

Resistivity – Conditioning and Summary

The Resistivity Test can be used to evaluate the electrical resistivity of saturated concrete to provide a rapid indication of the concrete's resistance to fluid penetration. 4×8 in. cylinders are stored in a controlled solution of reagent grade NaOH, KOH, and Ca(OH)₂ that approximates a standard pore solution (Option A of AASHTO TP 119). At selected ages, samples are removed from the solution for testing and wiped with a wet sponge to ensure that they are in a saturated surface wet condition. Resistivity is measured in accordance with AASHTO T358 or TP119 (with appropriate corrections for sample size).

The sample conditioning is described below:

1. Immerse two 100-mm × 200-mm (4 in × 8 in.) specimens in a single 5-gal bucket with sufficient calcium hydroxide saturated simulated solution to cover the specimens by 38 mm.

2. The calcium hydroxide simulated pore solution shall consist of 7.6g/L NaOH (0.19M); 10.64g/L KOH (0.19M); 2g/L Ca(OH)₂.

Note 1: this can be made in a 5 gal bucket to provide 18.9 L of solution using 13250 g water, 102.6g NaOH, 143.90g KOH and 27g Ca(OH)₂.

Note 2: The chemicals should be reagent grade.

3. The sample is demolded at 24 hours and immediately placed in the solution.

4. A minimum of 6 days in solution is required for a valid test.

5. During specimen conditioning, maintain the temperature at $23 \pm 2^\circ\text{C}$.

Note 3: A correction factor must be applied within the resistivity calculation for temperature measurements outside of this range. This is included in resistivity spreadsheet as linked in the following section.

The links below provide more information about the resistivity test:

PEM website explaining PEM tests (resistivity is within the formation factor info)

<https://cptechcenter.org/performance-engineered-mixtures-pem/pem-test-methods/>

Test Summary and TP 119-15

https://intrans.iastate.edu/app/uploads/sites/7/2019/03/Test-Summary_formation_factor.pdf

AASHTO T358 (available for purchase)

<https://store.transportation.org/Item/PublicationDetail?ID=4170>

Resistivity video from Oregon State University

<https://www.youtube.com/watch?v=0GrY2-5AP6o>

You may skip from 1:54 to 5:07 in the video. This portion of the video covers other sample conditioning methods and other resistivity testing methods.

Spreadsheet for tracking the resistivity results.

https://intrans.iastate.edu/app/uploads/sites/7/2019/05/Template_2019-06-07_Resistivity.xlsx

Description of the aforementioned spreadsheet.

https://intrans.iastate.edu/app/uploads/sites/7/2019/06/Template_2019-06-21_Resistivity-Description.pdf