

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Ballast Water Management System**with type designation(s)
oneTank

Issued to

oneTank, LLC
Seattle, WA, USA

is found to comply with

DNV GL rules for classification – Ships**Resolution MEPC.169(57)****IMO Resolution MEPC.300(72) - Code for Approval of Ballast Water Management Systems (BWMS Code)****DNV GL class programme DNVGL-CP-0209 – Type approval – Ballast water management systems****Application :**

This is to certify that the Ballast Water Management System listed above has been examined and tested in accordance with the requirements of the specifications contained in the BWMS Code and DNV GL Rules stated above. The test records used are for Envirocleanse inTank BWTS as the base model. This Certificate is valid for the oneTank system referred to above.

System Design Limitations / Limiting Operating Conditions imposed are described in this document.

For the compliance with the BWMS Code, the Certificate is issued on behalf of the Norwegian Maritime Authority.

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

Issued at **Høvik** on **2020-07-03**This Certificate is valid until **2023-12-19**.for **DNV GL**DNV GL local station: **Seattle**Approval Engineer: **Martin Olofsson**

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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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV GL AS, its parent companies and subsidiaries as well as their officers, directors and employees ("DNV GL") 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 300,000 USD.



Job Id: **262.1-032595-1**
Certificate No: **TAP000024K**

Name of ballast water management system (BWMS)

oneTank

Ballast water management system manufactured by

oneTank, LLC

Place of production

oneTank, LLC, Seattle, Washington USA

Type and model designations

oneTank (one size)

Equipment/Assembly drawings

The oneTank system shall be installed in accordance with the documents listed below:

Description	Title	Dwg. No.	Doc. rev. & date
Operation, maintenance and safety manual (OMSM)	oneTank BWTS Operation, maintenance and safety manual	G2-1901-080	Rev. D 2020-06-08
Bill of materials	Bill of materials and certificates	G2-1901-010	Rev. C 2020-06-08
General assembly drawings	General arrangement	G2-1901-020	Rev. A 2020-03-14
Piping and instrumentation diagram (P&ID)	Piping and instrumentation diagram	G2-1901-030	Rev. C 2020-06-01
Electrical wiring diagrams, block diagrams, panel and device arrangement	Electrical wiring diagrams, block diagram, lists and notes	G2-1901-050	Rev. B 2020-06-01
Guidelines to place nozzles in any ballast tank for effective disinfectant dispersion	oneTank BWTS nozzle placement guidance	G2-1901-101	Rev. - 2020-01-31

Other equipment manufactured by

None

Total treatment capacity

Up to 4,000 m³ per ballast water tank

Type approval based on other type approval

The oneTank type approval is based on the type approval of Envirocleanse inTank BWTS, issued by DNV GL, on behalf of the Norwegian Maritime Authority, as certificate TAP000015Y Rev. 1, dated 2019-07-04. The oneTank system is a reduced features version of Envirocleanse inTank BWTS where the treatment philosophy and the dose used are identical. The main components of the oneTank system are the same as for inTank BWTS. The oneTank system can only treat one tank at the time, it only uses bulk chemicals and it has a fixed holding time of 24 hours.

Product description

Treatment sequence:

- Ballast water uptake: No treatment
- In-tank treatment: Injection of sodium hypochlorite (initial dose and maintenance dose) from bulk chemical storage and in-tank circulation (2 events)
- In-tank neutralization: Injection of neutralization agent and in-tank circulation
- Ballast water discharge: No treatment

System design limitations / Water quality parameters

Temperature and Salinity

Ballast water salinity and temperature are not limiting conditions for the oneTank system.

System design limitations / Operational parameters

Dosing and holding time

The target concentration-time (CT) must be ≥ 120 mg-hr/L Total Residual Oxidants as Cl_2 (TRO), within the boundaries in below table:

Ballast water salinity	Minimum holding time [hr]	Average target TRO concentration [mg/L]
any	24	$\frac{120 \left[\frac{\text{mg} \cdot \text{hr}}{\text{L}} \text{TRO} \right]}{\text{holding time [hr]}}$ The average TRO concentration shall be minimum 5 mg/L during the first 24 hours of treatment

The system is type approved with an initial dose setting of $1.25 \times$ target average TRO concentration ($=6.25$ mg/L).

The maximum allowable initial TRO is 8 mg/L. The source of active substance is sodium hypochlorite (NaOCl) stored as an 8.25% (w/w) bulk chemical solution.

TRO concentration in the tank before discharge shall be ≤ 0.1 mg/L.

Ballast tank volume, treatment time and estimated need of chemicals

The oneTank system treats one tank at the time, from the initial injection of the bulk chemical (BC) through the maintenance dose and to the injection of the neutralizer agent as de-chlor (DC), when the holding time is completed.

The below table gives the ballast water tank volume and the total treatment time. Estimated amounts of the chemicals BC and DC needed for the treatment and neutralization, are also indicated but these amounts depend on the actual contents of the ambient water from the uptake of the ballast water.

Ballast water tank volume (m ³)	Holding time 24 hours		
	Treatment time (hr)	BC volume (L) ⁽¹⁾	DC volume (L) ⁽²⁾
100	25	16	2
250	27	40	5
500	27	79	10
1000	27	159	21
1500	28	238	31
2000	28	318	41
2500	29	397	52
3000	29	477	62
3500	30	556	73
4000	30	636	83

(1) Volume of bulk chemical liquid solution with 8.25% (w/w) of sodium hypochlorite

(2) Volume of neutralizer liquid solution with 30% (w/w) of sodium thiosulphate

Larger tank volumes than 4000 m³ may be treated but would require additional treatment time and chemicals volume. Such arrangements should be approved, case by case, by DNV GL.

Control and monitoring equipment

Software version

The oneTank system is type approved with the system control software version oneTank 01.02. Any changes to the software are to be recorded as long as the system is in use on board. The records of all changes are to be forwarded to DNV GL 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.

Safety measures

The oneTank system is type approved with the following measure for monitoring the safe operation of the treatment system:

- The oneTank system uses plastic piping as part of the design, therefore steel, or equivalent, isolation valves shall be fitted before and after the dosing spool with remote closing arrangements.
- Appropriate drip pans shall be fitted under BC and DC chemical storage containers.

Electrical and electronic components

The oneTank system is type approved with the electrical and electronic components indicated in the P&ID and specified in the Bill of Materials (Appendix A and B to the OMSM). Except for the components listed below, alternate models to the ones specified in the Bill of Materials may be used provided that information regarding the selected component is part of the documentation related to the specific installation, by providing either a reference to valid type approval certificate or technical documentation demonstrating that the selected component was subject to environmental testing as per IACS UR E10.

For the following electrical and electronic components, the models specified in the Bill of Materials shall be used:

Tag No.	Component name	Manufacturer	Model(s)
XIT-07	Residual oxidant monitor – DPD	HF Scientific	CLX-XT2
MCP	Control panel	Glosten	MCP
RCP	Remote control panel (optional)	Glosten	RCP

Hazardous area / Ex-proof

The oneTank system is not designed to be installed in a hazardous area.

Documents approval

- Power supply arrangement
- Interface description towards ship's existing systems including alarms for failure and override functionality in case of emergency
- Piping and instrumentation diagram (P&ID)
- Bill of materials
- Nozzle placement and sizing document
- Commissioning procedure

Type approval documentation

- Basic Approval, Report of the Marine Environmental Protection Committee, MEPC 71/17 dated 2017-07-24 (for Envirocleanse inTank BWTS as the base model)
- Final Approval, Report of the Marine Environmental Protection Committee, MEPC 74/18 dated 2019-06-09 (for Envirocleanse inTank BWTS as the base model)

System documentation

- Operation, Maintenance and Safety Manual, oneTank Ballast Water Treatment System (OMSM), Glosten, File No. G2-1901-080, Rev. D, 2020-06-08
- oneTank BWTS Nozzle Placement Guidance, Glosten, File No. G2-1901-101, Rev. -, 2020-01-31
- oneTank BWTS Scaling Document, Appliances, Glosten, File No. G2-1901-110, Rev. A, 2020-04-30
- oneTank BWTS Functional Specification, Glosten, File No. G2-1901-060, Rev. B, 2020-04-30
- oneTank BWTS Safety Assessment, Glosten, File No. G2-1901-070, Rev. B, 2020-06-01
- oneTank BWTS Commissioning Procedure, Glosten, File No. G2-1901-082, Rev. C, 2020-06-01

Test reports

(for Envirocleanse inTank BWTS as the base model)

- Final land-based ballast water management report according to USCG final rule – Envirocleanse inTank BWTS, Golden Bear Research Center, Rev. 1, 2018-12-12
- Final shipboard ballast water management report according to USCG final rule – Envirocleanse inTank BWTS, Golden Bear Research Center, Rev. -, 2018-07-10
- EMC and Environmental testing of selected parts of Envirocleanse, Applica Test & Certification, Report No. 21246, Rev. 2, 2018-08-30
- Mineral New York inTank BWTS Install Mixing Study Report, Glosten, Doc. 16017.12.01-11, Rev. -, 2018-02-13

Tests carried out

- Land-based testing in accordance with Resolution MEPC.300(72)
- Shipboard testing in accordance with Resolution MEPC.300(72)
- Type test of the control and automation system witnessed by DNV GL
- Function test of the control system for oneTank
- Testing in accordance with environmental test specification for instrumentation and automation equipment, DNV GL CG-0339 and Resolution MEPC.300(72)
- Scaling test mixing capacity on board the bulk carrier, Mineral New York, using dosing module DM150G, witnessed by DNV GL

Marking of product

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

- Manufacturer's name or trade mark
- Type designation
- Serial number

Periodical assessment

For retention of the Type Approval, a DNV GL 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 ship fitted with this ballast water management system, for inspection on board the ship. A reference to the test protocol and a copy of the test results should be available for inspection on board the vessel.

ANNEX 1 SUMMARY OF TESTING

Summary of land-based testing for the Envirocleanse inTank BWTS (as the base model)

Tests were performed with the electrochlorination (EC) and bulk chemical (BC) variations of Envirocleanse inTank BWTS. The oneTank system is based on the bulk chemical variation.

For the purposes of biological efficacy testing, the EC variation was deemed to be equivalent to, or more effective than the BC variation, and testing of the two variations was combined. A minimum of five tests per salinity were required for the BC variation, and a minimum of two additional tests per salinity were required for the EC variation. A minimum of two tests per holding time per salinity using either EC or BC were required to prove efficacy of each holding time.

Table 1 Land-based challenge water conditions in fresh, brackish, and marine water test cycles for the electrochlorination (EC) and bulk chemical (BC) variations of the Envirocleanse inTank BWTS, in 2017-2018 at the Golden Bear Research Center.

Test cycle	inTank variation	Salinity [PSU]	Temp [°C]	Highest residual TRO [mg/L]	DOC [mg/L]	POC [mg/L]	TSS [mg/L]	Holding time [hr]
Fresh water tests								
LLB23	BC	1.1	13.3	9.0	7.9	8.0	48.2	24.5
LLB24	EC	1.1	13.3	7.2	7.9	8.0	48.2	24.5
LLB25	BC	0.7	11.9	7.1	10.0	10.0	53.7	24.5
LLB26	BC	0.7	11.9	8.6	10.0	10.0	53.7	25.5
LLB27	EC	0.5	12.5	4.7	8.3	12.3	65.3	61.3
LLB29	BC	0.7	9.5	7.9	9.2	10.8	52.7	24.6
LLB30	BC	0.7	9.5	8.3	9.2	10.8	52.7	24.7
Brackish water tests								
LLB5	BC	7.7	14.7	7.5	8.0	8.7	72.4	24.7
LLB6	BC	7.7	14.7	7.2	8.0	8.7	72.4	24.6
LLB14	EC	15.8	19.8	6.4	6.6	10.4	87.5	24.4
LLB15	BC	17.0	17.0	7.5	8.2	8.5	52.7	24.5
LLB16	EC	17.0	17.0	6.6	8.2	8.5	52.7	24.4
LLB21	BC	14.5	15.4	5.2	7.8	8.0	49.8	61.3
LLB22	BC	14.5	15.4	4.2	7.8	8.0	49.8	61.1
Marine water tests								
LLB8	BC	24.2	19.8	6.6	6.6	9.4	50.1	27.2
LLB11	BC	22.9	21.4	6.6	5.5	7.8	52.6	24.5
LLB12	EC	22.9	21.4	6.5	5.5	7.8	52.6	24.4
LLB17	BC	25.7	15.1	7.9	8.4	9.7	57.4	24.9
LLB18	EC	25.7	15.1	6.6	8.4	9.7	57.4	24.4
LLB19	BC	27.0	15.5	4.2	7.6	9.0	65.6	61.2
LLB20	BC	27.0	15.5	4.3	7.6	9.0	65.6	61.1

Table 2 Summary of land-based test results for the Envirocleanse inTank BWTS: Average density of live organisms in inlet, treated, and control discharge waters. Live organisms in the ≥ 10 and $< 50 \mu\text{m}$ size group were quantified using CMFDA. All counts of pathogenic bacteria (*E. coli*, *Enterococci* and *Vibrio cholerae*) in the test cycles were below the ballast water discharge standard.

Test cycle	Organisms $\geq 50 \mu\text{m}$ [org/m ³]	Organisms $\geq 10 - < 50 \mu\text{m}$ [org/mL]	Organisms $\geq 50 \mu\text{m}$ [org/m ³]		Organisms $\geq 10 - < 50 \mu\text{m}$ [org/mL]	
	Inlet	Inlet	Treated	Control	Treated	Control
Fresh water tests						
LLB23	105,253	3,648	0.4	174,546	6.0	2,527
LLB24	105,253	3,648	0.5	174,546	3.3	2,527
LLB25	212,323	1,407	0.6	197,374	0.3	983
LLB26	212,323	1,407	< 0.3	197,374	0.3	983
LLB27	94,748	1,260	4.7	74,141	1.2	1,040
LLB29	106,667	1,250	1.3	55,354	1.0	1,030
LLB30	106,667	1,250	0.3	55,354	1.5	1,030
Brackish water tests						
LLB5	1,836,970	1,628	0.4	1,663,030	0.7	1,960
LLB6	1,836,970	1,628	0.2	1,663,030	5.0	1,960
LLB14	423,030	3,167	4.7	206,465	4.3	1,060
LLB15	172,727	7,533	0.8	61,212	0.3	2,590
LLB16	172,727	7,533	1.4	61,212	0.7	2,590
LLB21	109,091	3,237	0.7	67,273	1.5	1,357
LLB22	109,091	3,237	1.5	67,273	1.8	1,357
Marine water tests						
LLB8	422,626	4,600	8.5	179,293	2.2	782
LLB11	499,394	1,178	3.5	188,283	2.3	592
LLB12	499,394	1,178	4.9	188,283	1.8	592
LLB17	180,808	1,757	0.4	64,242	2.8	1630
LLB18	180,808	1,757	0.6	64,242	9.7	1630
LLB19	583,030	3,460	0.6	56,389	3.3	1803
LLB20	583,030	3,460	0.4	56,389	8.7	1803

**Summary of shipboard testing for the Envirocleanse inTank BWTS
(as the base model for the oneTank system)**

Table 3 Summary of shipboard test conditions and results for the (EC) and bulk chemical (BC) variations of the Envirocleanse inTank BWTS, 2017-2018 on board the USTS GOLDEN BEAR. All counts of pathogenic bacteria (*E. coli*, *Enterococci* and *Vibrio cholerae*) in the test cycles were below the ballast water discharge standard.

Test cycle	inTank variation	Test volume [m ³]	Highest residual TRO [mg/L]	Holding time [hr]	Salinity [PSU]	DOC [mg/L]	Temp. [°C]	Organisms ≥50 µm [org/m ³]		Organisms ≥10 - <50 µm [org/mL]	
								Inlet	Discharge	Inlet	Discharge
LSB1	BC	477	9.0	24.6	5.5	7.1	14.5	358,207	2.1	553	0.2
LSB2	BC	244	7.4	23.2	0.3	4.0	17.4	268,081	5.2	948	0.2
LSB3	BC	810	6.3	23.9	26.8	1.5	11.1	101,010	1.7	441	1.8
LSB4	BC	440	6.1	24.5	6.3	2.7	19.7	322,083	4.3	695	2.7
LSB5	EC	222	6.4	24.3	16.5	6.6	19.8	423,030	4.7	3167	4.3