

February 10, 2021

**SPECIFICATION NO. TES-P-9**  
**SUPPLY OF GLASS BEADS**

**A. GENERAL REQUIREMENTS**

1. Glass beads are used in pavement marking application to provide night time visibility. Beads must be dry, free from lumps, and flow freely through conventional bead application equipment.
2. Beads shall consist of transparent water-white glass particles of spherical shape. Be transparent, clean, colorless, spherically shaped, and free from milkiness, pits or excessive air bubbles.
3. Exposure to heavy metals can cause serious health effects. With the use of modern furnace manufacturing technology, the North American glass bead manufacturers are meeting the EPA regulations which restrict the emission of heavy metals for health and safety reasons. Once the contract is awarded glass bead manufacturer will be requested to certify that their product does not exceed the following heavy metal contaminants: Arsenic<75 ppm; Lead<100 ppm; Antimony<80 ppm [Antimony / a toxic crystalline chemical element].
4. Beads are to be dual coated with moisture resistance and adherence coating.
5. Once the contract is awarded 25% of the total order must be available for delivery within 10 days from receipt of the purchase order if requested by the shipment co-ordinator.
6. Production samples for each batch must be sent to the Contract Administrator, copy of the quality control tests performed at the manufacturing plant shall accompany the sample.

**B. SAMPLING**

**By Supplier**

The supplier must submit one 1 litre sample representative of the entire shipment and shall be forwarded to Wes Delaney, Superintendent of Traffic Services. The combined sample shall be made up of quality control samples taken during the manufacturing. The 1 litre sample is derived as follows: the manufacturer shall take at minimum of 2 litres of samples; then split the sample in two.

Please forward samples to the attention of:

Wes Delaney  
495 Archibald St. Winnipeg, Manitoba Canada  
R2J 0X2

**By Department** - Production samples shall be taken at the bead gun for testing.

**D. ACCEPTANCE**

1. Any sample failing to meet the requirements of Section E. TEST REQUIREMENTS, will be cause for rejection of the shipment.
2. In borderline cases the Department may choose to retest the remaining portion of the 1 litre sample tin. If this retest does not meet the specification, the whole shipment will be subject to rejection.
3. Shipments will not be unloaded from the carrier until it is established that the test requirements have been met. Any demurrage charges, should a shipment fail to meet specifications, will be the responsibility of the supplier.

**Shipments may be subject to rejection even though the beads have been found to conform to the test requirements if it is discovered through field application that one or more of the conditions under heading "A. GENERAL REQUIREMENTS" have not been met.**

**E. TEST REQUIREMENTS**

**Toxicity**

**Glass beads must not exhibit a characteristic of toxicity relative to heavy metals when tested in accordance with EPA 40 CFR 261.24 using testing methods such as EPA Method 3052, and EPA Method 6020.**

**Sieve Analysis**

**Gradation**

The beads must conform to the following gradation requirements when tested according to ASTM D-1214.

<b>U.S. Standard Sieve #</b>	<b>% Passing by Weight</b>
20	98-100
30	70-90
50	5-20
200	0

**Oversize**

**Any material retained on a #16 sieve will be cause for rejection of the shipment.**

**Imperfections**

A minimum of 70 percent by weight of the beads must be of true spherical shape when tested according to the following procedure:

The passing sieve #30, retained sieve #50 portion of beads from the sieve analysis test are separated using the Roundometer apparatus described in ASTM D-1155 with the inclined plane and the amplitude adjusted to give the best separation between the true spherical on one side and the non-spherical on the other. The sample of beads is hand fed onto the glass plate by dropping from a height of 10 - 15 mm from a small container in the middle area of the plane. Flooding of the glass plate is avoided in order to permit the spheres to roll down. When the plate becomes crowded with non-spherical beads, feeding is halted and the spheres are allowed sufficient time to roll down. Before resuming feeding the plate is cleared of the non-spherical beads by sweeping up the inclined plane using static free brush or other suitable means, without shutting off the vibrator.

The separated spheres and non-spheres are rerun over the Roundometer using empty containers to collect the separations until it is estimated that less than 5 percent misplaced beads are contained in each separated portion.

Although the retained sieve #30 portion and the passing sieve #50 portion of the original sample is not tested for roundness, microscopic examination must indicate a quality essentially equal to that of the passing #30 retained #50 sieve portion which is tested.

The true spheres obtained from the test in (a) above are examined under a stereo microscope at 20x magnification. Approximately 100 beads mounted on clear tape (by placing a length of tape under a #30 sieve) are examined and counted for non-spherical shapes, air inclusions, milkiness, fractures, surface film, or any other imperfections which would render the bead to be of doubtful performance as a retro-reflector. The total percent imperfect beads based on the microscopic count added to the percent non-spherical beads from (a) above must not exceed 35 percent. In borderline situations, the non-spherical portion is similarly examined under the microscope to correct for the percent good beads contained. **In any event, not more than 2% of beads may be of non-water-white particles.**

#### **F. SAMPLE PACKAGING**

Standard 1 litre metal tin sealed with a lid.

Sample must indicate the supplier's name and batch number and shipment destination.

#### **G. RETURNABLE DRUMS - SHIPMENTS**

Beads must be packaged in either returnable steel, fibre or plastic drums containing a minimum of 300 kg of glass beads in each drum. The drums must be sealed to prevent moisture from entering the beads.

Drums must have removable lids. The locking ring must be bolted with a 5/8" bolt with 15/16" head, with the nut welded to the ring (steel drums). Drums and lids must withstand lifting by the top rim using a scissor clamp. Will also accept lever lock style rings as well.

Drums shall be shipped on pallets (4 to a pallet) to allow loading with a fork lift.

**The supplier's name and batch number must be clearly indicated on each lid.**

Any questions concerning specifications and testing procedures should be directed to:

Wes Delaney  
Superintendent of Traffic Services  
City of Winnipeg  
204-794-4292  
[wdelaney@winnipeg.ca](mailto:wdelaney@winnipeg.ca)  
495 Archibald St.  
Winnipeg, MB Canada  
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