MBN Engineering and Consulting

Oil Water Separation Equipment

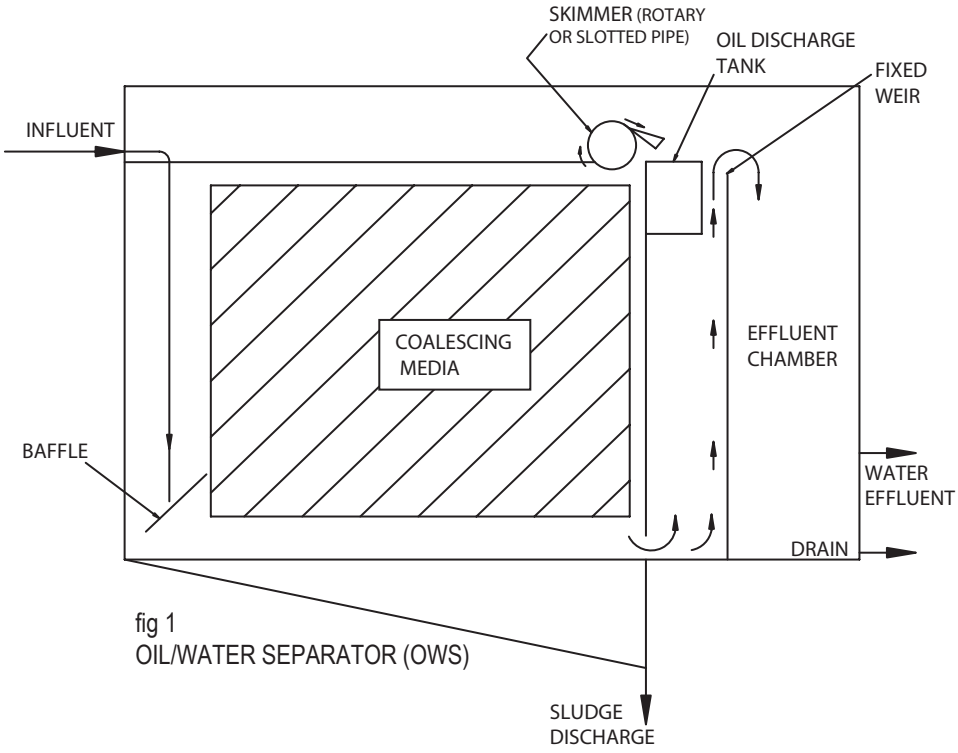

fig 1
OIL/WATER SEPARATOR (OWS)

Coalescing oil/water separators (OWS) are passive, physical separation systems designed for removal of oils, fuels, and hydraulic fluids, from water.

Physical oil water separators are designed to handle the problem of free oil and oily solids which rise and fall, respectively, in water. Mechanical dispersions may be addressed with a combination of MBN's OWS and additional steps, utilizing chemicals and gas flotation methods.

Applications include:

- Oily Runoff
- Oil Field
- Produced Water
- Electric Utilities
- Petroleum Refineries
- Metal Finishing
- Chemical Processing
- Food processing
- Retrofit of existing Pits and Tank

Our separator's performance can be described by a combination of Stoke's Law: $V = (g/18\mu)(Pw-Po)D^2$

(where V = velocity of rise, g = acceleration of gravity, D = diameter of particle, Po = density of oil, Pw = density of water, μ = viscosity of water)

and coalescing media theory, wherein, the oil droplet rise rate and other parameters dictate the surface area required for gravity and coalescent separation.

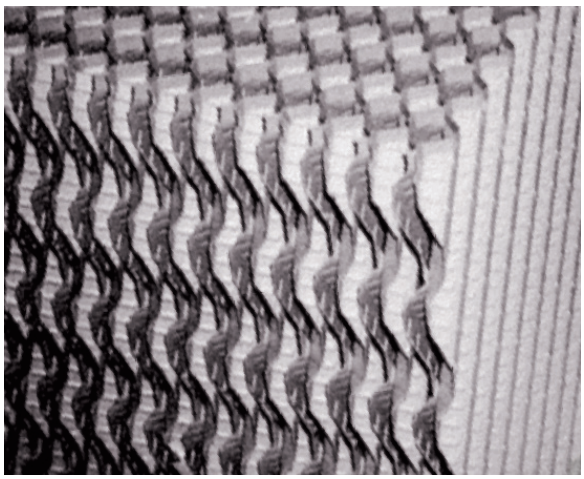

fig 2
COALESCING MEDIA

Separation Process: The water/oil mixture enters the separator and is spread out horizontally, distributed through a special baffle design. The mixture enters the coalescing media where laminar flow is established and the oils impinge on the media surface. As oils accumulate they coalesce into larger droplets, rising upward through the pack corrugations until they reach the top of the pack, where they detach and rise to the water's surface. At the same time solids encounter the media and slide down the corrugations, falling into the area under the coalescing media. The separated oil accumulates at the surface of the separator chamber where it displaces the water. As the oil layer increases, oil spills into an adjustable slotted pipe skimmer or a rotary pipe skimmer where it can flow by gravity to an optional oil storage reservoir or to remote storage tank. The clean water leaving the coalescing media passes under an oil retention baffle and into the effluent chamber (clean water chamber). From there the clean water passes over a weir which maintains the liquid level in the separator. The clean water flows by gravity through a pipe or effluent pump (see fig. 1).

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The OWS will satisfy the design criteria below:

- Hydraulic distribution of the influent flow assures full usage of the cross-sectional area of the media, fully utilizing the plate pack's surface area
- Determined flow control and direction, preventing hydraulic short circuiting around, under or over the media pack
- Maintained laminar flow (Reynolds "Re" number less than 500) to assist droplets in rising (per the American Petroleum Institute's (API) Publication 421 of February 1990)
- Horizontal flow-through velocities in the separator not exceeding 3 ft./min. or 15 times the rate of rise of the droplets, whichever is smaller
- Media containment chamber design, plate design/angle and spacing sufficient to facilitate removal of accumulating solids. Plates are smooth surfaced and angled at 60°

Coalescing Media

It can be made of inexpensive PVC corrugated sheets (see fig. 2); an oleophilic (oil-loving) material, chemically inert to most oils and contaminants, used in wastewater at moderate temperatures. For higher temperature wastewater specially formulated PVC or polypropylene can be used. Polypropylene is a higher cost oleophilic material which can be used up to 185°F. For much higher wastewater temperatures, more expensive stainless steel plate packs are commercially available. Each pack is equipped with lifting handles or lugs for simple removal and cleaning.

Oil/Water Separator Standard Specifications:

- Custom designed to fit specific performance, and space limitation requirements
- Steel construction of 1/8"-3/8" wall thickness, and structural steel reinforcement (stainless steel construction available)
- Ambient pressure tank
- Oil removal to 10 mg/l @ 20 microns when optimum conditions are met
- Feed flow: 10 GPM – 2000 GPM
- Rotary oil skimmer or automated slotted pipe oil skimmer
- No weir adjustment
- Influent pH 2-13.5
- Operating temp. range: 35 to 180°F
- Electrical equipment: NEMA 12 Panel
- High and low level sensor for water and oil
- Low cost installation and maintenance

Options:

- Clean water oil content monitoring system
- Fully automated system

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