

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

RAPID DETERMINATION OF THE POLISH
SUSCEPTIBLE CARBONATE PARTICLE CONTENT IN
AGGREGATES

1. PURPOSE

- 1.1 To establish a rapid testing procedure for determining the approximate percentage, by weight, of polish susceptible carbonate particles in aggregate.
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2. SCOPE

- 2.1 This procedure is designed to be used in conjunction with the testing of heterogeneous aggregate such as river gravel.
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3. APPLICABLE DOCUMENTS ASTM E-11

- 3.1 ASTM C702 or AASHTO T248
3.2 MP 700.00.06
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4. APPARATUS

- 4.1 A 4.75 mm (No. 4) U. S. Standard 203 mm diameter sieve, conforming to ASTM E-11 Specifications.
- 4.2 Balance or scale, having a capacity of at least 300 grams and a sensitivity of at least 0.1 grams.
- 4.3 Oven capable of being maintained at $110 \pm 5^{\circ}\text{C}$ ($230 \pm 9^{\circ}\text{F}$).
- 4.4 Containers: an acid resistant $225 \times 175 \times 51$ mm Pyrex dish.
- 4.5 Receiving beaker: 400 or 600 ml Pyrex beaker.
- 4.6 Tongs: Acid resistant
- 4.7 Hydrochloric Acid: 6N solution
- 4.8 Safety Apparatus (rubber gloves, apron, respirator, ventilation hood, eye protection.)
- 4.9 A source of magnification, preferably a microscope of sufficient power, to discern grain sizes as small as 2 mm.

5. SAMPLE PREPARATION

- 5.1 Samples shall be representative of the sources from which they are obtained and shall be reduced to an appropriate size by use of a sample splitter or by quartering in accordance with ASTM C-702 or AASHTO T-248.
- 5.2 Samples shall be sieved and thoroughly washed over a 4.75 mm (No. 4) sieve and dried in an oven to constant weight at $110 \pm 5^{\circ}\text{C}$ ($230 \pm 9^{\circ}\text{F}$).
- 5.3 An oven dry sample, weighing a minimum of 350 grams, shall be used for the test and shall be weighed to the nearest 0.1 gram.
- 5.3.1 The selection of samples of an exact predetermined weight shall not be attempted.

6. PROCEDURE

- 6.1 Under a ventilation hood, pour a quantity of 6N hydrochloric acid into the Pyrex dish to cover the largest piece of aggregate in the sample.
- 6.2 Place a small number of aggregate particles from the sample into the acid and observe signs of effervescence.
- 6.3 Immediately remove all pieces of aggregate exhibiting strong signs of effervescence and place in the receiving beaker containing water to stop the acid-carbonate reaction.
- 6.4 Repeat this process until all particles exhibiting effervescence have been removed from the sample.
- 6.5 Thoroughly wash and oven dry all pieces which exhibited effervescence and discard the remainder of the sample.
- 6.6 Each individual piece of aggregate should be carefully examined under a microscope by a person qualified by education and experience to employ petrographic techniques for the recognition of characteristic properties of rocks and minerals.
- 6.6.1 It is the intent of this test to determine those carbonate particles which would be considered to be polish susceptible and detract from the overall anti-skid properties of the aggregate. Those carbonate particles which exhibit frictional properties by virtue of a coarse-grained texture ($> 2 \text{ mm}$) should not be counted as polish susceptible. Calcareous sandstone, for example, would not be considered as a carbonate particle because only the matrix would be made up of carbonate material.
- 6.7 After this final separation has been made, weigh the carbonate particles to the nearest 0.1 gram.

7. CALCULATIONS

7.1 Calculate the percentage of carbonate particles as follows:

$$C = \frac{W_{11}}{W_{21}} \times 100$$

Where:

C = Percentage of carbonate particles

W₁ = Total weight of carbonate particles

W₂ = Total weight of test sample coarser than 4.75mm



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