Certificate no.:
TAP0000305

TYPE APPROVAL CERTIFICATE

This is to certify:

that the 5 ppm Bilge Water Separator

with type designation(s)
BilgeMaster, GEA bilge Separator

issued to
GEA Westfalia Separator Group GmbH
Oelde, Nordrhein-Westfalen, **Germany**

is found to comply with
IMO Resolution MEPC.107(49) – Revised Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilges of Ships

Application:

Product(s) approved by this certificate is accepted for installation on all vessels classed by DNV, unless otherwise instructed by relevant Maritime Administration.

System design limitations / limiting operating conditions imposed are described in this document.

For the compliance with IMO Resolution MEPC.107(49), the certificate is issued on behalf of Transport Canada, Marine Safety & Security.

For vessels with EU Flag, EU Marine Equipment Directive (MED) certificates are required instead of this Type Approval certificate.

Type:	Capacity:
BilgeMaster	**500 up to 5000 l/h**
GEA bilge Separator	**600 up to 5000 l/h**

Issued at **Hamburg** on **2025-05-22**

This Certificate is valid until **2027-09-14**.

for **DNV**

DNV local unit: **Essen**

Approval Engineer: **Hagen Markus**

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to USD 300 000.

Product description

The bilge separator series BilgeMaster and GEA bilge Separator consists of a bilge water conditioning system and centrifugal separator.

Overview

BilgeMaster	E-500	E-1200	E-2500	E-5000
Separator type	WSE 5	WSE 10	WSE 20	WSE 50
Max. treatment capacity [l/h][1]	500	1200	2500	5000

GEA bilge Separator	600	1200	2500	4500	5000
Separator type	WSF 6	WSF 12	WSF 25	WSF 35	WSF 50
Max. treatment capacity [l/h][1]	600	1200	2500	4500	5000

Note
[1] Type test maximum rated capacity at inlet temperature of 85°C.

P&ID and Device lists - GEA bilge Separator

Type	Drawing no.	Device list
600 - WSF 6-01-132	Q1451000001-9913-PID401	Q1451000001-9913-DVL401A
1200 - WSF 12-01-132	Q1451000001-9913-PID411	Q1451000001-9913-DVL411
2500 - WSF 25-01-132	Q1451000001-9913-PID421	Q1451000001-9913-DVL421
4500 - WSF 35-01-132	Q1451000001-9913-PID431	Q1451000001-9913-DVL431
5000 -WSF 50-01-132	Q1451000001-9913-PID441	Q1451000001-9913-DVL441

Electrical equipment

	Wiring diagram and parts list	Separator type	Control type
Switch board, control, and monitoring system[1]	8106-2011-010	WSE50	E40
	8106-2031-040	WSE20	IO
	8106-2032-073	WSF6	
	8106-2032-074	WSF12	
	8106-2032-075	WSF25	
	8106-2032-076	WSF35	
	8106-2032-077	WSF50	

Programmable logic control[2]	WC-1, Siemens E40, GEA IO
Frequency converter separator drive[2]	Danfoss Drives A/S, FC302
Software versions	WSE: 8106-0E40-604 WSF: 1101-1000-0002

Notes
[1] Individual wiring plans for projects are based on this referenced wiring diagrams and parts list.
[2] Other type approved system may be accepted

Piping system components[1]

BilgeMaster - E series

Component	500	1200	2500	5000
	GEA part no.			
Feed pump type	8143-9201-350	8143-9201-180	8143-9201-240	8143-9201-170
Metal edge filter at inlet	2010-3255-000	2011-3255-000	2011-3255-000	2011-3255-010
Adsorption filter at outlet[2]	9913-8977-290	2011-2875-030	2011-2875-010	2011-2875-020

GEA bilge Separator

Component	600	1200	2500	4500	5000
	GEA part no.				
Feed pump type	8143-9201-350	8143-9201-180	8143-9201-240	8143-9201-170	8143-9201-170
Metal edge filter at inlet	2010-3255-000	2011-3255-000	2011-3255-000	2011-3255-010	2011-3255-010
Adsorption filter at outlet[2]	2011-2875-030	2011-2875-030	2011-2875-010	2011-2875-020	2011-2875-020

Notes
[1] Other types may be accepted provided that the same design parameter, e.g., speed-delivery characteristic curve (supply pump), flow capacity, mesh size (filter) or heat capacity (heat exchanger) are applied for selection.
[2] Adsorption filter at effluent ensures oil content ≤5 ppm at the discharge.

All separator types

Bilge water preheater at inlet	GEA part no.: 9085 or 9990-xxxx-xxx order/class related
Oil monitor type OMD 24, 15 ppm	GEA part no.: 9913-8962-010

Application

The bilge separator BilgeMaster and GEA bilge Separator series are type approved for bilge water treatment intended to be installed on ships for treatment of oily water for discharge to sea.

Bilge alarm (oil content meter)
For the monitoring of the effluent, bilge alarm types complying with MARPOL Annex I Regulation 14 and IMO Res. MEPC.107(49) shall be installed.

Limitation

Installation of the equipment in spaces subject to explosion hazard is not permitted.
The capacity of the supply pump should not exceed 110% of the rated capacity of the bilge separator.

Operation and Installation

For operation and installation, the following documents are to be observed

BilgeMaster - E series	Document no.
Installation Guidelines	2011-9601-000
Instruction Manual	8555-9001-220
Start-up and shut-down instructions	8555-4231-040

GEA bilge Separator	Document no.
	2011-9000-001 (GER), 2011-9001-001 (EN)

Function test after installation

After installation of the separator system the following shall be verified:

1. The alarm is always activated whenever clean water is used for cleaning or zeroing purposes;
2. The alarm is always activated whenever no flow of sample through the 15 ppm bilge alarm is detected by the flow sensor (optional);
3. Any alarm will activate the Automatic Stopping Device and lead to recirculation;
4. The overall response time (including the response time of the alarm) between an effluent discharge exceeding 15 ppm oil and to the Automatic Stopping Device preventing the overboard discharge is less than 20 seconds;
5. By-passing the alarm during normal operation shall by no means be possible;
6. Every access of the alarm (beyond check on instrument drift, repeatability of the instrument reading, and the ability to re-zero the instrument) requires the breaking of a seal.

A copy of the operation, installation and maintenance manual shall always be available on-board the ship/marine unit.

Tests carried out

Bilge separator system
Type tests according to IMO Resolution MEPC.107(49), ANNEX Part 1 - Test and performance specifications for type approval of 15 ppm bilge separators.

Environmental tests on electronic section acc. to IMO Resolution MEPC.107(49), ANNEX Part 3 - Specifications for environmental testing for type approval of pollution prevention equipment.
Components:
- Electrical control system WC-1(in addition tested acc. to US Coast Guard standard §162050-37)
- Danfoss frequency controller FC-302

Separator Drive F
Type test on Separator Drive F-series acc. to GEA Type Test Procedure OSF Series, 2018-10-19

Type Approval documentation

Piping and Instrument diagrams P&ID

GEA bilge Separator	P&ID	Issue date
600 - WSF 6-01-132	Q1451000001-9913-PID401	2022-03-31
1200 - WSF 12-01-132	Q1451000001-9913-PID411	2021-07-16
2500 - WSF 25-01-132	Q1451000001-9913-PID421	2021-06-14
4500 - WSF 35-01-132	Q1451000001-9913-PID431	2022-09-14
5000 - WSF 50-01-132	Q1451000001-9913-PID441	2021-02-09

GEA bilge Separator	Device list Basic	Issue date
600 - WSF 6-01-132	Q1451000001-9913-DVL401A	2022-06-14
1200 - WSF 12-01-132	Q1451000001-9913-DVL411	2022-07-13
2500 - WSF 25-01-132	Q1451000001-9913-DVL421	2022-06-15
4500 - WSF 35-01-132	Q1451000001-9913-DVL431	2022-09-14
5000 - WSF 50-01-132	Q1451000001-9913-DVL441	2022-06-07

Drawings - General

Drawing no.	Title	Issue date
2063-4100-020	Dimensioned drawing (for WSE50)	2014-10-28
2064-4100-080	Dimensioned drawing (for WSE20)	2014-02-27
2065-4100-020	Dimensioned drawing (for WSE10)	2023-03-17
2066-4100-020	Dimensioned drawing (WSE-5)	2013-10-18
2011-2875-030	Adsorption filter AF300-12/30	2020-12-14
2011-2875-020	Adsorption filter AF500-30/30	2020-12-14
2011-2875-010	Adsorption filter AF410-20/30	2020-12-14
9913-8977-290	Adsorption filter AF220- 7/30	2020-14-12

8555-9001-220	Instruction Manual
2011-9101-000	Maintenance Schedule and Parts List for GEA Westfalia Separator BilgeMaster - E series
2011-9601-000	Installation Guidelines
8555-4231-040	Start-up and shut-down instructions
8555-9201-180	Parameters and Troubleshooting

Drawings - Individual types

Types	Drawing no.	Title	Issue date
BM E 500	Q1452000001-9900-DVL331	Device list CP	2014-07-21
	Q1452000001-9900-LAY331	Layout drawing	2013-04-19
	Q1452000001-9900-PID331	P&ID	2013-04-19
BM E 1200	Q1452000001-9900-DVL291	Device list CP	2014-07-21
	Q1452000001-9900-LAY291	Layout drawing	2013-04-12
	Q1452000001-9900-PID291	P&ID	2013-04-12
BM E 2500	Q1452000001-9900-DVL311	Device list CP	2014-07-21
	Q1452000001-9900-LAY311	Layout drawing	2013-04-19
	Q1452000001-9900-PID311	P&ID	2013-04-19
BM E 5000	Q1452000001-9900-DVL271	Device list CP	2014-07-21
	Q1452000001-9900-LAY271	Layout drawing	2013-04-19
	Q1452000001-9900-PID271	P&ID	2013-04-19

Electrical Wiring diagrams

Drawing no.	Status	Separator type	Control type	Software no.
8106-2013-051	2012-08-31	WSE5	E40	8106-0E40-604
8106-2011-010	2012-05-25	WSE50	E40	
8106-2031-014, rev.01	2020-03-19	WSE20	IO	1101-1000-001
8106-2032-073	2021-03-16	WSF6		1101-1000-0002[1]
8106-2032-074		WSF12		
8106-2032-075		WSF25		
8106-2032-076		WSF35		
8106-2032-077		WSF50		

Note
[1] 1101 => BilgeMaster, 1000 => Siemens PLC, 0002 => GEA bilge Separator Standard Software

Electrical components

Danfoss Frequency converter FC302	TAE000008C, Rev.3
GEA-IO Steuerung Siemens Type KTP400	TAA000016S

Piping system components[1,2]

BilgeMaster - E series

Component	500	1200	2500	5000
Feed pump type	AEB2N	AEB	AEB	AEB
Feed pump type GEA part no.	8143-9201-350	8143-9201-180	8143-9201-240	8143-9201-170
Metal edge filter at inlet	AF 7111	AF 7133	AF 7133	AF 7243
Metal edge filter at inlet GEA part no.	2010-3255-000	2011-3255-000	2011-3255-000	2011-3255-010
Adsorption filter at outlet	AF 220	AF 300	AF 410	AF 500
Adsorption filter at outlet GEA part no.	9913-8977-290	2011-2875-030	2011-2875-010	2011-2875-020
Bilge water pre-heater at inlet	NX25	NT50	NT50	NT50

GEA bilge Separator

Component	600	1200	2500	4500	5000
Feed pump type	AEB2N	AEB	AEB	AEB	AEB
Feed pump type GEA part no.	8143-9201-350	8143-9201-180	8143-9201-240	8143-9201-170	8143-9201-170
Metal edge filter at inlet	AF 7111	AF 7133	AF 7133	AF 7243	AF 7243
Metal edge filter at inlet GEA part no.	2010-3255-000	2011-3255-000	2011-3255-000	2011-3255-010	2011-3255-010
Adsorption filter at outlet	AF 220	AF 300	AF 410	AF 500	AF 500
Adsorption filter at outlet GEA part no.	9913-8977-290	2011-2875-030	2011-2875-010	2011-2875-020	2011-2875-020
Bilge water pre-heater at inlet	NX25	NT50	NT50	NT50	NT50

All separator types

Bilge water preheater at inlet GEA	part no. 9085/9990-xxxx-xxx order/class related
Oil monitor type OMD 24, DNV 15 ppm GEA part no.	9913-8962-010

Notes
[1] Other types may be accepted provided that the same design parameter, e.g., speed-delivery characteristic curve (supply pump), flow capacity, mesh size (filter) or heat capacity (heat exchanger) are applied for selection.
[2] Manufacturer: Pump Allweiler, Edge filter Filtration Group, Adsorption filter maker Dutch Filtration, Water preheater maker Kelvion

Test reports

Test laboratory PAConsult
- Test report Nr 0862-05 Revision 1 – Control boxes WC-1 and D-20, 2020-07-14

Test laboratory DD Test Service, Grasten-Denmark
- Test specimen Danfoss/FC-302P11KT5E55H5, Vibration Test Sinusoidal
  Test method IEC68068-2-6:2007, 2020-06-29
GEA Type Test Report “Separator OSF Series – Type Test Procedure Separator Drive”, 2018-10-19

Performance and function test
- GEA test report BilgeMaster - E 5000, 2016-06-30 and BilgeMaster - E 500, 2017-06-29
- DNVGL test report WSE50-01-037 / 2063-4100-20, 2016-09-26
- DNVGL test report WSE5-01-037 / 2063-4100-20, 2017-08

Laboratory results on samples

BilgeMaster - E 500	Issue date	BilgeMaster - E 5000	Issue date
GBA test report 2017P510642_1 (F)	2017-07-05	GBA test report 2016P511701_1	2016-08-17
GBA test report 2017P510720_1 (W)	2017-07-06	GBA test report 2016P510335_1	2016-07-21
GBA test report 2017P510741_1 (S)	2017-07-06	GBA test report 2016P510447_2	2016-08-08
GBA test report 2017P511212_2 (Oil)	2017-07-24		

Laboratory results on test material
- Sigma Aldrich certificates of analysis

Environmental test reports on electronical section
- GEA Manufacturer Statement of Compliance, 2016-09-21

Marking of product

For traceability to this type approval certificate each unit is to be provided with a name plate with at least the following data:

Scope	Example
Manufacturer's name or trademark	GEA
Type	GEA bilge Separator 600
With separator type	WSF 6
Separation temperature	85°C

Electrical control panel - HMI	Example
Firmware, Software	1101 1000 002

In addition, individual main components mentioned in this certificate such as feed pump, filter, pre-heater and oil monitor shall be provided with individual name plate to ensure traceability to this type approval certificate.

Periodical assessment

Not applicable.

Manufactured by

GEA Westfalia Separator Group GmbH, Oelde, Nordrhein-Westfalen, Germany
GEA Mechanical Equipment (Tianjin) Co., Ltd., No.8 Quanda Road, Wuqing Development Area, Tianjin, China

Responsibility

The company GEA Westfalia Separator Group GmbH takes the responsibility that the design and the production of the products is in compliance with the Rules, Standards and/or Regulations listed on page 1 of this certificate.

APPENDIX – Performance test results

Test data and results of tests conducted on the 15 ppm Oily Water Separator in accordance with Part 1 of the Annex to the Guidelines and Specifications contained in IMO Resolution MEPC.107(49).

15 ppm Oily Water Separator submitted by:	**GEA Westfalia Separator Group GmbH**
Tested type:	**BilgeMaster - E 5000 cleandesign, WSE 50-01-037**
Test location:	**GEA Westfalia Separator Group GmbH, Oelde**
Date:	**2016-06-29, 2016-06-30**
Organisation conducting the test:	GEA Westfalia Separator Group GmbH
Organisation witnessed the tests	DNV GL
Method of sample analysis:	ISO 9377-2 (H53)
Samples analysed by:	GBA, 25421 Pinneberg, Germany Test reports 2016P511701/1, 2016P510447/2

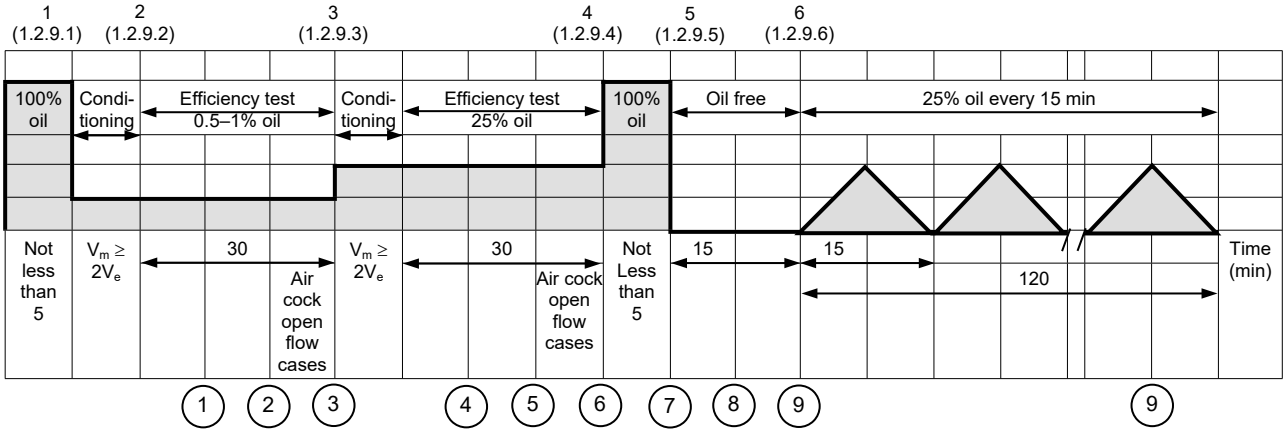
Environmental testing of the electrical and electronic sections of the 15 ppm Oily Water Separator has been carried out in accordance with part 3 of the annex to the guidelines and specifications contained in IMO Resolution MEPC.107(49). The equipment functioned satisfactorily on completion of each test specified on the environmental test protocol.

The environmental tests were performed on a control cabinet of BallastMaster-UV systems, which includes the same components used in the control cabinet for the BilgeMaster systems.
Reference document: “GEA Manufacturer Statement of Compliance”.
The test results are documented in the test reports no. 12-4708, 12-4863 issued by PAConsult and test report 06850.139.12 V1.0 issued by Meß Technik Nord GmbH.

Manufacturer's recommendations and information concerning the use of cleansing agents: N/A

TEST RESULTS (IN PPM) AND TEST PROCEDURES BilgeMaster - E 5000 cleandesign

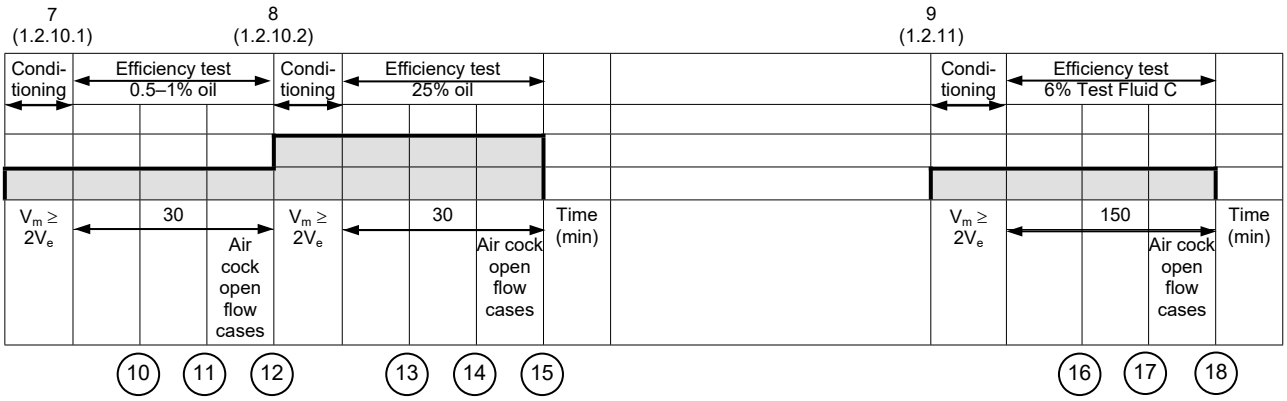
TEST FLUID “A”



Test sample 9 (taken at the end of auto test, paragraph 1.2.9.6 Annex to Resolution MEPC.107(49))

	1	2	3	4	5	6	7	8	9
Influent (%)	0.5-1.0	0.5-1.0	0.5-1	25.0	25.0	25.0	0	0	25.0
Effluent (ppm)	2.1	1.7	1.5	1.4	1.0	1.1	0.7	0.7	0.8

TEST FLUID “B” TEST FLUID “C”



	10	11	12	13	14	15	16	17	18
Influent (%)	0.5-1	0.5-1	0.5-1	25.0	25.0	25.0	6.0	6.0	6.0
Effluent (ppm)	2.0	2.3	1.9	1.5	3.7	0.3	4.9	4.7	4.5

V_e - volume of oily water separator (OWS)
V_m - oil/water mixture passed through OWS

Test fluid "A"

Density at 15°C:	985.0 kg/m^3
Viscosity at 100°C:	33 cst
Flashpoint:	112.0°C
Ash content:	<0.01 %
Water content at start of test:	500 ppm

Test fluid "B"

Density at 15°C:	841.0 kg/m^3
Viscosity at 40°C:	2.9 cst
Flashpoint:	70.0°C
Ash content:	<0.01 weight %
Water content at start of test:	45 ppm

Test fluid "C"

Surfactant:	Sodium salt of dodecylbenzene sulfonic acid CAS25155-30-0 Sigma-Aldrich
Iron oxides:	Iron(II, III) oxide – powder, <5micron, 95% Fe_3O_4, Sigma Aldrich Batch number: MKBW3530V

Test water

Density at 20°C:	1.013 kg/m^3
Solid matter present:	None

Test temperatures

Ambient:	22°C
Test fluid "A":	75°C
Test fluid "B":	23°C
Test fluid "C":	24°C
Test water:	85°C

APPENDIX – Performance test results

Test data and results of tests conducted on the 15 ppm Oily Water Separator in accordance with Part 1 of the Annex to the Guidelines and Specifications contained in IMO Resolution MEPC.107(49).

15 ppm Oily Water Separator submitted by:	**GEA Westfalia Separator Group GmbH**
Tested type:	**BilgeMaster - E 500 cleandesign, WSE 5-01-037**
Test location:	**GEA Westfalia Separator Group GmbH, Oelde**
Date:	**2017-06-29**
Organisation conducting the test:	GEA Westfalia Separator Group GmbH
Organisation witnessed the tests	DNV GL, CCS, RS surveyors
Method of sample analysis:	ISO 9377-2 (H53)
Samples analysed by:	GBA, 25421 Pinneberg, Germany Test reports 2017P510741/1, 2017P510720/1, 2017P511212/2

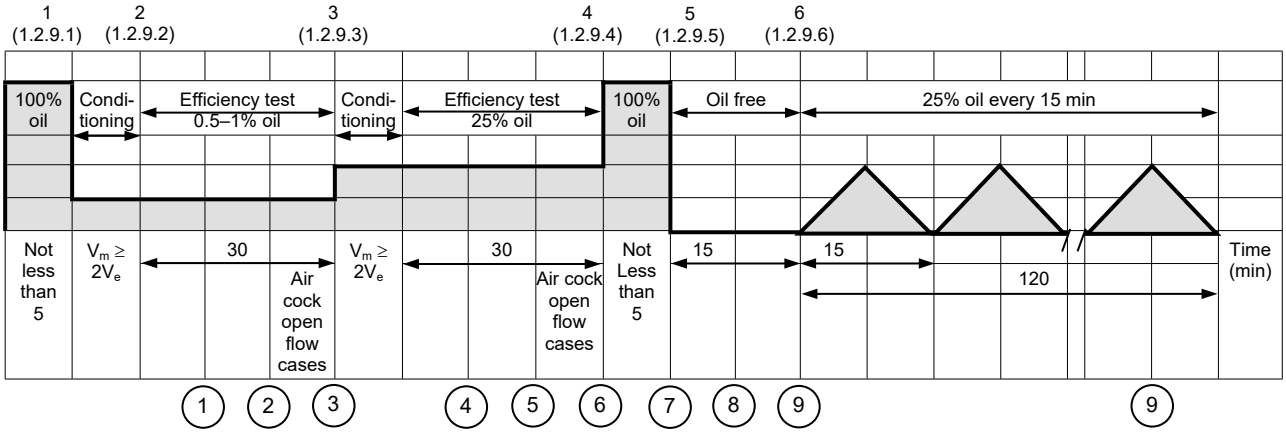
Environmental testing of the electrical and electronic sections of the 15 ppm Oily Water Separator has been carried out in accordance with part 3 of the annex to the guidelines and specifications contained in IMO Resolution MEPC.107(49). The equipment functioned satisfactorily on completion of each test specified on the environmental test protocol.

The environmental tests were performed on a control cabinet of BallastMaster-UV systems, which includes the same components used in the control cabinet for the BilgeMaster systems.
Reference document: “GEA Manufacturer Statement of Compliance”.
The test results are documented in the test reports no. 12-4708, 12-4863 issued by PAConsult and test report 06850.139.12 V1.0 issued by Meß Technik Nord GmbH.

Manufacturer's recommendations and information concerning the use of cleansing agents: N/A

TEST RESULTS (IN PPM) AND TEST PROCEDURES BilgeMaster - E 500 cleandesign

TEST FLUID “A”

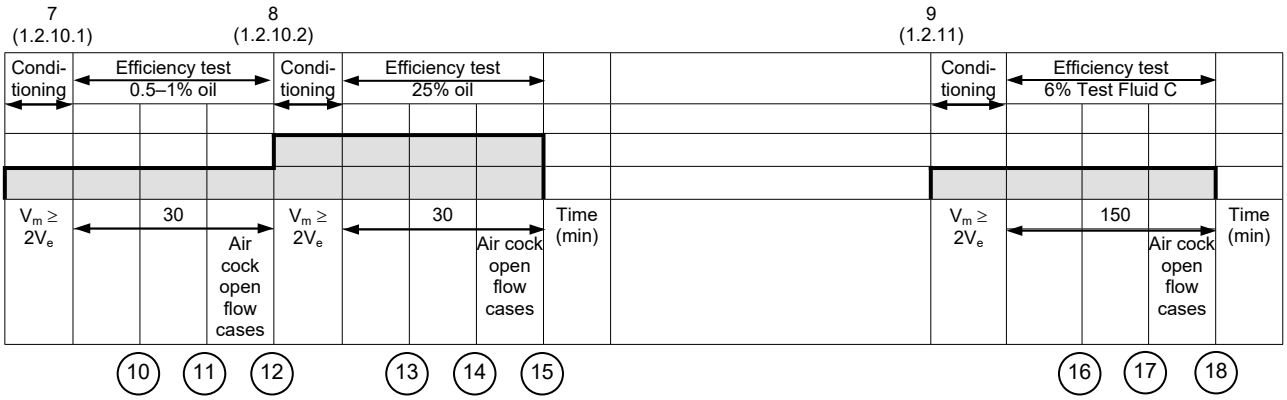


Test sample 9 (taken at the end of auto test, paragraph 1.2.9.6 Annex to Resolution MEPC.107(49))

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Influent (%)	1.0	1.0	1.0	25.0	25.0	25.0	0	0	25.0
Effluent (ppm)	0.39	0.14	0.22	0.30	0.26	0.12	0.37	0.21	0.74

TEST FLUID “B”

TEST FLUID “C”



	10	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Influent (%)	0.5	0.5	0.5	25.0	25.0	25.0	6.0	6.0	6.0
Effluent (ppm)	0.58	0.24	0.19	0.40	0.37	0.43	1.42	1.53	1.53

V_e - volume of oily water separator (OWS)
V_m - oil/water mixture passed through OWS

Test fluid "A"

Density at 15°C:	986.0 kg/m^3
Viscosity at 100°C:	35.3 cst
Flashpoint:	114°C
Ash content:	<0.010 %
Water content at start of test:	<0.05 %

Test fluid "B"

Density at 15°C:	842.0 kg/m^3
Viscosity at 40°C:	3.019 cst
Flashpoint:	70.0°C
Ash content:	<0.01 weight %
Water content at start of test:	47 mg/kg

Test fluid "C"

Surfactant:	Sodium salt of dodecylbenzene sulfonic acid
Iron oxides:	Fe_3O_4, Cu. 40302

Test water

Density at 20°C:	1 010 kg/m^3
Solid matter present:	29 mg/l

Test temperatures

Ambient:	22°C
Test fluid "A":	75°C
Test fluid "B":	23°C
Test fluid "C":	24°C
Test water:	85°C