Test Method

Soluble Salts in Soil (Conductivity Method)

RC 353.09

1. Scope

This test is used to determine the concentration of soluble salts content in soil using a conductivity meter.

2. Apparatus

(a) Conductivity meter capable of reading the range of conductivity values required.

(b) 100 mL glass beaker, cover glass, burette and glass stirrer.

(c) AS 2.36 mm sieve.

(d) Balance of sufficient capacity having a limit of performance ot exceeding ± 0.0005 g.

(e) Thermometer reading to 0.2°C.

(f) Oven operating at 105°C-110°C.

3. Reagents

(a) Distilled water.

(b) Sodium Chloride (AR Grade).

4. Preparation of Calibration Curves

Prepare calibration curves of conductivity as a function of sodium chloride concentration.

Note: this calibration is only required for a new meter or if the meter has been damaged and repaired or a new cell has been fitted.

(a) Dry the sodium chloride at 105°C-110°C to constant mass.

(b) Prepare sodium chloride solutions for the range of concentrations required. For each range of the conductivity meter, the calibration curve shall have at least six points.

(c) Measure the conductivity of each solution prepared using the conductivity meter in accordance with the manufacturer's instructions. Record the temperature of the solution and correct the reading to 25°C using Table 1.

(d) Plot the concentration of the solution in mg/litre versus the conductivity reading in µS/cm for each range of the conductivity meter.

5. Preparation of the Test Portion

(a) Using the 2.36 mm sieve, sieve a representative sample of the soil prepared in accordance with the procedure prescribed in AS 1289.1 Take care to brush all the fines through the sieve.

(b) Obtain, by riffling or quartering the sieved material, a representative test portion of approximately 55 g.

(c) Dry the material at 105°C-110°C to constant mass.

6. Procedure

(a) Weigh 50 g of the dry soil passing the 2.36 mm sieve into a 100 mL beaker and add 50 mL of distilled water.

(b) Stir the suspension for a few minutes to thoroughly wet the soil particles. Cover the beaker with a cover glass and allow the soil and water to soak for about but not greater than 2 hours, stirring the suspension every twenty minutes.

(c) Thoroughly clean and dry the conductivity meter cell.

(d) Transfer a portion of the supernatant liquid in the beaker to the cell of the conductivity meter, or transfer the conductivity meter probe to the liquid in the beaker and read the conductivity of the solution in accordance with the manufacturer's instructions.

(e) Repeat step (d) until four successive readings are within 1 percent. Record the readings and calculate the mean conductivity of the last four readings. Correct the mean value to 25°C using Table 1.

(f) Use the value of the mean conductivity obtained in step (e) and the calibration curve to read the concentration of salt, expressed as sodium chloride, n mg/kg of soil.

7. Test Report

Report the following:

(a) The conductivity of the supernatant liquid to the nearest 10 µS/cm.

(b) The concentration of soluble salts in the soil expressed in mg of sodium chloride per kg of soil to the nearest 10 mg/kg.

(c) If known, the source and description of the soil tested.

Note: 1 Siemen = 1S = 1 mho = 1/ohm

Table 1 - Temperature factor (fs) for correcting electrical conductivity (by multiplication) of soil extracts to the standard temperature 25°C

°C	f_s	°C	f_s	°C	f_s
18.0	1.163	22.0	1.064	26.0	0.979
18.2	1.157	22.2	1.060	26.2	0.975
18.4	1.152	22.4	1.055	26.4	0.971
18.6	1.147	22.6	1.051	26.6	0.967
18.8	1.142	22.8	1.047	26.8	0.964
19.0	1.136	23.0	1.043	27.0	0.960
19.2	1.131	23.2	1.038	27.2	0.956
19.4	1.127	23.4	1.034	27.4	0.953
19.6	1.122	23.6	1.029	27.6	0.950
19.8	1.117	23.8	1.025	27.8	0.947
20.0	1.112	24.0	1.020	28.0	0.943
20.2	1.107	24.2	1.016	28.2	0.940
20.4	1.102	24.4	1.012	28.4	0.936
20.6	1.097	24.6	1.008	28.6	0.932
20.8	1.092	24.8	1.004	28.8	0.929
20.0	1.087	25.0	1.000	29.0	0.925
20.2	1.082	25.2	0.996	29.2	0.921
20.4	1.078	25.4	0.992	29.4	0.918
20.6	1.073	25.6	0.988	29.6	0.914
20.8	1.068	25.8	0.983	29.8	0.911

Test Method - Revision Summary

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Date	Clause Number	Description of Revision	Authorised by
Dec 2012	Full document	Re-styled with minor corrections made	Principal Advisor – Pavements & Materials