# CERTIFICATE OF CONFORMITY – EC (MODULE G)

Certificate No:
**MEDG000001Z**

Application of: Council Directive 96/98/EC of 20 December 1996 on Marine Equipment as amended by directive 2014/93/EU, issued as "Forskrift om Skipsutstyr" by the Norwegian Maritime Directorate. This Certificate is issued by DNV GL AS under the authority of the Government of the Kingdom of Norway.

## This is to certify:

**That the On board exhaust gas cleaning systems**
with type designation and serial number
**1900T-6H-2S installed onboard STENA FORERUNNER (IMO 9227259) - M00904-MS1 & M00904-MS2**
Issued to

## CR Ocean Engineering

### Parsippany NJ, United States

is, by design assessment and product verification, found to comply with
**Annex A.1, item No. A.1/2.10 and Annex B, Module G in the Directive. Marpol 73/78 as amended, Annex VI Regulation 4 and IMO Res. MEPC.259(68)**

USCG Approval No: **N/A**
Further details of the equipment and conditions for certification are given overleaf.

Issued at **Høvik** on **2016-03-11**

Notified Body
No.: **0575**

DNV GL local station:
**Høvik Machinery**
Approval Engineer:
**Tin Nguyen**

for **DNV GL AS**

**Vidar Dolonen**
**Head of Notified Body**

## Product description

The EGC system is based on two Open Loop CROE® Marine scrubbers capable of reducing 3.5% sulphur fuel emissions to less than 0.1% equivalent sulphur in compliance with MARPOL Annex VI, Reg 4 & MEPC.259(68).

The engine exhaust gas enters the inlet duct at the scrubber bottom and is distributed radially through the inlet distributor. Once it enters the vessel, it is immediately quenched to adiabatic saturation temperature by the scrubbing water. The quenched gas flows upward into the packed tower. Counter current flow of the scrubbing water over the packing provides efficient mass transfer and intimate gas / liquid contact for high SO2 removal. A chevron mist eliminator located at the top of the scrubber ensures removal of residual droplets before the gas exits through the stack.

The CROE® marine scrubber uses the alkalinity of the seawater to remove SO2 from the engine exhaust gas. The scrubber can operate in open loop mode in areas where the seawater has sufficient alkalinity and where the used seawater can be discharged.

The used seawater is directly discharged via the scrubber drain piping which will include a loop seal.

Instrumentation is provided for monitoring pH, PAH and turbidity of the scrubber effluent.
Since the seawater is colder than the saturation temperature of the flue gas, subcooling and condensation will occur in open loop mode which will reduce the appearance of the plume at the stack.

Provisions are included for addition of sodium hydroxide to the seawater in low alkalinity areas. The caustic soda system include a 316L storage tank (ISO container), two metering pumps per scrubber (caustic injection into incoming seawater and discharge seawater) and 316L piping. Caustic soda addition is only used if needed to raise the pH of the washwater in low alkalinity areas.

## Application/Limitation

Exhaust Gas Cleaning (EGC) Systems are intended for reducing the SOx emissions to a level below the current and upcoming requirements in worldwide and ECA areas. In scheme B, compliance with emission requirements are demonstrated by continuous exhaust gas and washwater discharge monitoring. The monitoring system is to be approved by the Administration.
The monitoring equipment is to have yearly surveys according to MEPC.259(68)

## Type Examination documentation

| | | |
|---|---|---|
| ETM-B | Rev 2: | EGC System Technical Manual “Scheme B” |
| OMM | Rev 2: | Onboard Monitoring Manual |
| EGC Record Book | Rev 1: | EGC Record Book |
| SECP | Rev 1: | SOx Emissions Compliance Plan |
| | | |
| 22692-20678174/DNV: | | Washwater Analysis Reports |

## Tests carried out

22692-20678174/DNV: DNV GL MARPOL survey checklist EGCS

## Marking of product

The product is to be indelibly marked with name of manufacturer, type designation, dimensions and date of manufacture, according to LSA code item 4.4.1.2 and the mark of conformity. In addition, the manufacturer shall affix the Mark of Conformity followed by DNV Notified Body No. and the two last digits of the production year.
END OF CERTIFICATE