

# MANUAL SDI KIT

Suspended solids and colloidal materials in feed water are one of the biggest problems in reverse osmosis systems. Although most systems have some pre-treatment, including 5-micron pre-filters, these fine particles are responsible for the fouling of reverse osmosis membranes.

In order to measure the degree of this fouling problem, a concept called Silt Density Index is used. Here filtration rates are calculated by exposing a 0.45-micron filter to the feed water under pressure. An SDI of less than 5 is typically considered acceptable for the reverse osmosis systems. This means membranes should foul at a very low rate at SDI values of less than 5.

Although this concept works most of the time, there are exceptions when a lower SDI (less than 3) is desirable due to the nature of the suspended solids in the feed water.

## Equipment

- Silt Density Index Test Assembly
- 47mm Filter Holder
- 0.45 $\mu$ m 47mm filter papers
- Pressure Gauge
- Pressure Regulator
- Ball Valve
- 500ml Graduated Cylinder
- Stop Watch
- Dull Tweezers

# MANUAL SDI KIT - TEST PROCEDURE

1. Connect the test kit less filter paper for pretest flush.
2. Flush the test kit and supply line (not supplied) for 3 to 5 minutes to remove any possible contaminants.
3. Measure the temperature of the water.
4. Make sure the O-ring on the filter is in good condition and properly placed. Set the pressure regulator to 30 psig. The set screw on the regulator should be adjusted while there is a small flow. Supply pressure to the regulator should be > 40psig.
5. Open the membrane filter holder and carefully place a 0.45 $\mu$  membrane filter in to the filter holder using the dull tweezers to avoid damage and touching the filter paper. Screw loosely together.
6. Open the feed valve slightly and adjust the filter housing to overflow, displacing any trapped air. Tighten the filter housing, open the feed valve completely and make final adjustments to the pressure regulator as required. Close the feed valve.
7. Prepare to take measurements. Open the ball valve and simultaneously, using the stop watch begin measuring the time required to fill the 500 ml measuring cylinder. Record the time (*tf*). Leave the valve open for continued flow.
8. Measure and record the times to collect additional 500 ml volumes of sample, starting the collection at 5, 10, 15 minutes of total elapsed flow time. This value is recorded as (*tf*) with *f* being the time used. Measure the water temperature and check the pressure as each sample is collected. The pressure must remain constant at 30 psig ( $\pm 1$  psig) and the temperature must remain constant to 1°C.
9. After completion of the test the membrane filter may be retained for future reference. Record the Date, Sample Location, Time, Operator, SDI Value and Comments with the filter pad.

## MANUAL SDI KIT - CALCULATION

Calculate the Silt Density Index (SDI) as follows:

$$SDI_T = \frac{[1 - (ti / tf)] * 100}{T}$$

Where : T = Total elapsed time flow time, minutes (e.g. 15 minutes for an SDI<sub>15</sub>)

Where : *ti* = Initial time required to collect 500 ml of sample

Where : *tf* = Time required to collect 500 ml of sample after test time T (15 minutes for an SDI<sub>15</sub>)

**Note :** The expression [ 1 - *ti* / *tf* ] should not exceed 75%. If it does exceed this value, use a shorter time for ; that is 5 or 10 minute measurements. If times shorter than 15 minutes are required, the SDI values are too high for the membrane.

### Comments on Variability

The procedure outlined must be followed exactly for the information to have meaning and be reproducible. Test variability (50 - 100%) has been a recognized problem with this method and operator training in procedural details is a critical factor in obtaining precision and accuracy.

SDI < 5	No Pre filtration is required
SDI 5 - 10	A media (sand type) filter is required
SDI > 10	A 2 stage media filtration is required