

32.- Spiral plate technology separator

Title and name of product or technology
Evodos spiral plate technology (SPT) separator
Abstract
<p>Evodos SPT is a new approach to separation or clarification. Instead of a conventional conical disk stack, spiralized vertical plates are used. This solution allows a free interface level making SPT machines self adapting to changes in process parameters. Long delay times in the SPT pack and avoiding cross- or counterflow of the liquids leads to high separation efficiency.</p> <p>The patented method to discharge the collected material leads to high dry solid content of the discharged material.</p> <p>Evodos SPT may be equipped as a liquid-liquid separator (Trenner), as a liquid-solid clarifier (Klärer) or a liquid-liquid-solid separator.</p> <p>The Evodos rotor carries the SPT pack and a sliding cylindrical drum. All parts run on a vertical shaft at the same speed, giving an artificial gravity of 3000xG. The feed enters the rotor at its lower end. Clarified liquids are discharged from the top end of the rotor by one or two paring disks.</p> <p>The curved SPT pack is flexibly hinged to the rotor core. The SPT pack rests with its free end against the inner side of the sliding drum. The sliding drum is hooked to the rotor, giving all components the same rotational speed.</p> <p>As mentioned before, two neighbouring plates of the SPT pack form an enclosed, vertical and curved, banana shaped channel with large length and width but with very limited height. Whilst the feed flows from the bottom of the rotor upwards through these channels, it is separated in two liquids. Both liquids flow parallel, allowing Y-flow instead of cross-flow or counter-flow as seen in conventional stacked disk separators. This Y-flow highly supports the separation efficiency of the Evodos SPT separators.</p> <p>Particle separation efficiency is a result of settling distance and delay time. Together with the Y-flow in the channels, the combination of the limited distance (in the direction of the artificial gravity) a particle has to travel before settling and the large delay time in the rotor leads to high separation efficiency.</p> <p>Since the feed flows upwards over the whole area of each channel, Evodos SPT separators have no adjustable interface level. There is no gravity disk or electronic system to set or adjust the interface level.</p> <p>The heavier liquid moves towards the outer diameter of the rotor, from where it is guided to its discharge channel. The lighter liquid moves towards the center and is discharged also.</p> <p>Separation of two liquids with different specific gravity might even be combined with removal of particles. Whilst separating the mixture into two separate liquid flows, particles deposit inside the SPT pack. Once the quantity of deposited cake gets to large, this cake is discharged.</p>
Description including main features/advantages
<p>Separation efficiency is equal or above industry standard. E.g. in processing primary municipal waste water sludge, Evodos reaches the maximum theoretical values as predicted by Degrémont.</p> <p>Liquid content in the drum is removed before discharging the collected solids, so the dry solid content of the discharged cake is far above industry standard. E.g. in processing primary municipal waste water sludge, Evodos reaches a dry solid% of 25% without adding flocculants.</p>

Designed to handle sticky/greasy/fatty and sharp/abrasive materials. E.g. Evodos easily separates grease from fish waste out of the centrate which is processed by a decanter.

No need to add flocculants, chemicals or polymers.

A minimal energy consumption of only 1.6 kWh/m³

Self adjusting on changes in process parameters (temperature, viscosity, mixture changes), no fixed interface level to be set

Simple, compact and rugged design, leading to minimal operational cost

Innovative aspects

The discharge method is innovative. It combines the use of a spiral plate pack with a separation efficiency higher than industry standard with discharging the collected solids as dry as possible with centrifugal technology. The spiral plate pack is made flexible. Therefore it functions well whilst separating. And it can open itself to let the collected solids out whilst discharging. This is truly innovation and patented.

Current and potential industrial users/domains of application

Industrial waste water treatment

Municipal waste water treatment (In practice Evodos separates primary sludge to the maximum theoretical values as defined by Degrémont, without adding flocculants)

Textile industry (decoloring wash water, reusing wool wash water, removing latex out process water in the carpet industry, cleaning cotton waste water without chloride)

Oil/water/sludge separation (e.g. slop oil, bottom oil, tank oil, bilge oil, lube oil, drilling mud,...) in three phases

Processing digestate of biogas plants as pre-treatment for membrane units

Processing animal manure (e.g. Pigs, cows, ...) into clear liquid without suspended solids

Processing slaughterhouse waste (after munching) mixed with slaughterhouse waste water

Algae harvesting

NOTE 1: All processing is done without flocculants/chemicals/polymers

NOTE 2: List is not limited. These are only examples which are applied in practice with the Evodos technology

Current state of development

In production

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