T 248

REDUCING SAMPLES OF AGGREGATES TO TESTING SIZE

FOP FOR AASHTO

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Significance

Aggregates and other materials sampled in the field in accordance with AASHTO T 2 are large composites and need to be reduced to the appropriate size for testing. It is extremely important that the procedure used to reduce the field sample not modify the material.

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Scope

Mechanical splitter

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This procedure covers the reduction of samples to the appropriate size for testing in accordance with AASHTO T 248. Techniques are used that minimize variations in characteristics between test samples and field samples. Method A (Mechanical Splitter) and Method B (Quartering) are covered.

This procedure applies to fine aggregate (FA), coarse aggregate (CA), and mixes of the two, and may also be used on soils.

Quartered sample

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Samples of FA that are at the saturated surface dry (SSD) condition or drier shall be reduced by a mechanical splitter according to Method A. Samples of FA that are wetter than SSD shall be reduced by Method B, or the entire sample may be dried and then reduced to test sample size using Method A. Samples of CA or mixtures of FA and CA may be reduced by either method. As a quick determination, if the fine aggregate will retain its shape when molded with the hand, it is wetter than SSD.

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Mechanical splitter

Apparatus

Method A – Mechanical Splitter

Splitter chutes:

- Even number of equal width chutes
- Discharge alternately to each side
- Minimum of 8 chutes total for CA, 12 chutes total for FA
- Width:
    - Minimum 50 percent larger than largest particle
    - Maximum chute width of 3/4 in. for fine aggregate passing 3/8 in. sieve
- Feed control:
    - Hopper or straightedge pan with a width equal to or slightly less than the overall width of the assembly of chutes
    - Capable of feeding the splitter at a controlled rate
- Splitter Receptacles / Pans:
    - Capable of holding two halves of the sample following splitting

The splitter and accessory equipment shall be so designed that the sample will flow smoothly without restriction or loss of material.

Method B – Quartering

- Straightedge scoop, shovel, or trowel
- Broom or brush
- Canvas or plastic sheet, approximately 6 by 9 ft

Sample Preparation

If the FA sample is wetter than the SSD condition and Method A – Mechanical Splitter is to be used, dry the material using temperatures not exceeding those specified for any of the tests contemplated for the sample.

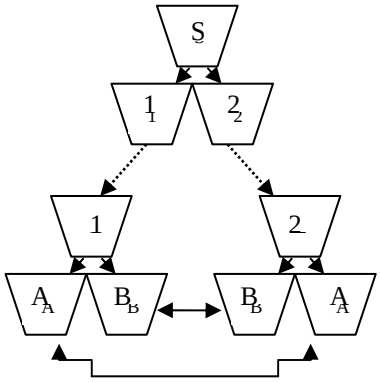
16 ***Note 1:*** It may be undesirable to split some FA / CA mixtures that are over SSD condition using Method A.

Procedure

Method A – Mechanical Splitter

17 1. Place the sample in the hopper or pan and uniformly distribute it from edge to edge so that approximately equal amounts flow through each chute. The rate at which the sample is introduced shall be such as to allow free flowing through the chutes into the pans below.

18 2. Split the sample from one of the two pans as many times as necessary to reduce the sample to the size specified for the intended test (See diagram for an example). The portion of the material collected in the other pan may be reserved for reduction in size for other tests.



Example Diagram

Example:

- Sample (S) is twice the mass needed for testing. Sample (S) is split in a mechanical splitter to yield parts (1) and (2).
- Part (1) is further reduced, yielding (A) and (B), while Part (2) is reduced to yield (B) and (A).
- Final testing sample is produced by combining alternate pans, i.e. (A)/(A) or (B)/(B) only.

19 3. As a check for effective splitting, determine the mass of each part of the split. If the percent difference of the two masses is greater than 5 percent, corrective action must be taken.

Calculation

Splitter check:	5127 total sample mass
Splitter pan #1:	2583
Splitter pan #2:	2544

$$\frac{2544}{2583} \times 100 = 98.5 \qquad 100 - 98.5 = 1.5\%$$

Method B – Quartering

Use either of the following two procedures or a combination of both.

Procedure #1: Quartering on a clean, hard, level surface:

1. Place the sample on a hard, clean, level surface where there will be neither loss of material nor the accidental addition of foreign material.
2. Mix the material thoroughly by turning the entire sample over a minimum of three times. With the last turning, shovel the entire sample into a conical pile by depositing each shovelful on top of the preceding one.
3. Flatten the conical pile to a uniform thickness and diameter by pressing down with a shovel. The diameter should be four to eight times the thickness.
4. Divide the flattened pile into four approximately equal quarters with a shovel or trowel.
5. Remove two diagonally opposite quarters, including all fine material, and brush the cleared spaces clean.
6. Successively mix and quarter the remaining material until the sample is reduced to the desired size.
7. The final test sample consists of <u>two diagonally opposite</u> quarters.

Flattening pile

Dividing pile

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Mixing the sample

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Quartered sample

Procedure #2: Quartering on a canvas or plastic sheet:

1. Place the sample on the sheet.
2. Mix the material thoroughly by turning the entire sample over a minimum of three times. Lift each corner of the sheet and pull it over the sample toward the diagonally opposite corner, causing the material to be rolled. With the last turning, form a conical pile.
3. Flatten the conical pile to a uniform thickness and diameter by pressing down with a shovel. The diameter should be four to eight times the thickness.
4. Divide the flattened pile into four approximately equal quarters with a shovel or trowel, or insert a stick or pipe beneath the sheet under the center of the pile, then lift both ends of the stick, dividing the sample into two roughly equal parts. Remove the stick, leaving a fold of the sheet between the divided portions. Insert the stick under the center of the pile at right angles to the first division and again lift both ends of the stick, dividing the sample into four roughly equal quarters.
5. Remove two diagonally opposite quarters, being careful to clean the fines from the sheet.
6. Successively mix and quarter the remaining material until the sample size is reduced to the desired size.
7. The final test sample consists of <u>two diagonally opposite</u> quarters.

Tips!

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- Remember, the reduced sample must be representative of the whole.
- Method A – mechanical splitter – is preferred.
- Method A cannot be used for FA wetter than SSD condition.
- Keep the mechanical splitter dry to avoid having particles "stick" to it.
- Make sure your splitter is level.

REVIEW QUESTIONS

1. When using the mechanical splitter for FA, the minimum width of the individual chutes should be approximately how much larger than the largest particles in the sample to be split?

2. What is the maximum width for material passing the 3/8 in. sieve?

3. How does the moisture content of the sample influence reduction?

4. Define the SSD condition.

5. Describe two methods of mixing the sample.

PERFORMANCE EXAM CHECKLIST

REDUCING FIELD SAMPLES OF AGGREGATES TO TESTING SIZE FOP FOR AASHTO T 248

Participant Name _____ Exam Date _____

Record the symbols "P" for passing or "F" for failing on each step of the checklist.

	Trial 1	Trial 2
Method A - Splitting		
1. Material spread uniformly on feeder?	_____	_____
2. Rate of feed slow enough so that sample flows freely through chutes?	_____	_____
3. Material in one pan re-split until desired mass is obtained?	_____	_____
Method B - Quartering		
1. Sample placed on clean, hard, and level surface?	_____	_____
2. Mixed by turning over 3 times with shovel or by raising canvas and pulling over pile?	_____	_____
3. Conical pile formed?	_____	_____
4. Diameter equal to about 4 to 8 times thickness?	_____	_____
5. Pile flattened to uniform thickness and diameter?	_____	_____
6. Divided into 4 equal portions with shovel or trowel?	_____	_____
7. Two diagonally opposite quarters, including all fine material, removed?	_____	_____
8. Cleared space between quarters brushed clean?	_____	_____
9. Process continued until desired sample size is obtained when two opposite quarters combined?	_____	_____

*The sample may be placed upon a sheet and a stick or pipe may be placed under the sheet to divide the pile into quarters***.**

Comments: First attempt: Pass ☐ Fail ☐ Second attempt: Pass ☐ Fail ☐

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_____

Examiner Signature _____ WAQTC #:_____