



**INDIANA DEPARTMENT OF TRANSPORTATION
DIVISION OF MATERIALS AND TESTS**

**PROCEDURE FOR EVALUATION AND QPL REQUIREMENTS
FOR PAVEMENT MARKING BEADS
ITM No. 959-23**

1.0 SCOPE.

- 1.1** This evaluation procedure covers the methods that pavement marking beads are evaluated and placed, maintained, or removed from a qualified products list.
- 1.2** This ITM may involve hazardous materials, operations, and equipment and may not address all of the safety problems associated with the use of the test method. The user of the ITM is responsible for establishing appropriate safety and health practices and determining the applicability of regulatory limitations prior to use.

2.0 REFERENCES

2.1 ASTM Standards

- E1710 Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with (CEN)-Prescribed Geometry Using a Portable Retroreflectometer
- E2177 Standard Test Method for Measuring the Coefficient of Retroreflected Luminance (R_L) of Pavement Markings using the Bucket Method in a Condition of Wet Recovery

2.2 Other Standards.

AASHTO M 247 Standard Specification for Glass Beads Used in Pavement Markings

Indiana Manual on Uniform Traffic Control Devices (IMUTCD)

3.0 TERMINOLOGY. Definitions for terms and abbreviations shall be in accordance with the Department's Standard Specifications, Section 101.

- 3.1 Standard Beads** are made of recycled glass and are in accordance with AASHTO M 247, Type 1.
- 3.2 Modified Standard Beads** are made of recycled glass and are in accordance with AASHTO M 247, Type 2.

3.3 Supplemental Beads are made of glass and are in accordance with AASHTO M 247, Type 4.

3.4 Supplemental Elements are for wet weather retro-reflectivity.

4.0 SIGNIFICANCE AND USE. This ITM is used to evaluate, approve, maintain approval, and remove products which are placed on the Department List of Pavement Marking Beads. Each product will be evaluated separately.

5.0 APPARATUS.

Retro-reflectometer, Delta Model LTL-X, Gamma Scientific Model Stripemaster II or Stripemaster II Touch, in accordance with ASTM E1710. The measurement geometry will be 88.76° for the entrance angle β_1 , 0° for β_2 , and 1.05° for the observation angle. The aperture angles for both the source and receiver will not exceed 0.33° .

A factory calibration shall be performed on the retro-reflectometer at a minimum of once per calendar year. A copy of the calibration shall be provided to the Engineer prior to the start of work. Comparison measurements with an INDOT reflectometer may be made by the Contractor at an INDOT location.

6.0 SAMPLING. Upon review and acceptance of the documentation required in Section 7.2, the manufacturer shall install test strips with the product and traffic paint, multi-component, or thermoplastic marking material, at no cost to the Department unless the test strips are part of a construction contract. The test strips shall be at a location chosen by the Department and shall be a minimum of 120 ft (60 ft for white markings and 60 ft for yellow markings) in either a series of transverse markings across pavement lanes or longitudinally as a substitute for other pavement markings.

7.0 SUBMITTAL.

7.1 The manufacturer shall submit the Preliminary Product Evaluation Form (TD-477) for each product to be considered for the QPL.

7.2 The following documentation regarding the proposed product shall be submitted with the Evaluation Form (TD-477).

7.2.1 Product specifications and safety data sheet

7.2.2 An invoice showing an initial zero-dollar amount (\$0.00) for the use of the product samples. The invoice or a cover letter shall also indicate the typical unit price for the product and typical quantity for shipping.

- 7.2.3 For Standard Beads, Modified Standard Beads, or Supplemental Beads, three (3) one quart (1 liter) round double friction top metal paint cans labelled and filled with the product shall be submitted for analysis by INDOT under AASHTO M 247.
- 7.2.4 A certification that the product either complies with or is not covered by the Build America, Buy America requirements for manufactured products and construction materials in accordance with the Department's Standard Specifications, Section 106.01(c).

The requestor is encouraged to submit any supporting documents and references as to the manufacturer's experience and the product's performance history. This documentation should indicate experience in providing products for public agency projects and attest to the long-term stability of the manufacturer.

8.0 PROCEDURE

- 8.1 INDOT will require up to one year to complete the field testing.
- 8.2 Initial dry retro-reflectivity readings for Standard Beads, Modified Standard Beads, or Supplemental Beads, will be obtained between 14 and 30 days after the test strips or contract markings are placed. 16 readings will be taken and then averaged for dry retro-reflectivity readings on test strips and the procedure in 7.0 of ITM 931 will be used for pavement marking beads on construction contracts.
- 8.3 Initial dry and wet retro-reflectivity readings for Supplemental Elements will be obtained between 14 and 30 days after the test strips or contract markings are placed in accordance with ASTM E2177. On test strips, 3 dry readings will be taken and then averaged followed by 3 wet readings will be taken and then averaged. On construction contracts, 3 dry readings per sampling zone will be taken and then averaged followed by 3 wet readings will be taken and then averaged.
- 8.4 Final dry retro-reflectivity readings for Standard Beads, Modified Standard Beads, or Supplemental Beads will be obtained in the spring after the test strips or contract markings are placed. 16 readings will be taken and then averaged for dry retro-reflectivity readings on test strips and the procedure in 7.0 of ITM 931 will be used for pavement marking beads on construction contracts.
- 8.5 Final dry and wet retro-reflectivity readings for Supplemental Elements will be obtained in the spring after the test strips or contract markings are placed in accordance with ASTM E2177. On test strips, 3 dry readings will be taken and then averaged followed by 3 wet readings will be taken and then averaged. On construction contracts, 3 dry readings per sampling zone will be taken and then averaged followed by 3 wet readings will be taken and then averaged.

9.0 QPL.

9.1 Consideration of Inclusion of Pavement Marking Beads. The Pavement Marking Beads will be placed on the QPL when the following conditions are met:

9.1.1 A potential net benefit to the Department is realized by inclusion of the item on the QPL.

9.1.2 The required documentation is submitted and acceptable.

9.1.3 The field testing is completed with satisfactory results.

9.2 Maintaining Standing on QPL.

9.2.1 The Office of Traffic Administration shall be notified each time any update or revision of the product is made, and the changes and benefits of the change shall be submitted for approval. The Department will determine if and to what extent a revision is to be placed into field operation and may fully re-evaluate any product revision.

9.2.2 If the manufacturer makes any changes to an approved product to correct a safety issue, the Department shall be notified immediately. The manufacturer shall correct all existing material purchased by the Department either directly, by contract, or through agreement prior to the change being incorporated at the manufacturer's production level.

9.2.3 A design change to an approved product will require a submittal of documented changes. At the discretion of the Department, resubmission of the product for testing and evaluation may be required. Permanent addition or removals of source materials are examples of items that are considered to be design changes.

9.3 Removal from QPL. The Department reserves the right to remove products from the qualified products list for, but not limited to, the following reasons:

9.3.1 Changes in the production process that fail testing or evaluation, or that are found to have a compliance issue with Build America, Buy America requirements.

9.3.2 Recurring similar product failures indicative of a manufacturer's defect.

9.3.3 Failure to provide or notify the Department of the items required in Section 9.2 above.