

SAMKUN CENTURY

Whenever, Always like beginning Mind

Company that cares
about the environment

SAMKUN CENTURY



<http://www.samkunok.com>

<http://www.arasys.com>

SAMKUN 89
SAMKUN CENTURY CO., LTD



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SAMKUN 89
SAMKUN CENTURY CO., LTD

89 means that

- . Established year 1989
- . 8989 is a Korean word that aims to increase sales continuously.
- . Three circles are Human, Technology, Environment

II . WHAT'S ARA PLASMA BWTS ?

1. IMO Regulation (Revised B-3)
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1. CEO Greeting

First of all, we cordially express our gratitude for your continuing interest and support.

SAMKUN CENTURY is “Specialized Enterprise of Water Treatment Since 1989 (for 28 years)”

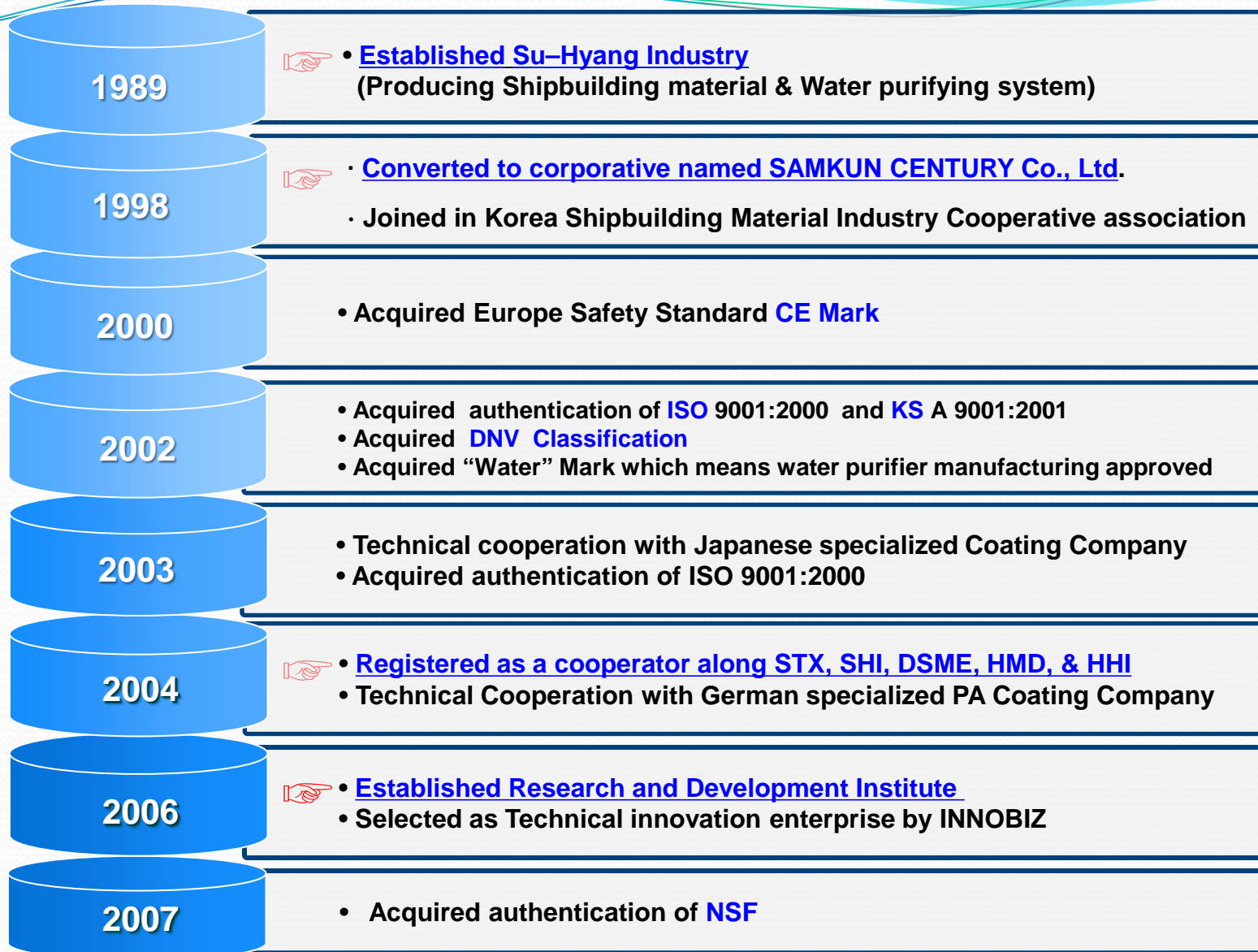
We have the highest value in our efforts to supply the best quality and service to our clients, as ideology of “Always, like the beginning”.

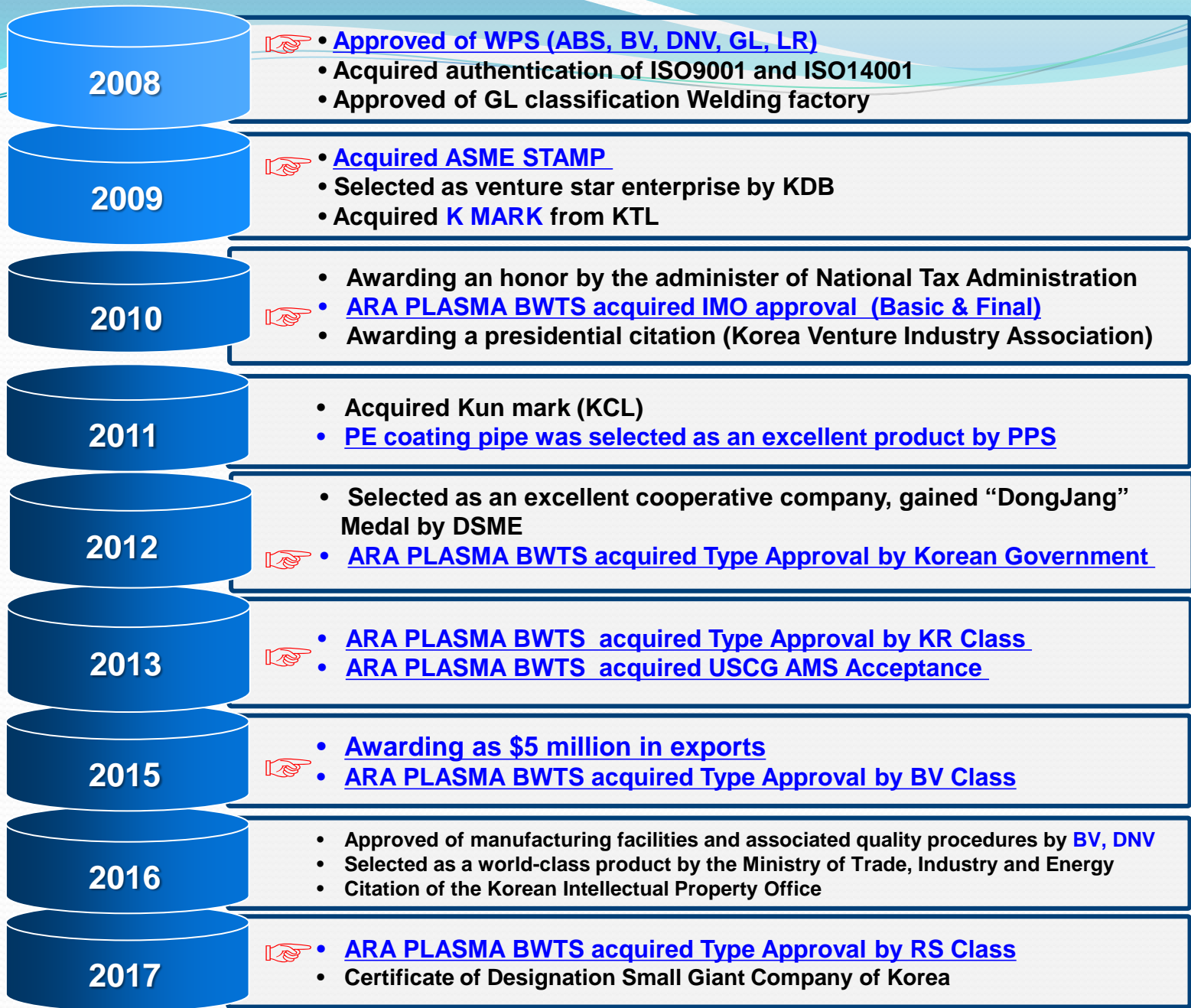
We will Strive to make positive changes in the environment And contribute to humanity and society for our next Generation. Thank you.

CEO Jung-il, Kang






2. History





3. R&D Center & Factory Location

[HEAD OFFICE] R & D Center	[FACTORY] Water Treatment / On-shore / Off-shore Plant / Pipe Spool	[FACTORY] Coating
		
<ul style="list-style-type: none"> ▪ Research & Development ▪ Technical design ▪ Technical Sales ▪ Purchase Team ▪ Financial Team 	<ul style="list-style-type: none"> ▪ Fresh water supply unit ▪ Sterilizer ▪ Re-Hardening filter ▪ Calorifier ▪ Hydrophore vessel ▪ High Pressure Pump Unit 	<ul style="list-style-type: none"> ▪ Poly Ethylene Coating ▪ Poly Amide Coating ▪ Rubber Coating ▪ Teflon Coating
<p>Sprox B/D 8TH Floor, Geumgok-daero 285beon-gil, Bukgu, Busan Korea TEL : 82-51-711-3000 FAX : 82-0303-3440-5418 skd@samkunok.com</p>	<p>197-12 YulDong-Ri, SamRangJin-Eup, Miryang City, GyeongNam, Korea TEL : 82-55-338-3030 FAX : 82-55-332-7123 sk@samkunok.com</p> <p style="text-align: center;">Aera : 46,000m²</p>	<p>1027-2 YeaCha-ri, sangDong-Myun, Gimhae-si Gyeongnam, Korea TEL : 82-55-338-3770 FAX : 82-55-332-7123 pnc@samkunok.com</p>



4. Business Group



**Water Treatment
Equip. & Unit**



Offshore Plant



**Coating
& Painting**



Pipe Spool



Onshore Plant



**Ballast Water
Treatment System**

4.1 Product of Water Treatment Division

“Specialized Enterprise of Water Treatment
Since 1989 (over 28 years)”
and supply all kinds of sterilizers

Main Product

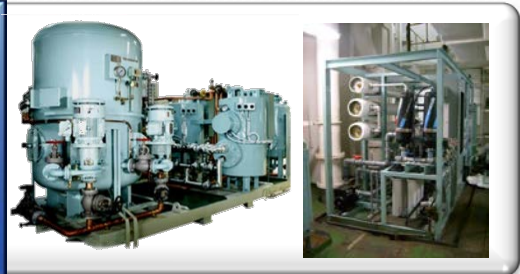


UV

Silver Ion

Sterili-zer

Fresh Water Supply Unit



Fresh water supply unit

RO Type Generator

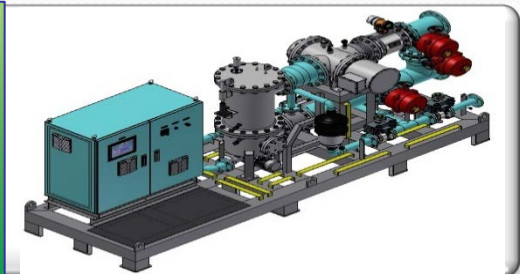


Chlorinator

Ozone Generator

Sterili-zer

BWTS

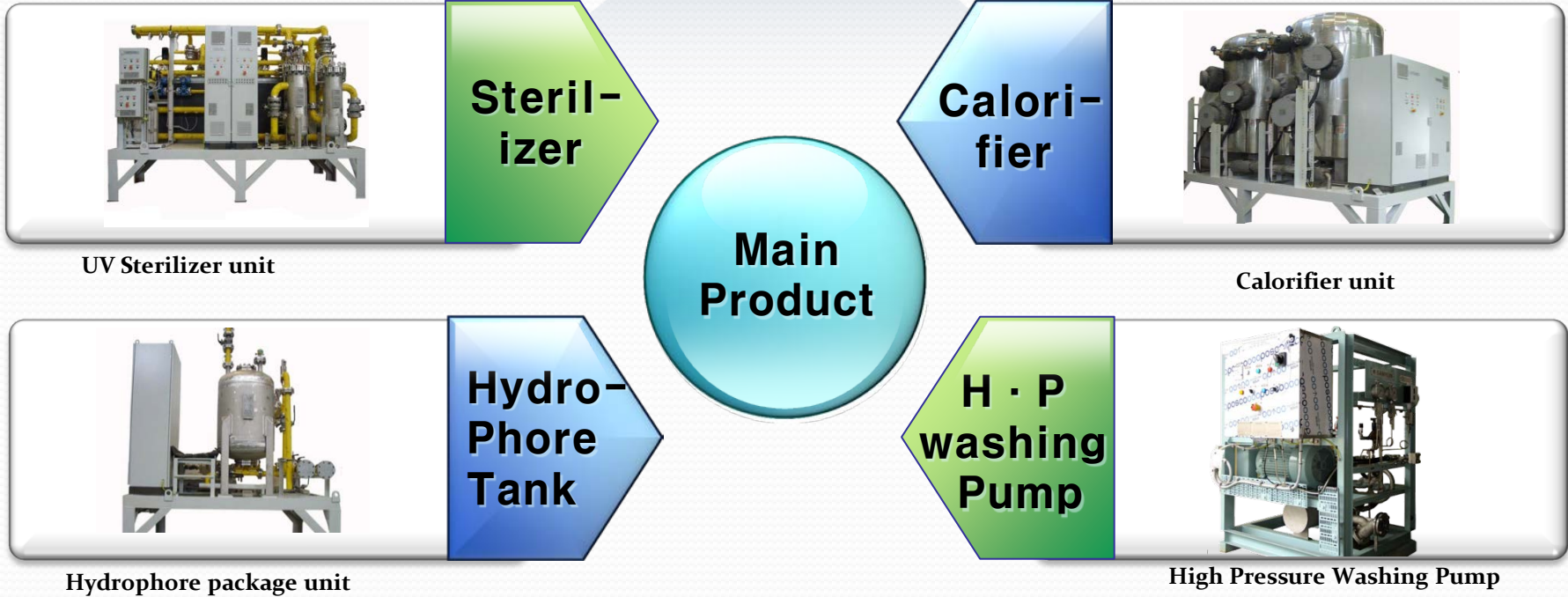


ARA PLASMA BWTS



4.2 Product of Offshore Plant Division

“Specialized Enterprise of Water Treatment
Since 1989 (over 28 years)”
and supply all kinds of sterilizers



4.2 Product of Offshore Plant Division

• UV STERILIZER



• CALORIFIER



• UVSTERILIZER



• HYDROPHORE



MULTIPURPOSE TANK



TANK



H.P PUMP UNIT

DAEWOO SHIPBUILDING & MARINE ENGINEERING

No	SIZE	TYPE	OWER
1	97K	Rig	BP
2		FPSO	CHEVRON
3	96K	Drill Rig	SEA DRILL
4	97K	Semi-sub Rig	ODFIELD
5	97K	Drill Rig	PETROSERV
6	97K	semi-sub Rig	ODFIELD
7	97k	Drillship	TRANSOCEAN
8	97K	Drill Rig	GRUPO R
9		DP Moored Rig	ODFIELD
10	97K	Drillship	TMT(ABS)
11	97K	Drillship	ODBRECHT
12		Rig	PETROSERV
13	97K	FPSO	TOTAL
14	200K	FPSO	TOTAL
15		Wind Turbine Installation Vessel	RWEI
16		Semi-rig	STATOIL
17		Fixed Platform	EXXONMOBIL
18		Drillship	TRANSOCEAN
19		Drillship	ATWOOD
20		Drillship	VANTAGE
21		Drillship	VANTAGE
22		Drillship	TRANSOCEAN
23		Offshore Pipe Laying Support Vessel	ODBRECHT
24		Drillship	TRANSOCEAN
25		Rig	SEA DRILL
26		LNG FPSO	PETRONAS
27		Drillship	TRANSOCEAN



9001
14001
TS16949

4.2 Product of Offshore Plant Division

SAMSUNG HEAVY INDUSTRIES CO.LTD

NO.	SIZE	TYPE	OWNER
1	204K	FPSO	COROCORO
2	900K	FPSO	ENFIELD
3	96K	Drillship	TANK PACIFIC
4	97K	Drillship	STENA
5	98K	Drillship	MOSVOLD
6	96K	Drillship	TANK PACIFIC
7	950K	FPSO	NEXUS
8	97K	Drillship	PETROBASS
9	97K	Drillship	STENA
10	97k	Drillship	PRIDE
11	97K	Drillship	STENA
12	97K	Drillship	TANK PACIFIC
13	97K	Drillship	TANK PACIFIC
14	97K	Drillship	TANK PACIFIC
15	96K	Drillship	SAIPEM
16	97K	Drillship	SCHAHIN
17		FPSO	BP
18		ONGC	VASHI
19		Drillship	QGOG
20		Drillship	SEA DRILL
21		FPSO	TEEKAY
22		Drillship	OCEAN RIG
23		Drillship	MAERSK DRILLING
24		Drillship	SEADRILL
25		Drillship	ENSCO
26		Drillship	OCEAN RIG
27	850K	FSU	STATOIL
28		Drillship	QGOG
29		WTIV	SEA JACKS
30		Drillship	ENSCO
31	850k	FSU	STATOIL MARINER
32		Drillship	PDC
33		Drilling Jack-up	STATOIL
34		LNG FPSO	SHELL

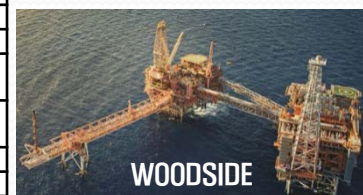


STX

NO.	SIZE	TYPE	OWNER
1	NPV 6001	Pipe Layer	TECHNIP
2	F1003	FSU	IOOC
3	F1004	Drillship	NOBLE

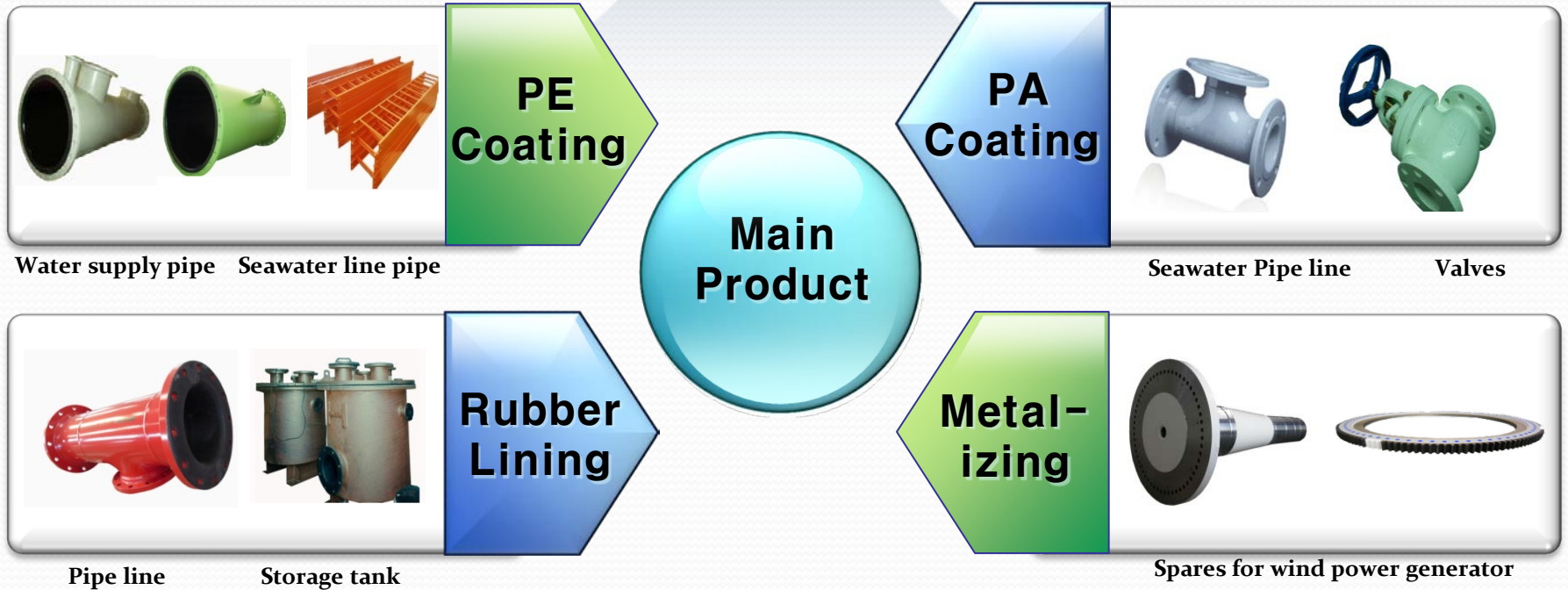
HYUNDAI HEAVY INDUSTRIES CO.LTD

NO.	SIZE	TYPE	OWNER
1	97K	Drillship	TRANSOCEAN
2	97K	Drillship	GLOBAL SANTA FE
3	109K	Semi sub heavy transport vessel	DOCKWISE, NETHERLAND
4		SHWE Field	DEAWOO ENGINEERING
5		NRB PLATFORM	WOODSIDE ENERGY LTD.
7		SHWE Field	DEAWOO ENGINEERING
6		Drillship	NOBLE
7		Drillship	DIAMOND
8		Semi sub drilling rig(DNV)	SEA DRILL
9		Drillship	DOLPHIN
10		Drillship	ROWAN
11		Multi Purpose Offshore Construction Vessel (DNV)	SEA LION
12		Offshore accommodation Vessel	EDDA
13		Drillship	DIAMOND
14		FPU	TOTAL



4.3 Product of Coating Division

“Specialized Enterprise of Water Treatment
Since 1989 (over 28 years)”
and supply all kinds of sterilizers



5. Certifications

KEPIC CERTIFICATE

Company Name : Samkun Century Co., Ltd.

Address : 191-52, Yelling-4, Sangnong-Eup, Miryang-si, Gyeongsang, Korea

This is to certify that the above company has established and maintained proper quality assurance program for the scope shown below in accordance with the applicable requirements of Korea Electric Power Industry Code.

Certificate Number : 086-207
Applicable Code : KEPIC-08
Certification Date : March 11, 2010
Expiration Date : March 11, 2013

Construction of the Class 3,345kV Voltage Class 243 Strain Tower
Class 2,345kV Substation For Power Apparatus
Class 2,3 Substation For Piping Substation
As a Member Organization Supplying of Terminals, Installation and Welding

KEPIC CERTIFICATE

Company Name : Samkun Century Co., Ltd.

Address : 191-52, Yelling-4, Sangnong-Eup, Miryang-si, Gyeongsang, Korea

This is to certify that the above company has established and maintained proper quality assurance program for the scope shown below in accordance with the applicable requirements of Korea Electric Power Industry Code.

Certificate Number : 086-208
Applicable Code : KEPIC-08
Certification Date : March 11, 2010
Expiration Date : March 11, 2013

Fabrication of Part and Appendments for Containment Structure(Metal Part only)
As a Member Organization Supplying of Formas, Installation and Welding
Material related to above Item

CERTIFICATE OF AUTHORIZATION

This certificate accredits the named company as authorized to use the indicated symbol of the American Society of Mechanical Engineers (ASME) for the scope of activity shown below in accordance with the applicable rules of the ASME Boiler and Pressure Vessel Code. The use of the Code symbol and the authority granted by this Certificate of Authorization are subject to the provisions of the agreement set forth in the application. Any construction stamped with this symbol shall have been built strictly in accordance with the provisions of the ASME Boiler and Pressure Vessel Code.

COMPANY: Samkun Century Co., Ltd. #120-56, Mae-ni, Sangnong-eup, Gyeongsang-city, Gyeongsang, #21-813 South Korea

SCOPE: Fabrication and assembly of pressure piping at the above location controlled by the above location

CERTIFICATE OF AUTHORIZATION

This certificate accredits the named company as authorized to use the indicated symbol of the American Society of Mechanical Engineers (ASME) for the scope of activity shown below in accordance with the applicable rules of the ASME Boiler and Pressure Vessel Code. The use of the Code symbol and the authority granted by this Certificate of Authorization are subject to the provisions of the agreement set forth in the application. Any construction stamped with this symbol shall have been built strictly in accordance with the provisions of the ASME Boiler and Pressure Vessel Code.

COMPANY: Samkun Century Co., Ltd. #120-56, Mae-ni, Sangnong-eup, Gyeongsang-city, Gyeongsang, #21-813 South Korea

SCOPE: Manufacture of pressure vessels at the above location and field sites controlled by the above location

KEPIC

ASME CERTIFICATION

MANAGEMENT SYSTEMS ASSESSMENT CERTIFICATE

Registration Number : KorQ-082318

MSA Certification Co., Ltd. hereby certifies that the company **SAMKUN CENTURY CO., LTD.**

#120-56 Mae-ni, Sangnong-eup, Gyeongsang-city, Gyeongsang-do, Korea

For the scope of Design, Development, Manufacture and Service of (Manufacturing Material/Parts Component Parts), (Mechanical Parts) and (Electrical System) as a member organization of the following standard:

ISO 9001:2000
DIN EN ISO 9001:2000

MANAGEMENT SYSTEMS ASSESSMENT CERTIFICATE

Registration Number : KorE-081168

MSA Certification Co., Ltd. hereby certifies that the company **SAMKUN CENTURY CO., LTD.**

#120-56 Mae-ni, Sangnong-eup, Gyeongsang-city, Gyeongsang-do, Korea

For the scope of Design, Development, Manufacture and Service of (Manufacturing Material/Parts Component Parts), (Mechanical Parts) and (Electrical System) as a member organization of the following standard:

ISO 14001:2004
DIN EN ISO 14001:2005

Certificate

Certificate No. : HHI QM 07-030

Company Name : SAMKUN CENTURY CO., Ltd.

Address : #1125-3, Souji-e, Ugangsang-eup, Yangsan-city, Kyungnam, Korea

We hereby certify that the above mentioned company is qualified to carry out self-control and self-guarantee of quality condition of goods by complying in all respects with the applicable rules and regulations which Shipping division stipulates, and the below items are certified as self-inspection items.

- U-V STERILIZER
- AUTO CHLORINATOR
- DECHLORINATOR (ACTIVE CARBON FILTER)
- MINERALIZER (REHARDENING FILTER)
- AMP DRYER

Quality Certificate

DSME

DAEWOO SHIPBUILDING & MARINE ENGINEERING CO., LTD. certifies that the company and items below have been assessed and approved in accordance with the requirements of the following standard:

Company Name : **SAMKUN CENTURY CO., LTD.**
Address : #1125-3, Souji-e, Ugangsang-eup, Yangsan-city, Kyungnam, Korea

Items : **STERILIZER & WATER FOUNTAIN &**

Certificate

Certificate No. : WF 081207 HH

This is to certify that Messrs. **Samkun Century Co., Ltd.**

1st workshop #120-56, Mae-ni, Sangnong-eup, Gyeongsang, Korea, Rep. of

2nd workshop #442-1, Ugeop-eup, Gyeongsang, Korea, Rep. of

has been granted on the basis of the verification of the workshop's procedures and of the proofs of qualification presented by

Approval for Welding

in accordance with the Germanischer Lloyd Rules for Welding (Rules for Classification and Construction, II Material and Welding Technology, Part 3 - Welding)

The range of application, if applicable other regulations also considered, the responsible agencies(s) as well as the period of validity are mentioned in the appendix to this certificate. Approved procedures are confirmed within the assigned supplements to the appendix.

Hamburg, 2008-08-30
Germanischer Lloyd

Certificate

Appendix to Certificate WF 081207 HH dated 2008-08-30

Messrs. **Samkun Century Co., Ltd.**

1st workshop #120-56, Mae-ni, Sangnong-eup, Gyeongsang, Korea, Rep. of

2nd workshop #442-1, Ugeop-eup, Gyeongsang, Korea, Rep. of

has been approved for the procedures as specified in the supplements for the following range of application:

1. Welding of Pressure Vessels
2. Welding of Pipelines

To B. Piping systems class 1 - B according to GL Rules - Code R12 - Section 11

Range of Production/Component/Construction name

Regulations also considered

Supervisor Certificate No.: issued by Kin, Young-Gil

Deputy Supervisor Certificate No.: issued by Park, Deok-Seok

Part of the approval is our letter of approval ref. no. 081207-08LHys of 2008-08-30.

Hamburg, 2008-08-30 Approval is valid until 2011-08-31

Germanischer Lloyd

Certificate

DET NORSKE VERITAS

Samkun Century Co., Ltd.

120-56, Mae-ni, Sangnong-eup, Gyeongsang, Korea, (621-813)

Attn : QC Dept.

Your ref. : Of ref. : Ta-Ms-Cc2005-08MNS370346&A3 Date : 2008-07-08

WPS & Welder Approval (Samgun Century, Ltd., Kyungnam, Korea)

Enclosed please find our service no. MKOER 135 887 421 amounting KRW (including VAT) for WPS Approval Certificate & Welder's Approval.

We kindly ask you to remit the amount to our office in Seoul by enclosed Giro Paper or pay directly to our Cheungwon office.

Your liability for DNV is limited.

Yang Seon, Inrg Station Manager Chagwon Station

K. H. Cho Surveyor

Enclosure:

Certificate

ABS

WELDING PROCEDURE APPROVAL

Serial No.	WPS No.	Welding Process	Welding Position	Base Metal	Filler Metal
BR24274-B	SK-GTFC-1-001	GTAW	03	A507	ER71T-1FC

THIS IS TO CERTIFY that the referenced Surveyor in this Bureau authorized for the above surveying and reporting as follows.

The following welding procedure approval tests were carried out in accordance with approved and accepted test procedures, specifications, examined, tested as required and considered satisfactory.

WPS No.	SK-GTFC-1-001	SK-GTFC-1-002	SK-GTFC-1-003
Welding Process	GTAW	GTAW	GTAW
Welding Position	03	03	03
Base Metal	A507	A507	A507
Filler Metal	ER71T-1FC	ER71T-1FC	ER71T-1FC
Shielding Gas	Ar	Ar/G	Ar/G

For the result of test, please refer to the approved procedure qualification test records.

APPROVAL OF WELDING PROCEDURE

Approval Cert. No. : PSN/WF/08/012/00

Messrs. **SAMKUN CENTURY CO., LTD.**

120-56, Mae-ni, Sangnong-Eup, Gyeongsang-city, Gyeongsang, Korea

This is to certify that under mentioned welding procedure specifications with relevant qualification test records have been duly reviewed according to the Rules of this society, and are considered that approval of the welding procedures can be granted under the conditions below -

- Manual Gas Tungsten-Arc Welding (GTAW) with shielding gas (Argon).
- SK-GT 8-8-001
- Supporting PQR No. / Gr. No. : Q27-GT-8-001, Q27-GT-8-002, Q27-GT-8-003(Rev. B)
- P & Gr. : 8 & 20 P & Gr. : 1 & 2
- 8.1 (Qualitative) : pressure vessels with Cr < 1% or Equivalent
- Thickness range : 3.0mm to 25.4mm
- Pipe Diameter : 17.8mm to Unlimited
- Max. interpass temp. : 150°C
- Post weld heat treatment : None
- Current type : DCEN (DCSP)
- Joint type : Single V Groove (without backing)
- Position : As Built (Flat)
- Welding technique : One side, multiple-run string or weaving
- Classification of welding consumable : If No. 8, A No. 1, ASME, SFA 5.9 (E309L)
- Brand name : ER71T-1FC (Auror) or EQ... 01.2 / (20-4mm)

- Manual Gas Tungsten-Arc Welding (GTAW) (Argon).
- Supporting PQR No. / Gr. No. : Q29
- P & Gr. : 8 & 20 P & Gr. : 1 & 2
- 1.1 (Qualitative) : pressure vessels with Cr < 1% or Equivalent
- Thickness range : 3.0mm to 25.4mm
- Pipe Diameter : 13.8mm to Unlimited
- Max. interpass temp. : 250°C
- Post weld heat treatment : None
- Current type : DCEN (DCSP)
- Joint type : Single V Groove (without backing)
- Position : As Built (Flat)
- Welding technique : One side, multiple-run string or weaving
- Classification of welding consumable : If No. 8, A No. 1, ASME, SFA 5.9 (E309L)
- Brand name : ER71T-1FC (Auror) or EQ... 01.2 (20-4mm)

To be continued...

5. Certifications

EC Attestation of Conformity
 No.: NB 00 12 40205 001
 TÜV PRODUCT SERVICE
 Sam Kun Century Co., Ltd.
 #1129-3, Bopjo-Ri, Ulsang-Up, Ulsang-City, Ulsang, Korea
 Product: House work and household appliances (Water Treatment)
 Model: JS-1000, JS-2000, JS-5000
 Parameters: Rated input voltage: 220 V a.c., 220 V a.c., 220 V a.c.; Rated frequency: 60 Hz, 60 Hz, 60 Hz; Rated input power: 70 W, 200 W, 400 W
CE MARK
 The equipment complies with the principal protection requirements of the Low Voltage Directive (Directive 73/23/EEC) relating to electrical equipment designed for use within certain voltage limits.

위생안전기준 인증서
 1. 인증번호: KCV-2011-0293
 2. 제품명: 상건세기
 3. 대표자: 강정일
 4. 본사주소: 경상남도 창원시 창동면 대리129-56
 5. 공장소재지: 경상남도 창원시 창동면 대리129-56
 6. 제품명: 상수도용 자동정수기
 7. 제조업체: 상수도용 자동정수기
KC MARK

K 마크 인증서 (성능)
 번호: FM/2009-157
 발급기간: 2010년 10월 5일
 기업: 삼진세기(주)
 경상남도 김해시 창동면 대리 129-56
 대표시명: 강정일
 제품명: PE 코팅 이형판
 모델명: E3기 type(세대 1000A) E3기 type(세대 700A)
K MARK

K 마크 인증서 (성능)
 번호: FM/2009-158
 발급기간: 2010년 10월 5일
 기업: 삼진세기(주)
 경상남도 김해시 창동면 대리 129-56
 대표시명: 강정일
 제품명: PE 코팅 관
 모델명: EE, EP type(세대 CE50A)
 적용규격: KTI, M 040
K MARK

경쟁입찰참가자격등록증

등록번호	등록일자	등록종류	등록기간
경쟁입찰참가자격	2011-09-01	경쟁입찰참가	2011.09.01 ~ 2012.08.31
등록대상	경쟁입찰참가	등록종류	경쟁입찰참가
등록대상	경쟁입찰참가	등록종류	경쟁입찰참가

folkehelseinstituttet
 SAMKUN CENTURY CO., LTD.
 1125-3 SOGONGRI ULSANG-UP, ULSANG CITY, KYUNGNAM PROVINCE, SOUTH KOREA
 Year of Issuance: 2006
 Ref no: 271.1.06.155
 Date: January 27th, 2006
NSF
 APPROVAL OF SAMKUN JSB UV REACTORS
 Reference is made to: Your application for type approval, dated December 26th 2005 including technical information about the UV units.
 I. Introduction
 The application for type approval includes Samkun JSB-1, JSB-3, JSB-5, JSB-10, JSB-20 and JSB-30 UV Units.
 We expect that the UV units are built according to the drawings and that the monitoring and control of the UV units have the intended function. Therefore there is no need for us to do any inspection of your units. Our requirements for control/monitoring equipment and maintenance are included in this approval.

NSF International
 SAMKUN CENTURY CO.
 Facility: KYUNGNAM-DO, KOREA
 AUTHORIZED TO BEAR THE NSF INTERNATIONAL LOGO
 NSF International RECOGNIZES

명부품목 유지자격공급자 등록증
 등록번호: KSP2009-00063
 업체명: 삼진세기(주)
 공장주소: 경남 창원시 창동면 율동리190-12
 제품명: ASME Heat Exchanger
 문헌구분: 건설기계
 자격유지기간: 2009.10.09 ~ 2012.10.08
 업체명: 우리원사의 기자재공급자관리제에 따라 심사한 결과 발전설비 명부품목 유지자격공급자 등록 되었음

품질인증서
 인증번호: 2011-003
 업체명: 삼진세기(주)
 제품명: 열교환기
 제품소재: 알루미늄
 제품규격: ASME Section VIII Div. 1
 제품용도: 열교환기
 제품소재: 알루미늄
 제품규격: ASME Section VIII Div. 1
 제품용도: 열교환기

로 창 강
 삼진세기(주)
 세로가 강정일
 2010년 10월 19일
 대통령 이명박
 국무총리 윤영열
 행정안전부장 박영진

IMO
 MARINE ENVIRONMENT PROTECTION COMMITTEE
 Report of the 8th meeting of the GESAMP-Ballast Water Working Group
 Note by the Secretariat
 SUMMARY
 This document contains the report of the 8th meeting of the GESAMP-Ballast Water Working Group (GESAMP-BWWWG) and includes the evaluation of proposals submitted for approval by China, Japan and the Republic of Korea. Following the decision of MEPC.65, the main body of the GESAMP-BWWWG's reports is translated in all the three working languages with the annexes in English only.
 Introduction
 The GESAMP-BWWWG was established in 2004 to provide technical support to the GESAMP in its work on ballast water management systems (BWMS) and to coordinate the work of the GESAMP-BWWWG with the work of the GESAMP-BWWWG in the area of ballast water management systems (BWMS). The GESAMP-BWWWG is mandated to make use of Annex 2 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention) to develop and recommend measures to prevent the transfer of harmful aquatic organisms and pathogens (HAOAP) to ballast water.

TEST CERTIFICATE FOR TYPE APPROVAL
 No. KR-2009-00412
 Product Name: AKA PLASMA-BWTS
 Type and Model Designation: AKA-017, AKA-218, AKA-031, AKA-063, AKA-086, AKA-126, AKA-150, AKA-190, AKA-300
 Treatment Rated Capacity: 150, 250, 350, 550, 750, 1100, 1300, 1650, 2000 m³/hour
 Address: SAMKUN CENTURY CO., LTD. 128-56, Maeri, Sangang-gu, Gyeongnam-do, Korea
 Representative: Kang Jung-il
 Date of Manufacture: 11.03.15
 Date of Issue: Jun. 25, 2012
 President of Korean Register of Shipping

U.S. Department of Homeland Security
 Coast Guard
 Extension of Implementation Schedule for Vessels Subject to Ballast Water Management System (BWMS) Discharge Standards
 From: R. B. BAILEY/CAPT
 COMST/CG-03
 To: Distribution
 Subj: EXTENSION OF IMPLEMENTATION SCHEDULE FOR VESSELS SUBJECT TO BALLAST WATER MANAGEMENT SYSTEM (BWMS) DISCHARGE STANDARDS
 Ref: 46 CFR 161.001-10 (15 June 2012)
 1. PURPOSE: Reference to contains provisions for the Coast Guard to grant an extension to the implementation schedule for Ballast Water Management Discharge Standards for vessels using Coast Guard Approved Ballast Water Management (BWMS) Systems as provided in 33 CFR 161.001-10 and 161.001-15. Under these regulations, an extension request must be filed with the Coast Guard on or later than 12 months before the vessel's applicable implementation date. The extension request must be filed with the Coast Guard on or later than 12 months before the vessel's applicable implementation date. The extension request must be filed with the Coast Guard on or later than 12 months before the vessel's applicable implementation date. The extension request must be filed with the Coast Guard on or later than 12 months before the vessel's applicable implementation date.
 2. ACTION: Area, District, and Sector Commanders and Captains of the Port shall ensure that the provisions of this policy are brought to the attention of the appropriate individuals in the maritime industry. Incentive release is authorized.
 3. OBJECTIVES AFFECTED: None.
 4. BACKGROUND: Reference (b) became effective on June 21, 2012 and established a quantitative ballast water discharge standard and BWMS methods for many of the ocean-going vessels.

로 창 강
 삼진세기(주)
 세로가 강정일
 2010년 10월 19일
 대통령 이명박
 국무총리 윤영열
 행정안전부장 박영진

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 행정안전부장 박영진

Type Approval USCG AMS

6. Main Customers and Partners



EVERGREEN



台灣國際造船股份有限公司
CSBC CORPORATION, TAIWAN



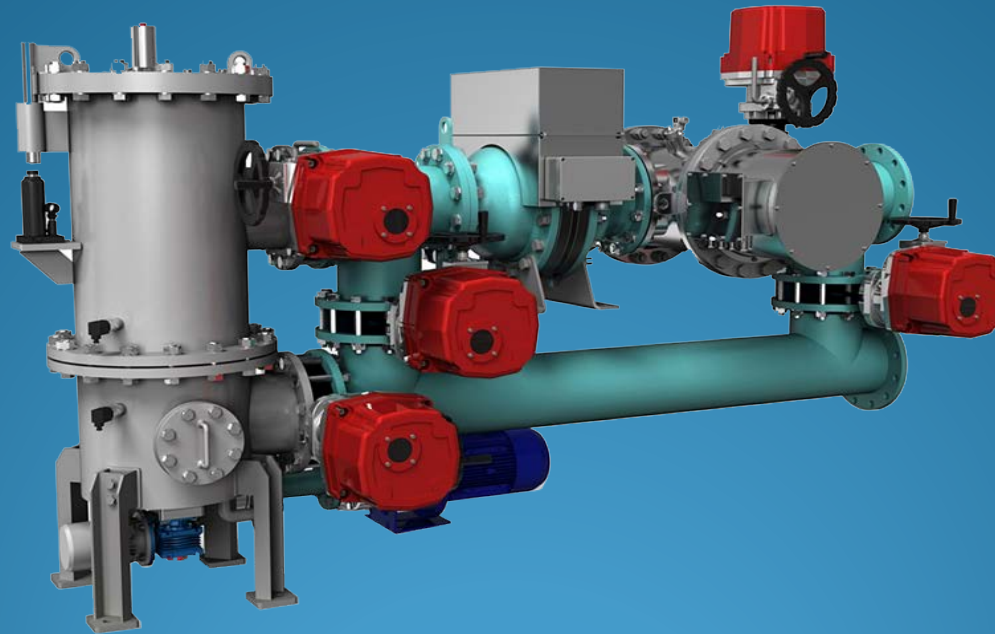
MAERSK





ARA PLASMA

Ballast Water Treatment System



<http://www.samkunok.com>

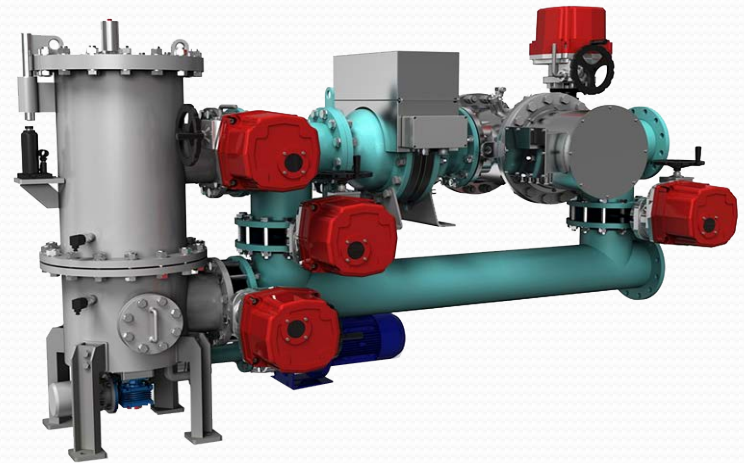
<http://www.arasys.com>



Contents

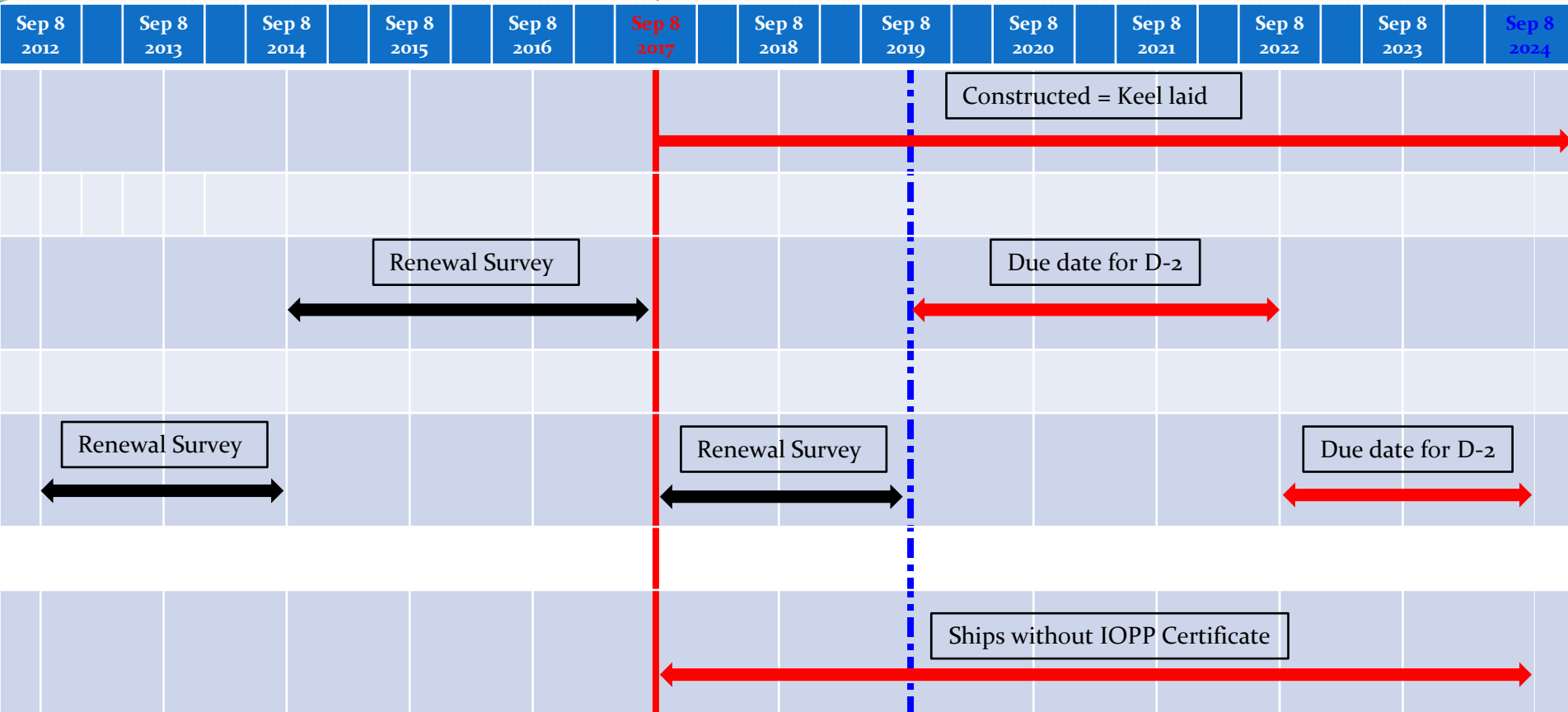
II. WHAT'S ARA PLASMA BWTS ?

- 1. IMO Regulation (Revised B-3)**
- 2. ARA PLASMA BWTS (2.3 Filter, 2.4 Plasma, 2.5 MPUV)**
- 3. Flow Diagram**
- 4. Installation Type**
- 5. Main Characteristics**
- 6. Certification of Type Approval (IMO & Korean Government)**
- 7. USCG T/A Processing**
- 8. Maintenance**
- 9. Reference**
- 10. Specification of ARA PLASMA BWTS**
- 11. Worldwide Network**



1. IMO Regulation (Revised B-3)

ENTRY INTO FORCE OF BWMS CONVENTION

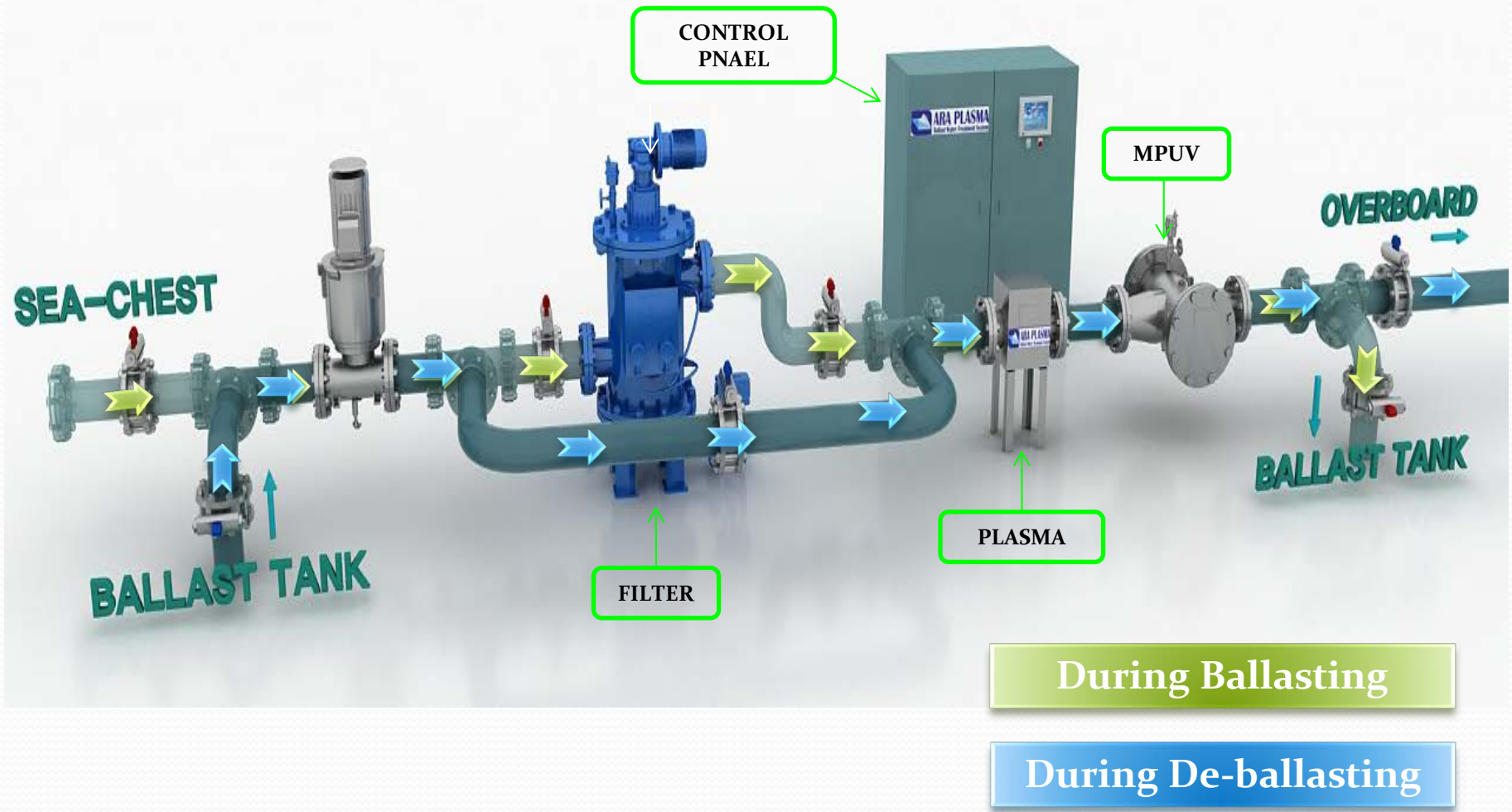


1. Ships constructed on or after 8 september 2017 shall comply with D-2 standard as of ships delivery (Constructed = Keel Laid).
2. A case where previous IOPP renewal survey had been completed between 8 september 2014 and 7 september 2017, the ships shall comply with D-2 standard by the first IOPP renewal survey after entry into force of the Convention.
3. A case where previous IOPP renewal survey had been completed between 8 september 2012 and 7 september 2014, the ships shall comply with D-2 standard by the second IOPP renewal survey after entry into force of the Convention.
4. Ships not subject to IOPP renewal survey (normally less than 400GT) shall comply with D-2 standard by 8 september 2024.

2. ARA PLASMA BWTS

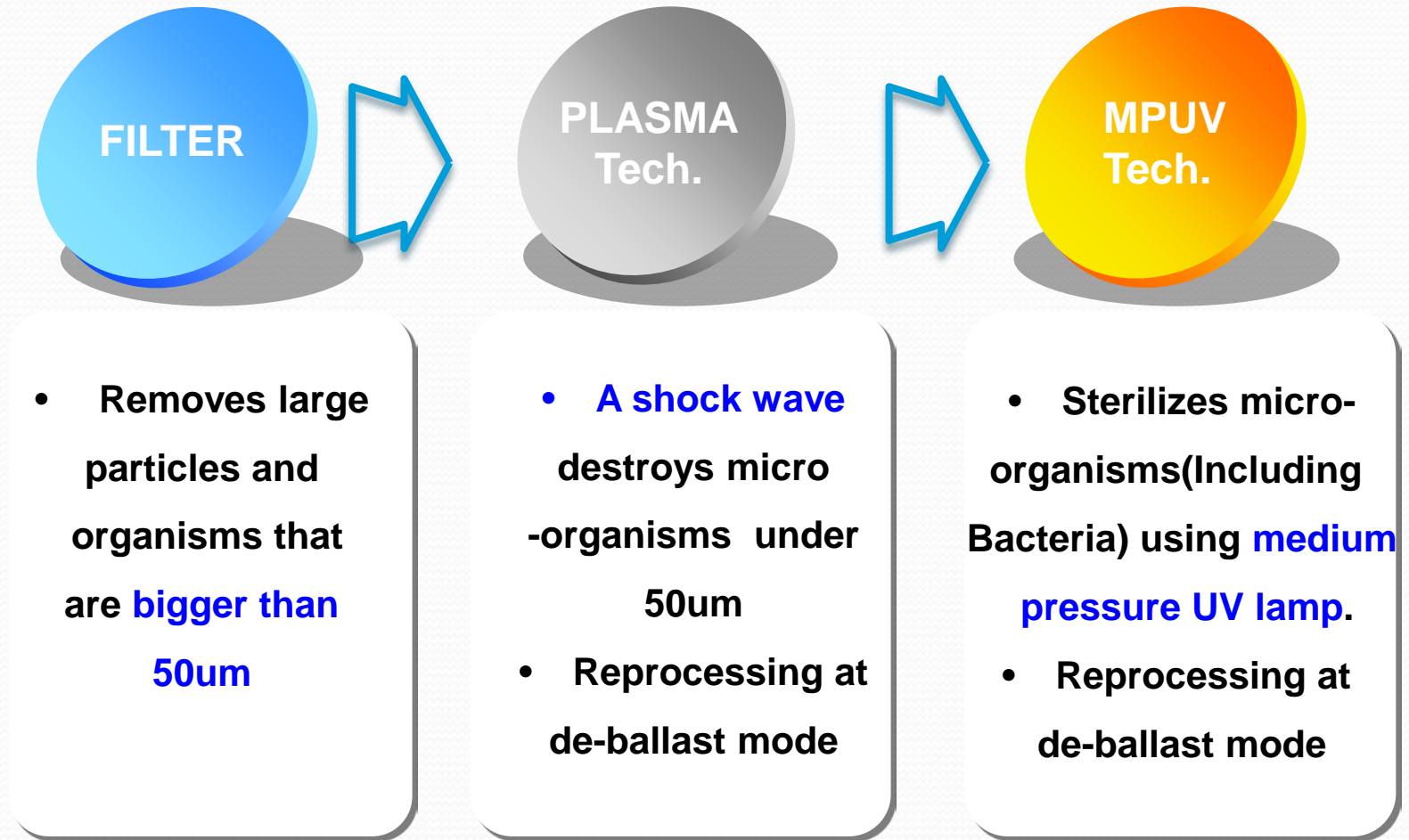
2.1 Flow Scheme

More powerful “hybrid BWTS” of FILTER + PLASMA + MPUV



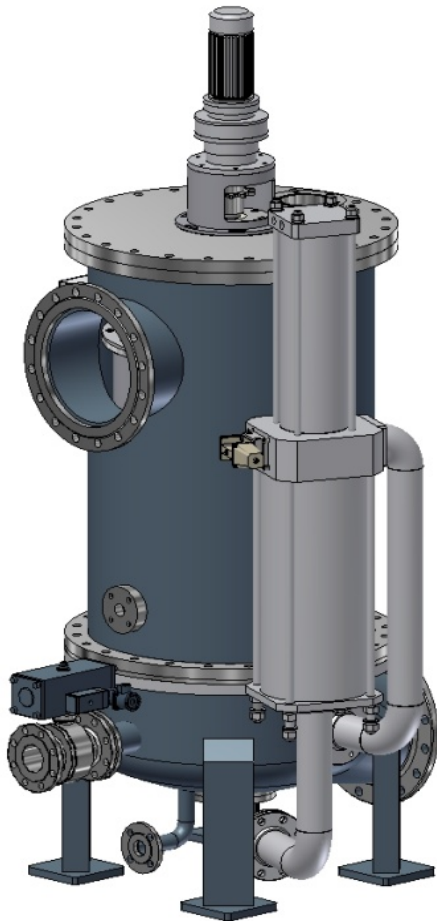
2. ARA PLASMA BWTS

2.2 Sterilization Principle

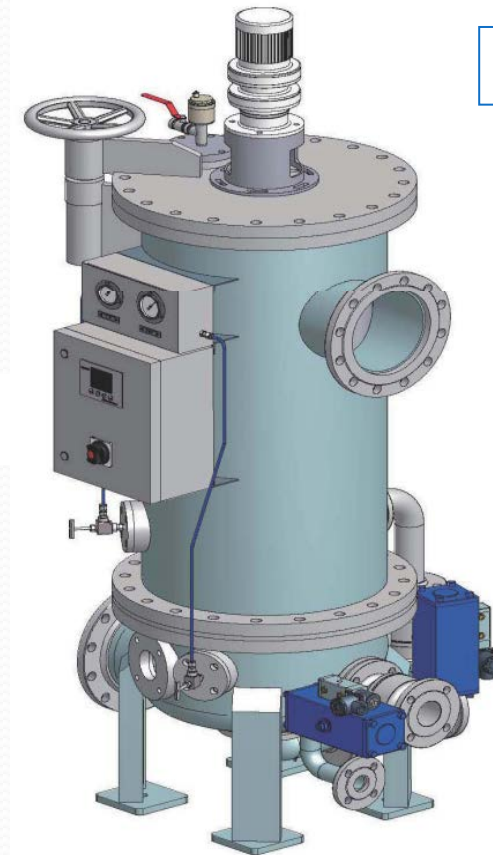


2.3 Filter

Ver.1



Ver.2



<Note : History of filter upgrade>

- Ver. 1 : auto backwashing filter (push type with air cylinder / medium size)
- Ver. 2 : auto backwashing filter (push type / compact size)

2.3 Filter

Ver.3



Outside Filter

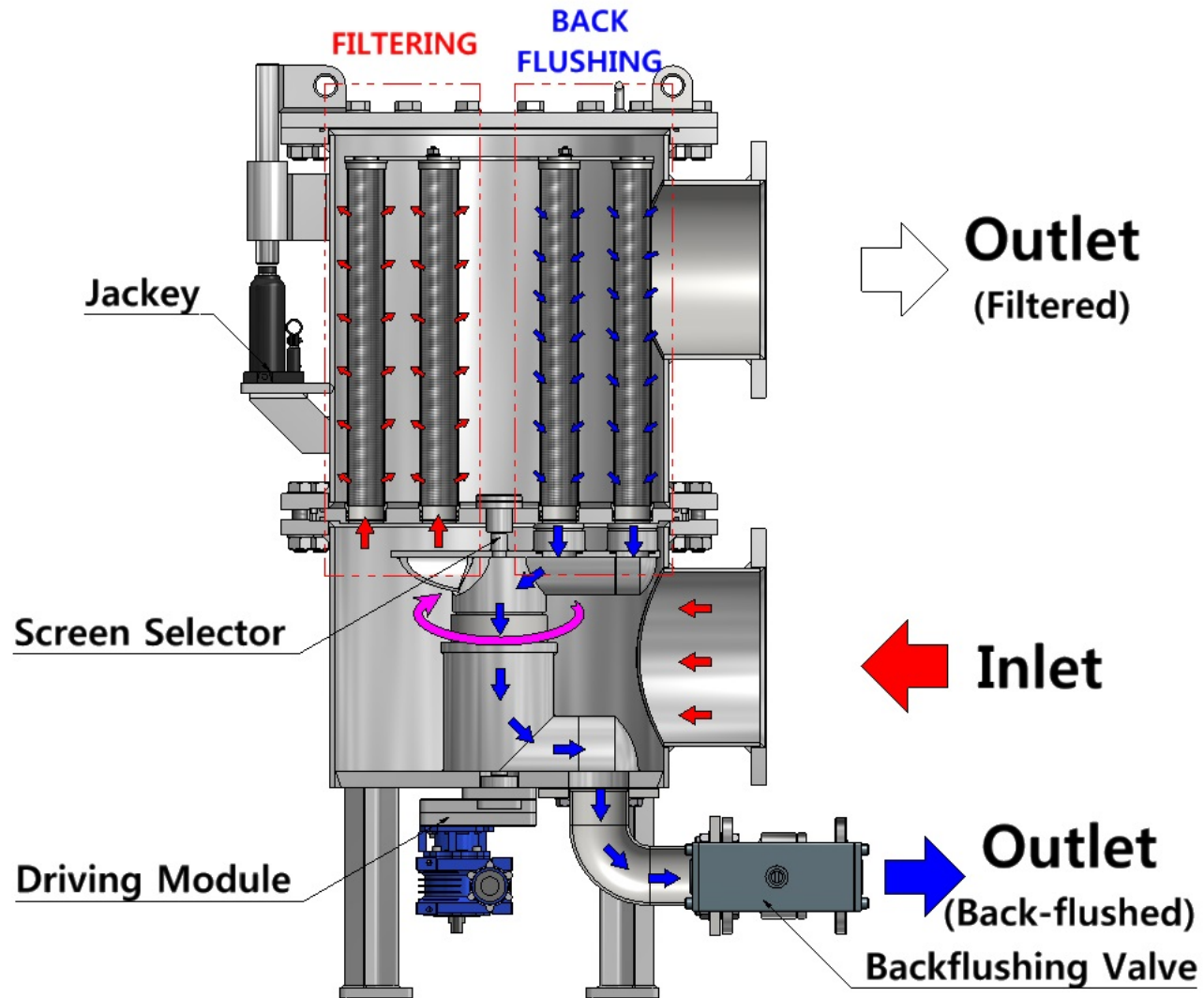


Inside Filter

<Note : History of filter upgrade>

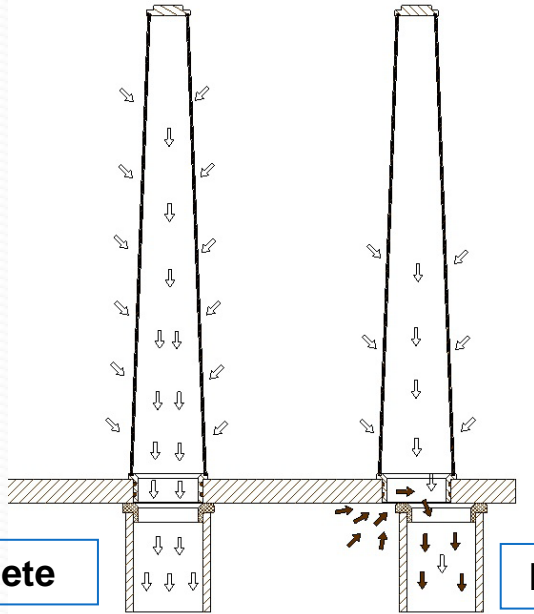
- Ver. 3 : auto backwashing filter (suction type / compact size)

2.3.1 Filter Operation Ver.3



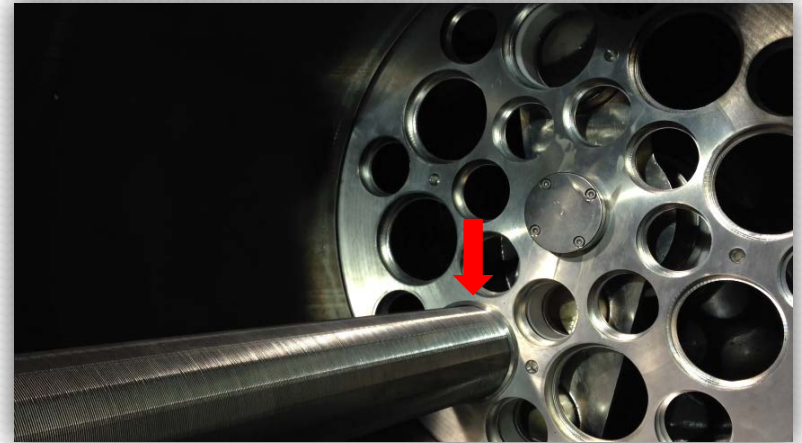
2.3.2 Backwashing efficiency

Ver.3

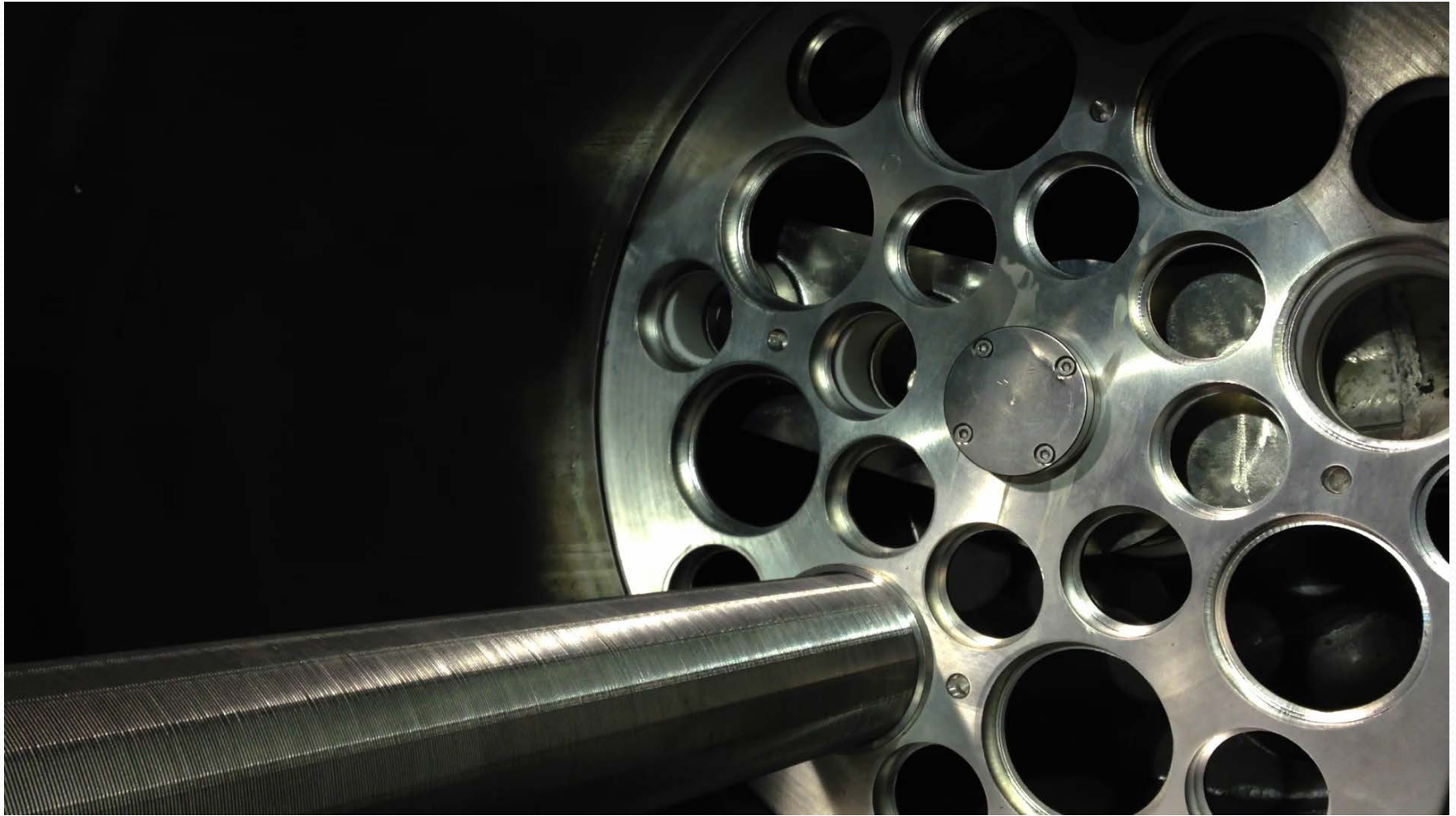


Complete

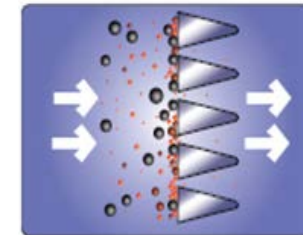
Incomplete



2.3.3 Backwashing efficiency Ver.3

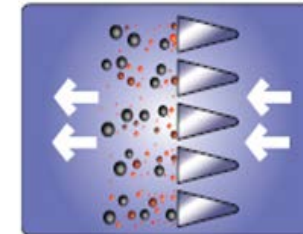


2.3.4 Wedge Wire Screen Ver.3



Filtration Mode

50 Micron 이상 처리

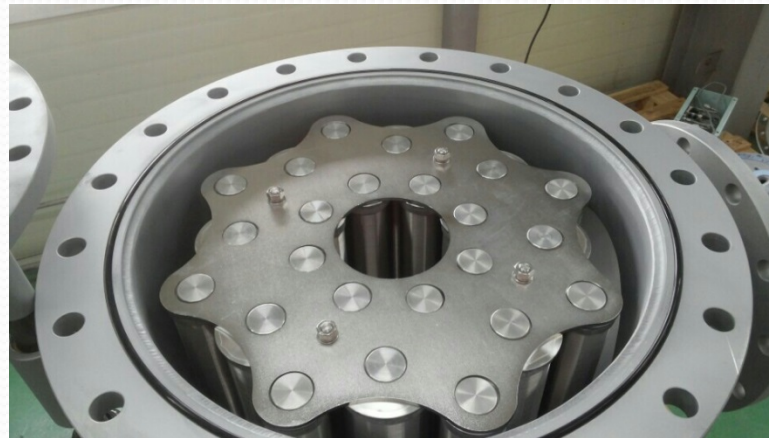


Backwash Mode

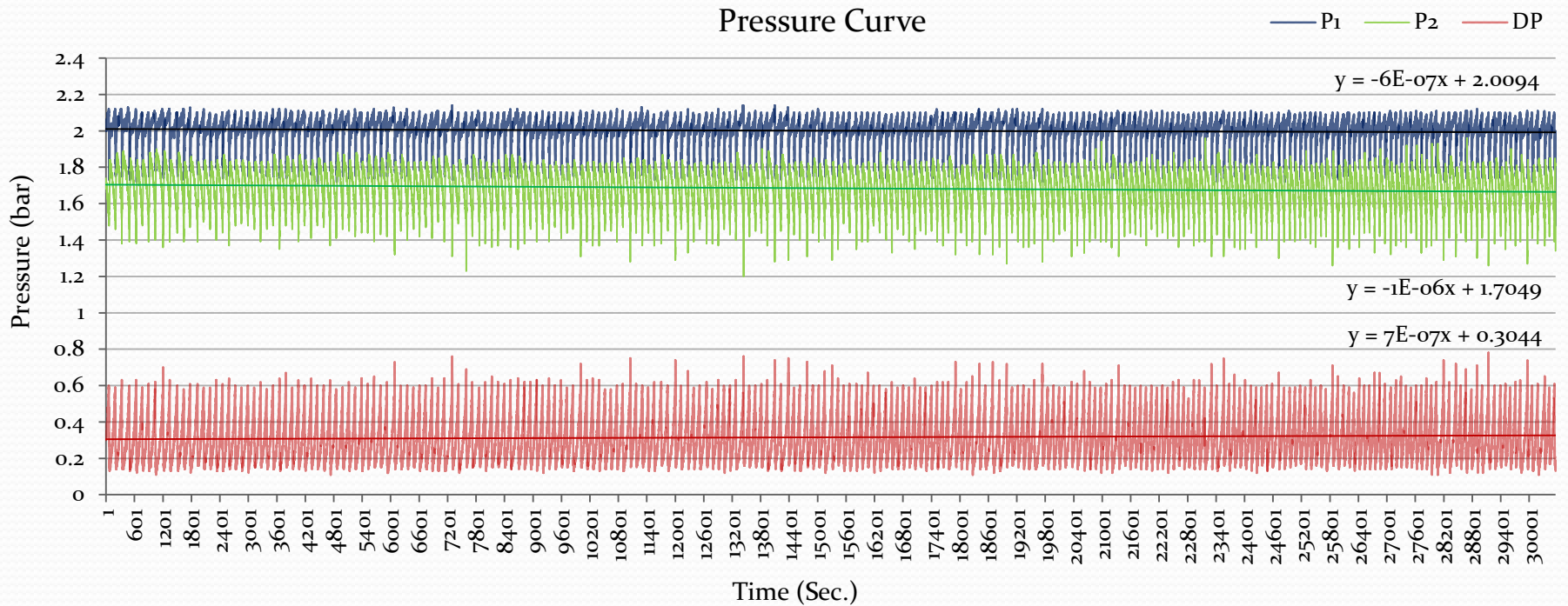
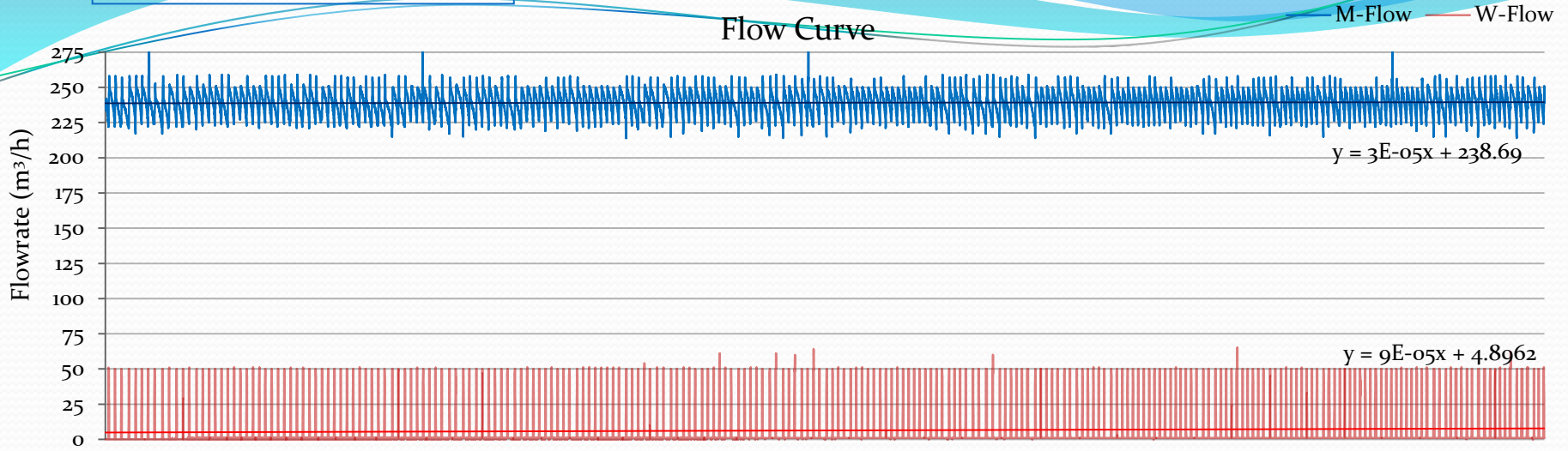
역세척 모드

**Filter Element
(Wedge Wire Screen Type)**

2.3.5 Picture of Filter Ver.3



Ver.3 operation data



2.3.6 Advantage Ver.3

1. Compact Size

- Reduced height(-30%) and small dimension.
- Very convenient arrangement and installation in the limited space (E/R).

2. Strong Backwashing

- Very strong filter back-Flushing by additional backwashing pump.
- Improved suction arm for complete suction point.
- Wedge wire type (or Mesh Type) for efficient back-Flushing.

3. Easy Maintenance

- Lower height of the filter body for easy handling.
- Cartridge type filter element (replace one by one).



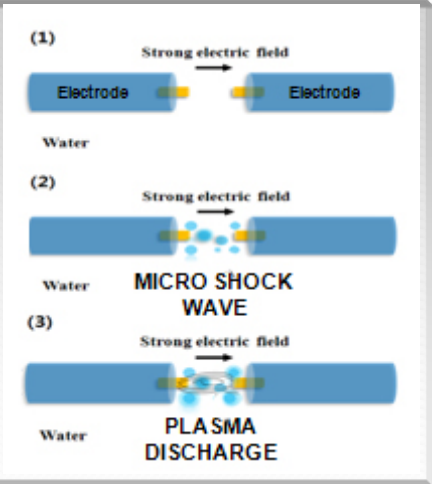
[Real Test Bed in KIOST]

2.4 PLASMA

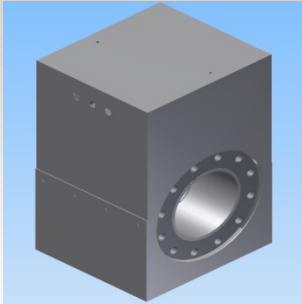
Outstanding synergy effect on UV sterilizer system in any condition of high level turbidity(or muddy)

Overview

- Shock wave is generated by Plasma in strong electric field.
- Micro shock wave which is high energy kill and damage cell wall of micro organisms.



Composition



Plasma chamber



Plasma electrode

Specification

No	Items	Description (for 250 m3/hr)
1	Plasma Electrode	Electrode ID : 250 A
2	Power Supply	Input : 1Phase, 220V ± 10%, 50/60Hz Output : 1 ~ 2 kw (Variable)
3	Plasma chamber	Carbon steel & PE coating

Function

- Micro organisms is sterilized by shock wave with high energy generated by Plasma.
- Ensure safety of plasma unit by an Interlock function

2.5 MPUV

Overview

- UV is efficient to disinfect for bacteria and viruses.
- No need any additional chemical substances.
- There are no formation of residual toxics or harmful substances.
- **Eco-friendly and economical**
- Using wavelength of **medium pressure lamp** (UV-C/200~280nm) to sterilize micro-organisms.

Specification

No	Items	Description
1	UV Lamp	3~3.5kW/ ea (for 250m³/hr)
2	UV Sensor	0~500mW/cm ²
3	Temperature Sensor	-50 ~ 200℃
4	Wiper Seal (Automatic)	EPDM
5	Power Source	AC 380/440V, 50/60Hz, 3Phase
6	Material	STS 316L

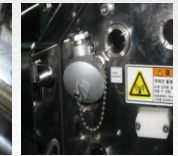
Composition



MPUV



MPUV Lamp Auto cleaning wiper

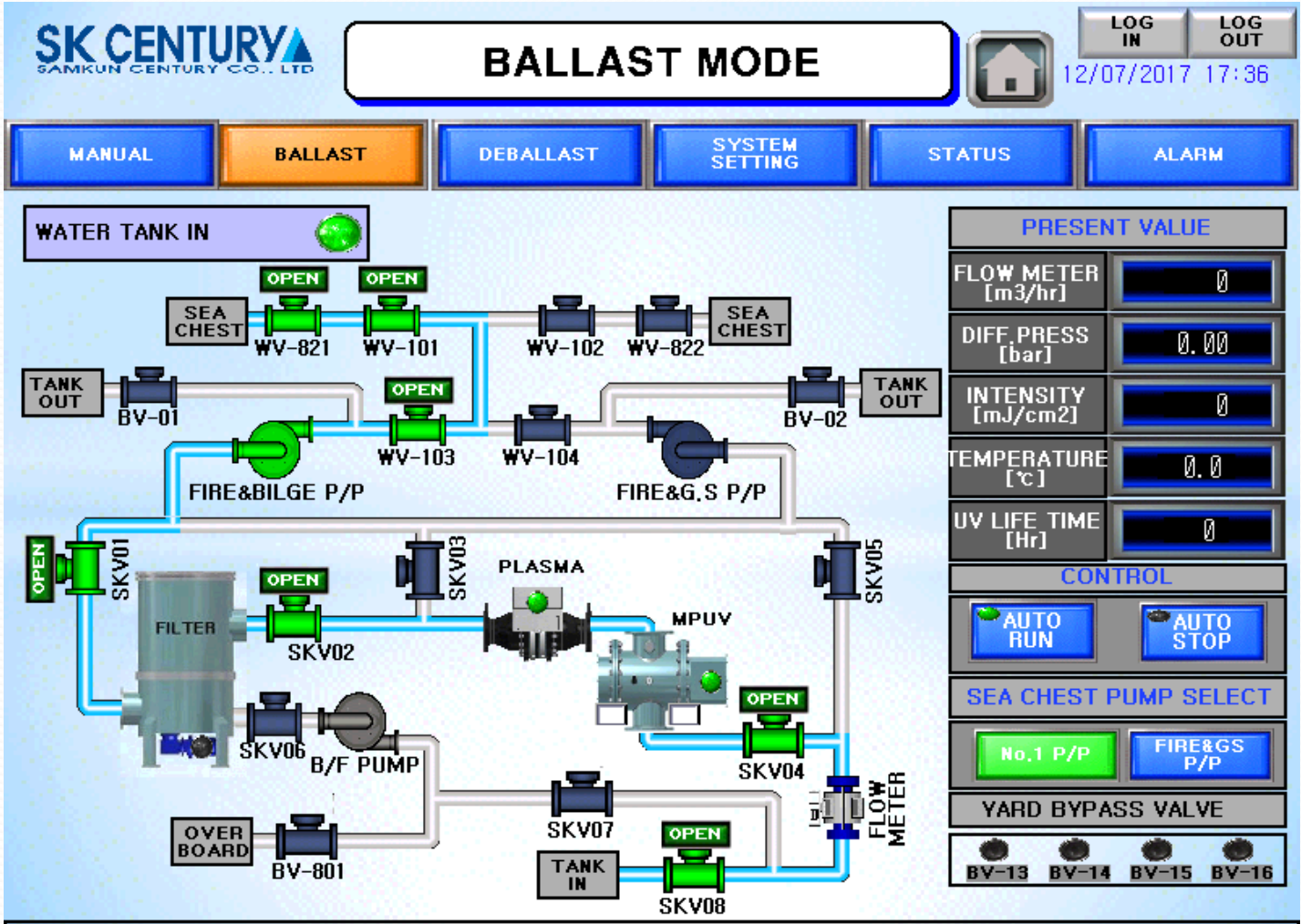


MPUV Sensor Temp. Sensor

Function

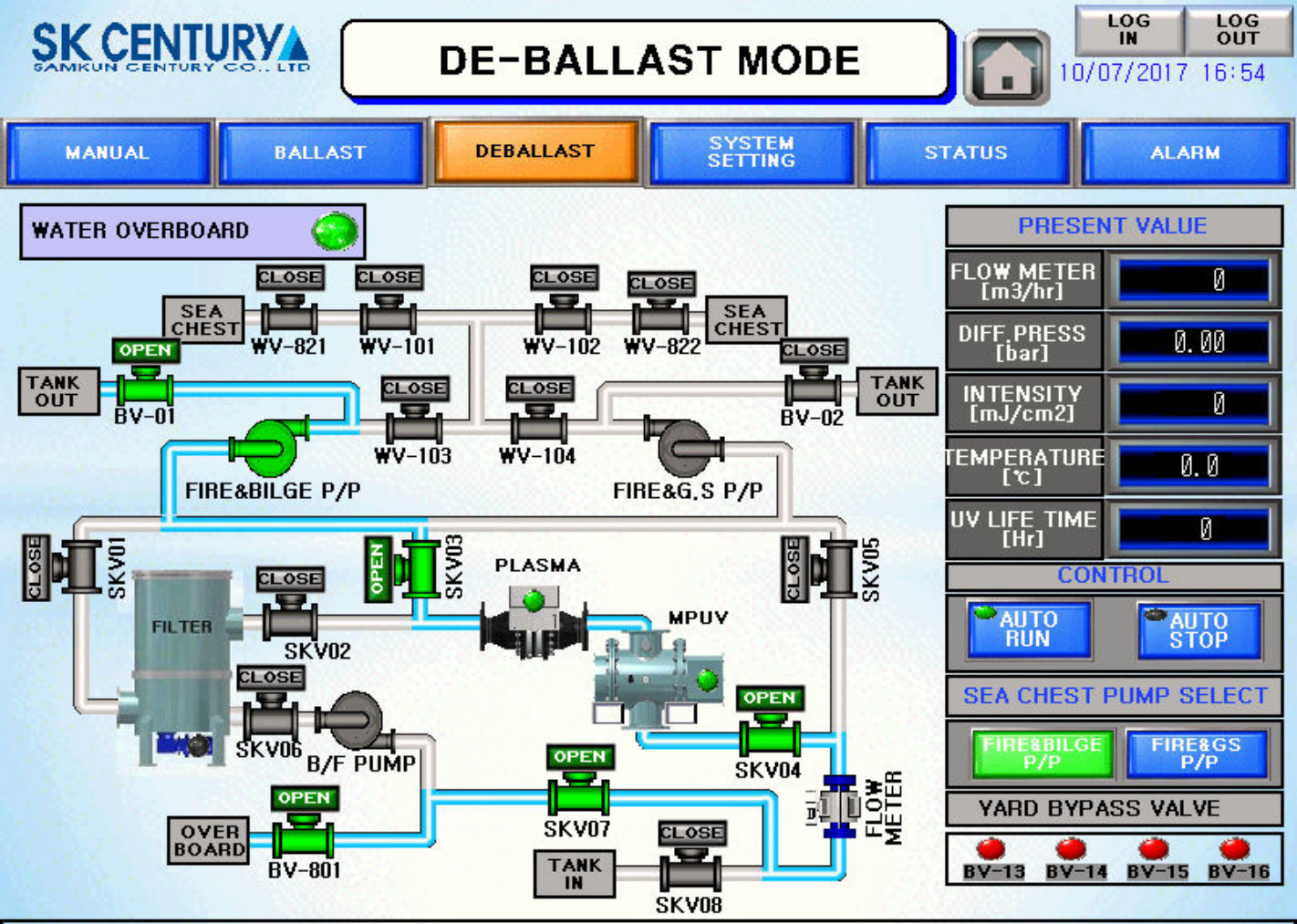
- It destroys microorganisms by exposing UV
- Generating UV from the mercury arc lamp
- **Operating at both ballast and de-ballast mode.**
- **Automatic washing system** to increase transmissivity of a quartz tube

3. Flow diagram



[For Reference]

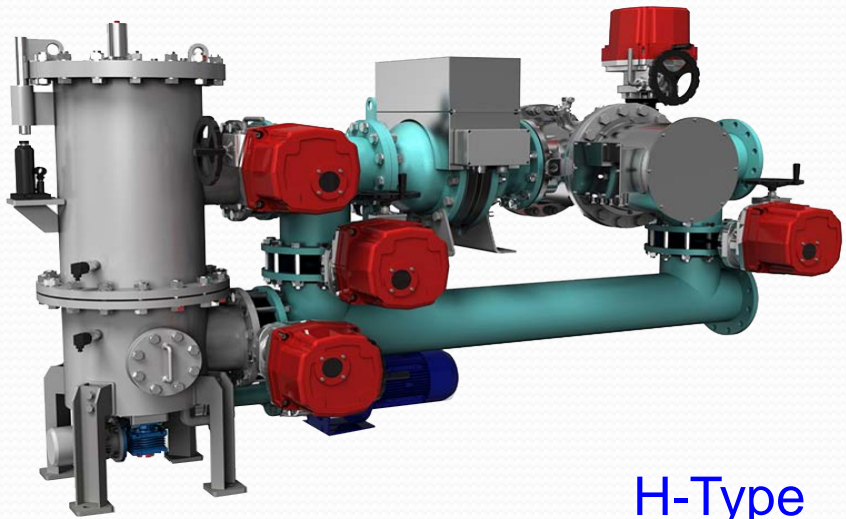
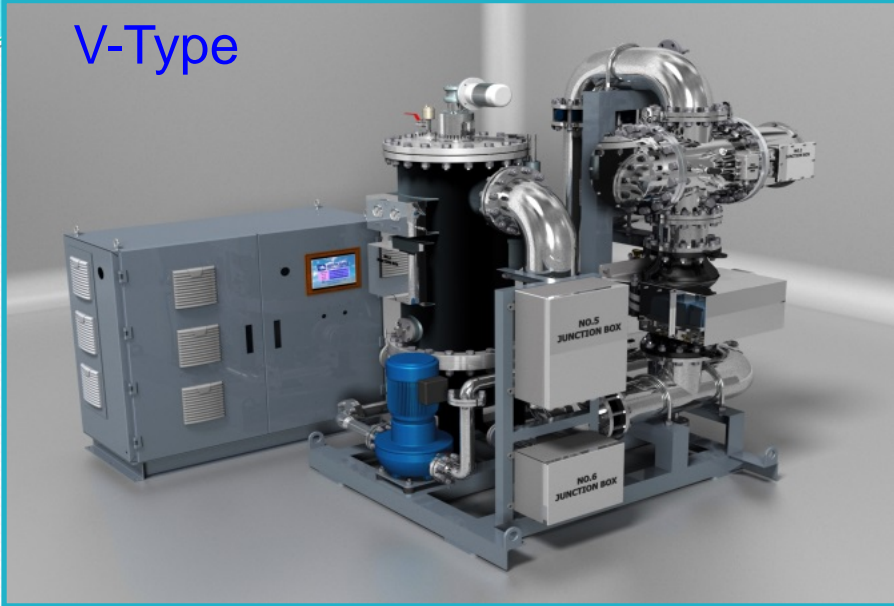
3. Flow diagram



[For Reference]

4. Installation Type (for New Ship)

V-Type



H-Type

5. Main Characteristics

Eco-friendly

- No use chemical substances
- By-product is not generated

Convenience

- Easy maintenance
- Compact size, easy & simple install to New/Old Vessel
- Automatic system & Designed special **Back-flushing filter**

Cost-Effective

- Low power consumption (can be evaluated through Plasma SYS)
- Competitive price
- Technical superiority on the performance

Advantage

- Physical treatment type and has strong exceptional performance of PLASMA unit in seawater of high level of turbidity
- Use of Inner **polyethylene coating material**(Long lifetime/Non-rusting)
- Never have any corrosion of Ballast Tank

6. Certification



Basic approval Mar. 2010
Final approval Oct. 2010



Type Approval July 2012



KR Type Approval Oct. 2013



BUREAU
VERITAS

BV Type Approval Feb. 2015



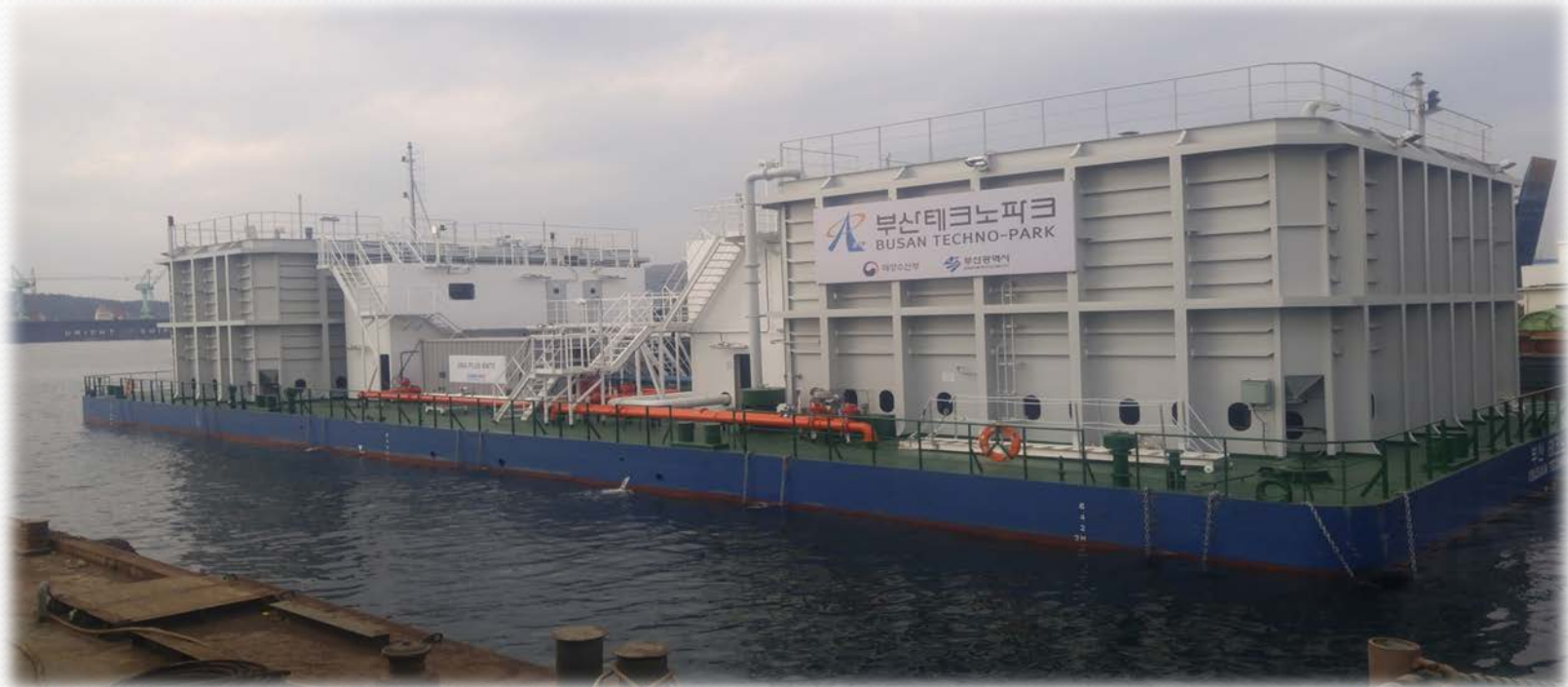
RS Type Approval June 2017

6. Certification



USCG AMS Acceptance Oct 2013

USCG Type Approval Test in Progressing
until the end of 2019



7. USCG T/A processing

Num.	Items	Begin Date	Expected Duration
1	Submit test plan at USCG and Review	Feb. 2018	-
2	Conducting for <u>Component test</u> ✓ Using over 200 m ³ /hr capacity on the test equipment -. Temperature & humidity test -. Vibration & Inclination test -. Power Change test or Ingress protection test	Apr. 2018	For 3 months
3	Conducting for <u>Land-based test</u> ✓ Using over 200 m ³ /hr capacity at test facility -. Sea water condition -. Fresh water condition -. Brackish water condition	Aug. 2018	For 5 months
4	Conducting for <u>Shipboard test</u> ✓ Install to over 200 m ³ /hr capacity on board -. Temperate weather condition -. Subtropical weather condition -. or Tropical weather condition	Feb. 2019	For 6 months
5	Reviewing final test result	Sep. 2019	For 3 months
6	Submit final test result to USCG	Dec. 2019	-

8. Maintenance

1. FILTER

Filter Element : 3 years (Check and Washing per 3~6 month)

2. PLASMA

PLASMA is also semi-permanent, there is no maintenance cost.

3. UV LAMP

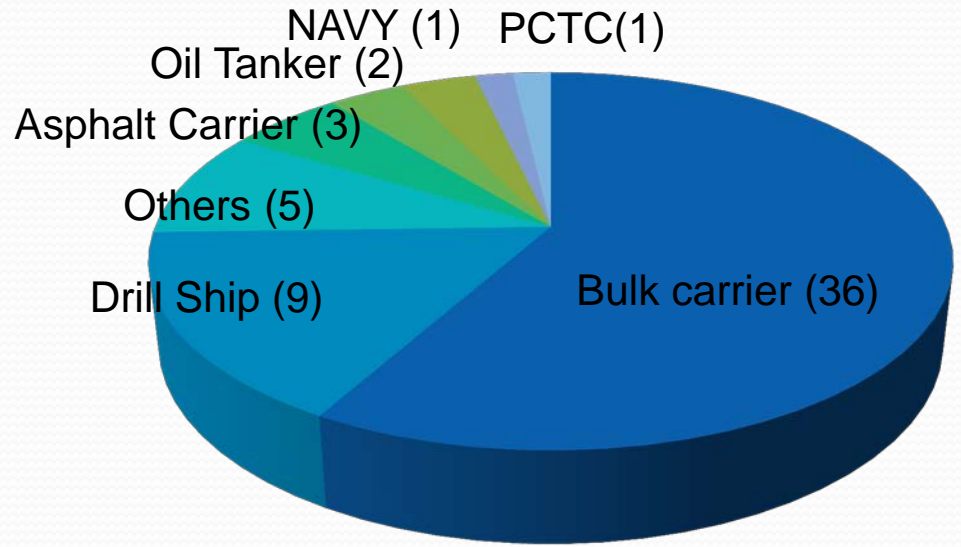
- UV LAMP life time : 3,000 ~ 4,500 hr
- Ballasting and De-Ballasting shall be conducted twice a month
Twice a month X 10hr/time x 12month = 240 hr /year
3000hr / 240 hr = 12.5 year

9. Reference

Total Contract : 49 Ships / 56 BWTS



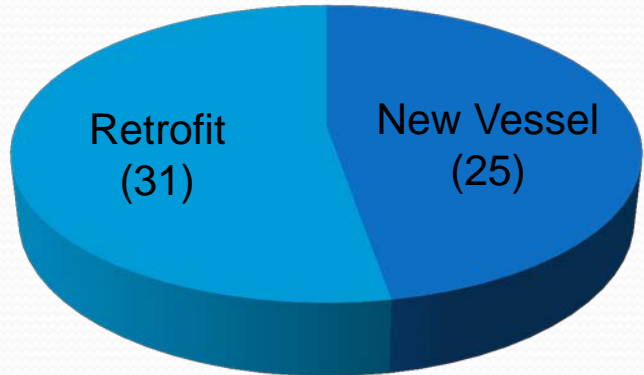
Ship Type



Delivered : 40 ships



Retrofit vs. New Ship



FAT/ SHOP TEST pictures



Delivery waiting



On-boarding installation picture



**4,300 DWT General Cargo Ship
(Retrofit, 150m³/hr Model)**



**6,500 DWT General Cargo Ship
(Retrofit, 250m³/hr Model)**



**Research Vessel
(New Ship, 150m³/hr Model)**

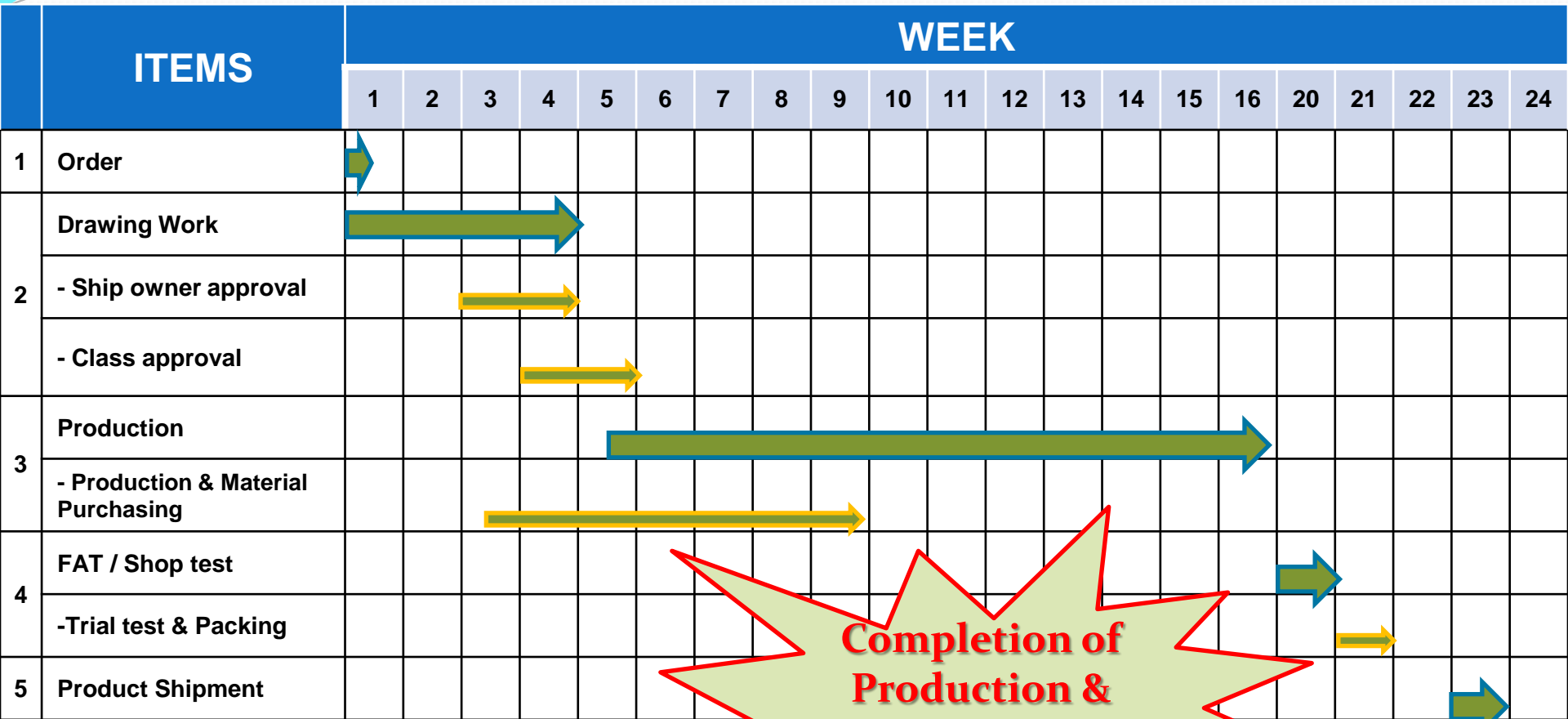


**9,000 DWT Multi-Purpose Vessel
(Retrofit, 350m³/hr Model)**

10. Specification of ARA PLASMA BWTS

Model (Capacity)	FILTER (Dia. X H)	PLASMA (W X L X H)	MPUV (W X L X H)	PANEL (W X L X H)	Foot Print (m ²)	Weight (Kg)	Power Consumpt ion (KW)	Skid dimension (not include control panel)
							MIN./MAX	
ARA-011 (100m ³ /h)	Φ508 x 1695	550 x 460 x 650	997 x 400 x 420	1200 x 600 x 1200	1.5	1063	14.5 / 16.5	1600x1100x1665
ARA-017 (150m ³ /h)	Φ508 x 1695	550 x 510 x 700	1001 x 445 x 500	1200 x 600 x 1200	1.7	1148	20.5 / 23.5	1800x1200x1950
ARA-028 (250m ³ /h)	Φ508 x 2050	500 x 510 x 700	1096 x 445 x 500	1400 x 600 x 1250	1.9	1279	32.5 / 37.5	1650x1300x2045
ARA-039 (350m ³ /h)	Φ710 x 2112	600 x 550 x 750	1001 x 490 x 610	1400 x 600 x 1250	2.1	1748	34.8 / 40.3	2200x1700x2420
ARA-063 (550m ³ /h)	Φ760 x 2258	600 x 620 x 820	1520 x 620 x 720	1300 x 800 x 1500	2.6	2375	50.0 / 58.0	2100x1800x2680
ARA-092 (800m ³ /h)	Φ865 x 2315	650 x 680 x 900	1520 x 745 x 810	1300 x 800 x 1500	3.0	2884	61.5 / 72.5	2300x2000x3055
ARA-126 (1,100m ³ /h)	Φ1030 x 2444	650 x 740 x 960	1520 x 795 x 870	1300 x 800 x 1700	3.3	3495	67.5 / 79.5	2800x2500x3245
ARA-150 (1,300m ³ /h)	Φ1220 x 2655	650 x 810 x 1030	1520 x 845 x 940	1300 x 800 x 1700	3.9	5100	84.2 / 98.2	3410x2600x3435

TIME SCHEDULE FOR NEW VESSEL



Completion of Production & Trial test Within 6 months

TIME SCHEDULE FOR RETROFIT

No.	ITEMS	WEEK																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	20	21	22	23	24				
1	Retrofit proposal (3D Scanning work)	→																								
2	Contract		→																							
3	Working Drawing for Retrofit Pipe			→																						
4	Approval Drawing for BWTS / Modified Vessel (Owner/Shipyard/Classification)			→																						
5	Material Procurement				→																					
6	Fabrication (Machinery Part / Electric Part)					→																				
7	Shop Test														→											
8	Delivery																	→								
9	Installation Machinery Part / Electric Part)																	→								
10	Pre-Commissioning																				→					
11	Commissioning (with inspection Classification)																						→			
12	Crew Training																							→		

**Completion of
Production &
Trial test Within
6 months**

RETROFIT PROCEDURE



Pipe line



Electric Spec.



Cable Connection



Pathway

① On board Survey (Checking)

① Filter Position Size : 800 mm x 800 mm

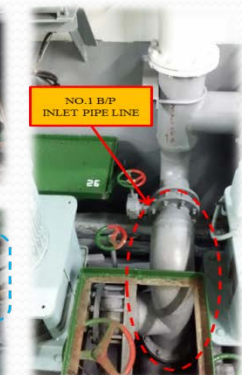
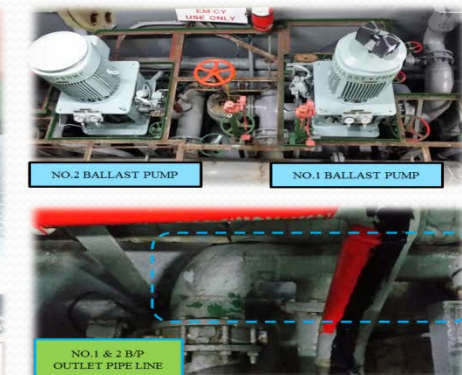
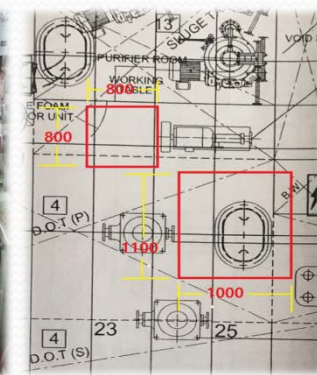
② MPUV & Plasma Position Size : 1100 mm x 1000 mm

Red dotted line

Inlet Pipe Line : 28, 29 (200A)

Blue dotted line

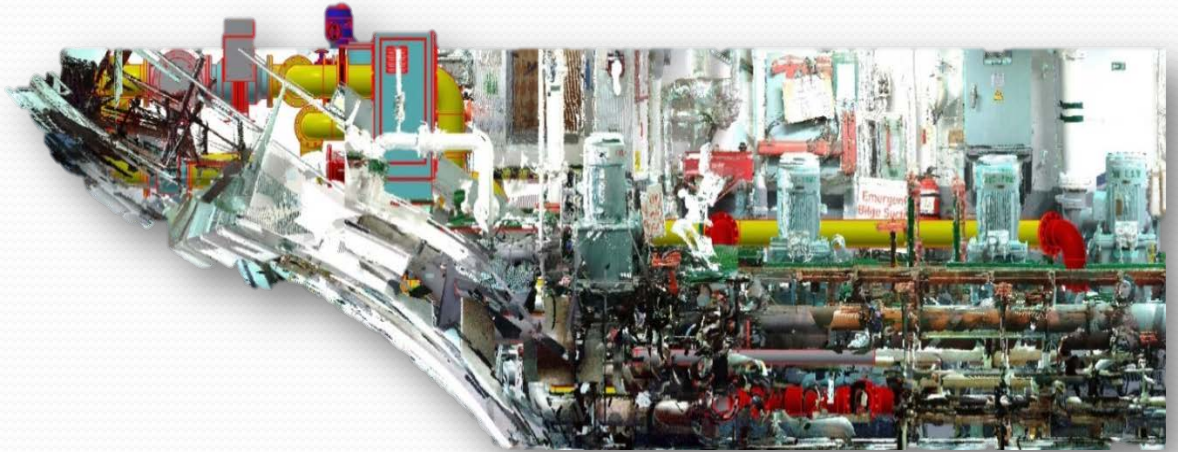
Outlet Pipe Line : 20 (200A)



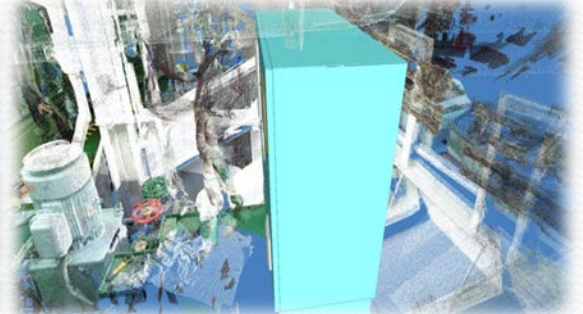
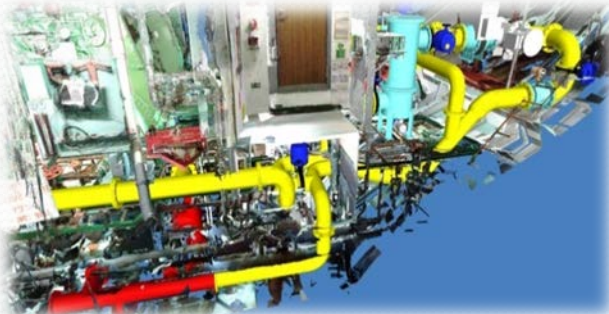
Expected installation position with drawings

Expected connecting pipe line

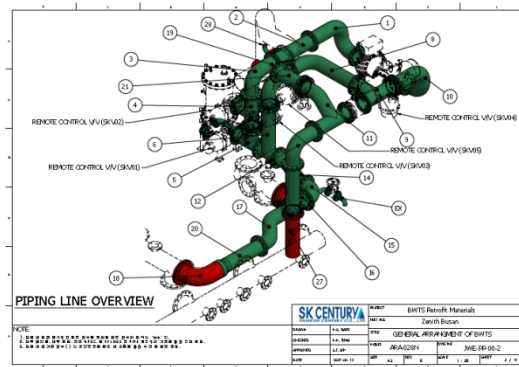
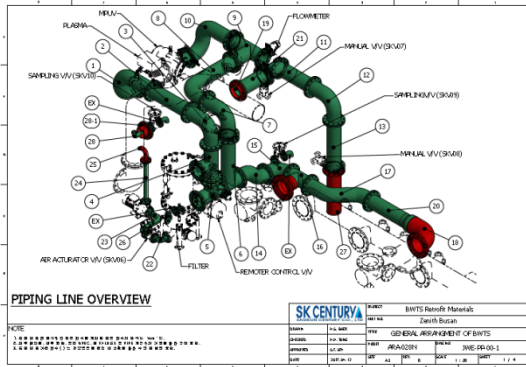
RETROFIT PROCEDURE



② 3D Laser Scanning
/ Reverse Modeling



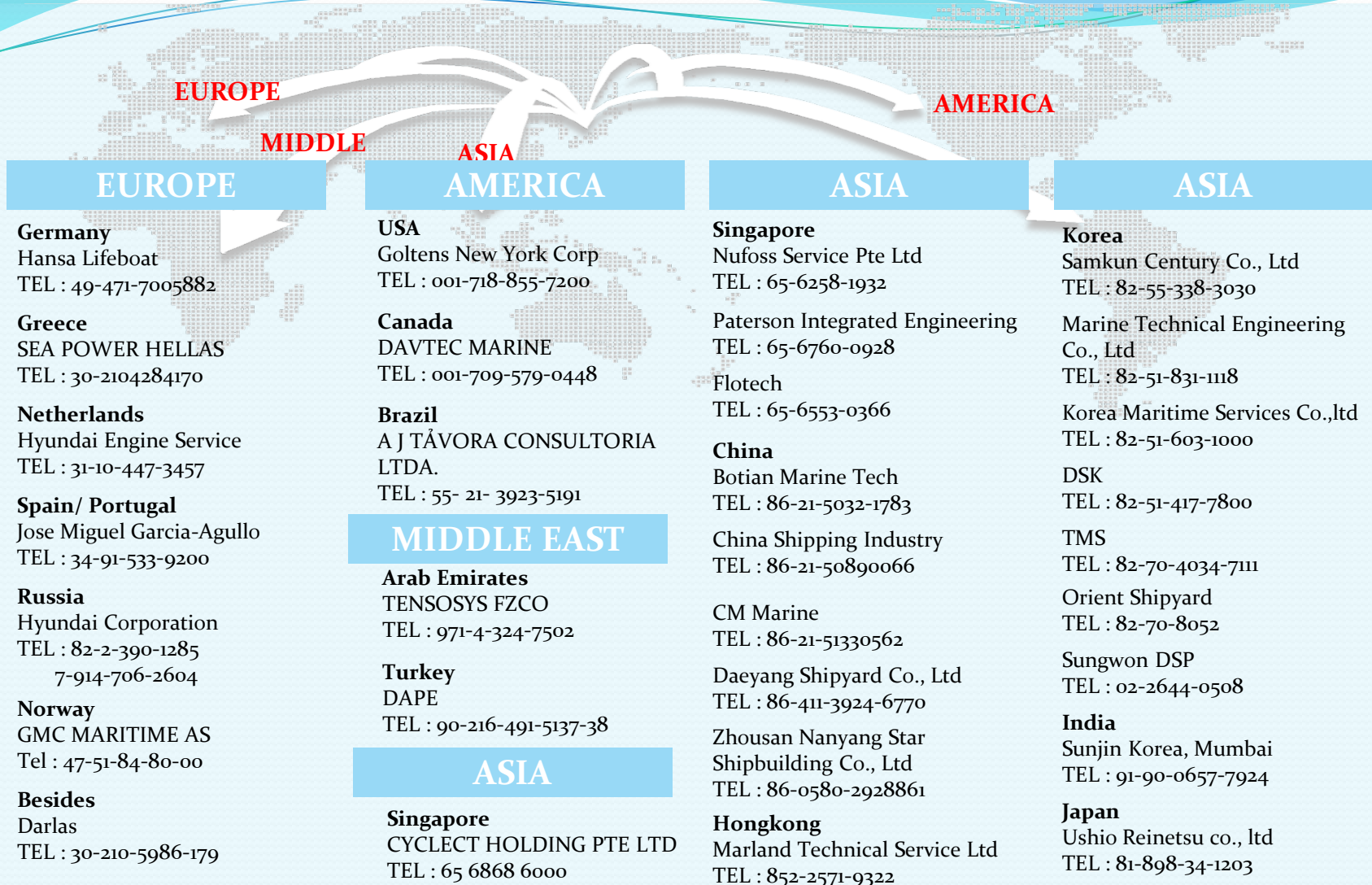
RETROFIT PROCEDURE



③ Installation / Commissioning



11. Worldwide Network



We have global Equipment Service Centers (A/S Network)

-We are choosing and building up the representative of A/S network by regional groups.

R&D Focus of Our System

- **System Guaranty**

- Sterilization Efficiency (Filter & Plasma, QA & A/S, Safety, etc)
- Stronger Auto back flushing of Filter than other Brand's

- **Power Consumption (kW) Reduction**

- ex) 1,000m³/hr, 50-60% relevel comparing to UV system

[사내 실험실 및 시험설비]

- **Maintenance cost down**

- Assurance of Lifetime/A.S of UV Lamp and PLASMA

- **Compact Size**

- **Optimized**

- Design & installation solution**

- **Global network**

- Installation, A/S and S/P supply (Main 35 agencies)

- **Competitive Price**



System Comparison

	PLASMA+UV	UV	ELECTRIC
VIEWS	<ul style="list-style-type: none"> • No use chemical materials • None of Corrosion (PE Coating) • None of Explosion 	<ul style="list-style-type: none"> • No use chemical materials • None of Corrosion • None of Explosion 	<ul style="list-style-type: none"> • Chemical materials using, Secondary pollutant • Corrosion • Explosion (Gas, etc.)
	<ul style="list-style-type: none"> • Operation (Simple) 	<ul style="list-style-type: none"> • Operation (Simple) 	<ul style="list-style-type: none"> • Operation (Complex)
	<ul style="list-style-type: none"> • Low power consumption ex)1,000m³/hr-50~60% Down 	<ul style="list-style-type: none"> • Higher Power consumption than Electric system 	<ul style="list-style-type: none"> • Low Power Consumption (Normal Condition of Chlorination)
	<ul style="list-style-type: none"> • Exceptional treatment of muddy & high level turbidity condition 	<ul style="list-style-type: none"> • Handicap of sterilization efficiency in muddy & high level turbidity condition by UV system only 	<ul style="list-style-type: none"> ※ But, Different according to condition of followings
	<ul style="list-style-type: none"> • Filter back-flushing (Powerful)–P/P pressure 		<ul style="list-style-type: none"> -Fresh water -Low degree(Chlorination) -Under 15degree(Temp) -Long time(Sterilizing)

☞ Evaluation Points : Cover Handicap of Electric system as well as UV system

Evaluation Technology

: Cover weak-point of the existing UV system due to Plasma Treatment

Environment

Existing UV system

PLASMA+UV

High level Turbidity
Of
Seawater&Fresh water

Low efficiency
of Sterilization

Supplement of 2nd UV
treatment by 1st Plasma's
effect of sterilization
regardless of turbidity

Supplement

Seawater
Fresh Water

Possible
Sterilization

Possible to be treated
By only UV, but reinforce 2nd
UV treatment by
1st Plasma's

Strengthen

Evaluation Result

FILTER + UV

	Ballasting		De-ballasting									Ave.
	Control water	Treated water	Treated water									
			Begin			Middle			End			
			B	M	E	B	M	E	B	M	E	
Viable Organism($\geq 50 \mu\text{m}$, inds./m ³)	121,500	610	4	6	2	4	6	2	8	4	4	6.6
Viable Organism($\geq 10-50 \mu\text{m}$, inds./mL)	2,240	52	2	0	4	2	6	0	2	2	2	3.3
Total Coliform (cfu/100 mL)	260	44	0	0	0	0	0	0	0	0	0	
Escherichia coli (cfu/100 mL)	320	86	0	0	0	0	0	0	0	0	0	
Intestinal Enterococci (cfu/100 mL)	0	0	0	0	0	0	0	0	0	0	0	
Vibrio cholera (cfu/100 mL)	0	0	0	0	0	0	0	0	0	0	0	

FILTER + PLASMA + UV

	Ballasting		De-ballasting									Ave.
	Control water	Treated water	Treated water									
			Begin			Middle			End			
			B	M	E	B	M	E	B	M	E	
Viable Organism($\geq 50 \mu\text{m}$, inds./m ³)	122,200	450	2	0	2	0	2	2	0	0	2	2.0
Viable Organism($\geq 10-50 \mu\text{m}$, inds./mL)	2,300	34	0	2	0	0	0	0	2	0	0	2.0
Total Coliform (cfu/100 mL)	200	50	0	0	0	0	0	0	0	0	0	
Escherichia coli (cfu/100 mL)	350	80	0	0	0	0	0	0	0	0	0	
Intestinal Enterococci (cfu/100 mL)	0	0	0	0	0	0	0	0	0	0	0	
Vibrio cholera (cfu/100 mL)	0	0	0	0	0	0	0	0	0	0	0	

*TNTC, Too Numerous To Count

IMO D-2 Performance Standard
(= USCG PHASE I Standard)



No.	Marine Organism	Standard Value
1	Organism($\geq 50 \mu\text{m}$, inds./m ³)	< 10 ind./m ³
2	Organism($\geq 10-50 \mu\text{m}$, inds./mL)	< 10 ind./mL
3	Total Coliform (cfu/100 mL)	<100 cfu/100mℓ
4	Escherichia coli (cfu/100 mL)	<250 cfu/100mℓ
5	Intestinal Enterococci (cfu/100 mL)	<100 cfu/100mℓ
6	Vibrio cholera (cfu/100 mL)	<1 cfu/100mℓ



ARA means original clean and ECO Ocean

<http://www.samkunok.com>

<http://www.arasys.com>

Thank you