



European Maritime Safety Agency

SAFEMED III Seminar on MARPOL Annex VI

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GHG/Relevant Substances Efficiency & Emissions

Part II - EGCS (scrubbers)

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Marpol Annex VI

Regulation 4 - Equivalents

- The Administration may allow **any fitting, material, appliance or apparatus to be fitted in a ship or other procedures, alternative fuel oils, or compliance method used as an alternative** if (...) they are **at least as effective** in terms of emissions reductions as required by this Annex.

Directive 2012/33/EU

Article 2 – definitions

- Emission abatement method means **any fitting, material, appliance or apparatus to be fitted in a ship or other procedure, alternative fuel, or compliance method, used as an alternative to low sulphur marine fuel (...), that is verifiable, quantifiable and enforceable.***

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Article 4c – Emission abatement methods

- Ships using the emission abatement methods (...) shall **continuously achieve reduction** of sulphur dioxide emissions that are **at least equivalent** to the reductions that would be achieved by using marine fuels

Approval

2009 EGCS Guidelines

Scheme A: EGC system approval, survey and certification using parameter and emission checks

Options under Scheme A provide for:

- Unit approval
- Serially manufactured units
- Production range approval

Scheme B: EGC system approval, survey and certification using continuous monitoring of SOx emissions

Under Scheme B the **monitoring system** should be approved by the Administration.

Directive 2012/33/EU

Article 4d – **Approval** of emission abatement methods for use on board ships flying the flag of a Member State

- Emission abatement methods falling within the scope of the Council Directive 96/98/EC (Marine Equipment Directive) shall be approved in accordance
- Emission abatement methods NOT covered by paragraph 1 shall be approved in accordance with the procedure referred to in Regulation 2099/2002 (COSS committee), taking into account:
 - Guidelines developed by the IMO
 - The results of any trials
 - Effects on the environment, including achievable emission reductions, and impacts on ecosystems in enclosed ports, harbours and estuaries; and
 - The feasibility of monitoring and verification

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Washwater

Marpol Annex VI

Regulation 4 - Equivalents

- The Administration **should** take into account any relevant **guidelines** pertaining to the equivalents provided for in this regulation
- Resolution MEPC 184(59) adopted on 17 July 2009 – 2009 **Guidelines for Exhaust Gas Cleaning Systems**
- 10.1: Wash water discharge criteria**
 - pH criteria
 - PAHs
 - Turbidity/Suspended PM
 - Nitrates
 - Wash water additives and other substances

Directive 2012/33/EU

Article 4c – Emission abatement methods

- The emission abatement methods (...) **shall** comply with the criteria specified in the instruments referred to in **Annex II**

Annex II – Criteria for the use of emission abatement methods

The emission abatement methods referred to in Art. 4c shall comply at least with the criteria specified in the following instruments:

For Exhaust gas cleaning systems:

Resolution MEPC 184(59):

"Wash water resulting from EGCS which make use of chemicals, additives, preparations and relevant chemical created in situ", (...) shall not be discharged into the sea, including enclosed ports, harbours and estuaries, **unless it is demonstrated by the ship operator** that such wash water discharge has **no significant negative impacts** on and do **not pose risks to human health and the environment**. If the chemical used is caustic soda it is sufficient that the washwater meets the criteria set out in the Resolution and its pH does not exceed 8,0.

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Exhaust Gas Cleaning Systems (scrubbers) Overview

Incentive: Difference in fuel price HFO vs MDO/MGO

EGCS Concept: Have been used efficiently on-board ships for long time, mainly combined with the IGS (e.g. tankers)

Driving Factors: Alkalinity, pH, Salinity and Temperature

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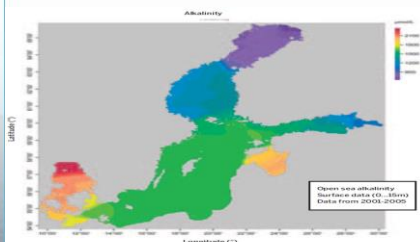
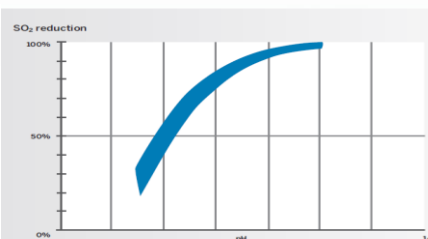


Fig. 2. – Alkalinity of the Baltic Sea.



Source: Wärtsilä Technical Journal 2007

Exhaust Gas Cleaning Systems (scrubbers) Overview

The Challenge - Meeting the requirements as follows:

1. Fulfilment of the **SO₂/CO₂** emission ratio (flue-gas)
 - Lower natural alkalinity characteristics of water lead to lower scrubbing efficiency i.e. lower SO₂ neutralisation
2. Fulfilment of the **washwater** discharge criteria
 - Lower SO₂ neutralisation will lead to higher acidic effluents

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Moving Forward with EGCS

- **EGCSA** September 2013 - 62 Installations/Orders
Indicative sales figures accelerate to around 200 ships.
- **DNV** ('Shipping 2020') foresees most likely scenario:
 - Limited uptake until 2020 when global sulphur limit of 0,5% is enforced: Around 200 hundred installations per year
 - After 2020, scrubbers may potentially be fitted on several thousands ships.
- Recent statements from both **cruise & ferry** companies show confidence in scrubbers as alternative method of compliance. Carnival & Royal Caribbean, DFDS - several scrubbers fitted
- Order book shows that orders & installations are increasingly covering **wide range of vessels** (cruise, container, ferry/ro-ro, tanker, bulker, etc.)

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The ESSF SG on EGCS (scrubbers)

• Main Objectives and Tasks

- *Address some of the market barriers hampering scrubbing technology take-up*
- *Propose to the ESSF guidelines and/or standards for scrubbing technology use on-board seagoing ships*
- *Collect relevant information*
- *Business case*

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Barriers hampering Scrubbing Technology

1. Regulatory and Environmental Impact

- Approval and Certification
- Patchwork of international, regional and local legal framework (Impact of local ecosystems, enclosed seas and ports on limitations of the use of open-loop scrubbers, washwater discharge criteria e.g. pH)

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2. Technical and Operational

- Design, on-board installation, efficiency and reliability while continuously achieving compliance (verifiable, quantifiable and enforceable)

3. Financing, Investment and Pay-back time

- Uncertainty on economical feasibility (Ship type specific, tailored EGCS installation, HFO/IFO vs LSF pricing, time spent in the SECA)

1. Regulatory and Environmental

- **Approval and Certification**

- Flag State Approval / MED / International Guidance

- Although EGCS are now included in Annex I of the **MED**, EU type approval will only be possible as of October 2014. **IMO EGCS Guidelines** are basis for the approval.
 - Until October 2014, approval is left to the individual Flag Administration therefore, additional national requirements can be applied.
 - Some difficulties are expected since the text of the revised Sulphur Directive imposes some **additional requirements beyond those in the IMO EGCS Guidelines**.
 - It has been recognised that EU Flag administrations still have to progress w.r.t. approval scheme, particularly if various national authorities are involved. Consequently, delays may occur (in some cases w.r.t. already installed scrubbers).

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1. Regulatory and Environmental

- **Patchwork of international, regional, national and local rules**

- Impact of local ecosystems, enclosed seas and ports on limitations of the use of open-loop scrubbers, washwater discharge criteria e.g. pH
 - Application of the **pre-cautionary principle**.
 - Flag State approval of exhaust gas cleaning systems (EGCS), particularly w.r.t. the application of the pH requirements in scrubber discharge water, notably during open-loop operations:
 - Revised Sulphur Directive confirmed the strict approach especially for ports and estuaries.
 - IMO Guidelines do make a distinction between ports/estuaries and open seas.
 - Should IMO revisit the pH requirements for different operating areas?
 - Should the 'approval' include testing for different pH levels?
 - Length of trials, reciprocal acceptance of approved EGCS in non-EU SECAs (North American), application in combination with other alternative methods and the **appropriate enforcement**.

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2. Technical and Operational

- **Design, on-board installation, efficiency and reliability while continuously achieving compliance**

- Plan-approval, Installation, Certification and Operation

- Certain ship designs/configurations may not be suitable for installation of scrubbers, particularly when retrofitting.
 - Ship-type specific taking into account which and how many machinery items will have EGCS. Different concepts (open/close, hybrid, dry).
 - Ship design and operational constraints (linked with Enforcement):
 - Stability and Buoyancy (LL) - volume/weight/location requisites
 - Combined EGCS solutions (Scrubbers, SCR, EGR, etc.).
 - Some operational issues (SOx reduction efficiency, equip. reliability).
 - Ordering time, lay-off period (during retrofits) and dock-availability (?).

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3. Financing, Investment, Pay-back

- **Economical feasibility (Ship-type specific, tailored EGCS installation, HFO/IFO vs LSF pricing, time spent in the SECA)**

- Financing and funding aspects, fiscal incentive measures

- In line with the revised Sulphur Directive, MS may adopt financial measures as long as in accordance with State Aid rules.
 - Several financial initiatives not used to promote scrubbers as some countries do not wish to support the use of residual fuels in future.
 - **TEN-T** Funding: over **30M €** spent on TEN-T projects co-financing the installation of scrubbers on-board ships. Experience should be shared.

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- Investment and Pay-back time

- Uncertainty about future price of LSFs and alternative fuels e.g. LNG
 - Initial investment (CAPEX) remains high especially for smaller companies

Conclusions

- It is believed that EGCS technologies are sufficiently mature to be safely installed on-board ships. There are already solutions with proven results w.r.t. safety, reliability and efficiency.
- On the other hand, it is also recognised that there are still some barriers that would require our most attention on the short-term. Difficulties related to retrofitting certain existing ship types and additional guidance for all parties involved in the acceptance (including approval and certification) are amongst these.

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**THANK YOU FOR
YOUR ATTENTION**

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