

SILT DENSITY INDEX (SDI)

The **silt density index (SDI)** is a measure of the fouling capacity of water in reverse osmosis systems. The test measures the rate at which a 0.45 micron filter is plugged when subjected to a constant water pressure of 206.8 kPa (30 psi). The SDI gives the percent drop per minute in the flow rate of the water through the filter, averaged over a period of time such as 15 minutes.

Typically, spiral wound reverse osmosis systems will need an SDI less than 5, and hollow fiber reverse osmosis systems will need an SDI less than 3.

The SDI test kit is supplied with a pre-assembled unit to perform the test, together with associated filters, stop watch and connection hose.

Procedure:

1. Ensuring that the ON/OFF valve is in the OFF position, connect the tubing to the sample point and connect firmly.
2. Unscrew the two halves of the filter holder and place a 47mm, 0.45u filter circle (white coloured membrane) onto the support plate of the holder. Screw the two halves together to seal the unit.
3. Turn on the supply then open the ON/OFF valve.
4. Set the pressure regulator to 207kPa (30psi) by pulling out the dial on the regulator and adjusting appropriately.
5. Close the ON/OFF valve and remove the filter circle.
6. Insert a clean unused filter circle.
7. Open the ON/OFF valve for a second to remove any trapped air.
8. Place the whole unit over the 100ml measuring cylinder and open the valve once more, simultaneously starting the stop watch.
9. Measure the time required to fill the measuring cylinder with 100ml of water (t_i). Allow the flow to continue.

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Procedure (continued)

10. After 5 minutes (time T) measure and record the time (t_f) to collect an additional 100ml sample of water.
11. Repeat this again after 10 and 15 minutes to obtain additional (t_f) values at time T=10 and T = 15.

Calculation

Calculate the Silt Density Index (SDI) as follows:

Report the SDI with a subscript indicating the total elapsed flow time T in minutes.

$$SDI_T = \left[\frac{(1 - t_i/t_f)}{T} \right] \times 100$$

t_i = Initial time required to collect 100ml of sample, seconds.

t_f = Time required to collect 100ml of sample after time T, seconds.

T = Total elapsed flow time, minutes.

Notes:

1. Ensure the pressure remains at 207kPa (30psi) throughout the test. Adjust the pressure regulator if necessary.
2. Ensure the temperature of the water remains constant throughout the test (+/- 1°C) as flow rate changes by approximately 3% per °C.