



Formation Factor via Surface Resistivity Test Procedure

1. Cast two 4" x 8" concrete cylinders per day of concrete paving from one batch, according to ASTM C 31, Standard Practice for Making and Curing Concrete Test Specimens in the Field. Seal mold with lid. Label cylinder mold with sample number.
2. Pour 3.5 gallons of tap water (de-ionized water) into a 5-gallon bucket. Add 102.6g NaOH, 143.9 g KOH and 27g Ca(OH)₂ to water. Stir to ensure all the chemicals properly dissolve.
3. Demold cylinders after one day and mark the cylinder with the sample numbering information. Place cylinders into the solution and seal the bucket with a lid. Two concrete samples may be placed in each bucket. Position them to ensure all the surface is in contact with the solution. Samples should be covered by a minimum of 1.5 inches (38mm) of solution.
4. Measure resistivity at 7, 14 and 28 days.

Proceq Resistivity Device Operation

This non-destructive laboratory test method measures the electrical resistivity of water-saturated concrete and provides an indication of its permeability. Please refer to AASHTO T358 for further details.

1. Prior to measuring, ensure the air temperature around the specimen is in the range of 20 to 25°C (68 to 77°F).
2. Remove cylinder, towel dry and make four permanent marks on the top circular face of the specimen marking the 0, 90, 180, and 270 degree points of the circumference of the circle. Extend the marks into the longitudinal sides of the specimens. The marks serve as visual aids during the resistivity readings.





3. Dip the Wenner array probe tips into a pan of water to get the contacts wet.



4. Turn on resistivity meter by pressing the power button.



5. Make sure the specimen is saturated surface wet, and place specimen on holder with the 0-degree mark on top.



6. Ensure the probe is centered on the side of the specimen and press down to make sure all the points of the probe are in contact with the concrete.
7. Wait 3 to 5 seconds or until a stable reading is obtained, record the resistivity measurement on the form shown in the Table or save the reading by pressing the bottom button. A reading is considered unstable if it drifts by more than 1 kohm-cm.
8. Rotate the specimen and test at the 90, 180, and 270 degree marks.
9. Repeat step 8.
10. Place cylinder back into the bucket for 14 and 28 day tests. After 28 day test, save for other tests such as compressive strength or discard.
11. Apply the proper geometric correction factors if required by manufacturer. Record results on data collection spreadsheet.

Sample Age (days)	Resistivity (kohm-cm)								
	0°	90°	180°	270°	0°	90°	180°	270°	Average
7									
14									
28									

12. To calculate formation factor, divide the average resistivity by the resistivity of pore solution.

$$F = \rho / \rho_0$$

Where,

ρ is the measured resistivity of the sample

ρ_0 is 0.1Ω.m.

Saturated F Factor Limits

Exposure Conditions	Saturated F Factor Limits Desired Service Life (yr)	
	25-35	>35
Non-Freeze-Thaw and No Deicers	>500	>1000
Freeze-Thaw and Deicer Exposure	>1000	>2000