

Understanding Salinity Measurements

The measurement of dissolved salts in ground water, irrigation or river water is confused by the various means of measurement and the ground rules for sampling.

So, is there any easy rule of thumb that compares Total Dissolved Solids (TDS) with Total Soluble Salts (TSS) with Parts Per Million (PPM) with Electrical Conductivity (EC) units, be they milliSiemens, microSiemens, or deciSiemens?

Quite simply, no.

Within the question lies the first problem. Milli, micro, or deciSiemen per unit by distance are all measured the same way, using the variation in electrical conductivity of different strength salt solutions.

The confusion lies in the shorthand. For convenience, the users of any particular EC measurement tend to refer to the amounts as 'EC units' with no further definition.

As an everyday comparison, a man who is six foot tall in the old way of measuring is either 1.83 metres tall, 183 centimetres tall or 1829 millimetres tall, all metric units.

Now if we were to say that he was 183 metric units (MU) tall you would be entitled to say "but which units?"

Many scientists and soil investigators tend to use the deciSiemen per metre (dSm^{-1}) EC measure and in this scale seawater is about 50-60 units.

Economists, saltwatchers, salt credit people, irrigators and the counters at Morgan use microSiemen per centimetre (mScm^{-1}). On this scale sea water is about 50,000 to 60,000 EC units.

Total dissolved salts (TDS), an indicator used by some chemical companies, is measured in milligrams per litre. For very general purposes either 600 times the deciSiemens

or 0.6 times the microSiemens is a fair approximation. By this measure seawater is in the order of 3000-3500 parts TDS.

This is a rule of thumb so please treat it as such.

To draw another rough comparison, the microSiemens EC indicator ought to be used a bit like a breathalyser bag.

The breathalyser is a quick, easy, portable way of finding out whether your blood alcohol content is in the wrong range.

The EC meters are a quick, easy, portable way of checking the salt loads in water, but like the breathalyser, if you get a positive reading you certainly would want a more accurate check before taking action.

—From Salt Force News



Pumping saline groundwater

MEASURING SALT IN WATER

The salt content of solutions is determined by the amount of dissolved salts, usually expressed as parts per million (ppm), milligrams per litre (gm^{-1}) or milligrams per kilogram (mgkg^{-1}).

The most accurate method of measurement is to take a sample of the solution, dry it and weigh the salts that remain.

This procedure however is slow and cumbersome and it is simpler and quicker to measure the ability of the solution to conduct electricity, a characteristic which has been shown to be related to the amount of salt in solution.

The electrical conductivity (EC) is measured by means of an EC meter and units expressed in deciSiemens per metre (dSm^{-1}).

This is the international standard unit used for all reports but it can be expressed in a number of ways:

- one deciSiemen per metre (dSm^{-1}) equals;
- 1000 microSiemens per centimetre (UScm^{-1}) equals;
- one milliSiemen per centimetre (mScm^{-1}).

The relationship between total soluble salts in solution (TSS) and EC varies with the concentration and proportion of individual ions.

For general purposes the Rural Water Commission multiplies EC by 600 to obtain TSS in water, which approximates to a factor of 640 in general use in the western United States.

A closer approximation can be obtained from the curvilinear relationship of EC and TSS. This was established from an analysis of 240 surface and subsurface water samples from various parts of Victoria which indicates that the approximate conversion factor varies as shown below:

EC (dSm^{-1} at 25°C)	Conversion Factor
0.2 - 0.6	740 - 620
0.6 - 6.0	600
6.0 - 30.0	600 - 690

(Source: Quality aspects of farm water supplies, second edition, 1980. Victorian Soil Conservation Authority, Melbourne).

— Courtesy of Farm June 1990