

Hydrocyclones

Desand • Degrit • Dewater

Hydrocyclones are designed for separating solids from liquids and are successfully used in a broad range of industrial and environmental applications. New uses are continually being discovered as engineers and project supervisors become familiar with the Hydrocyclones' versatility in liquid/solids separation, classification, and concentration.

Hydrocyclones can be defined as fixed wall centrifugal separator devices that separate particles according to density and mass. Unlike other type of centrifugal separators, the liquid mixture rotates within the chamber. Hydrocyclones have a tangential feed inlet leading into the cylinder portion of the cyclone body. The cylinder converges into a hollow cone and is sometimes referred to as the vortex "accelerator". There are two axial outlets: one at the tip of the cone, referred to as the "apex", and a second outlet at the top of the cyclone, known as the "vortex finder".

Features

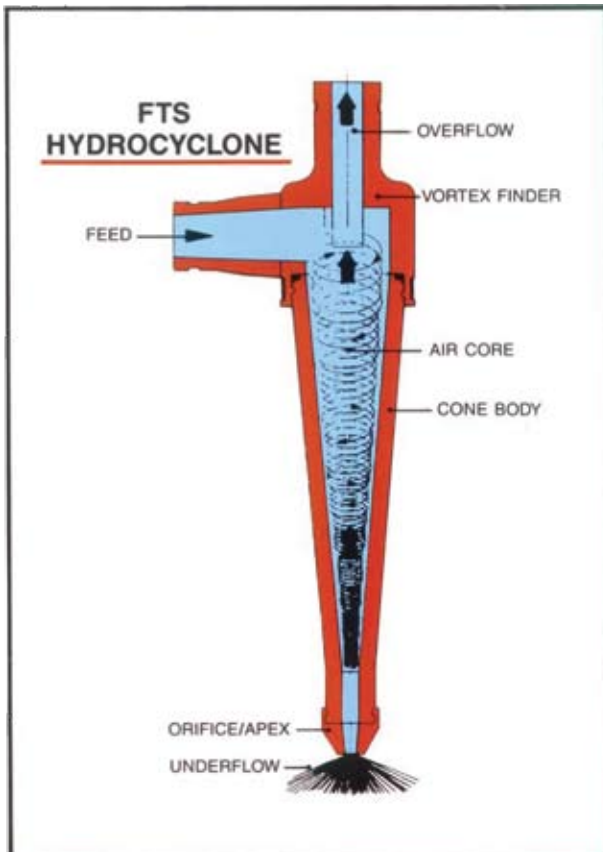


- High volume capacity
- Fine micron separation
- No moving parts
- Small space requirements
- Low maintenance
- Abrasion resistant urethane

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Hydrocyclones for Liquid/Solid Separation

Basic Cyclone Operation



A liquid mixture composed of a primary liquid and suspended particles that are heavier than the liquid fraction are fed under pressure by a pump into the inlet of the hydrocyclone. The rectangular shape at the point of entry introduces a thin band of liquid to the wall of the cylindrical section, forcing the suspension within the cyclone to rotate at a high angular velocity. The energy generated by the feed stream is converted to centrifugal force, and the heavier solids are thrown outward and spiral downward to discharge as a concentrated underflow at the apex. Meanwhile, the liquid phase and lighter solids move inward toward the vertical axis and are extracted through the vortex finder.

The liquid suspension forms a primary vortex along the cylindrical and conical wall forcing the heavier phase against the wall and downward toward the orifice. The orifice permits air to enter the cyclone creating a secondary, rising low pressure vortex of the cleaned liquid. Although the secondary vortex is created by the air core, it has a separate boundary from the air core so that three distinct phenomena occur simultaneously e.g. the primary vortex, the secondary vortex, and the air core. Every geometric parameter of the operational

design interacts with the multiple factors related to fluid flow. The optimization of the geometry for both flow pattern and friction reduction is critical to the efficiency of the cyclone. Under flow concentrations of as high as 80% solids by weight can be attained, and solids discharging with the overflow can be as fine as five microns.

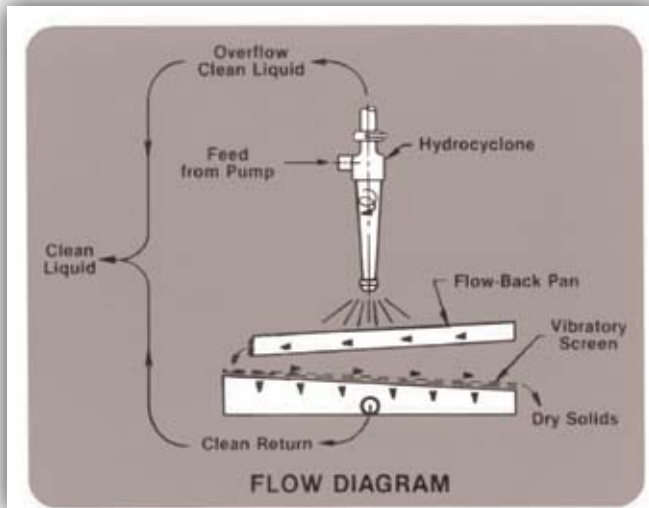


3" Hydrocyclone Manifold with Slurry Tank

Tank is a collection reservoir for further processing the hydrocyclone underflow (solids) through a vibratory screen.

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Hydrocyclones used with a Vibratory Screen



A unitized combination of hydrocyclones and a vibratory screen to provide liquid/solids separation and achieve a dry cake. As a first stage, the slurry is processed through the hydrocyclones, the cleaned liquid is carried out the hydrocyclone overflow and the concentrated underflow (solids) are deposited on a vibratory screen deck. The screen deck imparts a rapid linear motion, producing an energy force that dewateres and conveys the solids to the discharge end of the screen. The screened liquid flows into a collection pan located below the screen deck. The cleaned liquid overflow from the hydrocyclones and the screened liquid may be blended together.

General Applications:

- Sand and Silt Removal
- Sludge Clarification
- Mineral Classification
- Solids Concentration
- Soil Washing and Separation
- Coolant Contaminant Removal
- Dewatering
- Desliming



Hydraulic Shear/Hydrocyclone Technology

Optimum Solids Removal from a Liquid



The Two-Stage Desilter is a separator with larger hydrocyclones (4" or 5") as a first stage separation and smaller hydrocyclone (2" or 3") as a second stage. The slurry or mixture is processed through the larger hydrocyclones, and the overflow is directed into a reservoir compartment. It is then drawn out of the reservoir by a centrifugal pump and further processed through the smaller hydrocyclones to remove the fine suspended solids in the mixture. The underflow from both hydrocyclone manifolds is discharged into a sloping pan located directly beneath the hydrocyclone orifice and is fed into a hopper compartment to be mechanically dewatered. This system is compact and unitized on a single box skid.



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