**SECTION 714 – PAINT AND PAVEMENT MARKINGS**

**REQUIREMENTS**

**714.02.01 CERTIFICATIONS**

***DELETE PARAGRAPH “C” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

1. Manufacturer’s lab test results must be supplied upon request of the Engineer. No pavement marking material shall be used which is not on the Qualified Products List established by the Nevada Department of Transportation.

***ADD THE FOLLOWING SUBSECTION:***

**714.03.15 PREFORMED THERMOPLASTIC PAVEMENT MARKINGS**

* + 1. A durable, high skid resistant, retroreflective pavement marking material suitable for use as interstate shields, route shields, bike path, roadway, intersection, airport, commercial or private pavement delineation and markings.
       1. The markings must be a resilient white, yellow or other color thermoplastic product, with uniformly distributed glass beads throughout the entire cross sectional area. The markings must be resistant to the detrimental effects of motor fuel, lubricants, hydraulic fluids etc. Lines, legends and symbols are capable of being affixed to bituminous and/or Portland cement concrete pavements by the use of the normal heat of a propane torch.
       2. The markings must be capable of conforming to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures. The markings shall have resealing characteristics, such that is capable of fusing with itself and previously applied thermoplastic when heated with the torch.
       3. The markings shall not have a minimum ambient and road temperature requirements for application, storage, or handling.
    2. Manufacturing Control and ISO Certification: The manufacturer must be ISO 9001:2008 certified and provide proof of current certification. The scope of the certification shall include manufacture of reflective highway markings.
    3. Material: Must be composed of an ester modified rosin resistant to degradation by motor fuels, lubricants etc. in conjunction with aggregates, pigments, binders, abrasives, and glass beads which have been factory produced as a finished product, and meets the requirements of the current edition of the Manual on Uniform Traffic Control Devices for Streets and Highways. 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.
       1. Graded Glass Beads:
          1. The material must contain a minimum of thirty percent (30%) intermixed graded glass beads by weight. The intermixed beads shall conform to AASHTO designation M247, with minimum 70% true spheres and the index of refraction shall not be less than 1.50.
          2. The material must have factory applied coated surface beads and abrasives in addition to the intermixed beads at a rate of 1 lb. (± 10%) per 10 sq. ft. These factory applied coated surface beads shall meet the following gradation:

|  |  |  |  |
| --- | --- | --- | --- |
| Size Gradation | | Retained % | Passing % |
| US Mesh | Um |
| 12 | 1700 | 0-2% | 98-100% |
| 14 | 1400 | 0-6% | 94-100% |
| 16 | 1180 | 2-25% | 75-98% |
| 18 | 1000 | 28-63% | 37-72% |
| 20 | 850 | 63-72% | 28-37% |
| 30 | 600 | 67-77% | 23-33% |
| 50 | 300 | 89-95% | 5-11% |
| 80 | 200 | 97-100% | 0-3% |

* + - 1. Pigments:
         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.
         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 yellow pigments must be organic and must be heavy-metal free.
         3. Other Colors: The pigment must be heavy-metal free.
      2. Heating indicators: The top surface of the material (same side as the factory applied surface beads) shall have regularly spaced indents. These indents shall act as a visual cue during application that the material has reached a molten state so satisfactory adhesion and proper bead embedment has been achieved and a post-application visual cue that the installation procedures have been followed.
      3. Skid Resistance: The surface, with properly applied and embedded surface beads, must provide a minimum skid resistance value of 45 BPN when tested according to ASTM: E 303.
      4. Thickness: The material must be supplied at a minimum thickness of 90 mils (2.29mm).
      5. Retroreflectivity: The preformed retroreflective markings materials upon application shall exhibit adequate and uniform nighttime retroreflectivity when tested in accordance with ASTM # 1710. The applied material must have an initial minimum intensity reading of 500 mcd·m-2·lx-1 for white and 300 mcd·m-2·lx-1 for yellow as measured with a Delta pavement marking retroreflectometer

Note: Initial retroreflection and skid resistance are affected by the amount of heat applied during installation. When ambient temperatures are such that greater amounts of heat are required for proper installation, initial retroreflection and skid resistance levels may be affected.

* + - 1. 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.
    1. Application
       1. Asphalt: The materials shall be applied using the propane torch method recommended by the manufacturer. The material must be able to be applied without minimum requirements for ambient and road temperatures and without any preheating of the pavement to a specific temperature. The material must be able to be applied without the use of a thermometer. The pavement shall be clean, dry and free of debris. Supplier must enclose application instructions with each box/package.
       2. Portland Concrete: The same application procedure shall be used as described under subsection D.1 above. However, a compatible primer sealer may be applied before application to assure proper adhesion.
    2. Packaging: The preformed thermoplastic markings shall be placed in protective plastic film with cardboard stiffeners where necessary to prevent damage in transit. Linear material must be cut to a maximum of 3-ft long pieces. Legends and symbols must also be supplied in flat pieces. The cartons in which packed shall be non-returnable and shall not exceed 40 inches in length and 25 inches in width, and be labeled for the ease of identification. The weight of individual carton must not exceed seventy (70) pounds. A protective film around the box must be applied in order to protect material from rain or premature aging.
    3. Handling: The preformed thermoplastic markings shall not be brittle and shall be sufficiently cohesive and flexible at temperatures exceeding 10°C (50°F) for one person to carry without danger of fracturing the material before installation.
    4. Technical Services: The successful bidder shall provide technical services as required.

**END OF SECTION 714**