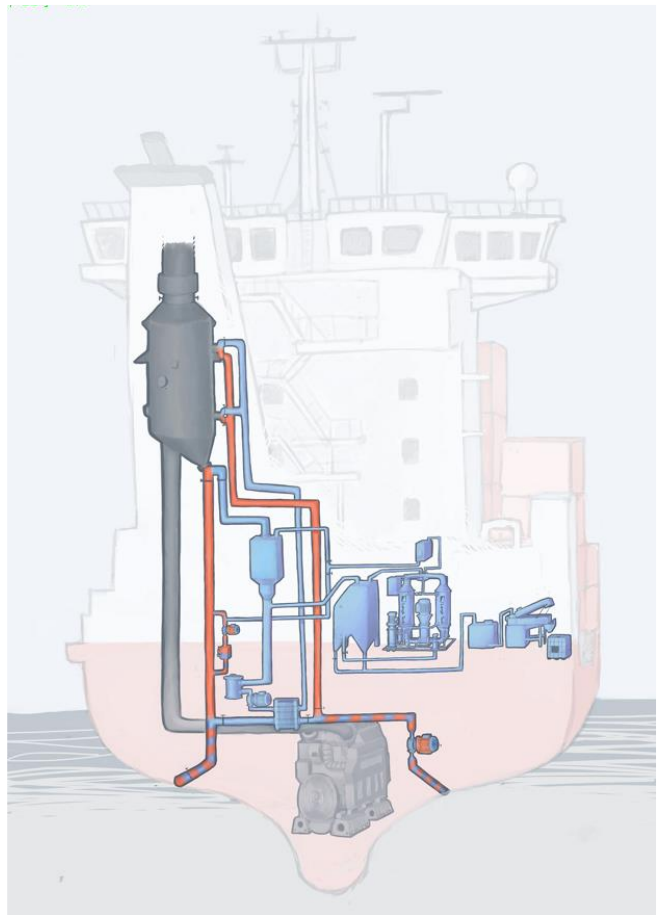


SOx Scrubbers and EGR WTS



- Langh Tech designs and produces scrubbers for SO_x removal from exhaust gases and water treatment units for closed loop scrubbers.
 - Open loop scrubbers
 - Closed loop scrubbers
 - Hybrid scrubbers
- Water treatment systems for MDT 2-stroke EGR engines (Tier III)



- Langh Tech has tested the Water Treatment System with EGR scrubber water in MAN Diesel & Turbo premises in Copenhagen in 2015.
- Langh Tech's WTS has been granted MAN Diesel & Turbo approval which states that the Langh Tech WTS technology is applicable for 2-stroke EGR.

MAN Diesel & Turbo 

*Provisional
Certificate of Approval*

This is to certify that

Langh Tech Oy Ab
Alaskartano, Vanhamakarantie 29, FI-21500 Piikkiö, Finland

Is provisionally approved by MAN Diesel & Turbo for the design, manufacture and supply of:

**Water Treatment System (WTS)
for Exhaust Gas Recirculation (EGR)**

for MAN Diesel & Turbo two-stroke diesel engines in accordance with the Terms and Conditions stated in Appendix A.

issued on 2016-12-09 expires on 2019-12-09

Certificate no.: 2700-2016-556.0

MAN Diesel & Turbo


Kenneth Tolberg


Hanne Hostrup Poulsen





Langh Tech

Closed Loop Water Treatment System

- Membrane filtration unit to purify the closed loop process water.
- No chemicals used in the filtration process
- Automated backflush of the filter elements
- One unit can serve engine power up to 20.000 kw in closed loop operation
- Multiple units used for larger system installation





Langh Tech

Closed Loop Water Treatment System

- Sludge dewatering system to dry the sludge and minimize the sludge amount
- Small amount of dry polymer used in the process.
 - HL21D, Langh Tech product
- Depending on the system size, avg. 1h sludge dewatering cycle in every 24h.
- Small amount of dry sludge
 - 2,5 – 2,8 kg per burned HFO mt
 - Sludge disposal cost avg. 350 Eur per ton.
- No need for sludge tank onboard
 - Sludge can be stored in IBC container or barrel



2,5 kg residual sludge per HFO mt

- M/S Marjatta
 - 5,8MW main engine
 - During a two week round voyage the main engine consumes **170 tons of HFO**
 - In continuous closed loop operation the scrubber system produces **500 kg of dry sludge**
 - Waste disposal cost of dry sludge is about 350 Eur per ton
- NCL Cruise Ship
 - Total installed engine power is 76,8 MW
 - During closed loop operation **max engine power is 44 MW**
 - During **24h** closed loop operation the scrubber system produces **500 kg of dry sludge**



- Manufacturing of Water Treatment Units at Langh Group production facility in Finland
- Each WTU is pressure and tightness tested by 3rd party surveyor
- Factory acceptance tests arranged according to customer requirements
- Land based water treatment facility – crew training center under construction



ISO 9001
ISO 14001
BUREAU VERITAS
Certification

