

Project Case Study

Crystal Serenity

Client:	Crystal Cruises
End User:	Crystal Cruises
Capacity:	400 m ³ /d
Contract Value:	circa £270K
Scope:	Design, build, supervise install & commission.
Contract Completion:	June 2008 to December 2008



General

Due to changing cruising patterns and availability/cost of bunkered potable water from shore, a 400 m³/d Reverse Osmosis desalination plant was installed to supplement existing fresh water production.

Following a competitive tendering exercise, the client selected ourselves to design, manufacture, supervise the installation and commission the equipment.

Project Details

The plant was designed to be installed whilst the ship was at sea with only the through-hull valves installed during a dry-dock period. With all the equipment being routed via a cargo hatch on the ships side into the engine room, all the equipment had to be within certain size and weight limitations.



The plant was manufactured and tested in our workshops prior to stripping-down and packing.

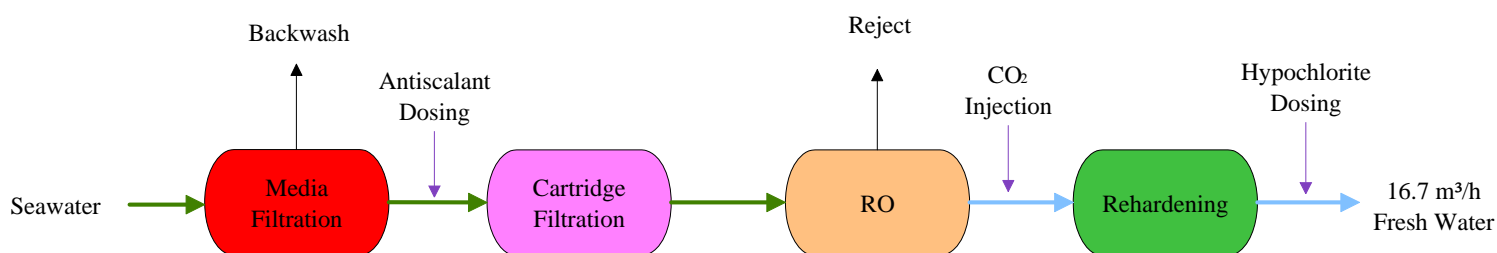
The installation of the plant was completed by a team of sub-contractors (arranged by the client) under the supervision of one of our engineers over a three week period. One of our commissioning engineers then joined the ship to complete the commissioning of the plant and provide training to ships staff.



The plant comprises of automated suction/discharge valves, suction strainer, feed/backwash pump, two sand filters in parallel (one single sand filter was too large to fit through the water tight doors), antiscalant dosing, cartridge filtration, high pressure pumps, RO stack, automatic permeate dump system, permeate remineralisation (c/w CO₂ injection) and hypochlorite dosing. The electrical control panel provides operator interface, annunciates all alarm conditions/safety trips and controls the automatic backwash operation of the sand filters.

The installation and commissioning was completed on schedule with no inconvenience to ships staff or passengers.

Process Flow



Performance Characteristics

Parameter	Design	Actual
Feed TDS (Salinity)	35,000 to 42,000 mg/l	28,300 mg/l
Feed Temperature	5 to 35°C	26.2°C
Feed pH	7.9	7.9
Feed Flow	40 m ³ /h	40 m ³ /h
Permeate TDS	52 to 382 mg/l	146 mg/l
Permeate Flow	16.7 to 18 m ³ /hr	16.4 m ³ /h
Fresh Water Hardness	40 to 80 mg/l	65 mg/l
Fresh Water Chlorine	up to 5 mg/l	--
Fresh Water pH	6.5 to 9	8