



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

**FLAKINESS INDEX OF AGGREGATES  
ITM No. 224-21**

**1.0 SCOPE.**

- 1.1 This test method describes a procedure to determine the Flakiness Index (FI) of aggregates. The FI is used as a design input to determine the rate of application of aggregate and asphalt material for seal coats.
- 1.2 The flakiness index is a measure of the cubical shape of the aggregate which is needed for effective use of aggregates in seal coat applications.
- 1.3 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 AASHTO Standards.**

- M 231 Weighing Devices Used in the Testing of Materials
- R 76 Reducing Samples of Aggregate to Testing Size
- T 11 Materials Finer Than 75  $\mu\text{m}$  (No. 200) Sieve in Mineral Aggregates by Washing
- T 27 Sieve Analysis of Fine and Coarse Aggregates

**2.2 ASTM Standards.**

E11 Woven Wire Test Sieve Cloth and Test Sieves

**2.3 ITM Standards.**

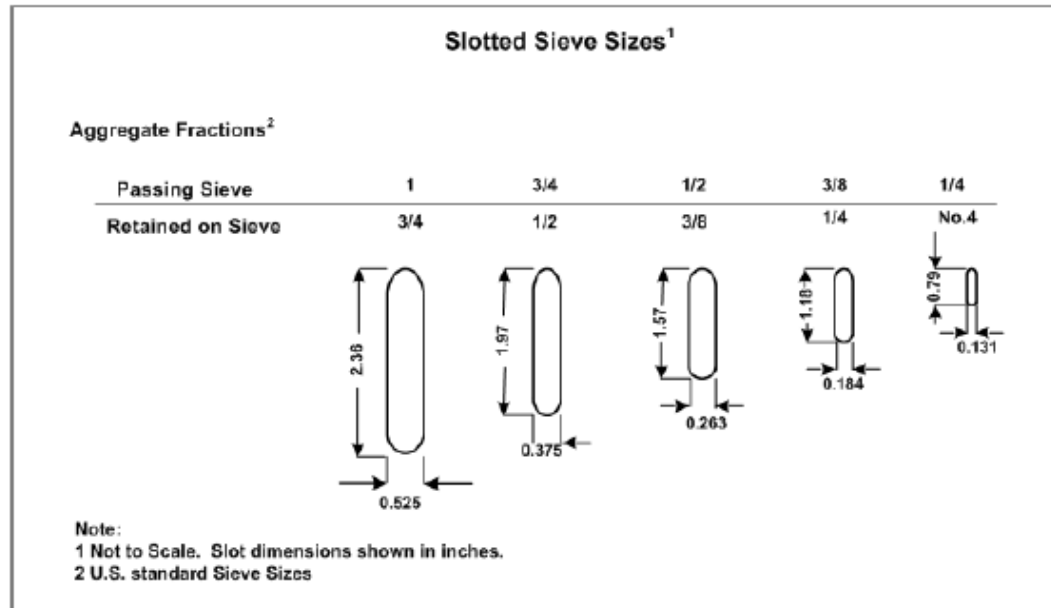
207 Sampling Stockpiled Aggregates

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

**4.0 SIGNIFICANCE AND USE.** This ITM shall be used to evaluate seal coat (SC) aggregates to meet the requirements of SC aggregates in 904.

## 5.0 APPARATUS.

- 5.1 Balance, Class G2, in accordance with AASHTO M 231
- 5.2 Sieves, in accordance with **ASTM E11**
- 5.3 Metal plate, approximately  $0.1175 \pm 0.0100$  in. thick with slotted openings conforming to the dimensions indicated in Figure 1 and the table below. Tolerances for the openings are indicated in the table below.



Opening Widths and Tolerances					
Passing Sieve	Retained on Sieve	Width (in.)	Width Tolerance (in.)	Length (in.)	Length Tolerance (in.)
1	3/4	0.525	0.0160	2.36	0.0630
3/4	1/2	0.375	0.0120	1.97	0.0590
1/2	3/8	0.263	0.0080	1.57	0.0430
3/8	1/4	0.184	0.0060	1.18	0.0310
1/4	No. 4	0.131	0.0040	0.79	0.0240

## 6.0 SAMPLE PREPARATION.

- 6.1 Obtain the sample in accordance with ITM 207
- 6.2 **Prepare two laboratory specimens**

- 6.3 Reduce **both test specimens** in accordance with AASHTO R 76 to the following minimum weight:

Size of Sample		
Aggregate Size	Minimum Weight, g	Maximum Weight, g
8	6000	8000
9	4000	6000
11	2000	---
12	1000	---
SC 11	2000	---
SC 12	1000	---
SC 16	2000	

- 6.4 Determine the percentage of materials finer than the No. 200 sieve **for both test specimens #1 and #2** in accordance with AASHTO T 11
- 6.5 Determine the gradation of test specimen **#1** in accordance **with** AASHTO T 27. **The 1/4 in. (6.3 mm) sieve must be used.**

## 7.0 PROCEDURE.

- 7.1 For each size aggregate, determine the weight of the aggregate retained on the No. 4, 1/4 in., 3/8 in., 1/2 in., and 3/4 in. sieves, if applicable.
- 7.2 Determine the percentage of aggregate retained on each sieve to the nearest 0.1% by dividing the weight of the aggregate on each sieve by the total weight of the sample and multiplying by 100. Each size fraction present in the amount of 4 % or more will be tested. Size fractions containing less than 4% are not tested and shall be discarded.
- 7.3 Reduce **test specimen #2** in accordance with AASHTO R 76 to the following minimum size sample:

Size of <b>Test Specimen #2</b>	
Aggregate Size	Minimum Weight, g
8*	<b>3500</b>
9*	<b>1750</b>
11	<b>650</b>
12	<b>350</b>
SC 11	<b>650</b>
SC 12	<b>350</b>
SC 16	<b>650</b>

\* For No. 8 and No. 9 aggregate size, the test sample may be separated on the 3/8 in. sieve. The portion passing the 3/8 in. sieve may then be further reduced to a minimum of 200 g. This will reduce the number of particles to be evaluated. The flakiness index shall be determined on each portion and a weighted average percentage shall be calculated.

- 7.4** Determine the gradation of **test specimen #2** in accordance with AASHTO T 27. For aggregates retained on each applicable size sieve, each particle shall be tested by attempting to pass the particle through the appropriate slot for the size of material being tested.
- 7.5** The weight of the particles not passing the slot opening and the weight of the particles passing the same slot opening shall be determined to the nearest 0.1 g.

## **8.0 CALCULATIONS**

- 8.1** The FI shall be determined to the nearest whole percentage as follows:

$$\text{Flakiness Index (FI), \%} = \frac{\text{Total Weight Passing Slots}}{\text{Total Weight Retained on No. 4 Sieve}} \times 100$$

## **9.0 REPORT.**

- 9.1** The Flakiness Index shall be reported to the nearest whole number using the Flakiness Index Worksheet shown in Appendix A.

**FLAKINESS INDEX  
WORKSHEET**

**Sample ID #:** \_\_\_\_\_ **Source #:** \_\_\_\_\_

Test Specimen #1 Gradation			Test Specimen #2 Gradation			
Sieve Size	Weight Retained, g	% of Total Sample	Slot Size	(A) Weight Not Passing Slot, g	(B) Weight Passing Slot, g	(C) Total Weight, g (A+B)
3/4 in.			1 to 3/4			
1/2 in.			3/4 to 1/2			
3/8 in.			1/2 to 3/8			
1/4 in.			3/8 to 1/4			
No. 4			1/4 to No. 4			
Total						

$$\text{Flakiness Index (FI), \%} = \frac{\text{Total Weight Passing Slots (Column B)}}{\text{Total Weight Retained on No. 4 Sieve (Column C)}} \times 100$$

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Tested by:** \_\_\_\_\_ **Date:** \_\_\_\_\_