STANDARD SPECIFICATION
FOR
GLASS BEADS USED IN TRAFFIC PAINTS

AASHTO DESIGNATION: M247-81 (1996)

1. Scope

1.1 This specification covers glass beads to be dropped or sprayed upon pavement markings so as to produce a reflectorized pavement marking.

1.2 Types:

1.2.1 Type 1 – shall be known as a standard gradation.

1.2.2 Type 2 – shall be known as uniform gradation.

1.3 Flotation

Either of the above gradation types may be obtained with flotation properties at the request of the purchaser.

1.4 Moisture Resistance

Either of the above types may be obtained with a moisture-resistance coating if so specified by the purchaser.

1.5 The values stated in SI units are to be regarded as standard.

2. General Requirements

2.1 The beads shall be transparent, clean, colorless glass, smooth and spherically shaped, free from milkiness, pits, or excessive air bubbles and conform to the following specific requirements.

3. Specific Requirements

3.1 Gradation

The beads shall meet the gradation requirements for type as given in Table 1.

3.2 Roundness

The glass beads shall have a minimum of seventy percent (70%) true spheres.

TABLE: GRADATION OF GLASS BEADS

Sieve Designation		Mass Percent Passing	
Standard mm	**Alternate No.**	**Type I**	**Type II**
0.850	20	100	--
0.600	30	75 - 95	100
0.425	40	--	90 - 100
0.300	50	15 - 35	50 - 75
0.180	80	--	0 -5
0.150	100	0 - 5	--

3.3 Crushing Resistance – Retained 0.425-mm (No. 40) sieve 133 N (30lbs.) minimum.

3.4 Refractive Index – The glass beads shall have a minimum refractive index of 1.5.

3.5 Moisture Resistance – Flow characteristics – The beads shall not absorb moisture in storage. They shall remain free of clusters and lumps and shall flow free from dispensing equipment.

3.6 Flotation – When tested in accordance with Section 4.5, a minimum of 90-percent beads shall float in xylene.

4. **METHODS OF SAMPLING AND TESTING**

4.1 The sampling shall be random in the following ratios – 45 kg (100 lbs) of sample (in full bags) per 4535kg (10000 lbs.) shipped. Upon arrival material shall be reduced in a sample splitter to a size of approximately 1-kg.

4.2 The following requirements shall be tested with the following test methods:
Gradation – ASTM D 1214
Roundness – ASTM D 1155
Crushing – ATSM D 1213

4.3 The refractive index shall be tested by liquid immersion method (Becke Line Method or equal) at

a temperature of 25 +/- 5 deg. C (77 +/- 9 deg. F)

4.4 Flow Characteristics

Beads will flow properly when tested in accordance with procedure 4.4.1 unless they are specified to be moisture resistant, in which case, testing in accordance with procedure 4.4.2 will be followed.

4.4.1 A 100-g sample of beads is placed in a Corning 3140 crystallizing dish. 100-mm diameter by 50-mm depth. Place the dish in a Corning 3080 Desiccator (or equivalent) 250-mm inside diameter by 330-mm overall height and 130-mm chamber depth, which shall be filled with a sulfuric acid-water solution having a specific gravity of 1.10 (approximately 94 percent humidity) to a point 25.4-mm below the top of a size 5 Coors 60003 Desiccator Plate. The sample shall remain in the covered Desiccator at 25 +/- 5 deg. C for four (4) hours. Remove the sample from the Desiccator and transfer the beads to a metal pan. The beads shall be essentially free of lumps and clusters and shall flow without stoppage when poured slowly through a standard glass funnel (Corning 6120), 126-mm diameter, 102-mm stern length, and 11-mm stern inside diameter (Note 1).

4.4.2 A 100-g sample of beads is placed in a 600-ml beaker and an equivalent volume of distilled water shall be added to the beaker. The beaker will then stand for five (5) minutes, at the end of which time the water shall be carefully poured off and the beads transferred to a clean, dry, beaker and allowed to stand for five (5) minutes. The beads will then be poured slowly into a standard glass funnel (Corning 6120), 127-mm diameter, 102-mm stem length, and 11-mm stem inside diameter. The beads shall flow through the funnel at the beginning of the test is permissible.

4.5 Flotation Test

Determine the mass of approximately 1-g to the nearest 0.005-g; evenly distribute beads into a clean standard 100-mm glass Petri dish previously weighted to the nearest 0.0005-g. The dish is vibrated slightly to attain the near as possible a monolayer of beads. Xylene, C.P. Grads is introduced at one side of the dish at a rate of 10 to 15 mL per minute from a burette until 30 mL has been added. The floating beads are then carefully drawn off by suction through a suitably constricted delivery tube connected to a receiving flask. Excess is drawn off so that no remaining beads are lost and the dish dried in an oven at 110 +/_ 5 deg. C. The dish is weighed and the percentage of floating beads calculated.

5. Packaging & Marking

5.1 Glass beads shall be furnished in 1-kg (lbs.) lots as specified by the purchaser and packaged in moisture-proofed bags. Containers are to be guaranteed to furnish dry and undamaged beads. Each package shall contain the following information:
Name and address of manufacturer, shipping point, trademark or name, the wording “glass beads”, the specification number, number of kg (lbs), the lot or batch number and the month and year of manufacture.

Note 1: The test operations should be performed immediately on removal of the beads from the Desiccator.