

S T A T E

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T E N N E S S E E

(Rev. 10/12/20)

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January 1, 2021

SPECIAL PROVISION

REGARDING

WET RETROREFLECTIVE PAVEMENT MARKING

Description

This work shall consist of the placement of a Wet Retroreflective Pavement Marking that is either hot applied thermoplastic pavement marking or preformed wet retroreflective tape. All work shall be accomplished in accordance with **716** and **919** of the Standard Specifications.

The Wet Retroreflective Pavement Marking available are approved on the Department's Qualified Products List (QPL) and composed of one of the following:

A. Microcrystalline Ceramic Elements for Double Drop System

Materials

Use thermoplastic pavement marking material meeting the requirements of **919.01** except as specified, and in accordance with the Department's Sampling and Testing Guide.

Double Drop System

The double drop system shall be capable of applying microcrystalline ceramic elements at the rate of 5.29 pounds per 100 square feet of pavement marking material. Followed by an application of Type 3 glass beads at a minimum rate of 5.29 pounds per 100 square feet of pavement marking material.

Use Microcrystalline ceramic elements listed on the Department's Qualified Products List for Wet Retroreflective Pavement Markings.

Use Type 3 drop on glass beads that meet the requirements **919.01.C & D**.

Equipment

Use equipment meeting **716.03** for extruded or ribbon-dispensed thermoplastic material.

Application

Apply thermoplastic pavement marking material meeting **716.03** for extruded or ribbon-dispensed thermoplastic material, except as noted.

When applying traffic stripes and marking over existing markings, ensure that not more than 2 inches on either end and not more than 1 inch on either side of the existing line is visible.

B. Preformed Wet Retroreflective Tape

Materials

Use preformed wet retroreflective pavement marking tape meeting **716.06** and **919.03** and listed on the Department's Qualified Products List (QPL) for Preformed Tape.

Equipment

Use equipment based on manufacturer's recommendations.

Application

Apply preformed wet retroreflective pavement marking tape meeting **716.06**, except as noted. The pavement surface shall be prepared in accordance with manufacturer's recommendations.

Apply preformed wet retroreflective pavement marking tape only to dry surfaces, and when the ambient air and surface temperature is at least 40°F and rising.

On all Portland cement concrete surfaces, apply a primer, sealer or surface preparation adhesive that is recommended by the manufacturer for the specific pavement marking tape. Offset longitudinal lines at least 2 inches from construction joints of Portland cement concrete pavement.

C. Inverted Profiled Thermoplastic Pavement Marking

Materials

Use thermoplastic pavement marking material meeting the requirements of **919.01**, except as specified, and in accordance with the Department's Sampling and Testing Guide.

1. Composition

Thermoplastic pavement marking material composition shall meet the following requirements:

| Component | White | Yellow |
|--------------------------------------|-------------------|-------------------|
| Binder, % minimum | 19 | 19 |
| TiO ₂ Pigment, % minimum | 10 | N/A |
| Yellow Pigment % minimum | N/A | 5 |
| Intermix Glass Beads, % minimum | 40 | 40 |
| Calcium Carbonate/Fillers, % maximum | 31 ⁽¹⁾ | 41 ⁽¹⁾ |

⁽¹⁾ The amount of Calcium Carbonate and inert fillers shall be as recommended by the manufacturer, provided all other specifications are met.

2. Glass Beads

Use retroreflective glass beads shall meet the requirements of **919.03** and in accordance with the Department’s Sampling and Testing Guide.

3. Intermix Glass Beads

Intermix glass beads shall make up a minimum of 40% by weight of the thermoplastic formulation. These beads shall meet all requirements of AASHTO M247 Type 1 and 3 with a minimum of 80% true spheres.

4. Double Drop System

The double drop system shall be capable of applying glass beads at the specified application as specified in **919.01.E**. The retroreflective element drop-on rate shall meet or exceed Section **716** as specified by the manufacturer.

Use Type 3 drop on beads that are dual coated for moisture resistance and adhesion that meet the requirements of AASHTO M247 Type 3, and the beads shall be with 80% true spheres.

Use Type 1 drop on glass beads that are dual coated for moisture resistance and adhesion that meet the requirements of AASHTO M247 Type 1, and the beads shall be with 80% true spheres.

Equipment

Use equipment meeting **716.03** for extruded or ribbon-dispensed thermoplastic material, except as specified in Application, that will produce a consistent pattern for inverted profiled thermoplastic pavement marking. The use of rollers to place grooves in the pavement marking material utilizing a separate vehicle or grooves that are not pressed within 1 second of thermoplastic pavement marking material application will not be allowed.

Use equipment based on manufacturer's recommendations.

Application

Use equipment specially designed for placing hot thermoplastic pavement marking material in a hot molten state on the pavement surface utilizing a pressure type application method. An inverted profiled thermoplastic pavement marking die that can travel along in proximity with the road surface shall form the hot inverted profiled thermoplastic pavement markings. The die is pulled forward by a special linkage that will allow it to automatically level itself as to float and remain parallel with the road surface. The top of the die shall be enclosed and provide entry means for the hot molten thermoplastic to enter the die cavity. The bottom of the die shall contain a movable door that is remote controlled so as to start or stop the flow of thermoplastic on to the pavement surface. When the movable door is open, thermoplastic can flow through the die and will apply thermoplastic material that will be formed rearward of the advancing die. The road surface shall be at the bottom of the die enclosure. Thermoplastic material shall be fed to the die under pressure through flexible oil-jacketed stainless steel hoses. The die shall be formed from a single solid block of steel that is oil-jacketed on 4 sides to keep the die hot at all times.

The inverted profiled thermoplastic pavement marking system consists of a low-pressure drop-on type glass bead dispenser, moisture resistance bead coat. The glass beads shall be dispensed onto the hot thermoplastic material from a height of approximately 1 inch, above the road surface. The point at which the glass beads strike the surface of the pavement marking shall be approximately 3 inches, behind the strike point of the thermoplastic. The glass bead coat shall utilize Type 3 glass beads and shall provide a surface coating of 50% of the thermoplastic pavement marking surface, and at least 50% of the beads will be embedded to a depth of 60% of their diameter.

A second low-pressure drop-on glass bead dispenser capable of applying a continuous coating of glass beads shall follow approximately 10 inches behind the first bead dispenser. This second glass bead dispenser shall apply adhesion bead coat which will form a continuous drop-on coat of Type 1 glass beads immediately in front of the profile thermoplastic pavement marking die. The second coat of glass beads shall be applied with low impact so that they are not forced into the pavement marking under pressure.

The rotatable wheel for inverted profiled thermoplastic pavement marking die shall be located approximately 8 inches, behind the second bead dispenser. The inverted profiled pavement marking die shall be approximately 7 inches in diameter and shall have a plurality of spaced projections located around its circumference. The inverted profiled pavement marking die shall be wider than the pavement marking material being applied to ensure adequate coverage. The projections on the inverted profiled pavement marking die shall have an angular profiling surface set at an angle to the pavement surface. The inverted profiled pavement marking die shall be mounted with an automatic leveling device to the same carriage assembly as the thermoplastic dispenser. To ensure that no hot thermoplastic material adheres to the die as it rotates and invert profiles the pavement marking, a small air atomized water jet shall apply a thin mist of water to the rotatable die. No water droplets greater than ¼ inch in diameter shall be allowed to accumulate on the pavement surface in proximity to the freshly placed pavement marking.

All parts of the thermoplastic holding tank including manifolds, hoses, pipes, dies, etc., shall be oil-jacketed to insure accurate temperature control. The thermoplastic material shall be preheated in kettles designed specifically for that purpose. Each kettle of preheated thermoplastic material shall be properly mixed and heated to the correct application temperature. The preheated material shall then be fed to the thermoplastic gun for application.

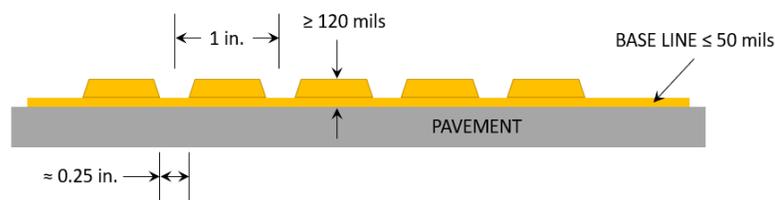
When placing inverted profiled thermoplastic pavement marking material on existing asphalt or concrete pavement that has more than one existing pavement marking material, the existing material shall be removed to the point that 80 percent of the pavement surface is visible.

Dimensions of Inverted Profiled Pavement Marking

The dimensions of the inverted profiled thermoplastic pavement marking shall have a minimum thickness of 120 mils measured from the pavement surface. The thermoplastic pavement marking material in the bottom of the inverted profiles shall have a thickness of up to 50 mils.

The individual inverted profiles shall be located transversely across the entire pavement marking surface at intervals of approximately 1 inch. The bottoms of these intervals shall be between 3/32 inch and 5/16 inch wide. It is acceptable for the top surface of the inverted profiles to be slightly irregular.

Detail: 716WR-1 Inverted Profiled Thermoplastic Pavement Marking



Notification

Notify the Engineer prior to the placement of pavement markings. Furnish the Engineer with the manufacturer’s name and batch numbers of the thermoplastic materials, glass beads, and microcrystalline ceramic elements to be used. Ensure that the batch numbers appear on the thermoplastic materials and retroreflective elements packages.

Protection of Pavement Markings

Do not allow traffic onto or permit vehicles to cross newly applied pavement markings until they are sufficiently dry. Remove and replace any portion of the pavement markings damaged by passing traffic or from any other cause.

Deficiencies

As determined by the Engineer, remove, and replace any unsatisfactory raised or inverted profiled thermoplastic pavement markings. The removal and replacement of the unsatisfactory pavement marking material shall be at no additional cost to the Department.

Method of Measurement

The Department will measure by the linear mile, complete in place and accepted, Wet Retroreflective Pavement Marking in accordance with **716.08**.

Basis of Payment

The Department will pay for accepted quantities, complete in place, at the contract prices as follows:

| Item No. | Description | Unit |
|-----------|---------------------------------------|-------------|
| 716-09.03 | WET REFLECTIVE PAVEMENT MARKING (6IN) | LINEAR MILE |
| 716-09.-- | WET REFLECTIVE PAVEMENT MARKING(---) | ----- |

Such payments will be full compensation for all work specified, including, all cleaning and preparing of surfaces, furnishing of all materials, application, curing and protection of all items, protection of traffic, furnishing of all tools, machines and equipment, and all incidentals necessary to complete the work. Final payment may be withheld until all deficiencies are corrected.