

RephiLe SDI Kit (RASDI0001)

Installation and User Manual



Silt Density Index (SDI) is a measurement of the fouling potential of suspended solids and colloidal to the RO membranes. A feed SDI reading of less than 5 is considered acceptable.

Based on ASTM Method 4189-95, the test is accepted industry-wide to estimate the rate at which colloidal and particle fouling will occur in water purification systems.

Product Description

The RephiLe SDI Kit is used to indicate the quantity of particulate contamination in relatively low-turbidity water supplies or waste streams.

Why Measuring SDI

Suspended solids and colloidal materials in feed waters are one of the biggest problems, causing fouling to the RO membranes and greatly shorten their useable lives. Checking SDI ensures feed water is within feed water specifications for the purification system, or to assess any extra pretreatment, if water is outside specs.

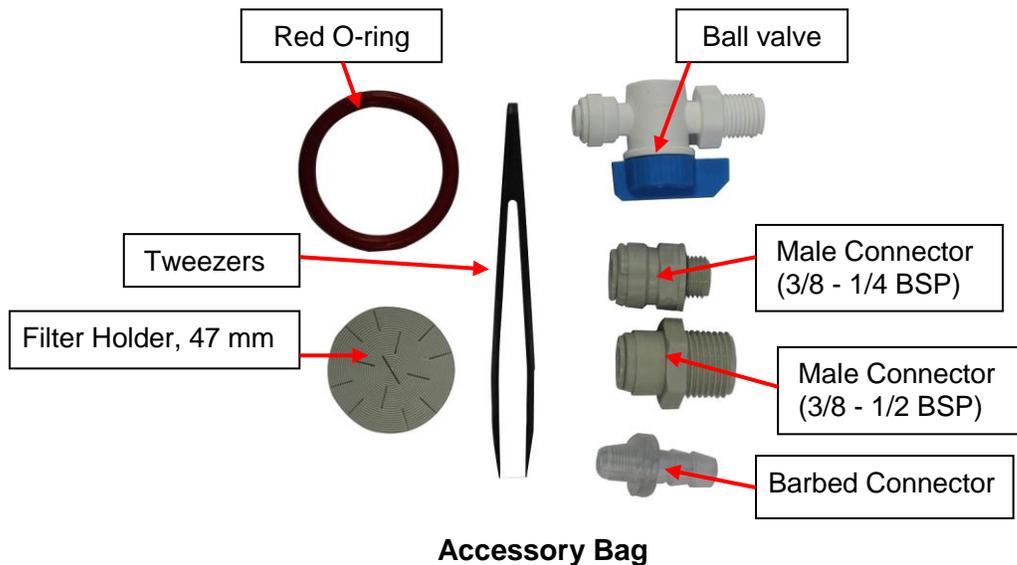
The **SDI₁₅** Index is obtained by comparing time it takes to collect 500 mL of water before and after the exposure of a 0.45 µm membrane to feed water under 30 psi pressure for 15 minutes.

The maximum value of SDI₁₅ is 6.7. Any value above 5 is not meaningful as the filter has plugged too much. Need to use a shorter exposure time, such as 5 or 10 minutes (SDI₅ or SDI₁₀) to re-test to get a meaningful SDI value.

How to Assemble the Kit

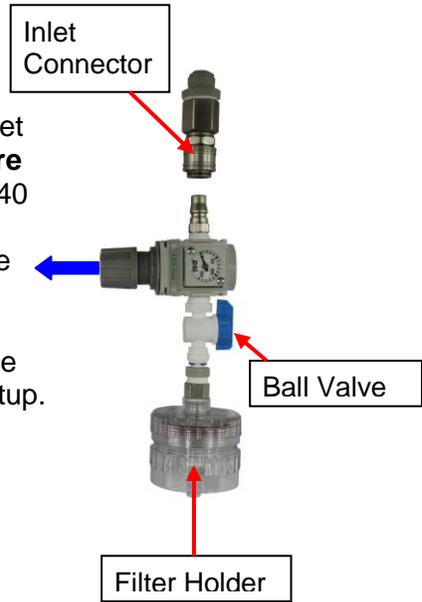
The RephiLe SDI Kit includes

Name	Quantity	Note
SDI Kit	1	
Inlet Connector	1	
Accessory Bag	1	Including: <ul style="list-style-type: none"> • Two male connectors (3/8 - 1/4 BSP and 3/8 - 1/2 BSP); • Ball valve; • 0.6 m 3/8" PE Tubing; • Red O-ring; Filter holder, 47 mm; • Barbed connector ; • Antistatic Tweezers
0.45 µm 47 mm filter papers	100	
Graduated Cylinder	1	500 mL
Stop Watch	1	
Teflon Tape	1	



1. Install **the inlet connector** to the inlet of the SDI kit.
2. Insert one end of the 3/8" PE tubing into the inlet connector and the other end to the feed water source. There are options of connectors (1/4 or 1/2 inch) in accessories bag to the feed water source. Pick the suitable one for the assembly if the diameter of the tubing is not 3/8 inch.

3. **Flush** the assembled test kit (without the membrane) for 3 to 5 minutes to remove any possible contaminants.
4. **Set the pressure regulator** to 30 psi (2 bars). The set screw on the regulator should be adjusted **while there is a small flow**. Feed water pressure needs to be > 40 psi.
Setting method: **Close the ball valve** and pull out the set screw (seen as the blue arrow). Rotate the set screw to adjust outlet pressure. Turn clockwise to increase the pressure and counterclockwise to reduce the pressure. Push in the set screw after finishing setup.



5. **Install the membrane:** Open the membrane filter holder, remove the O-ring, and carefully place a 0.45 μm membrane with the tweezers on the holder. Place back the O-ring. **Screw loosely together** to leave gap for degassing.
6. **Degassing:** Open the ball valve slightly and adjust the filter housing let any trapped air out of the filter holder. Tighten the filter housing, open the ball valve completely and make final adjustments to the pressure regulator at 2 bars as required. Close the ball valve.

How to Run the Silt Density Index Test

The water to be tested is supplied to the filter at a constant pressure of 30 psi. The test involves measuring the time it takes to collect a 500 ml sample through the filter at the start of the test (T_0) and comparing it with the time it takes to collect a 500 mL sample after water has flowed through the filter (at 30 psi) for 15 minutes (T_x). The sample times are used to calculate the **SDI₁₅** value.

1. Fully open the ball valve and simultaneously, using the stop watch, record the time required to fill the 500 mL cylinder. **Leave the valve open for continued flow.** This value is (T_0).
2. **Take additional measurements** by recording time it takes to collect another 500 ml of water starting from 15 minutes of total elapsed flow time. This value is recorded as (T_{15})

Note:

When there are large amounts of particles and colloidal in the water, water flow rate will drop very quickly till the membrane is plugged. SDI reading is “out of range”. In this case, can use elapsed time of 10 (SDI₁₀) or 5 minutes (SDI₅) to measure and calculate SDI.

If the membrane is clogged within 10 minutes, either add prefiltration to the feed water first then check SDI again, or record the time it takes to plug the membrane (in minutes). Then use equation 2 to calculate SDI.

Silt Density Index Calculation

Calculate the Silt Density Index (SDI) as follows:

Equation 1

$$SDI_T = \frac{[1 - (T_0 / T_x)]}{T} * 100\%$$

Where: T = Total elapsed flow time in minutes (e.g. 15 minutes for an SDI15)

Where: T_0 = Initial time required to collect 500 mL of water

Where: T_x = Time required to collect a second 500 mL of water after time point X (e.g. 15 minutes for an SDI15)

For example:

$$\begin{aligned} T &= 0 & t_0 &= 11 \text{ seconds} \\ T &= 15 \text{ min.} & t_{10} &= 20 \text{ seconds} \\ SDI_{15} &= (1 - 11/20) \times 100/15 = 3.0 \end{aligned}$$

Note: This equation is only suitable for $[1 - T_0 / T_x]$ at 75% or less (i.e., T_x is 4 time or less than T_0 , or a SDI of 5 or less). If it does exceed this value, use time at 10 or 5 minute time points.

Equation 2 (all plugged time)

$$SDI = 1/T \times 100$$

For example: $T=12$ minutes, $SDI = 1/12 \times 100 = 8.3$

Explanation

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