Uncompacted Void Content of Fine Aggregate AASHTO T304-11_____
ASTM C1252 (withdrawn 2015) No Replacement

APPARATUS

1. CYLINDRICAL MEASURE:

Approximately 100-mL capacity?			
Inside diameter approximately 39 mm?			
Inside height approximately 86 mm?			
Made of drawn copper water tube?			
Bottom made of metal at least 6 mm thick?			
Bottom firmly sealed to tubing?			
Bottom provided with means for aligning axis of cylinder with axis of funnel?			
Calibrated according to Section 8 with freshly boiled, deionized water at 18 to 24°C? See **Note 2** in procedure			
Volume calculated to nearest 0.1 mL? (Record)			

2. FUNNEL:
   (a) Lateral surface of right frustum of a cone sloped 60±4° from the horizontal? ..... _____
   (b) Opening diameter 12.7±0.6 mm? ..... _____
   (c) Funnel section made of metal, smooth on inside, and at least 38 mm high? ..... _____
   (d) Volume of funnel section at least 200 mL or provided with supplemental glass or metal container to provide required volume? ..... _____

   Note 1: Pycnometer top C9455 is satisfactory for funnel section, except size of opening has to be enlarged and any apparent burrs or lips should be removed by filing or sanding. Pycnometer top must be used with suitable glass jar with bottom removed.
3. FUNNEL STAND:
   (a) 3 or 4 legged support capable of holding funnel firmly in position with axis of funnel collinear (within a 4° angle and a displacement of 2 mm) with the axis of the cylindrical measure? ..... _____
   (b) Funnel opening 115±2 mm above top of cylinder? ..... _____
4. GLASS PLATE, used to calibrate cylindrical measure:
   (a) Square, approximately 60 by 60 mm? ..... _____
   (b) Thickness at least 4 mm? ..... _____
5. METAL OR PLASTIC PAN, of sufficient size to contain the funnel stand and to prevent loss of material when filling the measure? ..... _____
6. METAL SPATULA:
   (a) Blade approximately 100 mm long and at least 20 mm wide? ..... _____
   (b) Has straight edges? ..... _____
   (c) End cut at right angle to edges? ..... _____
7. SCALE OR BALANCE, accurate and readable to ±0.1 g? ..... _____

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PROCEDURE

SAMPLING

1. Sample obtained by one of the following:
   (a) T248 (splitting and quartering)?..... _____
   or (b) From sieve analysis samples used for T27?..... _____
   or (c) From aggregate extracted from a bituminous concrete specimen?..... _____
2. Methods A and B:
   (a) Sample washed over 150µm (No. 100) or 75µm (No. 200) sieve in accordance with T11? ..... _____
   (b) Sample dried and sieved into separate size fractions in accordance with T27?..... _____
   (c) Necessary size fractions obtained from sieve analysis maintained in a dry condition in separate containers for each size? ..... _____

   Method C:
   (a) A split of the as-received sample dried in accordance with the drying procedure of T27?..... _____

SAMPLE PREPARATION

METHOD A - STANDARD GRADED SAMPLE

1. Following quantities of aggregate that has been dried and sieved in accordance with T27 weighed out and combined?..... _____

Individual Size Fractions	Mass, g	OK?
2.36 to 1.18 mm (No. 8 to No. 16)	44±0.2	
1.18 mm to 600 µm (No. 16 to No. 30)	57±0.2	
600 to 300 µm (No. 30 to No. 50)	72±0.2	
300 to 150 µm (No. 50 to No. 100)	17±0.2	
Total	190±0.2	

METHOD B - INDIVIDUAL SIZE FRACTIONS

1. Separate 190-g sample of aggregate, dried and sieved in accordance with T27, prepared for each of the following size fractions?: ..... _____

Individual Size Fractions	Mass, g	OK?
2.36 to 1.18 mm (No. 8 to No. 16)	190±1	
1.18 mm to 600 µm (No. 16 to No. 30)	190±1	
600 to 300 µm (No. 30 to No. 50)	190±1	

2. Samples not mixed together and each size tested separately? ..... _____

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METHOD C - AS RECEIVED GRADING

1. Sample (dried in accordance with T27) passed through 4.75mm (No. 4) sieve? ..... _____
2. A 190±1-g sample of material passing the 4.75-mm sieve obtained? ..... _____

SPECIFIC GRAVITY OF FINE AGGREGATE

1. If bulk dry specific gravity of aggregate from the source is unknown, specific gravity determined on material passing 4.75mm (No. 4) sieve in accordance with T84? ..... _____
2. This value used in subsequent calculations unless some size fractions differ by more than 0.05 from the specific gravity typical of the completed sample (in which case the specific gravity of the fraction(s) being tested must be determined)? ..... _____
3. If specific gravity differences exceed 0.05:
   (a) Specific gravity of the individual 2.36mm (No. 8) to 150µm (No. 100) sizes determined for use with Method A or the individual size fractions for use with Method B? ..... _____
   (b) Specific gravity determined by direct measurement or by calculation using specific gravity data on gradings with and without the size fraction of interest? ..... _____

PROCEDURE

1. Each test sample mixed with spatula until it appears to be homogeneous? ..... _____
2. Jar and funnel section positioned in stand and cylindrical measure centered? ..... _____
3. Finger used to block opening of funnel? ..... _____
4. Test sample poured into funnel? ..... _____
5. Material in funnel leveled with spatula? ..... _____
6. Finger removed and sample allowed to fall freely into cylindrical measure? ..... _____
7. After funnel empties, excess heaped aggregate struck off from cylindrical measure by single pass of spatula, with blade width vertical and using straight part of its edge in light contact with top of measure? ..... _____
8. Care exercised to avoid vibration or any disturbance that could cause compaction of aggregate into cylindrical measure? ..... _____
   Note 3: After strike-off, measure may be tapped lightly to compact sample to make it easier to transfer container to scale or balance without spilling any of the sample.
9. Adhering grains brushed from outside of container? ..... _____
10. Mass of cylindrical measure and contents determined to nearest 0.1 g? ..... _____
11. All aggregate particles retained for second test run? ..... _____
12. Sample from retaining pan and cylindrical measure recombined and procedure repeated? ..... _____
13. Mass of empty measure recorded? ..... _____

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CALCULATION

1. Uncompacted voids for each determination calculated as follows? ..... _____

$$U = \frac{V - \frac{F}{G}}{V} \times 100$$

where:

V = volume of cylindrical measure, mL
F = mass of aggregate in measure, g
G = bulk dry specific gravity of aggregate
U = uncompacted voids in material, %

2. For Methods A and C, average 2 runs uncompacted voids determined?..... _____
3. For Method B:
   (a) Average 2 runs uncompacted voids for each size fraction determined? ..... _____
   (c) The mean of the uncompacted voids including the results for all 3 sizes determined? ..... _____