

TYPE APPROVAL CERTIFICATE

This is to certify:**That the 5 ppm Bilge Water Separator**

with type designation(s)

GRS-10EB, GRS-20EB, GRS-25EB, GRS-50EB, GRS-100EB

Issued to

Geo Rim Engineering Co., Ltd.
Busan, Republic of Korea

is found to comply with

DNV GL class programme DNVGL-CP-0208 – Type approval – 5 ppm bilge water separators**Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL with optional notation Clean(Design).****Type: Capacity:**

GRS-10EB	1.0
GRS-20EB	2.0
GRS-25EB	2.5
GRS-50EB	5.0
GRS-100EB	10.0

Issued at **Høvik** on **2019-11-01**This Certificate is valid until **2024-10-31**.for **DNV GL**DNV GL local station: **Gimhae Station**Approval Engineer: **Thomas Grafton**

Dag Sæle-Nilsen
Head of Section

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.



Product description

The GRS EB Series bilge water separator is intended for installation onboard ships or other marine units to reduce the oil content in bilge water to less than 5 ppm. The equipment is designed and tested to meet the requirements of DNVGL-CP-0208.

The GRS EB Series separates oil and water by utilising the difference in their specific gravity. The system separates the oil by passing it through two vessels. The first vessel consists of three chambers: i) the oily water enters through a 4-way distributing device and the floated and accumulated oil are collecting into the upper part of 1st chamber; ii) the remains, including minute oil particles of oily water, passes through the Pallring & Urethane Coalescer in the 2nd chamber; iii) emulsified oil is removed by a coalescer in the 3rd chamber. Emulsified oil is further treated in the second vessel (Emulsion Treatment Unit), and then water is discharged with oil content below 5PPM.

Application/Limitation

Application:

Model:	Max. Flowrate (m³/h)	Supply Pump Capacity (*) (m³/h)	Supply Pump Type (Part No.)	Supply Pump Motor Rating (*) (kW / rpm)
GRS-10EB	1.0	1.0	P-101B	0.4 kW at 276 rpm
GRS-20EB	2.0	2.0	P-101C	0.75 kW at 275 rpm
GRS-25EB	2.5	2.5	P-101D-6P	0.75 kW at 274 rpm
GRS-50EB	5.0	5.0	P-102B-6P	1.5 kW at 178 rpm
GRS-100EB	10.0	10.0	P-103A-6P	2.2 kW at 218 rpm

Applicable to all Models (unless specified otherwise)	
Operating Pressure:	- GRS-10EB - GRS-20EB to GRS-100EB
Operating Temperature of Bilge Water:	40 °C An electrical heater is fitted to all models. The heater is operated when the temperature of the bilge water is below 40 °C
Power Supply:	220/440 V 60 Hz, 3-phase 220/380 V 50 Hz, 3-phase
Inclination Range:	0 to 22.5 degrees

(*) The GRS EB Series are fitted with an integral piston supply pump. The pumping capacity is set to the correct value through the power and rpm settings of the motor.

Limitations :

The equipment is not permitted to be installed in spaces subject to explosion hazards.

The GRS EB Series are fitted with an integrated 5ppm Oil Content Monitor required by the DNV GL optional Class Notation **Clean(Design)**. The GRS EB Series is normally fitted with the Geo Rim "GBA-155" 5ppm Oil Content Meter. The 5ppm Oil Content Monitor shall be provided with separate DNV GL Type Approval Certificates (to standard DNVGL-CP-0485).

Pumps listed in the Type Examination Documentation may be exchanged for another manufacturer with the same pump speed delivery characteristics curve. The new and old pump speed delivery characteristics curve shall be included with the copy of this certificate delivered with the Separator.

Installation:

The following shall be verified after installation: -

1. An alarm in the 5ppm Oil Content Monitor is always activated whenever clean water is used for cleaning or zeroing purposes.
2. An alarm in the 5ppm Oil Content Monitor is always activated whenever no flow of sample through the oil content monitor is detected by the flow sensor
3. Any alarm in the 5ppm Oil Content Monitor will activate the automatic stopping device preventing overboard discharge and lead to recirculation
4. The overall response time (including the response time of the 5 ppm Bilge Monitor) between an effluent discharge from the 5 ppm Bilge Separator exceeding 5 ppm, and the operation of the Automatic Stopping Device preventing overboard discharge, shall be not more than 20 seconds.
5. Every access of the alarm (beyond check on instrument drift, repeatability of the instrument reading, and the ability to re-zero the instrument) requires breaking of a seal.

A copy of the Operation, installation and maintenance manual shall be available on-board the ship/marine unit at all times.

Type Approval documentation

<i>Drawing No.:</i>	<i>Date:</i>	<i>Rev.:</i>	<i>Title:</i>
GRS-10EB			
GRS-10EB-01	2004.05	Rev.0	15ppm Bilge Separator, general view
GRS-10EB-02	2010.08	Rev.2	System diagram for 15ppm Bilge Separator
GRS-10EB-03	2004.05	Rev.0	Flowing diagram for 15ppm Bilge Separator
GRS-10EB-04	2004.05	Rev.0	Oil level detector (LSC-75)
GRS-10EB-05	2004.05	Rev.0	Globe valve
GRS-10EB-06	2004.05	Rev.0	Solenoid valve
GRS-10EB-07	2004.5	-	Low lift type safety relief valve
GRS-10EB-08	2004.05	Rev.0	Air vent valve (AV-26)
GRS-10EB-09	-	-	Spare part list
GR-10-001	2004.08	-	Control panel (1/6)
GR-10-002	2004.08	-	Control panel (2/6)
GR-10-003	2004.08	-	Control panel (3/6)
GR-10-004	2004.08	-	Control panel (4/6)
GR-10-005	2004.08	-	Control panel (5/6)
GR-10-006	2004.08	-	Control panel (6/6)
GR-10-007	2004.08	-	Control panel, spare parts
GRS-10EB-P1	2004.08	-	P101B Piston type bilge pump ass'y
GRS-10EB-P2	2004.08	-	P101B Piston type bilge pump list (1/2)
GRS-10EB-P3	2004.08	-	P101B Piston type bilge pump list (2/2)
GRS-10EB-P4		Rev.0	Spare part list for bilge pump
GRS-10EB-D01	2004.05	Rev.0	Upper cover 15ppm bilge
GRS-10EB-D02	2004.05	Rev.0	Steam inlet & outlet 15ppm bilge separator
GRS-10EB-D03-H1	2004.05	-	Electric heater
GRS-10EB-D03-H2	2004.05	-	Heater control panel, outline drawing
GRS-10EB-D01-H3	2004.05	Rev.0	Heater control panel, control circuit
GRS-10EB-D04	2004.05	Rev.0	Body detail 15ppm bilge separator

<i>Drawing No.:</i>	<i>Date:</i>	<i>Rev.:</i>	<i>Title:</i>
GRS-10EB-D05	2004.05	Rev.0	Hand hole & f/ bracket detail
GRS-10EB-D06	2004.05	Rev.0	Nozzle detail 15ppm bilge separator
GRS-10EB-D07	2004.05	Rev.0	Sheet packing 15ppm bilge separator
GRS-10EB-D08	2004.05	Rev.0	Filter detail 15ppm bilge separator
GRS-20EB			
GRS-20EB-01	2004.05	Rev.0	15ppm Bilge Separator, general view
GRS-20EB-02	2010.08	Rev.2	System diagram for 15ppm Bilge Separator
GRS-20EB-03	2004.05	Rev.0	Flowing diagram for 15ppm Bilge Separator
GRS-20EB-04	2004.05	Rev.0	Oil level detector (LSC-75)
GRS-20EB-05	2004.05	Rev.0	Globe valve
GRS-20EB-06	2003.06	-	2 way cylinder valve
GRS-20EB-07	2004.05	-	3 way cylinder valve
GRS-20EB-08	2004.05	-	Low lift type safety relief valve
GRS-20EB-09	2004.05	-	Primary pressure regulating valve
GRS-20EB-10	2004.05	-	Primary pressure reducing valve
GRS-20EB-11	2004.05	Rev.0	Solenoid valve & filter regulator
GRS-20EB-12	2004.05	Rev.0	Air vent valve (AV-26)
GRS-20EB-13	-	-	Spare part list
GR-20-001	2004.08	-	Control panel (1/6)
GR-20-002	2004.08	-	Control panel (2/6)
GR-20-003	2004.08	-	Control panel (3/6)
GR-20-004	2004.08	-	Control panel (4/6)
GR-20-005	2004.08	-	Control panel (5/6)
GR-20-006	2004.08	-	Control panel (6/6)
GR-20-007	2004.08	-	Control panel, spare parts
GRS-20EB-P1	2019.11	Rev.1	P101C-Piston type bilge pump ass'y
GRS-20EB-P2	2019.11	Rev.1	P101C Piston type bilge pump list (1/2)
GRS-20EB-P3	2019.11	Rev.1	P101C Piston type bilge pump list (2/2)
GRS-20EB-P4		Rev.0	Spare part list for bilge pump
GRS-20EB-D01	2004.05	Rev.0	Upper cover 15ppm bilge separator
GRS-20EB-D02	2004.05	Rev.0	Steam inlet & outlet 15ppm bilge separator
GRS-20EB-D03-H1	-	-	Electric heater
GRS-20EB-D03-H2	2004.05	Rev.0	Heater control panel, outline drawing
GRS-20EB-D03-H3	2004.05	Rev.0	Heater control panel, control circuit
GRS-20EB-D04	2004.05	Rev.0	Body detail 15ppm bilge separator
GRS-20EB-D05	2004.05	Rev.0	Hand hole & f/ bracket detail
GRS-20EB-D06	2004.05	Rev.0	Nozzle detail 15ppm bilge separator
GRS-20EB-D07	2004.05	Rev.0	Sheet packing 15ppm bilge separator
GRS-20EB-D08	2004.05	Rev.0	Filter detail 15ppm bilge separator

<i>Drawing No.:</i>	<i>Date:</i>	<i>Rev.:</i>	<i>Title:</i>
GRS-25EB			
GRS-25EB-01	2004.05	Rev.0	15ppm Bilge Separator, general view
GRS-25EB-02	2010.08	Rev.2	System diagram for 15ppm Bilge Separator
GRS-25EB-03	2004.05	Rev.0	Flowing diagram for 15ppm Bilge Separator
GRS-25EB-04	2004.05	Rev.0	Oil level detector (LSC-75)
GRS-25EB-05	2004.05	Rev.0	Globe valve
GRS-25EB-06	2003.06	-	2 way cylinder valve
GRS-25EB-07	2004.05	-	3 way cylinder valve
GRS-25EB-08	2004.05	-	Low lift type safety relief valve
GRS-25EB-09	2004.05	-	Primary pressure regulating valve
GRS-25EB-10	2004.05	-	Primary pressure reducing valve
GRS-25EB-11	2004.05	Rev.0	Solenoid valve & filter regulator
GRS-25EB-12	2004.05	Rev.0	Air vent valve (AV-26)
GRS-25EB-13	-	-	Spare part list
GR-25-001	2004.08	-	Control panel (1/6)
GR-25-002	2004.08	-	Control panel (2/6)
GR-25-003	2004.08	-	Control panel (3/6)
GR-25-004	2004.08	-	Control panel (4/6)
GR-25-005	2004.08	-	Control panel (5/6)
GR-25-006	2004.08	-	Control panel (6/6)
GR-25-007	2004.08	-	Control panel, spare parts
GRS-25EB-P1	2019.11	Rev.1	P101D-Piston type bilge pump ass'y
GRS-25EB-P2	2019.11	Rev.1	P101D Piston type bilge pump list (1/2)
GRS-25EB-P3	2019.11	Rev.1	P101D Piston type bilge pump list (2/2)
GRS-25EB-P4	Rev.0	Rev.0	Spare part list for bilge pump
GRS-25EB-D01	2004.05	Rev.0	Upper cover 15ppm bilge separator
GRS-25EB-D02	2004.05	Rev.0	Steam inlet & outlet 15ppm bilge separator
GRS-25EB-D03-H1	-	-	Electric heater
GRS-25EB-D03-H2	2004.05	Rev.0	Heater control panel, outline drawing
GRS-25EB-D03-H3	2004.05	Rev.0	Heater control panel, control circuit
GRS-25EB-D04	2004.05	Rev.0	Body detail 15ppm bilge separator
GRS-25EB-D05	2004.05	Rev.0	Hand hole & f/ bracket detail
GRS-25EB-D06	2004.05	Rev.0	Nozzle detail 15ppm bilge separator
GRS-25EB-D07	2004.05	Rev.0	Sheet packing 15ppm bilge separator
GRS-25EB-D08	2004.05	Rev.0	Filter detail 15ppm bilge separator
GRS-50EB			
GRS-50EB-01	2004.05	Rev.0	15ppm Bilge Separator, general view
GRS-50EB-02	2010.08	Rev.2	System diagram for 15ppm Bilge Separator
GRS-50EB-03	2004.05	Rev.0	Flowing diagram for 15ppm Bilge Separator
GRS-50EB-04	2004.05	Rev.0	Oil level detector (LSC-75)

<i>Drawing No.:</i>	<i>Date:</i>	<i>Rev.:</i>	<i>Title:</i>
GRS-50EB-05	2004.05	Rev.0	Globe valve
GRS-50EB-06	2003.06	-	2 way cylinder valve
GRS-50EB-07	2004.05	-	3 way cylinder valve
GRS-50EB-08	2004.05	-	Safety relief valve
GRS-50EB-09	2004.05	-	Primary pressure regulating valve
GRS-50EB-10	2004.05	-	Primary pressure reducing valve
GRS-50EB-11	2004.05	Rev.0	Solenoid valve & filter regulator
GRS-50EB-12	2004.05	Rev.0	Air vent valve (AV-26)
GRS-50EB-13	-	-	Spare part list
GR-50-001	2004.08	-	Control panel (1/6)
GR-50-002	2004.08	-	Control panel (2/6)
GR-50-003	2004.08	-	Control panel (3/6)
GR-50-004	2004.08	-	Control panel (4/6)
GR-50-005	2004.08	-	Control panel (5/6)
GR-50-006	2004.08	-	Control panel (6/6)
GR-50-007	2004.08	-	Control panel, spare parts
GRS-50EB-P1	2019.11	Rev.1	P102B-Piston type bilge pump ass'y
GRS-50EB-P2	2019.11	Rev.1	P102B Piston type bilge pump list (1/2)
GRS-50EB-P3	2019.11	Rev.1	P102B Piston type bilge pump list (2/2)
GRS-50EB-P4	Rev.0		Spare part list for bilge pump
GRS-50EB-D01	2004.05	Rev.0	Upper cover 15ppm bilge separator
GRS-50EB-D02	2004.05	Rev.0	Steam inlet & outlet 15ppm bilge separator
GRS-50EB-D03-H1	-	-	Electric heater
GRS-50EB-D03-H1	-	-	Electric heater (2.0kW)
GRS-50EB-D03-H2	2004.05	Rev.0	Heater control panel, outline drawing
GRS-50EB-D03-H3	2004.05	Rev.0	Heater control panel, control circuit
GRS-50EB-D03-H3	2010.08	Rev.1	Heater control panel, control circuit (2.0 kW)
GRS-50EB-D04	2004.05	Rev.0	Body detail 15ppm bilge separator
GRS-50EB-D05	2004.05	Rev.0	Hand hole & f/ bracket detail
GRS-50EB-D06	2004.05	Rev.0	Nozzle detail 15ppm bilge separator
GRS-50EB-D07	2004.05	Rev.0	Sheet packing 15ppm bilge separator
GRS-50EB-D08	2004.05	Rev.0	Filter detail 15ppm bilge separator
GRS-100EB			
GRS-100EB-01	2004.05	Rev.0	15ppm Bilge Separator, general view
GRS-100EB-02	2010.08	Rev.2	System diagram for 15ppm Bilge Separator
GRS-100EB-03	2004.05	Rev.0	Flowing diagram for 15ppm Bilge Separator
GRS-100EB-04	2004.05	Rev.0	Oil level detector (LSC-75)
GRS-100EB-05	2004.05	Rev.0	Globe valve
GRS-100EB-06	2003.06	-	2 way cylinder valve
GRS-100EB-07	2004.05	-	3 way cylinder valve

<i>Drawing No.:</i>	<i>Date:</i>	<i>Rev.:</i>	<i>Title:</i>
GRS-100EB-08	2004.05	-	Safety relief valve
GRS-100EB-09	2004.05	-	Primary pressure regulating valve
GRS-100EB-10	2004.05	-	Primary pressure reducing valve
GRS-100EB-11	2004.05	Rev.0	Solenoid valve & filter regulator
GRS-100EB-12	2004.05	Rev.0	Air vent valve (AV-26)
GRS-100EB-13	-	-	Spare part list
GR-100-001	2004.08	-	Control panel (1/6)
GR-100-002	2004.08	-	Control panel (2/6)
GR-100-003	2004.08	-	Control panel (3/6)
GR-100-004	2004.08	-	Control panel (4/6)
GR-100-005	2004.08	-	Control panel (5/6)
GR-100-006	2004.08	-	Control panel (6/6)
GR-100-007	2004.08	-	Control panel, spare parts
GRS-100EB-P1	2019.11	Rev.1	P103A-Piston type bilge pump ass'y
GRS-100EB-P2	2019.11	Rev.1	P103A Piston type bilge pump list (1/2)
GRS-100EB-P3	2019.11	Rev.1	P103A Piston type bilge pump list (2/2)
GRS-100EB-P4	Rev.0		Spare part list for bilge pump
GRS-100EB-D01	2004.05	Rev.0	Upper cover 15ppm bilge separator
GRS-100EB-D02	2004.05	Rev.0	Steam inlet & outlet 15ppm bilge separator
GRS-100EB-D03-H1	-	-	Electric heater
GRS-100EB-D03-H1	-	-	Electric heater (2.0kW)
GRS-100EB-D03-H2	2004.05	Rev.0	Heater control panel, outline drawing
GRS-100EB-D03-H3	2004.05	Rev.0	Heater control panel, control circuit
GRS-100EB-D03-H3	2010.08	Rev.1	Heater control panel, control circuit (2.0 kW)
GRS-100EB-D04	2004.05	Rev.0	Body detail 15ppm bilge separator
GRS-100EB-D05	2004.05	Rev.0	Hand hole & f/ bracket detail
GRS-100EB-D06	2004.05	Rev.0	Nozzle detail 15ppm bilge separator
GRS-100EB-D07	2004.05	Rev.0	Sheet packing 15ppm bilge separator
GRS-100EB-D08	2004.05	Rev.0	Filter detail 15ppm bilge separator

Tests carried out

Performance Tests:

- With fluid A and inclination:
 - Report GRS20190927-01 "Appendix D Forms of Test Data and Test Results for 5ppm Bilge Separator", dated 27 September 2019 (witnessed by DNVGL).
 - Sample Water Test Report from Korea Testing and Research Institute dated 8 July 2019. Report No. TAK-2019-101721.
 - Sample Water Test Report from Korea Testing and Research Institute dated 8 July 2019. Report No. TAK-2019-100915.
 - Fuel Oil (Test Liquid "A") Test Report from Korea Testing and Certification dated 11 February 2019. Report No. T2019-00859.
 - Specific Gravity Report from Korea Testing and Research Institute dated 7 February 2019. Report No. TAK-2019-017309.
- With fluid B and C:
 - Test Report 5ppm Bilge Separator Model GRS-10EB, Doc. No. GRS-TA-06, Rev.0, dated 17 January 2017 (containing test results from Korea Testing & Research Institute for Chemical Industry dated 17 November 2004)
 - Test Report 5ppm Bilge Separator Model GRS-10EB, Doc. No. GRS-TA-06, Rev.0, dated 17 January 2017 (containing test results from Korea Testing & Research Institute for Chemical Industry dated 17 November 2004)

Environmental Test:

- Test Report on 15ppm Bilge Separator for Korean Register of Shipping, Korea Institute of Machinery and Materials, Daejeon, Korea. Report no. 2004334320, dated 22 November 2004.

Note:

The GRS EB Series 5ppm model is the same as the GRS EB Series 15ppm model (certified to IMO Res.MEPC.107(49)). The Performance Tests with Fluid B and C and the Environmental Test were performed on the GRS EB Series 15ppm model with testing and results also in compliance with DNVGL-CP-0208. See results in Appendices for further details.

Marking of product

The final product shall be provided with visible marking, which completely identifies the product and its components according to drawings/equipment specifications.

The marking shall give at least the following information:

- Identification of manufacturer.
- Equipment type designation or model identification.
- Maximum throughput and maximum influent pressure at which the separator is designed to operate.
- Serial number.
- Revision information, as applicable, for all firmware or software modules installed per hardware unit, necessary to identify the equipment.

Periodical assessment

Retention survey to be performed according to Type approval program DNVGL-CP-0338:

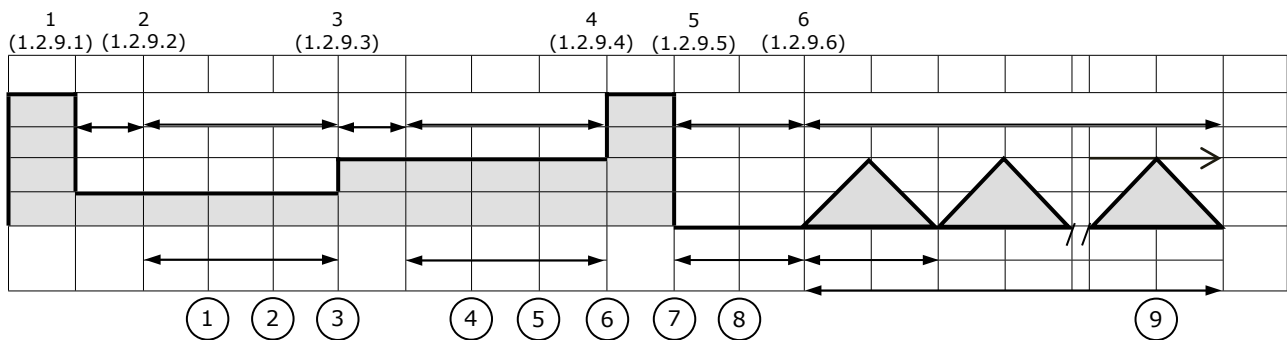
- This certificate is valid for five years and periodical assessments will be required after 2 years (+/- 90 days) and 3.5 years (+/- 90 days).

APPENDIX – GRS-10EB

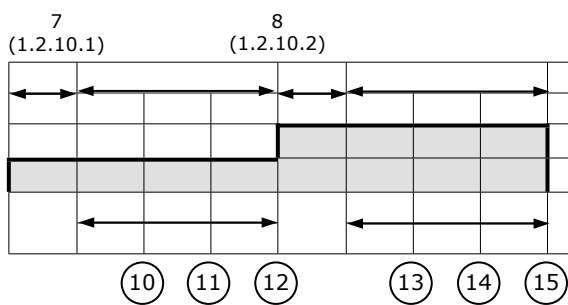
Test data and results of tests conducted on a 5 ppm Bilge Separator in accordance with DNVGL-CP-0208.

TEST RESULTS AND TEST PROCEDURES

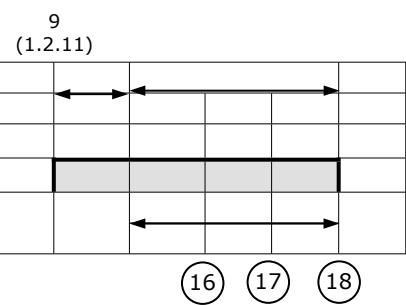
TEST FLUID "A"



TEST FLUID "B"



TEST FLUID "C"

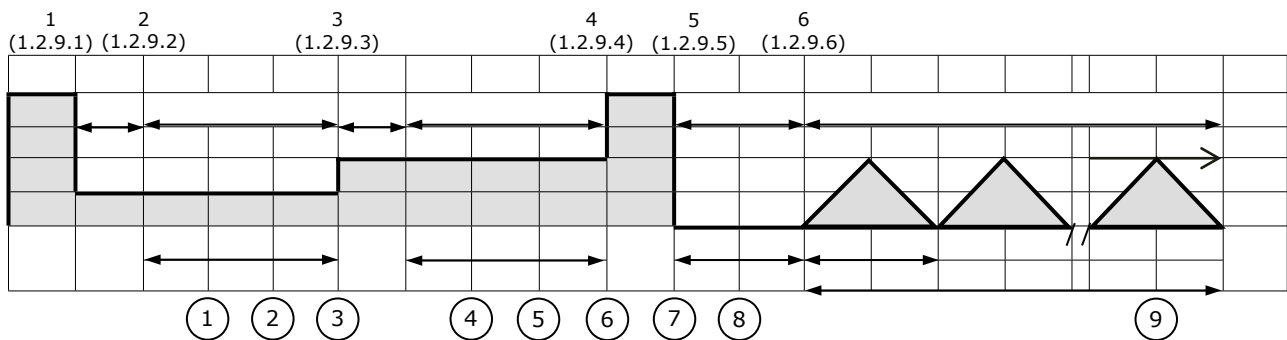


APPENDIX – GRS-50EB

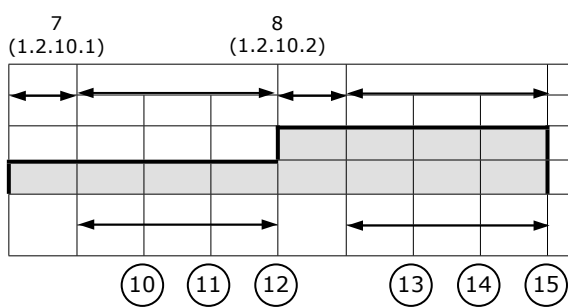
Test data and results of tests conducted on a 5 ppm Bilge Separator in accordance with DNVGL-CP-0208.

TEST RESULTS AND TEST PROCEDURES

TEST FLUID "A"



TEST FLUID "B"



TEST FLUID "C"

