

ECOCHLOR BALLAST WATER TREATMENT



USCG Type Approved

Low Power Consumption

Crew Friendly

Small Footprint

**No Need to Re-treat or
Neutralize on Discharge**

**Option for Bulk Carriers
with Gravity Discharge
Top Side Tanks**

**Inc.
5000**

Ecochlor is listed in the top 10% of Inc. 5000 Award for the fastest-growing private companies in U.S.



14 Years of Proven Technology

The unique, patented technology provides installation advantages in placement flexibility and scalability, and ongoing operating advantages in efficiency and energy savings.

The system simply works. It is rugged. It lasts. We have had systems in operation since 2004. Shipowners and crews have been pleased with the technical performance and operational efficiencies of these systems for over 14 years.

Gravity Discharge Top Side Tanks: No Neutralization or Treatment at Discharge

While there are fewer concerns associated with the installation of BWTS on bulk carriers than tankers, those with top side tanks still present a significant challenge. Top side tanks are typically filled through the fire main and, due to their design, cannot treat or neutralize this ballast water prior to discharge. Converting a bulk carrier with top side tanks to allow re-treatment or neutralization of ballast water would be extremely costly and, more importantly, could lead to operational difficulties of the vessel. The ability to discharge ballast water directly with no treatment or neutralization requirements is an advantage of the Ecochlor System for these vessels.

Technology: Unaffected by Salinity, Temperature, Organics

The Ecochlor® BWTS uses chlorine dioxide (ClO₂) for disinfection, a water treatment technology that has been proven effective over 70 years in land-based applications. The technology is not affected by water salinity, turbidity, organics or temperature (operating in temperatures as low as 0°C). This system gives you the reliable performance you need for global shipping.

Retrofit Ready: Small Footprint with Flexible, Modular Installation

The Ecochlor® BWTS offers the small footprint and modularity needed to optimize available space. The generator and tanks can be placed in almost any convenient location on a ship. The filtration system is typically located in close proximity to the ballast pumps, and can be placed in a horizontal or vertical configuration space for system placement.

Ideal for Mid-size to the Largest Bulk Carriers in the World

The flexibility of Ecochlor's BWTS with respect to installation location and engineering design has driven more owners to choose the Ecochlor System for their vessels.

A Rugged System that Meets or Exceeds the Most Demanding Regulations

Our systems have both USCG and IMO Type Approval, demonstrating that our technology can meet, and in many cases exceed, the most demanding regulations. In August 2017, Ecochlor received USCG Type Approval.

Ecochlor's USCG Type Approval offers almost twice the flow capacity of any other approved technology and the only approved BWTS that does not require re-treatment or neutralization on discharge.

Operationally Efficient: Low Energy Consumption, Automated, Crew-Friendly

The energy required to power the Ecochlor® BWTS is negligible in comparison to other ballast water treatment systems. Operation is simple and straightforward with an intuitive control panel. For the crew, there is no chemical handling.

Rigorous studies have demonstrated that treatment with the Ecochlor® BWTS will not affect ballast tank coatings.

Support for the Long Haul

It isn't just the system, unique technology and engineering – it's the support provided before and after as well as during installation that sets us apart from the competition. We have a worldwide network of maritime engineers, partners and associates here: to serve; to consult; to conduct feasibility studies; to install systems; and to provide ongoing service and support.

Our mission: To help you protect our coastal ecosystems and meet regulatory requirements in the most effective and efficient way now — 14 years from now, and longer.

For more information go to www.ecochlor.com

ECOCHLOR® BALLAST WATER TREATMENT SYSTEM

TOUGH, MODULAR, SCALABLE



CIO₂ Generator: Unique Technology

The heart of our treatment system: a chlorine dioxide generator that delivers a dilute solution of chlorine dioxide to treat incoming ballast water. The fully automated, compact generator has few moving parts and is the same physical size for all sizes of systems. It works simply: a small amount of supply water from the ship flows through an eductor which creates a vacuum in the mixing chamber. Once the vacuum has been created, two precursor chemicals flow into the chamber; the supply water becomes a solution of chlorine dioxide that is sent to the main ballast water line.

Scalable: Sized to Ship and Ballast Water Needs

The CIO₂ Treatment System includes the CIO₂ generator, self-contained chemical storage tanks, associated piping and automated PLC controls. The system is easily scalable for different sizes of ships and ballast volumes. Larger systems are particularly space efficient with ten times the capacity for less than twice the footprint.



Series 100 Model: ES-500-1.5
Capacity: 500 m³/hr, Tank Size: 1.5 m³



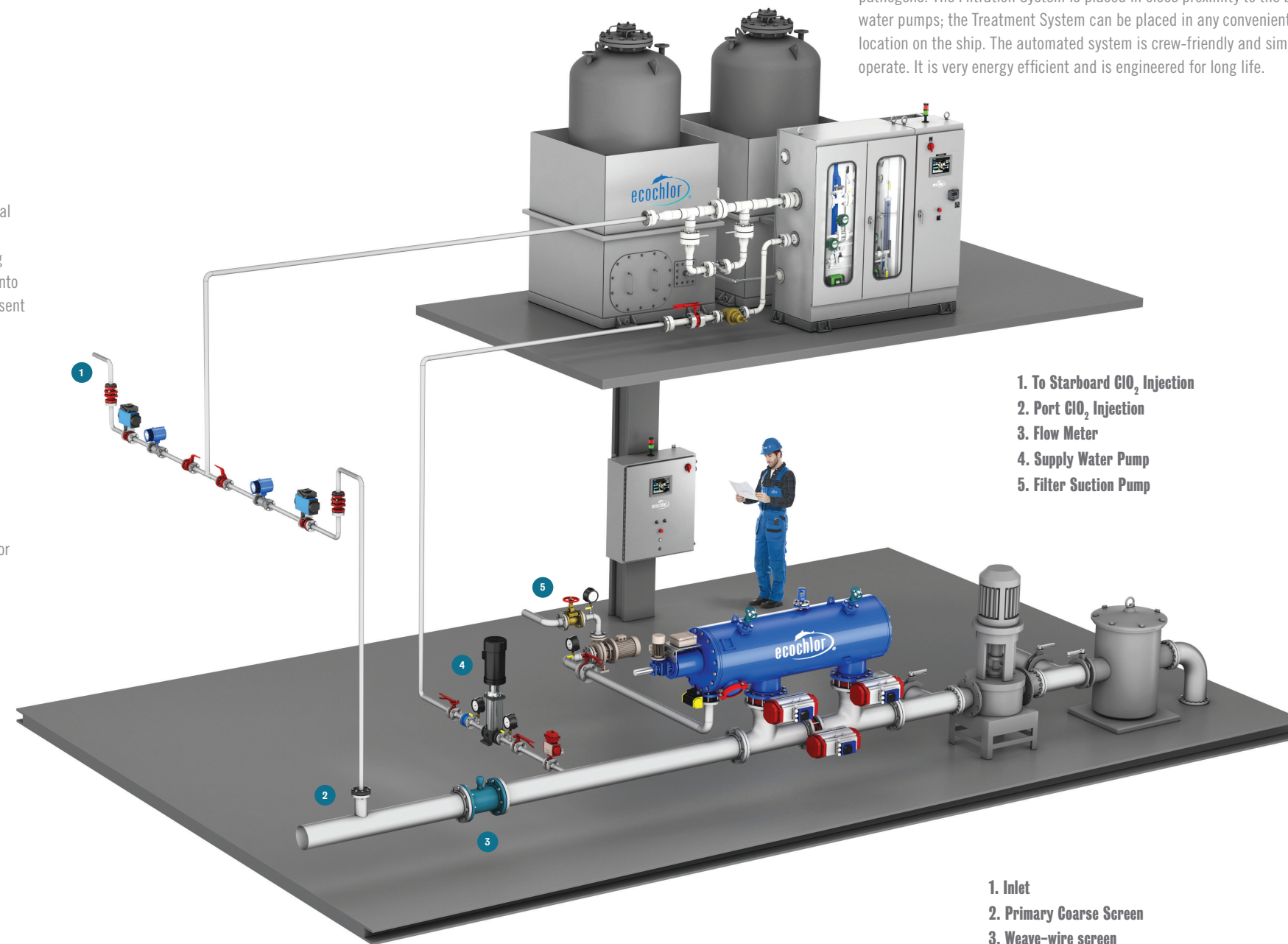
Series 150 Model: ES-1500-2.5
Capacity: 1,500 m³/hr, Tank Size: 2.5 m³



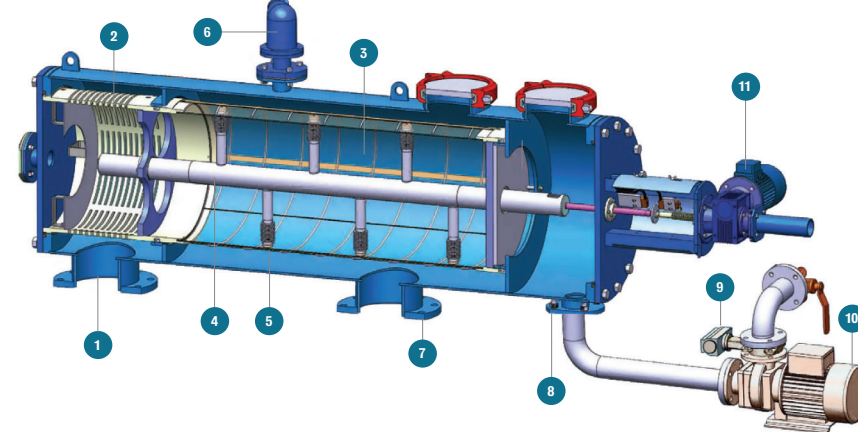
Series 200 Model: ES-3000-3.5
Capacity: 3,000 m³/hr, Tank Size: 3.5 m³



Series 250 Model: ES-5000-5.0
Capacity: 5,000 m³/hr, Tank Size: 5.0 m³



1. To Starboard CIO₂ Injection
2. Port CIO₂ Injection
3. Flow Meter
4. Supply Water Pump
5. Filter Suction Pump



1. Inlet
2. Primary Coarse Screen
3. Weave-wire screen
4. Suction Scanner
5. Proximity Nozzles
6. Air Release Valve
7. Outlet
8. Flush Water Discharge Outlet
9. Flush Valve
10. Suction Pump
11. Worm Gear and Motor

Filtration System: Rugged, Self-Cleaning, Highly Efficient

Includes two stages of filtration: coarse and fine. It offers fully automatic self-cleaning operation and can handle heavy sediment loads. Low energy usage.

Ecochlor® Ballast Water Treatment System: Filtration and Treatment

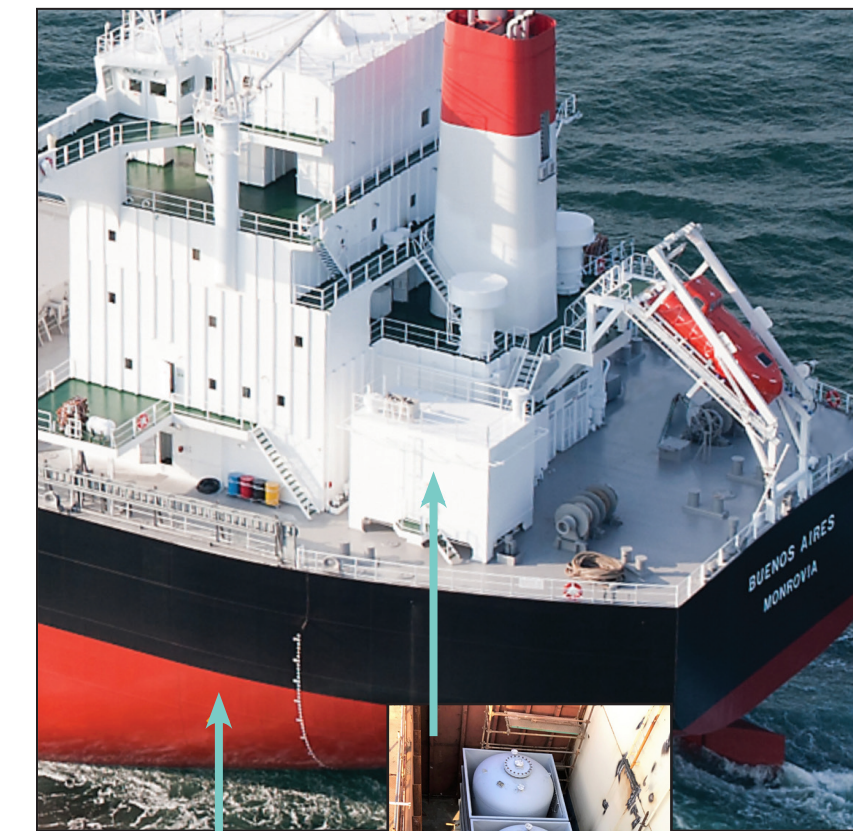
The Filtration System removes sediments and larger organisms and the Chlorine Dioxide Treatment System eliminates smaller organisms and pathogens. The Filtration System is placed in close proximity to the ballast water pumps; the Treatment System can be placed in any convenient location on the ship. The automated system is crew-friendly and simple to operate. It is very energy efficient and is engineered for long life.

NEW BUILDS AND RETROFITS: HIGHLY FLEXIBLE, MODULAR INSTALLATION



“Even though our system is relatively simplistic, our experienced installation team works at the dry dock alongside the shipyard, shipowner’s superintendent, engineering integrator and the vessel’s crew to ensure that the ballast water treatment system is retrofitted properly and operating effectively at commissioning. Our company philosophy is that the sale and installation of an Ecochlor System initiates a relationship with the shipowner and operator that will last for the life of the vessel, and this cooperative relationship begins at the installation.”

Tom Perlich, founder and president of Ecochlor



The CIO₂ Treatment System can be located in any convenient part of the ship. The system itself is modular to further optimize space.

The Ecochlor® System offers a high degree of flexibility for installation. It has a relatively small footprint compared to other ballast water treatment systems.

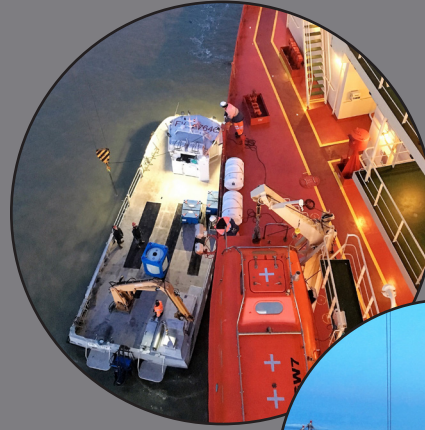
Only the Filtration System needs to be installed in close proximity to the ballast water pumps. The filters can be installed horizontally or vertically and are configured to match the ship size and ballast water volume.



Ecochlor® BWTS Power Consumption

ECOCHLOR Series	FLOW RATES (m ³)	POWER (kW)	
		Typical ⁽¹⁾	Maximum ⁽²⁾
75	200 - 400	4.9	8.5
100	400 - 1000	5.5	9.1
150	1000 - 3000	6.6	22.2
200	3000 - 6000	10.4	31.8
250	6000 - 10,000	12.6	57.1
300	10,000+	TBD	TBD

Power requirements include filter(s), filter suction, cleaning pump, generator, control panel and motive water booster pump.
⁽¹⁾Based on normal operation of filter cleaning every 15 minutes.
⁽²⁾Based on continuous filter cleaning.



After the Installation

The sale and installation of an Ecochlor Ballast Water Treatment System (BWTS) begins a relationship with the owner, operator and crew that will last for the life of the vessel. Through our Technical Service Agreement, an authorized Ecochlor representative will resupply the chemicals approximately every six months. During the chemical resupply process, there is very little crew involvement. The Ecochlor Service team has collaborated with Drew Marine to assist in providing logistics and technical support for resupply of the precursor chemicals at ports and harbors around the world.

Ecochlor has an established international Customer Service Call Center that is available 24/7 for other service needs. Crew training can be done on the vessel's computer using the Ecochlor interactive training program that is available in varying levels of detail for the deck crew, engineering staff, chief engineer and chief officer, based on their level of responsibility for the system.



USCG Type Approval



IMO G9 Active Substance Approved



IMO G8 NIMO Norway

Ecochlor's attainment of global regulatory type approvals, including IMO, USCG, class and flag societies, highlights our perseverance in bringing a quality, effective BWTS to market in the marine industry and our continued commitment to working with shipowners to assist them in having BWT compliant fleets and/or individual vessels.



IMO Type Approved Liberian Ship Registry



IMO Type Approved Cyprus Ship Registry



ABS Type Approved



BV Type Approved



LR Type Approved



NK Type Approved



RMRS Type Approved



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