

Topic 2 INTERNAL PLASTERS

Worksheet No.4

Determination of setting time of cement slurry

Devices and equipment:

Vicat apparatus: the densitometer is replaced by a cylindrical steel needle with an effective length of at least 45 mm and a diameter of $1.13 \text{ mm} \pm 0.05 \text{ mm}$

The total mass of the moving part must be $300\text{g} \pm 1\text{g}$. It must move vertically and without significant friction and its axis must be equal to the axis of the needle

Before the test, a Vicat apparatus equipped with a needle is adjusted by placing the needle on a pad placed in a test vessel and setting the indicator to the zero scale mark

Then the needle is raised to the starting position

Vicat ring (socket): 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 inner diameter of $75 \text{ mm} \pm 10 \text{ mm}$

Washer (slide): is larger than the socket, with a thickness of 2.5 mm

Test sample: cement slurry of standard density (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%)

METHODS

1. Determination of the onset of solidification

The Vicat ring, placed on a base, is filled with a cement slurry of normalized density.

The Vicat ring is placed under the Vicat device; the needle is carefully lowered to touch the surface of the cement slurry. The needle must remain in this position for 1-2 s.

Then the moving part is quickly released, so that the needle penetrates vertically into the cement slurry. The depth of penetration is read on the scale when the needle no longer penetrates, but no later than 30 s from the release of the needle.

The reading is entered in the test report together with the time that has elapsed since the cement was poured into the water.

The puncture tests are repeated on the same sample of cement slurry at suitably selected intervals, e.g. after 10 minutes and at suitable points at least 8 mm from the edge of the ring or 5 mm from each other and 10 mm from the last injection.

The test specimen should be stored to determine the end of solidification.

Test result

The time that has elapsed from zero time to when the distance between the needle and the pad has reached $6 \pm 3 \text{ mm}$. The resulting time is rounded to 1 minute.

Assessment of whether the observed time meets the standard requirements.

Requirements of STN EN 197-1 for the beginning of setting
of cements

Cement class	Onset of solidification (min)
32,5	≥ 75
42,5	≥ 60
52,5	≥ 45

The onset of solidification occurred minutes from zero time.

Cement (complies - does not comply)

2. Determination of the end of solidification

The filled Vicat ring used to determine the onset of solidification is inverted on the substrate so that end-of-solidification determination tests can be performed on the side originally adjacent to the substrate. The Vicat ring is placed under the needle of the Vicat apparatus, which is carefully lowered to touch the surface of the cement slurry sample. The needle must remain in this position for 1-2 s. Then the moving part is quickly released, so that the needle penetrates vertically into the cement slurry. The depth of penetration is read on the scale when the needle no longer penetrates, but no later than 30 s from the release of the needle.

The puncture tests are repeated at suitably selected time intervals, e.g. 30 minutes. In the time between the individual injections, the filled Vicat ring is stored in a test container in a storage cabinet. The Vicat needle is cleaned immediately after each injection.

The end of solidification is reached when the circular extension on the needle no longer leaves an imprint on the surface of the test body. The end of solidification should also be confirmed by repeated injections at two other sites.

Test result

The time that has elapsed from zero time to the time when the needle penetrated into the hardened cement slurry only to a depth of 0.5 mm. The time is rounded to 5 minutes.

The end of solidification occurred minutes from zero time.

Resources:

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