Tests on Cement:

Standard Consistency of Cement

Objective

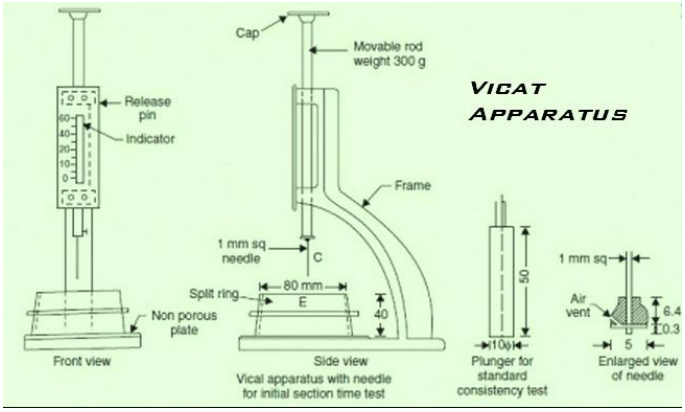
To find the percentage by mass of water to cement required to produce cement paste of desired consistency. It is used in the determination of the initial and final setting times and soundness of cement.

Principles

- The standard consistency of cement is between 26 and 33 % by weight of dry cement.
- Cement paste will be of standard consistency when the 10 mm plunger penetrate the paste to a distance of 5 to 7mm from the bottom of the Vicat mould.

Apparatus

- Vicat apparatus with the mould and its 10 mm diameter plunger for consistency test.
- Pan.
- Digital Weighing scale: to measure the weight of dry cement.
- Graduates cylinder: to measure the volume of water.
- Mixing bowl.
- Trowel.
- Stop watch.



Materials

- Ordinary Portland Cement.
- Water.

Test Procedure

1. Take empty pan free from dirt and other foreign particles.
2. Weight 500 gm of cement, and put that in the pan.
3. Measure an amount of water using graduates cylinder (This amount of water is nearly 26%-33% of the amount of cement).
4. Mix the cement and water thoroughly to get a homogenous mixture. Mixing for 4±1/4 minutes.
5. Fill the cement paste in the mould of Vicat apparatus.
6. The plunger is gently lowered on the paste in the mould until it touch the surface of the paste.
7. Release the plunger immediately to penetrate the paste (this must not exceed 30 seconds after completion of mixing).
8. Read the gauge or the penetration depth taking the distance from the base plate to the tip of the plunger.

Calculations

The consistency is measured by the Vicat apparatus, and it is defined as that consistency which will permit a Vicat plunger having 10 mm diameter to penetrate the paste to a point (5-7 mm) from the bottom of the mould.

Therefore:

- If the penetration is between 5 mm to 7 mm from the bottom of mould, the water added is correct.
- If penetration is not proper, the process is repeated with different percentages of water till the desired penetration is obtained.

Discussion:

1. Draw a curve between w/c ratio (x-axis) and penetration from bottom (mm) (y-axis).
2. Discuss the curve in 1.
3. What is the (w/c) ratio that gives the standard consistency of cement?
4. What are the factors that affect the test results?