



Certificate No. 02-003237/025263

TYPE APPROVAL CERTIFICATE

This is to certify that this product complies with the Rules for the classification of ships, Part 1 - General requirements, Chapter 3 - Type approval of products.

TYPE AND DESCRIPTION OF PRODUCT:

ELECTRO-CLEEN™ SYSTEM BWMS

(model range ECS-150B 1.1 to ECS-1000B 1.1)

(model range Ex-ECS-150B 1.1 to Ex-ECS-1000B 1.1)

Treatment rated capacity (TRC): 150-12000 m³/h

MANUFACTURER:

TEHCROSS

433 Noksansaneopbuk-ro, Gangseo-gu

BUSAN 46758

REPUBLIC OF KOREA

THE PRODUCT MEETS FOLLOWING RULES/REGULATIONS:

CRS Rules for technical supervision of sea-going ships, Part 22 – Pollution prevention
Resolution MEPC.300(72) – Code for approval of ballast water management systems

FURTHER DETAILS OF THE PRODUCT AND CONDITIONS FOR CERTIFICATION ARE GIVEN OVERLEAF.

APPROVAL IS VALID UNTIL: **2025-05-07**

Place and date: Split, 2021-05-07

Seal

Marinko Popović, dipl.ing.

NOTE: This certificate is not valid for equipment, the design or manufacture of which has been varied or modified from the specimen tested. The manufacturer should notify Croatian Register of Shipping of any modification or changes to the product in order to obtain a valid certificate.

DETAILED PRODUCT DESCRIPTION:

Ballast water management system using electro-chlorination at ballast water uptake and neutralization at ballast water discharge.

Mixing ballasting operation (from sea water holding tank) shall be applied if the water has a salinity below 1PSU.

Model	TRC (m ³ / h)	Electro-chamber unit (ECU)	Power distribution equipment	Rectifier	Auto neutralization unit
ECS-150B 1.1	150	ECU-150B 1.1	PDE-12A 1.1	PRU 1.1 x1	ANU-S or ANU-5T 1.1
ECS-300B 1.1	300	ECU-300B 1.1	PDE-12A 1.1	PRU 1.1 x2	ANU-S or ANU-5T 1.1
ECS-450B 1.1	450	ECU-450B 1.1	PDE-12A 1.1	PRU 1.1 x3	ANU-S or ANU-5T 1.1
ECS-600B 1.1	600	ECU-600B 1.1	PDE-12A 1.1	PRU 1.1 x4	ANU-S or ANU-5T 1.1
ECS-1000B 1.1	1000	ECU-1000B 1.1	PDE-12A 1.1	PRU 1.1 x8	ANU-5T 1.1
Ex-ECS-150B 1.1	150	Ex-ECU-150B 1.1	PDE-12A 1.1	Ex-PRU 1.1 x1	ANU-S or ANU-5T 1.1
Ex-ECS-300B 1.1	300	Ex-ECU-300B 1.1	PDE-12A 1.1	Ex-PRU 1.1 x2	ANU-S or ANU-5T 1.1
Ex-ECS-450B 1.1	450	Ex-ECU-450B 1.1	PDE-12A 1.1	Ex-PRU 1.1 x3	ANU-S or ANU-5T 1.1
Ex-ECS-600B 1.1	600	Ex-ECU-600B 1.1	PDE-12A 1.1	Ex-PRU 1.1 x4	ANU-S or ANU-5T 1.1
Ex-ECS-1000B 1.1	1000	Ex-ECU-1000B 1.1	PDE-12A 1.1	Ex-PRU 1.1 x8	ANU-5T 1.1

The electrolysis unit (ECU) shall be operated within the TRC of the BWMS.

ECS can be combined in parallel for higher TRC.

APPLICATION / LIMITATIONS:

Salinity: not applicable

Temperature of ballast water: not applicable

Minimum holding time between uptake and discharge of 4 hours is required for brackish and marine water.

Minimum holding time of 23 hours is required for fresh water with salinity below 1 PSU.

During ballast water uptake TRO shall be $\leq 10,0$ mg/L.

TRO concentration at ballast water discharge shall be $\leq 0,1$ mg/L.

Maximum working pressure: 5 bar

TYPE APPROVAL DOCUMENTATION:

Description	Drawing no.	Rev.
System drawings for all scaled units ECS-B 1.1	TC 1908-005	2.0
System drawings for all scaled units Ex-ECS-B 1.1	TC 1908-006	2.0
Component drawings for all scaled units Electro-Cleen System	TC 1908-007	2.0; 2.1
Type approval report for land-based test of the ECS	TAR-19T3806(E) Report No.22	0 August 2020
Verification testing report for shipboard test of the Electro-Cleen System	16T3358 Report No.4	0 October 2017
ECS OMSM Operation, maintenance and safety manual	TC 1908-002	0.0

HAZARDOUS AREA:

Electro-chamber unit, TRO sensor unit, fresh water tank unit (if applied), sensors and flowmeter unit with Ex certificates can be installed in hazardous area zone 1, gas group IIB and temperature class T4.
Power distribution equipment, neutralization unit and control PC are to be located in safe zone.

MARKING OF PRODUCT:

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

CONDITIONS FOR CERTIFICATION:

This certificate is issued on the basis of the test reports and the documentation in Republic of Korea, Ministry of Oceans and Fisheries type approval certificates No. 2021-1 to 2021-10.

BWMS is type approved with the following safety related instruments:

- flow transmitters in flow meter unit
- temperature switch mounted on ECU
- pressure switch mounted on ECU
- vibration level sensor mounted on inlet and outlet of Ex-ECU