Certificate No:
TAA000035B

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Monitoring System

with type designation(s)
SMART ESM Washwater Monitoring System

Issued to
Rivertrace Limited
Redhill, **United Kingdom**

is found to comply with
DNV rules for classification – Ships, offshore units, and high speed and light craft

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Location classes:

Temperature	**A**
Humidity	**B**
Vibration	**A**
EMC	**A**
Enclosure	**B/IP66**

Issued at **Høvik** on **2022-05-16**

This Certificate is valid until **2024-05-15**.

for **DNV**

DNV local station: **UK & Ireland CMC & VMC**

Approval Engineer: **Frode Nygård**

Trond Sjåvåg
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 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 300,000 USD.

Product description

The Smart ESM Wash water Monitoring System is a continuous in situ water monitoring system in accordance with IMO MEPC.259(68). As a standard configuration the system monitors PAH, turbidity, pH and temperature.

The Smart ESM is compatible with Open Loop, Closed Loop and Hybrid systems

The Smart ESM control system comprises the Control Module and electronics and a separate compartment for the Measuring Cell and sample conditioning equipment.

Water Monitoring System – Smart ESM				
Main Supply	115 or 230 VAC 50/60 Hz			
Communication	RS485 Modbus and TCP/IP Ethernet			
Firmware	> 112935v00-2x-xx			
System Components	Smart ESM Control Module assembly Smart ESM Measuring Cell (PAH, Turbidity, pH & Temp)			
Operating temperature	0-55 Deg C			
Sensor module	**PAH**	**pH**	**Temperature Sensor**	**Turbidity**
Measuring technique	Fluorescence	pH Electrode		IR Scattering
Range	0 to 4500 µg/L	0 to 14 pH units	0-100°C	0 – 500 NTU
Accuracy	5% of measurement reading	0.1 pH	-	0.1 NTU up to 100 NTU, 1 NTU thereafter.
Output	4-20 mA, Volt free output (fault)	4-20 mA, Volt free output (fault)		4-20 mA, Volt free output (fault)

Place of manufacture

Rivertrace Limited
Unit P Kingsfield Business Centre
Philanthropic Road
Redhill Surrey
United Kingdom

Application/Limitation

The Type Approval covers all hardware listed under Product description.

The Smart ESM is generally in compliance with the requirements of Resolution MEPC.259(68) - 2015 Guidelines for exhaust gas cleaning adopted on 15. May 2015, Chapter 10 “Washwater”.
The Smart ESM Water Monitoring System meets the following requirements:

- Principle of detection for $PAH_{PHE\ Eq.}$ (MEPC.259(68), 10.1.3.3)
- Measurement range $PAH_{PHE\ Eq.}$ (MEPC.259(68), 10.1.3.3)
- Turbidity influences on $PAH_{PHE\ Eq.}$ (MEPC.259(68), 10.2.3)
- Principle of detection for pH (MEPC.259(68), 10.2.2)
- Resolution for pH (MEPC.259(68), 10.2.2)
- Temperature compensation for pH (MEPC.259(68), 10.2.2)
- Principle of detection for Turbidity (MEPC.259(68), 10.2.5)

In order to completely fulfil the requirements of MEPC.259(68) for “washwater monitoring, additional equipment (e.g. data recording) will have to be installed.

DNV shall be notified in writing whenever the Smart ESM Washwater Monitoring System is installed in a DNV classed vessel. A reference to this Type Approval Certificate shall be included.

This Type Approval Certificate covers hardware and software as listed under Product Description.

Correct configuration and set up for each delivery to be tested during commissioning after installation.

Type Approval documentation

Tests carried out

Applicable tests according to class guideline DNV-CG-0339, August 2021.
Requirements in Resolution MEPC.259(68) adopted on 15 May 2015:
"2015 Guidelines for exhaust gas cleaning systems, Chapter 10 Washwater"

Marking of product

The products to be marked with:
- manufacturer name
- model name
- serial number
- power supply ratings

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate

A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE