



# Salt Separation Services

## Project Case Study

### New Cruise Ships S.697, S.698 & S.699

<b>Client:</b>	Meyer Werft GmbH
<b>End User:</b>	Undisclosed
<b>Capacity:</b>	800 m <sup>3</sup> /d each
<b>Contract Value:</b>	circa €3.8M
<b>Scope:</b>	Design, manufacture & commission
<b>Contract Completion:</b>	May 2012 to March 2016



### General

Three new 167,000 GT energy efficient cruise ships were constructed for a premium cruise brand.

Each ship is fitted with three RO plants, each capable of producing 800 m<sup>3</sup>/d of desalinated fresh water from seawater. The RO plants will supply fresh water to the 6,000 plus persons on board.

Following a competitive tendering exercise and subsequent negotiations, the client selected ourselves to design, manufacture and commission these plants.

### Project Details

The plants are skid-mounted and were installed during the construction of each ship – the ship was effectively built around the plants.



The first of class plant was manufactured and fully tested in our workshop prior to shipping. Client and end user representatives attended the Factory Acceptance Test (FAT) to witness plant performance.



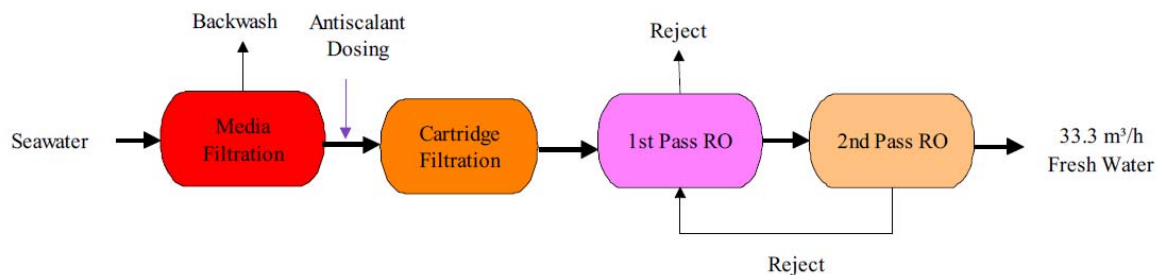
## Salt Separation Services

Each plant comprises of automated suction/discharge valves, feed/backwash pump, two sand filters in parallel, antiscalant dosing, cartridge filtration, high pressure pumps, RO stack and automatic permeate dump system. The electrical control panel provides operator interface, annunciates all alarm conditions/safety trips and controls the automatic backwash operation of the sand filters.



The innovative solution includes two pass RO technology to produce RO permeate to a very high quality as well as isobaric energy recovery technology, dramatically reducing the power requirements of the RO plants to less than 4 kW/m<sup>3</sup>.

### Process Flow



### Performance Characteristics

Parameter	Design	Actual
Feed TDS (Salinity)	37,000 mg/l	37,627 mg/l
Feed Temperature	5 to 32°C	17.9°C
Feed pH	7.9	7.27
Feed Flow	81.5 m <sup>3</sup> /h	82.2 m <sup>3</sup> /h
Permeate Chloride	<30 mg/l	6 mg/l
Permeate Flow	33.3 m <sup>3</sup> /h	33.7 m <sup>3</sup> /h

#### **SALT SEPARATION SERVICES LTD**

GROSVENOR HOUSE, GORRELL STREET, ROCHDALE, LANCS OL11 1AP

TEL : +44 (0)1706 655522 FAX : +44 (0)1706 654475

E-mail: sss@saltsep.co.uk Website: www.saltsep.co.uk

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