
Procedure for Determining % Ignition Loss of Inorganic Soils

SC T 36

1. Scope

This procedure is intended as an indicator of the amount of coarse (+75- μm sieve) mica present in inorganic soils such as the residual soils of the SC Piedmont. The water of crystallization contained within the mica is driven off by ignition at approximately 1000° C. The loss in mass of the sample is an index to the amount of mica present.

2. Referenced Documents

2.1 AASHTO Standards

T 88 Particle Size Analysis of Soils

2.2 SC Test Methods

SC T 34 Mechanical Analysis of Soils (Elutriation Method)

3. Apparatus

3.1 High temperature porcelain crucibles

3.2 Muffle furnace capable of maintaining a temperature of 1000° C \pm 50° C

3.3 Desiccator

3.4 AASHTO Class B Analytical Balance

4. Test Specimens

This test is normally performed in conjunction with a particle size analysis (SC T 34 or AASHTO T 88). The sample is prepared by recombining and mixing thoroughly the material above the 75- μm sieve from the sieve analysis performed on the portion of the sample passing the 2-mm sieve.

If the test is to be run on a specimen other than material from a particle size analysis, the sample is to be prepared as follows:

4.1 The sample should be dried to a constant mass at 110° C \pm 5° C.

4.2 Reduce the sample to approximately 100 grams by quartering or by the use of a riffle splitter. Weigh the sample and record the mass to the nearest 0.1 gram.

4.3 Place the sample in a glass beaker or jar. Add enough 4% hexametaphosphate (calgon) solution to cover the sample. Agitate the sample to assure thorough wetting and allow to stand at least one hour.

4.4 Wash the sample over a nested set of 2-mm and 75- μm sieves. Continue to wash the material by agitating the sieves under running water until all the material that will pass the 2-mm sieve has done so. Remove the 2-mm sieve, dry the material retained on the 2-mm sieve to a constant mass at 110° C and record the mass to

the nearest 0.1 gram. Continue washing the material remaining on the 75- μm sieve until all the material that will pass the 75- μm sieve has done so. Transfer the material retained on the 75- μm sieve to a pan and dry to a constant mass at 110° C. Weigh this material and record the weight to the nearest 0.1 gram.

- 4.5 Calculate the percentage of material that is retained on the 75- μm sieve in the material passing the 2-mm sieve.

$$\%+75\text{-}\mu\text{m} = w_3 / (w_1 - w_2)$$

w_1 = weight of whole sample

w_2 = weight of material retained on the 2-mm sieve

w_3 = weight of material retained on the 75- μm sieve

5. Procedure

- 5.1 The sample of soil shall be reduced in size (if necessary) to approximately 20 grams by quartering or use of a riffle splitter. If a visual inspection of the sample indicates that a large amount of mica is present, it may be necessary to reduce the sample size to less than 20 grams to prevent the material from expanding over the sides of the crucible.
- 5.2 Clean and weigh the crucible. Record the weight to the nearest 0.01 gram.
- 5.3 Place the sample in the crucible and determine the weight of the sample and crucible to the nearest 0.01 gram.
- 5.4 Before placing the crucible in the oven, let the temperature reach 1000° C ($\pm 50^\circ$ C). Place the crucible in the oven and allow the temperature to again reach 1000° C ($\pm 50^\circ$ C). Allow the samples to remain at 1000° C ($\pm 50^\circ$ C) for 45 minutes.
- 5.5 Remove the crucible from the oven and place in the desiccator to cool. Allow the sample to cool to room temperature in the desiccator prior to weighing.
- 5.6 Weigh the crucible and sample and record the weight to the nearest 0.01 gram.
- 5.7 Calculate the loss on ignition as:

loss (L) = mass (grams) of crucible and sample prior to ignition - mass of crucible and sample after ignition.

Calculate the % Ignition Loss for the material passing the 2-mm sieve as:

$$\% \text{ Ig} = (P \times L) / M \times 100$$

where: P = percentage of material above the 75- μm sieve in the material passing the 2-mm sieve. This corresponds to the percentage of Total Sand in the material passing the 2-mm sieve shown on the soil test report.

L = loss on ignition (grams)

M = mass of sample prior to ignition. This procedure calculates the % ignition loss as a percentage of the material passing the 2- mm sieve. If the % ignition loss of the sample as a whole is desired, multiply the value for % ignition loss calculated in step 5.7 by the percentage of material passing the 2-mm sieve in the sample as a whole.

6. Calculations

The loss on ignition is calculated as follows:

wt. of sample = 19.73 grams
wt. of crucible = 175.60 grams
wt. of crucible and sample after ignition = 194.05 grams
wt. of crucible and sample prior to ignition = 195.33 grams
percentage of material passing 75- μ m sieve in material passing the 2-mm sieve = 15%

then:

$$P = 100\% - 15\% = 85\%$$

$$L = 195.33 \text{ grams} - 194.05 \text{ grams} = 1.28 \text{ grams}$$

$$M = 19.73 \text{ grams}$$

$$\% \text{ Ig} = (1.28\text{g} \times 85) / 19.73\text{g} \times 100 = \underline{5.5\%}$$

7. Report

Report the ignition loss as a percentage of the material passing the 2-mm sieve expressed to the nearest 0.1%. Test results are reported on Lab Form 930. Data and calculations are recorded on worksheet SO 111W.
