

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Sewage Treatment Plants

with type designation(s)

ISB-01 (1,260 l/day), ISB-02 (2,100 l/day), ISB-03 (2,800 l/day), ISB-04 (4,200 l/day), ISB-06 (5,600 l/day), ISB-07 (7,000 l/day), ISB-09 (9,100 l/day), ISB-11 (11,200 l/day), ISB-15 (15,400 l/day), ISB-23 (23,100 l/day), ISB-33 (32,900 l/day), ISB-41 (41,000 l/day), ISB-48 (48,000 l/day), ISB-65 (65,000 l/day)

issued to

Dong Bang Ship Machinery Co., Ltd.
Busan, Republic of Korea

is found to comply with

IMO Resolution MEPC.227(64) "2012 GUIDELINES ON IMPLEMENTATION OF EFFLUENT STANDARDS AND PERFORMANCE TESTS FOR SEWAGE TREATMENT PLANTS" with the exception of Section 4.2

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.227(64), 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.

Issued at **Høvik** on **2025-03-07**

This Certificate is valid until **2030-03-06**.

for **DNV**

DNV local unit: **Busan, CMC Korea**

Approval Engineer: **Anna Piotrowska**

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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 ISB series treats sewage using the following process: i) sewage enters the unit via a screen, ii) organic matter in the sewage is decomposed by microorganisms in the No.1 and No.2 Moving Bed Bio-film Reactor (MBBR) tanks, iii) the process water passes through a settling tank where suspended solids and other remain contents are removed, iv) activated sludge from the settling tank is periodically returned to MBBR tanks, iv) the process water enters a sterilization tank where a chemical disinfectant is added, v) treated water exits the unit and may be discharged overboard.

Application/Limitation

Application

<i>Model</i>	<i>Designed Hydraulic Loading (l/day)</i>	<i>Designed Organic Loading, BOD₅ (kg/day)</i>
ISB-01	1,260	0.47
ISB-02	2,100	0.78
ISB-03	2,800	1.04
ISB-04	4,200	1.57
ISB-06	5,600	2.09
ISB-07	7,000	2.63
ISB-09	9,100	3.42
ISB-11	11,200	4.20
ISB-15	15,400	5.78
ISB-23	23,100	8.67
ISB-33	32,900	12.35
ISB-41	41,000	15.39
ISB-48	48,000	18.02
ISB-65	65,000	24.40

Limitations

Inclination range	Maximum 22.5 °
Ambient temperature (°C)	2 - 50°C
Relative humidity	80% or less

The ISB series shall not be used on Passenger Ships in Special Areas (ref. IMO Resolution MEPC.227(64) Section 4.2).

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

Sewage sludge shall be periodically discharged from the MBBR tanks and settling tank according to the instructions given in the operation and maintenance manual listed in the Type Approval documentation section.

The ship should have on board at all times a manual detailing the operational and maintenance procedures for the sewage treatment plant, including safety information about the chemicals and materials actually used in the operation of the sewage treatment plant.

Installation requirements

To ensure that the sterilization process operates correctly, the discharge pipe shall be installed so that it passes above the sewage treatment plant with a minimum height "H2" as indicated in the piping diagrams listed in the Type Approval documentation section.

The location of the MBBR tanks may be moved symmetrically on the x-axis relative to the centreline of the y-axis, as described in the "Dimension of S.T.P." drawings listed in the Type Approval documentation.

Type Approval documentation

Piping and Instrumentation Diagrams (P&ID):

<i>Drawing Title</i>	<i>Drawing Number</i>	<i>Revision (date)</i>
Piping Diagram (1x1)	ISB-01-65-002-01	4 (2024-10-21)
Piping Diagram (1x2)	ISB-01-65-002-02	4 (2024-10-21)
Piping Diagram (2x1)	ISB-01-65-002-03	4 (2024-10-21)
Piping Diagram (2x2)	ISB-01-65-002-04	4 (2024-10-21)

Arrangement Drawings and Parts:

<i>Drawing Title</i>	<i>Drawing Number</i>	<i>Revision (date)</i>
Dimension of S.T.P. (1x1)	ISB-01-03-001-01	6 (2024-10-21)
Dimension of S.T.P. (2x2)	ISB-01-03-001-02	6 (2024-10-21)
Dimension of S.T.P. (2x1)	ISB-01-03-001-03	6 (2024-10-21)
Dimension of S.T.P. (1x2)	ISB-01-03-001-04	6 (2024-10-21)
Dimension of S.T.P. (1x1)	ISB-04-11-001-01	6 (2024-10-21)
Dimension of S.T.P. (2x2)	ISB-04-11-001-02	6 (2024-10-21)
Dimension of S.T.P. (2x1)	ISB-04-11-001-03	6 (2024-10-21)
Dimension of S.T.P. (1x2)	ISB-04-11-001-04	6 (2024-10-21)
Dimension of S.T.P. (1x1)	ISB-15-65-001-01	6 (2024-10-21)
Dimension of S.T.P. (2x2)	ISB-15-65-001-02	6 (2024-10-21)
Dimension of S.T.P. (2x1)	ISB-15-65-001-03	6 (2024-10-21)
Dimension of S.T.P. (1x2)	ISB-15-65-001-04	6 (2024-10-21)
Discharge pump dimension (PU-1700)	ISB-01-65-003-01	1 (2024-10-21)
Discharge pump components (PU-1700)	ISB-01-65-003-02	1 (2024-10-21)
Discharge pump (PA-1688-4T-F55)	ISB-01-65-003-01	4 (2024-10-21)
Discharge pump (PA-1688-T-F55)	ISB-01-65-003-01	4 (2024-10-21)
Discharge pump (PA-1688-T(4T)-F55)	ISB-01-65-003-02	1 (2024-10-21)
Discharge pump dimension (NHF-40B)	ISB-01-65-005-03	1 (2024-10-21)
Discharge pump components (NHF-40B)	ISB-01-65-005-04	1 (2024-10-21)
Discharge pump dimensions (NHF-50A/10)	ISB-01-65-004-01	1 (2024-10-21)
Discharge pump components (NHF-50A/10)	ISB-01-65-004-02	1 (2024-10-21)
Discharge pump dimensions (NHF-50A/15)	ISB-01-65-005-01	1 (2024-10-21)
Discharge pump components (NHF-50A/15)	ISB-01-65-005-02	1 (2024-10-21)
Aeration blower dimension (IHB-202)	ISB-01-65-006-01	1 (2024-10-21)
Aeration blower components (IHB-202)	ISB-01-65-006-02	1 (2024-10-21)
Aeration blower dimension (IHB-402S)	ISB-01-65-007-01	1 (2024-10-21)
Aeration blower components (IHB-402S)	ISB-01-65-007-02	1 (2024-10-21)
Aeration blower dimension (IHB-802)	ISB-01-65-008-01	1 (2024-10-21)
Aeration blower components (IHB-802)	ISB-01-65-008-02	1 (2024-10-21)
Aeration blower dimension (IHB-1102)	ISB-01-65-009-01	1 (2024-10-21)
Aeration blower components (IHB-1102)	ISB-01-65-009-02	1 (2024-10-21)
Chemical pump dimension (AX1-21)	ISB-01-65-010-01	1 (2024-10-21)
Chemical pump components (AX1-21)	ISB-01-65-010-02	1 (2024-10-21)
Chemical pump dimension (SP-B30)	ISB-01-65-012-01	1 (2024-10-21)
Chemical pump components (SP-B30)	ISB-01-65-012-02	1 (2024-10-21)
Level switch	ISB-011-01	1 (2024-10-21)
Level switch	ISB-011-02	1 (2024-10-21)

Electrical Drawings:

<i>Drawing Title</i>	<i>Drawing Number</i>	<i>Revision (date)</i>
Control circuit for S.T.P	ISB-00-11C-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-11C-02	5 (2024-10-21)
Operation switch name plate	ISB-00-11C-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-12C-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-12C-02	5 (2024-10-21)
Operation switch name plate	ISB-00-12C-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-21C-01	6 (2024-10-21)

<i>Drawing Title</i>	<i>Drawing Number</i>	<i>Revision (date)</i>
Panel control circuit for S.T.P	ISB-00-21C-02	5 (2024-10-21)
Operation switch name plate	ISB-00-21C-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-22C-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-22C-02	5 (2024-10-21)
Operation switch name plate	ISB-00-22C-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-11G-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-11G-02	5 (2024-10-21)
Operation switch name plate	ISB-00-11G-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-12G-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-12G-02	5 (2024-10-21)
Operation switch name plate	ISB-00-12G-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-21G-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-21G-02	5 (2024-10-21)
Operation switch name plate	ISB-00-21G-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-22G-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-22G-02	5 (2024-10-21)
Operation switch name plate	ISB-00-22G-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-11CL-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-11CL-02	5 (2024-10-21)
Operation switch name plate	ISB-00-11CL-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-12CL-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-12CL-02	5 (2024-10-21)
Operation switch name plate	ISB-00-12CL-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-21CL-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-21CL-02	5 (2024-10-21)
Operation switch name plate	ISB-00-21CL-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-22CL-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-22CL-02	5 (2024-10-21)
Operation switch name plate	ISB-00-22CL-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-11GL-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-11GL-02	5 (2024-10-21)
Operation switch name plate	ISB-00-11GL-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-12GL-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-12GL-02	5 (2024-10-21)
Operation switch name plate	ISB-00-12GL-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-21GL-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-21GL-02	5 (2024-10-21)
Operation switch name plate	ISB-00-21GL-03	5 (2024-10-21)
Control circuit for S.T.P	ISB-00-22GL-01	6 (2024-10-21)
Panel control circuit for S.T.P	ISB-00-22GL-02	5 (2024-10-21)
Operation switch name plate	ISB-00-22GL-03	5 (2024-10-21)
Control circuit for S.T.P & vacuumator	ISB-00-11VC-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumator	ISB-00-11VC-02	6 (2024-10-21)
Control panel for S.T.P & vacuumator	ISB-00-11VC-03	5 (2024-10-21)
Operation switch name plate	ISB-00-11VC-04	5 (2024-10-21)
Control circuit for S.T.P & vacuumator	ISB-00-12VC-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumator	ISB-00-12VC-02	6 (2024-10-21)
Control panel for S.T.P & vacuumator	ISB-00-12VC-03	5 (2024-10-21)
Operation switch name plate	ISB-00-12VC-04	5 (2024-10-21)
Control circuit for S.T.P & vacuumator	ISB-00-21VC-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumator	ISB-00-21VC-02	6 (2024-10-21)
Control panel for S.T.P & vacuumator	ISB-00-21VC-03	5 (2024-10-21)
Operation switch name plate	ISB-00-21VC-04	5 (2024-10-21)
Control circuit for S.T.P & vacuumator	ISB-00-22VC-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumator	ISB-00-22VC-02	6 (2024-10-21)
Control panel for S.T.P & vacuumator	ISB-00-22VC-03	5 (2024-10-21)
Operation switch name plate	ISB-00-22VC-04	5 (2024-10-21)
Control circuit for S.T.P & vacuumator	ISB-00-11VG-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumator	ISB-00-11VG-02	6 (2024-10-21)
Control panel for S.T.P & vacuumator	ISB-00-11VG-03	5 (2024-10-21)
Operation switch name plate	ISB-00-11VG-04	5 (2024-10-21)

<i>Drawing Title</i>	<i>Drawing Number</i>	<i>Revision (date)</i>
Control circuit for S.T.P & vacuumarator	ISB-00-12VG-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-12VG-02	6 (2024-10-21)
Control panel for S.T.P & vacuumarator	ISB-00-12VG-03	5 (2024-10-21)
Operation switch name plate	ISB-00-12VG-04	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-21VG-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-21VG-02	6 (2024-10-21)
Control panel for S.T.P & vacuumarator	ISB-00-21VG-03	5 (2024-10-21)
Operation switch name plate	ISB-00-21VG-04	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-22VG-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-22VG-02	6 (2024-10-21)
Control panel for S.T.P & vacuumarator	ISB-00-22VG-03	5 (2024-10-21)
Operation switch name plate	ISB-00-22VG-04	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-11VCL-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-11VCL-02	6 (2024-10-21)
Control panel for S.T.P & vacuumarator	ISB-00-11VCL-03	5 (2024-10-21)
Operation switch name plate	ISB-00-11VCL-04	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-12VCL-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-12VCL-02	6 (2024-10-21)
Control panel for S.T.P & vacuumarator	ISB-00-12VCL-03	5 (2024-10-21)
Operation switch name plate	ISB-00-12VCL-04	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-21VCL-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-21VCL-02	6 (2024-10-21)
Control panel for S.T.P & vacuumarator	ISB-00-21VCL-03	5 (2024-10-21)
Operation switch name plate	ISB-00-21VCL-04	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-22VCL-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-22VCL-02	6 (2024-10-21)
Control panel for S.T.P & vacuumarator	ISB-00-22VCL-03	5 (2024-10-21)
Operation switch name plate	ISB-00-22VCL-04	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-11VGL-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-11VGL-02	6 (2024-10-21)
Control panel for S.T.P & vacuumarator	ISB-00-11VGL-03	5 (2024-10-21)
Operation switch name plate	ISB-00-11VGL-04	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-12VGL-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-12VGL-02	6 (2024-10-21)
Control panel for S.T.P & vacuumarator	ISB-00-12VGL-03	5 (2024-10-21)
Operation switch name plate	ISB-00-12VGL-04	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-21VGL-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-21VGL-02	6 (2024-10-21)
Control panel for S.T.P & vacuumarator	ISB-00-21VGL-03	5 (2024-10-21)
Operation switch name plate	ISB-00-21VGL-04	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-22VGL-01	5 (2024-10-21)
Control circuit for S.T.P & vacuumarator	ISB-00-22VGL-02	6 (2024-10-21)
Control panel for S.T.P & vacuumarator	ISB-00-22VGL-03	5 (2024-10-21)
Operation switch name plate	ISB-00-22VGL-04	5 (2024-10-21)

Operational and Maintenance Manuals:

<i>Drawing Title</i>	<i>Drawing Number</i>	<i>Revision (date)</i>
Instruction Manual, M-Bio Sewage Treatment Plant Model: ISB Series	ISIM-MBIO-001	12 (2025-02-24)

Basis of acceptance

Performance testing was conducted on the ISB-01 and ISB-07 models ashore in accordance with IMO Resolution MEPC.227(64) Sections 4.1 and 5.2 to 5.7. The test reports are listed in the "Test reports" section of this certificate and the results are given in the Appendixes.

Performance testing was conducted on two model sizes (ISB-01 and ISB-07) to assess the effect of scaling the design up or down in accordance with IMO Resolution MEPC.227(64) Section 5.8. In addition, further information was submitted to show how the critical parts were scaled with change in model size.

Environmental testing was carried out in accordance with IMO Resolution MEPC.227(64) Section 5.9.3 and the test report is listed in the "Test reports" section of this certificate.

Tests reports

Performance Tests:

- Test report: Certification of Analysis, Sewage Treatment Plant (Model: ISB-010), dated 2016-07-19
Chunho Environment Co., Ltd., Busan, Republic of Korea,
Date of testing: 2016-07-04 – 2016-07-13,
Testing witnessed by Korean Register of Shipping,
Test report no.: GCHKM-006-16, dated 2016-07-25
- Test report: Certification of Analysis, Sewage Treatment Plant (Model: ISB-070), dated 2016-07-19
Chunho Environment Co., Ltd., Busan, Republic of Korea,
Date of testing: 2016-07-04 – 2016-07-13,
Testing witnessed by Korean Register of Shipping,
Test report no.: GCHKM-011-16, dated 2016-07-25

Environmental Test:

- Test Report for Panel Model ISB, SGS Korea Co., Ltd., Busan, Republic of Korea
Test report no.: SGS-R14-1623-EN00, dated 2014-12-01,
Date of testing: 2014-10-30 – 2014-11-20

Marking of product

The marking shall give the following information:

- Manufacturer's name or trademark
- Type designation
- Serial number
- Designed Hydraulic Loading, and any operational or installation limits considered necessary by the manufacturer or the Administration

A copy of this certificate should be carried on board the vessel equipped with the above-described sewage treatment plant.

Periodical assessment

For retention of the Type Approval, a DNV surveyor shall perform periodical assessments (refer to Type Approval programme DNV-CP-0338). The main scope of the periodic assessment will normally include:

- Verification of the Type Approval applicant's production and quality system with relation to ensuring continued consistent production of the type approved products at the applicant's own premises and at other companies that are given the responsibility for manufacturing of the products.
- Review of the documentation and checking that this is still used as basis for the production.
- Review of possible changes to the design, material and performance of the product.
- Verification of the product marking.

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

Places of manufacture

- **#31, Noksansandan 165-ro 14beon-gil, Gangseo-gu, Busan, Rep. of Korea, 46752**

The Sewage Treatment Plants ISB series, as listed under Application table of this certificate, was previously manufactured by IL Seung Co., Ltd. 31, Noksansandan 165-ro 14beon-gil, Gangseo-gu, Busan, Republic of Korea. Currently, the company name changed from IL Seung Co., Ltd. to Dongbang Ship Machinery Co., Ltd, including transferring business divisions as the design, quality control, production and sale of the environmental equipment of IL Seung Co., Ltd.

Revision history

Revision	Date of issuance	Description
-	2025-03-07	Initial certificate based on DNV TA certificate TAP00002AT

APPENDIX A - SUMMARY OF TEST RESULTS FOR ISB-01

Test results and details of tests conducted on samples from the sewage treatment plant in accordance with IMO Resolution MEPC.227(64), excluding Section 4.2 for Passenger Ships in Special Areas:

Sewage treatment plant type:	ISB-010 (equivalent to ISB-01)
Manufactured by:	Dong Bang Ship Machinery Co., Ltd. Changwon-si, Gyeongsangnam-do, Republic of Korea
Organization responsible for the test:	SGS Korea Co, Ltd. Chunho Environment Co., Ltd. Witnessed by Korean Register of Shipping
Organization responsible for handling the samples and laboratory analysis:	Chunho Environment Co., Ltd. 54, Daejeo-ro 29beon-gil, Gangseo-gu, Busan, Republic of Korea
Test Location:	IL Seung Co., Ltd. 1532-10, Songjeong-dong, Gangseo-gu, Busan, Republic of Korea
Designed hydraulic loading:	1.26 m³/day
Designed organic loading:	0.47 kg/day BOD
No. of effluent samples tested:	40
No. of influent samples tested:	40
Total suspended solids influent quality:	949.6 mg/l
Total nitrogen influent quality:	
- Geometric mean:	
- Maximum	
- Minimum	N/A
Total phosphorus influent quality:	
- - Geometric Mean:	
- - Maximum:	
- - Minimum:	N/A
BOD ₅ without nitrification influent quality:	372.8 mg/l
Maximum hydraulic loading:	3.15 m³/day
Minimum hydraulic loading:	0.63 m³/day
Average hydraulic loading (Qi):	1.28 m³/day
Effluent flow (Qe):	1.28 m³/day
Dilution compensation factor (Qi/Qe):	1.0
Geometric mean of total suspended solids:	15.8 mg/l
Geometric mean of the thermotolerant coliform count:	0 ufc/100 ml
Geometric mean of BOD ₅ without nitrification:	4.9 mg/l
Geometric mean of COD:	37.2 mg/l
Geometric mean of total nitrogen:	
Percentage reduction of total nitrogen:	N/A
Geometric mean of total phosphorus:	
Percentage reduction of total phosphorus:	N/A

Maximum pH: **7.37**
Minimum pH: **7.03**
Type of disinfectant used: **Sodium hypochlorite (NaOCl, 8%)**
If Chlorine - residual Chlorine: **0.11 mg/l**
Maximum: **0.2 mg/l**
Minimum: **0.05 mg/l**
Geometric mean: **0.1 mg/l**

Was the sewage treatment plant tested with:

Fresh water flushing? ☒ Yes ☐ No
Salt water flushing? ☒ Yes ☐ No
Fresh and salt water flushing? ☒ Yes ☐ No
Grey water added? **Yes**

Was the sewage treatment plant tested against the environmental conditions specified in section 5.9 of resolution MEPC.227(64):

Temperature: ☒ Yes ☐ No
Humidity: ☒ Yes ☐ No
Inclination: ☒ Yes ☐ No
Vibration: ☒ Yes ☐ No
Reliability of Electrical and Electronic Equipment: ☒ Yes ☐ No

Limitations and the conditions of operation are imposed:

Salinity: **36,500 ppm below**
Temperature: **2 - 50°C**
Humidity: **80%**
Inclination: **22.5 °**
Vibration: **2 - 80 Hz**

Results of other parameters tested:

N/A

APPENDIX B - SUMMARY OF TEST RESULTS FOR ISB-07

Test results and details of tests conducted on samples from the sewage treatment plant in accordance with IMO Resolution MEPC.227(64), excluding Section 4.2 for Passenger Ships in Special Areas:

Sewage treatment plant type:	ISB-070 (equivalent to ISB-07)
Manufactured by:	Dong Bang Ship Machinery Co., Ltd. Changwon-si, Gyeongsangnam-do, Republic of Korea
Organization responsible for the test:	SGS Korea Co, Ltd. Chunho Environment Co., Ltd. Witnessed by Korean Register of Shipping
Organization responsible for handling the samples and laboratory analysis:	Chunho Environment Co., Ltd. 54, Daejeo-ro 29beon-gil, Gangseo-gu, Busan, Republic of Korea
Test Location:	IL Seung Co., Ltd. 1532-10, Songjeong-dong, Gangseo-gu, Busan, Republic of Korea
Designed hydraulic loading:	7.0 m³/day
Designed organic loading:	2.63 kg/day BOD
No. of effluent samples tested:	40
No. of influent samples tested:	40
Total suspended solids influent quality:	950.3 mg/l
Total nitrogen influent quality:	
- Geometric mean:	
- Maximum	
- Minimum	N/A
Total phosphorus influent quality:	
- - Geometric Mean:	
- - Maximum:	
- - Minimum:	N/A
BOD ₅ without nitrification influent quality:	375.4 mg/l
Maximum hydraulic loading:	17.5 m³/day
Minimum hydraulic loading:	3.5 m³/day
Average hydraulic loading (Qi):	7.1 m³/day
Effluent flow (Qe):	7.1 m³/day
Dilution compensation factor (Qi/Qe):	1.0
Geometric mean of total suspended solids:	15.2 mg/l
Geometric mean of the thermotolerant coliform count:	0 ufc/100 ml
Geometric mean of BOD ₅ without nitrification:	4.5 mg/l
Geometric mean of COD:	35.2 mg/l
Geometric mean of total nitrogen:	
Percentage reduction of total nitrogen:	N/A
Geometric mean of total phosphorus:	
Percentage reduction of total phosphorus:	N/A

Maximum pH: **7.39**
 Minimum pH: **7.07**
 Type of disinfectant used: **Sodium hypochlorite (NaOCl, 8%)**
 If Chlorine - residual Chlorine: **0.13 mg/l**
 Maximum: **0.2 mg/l**
 Minimum: **0.05 mg/l**
 Geometric mean: **0.1 mg/l**

Was the sewage treatment plant tested with:

Fresh water flushing? ☒ **Yes** ☐ **No**
 Salt water flushing? ☒ **Yes** ☐ **No**
 Fresh and salt water flushing? ☒ **Yes** ☐ **No**
 Grey water added? **Yes**

Was the sewage treatment plant tested against the environmental conditions specified in section 5.9 of resolution MEPC.227(64):

Temperature: ☒ **Yes** ☐ **No**
 Humidity: ☒ **Yes** ☐ **No**
 Inclination: ☒ **Yes** ☐ **No**
 Vibration: ☒ **Yes** ☐ **No**
 Reliability of Electrical and Electronic Equipment: ☒ **Yes** ☐ **No**

Limitations and the conditions of operation are imposed:

Salinity: **36,500 ppm below**
 Temperature: **2 - 50°C**
 Humidity: **80%**
 Inclination: **22.5 °**
 Vibration: **2 - 80 Hz**

Results of other parameters tested:

N/A