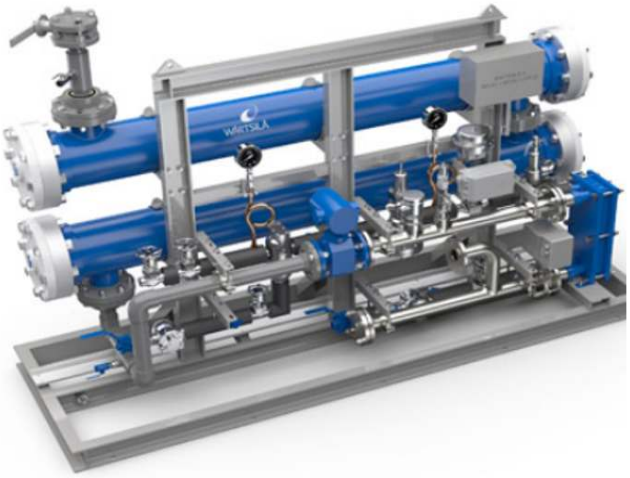
INTRODUCTION TO THE ELECTROCHLORINATION - TYPE BALLAST WATER TREATMENT SYSTEMS

Training Course

1. OVERALL AIM

A Training Course designed for Engineer and Deck Officers who are to be recruited on ships fitted with a Filtration - Electrolysis Ballast Water Treatment System. The focus will be on PURIMAR (Samsung), HI-BALLAST (Hyundai) and AQUARIUS EC (Wartsila). The overall aim of the course is to increase the awareness of the participants to the side stream, filtration – electrolytic ballast water treatment systems concept and key components.



2. LEARNING OBJECTIVES

To help the participating Officers understand:

- the combination of filtration and electrolysis process during ballasting.
- the importance of TRO sensors in adjusting the dose of free chlorine to ballast tanks or in the neutralization during de-ballasting.
- the design limitations of these systems and their key components installed in the pump room, the engine room and other deck areas.

3. TRAINING FACILITIES

The Training Course will take place at the ATHINA Maritime Learning and Development Center.

Hands-on Training will be provided at a Samsung PURIMAR Simulator installed in the Electromechanical Laboratory.

The Training Simulator consists of (3) skids, the Filtering Unit, the Electrolysis Unit, the TRO Analyzer/Neutralization Unit and the Display Operating Panel.

4. SCHEDULE

Time	Topics
09:00 – 09:30	**An overview of the available BWTS Technologies** - Types of BWTS installed on Minerva Marine ships
09:30 – 10:00	**Legal Framework** - The D-2 Performance (*Treatment*) Standard - BWM Convention & Compliance Dates - Developments in the STCW - The Code for the Approval of BWM Systems
10:00 – 11:00	**Terms of Electrolytic BWTS** - Side Stream / Full Flow Systems - Active Substances - System Design Limitations - TRC (Treatment Rated Capacity) - Holding Time - Maximum Allowable Discharge Concentration (MADC) – Dose (TRO)
11:00 – 11:20	*Coffee Break*
11:20 – 12:00	**Key Components of Electrolytic BWTS** **Filtration Unit** - Filter Element/Housing Types - Back wash cycle - Ballasting in high turbidity waters
12:00 – 13:00	**Electrochlorination Unit** - Production of Free chlorine and by-products - Electrolytic cells, Rectifiers, SW Feed water pumps - TRO Analyzers/Dose Adjustment - Ballasting Mode – Varied Salinities
13:00 – 13:50	*Lunch Break*

13:50 – 14:30	**TRO Analyzers, Gas Sensors and Neutralization Unit** **Integration of BWTS and VRC (Valve Remote Control) System**
14:30 – 15.45	**HMI (Operation Panels), Ballasting & De- ballasting Modes** **Troubleshooting** **Alarm Management** **Functionality Monitoring**
15:45 – 16.00	*Coffee Break*
16:00 – 17:00	**Practice on the BWTS Training Simulator**

ATHINA MARITIME LEARNING AND DEVELOPMENT CENTER