

Method of Test for
SIEVE ANALYSIS OF GLASS BEADS
 DOTD Designation: TR 634M/634-94

I. Scope

This method of test covers the procedure used to determine the gradation of glass beads used with traffic paint or thermoplastic striping material.

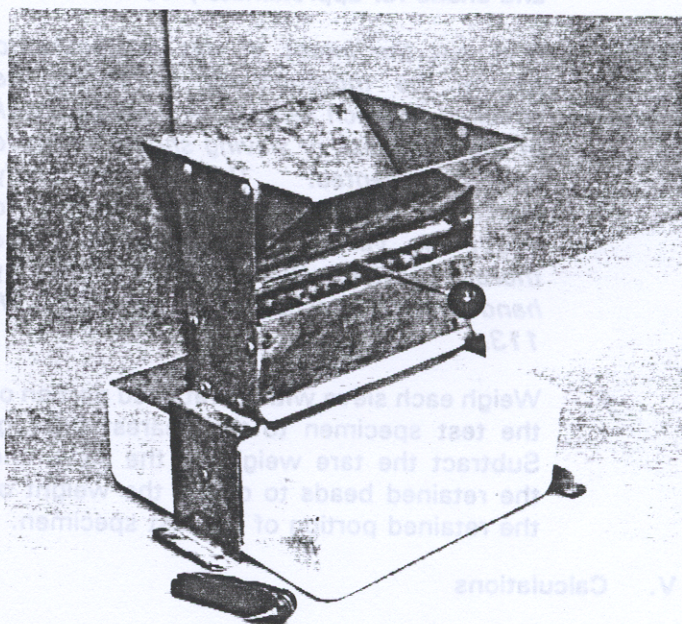
II. Apparatus

- A. **Balance** - with a capacity of 1 kg or more and a readability of 0.01 g.
- B. **Sample reducer** - as shown in Figure 1, which shall cut a representative 1/16 portion from feed material by systematically rejecting segments of material flowing down the 45° cast aluminum incline. An adjustable 7 dm³ (0.25 ft³) hopper must lock in the open position for receiving large 22.7 kg (50 lb) samples.



Sample Reducer
 Figure 1

- C. **Sample splitter** - as shown in Figure 2, which shall be constructed of 16 alternating fixed-width chutes (12.7 mm or ½ in.) that deliver half of the sample to each pan. The hopper-and-gate mechanism must assure an even sample distribution without particle segregation.



Sample Splitter
 Figure 2

- D. **Sieves, cover and bottom pan** - conforming to the requirements of the Standard Specification for Wire Cloth Sieves for Testing Purposes (AASHTO M 92).
- E. **Mechanical sieve shaker**
- F. **Worksheet** - Glass Beads. (Figure 3)

III. Sample Preparation

- A. Obtain one unbroken sack of beads as supplied by the manufacturer.
- B. Pour the entire sample through the sample reducer to obtain a representative portion. The sample shall be dry and free flowing.
- C. Using the sample splitter, continue to reduce the representative portion into an approximately 100 g test specimen.

IV. Procedure

- A. Weigh and record the tare weight of each sieve and pan to the nearest 0.01 g.
- B. Weigh and record the weight of the test specimen to the nearest 0.01 g.
- C. Assemble the sieves and the bottom pan in order with the largest opening on top.
- D. Place the test specimen in the top sieve and cover sieve assembly.
- E. Place the sieve assembly in the sieve shaker and shake for approximately 15 min.

NOTE: *It is not the intent of this procedure to require the thoroughness of sieving be checked for each sample. A periodic check of thoroughness of sieving should be made and documented. This is particularly necessary whenever there is reason to doubt the validity of the results. The thoroughness of sieving shall be verified by hand shaking in accordance with DOTD TR 113.*

- F. Weigh each sieve with its retained portion of the test specimen to the nearest 0.01 g. Subtract the tare weight of the sieve and the retained beads to obtain the weight of the retained portion of the test specimen.

V. Calculations

- A. Calculate the percentage that the accumulated total differs from the initial dry total weight or percent difference (D) to the nearest 0.1% using the following formula:

$$D = \frac{W_i - W_a}{W_i} \times 100$$

where:

W_i = initial dry total weight (The original dry weight of the test sample.)

W_a = accumulated total (The sum of all the weights retained on each sieve plus the total portion passing the smallest sieve used. The accumulated total shall not deviate from the initial weight by more than 0.2%.)

example:

$$\begin{aligned} W_i &= 99.65 \\ W_a &= 99.47 \\ D &= \frac{99.65 - 99.47}{99.65} \times 100 \\ &= \frac{0.18}{99.65} \times 100 \\ &= 0.00180 \times 100 \\ &= 0.180 \\ D &= 0.2 \end{aligned}$$

- B. Calculate the percentage of material retained on each individual sieve (R) to the nearest whole percent using the following formula:

$$R = \frac{W_x}{W_a} \times 100$$

where:

W_x = weight of oven-dry glass beads passing one size sieve and retained on the next smaller size sieve.
 W_a = accumulated total
 100 = constant

example:

$$\begin{aligned} W_{30} &= 9.95 \\ W_a &= 99.47 \\ R &= \frac{9.95}{99.47} \times 100 \\ &= 0.1000 \times 100 \\ &= 10.00 \\ R &= 10 \end{aligned}$$

VI. Report

Report the total percent retained as specified for each sieve to the nearest whole percentage.

VII. Normal Test Reporting Time

Normal test reporting time is 1 day.

Louisiana Department of Transportation and Development
 Materials & Testing Section

8/93

GLASS BEADS

REMARKS 2

TEST RESULTS (Max. of 15 Characters) P/F

COLOR Clear _____

TYPE MS 157-001 _____

SHAPE (SPEC. 1015.13) Round _____

GRADATION (U. S. STANDARD SIEVE) (TR 634): XXXXXXXXXXXXXXXXXXXXXXX xxx

RETAINED #20, % 0 P

RETAINED #30, % 10 P

RETAINED #50, % 60 P

RETAINED #80, % 22 P

PASSING #80, % 8 P

Sample Weight, g. (W _i) Sieve No.	20	30	50	80	-80
<u>99.65</u>					
Sieve + Retained Wt., g.	<u>486.57</u>	<u>466.41</u>	<u>445.43</u>	<u>395.34</u>	<u>404.49</u>
Sieve Wt., g.	<u>486.57</u>	<u>456.46</u>	<u>385.75</u>	<u>373.46</u>	<u>396.53</u>
Retained Wt., g. (W _x)	<u>0</u>	<u>9.95</u>	<u>59.68</u>	<u>21.88</u>	<u>7.96</u>
Retained, % $\frac{W_x}{W_i} \times 100$	<u>0%</u>	<u>10%</u>	<u>60%</u>	<u>22%</u>	<u>8%</u>

Total Retained Wt., g (W_x) = ΣW_x 99.47

Percent Difference, % = $[(W_i - W_o)/W_i] \times 100$ 0.180

REFRACTIVE INDEX (AASHTO M 247) 1.56 P

ACID RESISTANCE (SPEC. 1015.13) _____

SODIUM SULFIDE EFFECT (SPEC. 1015.13) _____

Tested by: CAO Date: 8/4/94 Checked by: BC Date: 8/4/94

APPROVED BY: _____ Date: _____

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