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TECHNICAL INFORMATION

NO. 2019-ETC-06(E)

Subject : FAQ for SOx Scrubber(Exhaust Gas Cleaning System, EGCS)

This Society has conducted drawing approval and inspection of SOx scrubber for more than 200 ships (new and existing ships), and during the course of undertaking such work, we have received a number of inquiries from the shipowners, shipyards and SOx scrubber manufacturers regarding the applicable rules & registrations, drawing approval, commissioning, etc. We have gathered and summarized these inquiries as Technical Information to be used as a reference during the undertaking of relevant work.

For your information, since 'Scheme B' of Res.MEPC.259(68) is applicable for most ships, 'Scheme B' is primarily described in this Technical Information. However, if 'Scheme A' is to be applied, you are invited to contact Environment & Piping Team of this Society for further guidance.

Contents

1. The modification of fixed fire extinguishing system for engine room(machinery space of category A) due to the installation of SOx Scrubber

When installing SOx scrubber in the expanded E/R on board an existing ship, it is to be reviewed whether or not additional provisions of the CO2 cylinders are necessary in accordance with the FSS Code in consideration of increased E/R volume. Upon review result, additional CO2 cylinders may be required. In addition, it is to be reviewed whether or not 85% of the CO2 gas can be discharged within two (2) minutes where additional CO2 cylinders are provided. Upon review result, additional CO2 nozzles may be required.

In case where a ship is equipped with a high expansion foam system, the area to be protected should be determined in accordance with [IACS UI SC262]. Generally, no change of protected area is required even if SOx scrubber is installed in E/R. However, if deemed necessary, additional foam solution and installation of foam generators may be required.

If a ship's nationality is 'KOREA' or BBCHP, the shipowner shall obtain confirmation whether the modification of fixed fire extinguishing system are subject to a change permission of the ship's facilities under Article 32 of the Enforcement Decrees of the Ship Safety Act from the local port authority and if so, apply for a change permission of the ship's facilities.

2. SOx Scrubber washwater supply piping arrangement & Sea chest

During the retrofitting of SOx scrubber, in case where the existing main sea water suction line is used for washwater supply line, the capacity of main sea water suction line is to be confirmed during retrofit design stage because it can affect the operation of other systems (sea water cooling, ballasting, etc.) as well as the operation of SOx scrubber.

In general, additional sea chest for SOx scrubber is installed to supply the washwater to SOx scrubber, or washwater pipe is installed in the existing sea chest directly in order to ensure steady supply of washwater. In case where SOx scrubber washwater pipe is directly installed in the existing sea chest, additional sea chest grating installation is to be considered.

3. GRE piping system for the discharge of SOx Scrubber washwater

Generally, Glassfiber Reinforced Epoxy (GRE) piping is used for the washwater discharge system of the SOx scrubber, and the washwater is discharged to overboard through the engine room (machinery space of category A). In such cases, the following requirements are to be satisfied:

- It is to be type-approved one that has passed the fire endurance test of Level 3.
- The remotely controlled valve is to be provided at ship' side and operated from the outside space.

4. Application of NaOH(as a neutralizer) Piping System

NaOH may be used in the SOx scrubber to neutralize the effluent (mostly hybrid scrubber). NaOH used as a neutralizer is classified as toxic, and therefore, NaOH piping is to considered as Class I regardless of design pressure and design temperature according to [KR Rule Pt.5 Ch.6 Table 5.6.1 Classes of Piping Systems].

However, open end pipes such as drain pipes and air pipes of NaOH tank can be considered as Class III. Materials of NaOH tanks, pipes and pipe fittings are to be of corrosion-resistant materials such as stainless steel or coated with corrosion-resistant materials.

5. Determination of SOx Scrubber design capacity (Scheme B)

The design capacity of the SOx scrubber can be determined by taking into account the maximum load required (usually sea going condition) from the equipment connected to the SOx scrubber considering the operation conditions of the ships (see the example table below).

Operating case	Seagoing	Manoeuvring	Loading/ Unloading	Port
Main engine (MCR : 17,000kW)	85% (14,450kW)	60% (10,200kW)	-	-
No.1 Auxiliary engine (MCR : 1,000kW)	90% (900kW)	100% (1,000kW)	85% (850kW)	85% (850kW)
No.2 Auxiliary engine (MCR : 1,000kW)	90% (900kW)	100% (1,000kW)	85% (850kW)	-
No.3 Auxiliary engine (MCR : 1,000kW)	-	-	85% (850kW)	-
Total	16,250kW	12,200kW	2,550kW	850kW

In the above example table, one (1) set of M/E and three (3) sets of A/E were assumed to be connected to the SOx scrubber. In case where other machineries (aux. boiler, em'cy generator engine, incinerator, etc.) are not connected to the SOx scrubber but use fuel oil, they should be operated by using only the low sulphur fuel oil in compliance with the MARPOL Annex.VI/Reg.14.

6. Washwater sampling and analysis

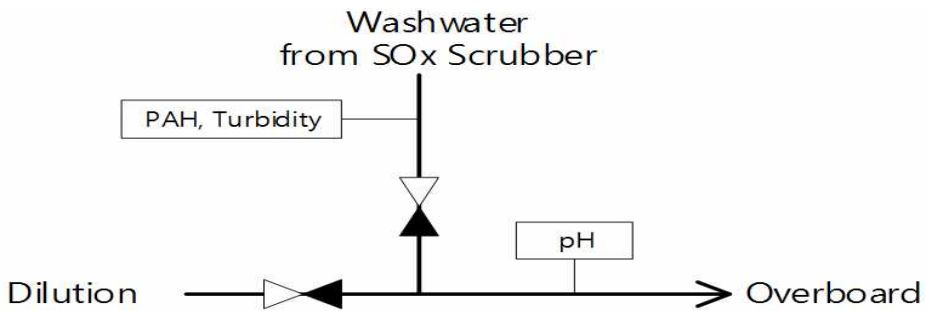
The pH, PAH, and turbidity of SOx scrubber washwater should be continuously monitored by the washwater monitoring equipment installed on board, and the nitrates should be analyzed by taking samples from the discharge water. Nitrates sampling and analysis should be performed during commissioning after initial installation of SOx scrubber and three months prior the renewal survey, and the results should be submitted to the class Society. In addition, nitrate discharge data and analysis certificate are to be retained on board the ship as a part of EGC Record Book [Res.MEPC.259(68) 10.1.5.2].

The is to be noted that it may take longer than one month to produce the result of nitrates sampling analysis. This means that the results may not be available even when the ship departs from the port after the end of the commissioning. In such cases, the IAPP certificate stating the information that a suitable SOx scrubber has been installed may not be available. However, a 'short term IAPP' certificate (usually valid for 5 months) may be issued upon consent from the flag State concerned, and in this case, SOx scrubber can be used immediately after departure. In case where the flag State concerned does not give its consent, however, low sulphur fuel should be used in accordance with the regulations until the IAPP certificate stating that a suitable SOx Scrubber has been installed is issued.

7. Dilution of washwater

When necessary, the piping system may be arranged to dilute the washwater to satisfy the pH limit to alleviate the strong acidity of washwater. However, since PAH and turbidity must be monitored before the dilution of washwater in accordance with [Res.MEPC.259(68) 10.1.3.2 and 10.1.4.3.3], the positions of monitoring should be as shown in the table and figure below.

Items	Position of monitoring
pH	After dilution
PAH	Before dilution
Turbidity	Before dilution



8. Calibration of Gas Monitoring/Water Monitoring Sensor

When SOx scrubber is installed, Gas Monitoring Equipment (for Scheme B) and Water Monitoring Equipment are to be installed. Each monitoring units are fitted with necessary sensors, and it is required that they be calibrated.

Calibration should be carried out in the presence of an attending Surveyor on board the ship. Alternatively, calibration may be carried out prior to the installation of SOx scrubber on board and the calibration report is to be submitted to the attending Surveyor for confirmation.

9. Sulphur contents of fuel and engine load during commissioning (Scheme B)

In case of Scheme B, there is no requirement in the Convention for the sulphur content of the fuel used nor the load of the engine during commissioning. However, the main points to check for commissioning of Scheme B is verification that the SOx scrubber and monitoring system operate well and the operation information is recorded properly. Therefore, the sulphur content of the fuel oil used and the load of the engine during commissioning can be determined through the consultation with the parties concerned (shipowner, classification society, ship builder, scrubber manufacturer, etc.). For this, it is recommended that the commissioning is done at the maximum operable load as much as possible, and the criteria required by [Res.MEPC.259(68)] for exhaust gas and washwater shall be met.

10. Using the IGS(Inert Gas System) as SOx Scrubber

Except where the SOx scrubber in accordance with Res.MEPC.259(68) is installed on board a ship, any fuel oil used in the ship shall comply with the requirement of MARPOL Annex.VI/Reg.14. The IGS may be considered as a substitute for the SOx scrubber owing to the fact that its function and operating principle are similar to those of conventional SOx scrubber. However, unless approval of relevant documents (SECP, ETM, etc.), the performance of IGS and installation of necessary equipment (sas & water monitoring system, etc.) are in accordance with the Res.MEPC.259(68), the IGS shall be operated by only using the low sulphur fuel oil in compliance with the MARPOL Annex.VI/Reg.14.

11. Guidance on failure of SOx Scrubber & monitoring instrument [MEPC.1/Circ.883]

In case where the SOx scrubber fails and the exhaust gas or washwater exceeding the relevant standard is emitted or discharged overboard for 1 hour or more, such should be reported to the flag State and port authorities.

However, in case where there is temporarily emission/discharging of exhaust gas or washwater (within 1 hour) exceeding the relevant standard or there is a simple failure of sensor, such will not be considered as a failure of SOx scrubber installed on board. In the event of a sensor failure, it is necessary to prove that all other devices are operating normally. To prove this, the following items are to be recorded and maintained:

- Information indicating that all operation records other than the malfunctioning sensor do not differ from those prior to malfunctioning of sensor.
- Sulfur content of fuel oil that were used after equipment malfunction

In case where the SOx scrubber fails and repair is not possible within an hour, fuel oil used shall be converted to compliant low-sulphur fuel oil. In case where the quantity of compliant sulfur fuel oil is not sufficient enough for the ship, such should be reported to the flag State and the port State, and it is necessary to follow the instructions provided by them. However, the ship has no choice but to continue sailing using the high sulphur fuel oil based by referring to MARPOL Annex.VI/Reg.18.2 which states that “the ship should not be required to deviate its voyage or to unduly delay”. However, it is to be noted that individual port State may take different approach for each case.

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