

## **Appendix F**

### **Proficiency Checklists**

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1. Test for Moisture in Pavement Prior to Application of Liquid Markings
2. Test for Moisture in the Pavement with Thermoplastic Application
3. Wet Film Thickness of Liquid Marking Materials
4. Test for Determining the Film Thickness for Thermoplastic Markings
5. Test for Determining Application Rate of Glass Beads – Method 1
6. Visual Inspection

<b>Test for Moisture in Pavement Prior to Application of Liquid Markings</b>		
	<b>Equipment needed:</b>	
	Minimum size 6" x 6" plastic	
	Duct tape	
	<b>Procedure:</b>	
1.	Select a location representative of the pavement surface where markings are to be applied.	
2.	Secure all edges of the plastic to the pavement surface with the duct tape.	
3.	After a period of time (20 minutes recommended), check for condensation of moisture on the under side of plastic.	

**What does moisture on plastic mean?**      Moisture in pavement surface  
**What steps should be taken?**              More drying (suggest 1 hour) and retest

<b>Test for Moisture in the Pavement with Thermoplastic Application</b>	
<b>Equipment Needed:</b>	
	#15 Tar paper
	Duct tape
<b>Procedure:</b>	
1.	Select a location where markings are to be applied.
2.	Place the tar paper on the pavement surface and secure the tar paper to the surface with duct tape such that it will not be displaced when the thermoplastic is applied.
3.	Apply the thermoplastic to the tar paper.
4.	Wait approximately one (1) minute to allow any moisture in the pavement to condense onto underside of the tar paper.
5.	Carefully remove the tar paper from the pavement.
6.	Inspect the underside of the tar paper for condensation of moisture.

**What does moisture on tar paper mean?**

Moisture in the pavement

**What steps should be taken?**

Wait 1 hour and retest

<b>Test for Determining the Wet Film Thickness of Liquid Marking Materials</b>	
	Verify the thickness of all liquid pavement marking materials, except thermoplastic, immediately following application
	<b>Equipment needed:</b>
	Calibrated wet mil thickness gauge
	Sample plate (sheet metal - 4"x 6", 20 to 40 mils thick)* *Thickness must be maintained: thinner plate will deform while taking readings, thicker plate will alter distance between gun and pavement. Both result in false readings.
	Piece of cloth
	Duct Tape
	<b>Procedure:</b>
1.	Select a level location in the path of where the markings are to be applied.
2.	Place the plate on the pavement surface and secure it with duct tape.
3.	Apply the marking material to the sample plate using the equipment being evaluated.
4.	Make sure the glass bead gun is turned off prior to applying the marking material to the sample plate
5.	Immediately after application, place the gauge into the material on the sample plate until the posts on the gauge are firmly in contact with the plate. The gauge is configured such that the probes indicate a thickness from a line drawn between the posts. The last probe with material on it indicates the thickness.
6.	Read the thickness from the gauge.
7.	Gauge should be cleaned with a cloth immediately after taking reading

**What do you do if the paint only covers a portion of the bottom surface of the tooth?**

Wipe the gauge clean using a soft cloth and repeat the test in another location.

<b>Determining the Film Thickness for Thermoplastic Markings</b>	
	<b>Equipment needed:</b>
	Calipers accurate to .001 inch
	Sample plate (sheet metal – 4" x 6", 40 to 60 mils thick)
	Duct tape
	<b>Procedure:</b>
1.	Measure and record the thickness of the sample plate.
2.	Select a location in the path of where the markings are to be applied. Place the plate on the pavement surface and secure it with duct tape.
3.	Make sure the glass bead gun or dispenser is turned off prior to application of the marking material to the sample plate.
4.	Apply the marking material to the sample plate using the equipment being evaluated.
5.	Wait until the sample cools sufficiently to be moved without flowing. Carefully remove the sample plate from the pavement.
6.	Using calipers, measure the total thickness of the thermoplastic and the sample plate.
7.	Subtract the panel thickness from the total thickness to obtain the thickness of the applied material.

Total thickness of material and panel \_\_\_\_\_  
 Thickness of the panel \_\_\_\_\_  
 Thickness of the thermoplastic \_\_\_\_\_

<b>Test for Determining Application Rate of Glass Beads - Method 1</b>	
	<b>Equipment needed:</b>
	Calibrated 1 gallon bucket.
	Stop watch or watch with second hand
	<b>Procedure:</b>
1.	Determine the time required to dispense the specified quantity of beads from Table 1. Find vehicle speed. Go to column on right for time needed to dispense 6 lbs. of beads.
2.	Position the bucket under the bead gun such that all beads dispensed will be caught in the bucket.
3.	Turn on the bead gun for the time increment from Table 1 (The pressure must be at the same setting that is used while applying markings.)
4.	Compare the level of beads in the bucket with the appropriate graduation.

**If there is a difference of 1/2 inch or greater between the level of the beads and the calibration mark in the bucket what would you do?**

Make adjustments to the equipment to close this gap.

**How is bucket calibrated?**

Pour 6 pounds of glass beads into bucket and mark depth on bucket by using indentions, drilled holes or marks. Then add 1 pound increments of beads, marking on side of bucket after each addition.

Table 1

Vehicle Speed mph	Time to Dispense Specified Quantity of Glass Beads (seconds)
4	54.5
5	43.6
6	36.4
7	31.2
8	27.3
9	24.2
10	21.8
11	19.8
12	18.2
13	16.8
14	15.6
15	14.5
16	13.6
17	12.8

## Visual Inspection

Knowing material quantities does not assure that everything was distributed correctly. This procedure provides guidelines for the visual inspection of pavement markings. Markings which do not meet the criteria stated below, fail this procedure and should be rejected.

Visual inspections are made with regard to one of two (2) items: the marking itself or the glass beads.

### 1) The Marking

- a) The location of markings should be compared with the plans and/or the Manual of Uniform Traffic Control Devices (MUTCD). Markings that do not conform to these requirements are unacceptable.
- b) Markings must be of the specified width.
- c) Markings must be checked for even thickness. This may be done by either inspecting the samples taken for thickness measurements or viewing the marking directly on the pavement. With either method, look for uneven thickness in the cross-section of the marking.

### 2) The Glass Beads

Visual inspection of glass bead application is either with regard to distribution or embedment

#### Distribution

- a) Beads should cover the entire marking.
- b) Beads should be evenly distributed across the entire marking.
- c) All beads should either be embedded into or onto the marking with little or no loss onto the adjacent pavement.

#### Embedment

- a) Visual evaluation of bead embedment should be made on the marking after application to the road surface. The specifications for bead embedment are general. It is not feasible to obtain exact percentages of buried vs. non-buried beads.

Generally, a marking that fails the visual inspection for bead embedment exhibits one of the following conditions:

- 1) Most or all the beads are buried in the marking material.
- 2) Beads are insufficiently buried (most or all beads are on the surface of the marking).
- 3) “Pulsed” beads - This is caused by rapid fluctuations in the delivery of the beads to the gun.

