

Method of Test for Flakiness Index

1. Scope:

This test is for determining the flakiness index of aggregates used in asphalt surface treatments.

2. Apparatus:

- 2.1 Scale or balance having the capacity to weigh any sample which may be tested utilizing this procedure and readable to the nearest 0.1 gram.
- 2.2 A metal plate approximately 0.0625 inches thick with slots of the following dimensions: 0.525" x 2.36", 0.375" x 1.97", 0.263" x 1.57", 0.184" x 1.18" and 0.131" x 0.79". Tolerances in the width dimension will be ± 0.005 " and tolerances in the length will be ± 0.10 "
- 2.3 Pans, scoops, brushes, etc. for handling the materials.

3. Procedure:

Flakiness Index:

NOTE: The following procedure is prepared based on the assumption the flakiness index test is performed utilizing the aggregate retained on the applicable sieves during a sieve analysis test performed in accordance with the provisions of SD 202.

- 3.1 Copy the weights of the materials retained on the 3/4", 1/2", 3/8", 1/4" and #4 sieve from the DOT-3 into the appropriate box in column A of the DOT-61.
- 3.2 Aggregate retained on each sieve will be tested particle by particle for its ability to pass through the appropriate elongated opening on the plate. The size of the slots required for each fraction is given in table 1 below.

NOTE: If the material retained on any one of the sieves comprises less than 4% of the total weight of the sample, that material will be omitted from the flakiness index test. If a 5/8" sieve is used in the sieving, the material retained on that sieve will be combined with the material retained on the 1/2" sieve for this testing.

Table 1
Slot Size for Each Aggregate Fraction

Range of aggregate size		Width of slotted sieve opening (Inches)
Material passing	Material retained	
1"	3/4"	0.525
3/4"	1/2"	0.375
1/2"	3/8"	0.263
3/8"	1/4"	0.184
1/4"	#4	0.131

3.3 Following the testing of the aggregate particle by particle over the appropriate elongated opening on the plate, weigh the material that was retained and record the weight in column C for each fraction. Also weigh the material that passed through the slot for each fraction and record the weight in column D of the worksheet. Add the materials weights in columns C & D and record the result in column E. All weights will be recorded to the nearest 0.1 grams.

3.4 Total the weight of the materials in columns C & D and record the result in the "Total" block for each column at the bottom of the worksheet. The total for columns C & D combined should equal the total of column E. The total of column E will be within 0.3% of the total in column A.

Example (Figure 2):

$$\left(\frac{\text{Total Column (A)} - \text{Total Column (E)}}{\text{Total Column (A)}} \right) \times 100 = \left(\frac{584.6 - 582.9}{584.6} \right) \times 100 = 0.3\%$$

3.5 Calculate the flakiness index by dividing the total in column D (Total weight of the materials passing the elongated slots) by the total in column E (Total weight of the material) and multiplying the result by 100. Report the result to the nearest whole percentage.

Flakiness Index =

$$\frac{\text{Total of column (D)}}{\text{Total of column (E)}} = \underline{\hspace{2cm}} \times 100 = \underline{\hspace{2cm}} \%$$

4. Report:

4.1 Test results will be reported on form DOT-61.

5. References:

SD 202
DOT-3
DOT-61

Sample ID 2203623

Sieve Analysis and P.I. Worksheet

DOT-3

File No.

3-19

PROJECT PH 0066(00)15

COUNTY Aurora, Ziebach

PCN B015

Charge to (if not above project)

Field No. 01

Date Sampled 03/13/2019

Date Tested 03/13/2019

Sampled By Tester, One

Tested By Tester, One

Checked By Tester, Two

Material Type Type 2A Cover Aggregate

Source Spencer Quarry

Taken @ 180.3 tons

Lot No. Sublot No.

Weight Ticket Number or Station # 194, Sta 866+00

Lift of

[Wet Sample Weight (0.1g) - Original Dry Sample Weight (0.1g)] / dry weight x 100 = % moisture

Sieve Size	Fineness Modulus	Retained (0.1g)	% total ret. (0.1g)	% passing (0.1g)	% passing (rounded)	Spec Req.
4 in.						
3 in.						
2 1/2 in.						
2 in.						
1 1/2 in.						
1 1/4 in.						
1 in.						
3/4 in.						
5/8 in.						
1/2 in.						
3/8 in.	0.0	0.0	0.0	100.0	100	100 - 100
1/4 in.		235.5	19.2	80.8	81	
#4	47.6	349.1	28.4	52.4	52	0 - 70
Pan						
Total						

+ #4 Gradation Check

within 0.3% of original dry weight

Dust Check

wt. before washing (0.1g)

wt. after washing (0.1g)

loss from washing

% - #200

Liquid Limit & Plastic Limit

A. Can number		
B. Weight of can + wet soil (0.01g)		
C. Weight of can + dry soil (0.01g)		
D. Weight of water (B - C) (0.01g)		
E. Weight of can (0.01g)		
F. Weight of dry soil (C - E) (0.01g)		
G. Liquid Limit (D / F x J x 100) (0.1g)	N.A.	N.P. <input type="checkbox"/>
H. Plastic Limit (D / F x 100) (0.1g)		N.A.
I. Plasticity Index (G - H) (0.1g)		Specification
Liquid Limit N.C. <input type="checkbox"/> (G rounded)		
Plasticity Index (I rounded)	N.A.	0 - 3
J. Correction # Blows		

22=0.9846, 23=0.9899, 24=0.9952, 25=1.0000, 26=1.0050, 27=1.0100, 28=1.0138

weight - #40 / weight - #4 x % passing #4 =

(±3.0% VARIABLE of accumulative % passing (0.1%) on the #40)

Sieve Size	Fineness Modulus	Retained (.1g)	% total ret. (0.1g)	% total x % pass. #4	% passing (0.1g)	% passing (rounded)	Spec Req.
#6							
#8	89.8	518.3	42.2	22.1	10.2	10	0 - 28
#10		44.6	3.6	1.9	6.6	7	
#12							
#16							
#20							
#30							
#40		66.0	5.4	2.8	1.2	1	0 - 4
#50							
#80							
#100							
#200		12.2	1.0	0.5	0.2	0.2	0.0 - 3.0
Pan dry		1.1	4.7	0.2			1228.5
Pan wash		3.6	0.2				1224.9
Total		1230.4					loss from washing(-#200) 3.6

- #4 Gradation Check

within 0.3% of original dry weight

0.15

Crushed Particles Test

Weight of crushed particles	582.6
Weight of total + #4 sample	582.6
Percent of crushed pieces	100
Specification	2 or more FF, min. 50 - 100

- #4 % Particles less than 1.95 Specific Gravity

Specific gravity of solution (1.95 ± 0.01)	
Weight of lightweight particles	
Weight of - #4 material	
% lightweight particles	
Specification	

+ #4 % Particles less than 1.95 Specific Gravity

Specific gravity of solution (1.95 ± 0.01)	
Weight of lightweight particles (0.1g)	
Weight of + #4 material (0.1g)	
% lightweight particles	
Specification	

Natural Fines	0.00	Ma. Sand	0.00	Filler	0.00
Natural Sand	0.00	Add Rock	0.00	Na. Rock	0.00
	0.00	Cr. Rock	0.00	Cr. Fines	

Comments 12" sieves were used. The #8 was split in two and shaken by hand. As per foot note #2, plasticity index was waived as not more than 4.0% of the material passed the #40 sieve.

Sample ID: 2205266

Flakiness Index Worksheet

DOT-61
5-21

PROJECT PH 0066(00)15 COUNTY Aurora, Ziebach PCN B015
 Field No. 01 Date Sampled 03/12/2021 Date Tested 03/12/2021
 Sampled By Tester, One Tested By Tester, One Checked By Tester, Two
 Material Type Type 2A Cover Aggregate Source Jones Quarry

Referenced Test: 01 - Acceptance - DOT-3 - Sieve Analysis, ID=2335828 - 3/12/2021

Aggregate Gradation		Data for Determination of Flakiness Index			
Sieve Size (inches)	A	B	C	D	E
	Weight Retained from Sieve Analysis (grams)	Flakiness Plate Slot Size (inches)	Weight Retained on Flakiness Plate (grams)	Weight Passing Thru Slot in Flakiness Plate (grams)	Total Weight = C + D (grams)
1					
3/4		0.525			
1/2		0.375			
3/8		0.263			
1/4	235.5	0.184	162.5	71.3	233.8
#4	349.1	0.131	282.0	67.1	349.1
Totals	584.6		444.5	138.4	582.9

Gradation Check	
Total Column (E) Within 0.3% of Total Column (A)	0.3

$$\text{Flakiness Index} = \frac{\text{Total of Column D}}{\text{Total of Column E}} = \frac{138.4}{582.9} = 0.24 \times 100 = 24$$

Figure 2