# YILDIZ TECHNICAL UNIVERSITY
# CIVIL ENGINEERING DEPARTMENT
# CONSTRUCTION MATERIALS DIVISION

## CONSTRUCTION MATERIALS / LABORATORY REPORT 2: CEMENT

**Name- Surname:** **Group:** ☐ **4** ☐ **5**

**Student No.:** **Session:** ☐ **10:$^{00}$-10:$^{40}$** ☐ **10:$^{50}$-11:$^{30}$**

### 2.1. SPECIFIC GRAVITY (DENSITY) OF CEMENT

**Calculations:**

Table 2.1. Specific gravity of cement

| Sample | W (g) | $V_1$ ($cm^3$) | $V_2$ ($cm^3$) | γ ($g/cm^3$) |
|---|---|---|---|---|
| **CEM I 42,5 R** | | | | |

### 2.2. STANDARD CONSISTENCE AND SETTING TIME TESTS (EN 196-3)

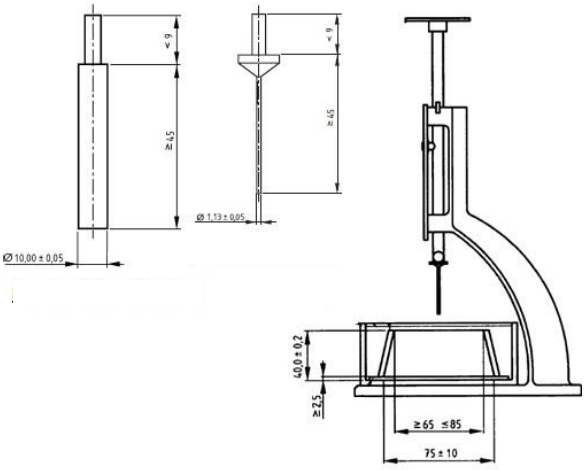


**Figure 2.1.** Side view of the Vicat apparatus.

The water content of the paste expreseed as a percentage by mass of the cement is ……% and the distance between the base plate and the bottom face of the plunger is …….. mm.

According to test results:

☐ The water content of the mix design is sufficient to obtain standard consistency.

☐ We must repeat the test with ***…an increase/ a decrease…*** in the water content until one is found to produce a distance between plunger and base-plate of (6 ± 2) mm.

**Table 2.2.** Test results for setting time

| **t (min.)** | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **h* (mm)** | 40 | 40 | 40 | 40 | 38 | 36 | 34 | 33 | 32 | 28 | 25 | 20 | 12 | 6 | 2 | 0 | 0 |

h*: Penetration depth of Vicat needle

*According to the test results given in Table 2.2:*

- Initial setting time……min. (for h=6±3mm)
- Final setting time ...…….min. (for h=0.5mm)

## 2.3. FLEXURAL AND COMPRESSİVE STRENGTH (TS EN 196-1)

Each batch for three test specimens consists of:

…… g cement

…… g CEN standard sand

…… g water

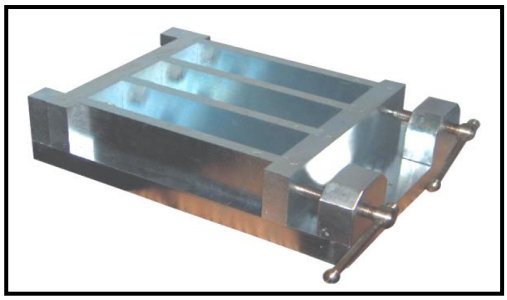

**Figure 2.2.** The prismatic mold with the dimesions of 40x40x160 $mm^3$

Table 2.3. The compressive and flexural strength test results at 28 days.

| Sample No. | Failure Load for Bending Test (kN) | Flexural Strength (MPa) | Failure Load for Compression Test (kN) | Compressive strength (MPa) | Average compressive strength (MPa) |
|---|---|---|---|---|---|
| **1** | 5,7 | … | 72,9 / 71,1 | … | |
| **2** | 4,2 | … | 63,6 / 64,1 | … | **…** |
| **3** | … | … | … | … | |

Calculations:

**Table 2.4.** Mechanical and physical requirements given as characteristic values (EN 197-1).

| Strength class | Compressive strength MPa | | | | Initial setting time |
|---|---|---|---|---|---|
| | Early strength | | Standard strength | | |
| | 2 days | 7 days | 28 days | | min |
| 32,5 N | - | ≥ 16,0 | ≥ 32,5 | ≤ 52,5 | ≥ 75 |
| 32,5 R | ≥ 10,0 | - | | | |
| 42,5 N | ≥ 10,0 | - | ≥ 42,5 | ≤ 62,5 | ≥ 60 |
| 42,5 R | ≥ 20,0 | - | | | |
| 52,5 N | ≥ 20,0 | - | ≥ 52,5 | - | ≥ 45 |
| 52,5 R | ≥ 30,0 | - | | | |

*Evaluation:*

The average compressive strength value of the produced cement mortars is obtained as 21.5 MPa at 2-days of curing age, considering all of the test results, the cement,

☐ Conforms the requirements given given in Table 2.4 for class 42.5 R.

☐ Does not conform the requirements given given in Table 2.4 for class 42.5 R ***due to the,***

*a. compressive strength.*

*b. initial setting time.*

*c. both compressive strength and initial setting time.*