



## Reference List 2012

### Examples of Desalination unit installations



Alfa Laval  
Market Unit Power

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## Examples of Desalination unit installations

With more than 50 years' experience, over 30,000 successful installations and references throughout the world, Alfa Laval is one of the technology leaders in the desalination field.



Alfa Laval has installed a total freshwater capacity of more than 1,000,000 m<sup>3</sup>/ day for offshore oil and gas installations, ships, cruise ships and merchant vessels of all types with a delivery of more than 1200 units every year. More than 200 land-based installations have been installed for power, industry, mining, geothermal, district heating, food processing and municipal applications. Below list shows an extract of some of these installations.

Facility / Location	Total Capacity	No. of Units	Type	Application	Owner/Contractor/ Operator	Year
Power Station	400	1	Multi-Effect	Diesel Power Station	Macau Island	1990
Maldives Power Authority	700	2	Multi-Effect	Diesel Power Station	Gov., Maldives	1990
M/V Costa Classica	800	2	Multi-Effect	Cruise	Costa Cruise	1990
M/V Royal Majesty	300	2	Multi-Effect	Cruise	Dolphin Cruise	1991
M/V Costa Romantica	800	2	Multi-Effect	Cruise	Costa Cruise	1991
M/V Statendam	1060	2	Multi-Effect	Cruise	Carnival Cruise	1991
Power Station	2400	3	Multi-Effect	Steam Turbine	Govern, Gibraltar	1991
Mardi Gras	150	1	Multi-Effect	Cruise	Carnival Cruise	1992
M/V Starward	150	1	Multi-Effect	Cruise	Kloster Cruise	1992
Nordic Prince	230	1	Multi-Effect	Cruise	Royal Caribbean Cruises	1992
Song of Norway	230	1	Multi-Effect	Cruise	Royal Caribbean Cruises	1992
F/V Siberian Enterprise	300	1	Multi-Effect	Fish Process	Artic Alaska Fisheries	1992
Avedore Power Plant / DK	800	1	Multi-Effect	CHP Station	IFV-Energi, DK	1992
M/V Massdam	1060	2	Multi-Effect	Cruise	Carnival Cruise	1992
M/V Volker	150	1	Multi-Effect	Cruise	Varco Chiapella	1993
Sun Viking	230	1	Multi-Effect	Cruise	Royal Caribbean Cruises	1993
M/V Ryndam	1060	2	Multi-Effect	Cruise	Carnival Cruise	1993
Camar Nusantara	200	2	Multi-Effect	Cruise	Nortrans Shipping	1994
Independence	416	2	Multi-Effect	Cruise	Delta Queen Steamboat	1994
Constitution	416	2	Multi-Effect	Cruise	Delta Queen Steamboat	1994
Veendam	1060	2	Multi-Effect	Cruise	Holland America Line	1994
Aida	300	2	Multi-Effect	Cruise	DSR	1995
Napoleon Bonaparte	400	2	Multi-Effect	Ferry	SNCM	1995
Grandeur of the Seas	1200	2	Multi-Effect	Cruise	RCCL	1995
Costa Victoria	1200	2	Multi-Effect	Cruise	Costa Cruise	1995
Norwegian Sky	1200	2	Multi-Effect	Cruise	NCL	1995



MEP case: Karachi, Pakistan  
DHA Cogen Ltd (DCL) has installed two Alfa Laval MEP desalination units, total capacity 13,680 m<sup>3</sup>/day, in a new plant producing both fresh water and electrical power. “It requires the minimum amount of energy to convert seawater into drinkable water,” says DCL CEO Waqas Mohsin.

Facility / Location	Total Capacity	No. of Units	Type	Application	Owner/Contractor/ Operator	Year
Geothermal Water, Greece	90	1	Multi-Effect	Land	Kimolos Island	1996
AL Mesilah	1200	1	Multi-Effect	Marine	Livestock Trading Co.	1996
Enchantment of the Seas	1200	2	Multi-Effect	Cruise	RCCL	1996
Disney Magic	1200	2	Multi-Effect	Cruise	Disney Cruise Line	1996
Rotterdam VI	1400	3	Multi-Effect	Cruise	Holland America Line	1996
Clifton Pier, Bahamas	300	1	Multi-Effect	Power Station	ABB/BEC	1997
Surimi, US	350	1	Multi-Effect	Fish Factory	Far East Maritime	1997
Samho, Korea	350	1	Multi-Effect	Fish Factory	Samho Fisheries	1997
Almeria, Spain	1000	1	Multi-Effect	Power plant	Abengoa/Abenzur	1997
Disney Wonder	1800	3	Multi-Effect	Cruise	Disney Cruise Line	1997
TSS Topaz	300	1	Multi-Effect	Cruise	Topaz Int. Shipping	1998
Titan Trinidad	900	1	Multi-Effect	Methanol Plant	Lurgi Germany	1998
Hirgigo, Eritrea	1000	2	Multi-Effect	Power Station	Hanjung Korea	1998
Volendam	1400	3	Multi-Effect	Cruise	Holland America Line	1998
Zaandam	1400	3	Multi-Effect	Cruise	Holland America Line	1998
Voyager of the Seas	1800	2	Multi-Effect	Cruise	RCCL	1998
Explorer of the Seas	1800	2	Multi-Effect	Cruise	RCCL	1998
Silver Shadow	350	2	Multi-Effect	Cruise	Silver Sea Cruises	1999
Silver Whisper	350	2	Multi-Effect	Cruise	Silver Sea Cruises	1999
RAK Ceramics, UAE	1000	1	Multi-Effect	Ceramic Industry	RAK Ceramics	1999
Radiance of the Seas	1280	2	Multi-Effect	Cruise	RCI, Voyager Class	1999
Costa Atlantica	1300	2	Multi-Effect	Cruise	Costa	1999
Carnival Spirit	1300	2	Multi-Effect	Cruise	CCL	1999
Hull 6052	1400	3	Multi-Effect	Cruise	Holland America Line	1999
Equatorial Guinea	2726	2	Multi-Effect	Methanol Plant	Raytheon Engineering	1999
Aruba, Netherl. Antilles	6000	1	Multi-Effect	Refinery	Coastal Refining	1999
Costa Classica	380	1	Multi-Effect	Cruise	Costa Crociere	2000
Resident Sea	530	2	Multi-Effect	Cruise	Fosen Mek.	2000
Nuovi Cantieri	600	2	Multi-Effect	Cruise	Apuania / Grimaldi Group	2000
Nuovi Cantieri	600	2	Multi-Effect	Cruise	Apuania / Grimaldi Group	2000
Norwegian Sun	1200	2	Multi-Effect	Cruise	NCL	2000
Carnival Pride	1300	2	Multi-Effect	Cruise	CCL	2000



TVC case: Iskenderun Bay, Turkey  
 The Sugözü coal-fired power plant needed a sustainable supply of process water. Three Alfa Laval TVC units were installed, powered by thermal energy taken as bleed steam from the power plants' turbines. Each unit has a capacity of 1,750 m<sup>3</sup> per day.

Facility / Location	Total Capacity	No. of Units	Type	Application	Owner/Contractor/ Operator	Year
Adventure of the Seas	1800	2	Multi-Effect	Cruise	RCI, Voyager Class	2000
Norwegian Star	2100	3	Multi-Effect	Cruise	Star Cruises	2000
Fincantieri	300	2	Multi-Effect	Cruise	SNCM	2001
Orange Cogeneration, USA, Florida	350	2	Multi-Effect	Power plant	El Paso Energy	2001
Brilliance of the Seas	1280	2	Multi-Effect	Cruise	RCI, Voyager Class	2001
Carnival Legend	1300	2	Multi-Effect	Cruise	CCL	2001
Carnival Miracle	1300	2	Multi-Effect	Cruise	CCL	2001
Kaltim-4, Unit III, Indonesia	1680	1	Multi-Effect	Fertilisers Plant	Pupuk Kaltim Indonesia	2001
Fincantieri	1700	3	Multi-Effect	Cruise	HALW	2001
Fincantieri	1700	3	Multi-Effect	Cruise	HALW	2001
Journey of the Seas	1800	2	Multi-Effect	Cruise	RCI, Voyager Class	2001
Norwegian Dawn	2100	3	Multi-Effect	Cruise	Star Cruises	2001
Kaltim-4, Indonesia	3360	2	Multi-Effect	Fertilisers Plant	Pupuk Kaltim Indonesia	2001
Iskenderun Bay, Turkey	5250	3	Multi-Effect	Power Plant	Siemens / STEAG Turkey	2001
MHI, Curacao	6000	1	Multi-Effect	Petrochemical Plant	Curacao Utility Co.	2001
Saudi Arabia	475	1	Multi-Effect	Food Process Plant	NPC Ltd.	2002
RAK, Ras Al Khaimah, UAE	1000	1	Multi-Effect	Industry	RAK Ceramics	2002
Serenade of the Seas, Meyer Werft	1280	2	Multi-Effect	Cruise	RCI, Norway	2002
Jewel of the Seas, Meyer Werft	1280	2	Multi-Effect	Cruise	RCI, Norway	2002
KMY NB 503	1300	2	Multi-Effect	Cruise	CCL	2002
Fincantieri	1700	3	Multi-Effect	Cruise	HALW	2002
Eagle 5	1800	2	Multi-Effect	Cruise	RCI, Voyager Class	2002
Queen Mary II	1890	3	Multi-Effect	Cruise	Cunard	2002
Kansai Electric, Japan	2000	2	Multi-Effect	Power plant, nuclear	KEPCO/Kanden Kogyo	2002
Mapna/South Pars Gas Phase 1, Iran	6000	3	Multi-Effect	Petrochemical Plant	Mapna / South Pars Iran	2002
CEM Macao	700	1	Multi-Effect	Power plant	CEM Macao / BWSC Denmark	2003
PPC Crete	1580	2	Multi-Effect	Power plant	PPC Crete / BWSC Denmark	2003
Fincantieri	1700	3	Multi-Effect	Cruise	HALW	2003
Fincantieri	1700	3	Multi-Effect	Cruise	HALW	2003
PPC Lavrion, Greece	720	1	Multi-Effect	Power plant	PPC Lavrion / METKA Greece	2005
IKATA NPP, Japan	2000	2	Multi-Effect	Power plant, nuclear	Shikoku Electric, Japan	2006
DHA Cogen Ltd, Pakistan	13680	2	Multi-Effect	Power plant	DHA Cogen Ltd (DCL)	2006



TVC case: Kaltim, Indonesia  
 Three Alfa Laval TVC units, each producing 1,680 m<sup>3</sup>/day process and potable water from seawater, have been in operation at the Pupuk Kaltim Fertilizer Complex, Indonesia, since 2001. The heat transfer surfaces in the TVC units are in Grade 1 Titanium.

Facility / Location	Total Capacity	No. of Units	Type	Application	Owner/Contractor/ Operator	Year
Equatorial Guinea	1363	1	Multi-Effect	Methanol Plant	AMPCO	2010
Algeria	720	2	Multi-Effect	Power plant	IBERDROLA	2011
Malta	1500	2	Multi-Effect	Power plant	BWSC	2011
France	360	1	Multi-Effect		STX	2012
Germany	1800	2	Multi-Effect		Meyer	2012
Belgium	650	1	Multi-Effect	Power plant	Electrawinds	2012
Spain	140	2	FWG	Power plant	Endesa	2011
Haiti		1	FWG	Process Plant	Haiti	2011
China		1	FWG	Power plant	China	2012
Unitor, Maldives	50	1	Vapour Compression	Fish Proces. Plant	Ticon	1994
Foramer	50	1	Vapour Compression	Off-Shore Platform	Foramer	1994
Binzagr, Saudi Arabia	125	1	Vapour Compression	Food Process Plant	Binzagr Coro	1994
Ouvea, New Caledonia/F	250	1	Vapour Compression	Municipality	SITEE	1994
Binzagr, Saudi Arabia	350	1	Vapour Compression	Food Process Plant	Binzagr Coro	1995
Galfar, Oman	50	1	Vapour Compression	Industry	Galfar	1997
Holland	100	2	Vapour Compression	Barge	EMC	1997
RAK Ceramics, UAE	1000	1	Vapour Compression	Ceramic Industry	RAK Ceramics	1997
Canaria, Spain	50	1	Vapour Compression	Research Centre	Canarias' Inst. of Tech.	1998
Rig Leen, Qatar	50	1	Vapour Compression	Drilling	Mansal Offshore	1998
Platform PS1, Qatar	50	1	Vapour Compression	Off-Shore Platform	Occidental	1998
Cayo Arcas, Mexico	50	1	Vapour Compression	Production Offshore	Pemex	1998
Prøvestenen, DK	50	1	Vapour Compression	Concentration	UFT Co.	1998
Spain	50	1	Vapour Compression	Concentration	Trialba Spain	1998
Platform Oseberg S	100	2	Vapour Compression	Production Offshore	Norsk Hydro	1998
Hydro Consult, New Cale.	24	1	Vapour Compression	Municipality	Poum City Hall	1999
China Navigation	40	1	Vapour Compression	Marine	China Navigation	1999
Sedco Forex, USA	50	1	Vapour Compression	Drilling	Sedco Forex	1999
SBM, Holland	70	2	Vapour Compression	FSO	SBM	1999
Singapore	140	2	Vapour Compression	Pipelayer barge	McDermott	1999
EMC	50	1	Vapour Compression	Off-shore	EMC	2000
Global Beverage Systems Inc. US50		1	Vapour Compression	Industry	Global Beverage Syst. Inc. USA	2000
Tetrapak Factory, Jeddah, Saudi	50	1	Vapour Compression	Industry-pot. Water	Tetrapak Saudi	2000
EMC	50	1	Vapour Compression	Off-shore	EMC	2000



MEP case: Delimara, Malta Two Alfa Laval MEP desalination units producing 1,500 m<sup>3</sup> of fresh water per day are installed in the Enemalta Corporation's Delimara diesel power plant. The power source is waste heat from the diesel engines. The contractor was diesel power plant builder BWSC A/S.

Facility / Location	Total Capacity	No. of Units	Type	Application	Owner/Contractor/ Operator	Year
Canada	400	1	Vapour Compression	Industry	3e Technologies	2000
Canada	500	1	Vapour Compression	Industry	3e Technologies	2000
India	750	1	Vapour Compression	Veg. Oil refinery	Adani Wilmar	2000
Sadra Samsung, Iran	50	1	Vapour Compression	Off-shore	South Pars 1	2001
Sadra Samsung, Iran	50	1	Vapour Compression	Off-shore	South Pars 1	2001
Smedvig, Norway	50	1	Vapour Compression	Off-shore	Smedvig	2001
Inis Mean Ireland	50	1	Vapour Compression	Power	Danvest Energi	2001
Trident 9 - Transocean S.F., USA	50	1	Vapour Compression	Off-shore	Transocean S.F., USA	2001
A.P. Møller	60	1	Vapour Compression	Off-shore	Hyundai	2001
Maersk	60	1	Vapour Compression	Offshore	Maersk	2001
Global	70	1	Vapour Compression	Offshore	Global	2001
Shell, Iran	100	2	Vapour Compression	Off-shore	Shell/Samsung	2001
Kvitebjørn, Norway	100	2	Vapour Compression	Offshore	Statoil, Norway	2001
Enron, Nigeria	2250	3	Vapour Compression	Power plant	Enron, USA	2001
Nippon Oil, Malaysia	40	2	Vapour Compression	Off-shore	Nippon Oil	2002
Clough Lakshmi, India	50	1	Vapour Compression	Off-shore	Clough Lakshmi	2002
Smedvig, Norway	50	1	Vapour Compression	Offshore	Smedvig	2002
BP, USA	50	1	Vapour Compression	Offshore	Daewoo, Korea	2002
BP, USA	50	1	Vapour Compression	Offshore	Daewoo, Korea	2002
A.P. Møller	50	1	Vapour Compression	Offshore	A.P. Møller	2002
USA	140	2	Vapour Compression	Offshore	McDermott	2002
USA	140	2	Vapour Compression	Offshore	McDermott	2002
Itabo, Dominican Rep.	600	1	Vapour Compression	Power plant	Itabo/ El Paso Energy	2002
Mantos de La Luna, Chile	500	1	Vapour Compression	Industry	Tocopilla Mining, Chile	2005
Barcelona, Spain	1200	2	Vapour Compression	Power plant	Technicas Reunidas	2009
Spain	70	1	Vapour Compression	Power plant	Endesa	2010
Japan	800	1	Vapour Compression	Power plant, nuclear	Genkai Nuclear Power, KEPCO	2012



# STEAMY EXPANSION IN WEST AFRICA

Fresh water, and lots of it, is needed to produce steam for methanol production at a plant in Equatorial Guinea. With water in short supply, the plant owner relies on Alfa Laval's Multi-Effect Plate desalination units to solve the problem.

**FOUR QUESTIONS FOR NICK LATTIMORE**, technical manager at the Atlantic Methanol Production Company (AMPCO), which recently invested in a new unit.

**What is the purpose of the Alfa Laval Multi-Effect Plate (MEP) desalination units at AMPCO's methanol plant?**

"Since supplies of fresh water are limited at AMPCO's plant site in Equatorial Guinea, we use the Alfa Laval MEP desalination units to turn seawater into fresh water. The primary purpose of this fresh-water output is to make steam, which is integral to the methanol process. High-pressure steam is one raw material in the production of synthesis gas, which in turn is converted to methanol. Some of the freshwater is also used as potable water for the site personnel as well as for the expatriate personnel residential areas."

**What is your impression of the Alfa Laval MEP desalination units?**

"We're satisfied with all the units, particularly the new desalination unit [the MEP-3-1363, installed in 2010]. The operating cost and reliability have been good. Our satisfaction with the two original Alfa Laval units [installed in 1999] was the primary driver for us in choosing Alfa Laval again, although we did investigate other suppliers and technologies."

**How has the MEP unit helped AMPCO plant operations?**

"One of the deciding factors for the installation of the third Alfa Laval unit was the beneficial effects on the plant's steam balance. The improved steam balance added flexibility to plant operations. For example, we're able to operate the steam turbine drivers harder to make more horsepower, or to operate steam turbines instead of electric motor drivers, adding to the plant's operating reliability."

**Alfa Laval made some improvements to the most recent desalination unit to enable higher production of the unit. How is that working out?**

"AMPCO participated with Alfa Laval throughout the design process to make improvements based on our experiences with the two original units. Although the new unit has only been in service for a short while, the changes appear to be beneficial. So far, the new unit seems to hold its production rate better, indicating less fouling of the heat exchanger plates."

**CARI SIMMONS**