

### **1. What is the Silt Density Index (SDI) test and why should I be interested in it?**

The SDI test is an ASTM published method designed to give membrane water treatment system operators a means to test feed water for plugging tendency. The test is simple and consists of passing feed water through a small filter with 0.45 micron pores. The flow rate through the filter is measured at various times to determine how fast the filter plugs. By means of some simple calculations, an index is derived which describes the plugging tendency of the feed water. Because of the small filter pore size, even very small particles are detected. These particles contribute greatly to membrane fouling in reverse osmosis and nanofiltration systems. The early detection of these plugging particles can prevent expensive membrane cleaning or replacement.

### **2. Our facility already has turbidimeters and particle counters. Why do we need the SDI test?**

Turbidimeters and particle counters are good feed water monitoring tools since they continuously monitor the quality of the feed water. While these methods detect the presence of particles, they do not measure the plugging nature of the particles. Also, most membrane manufacturers still rely on SDI results in specifying the quality of the feed water necessary for use in their membranes.

### **3. If the ASTM SDI test is a manual test, why do I need an automatic SDI monitor?**

While the manual test is simple, it is also time-consuming. It requires at least 20 to 30 minutes to run the test in addition to the time necessary to calculate the SDI values. The EZ SDI automates the procedure. After installing a filter, the operator simply starts the test and walks away. An indicator light blinks at the end of the test and the results may be read from the backlit liquid crystal display.

### **4. We only run the SDI test once per week. Thirty minutes spent on the manual test per week is not so expensive.**

In order for the SDI results to be meaningful, they must be acquired on a regular and frequent basis. Many operators only run the test after a fouling problem occurs. It should be used to prevent problems, not to diagnose problems that have already occurred.

### **5. There are other automatic SDI monitors that are less expensive. Why should I make an investment in the EZ SDI?**

The EZ SDI is the most cost-effective industrial grade SDI monitor. It is designed to be mounted as a permanent part of the water treatment system and is capable of standing up to the typical water treatment environment. The high-quality components used in the EZ SDI are designed to provide long-term service without failure. The less expensive SDI monitors on the market are not designed to be a permanent fixture of the water treatment system. They are portable instruments designed to be used on an intermittent basis.

### **6. The ASTM method requires that SDI calculations be made at five, ten, and fifteen minutes. Does the EZ SDI calculate all three results?**

Yes, the EZ SDI follows the ASTM method exactly. It even monitors the sample pressure and notifies the operator if the pressure falls outside of the ASTM required range. It also monitors and displays the change in temperature of the sample during the test. This is another ASTM requirement that is seldom done by other SDI monitors.

**7. I have used other SDI monitors in the past and have had trouble with the small flow sensor in the monitor. Will I have the same problem with the EZ SDI?**

The EZ SDI does not use a flow rate sensor. It uses a volumetric container equipped with an optical level sensor to determine the time necessary to filter the required volume of water during each step of the test. This is in accordance with ASTM specifications. The optical level sensor is a solid state device which only requires periodic cleaning to maintain performance.

**8. What type of inlet pressure is required by the EZ SDI?**

The EZ SDI can accommodate inlet pressures ranging from 70 to 1000 psi. This allows the sample to be taken directly from the high pressure pump discharge.

**9. When running the manual test, I often have trouble with air being trapped on the filter. Will this happen with the EZ SDI?**

The unique design of the EZ SDI purges air from the filter chamber at the beginning of the test. Also, the sample line going to the filter chamber is equipped with an air separator to prevent air from being sent to the filter during the course of the test.

**10. Since the EZ SDI is designed to be permanently installed, will I have a problem with biogrowth or stagnation in the sample line while the monitor is idle between tests?**

The EZ SDI is designed to allow sample to continually flow through the monitor during idle periods. This prevents stagnation in the sample line. Making the sample line as short as possible also helps eliminate biogrowth.

**11. Will the EZ SDI run multiple tests with no attention?**

Two version of the EZ SDI are available. With the single test version (EZ SDI-1), the filter must be changed between each test. The EZ SDI-4 will perform four tests before the filters need to be replaced.

**12. Do I have to buy special filters?**

No. The EZ SDI uses standard 25mm diameter filters. While RODI Systems can provide them at a competitive price, they are available from a number of other suppliers.

**13. Is the EZ SDI difficult to install?**

The installation steps consist of mounting the monitor in a vertical (and level) position, connecting power, connecting the ¼" sample tubing, and routing the drain tubes. In most facilities, installation should require less than one hour.

**14. Is the EZ SDI difficult to use?**

It is much easier than the manual test. Simply install the filter and press the "Start" key. Everything is automatic from that point forward.

**15. Can the EZ SDI be interfaced with my control system?**

The EZ SDI is equipped with an isolated relay output which indicates when a high SDI value has been detected. Both versions of the EZ SDI are also available with optional 4-20 mA analog outputs.

## **16. Do I still have to do calculations or log test results with the EZ SDI?**

The EZ SDI does all of the necessary calculations and logs the results of the tests. Four test results may be viewed directly on the LCD of the EZ SDI. The results of the last 64 tests may be downloaded from the internal memory of the EZ SDI by means of a PC. A serial cable and PC software are provided with the EZ SDI for data downloading. After downloading, the data file may be opened with any spreadsheet program.

## **17. What are the sensitivity, repeatability, and accuracy of the EZ SDI?**

Most instrument and analyzer manufacturers publish this type of data for their products and we are often asked to provide such information for the EZ SDI. However, this information does not exist for the EZ SDI for a couple of reasons. First, the EZ SDI is not an analyzer per se. It is an automated test apparatus designed to conduct the manual test method as specified in ASTM D 4189-07. Second, due to the nature of the test method, the high variability in filter materials, and the lack of a recognized SDI calibration standard, it is virtually impossible to determine the sensitivity, repeatability, and accuracy of any SDI test method including the EZ SDI.

## **18. What is the range and response time of the EZ SDI?**

Since the EZ SDI follows ASTM D 4189-07, the range for the SDI<sub>15</sub> value will be from 0.0 to 6.7 SDI units. The response time is a function of the time required to conduct the test. The SDI<sub>15</sub> result will typically require 20 minutes from the time the test is initiated.

## **19. Will the EZ SDI results compare to manual SDI test results?**

This is a very common question. In general, if the manual test is conducted following the ASTM method, the two test results should compare *but they will seldom be the same*. Due to the nature of the SDI test and the variability of the equipment and materials as specified by the ASTM method, the results of a manual test and a test from the EZ SDI unit could vary greatly. Other than operator error, there are two things that create a lot of variation in test results. These are the type of filter holder used and the variation in filter material.

First, the filter holder can create a difference in test results since variations in the filter support material in the filter holder can affect the flow through the filter. Also, different filter holders may allow different filter surface areas to be exposed to the sample flow during the test. In other words, just because a 47 mm filter is being used for a test does not mean that the entire 47 mm diameter is available for flow during the test since a portion of the diameter will be covered by the sealing mechanism of the filter holder. Filter holders of different types may allow more or less filter area to be exposed to the sample flow.

Second, variations in the filter material can also result in different test results. Although the most recent revision of the ASTM method (D 4189-07) now specifies the type of filter material to be used, there are still variations within that specific type of material that can affect test results. Even filter material from the same manufacturer can vary enough to affect SDI test results.

Published test results have shown that both the filter holder and the filter material can each affect the SDI test results by as much as 50%. In addition, the sometimes rapid change in feed water quality and variability in feed water contaminants can make the comparison of different tests even more difficult. In general, SDI testing should be used frequently, and conducted consistently, with particular attention paid to changes in trend vs. changes in absolute value.

## **20. Can I use the EZ SDI to monitor multiple sample points in my water treatment system?**

With the EZ SDI-1, you can but you will need to provide a valve manifold to allow the right sample to flow to the monitor during the test. You will also need to be careful with such an arrangement to prevent stagnation in the idle sample lines. The EZ SDI-4 is available with an automatic sample sequencer. This allows the EZ SDI-4 to automatically sample from four different sample points.

## **21. How can the EZ SDI help identify membrane foulants without a membrane autopsy?**

In most cases, the foulants affecting the membrane are the same as those collected on the SDI filter. RODI Systems provides analytical services to identify the materials on the SDI filters. Knowing the composition of the foulants can help in eliminating the foulants from the feed stream. It can also be very valuable in choosing the right type of cleaning chemicals and procedures should membrane cleaning be necessary. Eliminating only one or two membrane cleanings can return the investment made on the EZ SDI. Fees for the analytical services vary. Please contact our office for more information.