Marine after-treatment from STT Emtec AB

SCR marine
For Your Vessel and the Environment
The selective catalytic reduction of nitrous oxides (NO\textsubscript{x}) by nitrogen compounds such as urea solutions is a well proven technology and commonly referred to as SCR systems.

The relatively large amounts of NO\textsubscript{x} emissions formed in the Diesel combustion can be effectively reduced by the means of an SCR system.

An urea and water solution is used as carrier of the nitrogen compound that is needed for the chemical reduction of NO\textsubscript{x}. A harmless solution typically between 32,5 and 40% urea is used, named DEF (Diesel Exhaust Fluid).

When DEF is injected in the hot exhaust stream the water is evaporated and the urea decomposes and forms ammonia.

The Ammonia reacts with the NO\textsubscript{x} from the engine combustion and forms harmless water and nitrogen. There are a number of chemical reactions to describe the reactions but the dominant reaction is the following:

$$4 \text{NH}_3 + 4 \text{NO} + \text{O}_2 \rightarrow 4 \text{N}_2 + 6 \text{H}_2\text{O}$$

The key to a well functioning SCR system is an exact dosing strategy of DEF and a well designed injection nozzle in combination with the exhaust mixer to allow for the most preferable conditions for the injected DEF to decompose to ammonia.
The SCR marine is a fully automatic NO\textsubscript{x} reduction system. It is based upon a NO\textsubscript{x} sensor measuring the actual emissions from the engine and therefore requires little or no calibration during commissioning.

An SCR catalyst assembly, and optionally a POC (Particulate Oxidation Catalyst), is installed in the exhaust line as close to the engine as possible to preserve exhaust temperature.

Compressed air is used to achieve a high degree of atomization of the injected DEF in the exhaust. This together with the flow optimized mixer guaranties the high level of performance.
Combined marine SCR and POC system for NO\textsubscript{x}, PM, HC and CO reduction

For low sulphur fuel (EN590)
- Up to 90% NO\textsubscript{x} reduction
- Up to 40% PM reduction
- More than 90% reduction of HC and CO
- Suitable for retrofit

The SCR\textit{marine} system in combination with a POC, Particulate Oxidation Catalyst, reduces all legislated emissions in high degree.
Technical specifications
Control cabinet – DEF service tank

- **Supply voltage**: 230 VAC or 24 VDC
- **Power consumption, Peak**: 150 W
- **Ambient temperature**: 0 - +55°C
- **Monitoring and data logger in the control system, including diagnostic display on control cabinet**
- **Engine interface**: CAN bus SAE-J1939 or discrete sensors
- **DEF service tank**: 100 l, with preassembled bulk tank connections. Material: Stainless steel, EN 1.4162
Technical specifications
DEF supply pump – DEF dosing unit

**DEF supply pump**
External 24VDC brushless gear type urea pump
Fluid: DEF (Urea solution) 32,5 - 40%
DEF hose fittings in accordance to SAEJ2044
Maximum suction height: 4 meter

**DEF dosing unit**
Air assisted hi accuracy model based DDS
Air consumption: 40 nl/min FAD (min pressure 5 bar)
PWM and period time controlled injection valve
Dosing ranges available:
0 – 13 kg/h
0 – 21 kg/h
0 – 31 kg/h
Fluid: DEF (Urea solution) 32,5 - 40%
DEF hose fittings in accordance with SAEJ2044
System configurations

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<thead>
<tr>
<th>L1, mm</th>
<th>L2, mm</th>
<th>D1, mm</th>
<th>D2, mm</th>
<th>Catalyst chamber design</th>
<th>Typical power range, kW</th>
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STT Emtec in brief

The history of STT Emtec, headquartered in Sundsvall, Sweden, goes back to 1981. Originally involved in land based diesel engine technologies, the vision has always been to establish the company as one of the world leading technology providers in the field of emissions and engine performance systems, many of which have been developed in house. As well as providing after-market systems STT Emtec is a key component supplier to the world’s automotive, marine and industrial engine manufacturers.

The move into emission control systems for the maritime sector is a natural progression from the automotive experience. It is obvious that the technologies from STT Emtec will contribute considerably to the shipping industry’s emission reduction efforts.

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