According to an aspect of the invention it is provided a subsea cooler system for cooling a well flow by seawater having an inlet and an outlet, the cooler system comprising:~~,~~ at least a first cooler and a second cooler, wherein the first cooler and second cooler are arranged in a series connection, the cooler system comprises at least a third cooler which is arranged in parallel connection with the first cooler and second cooler, and the cooler system comprises at least one flow control device for directing flow through at least one cooler wherein at least one of the coolers comprises a bypass circuit and/ or recirculation loop, wherein the coolers comprise temperature control means and sensors such that an operator may monitor the cooler system and the coolers and bypassing the whole flow or parts of the flow through the bypass circuit. The recirculation loop allows additional cooling of at least parts of the well flow, alternatively the whole well flow, in situations where the flow is not satisfactory cooled. In addition it might be arranged a bypass circuit over said first cooler and/or second cooler, which bypass circuit allows at least fractions of the flow, alternatively the whole flow, to bypass the cooler. This might be advantageous in occasions where cooling, e.g. additional cooling, are unnecessary or unwanted due to the temperature of the well flow, e.g. in that the temperature of the well flow may vary as a function of time, and/or that the flow rate of the well flow may vary during the lifetime of a field. The bypass circuit may form part of the recirculation loop for instance by the use of three-way valves allowing either no flow, flow in a first direction, or flow in a second direction. Alternatively, the bypass circuit and recirculation loop may be formed by separate pipes, tubes or similar, bypassing the cooler or recirculating around or alternatively within the cooler. The third cooler, or any number of additional coolers, may be arranged in one or more parallel connections relative the first and second cooler. There may also be additional coolers in the series of the first and second cooler. In one embodiment the third cooler comprises a recirculation loop. In another embodiment the third cooler comprises a bypass circuit and/ or a recirculation loop. But it should be understood that any of the first, second, third or any additional coolers can be arranged with a recirculation loop and/ or bypass circuit. The third cooler can be arranged in a series connection with at least one other cooler. The different series connections, e.g. denoted a single branch, may have the same maximum cooling effect or different cooling effect. The cooling effect in one series connection, or branch, also depends on the expected flow rate of the well. The cooler system comprises at least one flow control device for directing a fluid flow through at least one of said first cooler and second cooler, third cooler and/ or bypass line. The flow control device is preferably a valve or other means capable of directing the well flow. The system may be equipped with one, two, or a number of flow control devices directing the well flow through the desired coolers, bypass line or bypass circuits.

The cooler system may be provided with means for MEG-injection to prevent the formation of hydrates. The MEG-injection means might become usable both during standard operation of the cooler system under normal flow conditions, and when the flow is stopped etc.

CLAIMS

1. A cooler system having an inlet (A) and an outlet (B), the cooler system comprising; at least a first cooler (20, 21, 22, 23, 24) and a second cooler (20, 21, 22, 23, 24), wherein the first cooler (20, 21, 22, 23, 24) and second cooler (20, 21, 22, 23, 24) are arranged in a series connection, the cooler system further comprises at least a third cooler (20, 21, 22, 23, 24) which is arranged in parallel connection with the first cooler (20, 21, 22, 23, 24) and second cooler (20, 21, 22, 23, 24), and the cooler system comprises at least one flow control device for directing flow through at least one cooler (20, 21, 22, 23, 24) wherein at least one of the coolers (20, 21, 22, 23, 24) comprises a bypass circuit and/ or recirculation loop (35).

2. A cooler system according to claim 1, *characterized in that* at least two of the coolers (20, 21, 22, 23, 24) have different cooling capacity.

3. A cooler system according to claims 1-2, *characterized in that* the system comprises a bypass line (34) bypassing all of the coolers (20, 21, 22, 23, 24).

4. A cooler system according to claims 1-3, *characterized in that* the at least one flow control device directs the flow through at least one of said first cooler (20, 21, 22, 23, 24) and second cooler (20, 21, 22, 23, 24), third cooler (20, 21, 22, 23, 24) and/ or bypass line (34).

5. A cooler system according to claims 1-4, *characterized in that* the third cooler (20, 21, 22, 23, 24) is arranged in a series connection with at least one cooler (20, 21, 22, 23, 24).

6. A cooler system according to claims 1-5, *characterized in that* the coolers (20, 21, 22, 23, 24) comprises temperature control means and is configured to recirculate at least parts of a fluid flow through the recirculation loop (35) if the temperature is above a threshold value.

CLAIMS

1. A subsea cooler system for cooling a well flow by seawater having an inlet and an outlet, the cooler system comprising: at least a first cooler and a second cooler, wherein the first cooler and second cooler are arranged in a series connection, the cooler system further comprises at least a third cooler which is arranged in parallel connection with the first cooler and second cooler, and the cooler system comprises at least one flow control device for directing flow through at least one cooler wherein at least one of the coolers comprises a bypass circuit and/or recirculation loop, wherein the coolers comprise temperature control means and sensors such that an operator may monitor the cooler system and the coolers and bypassing the whole flow or parts of the flow through the bypass circuit.

2. A subsea cooler system according to claim 1, wherein at least two of the coolers have different cooling capacity.

3. A subsea cooler system according to claims 1-2, wherein the system comprises a bypass line bypassing all of the coolers.

4. A subsea cooler system according to claim 3, wherein the sensors are arranged at different positions in the cooler system, and that the operator, by reading the sensor values, can monitor the cooler system and coolers, and direct the flow into another set of coolers, re-circulate the whole flow or parts of the flow, bypassing the whole or parts of the flow through the bypass line or the bypass circuit.

5. A subsea cooler system according to claims 1-4, wherein the at least one flow control device directs the flow through at least one of said first cooler and second cooler , third cooler and/or bypass line.

6. A subsea cooler system according to claims 1-5, wherein the third cooler is arranged in a series connection with at least one cooler.

7. A subsea cooler system according to claims 1-6, wherein the coolers comprises temperature control means and is configured to recirculate at least parts of a fluid flow through the recirculation loop if the temperature is above a threshold value.

8. A subsea cooler system according to any of the preceding claims, wherein the recirculation loop and the bypass circuit is a two-way flow loop.

9. A subsea cooler according to any of the preceding claims, wherein the cooler system is provided with means for MEG-injection.

10. A subsea cooler according to any of the preceding claims, wherein at least one cooler comprises a first header pipe adapted for communication with at least one hydrocarbon well and forming a common inlet, a second header pipe adapted

for communication with a flow line and forming a common outlet, having its longitudinal axis substantially parallel with and in a distance from the first header pipe, and arranged between the first and second header pipe, at least one set of cooler coils; where the at least one set is formed such that the coils of the one set is arranged in one plane and each set is individually connected to the header pipes.

11. A subsea cooler according to claims 1-10, wherein the cooling of the well flow is driven by a controlled natural convection.

12. A subsea cooler system according to any of the preceding claims 1-10, wherein the cooler system comprises means for generating fluid motion in the seawater for driving the seawater through the cooler, which means for generating fluid motion includes a pump, propulsion means, propeller or similar.