

CASE STUDY

CHEMICAL

FOOD & BEVERAGE

OIL & GAS

POWER GENERATION

PULP AND PAPER

SEMICONDUCTOR & SOLAR



An Aquarion Group Company

A photograph of industrial machinery for oily water treatment, featuring large stainless steel tanks, pipes, and valves. The image is partially obscured by a blue overlay at the bottom.

Dong Energy Project

Oily Water Treatment Package

Dong Energy Water Package Project Description

End user: Dong Energy

Order receipt: January 2013

Delivery: January 2014

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Process Overview

The plant is designed to process all oil-containing waters collected together, treated and then discharged.

Dong Energy required an onshore oily water treatment package to treat water from various sources to remove oil down to <10 mg/l and 95 % of solids >100 microns, making the water suitable for discharge overboard. This application was particularly challenging due to the small droplet diameters and emulsified oils being received from various

sources. H+E met the challenge by providing their coalescer design which incorporates solids removal upstream of the coalescer technology.

The first step consists of a basket filter with the task of removing suspended solids from the feed water. The porosity grade is 100 µm. 95 – 98 % of solids with dimensions larger than 100 microns are removed.

The basket filter's operational cycle depends on the quantity of suspended material: an operational period of 3 – 4 months at a level of less than 5 ppm, and 3 – 4 weeks with levels within 20 and 30 ppm, respectively, is normal. To maintain continuous operational conditions, the filter must be periodically cleaned, independently of the basket clogging.

After solids removal, the water is treated with a CPI system. This system is comprised of a pressurised vessel containing a lamellar pack of separation plates. The water is fed through the vessel, and oil and residual solids are separated from the water by the lamella.

To begin the process, the water enters the system and the oil layer is zero: the oil outlet valve is closed.

During operation the oil layer increases, the oil (lighter than water) is separated from water through the dome situated on the top of the vessel, the valve opens and the oil is pushed out. This operation is driven by level transmitter.

The oil extraction can also be controlled by time or quantity of treated water.



Solids filters and
package controls



The process includes an injection point for dosing an oxygen scavenger before flare disposal.
Residual suspended solids are collected on the bottom of the vessel and discharged by opening dedicated valves, while the water is sent to the outlet of the system.
The oil content is checked by oil analyser, positioned at the outlet of the CPI system.

If the oil content is ≤ 10 mg/l, the de-oiled water can be sent directly to final use.
If there is a residual, but limited, excess of oil, the water is polished in a coalescing cartridge filter, while if the oil content is still very high, the water is recirculated back to the accidentally polluted storage tank.
In a final de-oiling system comprised of one cartridge filter, the product water is pol-

ished. This filter is designed to treat a flow rate of 1 m³/h capable of removing 0.4 kg of oil per cartridge. The exhausted cartridges are discarded and replaced with new ones. The operational life is approximately 3 – 4 weeks in case of heavy duty and 3 – 4 months in case of normal conditions at a low oil content from 10 to 15 ppm.

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Performance Characteristics

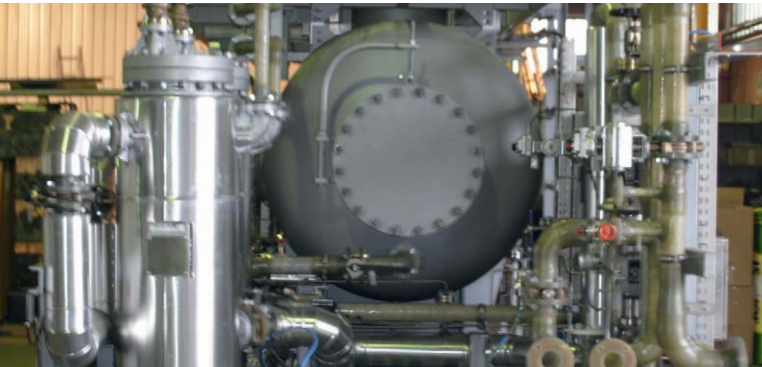
Type of water:	Oily water with suspended solids
Stream type:	Intermittent flow rate
Normal flow rate:	10 m ³ /hr
Design flow rate:	20 m ³ /hr
Inlet oil content:	200 – 3,000 ppm oil in water
Outlet oil content:	10 ppm oil in water
Inlet TSS:	Occasionally
Outlet TSS:	95 % > 100 microns

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Scope of Supply

Oily basket filters

Quantity:	1 x 100 %
Type:	Basket
Design flow rate:	20 m ³ /h
Operating flow rate:	10 m ³ /h
Design temperature:	60 °C
Operating temperature:	10 – 25 °C
Design pressure:	7 barg
Operating pressure:	3 barg
Filtering degree:	100 micron
Filter elements:	Super-duplex
Body and internal parts:	GRP



CPI vessel at the centre of the skid

CPI system

The separation of oil from water takes place between the lamella installed inside the pressure vessel. The oil phase moves towards the dome on the top of the vessel and – when a pre-set level value has been reached – is discharged via a dedicated discharge valve.

Design flow rate:	20 m ³ /h
Normal flow rate:	10 m ³ /h
Inlet pressure:	3 bar (by client)
Operating temperature:	10 – 25 °C
Design temperature:	60 °C



Coalescing filter, CPI and solids filters (left to right)

Vessel

Type: Cylindrical, horizontal pressurized vessel

Dimensions

Diameter:	1,500 mm internal
Length:	3,200 mm
Material:	CS
Internal protection:	Glass flake type with 3 mm C.A.
External protection:	As per Technip specification
Design code:	ASME VIII Div.1 PED certificate

Separation plates

Type:	Corrugated
Material:	HDPE
Thickness:	2 mm
Space between plates:	15 mm
Inclination:	45 °

Cartridge coalescing filters

Quantity:	1 x 100 %
Type:	Coalescing cartridge
No of cartridges:	20
Housing:	GRP
Cartridge:	PP with coalescing material

Housing dimensions

Diameter:	400 mm
Length:	1,300 mm
Cartridge length:	1,000 mm
Design temperature:	60 °C
Design pressure:	7 barg
Operating temperature:	10 – 25 °C
Operating pressure:	3 barg

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Performance Guarantee

The performance guarantee includes:

Particle removal on basket filters:	95 – 98 % > 100 microns
Oil at discharge:	< 10 mg/l

Note:

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