

The Silt Density Index, or most commonly referred to by the acronym SDI, is a popular method of determining the feed water quality of reverse osmosis membrane systems. SDI is a measurement of the *fouling potential* of suspended solids, not the amount of solids. Typically reverse osmosis systems require the SDI to be below 5.0 in seawater systems, and below 2.0 in brackish systems.* SDI values are reported as SDI_X, where X is the total time, reported in minutes, required to obtain the final sample (typically at fifteen minutes, or less).

In essence, the SDI measurement is easy -- it is a simple, pressure regulated test to measure the flow decline, or decline in filtration rate, of the feed water through a 0.45μ filter. Though easy in theory, the procedure and operation may take some practice to accomplish successfully.

General Rules of SDI

- Ensure that the o-ring is clean and in good condition.
- Prior to installing filter, flush the equipment to remove any contaminants.
- Carefully load membrane filter, avoiding exposure to fingers (most test equipment is supplied with specialty tweezers).
- Ensure all air is purged from inlet side of filter housing.

- Take the temperature of the feed water prior to the test; this should not vary more than +/- 1°C during the course of the test.

Procedure

1. Purge any air in the filter holder. This can be achieved by opening a bleed valve or loosening the filter holder while cracking the ball valve. After purging, close the valve or holder.
2. Place a 500 mL graduated cylinder under the filter apparatus to measure the time it takes to fill.
3. Open the ball valve fully, verifying the regulator is set at 30psi, and measure the time it takes to fill 100mL and 500mL from the time the valve is opened. Record these values, leaving the valve open and letting the flow continue.**
4. Subsequent measurements should be conducted at five minutes, ten minutes and fifteen minutes from the time that the valve was initially opened. Again, record the amount of time it took to fill 100mL and 500mL, leaving the valve open and letting the flow continue until completion of the test.***
5. Verify temperature fluctuation has not exceeded +/- 1°C from the initial temperature.

$$SDI = P30/TT = 100 * (1-Ti/Tf) / TT$$

Where SDI15 = Silt Density Index at 15 minutes

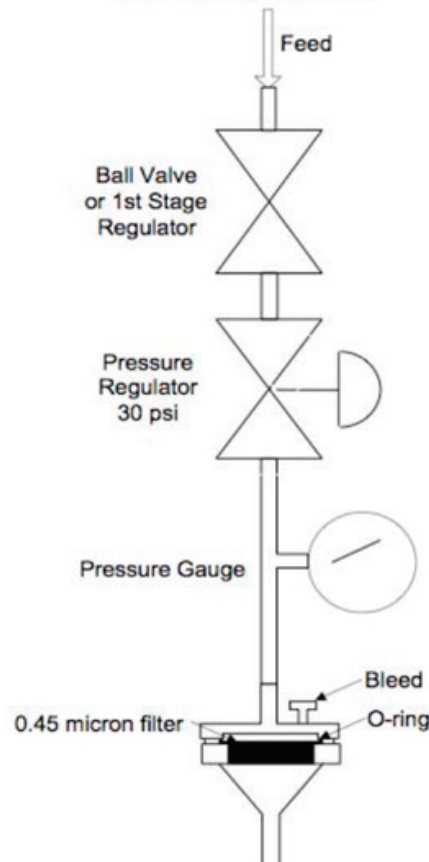
P30 = % plugage at 30psig feed pressure

Tt = total test time in minutes

Ti = initial time, in seconds, to obtain 500mL sample

Tf = time required, in seconds, to obtain 500mL at 15 minutes (or less)

Figure 1. SDI Apparatus



* Verify with the membrane manufacturer and/or system designer as to the specific SDI limits for your site.

** The time to collect 500mL at Ti should be approximately five times greater than the time to collect 100mL. If it takes much longer than this to collect 500mL, the test should be conducted using only 100mL collection times.

*** If P30 exceeds 75%, re-run the test utilizing a shorter value for Tf (typically at 5 or 10 minutes).