



Certificate No. 03-001948/031624

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:

EMISSION REDUCTION CONTROL SYSTEM – EXHAUST GAS RECIRCULATION SYSTEM

MAN B&W ERCS – EGR

MANUFACTURER:

**MAN Energy Solutions
Teglholmsgade 41
DK-2450 Copenhagen SV
DENMARK**

THE PRODUCT MEETS FOLLOWING RULES/REGULATIONS:

**Croatian Register of Shipping: Rules for the classification of ships,
Part 9. – Machinery
Part 12. – Electrical Equipment
Part 13. – Automation**

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

APPROVAL IS VALID UNTIL: **2027-04-14**

Place and date: Split, 2023-04-14

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:

The Emission Reduction Control System (ERCS) is the control system used on an ME engine that has Exhaust Gas Recirculation (EGR) system installed. In the EGR system, after a cooling and cleaning process, part of the exhaust gas is recirculated to the scavenge air receiver. In this way, part of the oxygen in the scavenge air is replaced by CO₂ from the combustion process. This replacement decreases the O₂ content and increases the heat capacity of the scavenge air, thus reducing the temperature peak of the combustion and the formation of NO_x.

By using this method, the Tier III requirements in NO_x ECA can be met.

There are three different matching methods that are used for the EGR systems:

- EGR with bypass, configured with only one turbocharger and used for engines of bore 70 or less.
- EGR with TC cut out matching, configured with two or more turbochargers and used for engines of bore 80 or greater.
- EcoEGR, configured as EGR with bypass. EcoEGR is a fuel optimised engine, which lowers the SFOC in both Tier II and Tier III mode, by using EGR to meet the relevant NO_x limit.

EGR system comprises of pre spray, EGR unit, EGR valves, EGR blower, EGR outlet pipe, and the Emission Reduction Control System (ERCS). EGR unit comprises of EGR cooler, water mist catcher and the cooler spray. EGR unit is available in low sulphur EGR system (LS EGR) and high sulphur EGR system (HS EGR) variants. The supply of water to the pre-spray and EGR cooler spray, and the removal of water from the EGR unit is part of the EGR water handling system, which will control and recirculate the water. Part of the water handling system, i.e. the Receiving Tank Unit (RTU) which includes a small tank and a circulation pump, is integrated on the engine.

The EGR control is handled by the ME-ECS engine control system on engines with EGR, ME-ECS controls the EGR valves, the EGR blowers and part of the water handling system (WHS). The ERCS is based on the same platform as the ME-ECS, meaning that controllers, HMI, Alarm handling and network are identical to that of the ME-ECS.

The EGR-CS handles the following main states of the EGR process:

- Starting up EGR
- Running with EGR (NO_x reduction)
- Switching EGR level (between Tier III and EcoEGR)
- Closing down EGR
- EGR Stop
- Failure in EGR system
- Manual mode
- Controls the water level and pH value in the Process Water Receiving Tank

APPLICATION / LIMITATIONS:

ERCS software version ERCS-SW-2011-1 is compatible with following ME-ECS software versions:

ME-ECS-SW-1609-6 | ME-ECS-SW-1909-3 | ME-ECS-SW-1909-4 | ME-ECS-SW-1909-5
ME-ECS-SW-1909-6 | ME-ECS-SW-1909-7

The EGR unit used for a low sulphur EGR system (LS EGR) is designed for a fuel sulphur limit of 0.5% S.

The EGR unit used for high sulphur EGR system (HS EGR) is designed for a maximum of 3.5% S.

TYPE APPROVAL DOCUMENTATION:

	<i>Type Approval Test</i>	<i>Documentation</i>
ERCS for EGR/SCR	15 th March 2016, Tamano, Japan	doc. 3099643-3 Type Approval Seminar ERCS for EGR/SCR

Document MAN B&W ERCS for EGR General System Information, doc. 3099640-8.4, approved by CRS letter 861/TSE/NP/ZS/031624, dated 2023-04-14

MARKING OF PRODUCT:

The Manufacturer and Type Designation of the product, serial number, date of manufacture, supply voltage and software version.

CONDITIONS FOR CERTIFICATION:

The ERCS-EGR is to be assembled by MAN ES designed and/or specified (OEM) components listed in document: 3093398-0, List of Electronic Components for ECS.

For each application on board CRS classed vessels complete technical documentation and drawings shall be submitted for examination and approval prior installation on board, with reference to this Type Approval Certificate.

A separate ERCS product certificate is not required.