

## Topic 2 INTERNAL PLASTERS

Worksheet No.3

*Test of normalized density of cement slurry*

### Related standards

STN EN 196-3: Cement testing methods. Part 3: Determination of setting time and volume stability

STN EN 197-1: Cement. Part 1: Composition, specifications and criteria for demonstrating the conformity of general purpose cements.

STN EN 196-7: Cement testing methods. Part 7: Procedures for sampling and treatment of cement samples

### Devices and equipment:

- scales: accurate to  $\pm 1\text{g}$
- measuring cylinder with an accuracy of  $\pm 1\text{ml}$
- bowl and trowel
- stopwatch with an accuracy of  $\pm 1\text{s}$
- Vicat apparatus with densitometer roller: the roller is made of corrosion-resistant metal in the form of a precision circular cylinder with an effective length of at least 45 mm and a diameter of  $10,00 \pm 0,05$  mm. The total mass of the moving part should be  $300 \text{ g} \pm 1 \text{ g}$  and should move without significant friction
- Vicat ring (mould): it is filled with the tested slurry, it must be made of hardened rubber, plastic or brass. The ring has a conical shape, a depth of  $40.0 \text{ mm} \pm 0.2 \text{ mm}$  and an internal diameter of  $75 \text{ mm} \pm 10 \text{ mm}$
- Washer (slide): is larger than the mould, with a thickness of 2.5 mm
- Test specimens: prepared and tested in a laboratory, which must have a constant temperature of  $20^\circ \text{C} \pm 2^\circ \text{C}$  and a relative humidity of at least 50%

### Method

Preparation of cement slurry of standard density:

400g cement CEM II 32.5 (accurate to 1g)

120 ml of distilled water (to the nearest 1 ml)

Carefully fill the mixing vessel with water and cement so that no water and cement are lost. Addition time must not exceed 10s. While pouring the cement, mix the mixture lightly.

Immediately thereafter, the mixture is stirred vigorously and this time is taken as the beginning of the mixing process. It is given for a minute exactly. After 90 s, stirring is stopped for 30 s.

The cement slurry, which is glued to the walls and bottom of the mixing vessel, is wiped with a suitable trowel into the center of the vessel. Then mix for another 90s. The total mixing time is 3 minutes.

The Vicat ring placed on the base is filled with cement slurry. Both the mould and the washer are previously oiled with a separating agent. Air bubbles in the cement slurry are removed by manually tapping the pad. The excess slurry is carefully removed and aligned with the top edge of the ring.

### Determination of normalized density

The Vicat apparatus with densitometer shall be accurately set to the zero scale before the test. Then the roller is raised to the upper starting position. The filled Vicat ring on the substrate is placed in the middle under the densified roller, which is moved downwards so that it is in contact with the surface of the cement slurry. Then the moving part is quickly released, so that the dense roller penetrates vertically into the center of the cement slurry. The standard density test must be performed  $4\text{min} \pm 10\text{s}$  after the end of the addition of cement to the water (zero time). The penetration depth is read on the scale when the densitometer roller no longer penetrates deeper into the cement slurry, but not before 5 s and at the latest after 30 s.

The test is repeated with a cement slurry containing different amounts of water until a distance of  $6\text{ mm} \pm 2\text{ mm}$  is reached between the bottom surface of the densitometer roller and the pad. After each standard density test, the densitometer is cleaned.

Nº	CEMENT (g)	WATER (ml)	Vicat apparatus (mm)
1.	400	120	
2.			
3.			

### Evaluation:

$w = (v / c) * 100 (\%) = \dots\dots\dots$

in  $\dots\dots\dots$  final amount of water (g)

c  $\dots\dots\dots$  final amount of cement (g)

### Resources:

<https://sites.google.com/site/svfmaterialeveinzierstvo/stavebne-materialy/ucebne-texty/skky-cementu/cas-tuhnucia-cementu>