



Oily Water / Produced Water Treatment

Corrugated Plate Interceptors (CPI)

PRESSURE VESSEL TYPE (SKIM-MFC)



Overview

Corrugated Plate Interceptors in Pressure Vessel (Skim-MFC), a Multi-phase Separator, is an integral system that combines in one unit two major steps in the treatment of produced water, i.e. degassing and primary separation of oil from water.

The Skim-MFC Separator offers substantial weight and space savings compared with conventional treatment, which is of major importance on offshore oil and gas production platforms.

Process Description

The produced water containing oil and partly dissolved hydrocarbon gases enters the separator above the free liquid surface. This enables part of the gas to immediately free itself from the liquid and flow towards the gas outlet. A foam screen is provided in the inlet section of the separator to eliminate the possibility of water and oil mist being carried towards the gas outlet.

Likewise, sand and other solid particles, which are frequently present in produced water streams, will settle on the bottom of the primary compartment where they can be released during the process by intermittent operation of the desludging valves.

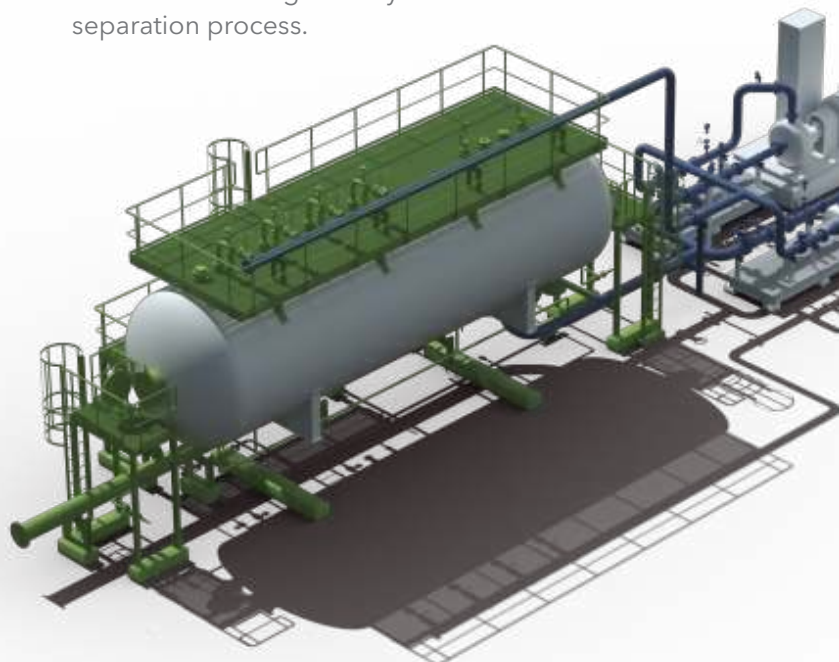
The oily water flows into the pack of inclined plates from the top and passes down through the plate pack. The plate pack is hydraulically designed in such a way that laminar flow conditions exist in each 'channel' (i.e. the distance between the subsequent plates). In this laminar flow the minute oil droplets

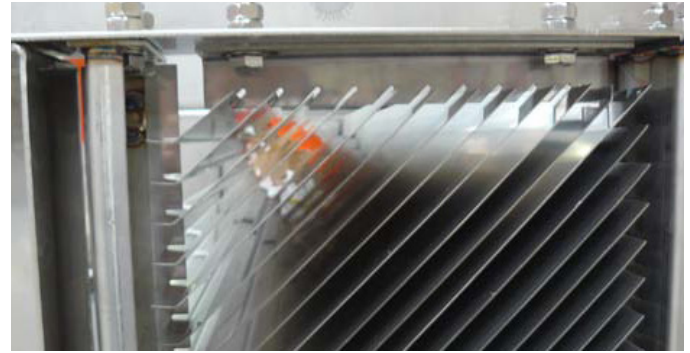
rise by virtue of the fact that their density is less than that of the water and attach themselves to the underside of the upper plate of the channel.

The build-up oily layer that is constantly being formed at the underside of each plate creeps slowly upwards along the plates. At the top of each plate the oil film is concentrated (coalesced) by the special fingers and leaves the plate at the fingertips as a thick stream or a rising chain of large bubbles.

Also any micron size gas bubbles, still contained in the water after initial gas release in the primary chamber, will rise. These gas bubbles in general are oleophilic so that they will easily adhere to the minute oil droplets.

This 'natural flotation' effect gives the oil droplets an increased rising velocity and thus accelerates the separation process.





The layer of separated oil flows at a constant rate over a fixed weir into the recovered oil sump from where it can be released intermittently during the process via a level switch controlled valve. The treated water leaves the separator vessel via the control valve and can be further treated if required by floatation or filtration.

Construction

The Skim-MFC Separator vessels are designed and fabricated in accordance with codes such as ASME VIII and BS 5500. Depending on the characteristics of the water to be treated, the inclined plate packs may be manufactured from:

- Glass fibre reinforced polyester (GRP)
- Coated carbon steel
- Various grades of Austenitic Steel (SS304, SS316, DSS, SDSS)

For easy removal of the separation plates or plate packs the separator is provided either with a flanged head or with a manway. Normally, however, in-situ cleaning of the plate packs is adequate, so that removal of the plates or plate packs from the vessel is not necessary.

Depending upon the concentration of suspended solids and waxes, the plate spacing and plate inclination can be varied to suit the particular process conditions. This design flexibility enables us to offer our clients a technically optimised solution for each individual application.

Typical Application

In conventional produced water treatment systems the water, coming from the production (3-phase) separator is first knocked-down to almost atmospheric pressure in a separate flash drum in order to blow-off the hydrocarbon gases. This water is then de-oiled by an (atmospheric) plate separator and a downstream flotation unit or filter.

The Skim-MFC Separator however combines both knock-out drum and primary separation in one unit.

It can be seen that the Skim-MFC separator offers considerable savings in weight, space and cost. In addition, the process requires less controls so that operator attendance and maintenance is kept to a minimum.

