

BALLAST WATER MANAGEMENTERMA FIRST FITERMA FIRST FIT

"Developed in The Biggest Shipping Nation In The World"

www.ermafirst.com



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.



Founded in 2001 and comprises the sole fully licensed company in Greece, providing integrated Waste Management & Valorization Services.



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THE SYSTEM IN A GLANCE: OPTION 1, ERMA FIRST BWTS

ERMA FIRST BWTS	Stage - Components		
	SEPARATION	200 microns mesh self-cleaning pre-filter 20 microns Hydro cyclones	
	DISINFECTION	Advanced Technology Electrolysis Cells TRO Concentration 8-10 mg/L	

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THE SYSTEM IN A GLANCE: OPTION 2, ERMA FIRST BWTS FIT

ERMA FIRST FIT BWTS	Stage – Com	ponents	
<image/>	SEPARATION	OPTION 1 Filtersafe: 40 microns self- cleaning automatic screen filter OPTION 2 Filtrex: 40 microns self- cleaning automatic screen filter	
	DISINFECTION	Advanced Technology Electrolysis Cells TRO Concentration 4-6 mg/L	

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Simplified Concept



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



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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

active substance up to 6mg/L

• Full Flow Type, Sodium Hypochlorite is produced at a max concentration of 4-6mg/Lt

Electrolytic Cell



Electrolytic Cell

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 ^oC
- 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

	m³/hr	100	250	500	750	1000	1500	2000	3000
0.9 psu	kW	6.23	15.6	31.15	46.7	62.3	93.5	124.6	186.9
15 psu	kW	2.73	6.82	13.65	20.48	27.31	40.95	54.6	81.9
30 psu	kW	1.8	4.3	9.0	13.3	18.0	27.0	36.0	54.0

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ERMA FIRST – FW OPERATION

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

Parameter	Values
Intake Water Salinity	200 mg/lit (0.2PSU)
Sea water Salinity	35,000 mg/lit
Brine water Salinity, Evaporator	55,000 mg/lit
BWTS Intake Requested Salinity	900 mg/lit (0.9PSU)

Type of vessel	DWT	Total BW per operation (m ³)	Sea water, 32 PSU (m ³)	Mixing ratio % (injection of sea water in ballast flow rate)	Brine water, Evaporator, 55 PSU	Mixing ratio (injection of brine water in ballast flow rate)
LPG	28500	9500	191	2,1	121	1,3
LPG	14500	4850	98	2,1	62	1,3
AFRAMAX	115000	32000	644	2,1	409	1,3

ERMA FIRST FIT BWTS Salinity

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



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ERMA FIRST FIT BWTS Temperature

Temperature



Sea surface temperature

Approval Status

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

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Το παρόν πιατοποιεί ότι το σύστημα διοχέξε	This certificate is issued to			5760						
κατωπέρω έχει εξεταστεί και δοκιμαστεί προδιαγραφών που περιέχονται στις Οδηγίε	PRODUCER	ERMA FIRST ESK E		October 11, 2013						
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ENGINEERING SOLUTION A.E.	1222	nano su contra de								
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	APPLICATION	For treatment of ship	following ERMA FIRST BWTS models:							
EXPLANT ADJUDING OF ADDISH ADJUDING ESK ENGINEERING SOLUTION A.E., Ballast water management system manufac SOLUTION SA.	SPICIFIED STANDARDS	Lingdis Register Ba Ships Part 5 and Par	 BWTS 50, BWTS 100, BWTS 200, BWT BWTS 700, BWTS 400, BWTS 900, BWT 1300, BWTS 1400, BWTS 1500, BWTS BWTS 2000, BWTS 2100, BWTS 2200, B 2000, BWTS 2100, BWTS 2100, BWTS 200, BWTS 	\$ 300, BWTS 400, BWTS 500, BWTS 600, (\$ 1000, BWTS 1000, BWTS 1200, BWTS 1600, BWTS 1700, BWTS 1800, BWTS 1900, 1WTS 2300, BWTS 4400, BWTS 2500, BWTS						
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ERMA FIRST BWTS 700_Assembly rpups	Loses Date	Mandae 202								
Ballast water treatment system (Piping &	Facing Date	4 () bdm 2017	The ERMA FIRST BWTS Ballasi. Water Treatme AMS identification mamber	nt Systems (BWTS) are assigned the following						
ERMA FIRST BWTS 200_Assembly date : ERMA FIRST BWTS 700_Assembly date :	Sheet	1.016	AMS-2013- ERMA EIRST Ballaot Water	Treatment System-001						
	Linut's Register EMEA 71 Feedback Street, London B	C3M 485	Coast Guard acceptance of the ERMA FIRST BW conformance to or compliance with any other Fed	TS as an AMS does not accord or imply oral, state, or local water discharge effluent						
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USCG process

United States Coast Guard U.S. Department of Homeland Security

NO.	Task	Start date	Finish date
1	USCG AMS approval Fresh, Brackish, Seawater	COMPLETED	COMPLETED
2	Submission of Application for USCG Type Approval	LOI 3.10.2014	LOI 3.10.2014
	Land-based test Total	SEPTEMBER 2015	MAY 2016
3	Land-based test Fresh 5 tests	OCTOBER 2015	MARCH 2016
	Land-based test Brackish 5 tests	MARCH 2016	MAY 2016
	Land-based test Sea 5 tests	APRIL 2016	APRIL 2016
4	Ship-board test 5 tests	NOVEMBER 2015	MAY 2016
5	Environmental test	COMPLETED	COMPLETED
6	USCG Type Approval	2nd QUARTER 2016	3rd QUARTER 2016

Time schedule for the USCG Type Approval

COMPLETED COLOR

IN PROGRESS COLOR



ERMA FIRST BWTS FIT MODULARITY



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ERMA FIRST BWTS FIT EX PROOF - CONTAINERIZED SOLUTION



RETROFIT SERVICES

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.

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Option 3 INSPECTION, 3D LASER SCANNING, FEASIBILITY STUDY, ENGINEERING STUDY & RETROFIT SPECIFFICATION

- 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.





2nd Deck



3rd Deck



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Longitudinal section



Vessel's elevation layout



Front section

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3D Laser Scanning



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3D Laser Scanning

Conversion to 3D Model



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.



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3D Laser Scanning

Conversion to 3D Model



Suggested ERMA FIRST FIT arrangement



Suggested ERMA FIRST FIT arrangement



Suggested ERMA FIRST FIT arrangement



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2nd Flat

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Untreated water to BWTS

Treated water to ballast tanks



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Untreated water to BWTS

Treated water to ballast tanks





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Retrofit Services

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BWTS Timeline

		Phase 1						Phase 2												Phase 3					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	Kick-off meeting	(1 w)		-					- 1	-	-			-		-	-			-	-	•		-	
	Technical review	. ,		(1 w)	1																				
	On board Survey (3D Scanning)			<u>, ,</u>	(1 w)	5																			
	Technical & Commercial Offer				(/	(2	w)																		
s s	Proposal acceptance & contract							(2 wee	eks)																
ent	Drawings submission to Class								(3	week	ks)	1													
Š	System's fabrication										,	(0	wee	ks)											
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ů.	Shippment & Delivery to Shipyard																I	(200)			(5 wee	ks)			
anb	Supports & foundation (steelwork)																				(5			(1 week)	
Se	BWTS Peripherals Installation																							(1 week)	
	Pinning																							(1 week)	
	Cahling																							(1 week)	
	System Installation																		(1 week)						
	Final Tests & Commissiong																		(1 Week)	(1 week)					
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ᅕ	System Installation																								
	Final Tests & Commissions																								

Reference List

	ERMA FIRST REFERENCE LIST MARCH 2016								CONTAINER		-	1		a	25		92 1									
VESSEL	TYPE OF	NEW BUTLDENG /	SHIPYARD	COUNTRY OF	SHIPOWNER	NO. OF	TYPE OF UNIT	VESSEL'S	HULL NOS.: HN2121, HN2122,	11000 TEU CONTAINER	NB	SAMSUNG HEAVY INDUSTRIES CO.	KOREA	COSTAMARE SHIPPING CO., S.A.	5	ERMA FIRST 1000	DNV-GL									
	VESSEL	RETROFIT		BUILT		ONLIS		cuss	HN2123, HN2124, HN2125	VESSEL																
TANKER SHIPS		- mar -				43		1.5510		11000 TEU	NB		KOREA	COSTAMARE SHIPPING	10	ERMA FIRST 1000	DNV-GL									
HULL NO.57004	157K COT SHUTTLE	NB	SUNCOONG SHIPBUILDING & MARINE ENGINEERING CO., LTD.	KOREA	NAVIGATION LTD	3	ERMA FIRST FIT 2500 EX & ERMA FIRST FIT 300	DWV		VESSEL	10		KODEA	OF FARBLE & MADITIME		FRMA FIRST 1000	MM-Q									
HN 5010 - 5018	112 000 DWT	NB	SC DAEWOO MANGALIA	ROMANIA	TSAKOS ENERGY	27	ERMA FIRST FIT	DNV-GL		CONTAINER VESSEL			handri	5.A.												
	COT		HEAVY INDUSTRIES S.A.	100.000	NAVIGATION LTD	10	2000EX & 300	1.531.55	COSCO GUANGZHOU	9460 TEU CONTAINER VESSEL	RF	EXISTING VESSEL	KOREA	COSTAMARE SHIPPING CO., S.A.	1	ERMA FIRST 500	DW-GL									
HULL NOS-53116, 53117	75000 DWT TSH	NB	SUNGDONG SHIPBUILDING & MARINE ENGINEERING CO., LTD.	KOREA	TSAKOS ENERGY NAVIGATION LTD	6	ERMA FIRST FIT 1500EX & ERMA FIRST FIT 500	ABS	HULL NOS: 654, 655	4800 TEU CONTAINER VESSEL	NB	ZHEILANG OLHUA SHIPBUILDING CO., LTD.	CHENA	EVALEND SHIPPING COMPANY S.A.	2	ERMA FIRST 600	DWV-QL									
HULL NOS:1584, 1585	74000 DWT PT	NB	STX OFFSHORE & SHIPBUILDING CO., LTD.	KOREA	ANDRIAKI SHIPPING CO., LTD	6	2x ERMA FIRST FIT 1200EX & ERMA FIRST FIT	DNV-QL	IRENES REMEDY	2800 TEU CONTAINER VESSEL	RF	LISNAVE ESTALEIROS NAVAIS SA	PORTUGAL	TSAKOS COLUMBEA SHIPMANAGEMENT ("TCM") SA	1	ERMA FIRST FIT	LR									
HULL NO. 107	7000 DWT	NB	RMK MARINE SHIPYARD	TURKEY	PRITCHARD GORDON	1	300 ERMA FIRST FIT	NK	HULL Nos: 1388, 1389, 1300	10920 TEU CONTAINER VESSEL	NB	SHANGHAI WAIGADQIAD SHIPBUILDING CO LTD	CHENA	STARBULK S.A.	3	ERIMA FIRST FIT 800	DNN/GL							-		
	TANKER				TANKERS		300			4614 TEU CONTAINER	RF	EXISTING VESSEL	SOUTH KOREA		1	ERMA FIRST FIT	ABS	OTHER HULL ND5: Y361, 362, 363, 364, 365,	OFFSHORE	NB	ABG SHIPYARD LTD.	INDIA	NA	7	ERMA FIRST 200	DNV-GL
BULK CARRIERS						47			LIQUEIFIED	VESSEL	5				18			366	VESSEL							
HULL NO: DY6006	62000 DWT BULK CARRIER	NB	YANGZHOO DAYANG SHIPBUILDING CO., LTD.	CHINA	DIANA SHIPPING SERVICES S.A.	2	ERMA FIRST FIT	NK	HULL NOS: 578,	3500 M3 LPG	NB	KITA-NIHON	JAPAN	STEALTH MARITIME	6	ERMA FIRST 300	ABS	HN.NY019	CEMENT CARRIER	NB	SHIPBUILDING CO., LTD	CHENA		1	ERMA FIRST FIT	LA
		1000							588 588			Shirbuisbang CO., LID		CURP. S.A.				107					_	184	IN TOTAL NO.	OF LINES
HULL NOS: DY6003, DY6004, DY6005	BULK CARRIER	ND	SHIPBUILDING CO., LTD.	CHINA	SHIPPING CORP.	0	1200	NK	HULL NO5:8184, 8185, 8186, 8187	24005 DWT LPG	NB	HYUNDAI MIPO DOCKYARD CO., LTD. (HMD)	KOREA	STEALTH MARITIME CORP. S.A.	4	ERMA FIRST FIT 800	LR	100	IN TOTAL NO	. of FLARES					in to the no.	OF DALLS
HULL NO: DY6011	82000 DWT BULK CARRIER	NB	SINOPACIFIC SHIPBUILDING GROUP	CHENA	SAINT MICHAEL SHIPPING CO., LTD	2	ERMA FIRST FIT	NK	SCF TOBOLSK	26424 DWT LPG	RF			SCF UNICOM MANAGEMENT SERVICES (CYPRUS) LTD	2	ERMA FIRST FIT	LR									
HULL NOS.: 1894, 1909, 1881, 1878	66000 DWT BULK CARRIER	NB	MITSUE ENGINEERING & SHIPBUILDING CO., LTD.	JAPAN	NIOVIS SHIPPING CD., S.A.	4	ERMA FURST 900	NK	SCF TOMSK	26200 DWT LPG	RF			SCF UNICOM MANAGEMENT SERVICES (CYPRUS) LTD	2	ERMA FIRST FIT 600	LR									
HULL NO5: 1061, 1062, 1063, 1064, 1080, 1081, 1082, 1083	64000 DWT BULK CARRIER	NB	JANGSU YANGZUIANG SHIPBURLDING CO., LTD.	CHENA	OCEANBULK MARITIME S.A.	16	ERMAFIRST 900	BV	HULL NOS: \$529/30/32/33	6600 - 6800 DWT LPG	NB	KYOKUYO SHEPYARD CORPORATION	JAPAN	PARADISE NAVIGATION SA	•	BRMA FIRST FIT 300	BV / NK									
HULL NO.GY601,	63800 DWT	NB	YANGZHOU GUOYU	CHENA	KYMA SHIP	2	ERMA FIRST FIT	LR	CAR/TRUCK	2		÷		e	7		e)									
CY602	BULK CARRIER		SHIPBUILDING CO., LTD		MANAGEMENT INC.		1000		HULL NOS: 8129,	3500 CARS	NB	HYUNDAL MIPO	KOREA	NEPTUNE LINES	2	ERMA FIRST 400	DNV-GL									
HULL NO-5838	85,000 DWT BULK CARRIER	NB	SASEBO HEAVY INDUSTRIES CO., LTD	JAPAN	ALEXANDRIA SHIPPING S.A.	2	ERIMA FIRST FIT 1500	NK	8130	RUND VESSEL		(HMD)		MANAGING ENTERIPRISES SA												
HULL NO: 1882	66000 DWT BULK CARRIER	NB	MITSUL ENGINEERING & SHIPBUILDING CO., LTD.	JAPAN	NIOVIS SHIPPING CO.	1	ERMA FIRST FIT	NK	HULL ND. 513, 514, 515, 524, 526	RORD PCTC	NB	ULIANIK SHIPYARD ISC	CROATIA	SIEM CAR CARRIERS	5	ERMA FIRST FIT 400	BV									
									PASSENGER /	11 A		1			4		-									
HULL NO5: Q543000-1/2/3/4	43000 DWT BULK CARRIER	NB	QENCISHAN SHIPYARD	CHENA	PHOENIX SHIPPING & TRADING S.A.	8	ERIMA FURST FIT	RINA	CZAR	MEGA YACHT	RF	EXISTING VESSEL	GREECE	NA	1	ERMA FIRST 100	LR									
HULL NOS.: 395,	37650DW	NB	AVIC WEIHAL SHIPYARD	CHENA	LAMDA MARITIME S.A.	2	ERMAFERST 700	NK	ELEMENTS	MEGA YACHT	NB	YACHTLEY EXCLUSIVE YACHTS	TURKEY		1	ERMA FURST 100	LR.									
	and complete		Lung Lind						FB 272	YACHT	NB	AZIMUT - BENETTI SPA	ITALY	NA	-1	ERMA FIRST FIT	LR									
HULL NO. 838-19, 838-20	37,400 DWT BULK CARRIER	NB	AVIC WEIHAL SHIPYAAD CD., LTD	CHENA	MST MINERALIEN SCHIFFAHRT SPEDITION UND TRANSPORT CMEM	2	EHUMA FIRST FIT	LR	FB 277	YACHT	NB	AZIMUT - BENETTI SPA	ITALY	NA.	1	100 ERIMA FIRST FIT 100	LR						Refer	en	ce lis	t

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World Wide Network



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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

Poseidon Evo, Bilge Water Separator



Poseidon evo



- 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

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

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



Triton m, Sewage Treatment Plant





TRITON H

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





<image>

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.



ERMAFIRST

Thank you for your kind attention

Visit us @ <u>www.ermafirst.com</u> See us @ <u>https://www.youtube.com/channel/UCXX7xnHtH7gEZZA_XXyPImQ</u>