**CLAIMS**

[Claim 1] A plate heat exchanger for treatment of a feed such as sea water, the plate heat exchanger including a plate package comprising a plurality of heat exchanging plates arranged in a successive order, the plate package defines a heating volume for receiving a heating medium, a cooling volume for receiving a cooling medium and a plurality of process volumes, each of the volumes being fluidly separated from each other in the plate package,

(a) wherein each of the process volumes includes:

(i) an evaporation section being arranged to permit evaporation of at least a part of the feed;

(ii) a separation section being arranged to separate a non-evaporated part of the feed from an evaporated part of the feed; and

(iii) a condensation section being arranged to condense the evaporated part of the feed;

(b) wherein each heat exchanging plate defines a first thermal interface between the heating volume and the evaporation section of a first process volume of the plurality of process volumes, a second thermal interface between the cooling volume and the condensation section of a second process volume of the plurality of process volumes, and at least one further thermal interface between an evaporation section and a condensation section of two adjacent process volumes; and

(c) wherein the volumes are fluidly separated from each other by means of a gasket.

[Claim 2] The plate heat exchanger according to claim 1, wherein the plate package defines at least two process volumes, preferably 3, 4, 5, 6, 7, 8, 9 or 10 process volumes being arranged such that two adjacent process volumes define a thermal interface between respective adjacent condensation and evaporation sections.

[Claim 3] The plate heat exchanger according to any of the preceding claims, wherein the pressure and temperature in the second process volume is lower than in the first process volume.

[Claim 4] The plate heat exchanger according to any of the preceding claims, wherein each of the process volumes comprises a feed inlet located at the bottom of the evaporation section and a non-evaporated feed outlet located below the separation section when the plate package is disposed in a normal position of use.

[Claim 5] The plate heat exchanger according to claim 4, wherein the feed inlet is located adjacent a centre axis of each heat exchanging plate for at least one process volume of the plurality of process volumes other than the first process volume.

[Claim 6] The plate heat exchanger according to claim 4, wherein the non-evaporated feed outlet is located adjacent a centre axis of each heat exchanging plate for at least one process volume of the plurality of process volumes other than the first process volume.

[Claim 7] The plate heat exchanger according to any of the preceding claims, wherein the evaporation section comprise a feed inlet located at the top of the evaporation section.

[Claim 8] The plate heat exchanger according to any of the preceding claims, wherein at least one heat exchanging plate define one or more apertures at the separation section of at least one process volume.

[Claim 9] The plate heat exchanger according to any of the preceding claims, wherein the evaporation section and the condensation section are arranged in the same plate interspace for at least one process volume, and/or, wherein the evaporation section and the condensation section are arranged in opposite plate interspaces for at least one process volume.

[Claim 10] The plate heat exchanger according to any of the preceding claims, wherein during use the condensation section of the second process volume is disposed above the evaporation section of the first process volume and within each process volume the evaporation section is disposed below the separation section and the separation section is disposed below the condensation section.

[Claim 11] The plate heat exchanger according to any of the preceding claims, wherein the number of heat exchanging plates is in the range of 4-1000 heat exchanging plates, such as in the range of 10-100.

[Claim 12] The plate heat exchanger according to any of the preceding claims, wherein the plate heat exchanger further comprising a pair of end plates covering two opposing sides of the plate package.

[Claim 13] A method of manufacturing a plate heat exchanger for treating a feed such as sea water,

(a) wherein the method comprises:

(i) providing a plurality of heat exchanging plates, each heat exchanging plate defines a first thermal interface, a second thermal interface and at least one further thermal interface, and

(ii) forming a plate package by arranging the plurality of heat exchanging plates in a successive order, wherein the plate package define a heating volume for receiving a heating medium, a cooling volume for receiving a cooling medium and a plurality of process volumes, each of the volumes being fluidly separated from each other in the plate package, each of the process volumes includes:

(1) an evaporation section being arranged to permit evaporation of at least a part of the feed;

(2) a separation section being arranged to separate a non-evaporated part of the feed from an evaporated part of the feed; and

(3) a condensation section being arranged to condense the evaporated part of the feed; and

(b) wherein the first thermal interface is defined between the heating volume and the evaporation section of a first process volume of the plurality of process volumes, the second thermal interface is defined between the cooling volume and the condensation section of a second process volume of the plurality of process volumes, and the at least one further thermal interface is defined between an evaporation section and a condensation section of two adjacent process volumes.

[Claim 14] A plate for arrangement into a plate package,

(a) wherein the plate package defines a heating volume for receiving a heating medium, a cooling volume for receiving a cooling medium and a plurality of process volumes, each of the volumes being fluidly separated from each other in the plate package;

(b) wherein each of the process volumes includes:

(i) an evaporation section being arranged to permit evaporation of at least a part of the feed;

(ii) a separation section being arranged to separate a non-evaporated part of the feed from an evaporated part of the feed; and

(iii) a condensation section being arranged to condense the evaporated part of the feed; and

(c) wherein the plate defines a first thermal interface between the heating volume and the evaporation section of a first process volume of the plurality of process volumes, a second thermal interface between the cooling volume and the condensation section of a second process volume of the plurality of process volumes, and at least one further thermal interface

between an evaporation section and a condensation section of two adjacent process volumes.