BALLAST WATER MANAGEMENT
ERMA FIRST FIT
ERMA FIRST

"Developed in The Biggest Shipping Nation In The World"
Established in 1977 and by continuous investing in R&D and new technologies, became a Global player in environmental protection, offering a variety of products and services in the **Marine** and **Industrial** field.

**ERMA FIRST**

Produces the sound and reliable **ERMA FIRST BWTS**, by being at the forefront of R&D with a team of specialists in Water Treatment Technology.

**polyeco**

Founded in 2001 and comprises the sole fully licensed company in Greece, providing integrated **Waste Management & Valorization Services**.
### THE SYSTEM IN A GLANCE: OPTION 1, ERMA FIRST BWTS

<table>
<thead>
<tr>
<th>ERMA FIRST BWTS</th>
<th>Stage - Components</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Separation" /></td>
<td><strong>SEPARATION</strong></td>
</tr>
<tr>
<td><img src="image2.png" alt="Separation" /></td>
<td>200 microns mesh self-cleaning pre-filter</td>
</tr>
<tr>
<td><img src="image3.png" alt="Separation" /></td>
<td>20 microns Hydro cyclones</td>
</tr>
<tr>
<td><img src="image4.png" alt="Disinfection" /></td>
<td><strong>DISINFECTION</strong></td>
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<tr>
<td><img src="image5.png" alt="Disinfection" /></td>
<td>Advanced Technology Electrolysis Cells</td>
</tr>
<tr>
<td><img src="image6.png" alt="Disinfection" /></td>
<td>TRO Concentration 8-10 mg/L</td>
</tr>
</tbody>
</table>

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Environmental Protection Engineering S.A. Group of Companies
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<thead>
<tr>
<th>ERMA FIRST FIT BWTS</th>
<th>Stage – Components</th>
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</thead>
<tbody>
<tr>
<td><strong>SEPARATION</strong></td>
<td><strong>OPTION 1</strong></td>
</tr>
<tr>
<td>Filtersafe: 40 microns self-cleaning automatic screen filter</td>
<td></td>
</tr>
<tr>
<td><strong>OPTION 2</strong></td>
<td>Filtrex: 40 microns self-cleaning automatic screen filter</td>
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<tr>
<td><strong>DISINFECTION</strong></td>
<td>Advanced Technology Electrolysis Cells</td>
</tr>
<tr>
<td>TRO Concentration 4-6 mg/L</td>
<td></td>
</tr>
</tbody>
</table>
Simplified Concept

Advanced Filtration
- Removal of particles > 40μm
- Negligible pressure drop
- Maximized Electrolysis results
- Minimized footprint

Electrolytic Cells
- Effective disinfection
- Low maintenance
- No cleaning required

OPERATION AT 0.9 PSU
Option 1 - FILTERSAFE

- Sintered Screen Type
- Pressure drop: 0,05-0,5bar
- **Automatic cleaning**
- Screen size: 40 μm
- Capacity: 50 ~ 3,000 m³/h
- Explosion proof type available
- SS 316L filter basket
Option 2 - FILTREX Ultra Compact

- Wedge wire pleated Screen Type
- Pressure drop: 0,05-0,5bar
- Automatic cleaning
- Screen size: 40 μm
- Capacity: 50 ~ 1,000 m³/h
- Extremely small footprint
- EX Available
- Housing: Bronze Aluminum Alloy

* Parallel hydraulic connection of filters results to higher flow rates
• **Full Flow Type**, Sodium Hypochlorite is produced at a max concentration of 4-6mg/Lt
Available Sizes:
• Cells: 150 - 300 - 600 – 800 - 1250 m³/ hr
• Parallel Connection – Higher flow rates
• Larger versions under development

Operating Specifications:
• Min. Operating Temp.: 3 °C
• Min. Operating Salinity: 0.9 PSU

Installation:
• Vertical or horizontal orientation

Maintenance:
• Electrodes lifetime exceeds 5000 hrs

Advantages:
• Very low power consumption
• Negligible hydrogen production of Max 0.1% v/v
• No corrosion risk
## Power Consumption

<table>
<thead>
<tr>
<th>m³/hr</th>
<th>100</th>
<th>250</th>
<th>500</th>
<th>750</th>
<th>1000</th>
<th>1500</th>
<th>2000</th>
<th>3000</th>
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<tbody>
<tr>
<td>0.9 psu</td>
<td>kW</td>
<td>6.23</td>
<td>15.6</td>
<td>31.15</td>
<td>46.7</td>
<td>62.3</td>
<td>93.5</td>
<td>124.6</td>
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<tr>
<td>15 psu</td>
<td>kW</td>
<td>2.73</td>
<td>6.82</td>
<td>13.65</td>
<td>20.48</td>
<td>27.31</td>
<td>40.95</td>
<td>54.6</td>
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<tr>
<td>30 psu</td>
<td>kW</td>
<td>1.8</td>
<td>4.3</td>
<td>9.0</td>
<td>13.3</td>
<td>18.0</td>
<td>27.0</td>
<td>36.0</td>
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</tbody>
</table>
ERMA FIRST Operation in Freshwater

- IMO defined as water salinity <3 PSU
- USCG defined as water salinity <1 PSU
- **ERMA FIRST is type approved to operate at 0.9 PSU**
- For lower salinity, addition of sea/brine water is required

### Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Values</th>
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<tbody>
<tr>
<td>Intake Water Salinity</td>
<td>200 mg/lit (0.2PSU)</td>
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<tr>
<td>Sea water Salinity</td>
<td>35,000 mg/lit</td>
</tr>
<tr>
<td>Brine water Salinity, Evaporator</td>
<td>55,000 mg/lit</td>
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<tr>
<td>BWTS Intake Requested Salinity</td>
<td>900 mg/lit (0.9PSU)</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Type of vessel</th>
<th>DWT</th>
<th>Total BW per operation (m³)</th>
<th>Sea water, 32 PSU (m³)</th>
<th>Mixing ratio % (injection of sea water in ballast flow rate)</th>
<th>Brine water, Evaporator, 55 PSU</th>
<th>Mixing ratio (injection of brine water in ballast flow rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPG</td>
<td>28500</td>
<td>9500</td>
<td>191</td>
<td>2,1</td>
<td>121</td>
<td>1,3</td>
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<tr>
<td>LPG</td>
<td>14500</td>
<td>4850</td>
<td>98</td>
<td>2,1</td>
<td>62</td>
<td>1,3</td>
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<tr>
<td>AFRAMAX</td>
<td>115000</td>
<td>32000</td>
<td>644</td>
<td>2,1</td>
<td>409</td>
<td>1,3</td>
</tr>
</tbody>
</table>
Salinity

The below illustrates different salinity in the sea around the world. Have in mind that the ports around often are found in river areas and the salinity might be somewhat different from the illustration.

![Sea Surface salinity map](image-url)
Temperature

Sea surface temperature

Dec 20 2013

Global

JPL G1SST

-4

0

4

8

12

16

20

24

28

32

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ERMA FIRST BWTS System holds:

- IMO Type Approval by Lloyds/Greek Maritime Administration

- **USCG AMS**

- USCG Test for Type Approval will start at USCG Approved Lab NSF in USA mid 2015

- **USCG Type Approval expected 2nd semester 2016**
### USCG process

#### Time schedule for the USCG Type Approval

<table>
<thead>
<tr>
<th>NO.</th>
<th>Task</th>
<th>Start date</th>
<th>Finish date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USCG AMS approval Fresh, Brackish, Seawater</td>
<td>COMPLETED</td>
<td>COMPLETED</td>
</tr>
<tr>
<td>2</td>
<td>Submission of Application for USCG Type Approval</td>
<td>LOI 3.10.2014</td>
<td>LOI 3.10.2014</td>
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<tr>
<td>3</td>
<td>Land-based test Total</td>
<td>SEPTEMBER 2015</td>
<td>MAY 2016</td>
</tr>
<tr>
<td></td>
<td>Land-based test Fresh 5 tests</td>
<td>OCTOBER 2015</td>
<td>MARCH 2016</td>
</tr>
<tr>
<td></td>
<td>Land-based test Brackish 5 tests</td>
<td>MARCH 2016</td>
<td>MAY 2016</td>
</tr>
<tr>
<td></td>
<td>Land-based test Sea 5 tests</td>
<td>APRIL 2016</td>
<td>APRIL 2016</td>
</tr>
<tr>
<td>4</td>
<td>Ship-board test 5 tests</td>
<td>NOVEMBER 2015</td>
<td>MAY 2016</td>
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<tr>
<td>5</td>
<td>Environmental test</td>
<td>COMPLETED</td>
<td>COMPLETED</td>
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<tr>
<td>6</td>
<td>USCG Type Approval</td>
<td>2nd QUARTER 2016</td>
<td>3rd QUARTER 2016</td>
</tr>
</tbody>
</table>
ERMA FIRST BWTS FIT MODULARITY

VARIOUS CONFIGURATIONS

- Horizontal filter with horizontal electr. Cell
- Vertical filter with horizontal electr. Cell
- Vertical filter with vertical electr. Cell
- Horizontal filter with vertical electr. Cell
Option 1
INSPECTION & REPORTING

A report with the survey findings in electronic format will be this project’s deliverables.

Option 2
INSPECTION, 3D LASER SCANNING & REPORTING

A report with preliminary suggested arrangements for the BWTS, including 3D model of the equipment on the alternative locations, followed by a presentation at the Client’s premises or tele-conference (at the Client’s discretion).
Option 3
INSPECTION, 3D LASER SCANNING, FEASIBILITY STUDY, ENGINEERING STUDY & RETROFIT SPECIFICATION

- Isometric piping drawings (with materials’ and parts’ list)
- Detailed piping sections / spools
- Modifications of affected “as built” structural, outfitting, diagrammatic piping and single line electrical drawings
- Class approved drawings
- Technical Specification of installation and related modification works

*ERMA FIRST is committed to work closely with the Classification Society, with absolute confidentiality and continuous communication of information.*

Option 4
SUPERVISION OF RETROFIT WORKS

One experienced ERMA FIRST Engineer will attend the modification works in order to survey them and to ensure that installation study and various drawings are followed by the shipyard or repair facility or riding crew.
ACTUAL CASE STUDY

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Vessel’s floor layout

Tank top
2nd Deck

Vessel’s floor layout
3rd Deck

Vessel's floor layout
Vessel’s elevation layout

Front section
Conversion to 3D Model

Stage 1

The drawings received in pdf format, are converted into 1:1 scaled pictures.
Conversion to 3D Model

Stage 2

The 1:1 scaled pictures are inserted and correctly aligned in 3D space, creating the 1:1 skeleton of the vessel in the specific area.
Conversion to 3D Model

3D Laser Scanning

Ballast pumps
Estimated location:
Stern-Port side
Suggested ERMA FIRST FIT arrangement

Front view

Top view
Suggested ERMA FIRST FIT arrangement

Starboard side

Port side

Vessels center line

Port

Starboard

Stern
Suggested ERMA FIRST FIT arrangement
Suggested arrangement of ERMA FIRST FIT on vessel

Ballast pumps
Estimated location: Stern-Port side

2nd Deck

Tank Top
Suggested arrangement of ERMA FIRST FIT on vessel

Untreated water to BWTS

Treated water to ballast tanks
Suggested arrangement of ERMA FIRST FIT on vessel
Suggested arrangement of ERMA FIRST FIT on vessel

Untreated water to BWTS

Treated water to ballast tanks

To ballast tanks
Suggested arrangement of ERMA FIRST FIT on vessel
Suggested arrangement of ERMA FIRST FIT on vessel
Suggested arrangement of ERMA FIRST FIT on vessel

Retrofit Services

Environmental Protection Engineering S.A. Group of Companies
### BWTS Timeline

#### Sequence of Events

<table>
<thead>
<tr>
<th>Event</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kick-off meeting</td>
<td>1</td>
<td>2</td>
<td>23</td>
</tr>
<tr>
<td>Technical review</td>
<td>(1 w)</td>
<td>(1 w)</td>
<td></td>
</tr>
<tr>
<td>On board Survey (3D Scanning)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical &amp; Commercial Offer</td>
<td>(2 w)</td>
<td>(2 w)</td>
<td></td>
</tr>
<tr>
<td>Proposal acceptance &amp; contract</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drawings submission to Class</td>
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<td>(3 w)</td>
<td></td>
</tr>
<tr>
<td>System's fabrication</td>
<td></td>
<td>(9 w)</td>
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</tr>
<tr>
<td>FAT</td>
<td></td>
<td>(1 w)</td>
<td>(5 w)</td>
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<tr>
<td>Shipment &amp; Delivery to Shipyard</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Supports &amp; foundation (steelwork)</td>
<td></td>
<td>(1 w)</td>
<td></td>
</tr>
<tr>
<td>BWTS Peripherals Installation</td>
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<td></td>
<td>(1 w)</td>
</tr>
<tr>
<td>Pipping</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cabling</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>System Installation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Tests &amp; Commission</td>
<td></td>
<td></td>
<td>(1 w)</td>
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</tbody>
</table>

#### Planning

<table>
<thead>
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<th>Phase 2</th>
<th>Phase 3</th>
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#### Preparation

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<th>Phase 2</th>
<th>Phase 3</th>
</tr>
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<tbody>
<tr>
<td>Proposal acceptance &amp; contract</td>
<td></td>
<td>(2 weeks)</td>
<td></td>
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<td>Drawings submission to Class</td>
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<td>(9 weeks)</td>
<td></td>
</tr>
<tr>
<td>FAT</td>
<td></td>
<td>(1 w)</td>
<td>(5 w)</td>
</tr>
<tr>
<td>Installation layout in detail</td>
<td></td>
<td></td>
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<tr>
<td>Shipment &amp; Delivery to Shipyard</td>
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#### Installation

<table>
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<tr>
<th>Event</th>
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<tr>
<td>Supports &amp; foundation (steelwork)</td>
<td>1</td>
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<tr>
<td>BWTS Peripherals Installation</td>
<td>2</td>
</tr>
<tr>
<td>Pipping</td>
<td>3</td>
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<tr>
<td>Cabling</td>
<td></td>
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<tr>
<td>System Installation</td>
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<tr>
<td>Final Tests &amp; Commission</td>
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www.ermafirst.com

Environmental Protection Engineering S.A. Group of Companies
### Reference List

<table>
<thead>
<tr>
<th>VESSEL</th>
<th>TYPE OF VESSEL</th>
<th>NEW BUIDL / REF NO</th>
<th>SHIPYARD</th>
<th>COUNTRY OF BUILT</th>
<th>SHIPOWNER</th>
<th>NO. OF VESSELS</th>
<th>VESSEL TYPE</th>
<th>VESSEL SIZE</th>
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<tr>
<td>MUSL M/1863</td>
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<td>YANGHO DOYUM SHIPBUILDING CO., LTD.</td>
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<td>2</td>
<td>EMIRATE FIRST FZC</td>
<td>15,980 DWT CARGO</td>
</tr>
</tbody>
</table>

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**Note:**
- The table above represents a list of vessels built by different shipyards in various countries, with details such as vessel type, size, and owners.
- Environmental Protection Engineering S.A. Group of Companies is involved in this list, likely indicating their role in the maritime or environmental sector.

---

**Reference list**

- [www.ermafirst.com](http://www.ermafirst.com)

---

**Environmental Protection Engineering S.A. Group of Companies**
World Wide Network

ERMA FIRST BWTS
Worldwide Network

WORLD WIDE STATIONS AFTER SALES SUPPORT

SERVICE ENGINEERS
SUPERVISION

COMMISSIONING
SPARE PARTS

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Environmental Protection Engineering S.A. Group of Companies
Our Group can provide a “Water & Waste Water Package”

**POSEIDON EVO**  
Bilge Water Separator,  
Acc. to MEPC.107(49)

**TRITON μ**  
Sewage Treatment Plant  
Acc. to MEPC.159(55)

**ALIOS EVO**  
RO Fresh Water Generator

Environmental Protection Engineering S.A. Group of Companies
Poseidon Evo, Bilge Water Separator

- Manufactured since 1983
- **POSEIDON EVO** Bilge water separator is the 3rd generation unit
- Installed on more than 3,500 ships
- Chosen by the largest shipyards worldwide
- Poseidon FIT (5ppm) available on Jan 2015

Main advantages:
- Fully automatic unattended operation
- Self-cleaning through backwash
- Minimum maintenance
- No chemicals required
- Effluent oil content under 5ppm under all test conditions
- Easy installation and reliable operation
- Minimum volume & footprint

Models (m3/hr):
0.25 / 0.5 / 1.0 / 2.5 / 5.0 / 7.5 / 10.0
Advantages

- Certified Acc to MEPC.159(55)
- High manufacturing quality
- Low purchasing and installation cost
- Compact unit with small footprint
- Compact unit with simple and automatic operation
- Safe and flexible operation
- Low operation and maintenance cost

- PHYSICAL METHODS
  - Maceration
  - Sedimentation
  - Dilution
  - Filtration

- CHEMICAL METHODS
  - Coagulation
  - Oxidation
Alios Evo, Fresh Water Generator

**Standard features:**
- Sea water feed pump
- Pre-treatment fine filters
- High pressure pump made by stainless steel grade 316
- High rejection efficiency spiral wound membrane modules
- Robust and long lasting pressure vessels
- Pressure safety valve
- Stainless steel pressure regulator
- On line TDS measurement
- 3-way valves for automatic operation when the effluent quality is out of the set limits
- Control panel with PLC for fully automatic operation
- Fresh water flow meter
- Sea water flow meter
- Automatic Clean In Place (CIP) procedure

**Models (m3/day):**
1.5 / 3.5 / 6.0 / 7.5 / 10.0 / 13.0 / 20.0 / 30.0 / 80.0 / *

*Design upon customer requests.*

Environmental Protection Engineering S.A. Group of Companies
Thank you for your kind attention

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See us @ https://www.youtube.com/channel/UCXx7xnHtH7gEZZA_XXyPImQ