Recommend Approval: Assistant Division Chief 10/19/12 Date Division Chief 12/12/12 Date	Maryland Department of Transportation State Highway Administration Office of Materials Technology MARYLAND STANDARD METHOD OF TESTS	
Approved: Director 01/17/13 Date	**EMBEDMENT COATING TEST FOR LARGE REFLECTIVE GLASS BEADS USED IN TRAFFIC MARKINGS**	**MSMT 619**

SCOPE:

This procedure is used to confirm the presence of an embedment coating on reflective glass beads.

REFERENCE DOCUMENT:

Potters Industries Quality Control Manual**, Determination of Adherence Coating of Glass Spheres**. Procedure Number PII #133, Revision #2, 9/4/91.

MATERIALS AND EQUIPMENT:

1. Graduated cylinders, 50 mL and 250 mL.

2. Acetone, reagent grade.

3. Dansyl Chloride - (1 dimethylamino, 5 naphthalene sulfonyl chloride), 98 percent.

4. Balance conforming to M 231, Class B.

5. Darkened glass container with tight sealing closure.

6. Rubber gloves with long cuffs or sleeves.

7. Safety goggles.

8. Glass (fiber) filter paper, 4 in. diameter.

9. Small aluminum weighing dishes.

10. 2 in. Buchner funnel and vacuum flasks.

11. 2 in. diameter filter paper, Whatman #1.

12. Vacuum source.

13. Ultraviolet light source, 7000 $\mu W/cm^2$ minimum intensity.

14. Dark room.

15. Drying oven capable of maintaining 60 ±2C.

PRECAUTIONS:

1. Laboratory goggles must be worn when using the chemicals listed for this test procedure or when testing glass beads due to the presence of fine glass particles.

2. Dansyl chloride is a hazardous compound - do not handle without protective gloves and safety goggles. Do not allow the compound to come in contact with the skin.

3. Read the Material Safety Data Sheets (MSDS) for all chemicals used in this procedure and understand them before performing the test.

4. Perform the test using an explosion proof fume hood.

5. Immediately sweep up any spilled glass beads to avoid a slipping hazard.

Preparation of Dansyl Chloride Solution

Prepare the solution by dissolving 0.03 g of Dansyl Chloride in 200 mL of acetone. This solution may be used for several tests during the day, but must be kept refrigerated in a darkened, tightly sealed, glass container between uses. Prepare fresh test solution daily. Ensure that all solid Dansyl Chloride particles are dissolved into solution.

TEST PROCEDURE:

1. Set drying oven to 60 C and turn on ultraviolet light source.

2. Weigh 10 ±0.5 g of glass beads in a small aluminum weighing dish.

3. Set up the Buchner funnel and vacuum flask. Place the 2 in. diameter filter paper into the top of the funnel and moisten with acetone.

4. Place the glass beads into the Buchner funnel on top of the wet filter paper.

5. Slowly and carefully pour 50 mL of the Dansyl Chloride solution over the glass beads, making sure all beads are covered. Let stand for 30 seconds. Turn the vacuum on and draw off all of the solution.

6. Place the treated beads back in the aluminum dish and place the dish into the drying oven. Dry the beads for 10-15 minutes.

7. Remove the beads from the oven and carefully pour the beads onto the glass filter paper. If beads are agglomerated, carefully separate them with a spatula.

8. Inspect the treated sample under the ultraviolet light in a darkened room.

OBSERVATIONS:

1. Beads will emit a yellow-green fluorescence when properly coated.

2. If little or no fluorescence is observed, rerun the test using a new sample of beads and a fresh solution of Dansyl Chloride.

3. If the second test shows little or no sign of fluorescence, the beads are considered not properly coated and that lot will be rejected for use by the Administration.

REPORT:

Report the lot of glass beads as passing or failing.