GDT 65

A. Scope

For a complete list of GDTs, see the Table of Contents.

Use this test method to make and test samples of hardened soil-cement and cement stabilized graded aggregate. The samples may also contain admixture consisting of granulated iron blast-furnace slag and fly ash. The samples are compacted in a mold before cement hydration to laboratory maximum density at optimum moisture content.

B. Apparatus

The apparatus consists of the following:

1. Mold: Use a cylindrical metal mold approximately 4 in (101.6 mm) diameter and 4.6 in (116.84 mm) high with a removable extension approximately 3.1 in (78.74 mm) high.
2. Rammer: Use a metal rammer with a 2-inch (50mm) diameter flat circular face and weighing 5.5 lbs (2.5kg). Equip the rammer to drop to a free fall of 12 inches (300mm) above the elevation of the sample.
3. Sieve: Use a No. 10 Sieve conforming to AASHTO M-92.
4. Sample Extruder: Use a jack, lever frame, or other device adapted for the purpose of extruding samples from the mold.
5. Balances: Use a balance or scale of at least 22 lbs (10 000 g) capacity sensitive to 0.002 lbs (1.0 g).
6. Polyethylene Freezer Bags: Use ordinary commercial-type freezer bag of 1 qt (1 L) capacity (WB-01).
7. Moist Room: Use a moist room or a suitable covered container capable of maintaining a temperature of 73.4 °, ± 3 °F (23 °, ± 1.3 °C) and having a relative humidity of not less than 90 percent.
8. Testing Machine: Use a hydraulic or screw type with sufficient opening between the upper bearing surface and the lower bearing surface of the machine to permit testing of the samples specified herein. The machine shall be capable of applying at least 20,000 lbs (88 964 N) with an accuracy of ±1 percent of the total load.
9. Straightedge: Use a steel straightedge 12 inches (300mm) long.
10. Large Pans: Use pans of sufficient size to allow thorough mixing of the material passing the No. 10 sieve.
11. Scoops: Use scoops or other suitable devices for mixing and sampling the material passing the No. 10 sieve.
12. Graduated Cylinder: Use a 1000ml capacity glass or plastic graduate for measuring the mixing water.
13. Small Pans or Dishes: Use pie pans or evaporating dishes for weighing the cement and/or other admixtures.

C. Sample Preparation

14. Soil Cement

    Sieve a sufficient quantity of soil through a No. 10 (2.00 mm) sieve to provide at least 9 compacted specimens, 4 in (100 mm) diameter by 4.6 in (176.34 mm) high, each having a volume of 1/30 ft^3 (0.0009 mm^3). Usually requires about 75lb (34kg) of dry soil.

15. Graded Aggregate

    Prepare three 10,000g samples of graded aggregate in accordance with GDT 49 to provide at least 9 compacted specimens, 4 in (100 mm) diameter by 4.6 in (176.34 mm) high, each having a volume of 1/30 ft^3 (0.0009 mm^3).

D. Procedures

1. Soil Cement
    a. Weigh out three 10 000 g batches of dry soil.
    b. Weigh out three batches of dry cement to represent 5% (400g), 7 percent (600g), and 9 percent (800g) of the batches of dry soil. If required, weigh out admixtures in a similar manner.

NOTE:-Due to its caustic nature, gloves and a mask should be worn at all times when handling unhydrated Portland cement.

c. Place one 10 000 g batch of dry soil plus the-first percentage of dry cement (5%) in a large pan and mix the dry ingredients to a uniform color.

d. Add sufficient potable water to raise the soil-cement mixture to optimum moisture as determined by GDT 19. Mix until a uniform moisture content is achieved throughout the entire batch.

e. Form a specimen by compacting the prepared soil-cement mixture, in three equal layers, in the mold according to GDT 19.

f. Extrude the sample from the mold and seal it in a polyethylene freezer bag.

g. Prepare two more samples as in steps D.1.e and D.1.f. from the batch of soil-cement mixture.

h. Prepare the 7% and 9% cement batches the same as in steps D.1.c through D.1.g and place all nine molded samples in the moist room for curing.

2. Graded Aggregate

a. Weigh out three 10 000 g batches of the dry graded aggregate

b. Weigh out three batches of dry cement to represent 3 percent (300g), 4 percent (400g), and 5 percent (500g), of the batches of dry graded aggregate. If required, weigh out admixtures in a similar manner.

c. Mix, mold, and prepare the graded aggregate-cement samples as in steps D.1.c through D.1.g. of the soil-cement procedure.

NOTE: Due to its caustic nature, gloves and a mask should be worn at all times when handling unhydrated Portland cement.

d. Prepare the 4 percent and 5 percent cement batches in the same manner as described above and place all nine molded samples in the moisture room for curing.

E. Testing

1. Cure the samples for 7 days in the moist room.
2. Test three samples at each cement content for unconfined compressive strength. Do not cap the specimens.
3. Vertically load the samples in a testing machine at a loading rate of 0.05 in/minute (1.27 mm/minute) until failure.

F. Calculations

$$\text{Compressive Strength - PSI (MPa)} = \frac{\text{Load - lbs (N) at failure}}{\text{Area of Sample - in}^2\ (\text{m}^2)}$$

NOTE: No consideration-is given to the length-diameter (l/d) ratio (K-factor).