

One Source

# KREBS® Separation Technology for Power, Industrial & Water Treatment



**The world leader in hydrocyclone and separator solutions**

**FLSMIDTH**  
**KREBS**

# Hydrocyclone or Separator?

FLSmidth Krebs is the world leader in Hydrocyclones and Separator design and implementation. The terms 'separator' and 'hydrocyclone' describe the same general type of solids/liquid separation device. While the term separator is often used to describe both types of equipment, there is a technical difference between the two.

A hydrocyclone, also known as a 'Cyclone', is a centrifugal device with no moving parts. It can be used to concentrate slurries, to classify solids in liquid suspensions, to de-grit liquids and to wash solids.

It is frequently used as a protection or pre-treatment device to improve the performance or decrease the cost of downstream equipment such as centrifuges, filters, and screens. Cyclones are also used in conjunction with thickeners, clarifiers, and strainers.

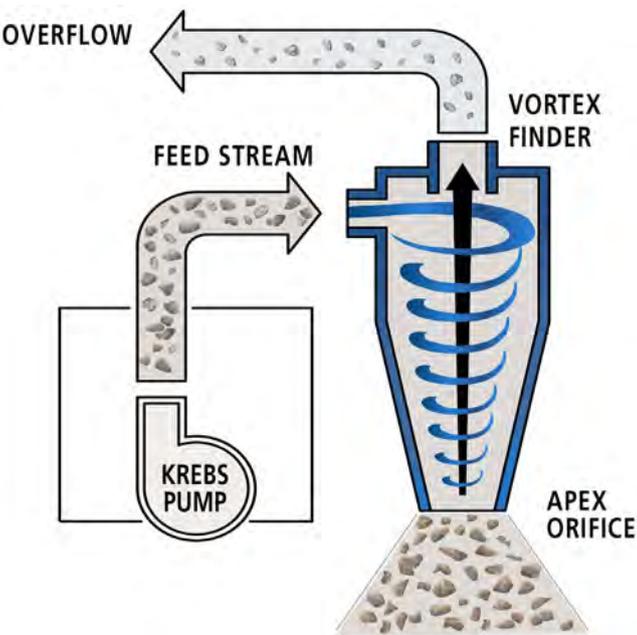


FIGURE 1.1

**Krebs hydrocyclones are designed for different applications and come in many sizes and with a variety of material of construction options.**

A 'separator' is used primarily in a closed system that is under high pressure, or where very fine separations are not required where liquid loss must be minimized, or where the solids loading is low. A separator is often referred to as a desander.

On the other hand, a hydrocyclone can perform ultrafine separations and handle large volume feedstreams with high solids loading.

As shown in figure 1.1 a hydrocyclone has an open apex permitting continuous underflow discharge. In contrast, a separator shown in figure 1.2 has a closed apex. The underflow discharges into a closed grit chamber, which is periodically emptied by automatic or manual means. Otherwise their separating action is the same.

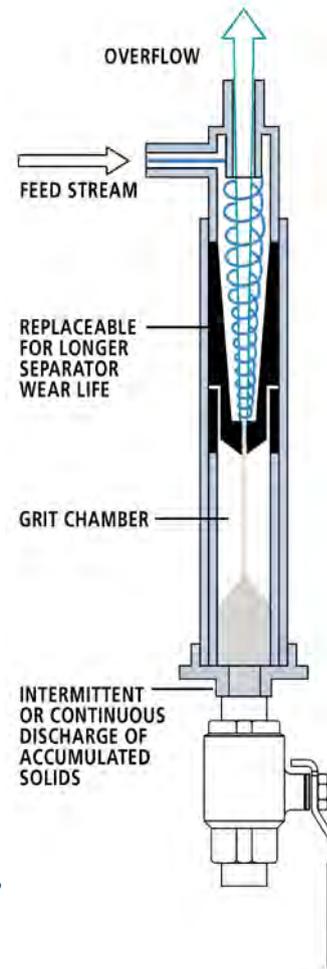


FIGURE 1.2

**A separator has a closed apex. The underflow discharges into a closed grit chamber, which is periodically emptied, automatically or manually.**

# Krebs Separation Solutions



## Solid / Liquid Separating: Desanders

The Close Packed gMAX® Cyclone vessels utilize our latest gMAX separation technology, which produces finer and sharper separations that maximizes the solids recovery in the finer size fractions. Close packed vessels can be designed for any number of cyclones and are available for our 1", 2" and 3" diameter cyclones. Our vessels can be outfitted with stainless steel or a variety of ceramic cyclones for high abrasion resistance.

- Removing fine solids in water treatment
- Removing fine crystals in crystallizer circuits
- Removing coke fines from cutting water in DCU
- Removing fine solids in paint systems for automotive industry
- Removing fine solids in geothermal power applications

## Krebs gMAX® Hydrocyclone

Hydrocyclones concentrate solids in liquid suspension or classify solids at a desired particle size. They produce a continuous overflow stream containing the fine solids and a continuous underflow stream containing the coarse solids. Typical applications include:

- Separating coke particle from water or hot oil in refineries and petrochemical plants
- Concentrating salt crystals in the chloralkali process
- Classifying limestone and thickening gypsum slurries in FGD systems at coal fired power plants
- Concentrating solids upstream of centrifuges in chemical processes

## Hydrocyclone with Grit Pot

Hydrocyclones can be supplied with a "grit pot" or solids accumulator that can be isolated from the process stream and collect solids for intermittent discharge, limiting the loss of liquid with the separated solids. During normal operation, all incoming liquid reports to the cyclone overflow. Typical applications include:

- Wine and juice degritting
- Separation of sand from cooked peppers and tomatoes in the production of hot sauce and ketchup
- Municipal well water desanding
- Cleaning paper pulp in recycled or virgin paper mills

## Close Packed Vessels for Liquid/ Liquid Separation (DeOiling)

Krebs® CycloClean® systems are installed as either vessels or inline manifolds. FLSmidth Krebs delivers space-saving solutions for your oily water separation applications regardless of the flow rate.

Water, mixed with oil, is fed tangentially into the hydrocyclone. The oily water starts to spin within the hydrocyclone. The mixture accelerates as it flows through the unit sending the lighter oil to the center for removal through the overflow. Cleaned water reports to the underflow. Typical applications include:

- Removing organic from electrolyte and raffinate in SX applications
- Removing oil and grease from plant wash down water
- Removing oil and grease from parking lot runoff water
- Removing oil from wash water
- Removing oil from cutting fluids
- Removing organics from ballast water



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[www.flsmidthkrebs.com](http://www.flsmidthkrebs.com)

## INDUSTRIAL WATER TREATMENT

### (Degritting and Desanding)

- Automotive painting or electroplating process
- Automotive parts cleaning and polishing process
- Metalworking / coolant
- Steel plant quench water
- Plant intake water / cooling water
- Electronics
- Vehicle wash

## MUNICIPAL / ENVIRONMENTAL

### WATER TREATMENT

- Sewage and waste water
- Soil remediation
- Desanding potable water
- Salt water conversion -protect RO units
- Harvesting algae
- Recover ion exchange resin beads
- Removal of solids from scrubber recycle systems
- Remove solids ahead of pH meters and analyzers
- Recover filter aid (diatomaceous earth)
- Remove oil from ballast water and parking lot runoff

## PULP & PAPER

- Removal of debris from OCC
- Degrit process water
- Degrit high-grade paper clays

## CHEMICAL & PETRO CHEMICAL / REFINERY

- Degrit diesel and jet fuel
- Remove coke solids from water or quench oil
- Catalyst removal
- Preparation of filter and centrifuge feeds

## POWER / FGD

- Limestone classification
- Gypsum dewatering

## FOOD & BEVERAGE

- Desand fruit & vegetable wash water
- Degrit wine, juice & puree
- Degrit tomatoes and peppers for sauces
- Remove sand from cooked seaweed

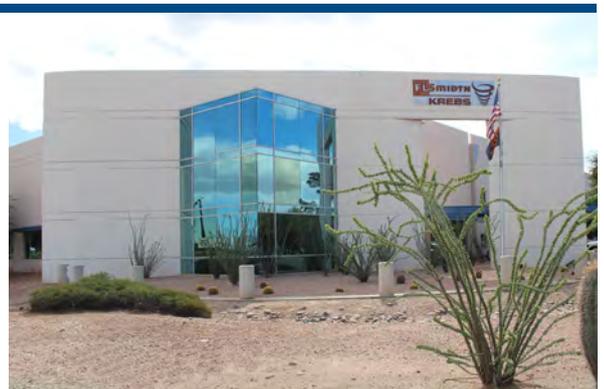
## RECYCLE PLASTICS

- Separate debris from plastic
- Separate plastics by specific gravity

## World-class Service & Hydrocyclone Test Facilities

The Krebs' customer service philosophy is to consistently exceed the expectations of our customers when it comes to providing technical support, processing orders and maintaining parts availability. Starting with the sales process, and extending throughout the life of the supplied process solution, we strive to provide an unmatched, world-class customer experience.

FLSmidth experienced engineers are frequently able to specify the proper separator without testing. However, when testing is required, a pilot plant is equipped and staffed for prompt testing at a very low cost. Arrangements can also be made to send test cyclones to the customer's site.



For more information on any of our products please contact one of our Regional Sales Offices below.

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