MAAGAN FILTRATION
Pure Innovation - Clear Solutions

Brackish Water Desalination | Case Study

Project ID

Maagan Desalination is the largest Brackish water desalination plant in Israel.
Almost 1000 cartridges are dumped every time.

Maagan Desalination

Location:	Maagan Michael – ISRAEL
Year:	2020
Application:	Brackish Water Reverse Osmosis Pre-Filtration
Goal:	Particles Reduction (less cartridges and membranes replacement)
Pilot Capacity:	24 m3/h
Full Scale Capacity:	1,650 m3/h

The Challange

- Existing treatment of 25 micron screen filters and 1 micron cartridges, do not succeed in retaining the small particle concentration and turbidity (most particles are in the 1-5-micron range), which enter the RO membrane.
- Mix of dissolved iron with silt minerals (sand) and organic particles result in the need for frequent cartridge replacement (every few weeks) due to intensive fouling.
- Recurrent clogging of existing Reverse Osmosis membranes (RO) due to bio-fouling and mechanical wear caused by micron size sand particles.

The plant intends to replace the 25 micron screen in the coming years, and therefore, checked few alternatives; among them a 10 micron screen filter and our Fiber Disc filter.

Parameter	Required Values
Removal of particle of 1 micron and above	› 85% removal rate @ 90% of measurements
Comparing particle's removal with existing 1-micron cartridges	≥ Removal rate compared to two cartridges systems @ 80 % of measurements
Comparing particle's removal with a 10-micron pilot screen filter	› Removal rate compared to 10-micron screen filter @ 95% of measurements
Hydraulic stability	Stable process of the filter (Defined by flow rate and pressure drop)

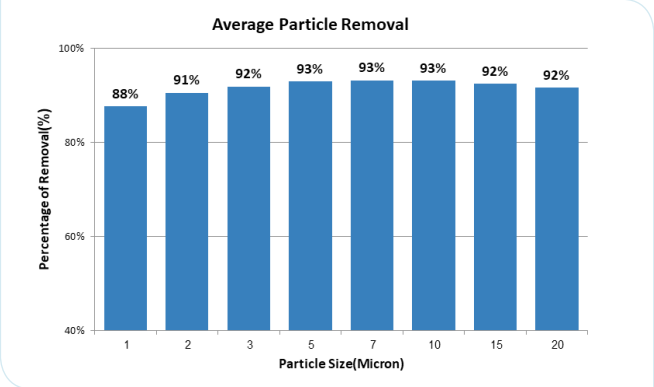
Solution

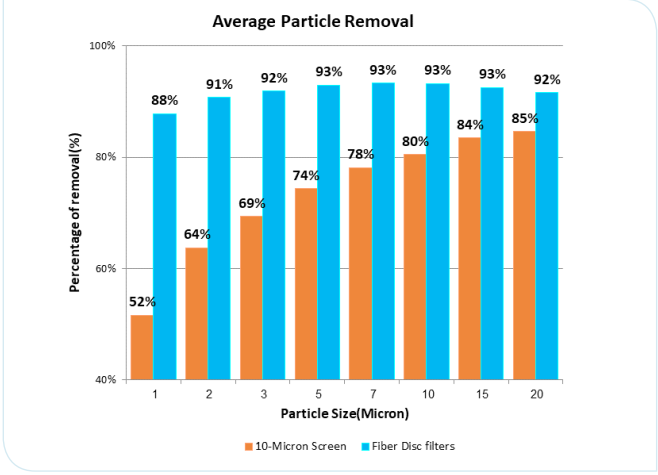
A 24m³/h Fiber Disc Filter, of Maagan Filtration, which designed for efficient filtration of fine particles, was purchased, installed and running since May 2020, at the Maagan Desalination plant. The Fiber Disc Filter was located on the entrance point to the pre-RO treatment in parallel to 25-micron screen filter by Amiad. The Fiber Disc Filter constantly recorded the hydraulic parameters of flow and differential pressure. A manual testing of particle counts and turbidity was performed at least once a week on the filter inlet and outlet and on two systems of cartridges. Results were also compared to a 10 micron screen filter pilot that was installed earlier at the same point on site.

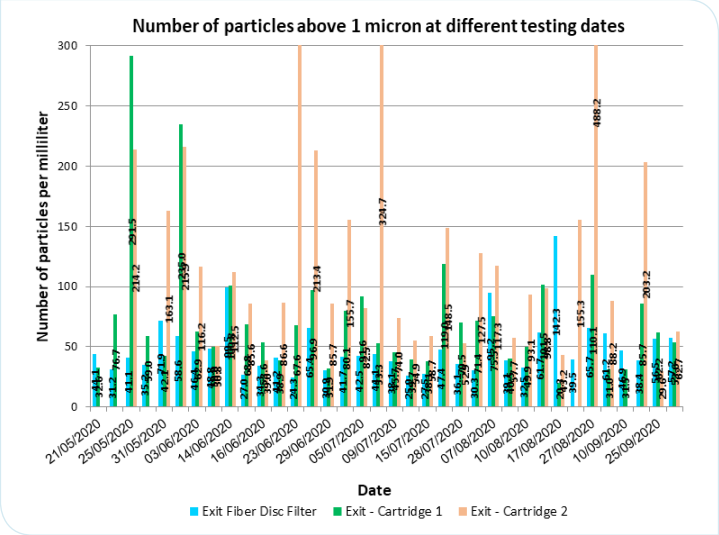
Results

The Fiber Disc Filter achieved, on average, 88% removal of 1 micron particles or more, when max. removal of 1 micron particles was 98%. Above 2 micron, and despite a very low number of particles, the filter has reached removal greater then 90% in all sizes measured.

In comparison to the 10-micron screen filter that was tested as well, the Fiber Disc Filter provided a much better filtration result. The smaller the particle size was; the greater the difference in performance. The actual number of particles of all sizes at the Fiber Disc Filter filtrate was 3 to 5 times less than on the screen filter.







The quality of the Fiber Disc filtered water was as good or better than existing 1-micron cartridges filtrate, in almost all tests and in total average.

The initial pressure drop on the filter (after washing) remained at around 0.03 bar, which indicates good cleaning of the filter. The pressure drop on the filter did not surpass 0.1 bar, and was 0.05 bar on average as compared to 0.15 bar of the screen filter, and the same dP on the cartridges system.
Backwash frequency was every 8 hours, as compared to the washing frequency of once every hour with the 25-micron and 10-micron screen filters.

Parameter	Required Values	Values Achieved
Particle removal of 2 or more microns	> 80% @ 90% of measurements	✓
Comparing to existing 1 micron cartridges	Removal ≥ @ 80% of measurements	✓
Comparing to Screen filter of 10 micron	Removal > @ 95% of measurements	✓
Hydraulic stability (Flow rate and pressure drop)	Stable process during entire operating period	✓

Conclusions

The Fiber Disc filter filtration results were extremely efficient, reflecting much better and finer filtration than the existing screen filter (and a potential 10 micron screen filter), proving fiber filtration is superior to screen filter technology.
The low frequency of backwashes (due to our large filtration area) resulted in less than 0.4% yield for backwash (comparing to more than 2% for the screen filters). Energy demand of our filter is about 1/6 of the combined solution of screen filter + cartridge. The removal of particles above 1 micron was as efficient with the Fiber Disc Filter as it was with the entire chain of filtration combining screen filters and 1-micron cartridges.

The Fiber Disc Filter can be a viable solution for pre-RO treatment of brackish water, replacing screen filters, or even both stages of screen filters and cartridges filters.

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Maagan Filtration
Tel: +972-73-2413856 | **Fax:** +972-4-6394252
Kibbutz Maagan Michael | 37805, Israel

filtration@mmm.org.il
www.maaganfiltration.com