

# Application Report

## Monitoring of Scrubber Wash Water

More and more goods are transported by sea on a global scale and cruise liners are also becoming increasingly popular. For economic reasons, many ship operators choose the cheap but highly polluting heavy oil as a propellant. To counter increasing environmental pollution, the International Maritime Organization (IMO) has issued guidelines for limiting pollutant emissions of diesel-powered ships. So that the ships can continue to operate on the highly sulphurous heavy oil, the ships' operators refit the ships with scrubbers. These waste gas purification systems are installed directly in the exhaust gas stack and wash a large proportion of pollutants such as nitrogen oxides ( $\text{NO}_x$ ), sulphur oxides ( $\text{SO}_x$ ) as well as hydrocarbon particles together with carbon dioxide ( $\text{CO}_2$ ) from the exhaust gas. The wash water is subsequently treated and the resulting sludge of the water treatment must be collected in tanks and properly disposed of in the ports. The treated wash water is returned to the sea in case of an open loop scrubber. If the scrubber is operated in a closed loop mode, this water is pumped back into the system. The ships can often switch between the different modes during their trip so that they can adhere as efficiently as possible to the regulations of the respective stretches of the seas.

### Benefit

The use of waste gas purification systems on ships results in considerable cost savings for many ship operators. The operators can thus avoid expensive fuel.

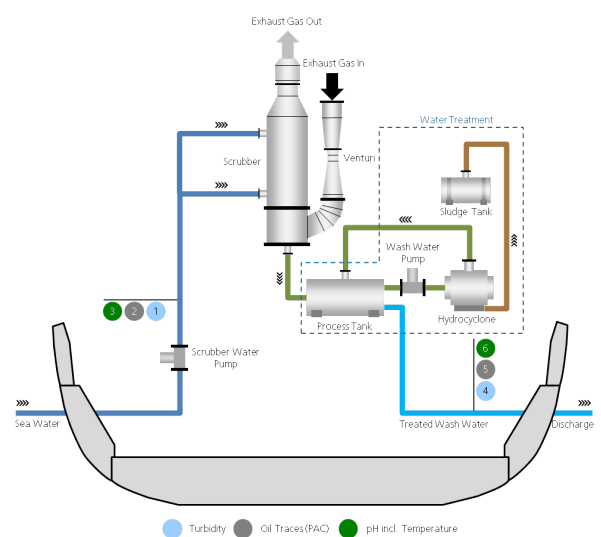
In Resolution MEPC.259(68) and MEPC.340(77), the monitoring of and reporting on the wash water is prescribed for the operation of a waste gas purification system. The continuous measurement of the following parameters is mandatory:

- Turbidity as a measure for the particle contents,
- PAHs concentration as a measure for harmful oil components (polycyclic aromatic hydrocarbons),
- pH-value as a measure for the acid content
- and temperature.

The SIGRIST ScrubberGuard guarantees reliable and continuous monitoring of the prescribed limits of the parameters to be measured. The measurements as well as the alarm and fault signals can easily be transmitted to the control system.

The SIGRIST ScrubberGuard was specifically designed for the challenging process and environmental conditions of this application.

### Typical application



**Figure 1: Measuring points and parameters of wash water monitoring for an open loop system**

To be able to reliably monitor and document the prescribed limits according to MEPC.259(68) and MEPC.340(77), the parameters at the inlet and the outlet of the wash water should be measured (see also Figure 1):

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- Inlet

Turbidity (no. 1) and the PAHs concentration (no. 2) is measured. Often the pH-value as well as the temperature is also measured (no. 3), depending on the measuring method chosen at the outlet.

- Outlet

After the wash water treatment stage, turbidity (no. 4), the PAHs concentration (no. 5) and the pH-value as well as the temperature (no. 6) is measured.

### Product

SIGRIST product for this application

ScrubberGuard consisting of:

- AquaScat SG A (turbidity measurement according to DIN ISO 7027:1999)
- OilGuard SG (PAHs using fluorescence-measurement)
- pH-sensor incl. temperature measurement



Figure 2: ScrubberGuard

### Advantages of the SIGRIST ScrubberGuard

#### Customer benefits

Compact all-in-one system with DNV statement of compliance

- correspond to regulation MEPC.259(68) and MEPC.340(77)
- one address for all measurements
- only one water inlet and one water outlet

Non-contact measurement (free-fall measurement) of PAHs and turbidity

- no reading falsification and no drift resulting from window contaminations
- even high amounts of solids and hydrocarbons do not contaminate the optics
- very long cleaning interval

Automatic calibration (AquaScat SGA)

- exact recalibration without formazine
- long-term stable measurement
- fully automatic operation of the instrument is possible
- no purchasing, storing and providing formazine

High sensibility

- reliable measurement of minute quantities of solids and hydrocarbons

The quality of the pH-sensor is permanently monitored

- an alarm is exited if the sensor has to be replaced
- the calibration standard is automatically accepted

The pH-sensor has only little drift

- permanently precise measurement

The pH-sensor is pre-configured

- simple replacement

The instrument was designed such that our customers only have minimal costs at a very long life cycle

- very low total cost of ownership

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