

Fouling Index

Generalities

The Fouling Index (FI) is considered the most classical indicator in the field of membrane filtration. This index is used to define and quantify the clogging power of water with respect to a membrane. It is equivalent to the SDI (Silt Density Index) test, developed by the ASTM (American Society for Testing and Materials) under the reference ASTM D4189-07. It is also called Sludge Density Index.

The determination is based on the measurement of the rate at which a cellulose acetate membrane with a pore diameter of 0.45 μm clogs during continuous filtration under a constant pressure of 2.1 bar.

Material required

- Filtration system for 47 mm diameter thread
- Cellulose acetate filter of 0.45 μm and 47 mm diameter (according to ASTM D4189-07)
- Needle valve for pressure regulation
- Pressure gauge
- 500 ml graduated cylinder or volumetric flask
- Stopwatch



Method of operation

This test consists of measuring the flow rate of the filtered fluid over time under a constant pressure of 2.1 bar, through a 0.45 μm cellulose acetate membrane of 47 mm diameter. Simply measure the flow time per 100 or 500 mL at 5, 10 and 15 minutes of filtration.

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Fouling Index

Fouling index calculation

The fouling power is given by the equation :

$$P (\%) = 100 \times \left(1 - \frac{t_0}{t}\right)$$

Calculate P with t = 15 min

If P > 80 % with t = 15 min, repeat the calculation with t = 10 min

If P > 80 % with t = 10 min, repeat the calculation with t = 5 min

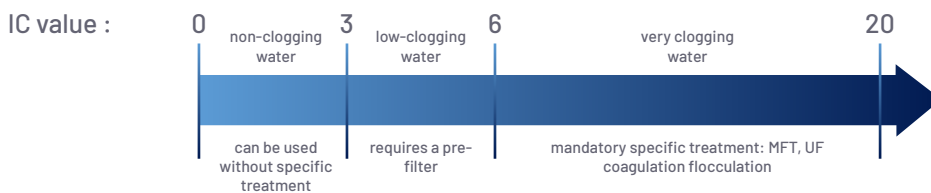
The clogging index is given by the equation :

$$IC = \frac{P (\%)}{t_{total}}$$

t_{total} = total time of the measurement defined for the calculation of the fouling power (5, 10 or 15 minutes).

If $t_0/t_5 < 0,2$ the Fouling Index is not measurable.

Interpretation of results and observations



Checking the appearance of the membrane will give an indication of the origin of the clogging material :

- Yellow gelatinous membrane : Presence of colloidal silica.
- Gelatinous rust membrane : Presence of iron in colloidal form.
- Membrane with black traces : Contamination by leaching of activated carbon.
- Membrane with red trace : Iron oxide contamination generated by network.

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