cyclonically removing bulk gas from the liquid in either a cyclone or auger separator. A liquid-liquid hydro-cyclone for the third stage acts to pre-separate the fluid either by separating and/or by coalescing oil droplets in a water continuous stream and/or water droplets in an oil continuous stream. A forth stage gravity separator is significantly smaller for the flow throughput as compared to surface separating systems due to the earlier separation processes and due to the option of subsequent oily-water separation in a de-oiling liquid-liquid hydro-cyclone.

Summary of the invention

The invention is defined in the patent claims.

In one aspect, there is provided a gas-liquid separation system comprising a splitter configured to separate the inlet stream from a well stream into liquid and gaseous phases, the splitter having an outlet for a liquid phase to a liquid continuous line to an inline degasser configured to drive separation of gas and liquid by centripetal acceleration, where the clean liquid exits through a liquid outlet pipeline and the gas with some liquid are extracted in a reject line and flow into a reject vessel, and the splitter having an outlet for the gaseous phase to a gas continuous line to an inline deliquidizer configured to drive separation of liquid and gas by centripetal acceleration, where the clean gas exits through a gas outlet pipeline and the liquid with some gas are extracted in a reject line and flow into the reject vessel, wherein the reject vessel is configured for separation by gravity.

In another aspect, there is provided a method of operating a gas-liquid separation system, comprising transferring an inlet stream from a well stream to a splitter facilitating separation of a liquid phase and a gaseous phase, transferring the liquid continuous stream into a degasser where the fluid is set into spin and the centripetal acceleration drives separation of gas and liquid, the clean liquid exits through a liquid outlet and gas and some liquid are extracted in the reject line and flow into a reject vessel, transferring the gas continuous stream into a deliquidizer where the fluid is set into spin and the centripetal acceleration drives separation of liquid and gas, the clean gas exits through a gas outlet and liquid and some gas are extracted in the reject line and flow into the reject vessel, the mixed liquid and gas from the

reject lines are separated by gravity in the shared reject vessel, the degassed liquid is combined with the liquid outlet and the dry gas is combined with the gas outlet.

Brief description of the drawings

Figure 1 shows an embodiment of the system according to the invention. The inlet stream 1 from the well stream is split in a gas continuous line and a liquid continuous line in for instance a phase splitter, a bulk separator, either compact or conventional. The gas continuous stream is cleaned i.e. de-liquidized, preferably in an Inline DeLiquidizer 2, and the clean gas exit through the gas exit and the reject stream enters the reject vessel 4, similar the liquid continuous stream is de-gasified, preferably in an Inline DeGasser 3, and the clean liquid exit through the liquid exit and the reject stream enters the reject vessel 4.

The reject vessel 4 is then used to clean the remaining gas and liquid, combining the gas with the gas outlet of the deliquidizer 2 and the liquid with the degasser 3 liquid line.

Figure 2 shows an embodiment of the invention with multiple DeGassers 3 and Deliquidizers 2 in parallel and wherein the reject streams enters a shared reject vessel 4.

Detailed description of the invention

The present invention is particularly advantageous in subsea application. Even if the invention is described herein by way of example with reference to such subsea application it should be understood that the invention is not limited to such subsea use but is also applicable for use both topside on an offshore installation as well as on land.