

# Integration of DuPont Components Enable the supply of 50,000 m<sup>3</sup>/day of drinking water to the island of Cyprus

## Site Information

**Location:** Limassol, Cyprus  
**Plant Capacity:** 50,000 m<sup>3</sup>/day drinking water  
**End-User:** Water Development Department of Cyprus  
**Start-Up:** 2013  
**Operation:** MN Limassol Water Co.

A highly efficient process to desalinate seawater has been installed at the Limassol desalination plant using the latest innovative technology from The DuPont Chemical Company. The facility uses DuPont™ Ultrafiltration and DuPont FilmTec™ Reverse Osmosis membranes as core desalination technology and AmberLite™ PWA10 Boron Selective Resin as a polisher to help meet the strict Boron quality requirements.

In addition, Limassol has other, state of the art design features, such as iSD (internally Staged Design), partial RO permeate split and AmberLite™ technology to consistently, reliably and sustainably produce 50,000 m<sup>3</sup>/day of potable water.

## Water characteristics and quality requirements

### Raw water quality

Parameter	Unit	Value
Total hardness	ppm CaCO <sub>3</sub>	1200
Total Fe	mg/L	6
Turbidity	NTU	30 to 40
Temperature	°C	10 to 35
Oil	mg/L	5 to 10
pH	-	7 to 8

### Specified product water quality

Parameter	Concentration
Boron	≤ 0.5 mg/L
TDS	≤ 420 mg/L

\*Blended product water after Boron Selective Resin and Reverse Osmosis System\*



Courtesy of MN Limassol Water Co Air view photograph of Limassol Desalination plant.

### Pretreatment – Ultrafiltration:

An advanced pretreatment using DuPont™ Ultrafiltration technology has been installed ahead of the Reverse Osmosis system. Ultrafiltration ensures a reliable and constant high quality RO feed water supply, ensuring stable operation and extending Reverse Osmosis service life.

The UF system contains a total of 1,056 DOW™ Ultrafiltration SFD-2880 modules arranged in 6 identical trains.

The system is designed to operate at a flux of 65 l/h/m<sup>2</sup> and a recovery of 94%.

### Key features of DuPont™

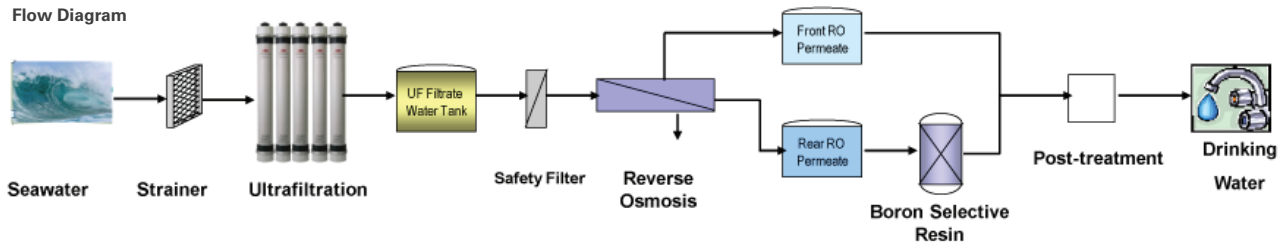
#### Ultrafiltration technology:

- Asymmetric hollow fiber membranes
- Outside-In flow configuration allowing low energy consumption and stable operation
- Hydrophilic PVDF hollow fibers providing superior physical strength and chemical resistance and low fouling tendency
- Uniform ultra-fine pores (0.03mm nominal) ensuring excellent filtrate quality
- High active area (77 m<sup>2</sup> per module) enabling low footprint and low capital expenses



## System Information

### Flow Diagram

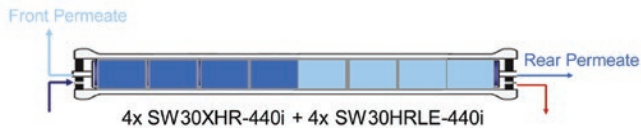


### Reverse Osmosis:

A total of 4,800 DuPont FilmTec™ Reverse Osmosis membrane elements are installed in 4+1 trains. The system is designed to operate at 45% of recovery.

### Optimized RO system design featuring:

- 440 ft<sup>2</sup> area of membrane per element
- Internally Staged Design (ISD) combining FILMTEC™ SW30XHR-440i and FILMTEC™ SW30HRLE-440i elements within the pressure vessel
- Permeate Split Design



Photograph of a UF and RO train from Limassol Desalination plant. Courtesy of MN Limassol Water Co

### Boron Selective Resin:

An Ion exchange resins system is installed to further polish the rear permeate stream from the RO system enhancing the boron removal of the system. The system will contain 54 m<sup>3</sup> of AmberLite™ PWA10 and will treat a flow between 12,000 – 25,000 m<sup>3</sup>/day (depending on the water temperature). AmberLite™ PWA10 resin features very high selectivity for boron and low risk of interference with other salts which makes it highly suitable for removal of boron from RO permeate water.



Photograph of the Boron Selective Resin system. Courtesy of MN Limassol Water Co

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