

## ND D 4791 – FLAT PARTICLES, ELONGATED PARTICLES, OR FLAT AND ELONGATED PARTICLES IN COARSE AGGREGATE

Conduct this procedure according to ND D 4791.

Consult the current edition of ASTM for procedure in its entirety and equipment specification details.

### SCOPE

The test method covers the determination of the percentages of flat particles, elongated particles, or flat and elongated particles in coarse aggregate.

### REFERENCED DOCUMENTS

ND T 2 and AASHTO T 2, Sampling of Aggregates  
 ND T 27 and AASHTO T 27, Sieve Analysis of Fine and Coarse Aggregate  
 ND T 248 and AASHTO T 248, Reducing Samples of Aggregate to Testing Size  
 ND T 255 and AASHTO T 255, Total Evaporable Moisture Content of Aggregate by Drying  
 ASTM D 4791, Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

### APPARATUS

Balance  
 Pan  
 Proportional Caliper Device  
 Oven  
 Sieves: 1½" (37.5 mm), 1" (25.0 mm), ¾" (19.0 mm), ½" (12.5 mm), ⅜" (9.5 mm)

### TEST SPECIMEN

Obtain sample according to ND T 2. Thoroughly mix and reduce according to ND T 248. The following table helps determine the initial sample size needed.

Nominal Maximum Size	Sample Size
3/8" (9.5 mm)	2 lbs (1 kg)
1/2" (12.5 mm)	4 lbs (2 kg)
3/4" (19.0 mm)	11 lbs (5 kg)
1" (25.0 mm)	22 lbs (10 kg)
1½" (37.5 mm)	33 lbs (15 kg)

## PROCEDURE

Record the information on SFN 51700. All weights are recorded to the nearest 0.1 g. Dry the sample according to ND T 255 at a temperature of  $230 \pm 9^{\circ}\text{F}$  ( $110 \pm 5^{\circ}\text{C}$ ). Weigh and record as weight of total sample.

Run a dry sieve analysis according to ND T 27. Discard material passing the 3/8" (9.5 mm) sieve. For each size sieve with at least 10% retained, reduce the sample according to ND T 248 until about 100 particles remain. Weigh and record.

If a sieve has less than 10% retained, do not test it.

Use the 5:1 setting on the proportional caliper device. Use the longest dimension of the particle to set the large gap on the device. Tighten the lever. If the particle can fit through the small gap, it is flat or elongated. Set aside all flat or elongated particles from each individual sieve size. Weigh and record each portion after the entire sample has been tested.

## CALCULATIONS

To calculate for a single sieve, divide the weight of particles determined to be flat and elongated by the weight of the 100 particles then multiply the result by 100. The equation is as follows:

$$A = (B/C) \times 100$$

*A = Percent flat and elongated particles*  
*B = Weight of flat and elongated material*  
*C = Total weight of sample on sieve*

If a sieve has less than 10% retained, use the value for the next size larger or smaller sieve that retained 10%. If both a larger and smaller size retained 10%, use the average.

Refer to SFN 51700 for remainder of calculations.

## REPORT

Report the results of flat or elongated particles to the nearest whole percent.

## CALIBRATION

A calibration check of the equipment should be performed annually as a minimum, or whenever damage or repair occurs.