

BlueZone™ Ballast water management system

[MICRO OZONE BUBBLE TYPE for all kinds of vessels]



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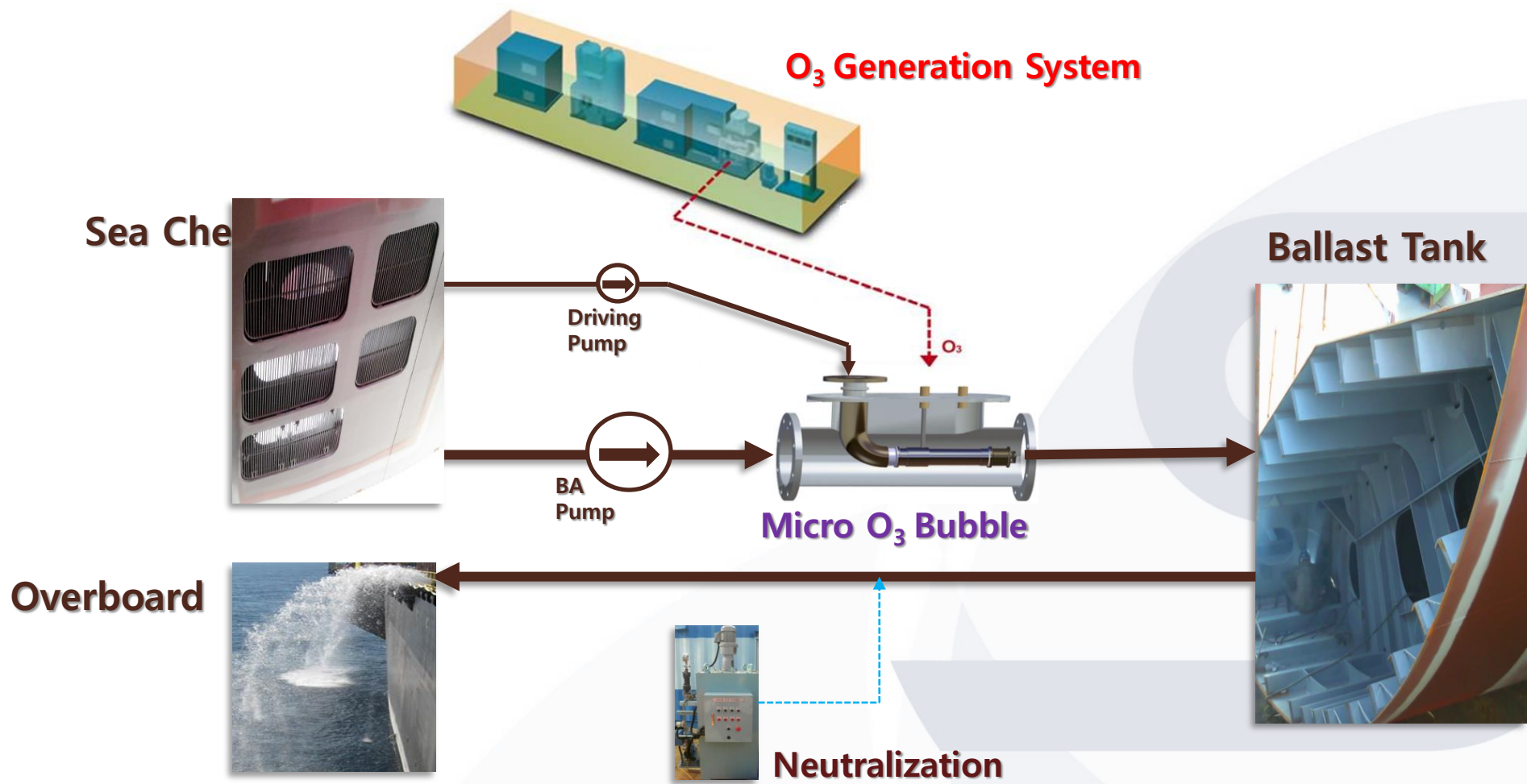
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SUNBO INDUSTRIES CO., LTD.



* Configuration of BlueZone BWMS



* Major Equipment of BlueZone BWMS

● O₃ Generation System

AIR

- Compressor
- Air Dryer & Filter



O₂

- O₂ Generator
- Air Filter



O₃

- O₃ Generator
- Chiller
- Destructor



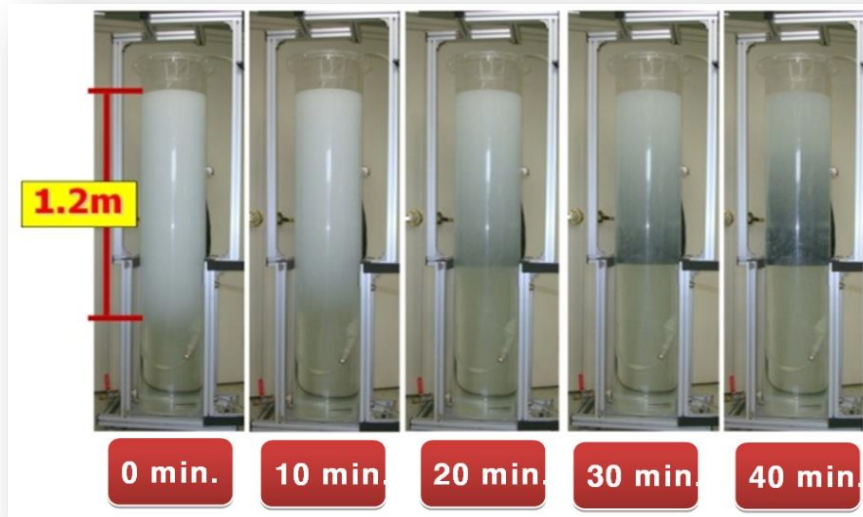
INJECT

- Micro Bubble Nozzle
- Mixing Chamber
- TRO Sensor



* The merit Micro Ozone Bubble

● Maximization of Disinfection Effect



- Under 50 μm Micro bubble stays for a long time in the water comparing to the general bubble.
 - Increase the contact surface area to kill the Microorganisms
 - improve sterilization effect
 - A significant effect with small amount of Ozone
 - Reduced Power consumption

SIMPLE

- Easy Installation
- The Minimum Modification of Existing Ballast System
- Easy Control by Automation System
- Easy Maintenance and Installation by One unit module

RELIABLE

- Proven Technology in water treatment industries for 100 years
- Optimized Solution by Marine Engineering Expert

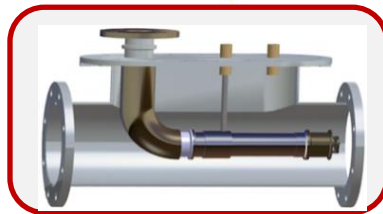
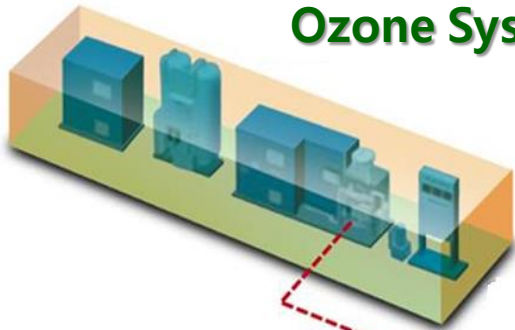
LOW COST

- Cost Saving by the Min. Ozone Injection Rate
- No Filter → No Pump head Increase → Decrease Power Consumption
- The Min. Time Loss for Retrofit of Existing Vessel

SIMPLE

Easy Installation

Ozone System

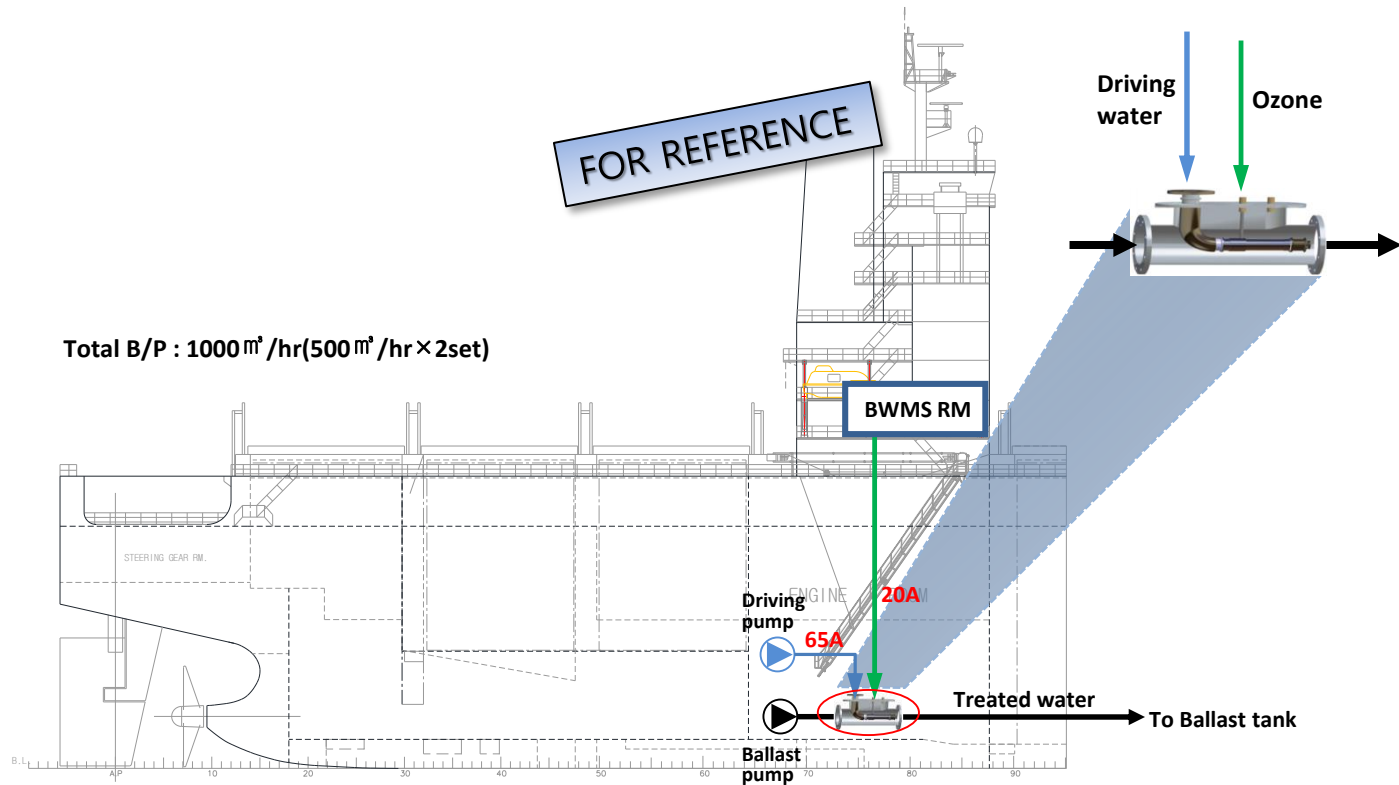


Micro O₃ Bubble Nozzle

- Only Inserting the Nozzle on Main Ballast Line (One Spool Installation)
- Ozone Generation Module to be installed on idle location

Advantage – SIMPLE!

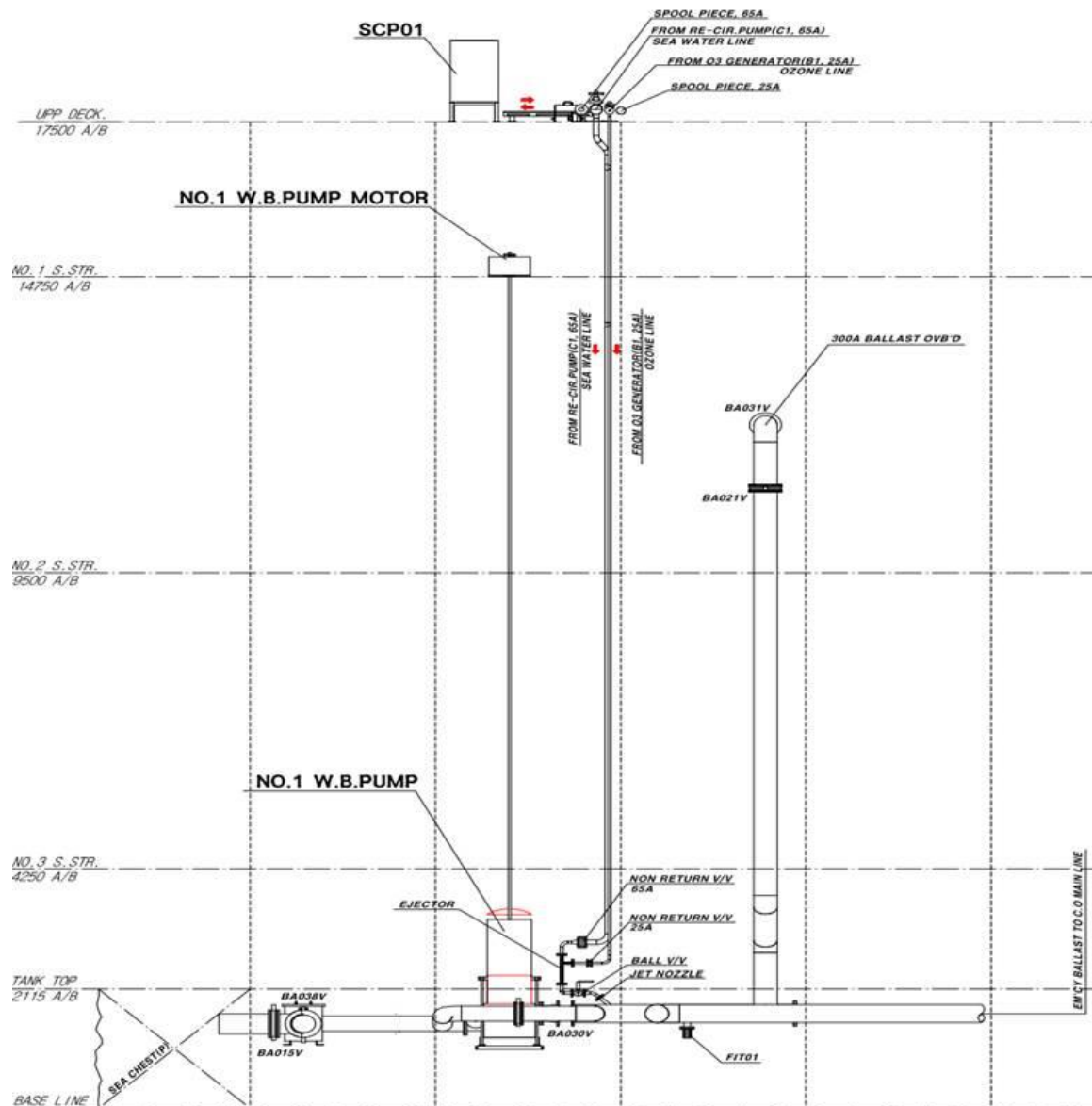
- **ONE SPOOL** (Ozone Injection Chamber) **Installation**
- Main Components : Modules System (CONTAINER) or Discontinuous Arrangement



Tankers with Framo-Type Ballast Pumps



BlueZone
BALLAST WATER
MANAGEMENT SYSTEM



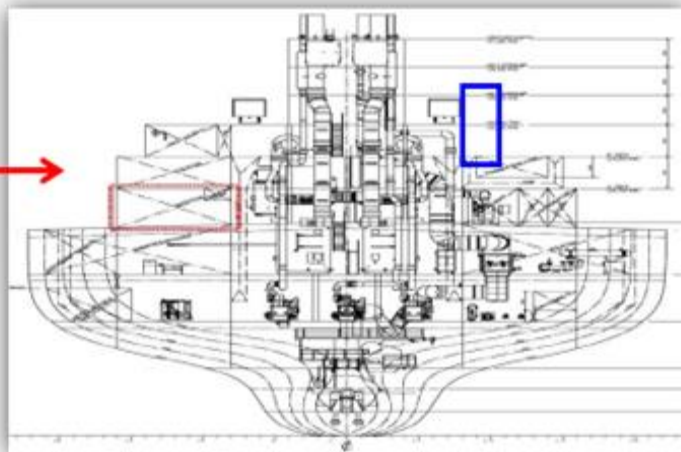
Advantage – SIMPLE!

SIMPLE

Review of Installation - Tanker



<BWMS Unit>

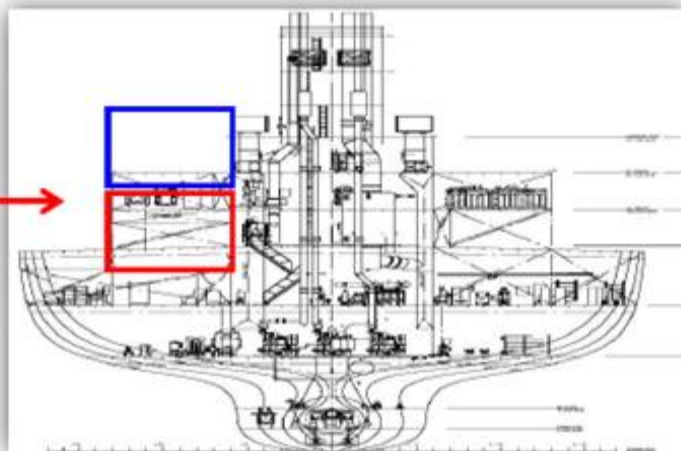


- New Ship : UPPER DECK, CASING AREA (**RED Color**)
- Existing Ship : CASING AREA (Blue Color)

Review of Installation - Bulk



<BWMS Unit>



- New Ship : UPPER DECK, CASING AREA (**Red Color**)
- Existing Ship : CASING AREA (Blue Color)

SIMPLE

Easy Control by Automation System



< Touch Screen >

Real-Time

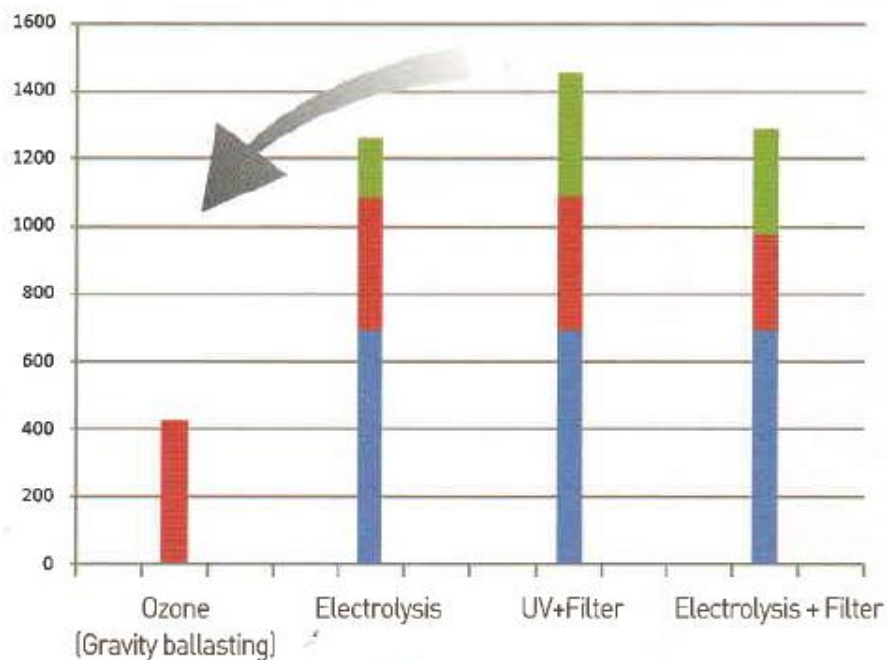


Real-Time





► Ballasting Power Consumption Graph



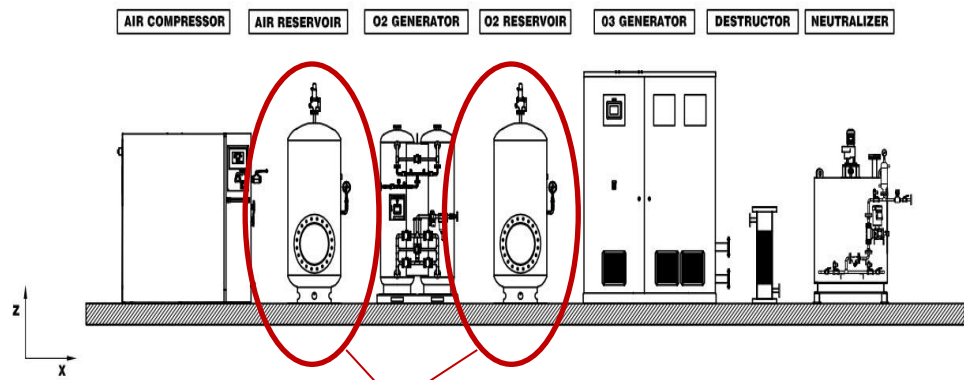
(Based on 3,000 m³ /h x 2 sets)

- Additionally Required Power(kW)
- BWMS Power Consumption
- Power for Ballast Pump 2 sets (kW)

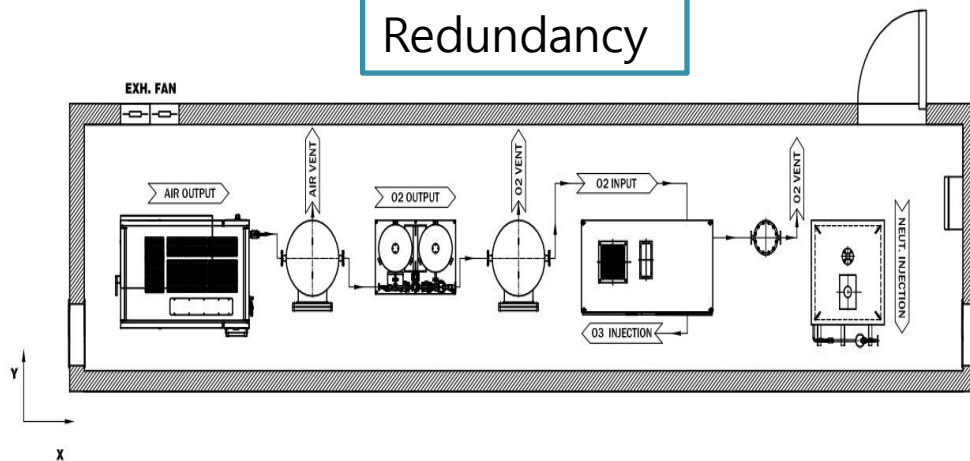
SIMPLE

Easy Maintenance and Installation by One unit module

Major equipment – Total 9 Unit



Redundancy



40 FEET CONTAINER BOX

L x W x H (mm): 12,034 x 2,348 x 2,390

- 1. Air compressor
- 2. Air dryer
- 3. Air cooler & Filter Unit

1 unit

- 1. Air receiver
- 2. O2 generator
- 3. O2 receiver

1 unit

Simplification

3 Unit !

- 1. O3 generator
- 2. MCP
- 3. Water chiller

1 unit

< O2 Generator >



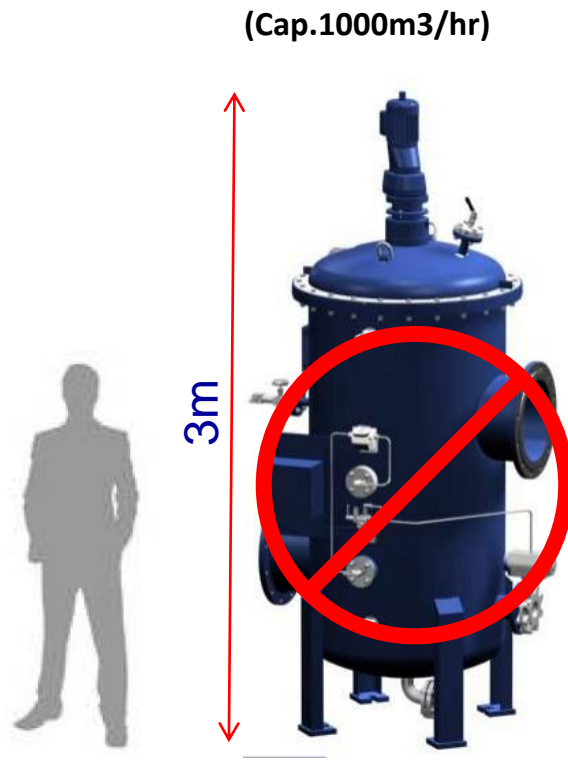
Before



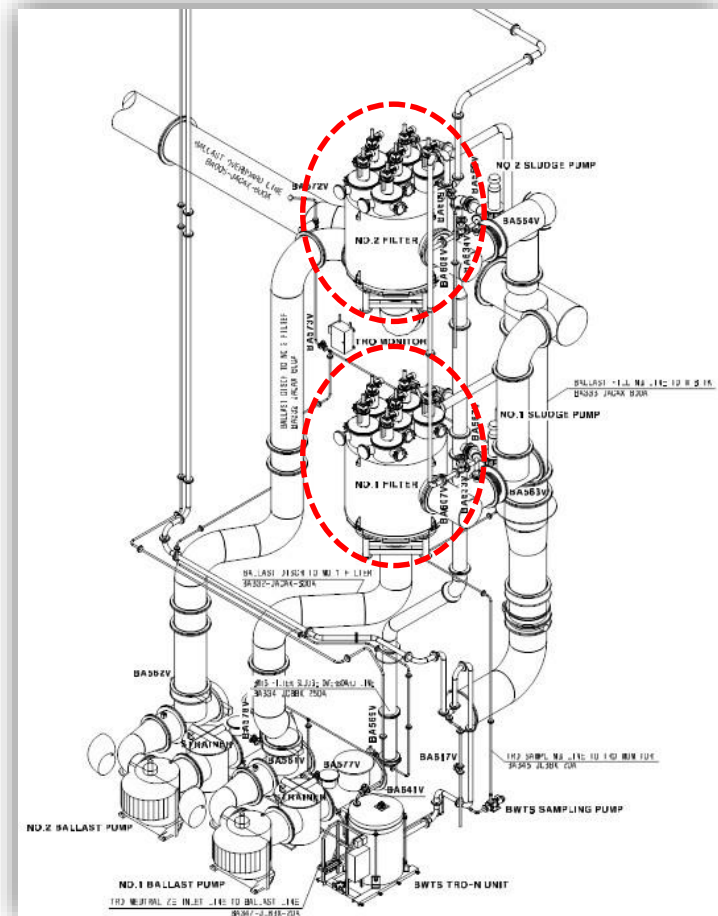
Now

Advantage – LOW COST!

- **NO Filter** – Cost Reduction to Installation & Maintenance
- Ozone : Removal Zooplankton by Strong Oxidants



Filter Size



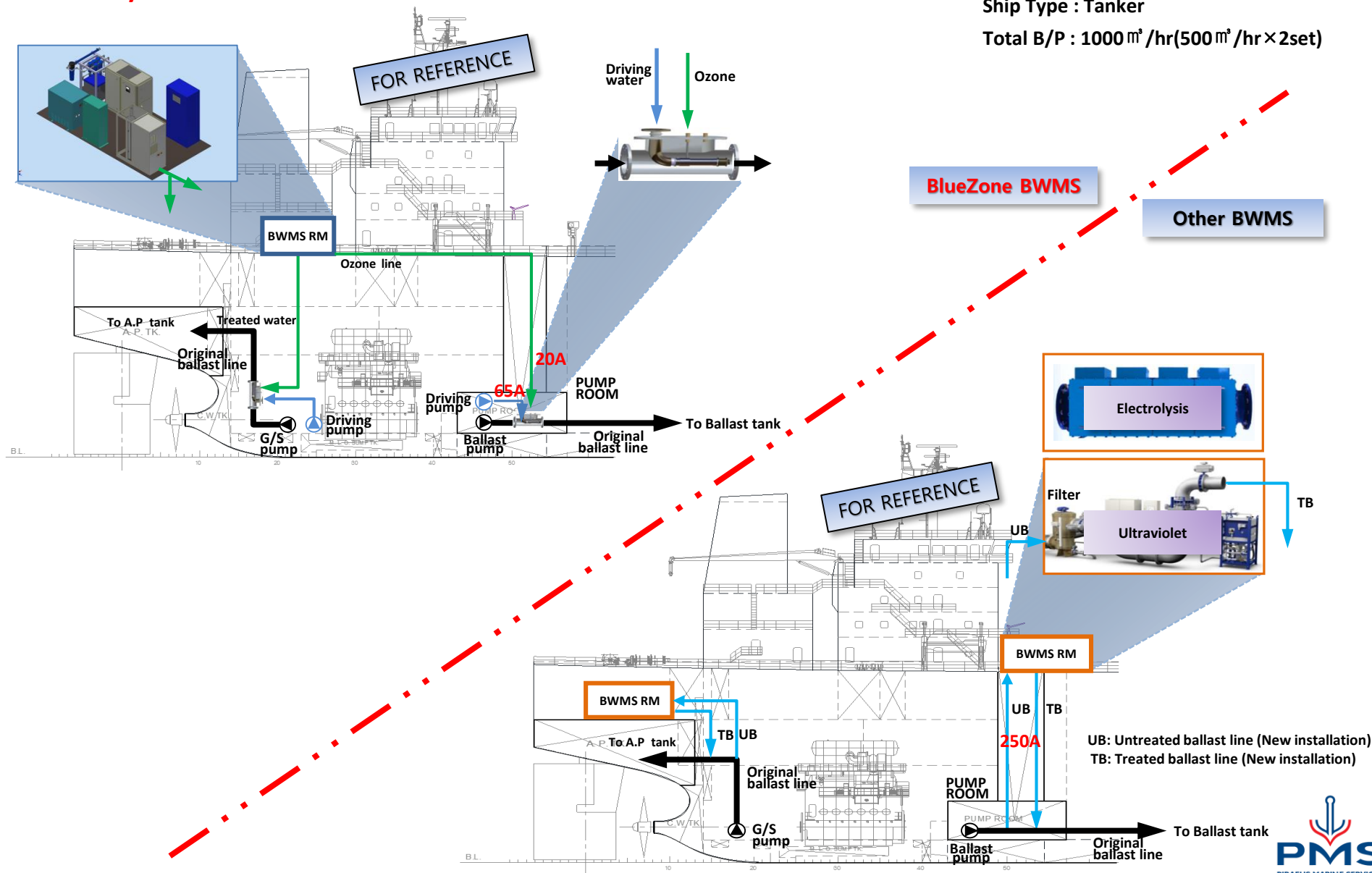
Filter Installation in the Pump Room or Engine Room

Advantage – LOW COST!

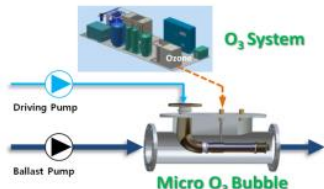

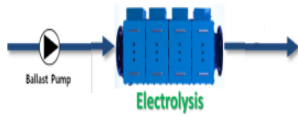
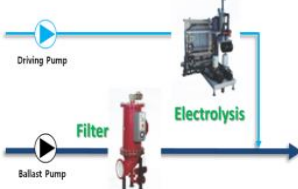
















▪ Easy Installation – Cost down of Installation Fee

Ship Type : Tanker

Total B/P : $1000 \text{ m}^3/\text{hr}$ ($500 \text{ m}^3/\text{hr} \times 2\text{set}$)



Comparison of Each Type

Description	Ozonation	Filter + UV	Electrolysis	Filter + Electrolysis
Feature				
Operating availability	Ballasting	Ballasting + Discharging	Ballasting	Ballasting
Neutralization system	Yes	No	Yes	Yes
Foot print (Main pipe line)				
Energy consumption (Ballasting + De-ballasting)				
Pressure loss (bar)				
Installation				

Technologies – ups & downs

Ozonation	
Ups <ul style="list-style-type: none"> Efficient Independent of salinity 1-way treatment 	Downs <ul style="list-style-type: none"> Corrosion Safety

Technologies – ups & downs

UV	
Ups <ul style="list-style-type: none"> Efficient Easy installation Minimal safety issues Independent of salinity 	Downs <ul style="list-style-type: none"> High sediments waters Power consumption 316/316L chamber 2-ways treatment

Technologies – ups & downs

Electrolysis	
Ups <ul style="list-style-type: none"> Onboard disinfection Efficient 1-way treatment 	Downs <ul style="list-style-type: none"> Salinity Power consumption Hydrogen Corrosion

Technologies – ups & downs

Filters	
Ups <ul style="list-style-type: none"> Self cleaning Easy installation Easy maintenance 	Downs <ul style="list-style-type: none"> Efficiency in high sediments waters Flow rate reduction 316/316L candles Pressure drop

Certification of BlueZone BWMS

 **IMO** INTERNATIONAL MARITIME ORGANIZATION

MARINE ENVIRONMENT PROTECTION COMMITTEE
65th session
Agenda item 2

MEPC 65/24
16 April 2013
Original: ENGLISH

HARMFUL AQUATIC ORGANISMS IN BALLAST WATER
Application for Basic Approval of the BlueZone™ Ballast Water Management System
Submitted by the Republic of Korea

SUMMARY

Executive summary: This document contains the non-confidential information related to the application for Basic Approval of the BlueZone™ Ballast Water Management System in accordance with the Procedure for approval of ballast water management systems that make use of Active Substances (G9) adopted by resolution MEPC.169(57).

Strategic direction: 7.1

High-level action: 7.1.2

Planned output: 7.1.2.5

Action to be taken: Paragraph 6

Related documents: BWMCNF/36, MEPC 53/24/Add.1, MEPC 57/21, MEPC 58/24, MEPC 59/213, MEPC 61/215, BWMC/Circ.13/Rev.1 and BWMC/Circ.36.


Introduction

1 Regulation D-3.2 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments stipulates that ballast water management systems which make use of Active Substances to comply with the Convention shall be approved by the Organization, based on a procedure developed by the Organization.

2 The "Procedure for approval of ballast water management systems that make use of Active Substances (G9)", adopted by resolution MEPC.169(57), defines the principal aspects to be documented by data or testing (MEPC 57/21, annex 1, paragraph 4.2.1) and some basic principles for risk evaluation (MEPC 57/21, annex 1, paragraph 5.3). According to section 6 of Procedure (G9), the Organization should evaluate the information provided in the application.

1:MEPC65-2.doc

IMO BASIC APPROVAL
(2013. 05)

 **IMO** INTERNATIONAL MARITIME ORGANIZATION

MARINE ENVIRONMENT PROTECTION COMMITTEE
67th session
Agenda item 2

MEPC 67/21
26 March 2014
Original: ENGLISH

HARMFUL AQUATIC ORGANISMS IN BALLAST WATER
Application for Final Approval of the BlueZone™ Ballast Water Management System
Submitted by the Republic of Korea

SUMMARY

Executive summary: This document contains the non-confidential information related to the application for Final Approval of the BlueZone™ Ballast Water Management System in accordance with the Procedure for approval of ballast water management systems that make use of Active Substances (G9), adopted by resolution MEPC.169(57)¹.

Strategic direction: 7.1

High-level action: 7.1.2

Planned output: 7.1.2.4

Action to be taken: Paragraph 17

Related documents: BWMCNF/36, MEPC 53/24/Add.1, MEPC 57/21, MEPC 58/24, MEPC 59/213, MEPC 61/215, BWMC/Circ.13/Rev.1 and BWMC/Circ.37

Introduction

1 Regulation D-3.2 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004, stipulates that ballast water management systems which make use of Active Substances to comply with the Convention shall be approved by the Organization, based on a procedure developed by the Organization.

2 The "Procedure for approval of ballast water management systems that make use of Active Substances (G9)", adopted by resolution MEPC.169(57), defines the principal aspects to be documented by data or testing (Procedure (G9), paragraph 4.2.1) and some basic principles for risk evaluation (Procedure (G9), paragraph 5.3). According to section 6 of Procedure (G9), the Organization should evaluate the information provided in the application.


1 The document is over 20 pages long and, in accordance with paragraph 6.1.1 of the Document Guidelines (MEPC 57/21, annex 1), only the first three pages were translated into the two working languages, with the annex in English only.

1:MEPC67-1.doc

IMO FINAL APPROVAL
(2014. 10)

한국해양수산개발원(한국해양수산개발원) 제11호사서 (2014.10.28.)

제11호사서 제 2015-73 호
Cert. No. 2015-73



선박평형수처리설비 형식승인서
TYPE APPROVAL CERTIFICATE OF BALLAST WATER MANAGEMENT SYSTEM

대한민국
REPUBLIC OF KOREA

이 증서는 국제해사기구(IMO) 결의 MEPC.174(58)에 포함된 지침서의 상세요건에 따라서 국제적 선박평형수처리설비(이하 "설비")의 형식승인을 증명합니다. 이 증서는 국제적 선박평형수처리설비에 한하여 유효합니다.

This is to certify that the Ballast Water Management System listed below has been examined and tested in accordance with the requirements of the specifications contained in the Resolution MEPC.174(58). This certificate is valid only for the Ballast Water Management System referred to below.

선박평형수처리설비 공급자
Ballast Water Management System supplied by: SUNK HUNTER CO., LTD. / 2015.09.16, Republic of Korea

형식 및 모델명
Under type and model designation: BlueZone™ BMS-1MS-250

선박평형수처리설비 제조사
Ballast Water Management System manufactured by: SUNK HUNTER CO., LTD. / 2015.09.16, Republic of Korea

장비 및 조립도면 번호
Equipment/assembly drawing No.: SDSA-02-000 - SDSA-10-000 Date: 2014.10.31

기타 장비의 제조사
Other equipment manufactured by: 날짜: / /

장비 및 조립도면 번호
Equipment/assembly drawing No.: 날짜: / /

장래처리용량
Treatment Rated Capacity: 250 m³/h

이 형식승인증서의 사본은 선박평형수처리설비를 설치한 선박에 항상 비치하여야 합니다. 관련 형식승인시험결과서와 형식승인시험결과서와 사본은 선박검사 시에 제시하여야 합니다. 만일, 형식승인증서와 그 주조항의 공인해사기관에서 발행된조립도면 그 둘이 일치하지 않으면, 형식승인증서는 효력이 없습니다.

A copy of this Type Approval Certificate, should be carried on board a vessel fitted with this Ballast Water Management System at all times. A reference to the test protocol and a copy of the test result should be available for inspection on board the vessel. If the Type Approval Certificate is issued based on approval by another Administration, reference to that Type Approval Certificate shall be made.

승인받은 조건은 이 증서의 부록에 기술되어 있습니다.
Licensing Conditions imposed are described in the appendix to this document.

공인해사기관
Official stamp

서명
Signed: 김창균
주관청
Administration of: Ministry of Oceans and Fisheries
날짜
Dated this day of: 8 September 2015

210x 300mm(포함용지) 2015/9/1

TYPE APPROVAL
(2015. 09)

Thank You for Your Attention !!