

AiRO

Air/water cleaning to control membrane fouling on Reverse Osmosis (RO) membranes

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DESCRIPTION AND SPECIAL FEATURES

Spiral wound membranes are often fouling and need to be cleaned. Using air instead of chemicals in a vertical positioned membrane the biofouling can be controlled.

Spiral wound membrane processes, i.e. reverse osmosis (RO) and nano filtration (NF), are increasingly used in water treatment for the production of drinking water, process water for industrial use and for waste water re-use. One of the largest problems using membrane processes, however, is biological membrane fouling. This results in loss of performance (capacity/ quality) and increasing the total cost of ownership.

Often only the first membrane in a system is fouled due to biological growth on the membrane surface as a result of nutrients in the feed water. Most pre treatment such as sand filters or micro/ ultra filtration membranes do not take away all these nutrients and thus results in bio growth on the membrane surface of the RO or NF.

If this RO/ NF membrane is positioned in a (horizontal) membrane pressure vessel together with more membranes (up to 7) this membrane can only be cleaned by cleaning all other membranes with chemicals in the same time.

The innovative AiRO process uses air/water cleaning in a separate frame with vertically positioned membrane elements to control membrane fouling. (Figure 1)

By making a separate skid with only one membrane in a vessel (Figure 2) upfront a membrane system, the fouling on the other membranes can be minimised.

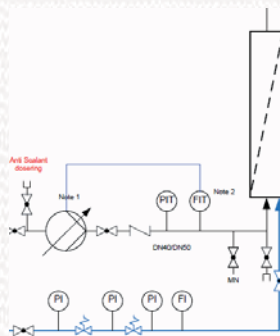


Figure 1.-



Figure 2.-

This technology is first successfully introduced in the biggest demin water installation in The Netherlands at the DWP Botlek project of Evides Industry Water Rotterdam, December 2009. (Figure 3)



Figure 3.-

INNOVATIVE ASPECTS

Spiral wound membranes are not cleaned with air at the moment. Only known for tubular or capillary membranes (mostly MF en UF). By using the sheer forces of air bubbles in the feed water, the membrane surface is cleaned and biofouling is removed without or with a minimum of cleaning chemicals. This is only done with a low frequency when biofouling occurs. As special designed air inlet system provides an equal distribution of air and water.

COMPETITIVE ADVANTAGES

- 1) Less membranes have to be cleaned. Only the first membrane instead of the whole stack;
- 2) Less (to no) additional cleaning/ sanitation chemicals have to be used;
- 3) Sustainable technology, environmental friendly;
- 4) Can be done automatically without attendance;
- 5) Total cost of ownership will decrease;
- 6) During cleaning the biofouling will not reach other membranes and thus will not potentially foul further membranes;
- 7) During cleaning the AiRO membranes can be bypassed (short time) and thus no capacity loss during cleaning.