CLAIMS

1. A scrubber (1) for exhaust gas from a marine vessel, comprising a lower and an upper scrubbing chamber (3, 13), the scrubbing chambers (3, 13) being substantially symmetric about a common length axis being substantially vertically arranged, where a lower chamber exhaust gas outlet (12) is arranged at the top of the lower scrubbing chamber (3) as a coaxial constriction, for withdrawing the partly scrubbed exhaust gas from the lower scrubbing chamber and introducing the gas into the upper scrubbing chamber (13), and being designed as a bottleneck to reduce the pressure drop over the scrubber (1);
wherein an exhaust gas tube (2) is substantially coaxially arranged through the bottom of the lower scrubbing chamber, that the exhaust gas tube (2) is opening into the lower scrubbing chamber (3), and that an exhaust gas outlet (20) is coaxially arranged through the top of the upper scrubbing chamber, wherein a lower scrubbing chamber deflection body (4) is arranged above the opening of the exhaust gas tube (2) for redirecting the exhaust gas towards the walls of the scrubber and create turbulent gas flow,
characterised in that
- the deflection body comprises two oppositely directed straight cones having a common base and a common axis of rotation coinciding with the length axis of the scrubber;
- one or more lower chamber water injector(s) (6, 6') is (are) arranged substantially along the length axis of the lower scrubbing chamber and arranged above the lower scrubbing chamber deflection body (4), to introduce scrubbing water into the exhaust gas stream, and where at least one of the water injectors (6) is (are) directed upwards, towards the lower chamber exhaust gas outlet (12) constriction, thus creating a Venturi effect in the lower chamber exhaust gas outlet (12).

2. The scrubber according to claim 1, wherein one or more lower chamber water outlet(s) (8) is (are) arranged to withdraw scrubbing water collected at the bottom part of the lower scrubbing chamber (3).

3. The scrubber according to any of the preceding claims, wherein two or more water injectors are arranged in the lower scrubbing chamber and where

at least one of the water injectors (6') is (are) directed downwards, towards the lower scrubbing chamber deflection body (4).

4. The scrubber according to any of the preceding claims, wherein a ring shaped lower chamber wall deflector (5) is arranged in the wall of the scrubber.

5. The scrubber according to any of the preceding claims, wherein the top angle (α) of the downwards directed cone is 80 - 100°, and top angle of the upwards directed cone is 70 – 90°.

6. The scrubber according to any of the preceding claims, wherein one or more water mist nozzle(s) is (are) arranged in the lower scrubbing chamber (3) below the lower scrubbing chamber deflection body (4).

7. The scrubber according to any of the preceding claims, wherein an upper scrubbing chamber deflection body (14) is arranged inside the upper scrubbing chamber (13) and above the lower scrubbing chamber exhaust gas outlet (12).

8. The scrubber according to claim 5, wherein one or more upper scrubbing chamber water injector(s) (16) is (are) arranged in the upper scrubbing chamber.

9. The scrubber according to any of the preceding claims, wherein a demister is arranged at the top of the upper scrubbing chamber for reduction of water mist in the scrubbed exhaust gas.

10. A method for scrubbing of exhaust gas, wherein the exhaust gas is introduced into a scrubber where the exhaust gas is scrubbed in contact with sea water for reduction of SOx and particles in the exhaust gas, the method comprising the steps of:

a. Introducing the exhaust gas to be scrubbed through a coaxially arranged exhaust gas tube into a lower scrubbing chamber in a tubular scrubber comprising two or more serially connected scrubbing chambers,
b. Redirecting the exhaust gas stream by means of a deflection body, comprising two oppositely directed straight cones having a common base and a common axis of rotation coinciding with the

length axis of the scrubber, is arranged above the opening of the exhaust gas tube to create turbulent gas flow;

c. Introducing water droplets into the exhaust gas for scrubbing thereof,
d. withdrawal of the scrubbed exhaust gas from a lower scrubbing chamber through a lower chamber exhaust gas outlet being arranged as a coaxially arranged constriction and designed as a bottleneck to reduce the pressure drop over the scrubber,
e. introduction thereof into a second scrubbing chamber wherein the exhaust gas is further scrubbed,
f. releasing the scrubbed exhaust gas into the surroundings,

characterised in that at least a part of the water droplets introduced in step c) is introduced by means of at least one lower chamber water spray injector arranged substantially along the length axis of the lower scrubbing chamber and above the lower chamber deflection body, and that at least one of the spray injector(s) is (are) spraying water upwards towards the lower chamber exhaust gas outlet constriction, thus creating a Venturi effect in the lower chamber exhaust gas outlet.

11. The method of claim 10, wherein water mist is introduced into the incoming exhaust gas for cooling and humidifying thereof between step a) and b).

12. The method of claim 10 or 11, wherein the used scrubbing water withdrawn from the scrubber is released into the surrounding sea.

13. The method of claim 12, wherein particles are removed from the used scrubbing water before the water is released.

14. The method of claim 10 or 11, wherein the used scrubbing water is recycled into the scrubber.

15. The method of claim 14, wherein the used scrubbing water is treated to reduce the amount of particles before being recycled into the scrubber.

16. The method of claim 14 or 15, wherein alkali is added to the water before recycling thereof into the scrubber.

17. The method of claim 16, wherein the alkali is an aqueous solution of MgO or $Mg(OH)_2$.