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TECHNICAL PUBLICATION

INFORMATION & STRATEGY FOR THE FACILITY MANAGER

Conductivity - A Measurement of Total Dissolved Solids

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Raw water contains dissolved impurities commonly referred to as Total Dissolved Solids (TDS). As the water is evaporated in processes such as boilers and cooling towers, the impurities are left behind, increasing their concentration levels in the remaining water.

As the TDS increases, the potential for deposition and corrosion increases. So, to minimize problems, a water manager must be able to measure TDS so it can be maintained within proper limits.

The most popular device that is used in the measurement of TDS is a conductivity meter. As the name implies, a conductivity meter measures the conductivity of the water.

How does conductivity relate to TDS?

It's a common knowledge that water conducts electricity which explains electrocution in water.

However it is not the water that conducts electricity. Pure water is a poor conductor of electricity. What causes water to be conductive is the presence of dissolved solids. The more dissolved solids a water contains, the more conductive the water becomes.

How is conductivity measured?

Conductivity (expressed in micromhos) is the measurement of water's ability to transmit electric current. It is the opposite or reciprocal of resistivity (expressed in ohms).

$$1 \text{ mho} = \frac{1}{\text{ohm}}.$$

$$1 \text{ micromho} = \frac{10^6}{\text{ohm}}.$$

Below is a table showing the relationship between conductivity and resistivity.

Can TDS be measured in ppm?

There are conductivity meters that read ppm directly…or one can convert readings in micromhos to ppm using the table below.

The conductivity meter must first be standardized according to the type of water being tested, since water salt type and concentration can vary greatly by location.. Most commonly used standard solution is Myron L's 442 Natural Water ™ Standard Solution.

Below is a table showing the relationship of conductivity, resistivity, and ppm of TDS.

Conductivity (micromhos)	Resistivity (ohms)	Approx. ppm
1	1,000,000	<1
10	100,000	<10
100	10,000	50
500	2000	350
1000	1000	650
1500	667	1050
2000	500	1450
2500	400	1850
3000	333	2250
3500	286	2650
4000	250	3050
4500	222	3500
5000	200	3950

For a perspective point of view, ultra pure water has a resistivity of 18,000,000 ohms, while sea water has about 20 ohms.