Certificate no.:
TAP000030N

TYPE APPROVAL CERTIFICATE

This is to certify:

that the 5 ppm Bilge Alarm

with type designation(s)
BilgMon 488 II (Ex)

issued to
Brannstrom Sweden AB
Göteborg, **Sweden**

is found to comply with

DNV class programme DNV-CP-0485 – Type approval – 5 ppm bilge alarms
IMO Resolution MEPC.107(49) – Revised Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilges of Ships

Application:

This is to certify that the 5 ppm Bilge Alarm listed above has been examined and tested in accordance with the requirements contained in the DNV programme for type approval, DNV-CP-0485. The Bilge Alarm also complies with IMO Resolution MEPC.107(49) (type approval - 15 ppm bilge alarms).

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

A product approved by this certificate is accepted for installation on all vessels classed by DNV, unless otherwise instructed by relevant Maritime Administration.

5 ppm bilge alarms are required on vessels with DNV class notation CLEAN DESIGN.

Issued at **Høvik** on **2025-04-30**
This Certificate is valid until **2030-04-29**.
DNV local unit: **Sweden CMC**

for **DNV**

Approval Engineer: **Martin Olofsson**

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 BilgMon 488 II Bilge Alarm is intended for installation on board ships for monitoring the oil content of bilge water. The unit monitors the effluent from an approved bilge water separator and sends an alarm signal that facilitates the activation of discharge control devices when the oil content exceeds 5 ppm.

The BilgMon 488 II also comes in an explosion proof (Ex) version, where a connection box and the measuring cell are placed in the hazardous area zone.

The BilgMon 488 II is equipped with an alarm relay as well as an alert relay, both in alarm/alert state when the unit is de-energized. Both outputs are adjustable (5 ppm or lower) and in alarm/alert state when the oil content of the processed sample exceeds the set limits, and if the equipment malfunctions.

The alarm output is also in alarm state when the bilge separator is not operating.

A red LED indicates alert state. A yellow "valve open" LED indicates that the Automatic Stopping Device is not active (alarm relay not in alarm state) and separated water is being discharged to the sea.

There is also a digital or analogue 0(4) - 20 mA current signal output for remote surveillance and recording of oil content.

A flow switch shall be connected to generate alarm/alert if there is no sample water flow when the bilge separator is operating. The detection of no-flow shall initiate an external audible alarm. The external audible alarm is initiated also when the oil content exceeds the alarm limit or in case the equipment malfunctions.

The BilgMon 488 II uses the principle of scattered light for real time detection and measurement of the oil content.

Application/Limitation

The BilgMon 488 II Bilge Alarm is designed and tested to meet the requirements of DNV class programme for type approval DNV-CP-0485 and the requirements of IMO Resolution MEPC.107(49). This means among other criteria, an accuracy of ±2 ppm and a response time of less than 5 seconds.

The BilgMon 488 II can be installed in a hazardous area zone, when using the additional Zener barrier, a connection box and a specially designed measuring cell with an ATEX certificate for Ex-proof equipment.

The following shall be verified during installation:

- The alarm is always activated whenever clean water is used for cleaning or zeroing purposes.
- The alarm is always activated whenever no flow of sample through alarm is detected by the flow switch.
- Any alarm will activate the automatic stopping device preventing overboard discharge and lead to recirculation.
- The overall response time (including the response time of the alarm) between the effluent discharge exceeding 5 ppm oil and the operation of the automatic stopping device preventing overboard discharge is less than 20 seconds.
- By-passing the alarm during normal operation shall by no means be possible.
- 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.

Type approval documentation

Dwg. no.	Title	Date/Rev.
BilgMon488II	Instruction Manual BilgMon 488 II (DNV-CP-0485)	2025-04-23 / vBG2
BMB250411.1		2025-04-11 / Rev.A
BMB250408.3		2025-04-08 / Rev.A
BMB240311.4		2025-04-08 / Rev.A
BMB240311.3		2025-04-08 / Rev.A
BMB041118.1		2025-04-04 / Rev.A
BMB250410.1		2025-04-10 / Rev.A
BMB250325.1		2025-04-15 / Rev.B

Dwg. no.	Title	Date/Rev.
BM200319.1		2024-10-31 / Rev.E
BM200319.2		2024-10-31 / Rev.E
BMB240228.1		2024-02-28 / Rev.A
TRAC12ATEX0027X	ATEX Zener barrier, Z11	2022-10-07 / Rev.1
TRAC12ATEX0028X	ATEX measuring cell, CTB11	2022-09-30 / Rev.1

Tests carried out

The equipment is tested in accordance with the requirements of the DNV programme for type approval DNV-CP-0485 and IMO Resolution MEPC.107(49), which is documented by the following test reports.

- Test protocol for type approval of 15 ppm bilge alarm according to MEPC.107(49), SGS Institut Fresenius, report 117-3969183-1, dated 2017-12-12.
- Environmental testing of converting and analyzing unit CleanTrack 1000B (now BilgMon 488 II (Ex) measuring cell), DNV Certification AS, report 2011-3155 rev.2, dated 2011-07-08.
- Environmental tests of BilgMon 488 II - 15 ppm Bilge Alarm, PAConsult GmbH, report 24DE-00633 rev.1, dated 2024-10-25.
- Test report 5 ppm bilge alarm according to DNV-CP-0485, Brannstrom, dated 2025-02-28.
- Survey report - performance test of BilgMon 488 II as 5 ppm bilge alarm, DNV, report 262.1-041568-J-5, rev. 0, dated 2025-03-14

Software and firmware

The BilgMon 488 II 5 ppm Bilge Alarm is type approved with the software version 00E7 in the master unit and version 00F2 in the sensor unit. The software version can always be found in the information menu of the master unit.

The records of all software changes are to be forwarded periodically to DNV for evaluation. Major changes in the software, which can alter the performance of the system, require approval. Testing of the application functions of the revised software may be required.

Marking of product

For traceability of this Type Approval, each unit is to be marked with:

- Identification of manufacturer
- Equipment type designation and model identification
- Serial number
- Revision information, as applicable, for all firmware or software modules installed per hardware unit
- TA certificate number and revision

Periodical assessment

For retention of the Type Approval, DNV surveyor shall perform periodical assessments to verify that the conditions of the TA are not altered since the certificate was issued. The scope of periodical assessment includes:

- Review of the TA documentation and verification that the documentation is still used as basis for the production.
- Review of possible changes in design, material and performance of the product.
- Verification of the company’s production and quality systems ensuring continued consistent production of the type approved products to the required quality.
- Verification that the product marking for identification and traceability to the TA Certificate is not altered.

Copy of type approval certificate

A copy of this Type Approval Certificate shall be carried on board a vessel fitted with this 5 ppm bilge alarm, for inspections on board. A reference to the test protocol and a copy of the test results (Appendix to this certificate) should be available for inspection on board the vessel.

Revision history

Rev.	Date of issuance	Description
0	2025-04-30	Initial certificate based on performance test completed 15 May 2024

APPENDIX – summary of test DATA and results

Test data and results conducted with the 5 ppm bilge alarm in accordance with DNV class programme for type approval DNV-CP-0485, also complying with IMO Resolution MEPC.107(49).

Manufacturer of 5 ppm bilge alarm	Brannstrom Sweden AB
Model name	BilgMon 488 II (Ex) 5 ppm Bilge Alarm
Serial number of test unit	F11A:0002 and FFFF:4444
Test location	Gothenburg, Sweden
Date of test	06-07 and 14-15 May 2024
Organization responsible for the test	Brannstrom Sweden AB
Samples sealed and labelled by	Brannstrom Sweden AB
Method of sample analysis	SS-EN ISO 9377-2
Samples analysed by (name of laboratory)	Saybolt Sweden
Test fluid "A"	
Density at 15°C	990 kg/m^3
Viscosity at 100°C	15.46 mm^2/s (15.46 centistokes)
Flashpoint	95°C
Ash content	0.029% (mass)
Water content at start of test	0.117% (volume)
Test fluid "B"	
Density at 15°C	865 kg/m^3
Viscosity at 40°C	5.884 mm^2/s (5.884 centistokes)
Flashpoint	78°C
Ash content	<0.001% (mass)
Water content at start of test	39 mg/kg
Test fluid "C"	
Surfactant specification	Sodium dodecylbenzenesulfonate, Aldrich, 289957-500G
Iron oxide specification	Fe304 (Magnetite) 0-10 micron, Powder Technology Inc., PTI ID 13188A
Test water	
Density at 20°C	998 kg/m^3
Solid matter present	40 mg/l
Test temperatures	
Ambient	20°C
Test fluid "A"	48°C
Test fluid "B"	24°C
Test fluid "C"	24°C
Test water	24°C

Diagram of test facility submitted: ☒ Yes ☐ No

Diagram of sampling arrangement submitted: ☒ Yes ☐ No

Display calibration and activation accuracy test

Test fluid "A"	**Time**	**Expected oil content [ppm]**	**Reading from alarm display [ppm]**		**Lab analysis oil content in grab sample (1) [ppm]**	**Accuracy of reading [ppm]**		**Alarm activated [Yes/No]**
			Ex	Std		Ex	Std	
Clean water	08:45	0.0						No
6 ppm (2)	09:58	6.2						Yes
Clean water	10:05	0.0						No
4 ppm	10:12	4.1						No
Clean water	10.15	0.0						No
2 ppm	10:25	2.0						No
Clean water	10:35	0.0						No
Water temperature	40°C							
Re-zero	☐ Yes ☒ No if Yes, when:							
Re-calibrate	☐ Yes ☒ No if Yes, when:							

(1) Laboratory analysis results only used for reference; the expected oil content (from mixing procedure) is used as the true value.
(2) 6 ppm was performed first due to practical setting of the dosing equipment.

Test fluid "B"	**Time**	**Expected oil content [ppm]**	**Reading from alarm display [ppm]**		**Lab analysis oil content in grab sample (1) [ppm]**	**Accuracy of reading [ppm]**		**Alarm activated [Yes/No]**
			Ex	Std		Ex	Std	
Clean water	09:02	0.0						No
2 ppm	09:22	2.0						No
Clean water	09:31	0.0						No
4 ppm	09:50	4.0						No
Clean water	10:00	0.0						No
6 ppm	10:10	6.0						Yes
Clean water	10:20	0.0						No
Water temperature	24°C							
Re-zero	☐ Yes ☒ No if Yes, when:							
Re-calibrate	☐ Yes ☒ No if Yes, when:							

(1) Laboratory analysis results only used for reference; the expected oil content (from mixing procedure) is used as the true value.

Contaminant and colour test

Test fluid	Time (1)	Expected oil content [ppm]	Reading from alarm display [ppm]		Calibration shift (2) [ppm]	
			Ex	Std	Ex	Std
Clean water	10:45	0.0				
Clean water and 4 ppm test fluid “B”	10:50	4.0				
4 ppm test fluid “B” and iron oxide 4 ppm	10:55	4.0				
4 ppm test fluid “B” and iron oxide 50 ppm	11:03	4.0				
4 ppm test fluid “B” and iron oxide 100 ppm	11:08	4.0				
Clean water and 4 ppm test fluid “B”	11:17	4.0				
4 ppm test fluid “B” and very salt water (6%)	11:38	4.0				

(1) Total testing time 60 minutes.
(2) Calibration shift is defined as temporary movements from the true (expected) value.

Sample pressure or flow test

Test fluid	Pressure [bar] or flow [l/min]	Expected oil content [ppm]	Reading from alarm display [ppm]		Zero shift (1) [ppm]		Calibration shift (2) [ppm]	
			Ex	Std	Ex	Std	Ex	Std
Clean water, normal pressure/flow	1.6 bar	0.0						
4 ppm test fluid “B”, normal pressure/flow	0.8 bar	4.0						
4 ppm test fluid “B”, twice of normal pressure/flow	1.6 bar	4.0						
4 ppm test fluid “B”, half of normal pressure/flow	3.2 bar	4.0						
Clean water, normal pressure/flow	1.6 bar	0.0						
Deviations and other comments								

(1) Zero shift is defined as temporary movements from an expected zero value.
(2) Calibration shift is defined as temporary movements from the true (expected) value.

Shut-off test

Test fluid	Time (3)	Expected oil content [ppm]	Reading from alarm display [ppm]		Zero shift (1) [ppm]		Calibration shift (2) [ppm]	
			Ex	Std	Ex	Std	Ex	Std
Clean water	17:15	0.0						
4 ppm test fluid “B” before shut-off	17:30	4.0						
Shut-off, minimum 8 hours	08:20							
4 ppm test fluid “B” min. 8 hours after shut-off	08:35	4.1						
Clean water	08:50	0.0						
Deviations or damage to bilge alarm								

(1) Zero shift is defined as temporary movements from an expected zero value.
(2) Calibration shift is defined as temporary movements from the true (expected) value.
(3) Test performed 6-7 May 2024 and agreed to be performed without the presence of a DNV surveyor.

Utilities supply variation test

Test fluid	Expected oil content [ppm]	Reading from alarm display [ppm]		Zero shift (1) [ppm]		Calibration shift (2) [ppm]	
		Ex	Std	Ex	Std	Ex	Std
Clean water	0.0						
110% voltage	4.0						
90% voltage	4.0						
90% air pressure	n/a						
110% air pressure	n/a						
90% hydraulic pressure	n/a						
110% hydraulic pressure	n/a						
Clean water	0.0						
Deviations and other comments							

(1) Zero shift is defined as temporary movements from an expected zero value.
(2) Calibration shift is defined as temporary movements from the true (expected) value.

Calibration and zero drift test

Test fluid	Time (4)	Expected oil content [ppm]	Reading from alarm display [ppm]		Lab analysis oil content in grab sample (5) [ppm]	Calibration shift (1) [ppm]		Calibration drift (2) [ppm]		Zero drift (3) [ppm]	
			Ex	Std		Ex	Std	Ex	Std	Ex	Std
Clean water	08:45	0.0									
4 ppm test fluid “B” after 0 hours	09:00	4.1									
4 ppm test fluid “B” after 2 hours	11:00	4.0									
4 ppm test fluid “B” after 4 hours	13:00	4.0									
4 ppm test fluid “B” after 6 hours	15:00	4.0									
4 ppm test fluid “B” after 8 hours	17:00	4.0									
Clean water	17:15	0.0									

(1) Calibration shift is defined as temporary movements from the true (expected) value. Zero shift is used for temporary movements from an expected zero value.
(2) Calibration drift is defined as slow movements from the true (expected) value, that becomes permanent over time.
(3) Zero drift is defined as slow movements from an expected zero value, that becomes permanent over time.
(4) Test performed 2024-05-06 and agreed to be performed without the presence of a DNV surveyor.
(5) Laboratory analysis results only used for reference; the expected oil content (from mixing procedure) is used as the true value.

Response time test

Test fluid	Time (1)	Expected oil content [ppm]	Reading from alarm display [ppm]	Response time [s]
Clean water	10:35			
Test fluid “A”	10:50			
Clean water	14:35			
Test fluid “B”	14:50			
Clean water	13:30			
Test fluid “C”	13:45			

(1) Test fluid “B” and “C” was done 14 May before test fluid “A” (15 May) for practical reasons.