Claims

1. A method for heat treatment of water of a first vessel (40) using a system for heat treatment of water, the system (102) comprising: a system inlet (4); a system outlet (10); a heat application section (8); a heat recovering section (6); and a heat treatment piping system, which system does not form part of a fixed installation of the first vessel, the water comprising ballast water of the first vessel and/or waste water from hull cleaning of the first vessel, the method comprising:

- providing a flow of the water from ~~a~~ the system inlet towards ~~a~~ the system outlet via: a first part of ~~a~~ the heat recovering section (7a); ~~a~~ the heat application section; and a second part of the heat recovering section (7b); such that the water is flowing: from the system inlet (4) to the first part of the heat recovering section (7a); from the first part of the heat recovering section to the heat application section (8); from the heat application section to the second part of the heat recovering section (7b); and from the second part of the heat recovering section to the system outlet (10); wherein the flow of the water being provided using ~~a~~ the heat treatment piping system;
- applying heat to the water at the heat application section, such that the water is heated while flowing through the heat application section; and
- recovering heat from the heated water at the heat recovering section by having the water, which is flowing through the second part of the heat recovering section, pre-heating the water, which is flowing through the first part of the heat recovering section, such that heat is exchanged from the second part of the heat recovering section to the first part of the heat recovering section;

wherein both the step of applying heat and the step of recovering heat occurs outside a fixed installation of the first vessel (40).

2. The method according to claim 1, wherein the water comprises ballast water of the first vessel, and wherein the method comprises temporarily coupling at least one of the system inlet and the system outlet to a ballast water piping system of the first vessel using a vessel piping connector.

3. The method according to claim 2, comprising utilizing a ballast pump of the first vessel for providing a flow of the ballast water from at least one ballast tank of the

first vessel towards the system inlet or from the system outlet towards at least one ballast tank of the first vessel.

~~4. The method according to claim 2 or 3, comprising temporarily coupling the system inlet to the ballast water piping system of the first vessel; the method comprising providing the water from the first vessel back to the first vessel via the system outlet.~~

~~5. The method according to claim 2 or 3, comprising temporarily coupling a second of the system inlet and the system outlet to a ballast water piping system of a second vessel; the method comprising providing the water between the first vessel and the second vessel via: the system inlet; the heat application section; the heat recovering section; and the system outlet.~~

~~6. The method according to any of the preceding claims, comprising providing the water from the system outlet to an outlet storage tank.~~

~~7. The method according to any of the preceding claims, comprising providing the water from an inlet storage tank to the system inlet.~~

~~8. The method according to any of the preceding claims, comprising providing the flow of the water between the system inlet and the system outlet using a treatment pump.~~

~~9. The method according to any of the preceding claims, wherein the heat recovering section comprises: a primary inlet; a primary outlet; a secondary inlet; and a secondary outlet; the primary inlet being coupled to the system inlet via a mode valve system, the primary outlet being coupled to the secondary inlet via the heat application section, the secondary outlet being coupled to the system outlet via the mode valve system, the secondary outlet being coupled to the primary inlet via the mode valve system, the method comprising temporarily setting the mode valve system such that the coupling between the secondary outlet and the primary inlet is open while the coupling between the primary inlet and the system inlet is closed and/or while the coupling between the secondary outlet and the system outlet is closed.~~

4~~10~~. The method according to any of the preceding claims, wherein the step of providing a flow of the water from the system inlet (4) towards the system outlet (10) via the heat application section (8) and via the heat recovering section (6) comprises an initial flow phase wherein the flow rate is lower than during a subsequent flow phase~~.~~.

~~11. The method according to any of the preceding claims, wherein the step of applying heat to the water at the heat application section comprises an initial heating phase wherein more heat is applied than during a subsequent heating phase.~~

the~~12. The~~ method ~~according to any of the preceding claims,~~ comprising:

- obtaining one or more temperature measurements of the water prior to entering the heat application section and/or subsequent to leaving the heat application section and/or within the heat application section; and
- utilizing the one or more temperature measurements for controlling: a flow rate of the water through the heat application section and/or a heat disposing setting of the heat application section~~,~~ ~~and/or a setting of the mode valve system according to claim 9.~~

~~13. The method according to claim 12 dependent on claim 10 or 11,~~ the method comprising utilizing the one or more temperature measurements for controlling ~~the initial heating phase and/or~~ the initial flow phase.

~~14. The method according to any of the preceding claims, wherein the water is not filtered using a filter section configured to filter 25 µm particles while the water is flowing between the system inlet and the system outlet.~~

~~15. The method according to claim 14, wherein the water is not filtered using a filter section configured to filter 45 µm particles while the water is flowing between the system inlet and the system outlet.~~

~~16. The method according to any of the preceding claims, wherein the step of applying heat to the water comprises using a boiler.~~

~~17. The method according to any of the preceding claims, wherein the step of applying heat to the water comprises utilizing an external hot fluid source supplying a flow of hot fluid.~~

~~18. The method according to claim 17, wherein the external hot fluid source comprises a district heating system.~~

~~19. The method according to any of the preceding claims, wherein the step of applying heat to the water comprises utilizing an electric heater.~~

~~20. The method according to any of the preceding claims, wherein both the step of applying heat and the step of recovering heat occurs within a mobile container.~~

~~21. The method according to any of the preceding claims, taking place at a port.~~

~~22. The method according to claim 21, wherein both the heat application section and the heat recovering section are fixed at a port.~~

5~~23~~. The method according to any of the preceding claims ~~1–20~~, taking place at an anchorage.

~~24. The method according to any of the preceding claims, wherein the step of providing a flow of the water from the system inlet towards the system outlet comprises providing the flow via a detention section, the method comprising detaining the water at the detaining section for a pre-determined average detention time by having the heated water, which is flowing from the heat application section towards the heat recovering section, being detained, such that the heated water is kept heated for the pre-determined average detention time.~~

6~~25~~. The method according to any of the preceding claims, wherein the water is heated at the heat application section, such that the water reaches a temperature of at least 60 °C~~.~~

~~26. The method according to any of the preceding claims~~, and wherein the flow of the water through the heat application section is provided at a flow rate of at least 5 m^3/h.

~~27. The method according to claim 26, wherein the flow rate is at least 100 m^3/h.~~

7~~28~~. A system comprising a first vessel (40) and a system (102) for heat treatment of water of ~~a~~ the first vessel outside a fixed installation of the first vessel, the water comprising ballast water of the first vessel and/or waste water from hull cleaning of the first vessel, the system comprising:

- a system inlet (4);
- a system outlet (10);
- a heat application section (8) configured for applying heat to the water, such that the water that is flowing through the heat application section is heated;
- a heat recovering section (6) configured for recovering heat from the heated water, the heat recovering section comprising a first part (7a) and a second part (7b) configured for exchanging heat; and
- a heat treatment piping system coupling the system inlet to the system outlet via: the first part of the heat recovering section; the heat application section; and the second part of the heat recovering section; such that the water can flow: from the system inlet to the first part of the heat recovering section; from the first part of the heat recovering section to the heat application section; from the heat application section to the second part of the heat recovering section; and from the second part of the heat recovering section to the system outlet;

the heat recovering section being configured for exchanging heat such that the water, which is flowing through the second part of the heat recovering section, is pre-heating the water, which is flowing through the first part of the heat recovering section,

wherein the system (102) does not form part of a fixed installation of the first vessel (40).

~~29. The system according to claim 28, wherein the water comprises ballast water of the first vessel, the system being configured for temporarily coupling at least one of the system inlet and the system outlet to a ballast water piping system of the first vessel using vessel piping connector.~~

~~30. The system according to claim 29, wherein the vessel piping connector comprises a flange configured for temporarily coupling at least one of the system inlet and the system outlet to the ballast water piping system of the first vessel.~~

~~31. The system according to claim 29 or 30, configured for having a ballast pump of the first vessel being utilized for providing a flow of the ballast water from at least one ballast tank of the first vessel towards the system inlet or from the system outlet towards at least one ballast tank of the first vessel.~~

~~32. The system according to any of the claims 29-31, configured for temporarily coupling the system inlet to the ballast water piping system of the first vessel, and configured for providing the water from the first vessel back to the first vessel via the system outlet.~~

~~33. The system according to any of the claims 29-31, configured for temporarily coupling a second of the system inlet and the system outlet to a ballast water piping system of a second vessel, such that water may be provided between the first vessel and the second vessel via the system for heat treatment.~~

8~~34~~. The system according to claim 7~~any of the claims 28-33~~, comprising a treatment pump configured for providing the flow of the water between the system inlet and the system outlet at a flow rate of at least 5 m^3/h.

9~~35~~. The system according to ~~any of the claims 28-34~~claim 7 or 8, comprising a mode valve system (18), the heat recovering section comprises: a primary inlet (6a); a primary outlet (6b); a secondary inlet (6c); and a secondary outlet (6d); the primary inlet being coupled to the system inlet via the mode valve system, the primary outlet being coupled to the secondary inlet via the heat application section (8), the secondary outlet being coupled to the system outlet via the mode valve system, the secondary outlet being coupled to the primary inlet via the mode valve system, the system being configured for: temporarily setting the mode valve system such that the coupling between the secondary outlet and the primary inlet is open while the coupling between the primary inlet and the system inlet is closed and/or while the coupling between the secondary outlet and the system outlet is closed~~.~~

~~36. The system according to claim 35~~, wherein the mode valve system comprises: an inlet valve (18a) provided between the system inlet and the primary inlet of the heat recovering section; an outlet valve (18c) provided between the system outlet and the secondary outlet of the heat recovering section; and an internal valve (18b) provided between the primary inlet of the heat recovering section and the secondary outlet of the heat recovering section.

~~37. The system according to any of the claims 28-36, configured for provision of an initial flow phase wherein a flow rate of the water from the system inlet towards the system outlet is lower than during a subsequent flow phase.~~

~~38. The system according to any of the claims 28-37, configured for provision of an initial heating phase wherein more heat is applied to the water at the heat application section than during a subsequent heating phase.~~

10~~39~~. The system according to any of the claims ~~28~~7-~~38~~9, comprising one or more temperature sensors (22a, 22b, 22c) configured for obtaining one or more temperature measurements of the water prior to entering the heat application section and/or subsequent to leaving the heat application section and/or within the heat application section; the system being configured for utilizing the one or more temperature measurements for controlling: a flow rate of the water through the heat application section and/or a heat disposing setting of the heat application section and/or a setting of the mode valve system according to claim ~~35~~9.

~~40. The system according to claim 39 dependent on claim 37 or 38, configured for utilizing the one or more temperature measurements for controlling the initial heating phase and/or the initial flow phase.~~

~~41. The system according to any of the claims 28-40, not comprising a filter section configured to filter 25 µm particles from the water while the water is flowing between the system inlet and the system outlet.~~

~~42. The system according to claim 41, not comprising a filter section configured to filter 45 µm particles from the water while the water is flowing between the system inlet and the system outlet.~~

11~~43~~. The system according to any of the claims ~~28~~7-~~42~~10, comprising a boiler (14) configured for applying heat to the water at the heat application section and/or wherein the heat application section comprises an electric heater configured for applying heat to the water.

~~44. The system according to any of the claims 28-43, comprising a hot fluid connector system, configured for being supplied with a flow of hot fluid from an external hot fluid source, the hot fluid connector system being configured for applying heat to the water at the heat application section.~~

~~45. The system according to claim 44, wherein the external hot fluid source comprises a district heating system.~~

~~46. The system according to any of the claims 28-45, wherein the heat application section comprises an electric heater configured for applying heat to the water.~~

12~~47~~. The system according to any of the claims ~~28~~7-~~46~~11, comprising a mobile container, wherein both the heat application section and the heat recovering section are installed within the mobile container.

13~~48~~. The system according to any of the claims ~~28~~7-~~47~~12, being installed and fixed at a port.

~~49. The system according to claim 48, being fixed at the port.~~

14~~50~~. The system according to any of the claims ~~28~~7-~~47~~12, ~~being~~ wherein the system is situated ~~or configured for being situated~~ at a vessel (80) other than the first vessel, or wherein the system is situated on the first vessel and is provided as a non-fixed installation of the first vessel.

15~~51~~. The system according to any of the claims ~~28~~7-~~50~~14, comprising a detention section (9), the heat treatment piping system coupling the system inlet to the system outlet via the detention section, such that the water can flow from the heat application section to the second part of the heat recovering section via the detention section, the detention section being configured for detaining the water flowing through the detention section for a pre-determined average detention time by having

the heated water, which is flowing from the heat application section to the heat recovering section, being detained, such that the heated water is kept heated for the pre-determined average detention time, and wherein the system does not comprise a filter section configured to filter 45 µm particles from the water while the water is flowing between the system inlet and the system outlet.

~~52. The system according to any of the claims 28-51, configured for heating the water at the heat application section, such that the water reaches a temperature of at least 60 °C.~~

~~53. The system according to any of the claims 28-52, configured for a flow of the water through the heat application section at a flow rate of at least 5 m^3/h.~~

~~54. The system according to claim 53, configured for a flow rate of at least 100 m^3/h.~~

~~55. The system according to any of the claims 28-54, configured for carrying out the method according to any of the claims 1-27.~~

~~56. A heat treatment and water storage system comprising the system according to any of the claims 28-55, and comprising an outlet storage tank coupled to the system outlet and/or an inlet storage tank coupled to the system inlet.~~