**PW 07: CONSISTENCY TESTS OF CEMENT**

1. **Objective of the Experiment**

Measure the consistency of cement according to EN 196-3

1. **Necessary Equipment**

* A balance (scale) (+1g)
* Mixer
* The Vicat apparatus with its cylindrical needle of diameter (10.00 ± 0.05) mm and effective length (50 ± 1) mm. The total mass of the moving parts must be (300 ± 1) g.
* The Vicat mold, intended to hold the paste during the test, must be made of hard rubber in the shape of a truncated cone, with a depth of (40.0 ± 0.2) mm and lower and upper diameters of (70 ± 0.5) mm and (80 ± 0.5) mm, respectively. This truncated cone should rest on a glass plate with a thickness of at least 2.5 mm.

1. **Materials Used**

* A sample of cement
* Water

1. **Operating Procedure**

* Weigh **500g ± 1g** of cement and pour it into the mixer bowl.
* Mix the cement with a quantity of water (starting with a mass ratio of **E/C = 0.24**).
* Mix the paste for **90 seconds** at a slow speed.
* Stop for **15 seconds**, disassemble the bowl, and use a spatula to remove all the paste adhered to the sides of the mixing vessel beyond the mixing zone.
* Reassemble the bowl and mix for **90 seconds** at a fast speed.
* Fill the truncated cone mold with the obtained paste and level the surface by resting on the edge of the mold.
* Place the filled mold on the Vicat apparatus and set the zero level of the probe.
* Center the mold in line with the probe axis, then carefully lower the probe until it makes contact with the paste. Release the screw so that the probe penetrates into the paste under its own weight.
* After **30 seconds**, record the penetration value **d** read from the device's index (see figure).
  + If **d = 6 mm ± 1 mm**, the test is valid and the consistency is **normal**.
  + If **d ˂ 5 mm**, the paste is **too wet**, and the test should be repeated with less water.
  + If **d ˃ 7 mm**, the paste is **too stiff**, and the test should be repeated with more water.
* Repeat the test with different water contents until a distance of **6 mm ± 1 mm** is obtained. Record the water content of the paste, expressed to within **0.5%**, as the water content for achieving normal consistency.

1. **Work required**

* Determine the mass ratio E/C to obtain a normal paste from the provided binder.
* Present your results by completing the test sheet.
* Plot the penetration curve as a function of the mass ratio E/C.
* Comment on the results
* Make a conclusion

**Table 1: Consistency test**

| **E/C** | **Water mass (g)** | **Penetration (mm)** |
| --- | --- | --- |
| 0.24 |  |  |
| 0.25 |  |  |
| 0.26 |  |  |
| … |  |  |