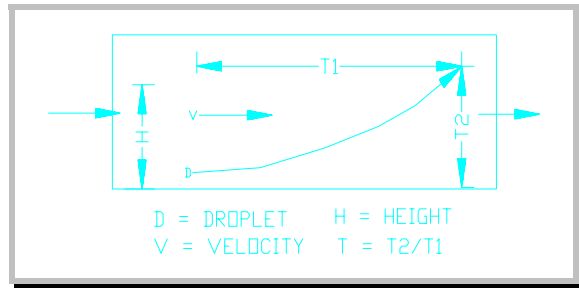


## Megator Oil Water Separator Operational Theory

Parallel plate oil water separators are devices that permit the removal of oil from a waste stream by allowing the oil droplets to rise out of the hydraulic flow path of the separator and thereby extracting them from the waste flow. In theory, the flow through velocity ( $V$ ) of a vessel is a function of the vessel size and flow rate (gpm). The velocity is then compared to the rate of rise of the oil droplet and the length of the vessel. If the resulting calculated trajectory ( $T$ ) of a given droplet will allow it to rise out of the effluent flow path before it reaches the vessels exit, it is removed. This is an application of Stoke's Law and terminal velocity to the rate of rise of a particle in a liquid medium.

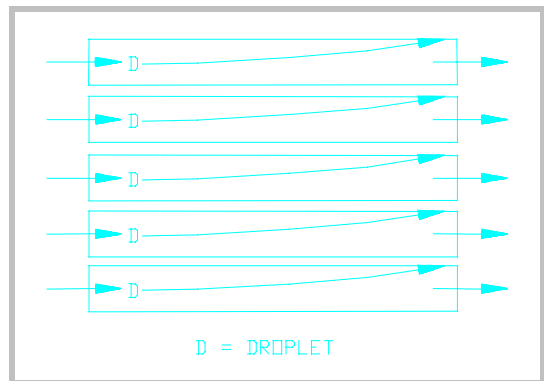
The separation process can be accomplished and enhanced in a variety of ways and with a variety of equipment configurations. One common way to improve separation without increasing the need for floor space is to install a multiple plate pack that will create many separation chambers in one vessel, each with a shallow depth. This is done by adding a series of appropriately spaced plates. The flow is distributed through the plates and the rate of rise of the droplet is applied to the application. The advantages of multiple plates is that surface area is increased without requiring additional floor space.



**Rate of Rise Theory**

The most efficient oil/water separators are designed to exploit Stoke's Law and the rate of rise for a given droplet. In order for a particle to be removed according to Stoke's Law, the separator must conform to several critical design criteria such as:

- Laminar flow conditions must be achieved (Reynolds "Re" number less than 500) in order to allow a droplet to rise.
- Hydraulic flow path must distribute influent AND effluent flow in such a way as to ensure complete utilization of the coalescing surface area in order to take full advantage of the plate pack coalescing surface area. Design of the flow distribution must be such as to prevent any hydraulic short circuiting of the plate pack, which would be detrimental.



**Parallel Plate Pack**

- Horizontal flow-through velocities in the separator must not exceed 3 feet per minute or 15 times the rate of rise of the droplets - whichever is smaller, per the American Petroleum Institute's Publication 421 of February 1990.
- Coalescing surface area must not become clogged during use, which would adversely alter flow characteristics, possibly creating hydraulic short circuiting and increasing the "Re" number past 500.
- If inclined parallel plates are used, they must be at the proper angle of repose to allow solids to settle in a liquid medium (ideally 55-60 degrees from horizontal) , and they must be smooth enough to allow the unhindered migration of a solid particle to the bottom of the plate pack and an oil droplet to the top of the plate pack where they will exit the waste stream.

There are several important factors to consider in efficient parallel-plate, oil water separator design. As stated earlier, the parallel plate must have a smooth surface in order to allow unhindered migration of the droplet to the top of the pack and solid particles to the bottom. Another enhancement is to use cross corrugated plates. Corrugated plates provide additional coalescing surface area, within the same volume, in the form of crests and valleys, that aid in the migration of the droplet to the top of the pack. As the droplets impinge on the crests and valleys and begin to migrate toward the top of the plate pack, they will coalesce with other droplets, thus creating larger droplets with increased mass which will improve their rate of rise.

Megator employs parallel plate oil water separator in a most efficient manner. We use ultra-smooth surface, cross-corrugated plates, that are arranged at a 60 degree angle of inclination. This promotes self-flushing and efficient droplet agglomeration, which improves the migration of droplets toward the top of the plate pack and sludge to the bottom of the plate pack and out of the waste stream into the sludge settling chamber. Our influent and effluent flow distribution systems are carefully designed to ensure efficient, even and complete usage of the entire plate pack and to prevent short circuiting. In summary, our parallel plate oil water separators are thoughtfully designed to ensure reliability and performance. We also offer custom design services to meet specific requirements.

