

January 16, 1998

**MINNESOTA DEPARTMENT OF TRANSPORTATION
SPECIFICATION
DROP-ON GLASS BEADS**

I. SCOPE

This specification covers treated glass beads for reflectorizing traffic marking paint.

II. GENERAL REQUIREMENTS

Beads for use with solvent-based paints will have a "dry flow" type surface treatment.

Beads for use with water-based paints will have a dual surface treatment consisting of a moisture resistant silicone treatment, and a silane adherence surface treatment.

Beads for use with epoxy paints will have a moisture resistant silicone surface treatment.

The beads will be made from clean colorless transparent glass. They will be smooth, spherically shaped, and free from milkiness, pits, excessive air bubbles, chips and foreign material. The beads will be suitable for application using conventional striping equipment, and will produce a retro-reflectorized line when viewed at night with automobile headlights.

III. SPECIFIC REQUIREMENTS

The glass beads will meet the requirements of AASHTO M 247 Type 1 "standard gradation" except the beads will have a minimum of 80 percent true spheres.

The dual treated beads will meet the moisture resistant requirements of AASHTO M 247 Section 4.4.2 and pass the adherence treatment Dansyl Chloride Test.

The moisture resistant silicone treated beads will meet AASHTO M 247 Section 4.2.2.

IV. SAMPLING AND TESTING

A. SAMPLING

The beads will be sampled at the rate of one sample per 4,000 kg (10,000 lbs) of beads. For beads shipped in 22 kg (50 lbs) bags a sample will consist of two bags selected at random and reduced to approximately one quart using a sample splitter. For bulk shipments, sampling will be by means of a perforated tube type "sampling thief." Three samples from each of three separate containers will be combined for one sample.

B. TESTING

Testing will be according to the requirements of AASHTO M 247.

Adherence coating will be tested by the Dansyl Chloride Method on file at the Mn/DOT Materials Laboratory.

Retroreflectivity will be determined by the Mn/DOT Method.

1. 3 draw downs (100 mm wide, 15 mil wet thickness) will be conducted in the lab for each color of paint.
2. Glass beads will be dropped on at a rate of 3.6 kg (8 lbs) per gallon.
3. 3 readings will be taken per draw down.
4. The average of those 9 readings will be the retroreflectivity of the system (paint and beads).

Roundness will be determined by the Mn/DOT Method detailed below.

Mn/DOT Method for Determining Roundness of Glass Beads.

1. Reduce sample to 25 to 50 grams by means of a sample splitter. Weigh to the nearest 0.01 grams.
2. Split the reduced sample into two fractions using a 297 μm (No. 50) sieve.
3. To separate rounds from imperfects, a smooth, 30 mm by 45 mm (12 in by 18 in), inclined glass or aluminum plate is used. The plate is inclined at approximately 3 degrees for the +297 μm (+50) fraction and at approximately 10 degrees for the -297 μm (-50) fraction.

Slowly apply part of the beads to the top of the plate. Tap the plate with a wooden pencil or brush to cause round beads to roll down the incline into a collecting pan. Brush the remaining beads into a separate collecting pan. Continue with small applications until the entire sample is processed. Repeat the process with beads that rolled off plate at least three times for the +297 μm (+50) fraction and at least four times for the -297 μm (-50) fraction.

4. Weigh the separated fractions of round beads and calculate percent rounds.

V. PACKAGING

Unless otherwise specified the beads will be packaged in moisture-proof multi-wall shipping bags.

Each container will be marked with name and address of the manufacturer, type of moisture treatment, batch number and date of manufacture.

The containers and contents will be delivered in a good, dry condition.

Any beads not meeting the requirements of this specification or delivered in an unusable condition will be rejected.