approved for use by the appropriate state agency.