



Performance Examination - Aggregate

Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate (ASTM D2419-14)

Candidate Name: _____ NICET ID: _____

Apparatus	Trial 1	Trial 2
Graduated Plastic Cylinders (at least three recommended) Outside diameter 38.1 mm (1.5 in.) Inside diameter 31.0-32.0 mm (1.25 in.) Inside height 430 mm (17 in.) Graduations at 2.54 mm (0.1 in.), marked up to at least 15 in.		
Rubber Stopper That fits the cylinder		
Satisfactory Siphon Assembly Irrigator tube with an outside diameter 6.4 mm (¼ in.) and length approximately 510 mm (20 in.). Pinched end with No. 60 holes (1.0 mm diameter) drilled in two places on end		
Weighted Foot Assembly Weighs 1000 ± 5 g with a guide fixed to the shaft		
Measuring Tin Diameter approximately 57 mm (2 ¼ in.) and capacity of 85 ± 5 ml		
Wide-Mouth Funnel		
Clock or Watch Readable in minutes and seconds		
Shaker One of the following: <i>Mechanical:</i> 1. Operates at 175 ± 2 cycles per minute (127 to 135 cycles during the testing period) 2. Securely fastened to firm and level mount <i>Manually operated:</i> Securely fastened to firm and level mount capable of producing an oscillating motion at a rate of 100 complete cycles in 45 ± 5 seconds, with a hand-assisted half stroke length of 5 ± 0.2 in. (12.7 ± 0.5 cm)		
Stock Calcium Chloride Solution <i>Note: The Stock solution may be made without using any biocide (formaldehyde, glutaraldehyde, or Kathon), provided the storage time of the stock solution is not sufficient to promote fungi growth.</i>		
Verified Calcium Chloride Solution: 1. The temperature of the solution is 22 ± 3 °C (72 ± 5 °F). 2. The solution is free of fungus. 3. Solution discarded if more than two weeks old and fresh solution not added to the old solution.		
Oven Maintains 110 ± 5 °C (230 ± 9 °F)		
Work Surface Free of vibration and not exposed to direct sunlight		
Sieve 4.75-mm (No. 4)		
Flat Pan for mixing		

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Procedures	Trial 1	Trial 2
Sample Preparation		
1. Sampled by D75, mixed and reduced according to C702 (splitting or quartering)		
2. Sample sieved on No. 4 (4.75-mm) sieve until not more than 1 weight % of the residue passes the sieve during 1 minute		
3. Any plus No. 4 material lumps pulverized to pass No. 4 sieve		
4. All fines cleaned from the plus No. 4 particles and included with the passing No. 4 material		
5. The sample is at least 1500 g of material passing the No.4 sieve		
Sample Procedure A		
1. Measuring tin filled four times by dipping from the sample		
2. Measure full is dipped and bottom edge tapped on a hard surface at least four times to consolidate the material		
3. Measure level full or slightly rounded above the brim		
4. Amount of material in four measures determined by weight or by volume, using a plastic cylinder		
5. This material returned to sample		
6. Sample quartered or split according to C702 to obtain the predetermined weight or volume		
7. The sample split or quartered two more times to obtain specimens		
8. Each specimen dried at 230 ± 9 °F (110 ± 5 °C) and cooled to room temperature before testing		
Sample Procedure B		
1. Material dampened sufficiently to prevent segregation or loss of fines		
2. 1000 to 1500 g of material split or quartered out		
3. Material mixed thoroughly with hand trowel in the circular pan by scooping toward the middle of the pan while rotating it horizontally		
4. Mixing continued for at least one minute		
5. Moisture condition checked by tightly squeezing small portion in the palm of the hand, forming a cast		
6. Sample at proper water content (cast permits careful handling without breaking) a. If too dry (cast crumbles easily), add water and remix b. If too wet (shows free water), drain sample and air dry, mixing frequently		

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Procedures (continued)	Trial 1	Trial 2
7. If either (a) or (b) above occurred, the sample placed in the pan, covered with a lid or damp cloth, not disturbing sample, and allowed to stand for at least 15 minutes		
8. Sample remixed for 1 minute after minimum curing time, without water, and formed into a cone with a trowel		
9. The tin measure pushed through the base of the pile with a free hand against pile opposite the measure		
10. The material fills tin to overflowing		
11. Material compacted into the tin with the palm of the hand		
12. Tin struck off level full with trowel		
Method Procedures	Trial 1	Trial 2
1. Siphon 4 ±0.1 in. (102 ± 3 mm) of working calcium chloride solution into a plastic cylinder		
2. Prepared sample poured from measuring tin into the cylinder, using a funnel to avoid spillage		
3. Bottom of cylinder tapped sharply on the heel of hand several times to release air bubbles		
4. Wetted sample allowed to stand undisturbed for 10 ± 1 minute		
5. Stopper placed in cylinder and material loosened from the bottom by shaking		
Mechanical Shaker Method (Referee Method)		
1. Stoppered cylinder placed in mechanical shaker and timer set		
2. Cylinder and contents shaken for 45 ± 1 second (127 to 135 cycles during the testing period)		
Manual Shaker Method		
1. Stoppered cylinder secured in hand shaker and stroke counter reset to zero		
2. Fingertips pushed against right-hand spring steel strap, and smooth oscillating motion maintained		
3. Tip of pointer reverses direction within marker limits		
4. Shaking action continued for 100 strokes in 45 ± 5 seconds		
Hand Method		
1. Cylinder held horizontally and shaken vigorously in horizontal linear motion from end to end		
2. Cylinder shook 90 cycles (one cycle is a complete back and forth motion) in approx. 30 seconds		
3. Using throw of 229 ± 25 mm (9 ± 1 in.)		
4. Following shaking, cylinder set upright on the worktable and stopper removed		

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Method Procedures (continued)	Trial 1	Trial 2
Irrigation Procedure		
1. Cylinder kept vertical and base in contact with work surface		
2. Irrigator tube inserted in cylinder, remove spring clamp from hose, and rinse material from cylinder walls as irrigator is lowered		
3. Irrigator forced through the material to the bottom of the cylinder by gentle stabbing and twisting action while solution flows from irrigator tip		
4. Stabbing and twisting motion applied until cylinder filled to the 15-in. (38.0-cm) mark		
5. Irrigator raised slowly without shutting off flow so the liquid level is maintained at about 15-in. (38.0-cm) mark		
6. Final level adjusted to 15 in. (38 cm) before irrigator is removed from the cylinder		
Clay Reading Determination		
1. Cylinder and contents allowed to stand undisturbed for 20 minutes ± 15 seconds, timing started immediately after withdrawal of irrigator		
2. After sedimentation, record the level at the top of clay suspension ("clay reading") If no clear line of demarcation, sample allowed to stand undisturbed until clay reading can be obtained, record clay suspension level and total sedimentation time If sedimentation time exceeds 30 minutes, rerun test using three individual samples of the same material, and record clay reading requiring shortest sedimentation time		
Sand Reading Determination		
1. Weighted foot assembly placed over cylinder and lowered gently until resting on the sand without allowing indicator to hit mouth of cylinder		
2. When weighted foot rests on sand, assembly tipped toward cylinder graduations until indicator touches inside of cylinder		
3. Subtract 10 in. (25.4 cm) from level indicated by the extreme top edge of indicator and record as "sand reading"		
4. If clay or sand readings fall between (0.1-in. (2.5-mm) graduations, record level of the higher graduation		

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Calculations	Trial 1	Trial 2
1. Sand equivalent calculated to the nearest 0.1% using the following equation: $SE = (\textit{sand reading} / \textit{clay reading}) \times 100$		
2. If the sand equivalent is not a whole number, reported as next higher whole number		
3. If desired to average sand equivalent values, and the average is not a whole number, reported as next higher whole number		

First Attempt: Pass: _____ Fail: _____ Second Attempt: Pass: _____ Fail: _____

Exam Administration: Remote _____ In-Person _____

Comments:

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