

Lakeside's Spiraflo Clarifier

The peripheral-feed center take-off clarifier with a proven spiral flow design for superior removal of total suspended solids.



- Spiral flow pattern - provides superior solids removal
- Full utilization of tank volume - eliminates short-circuiting
- Most reliable drive available - backed by a ten year warranty

The Lakeside Spiraflo Clarifier

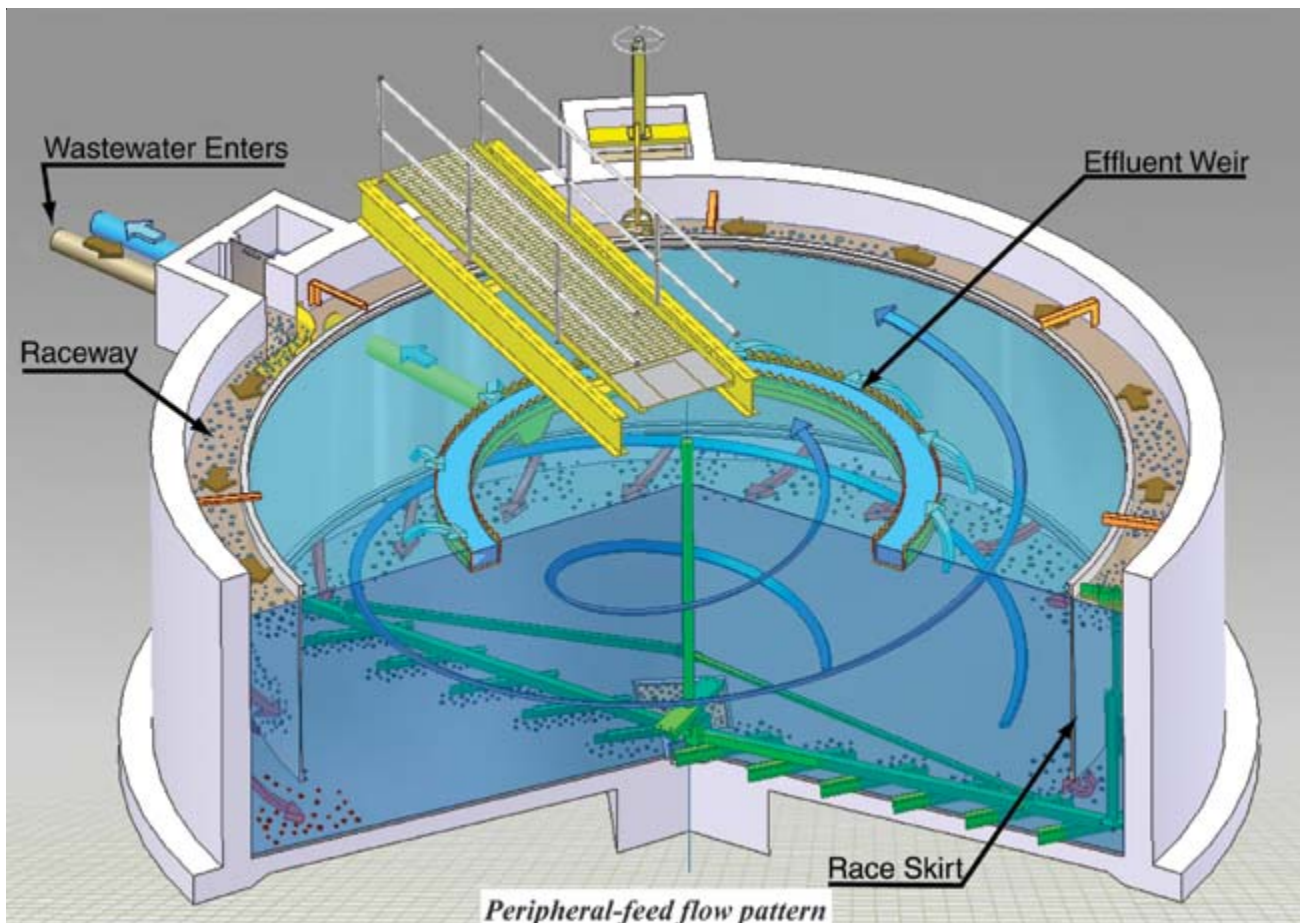
The performance of the Spiraflo Clarifier has been *extensively proven* since 1934. Lakeside has installed more than 2,000 clarifiers in sizes ranging from 8 ft to 130 ft in diameter for primary, secondary and tertiary clarification.

Spiraflo Design

Peripheral-Feed Flow Pattern

Wastewater enters the Spiraflo Clarifier at the periphery of the tank and is directed along the narrow raceway formed by the skirt and the outer wall. This flow pattern dissipates the wastewater's hydraulic energy as it flows around the raceway and eventually spirals down under the skirt.

Wastewater enters the main settling area from the full circumference of the skirt and slowly rises to pass over the centrally located effluent weirs. The inflow is prevented from flowing directly to the effluent weir by the specially designed race skirt which extends down to approximately two feet above the tank floor. The spiraling flow pattern makes use of total tank volume for more effective solids settling.

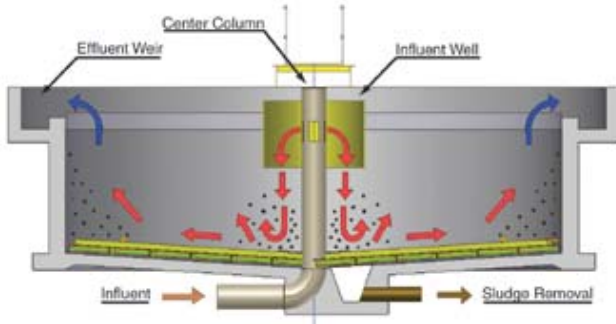


Spiraflo Hydraulic Advantages

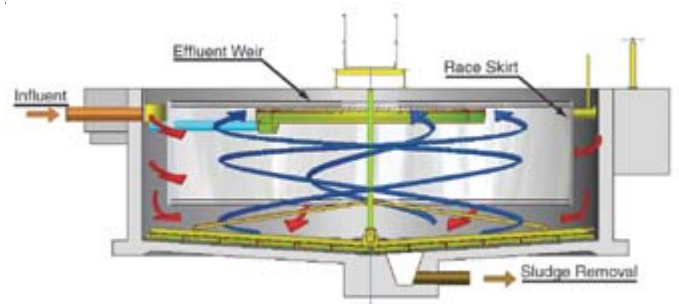
The Spiraflo's peripheral-feed design *provides the best hydraulic flow pattern* and minimizes many of the problems associated with centerfeed hydraulics.

Eliminates the Waterfall Effect

The influent well in a centerfeed clarifier deflects the high velocity inflow downward creating a waterfall effect. This velocity combined with the higher density of settling solids disturbs the sludge blanket at the bottom of the tank and interferes with proper solids removal.



Centerfeed Hydraulics



Peripheral-feed Hydraulics

Because the Spiraflo's incoming flow enters at the periphery, the flow spirals in the raceway dissipating the energy before it enters the main settling area. Any velocity remaining in the flow as it moves below the skirt is directed toward the center of the tank in a spiral pattern.

Eliminates Sludge Wall Creep

In a centerfeed clarifier, the velocity created by the waterfall effect moves solids from the center of the tank to the outer wall. This movement, known as sludge wall creep, can push solids up the outer wall and over the effluent weir and can greatly reduce effluent quality.

In the Spiraflo Clarifier, the flow travels inward from the skirt towards the center of the tank. This movement coincides with the direction of the scraper mechanism and assists in moving sludge to the central hopper.

Eliminates Short-Circuiting

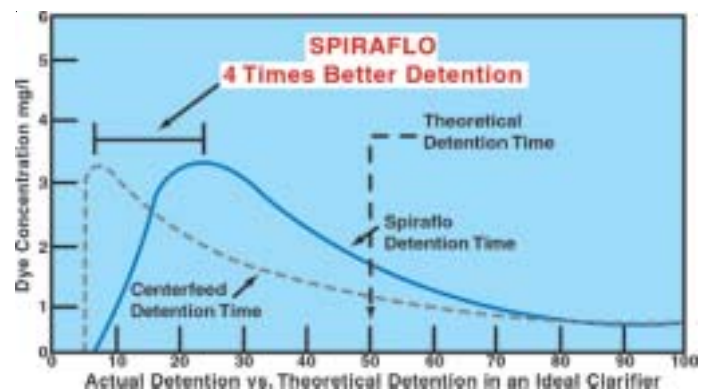
The centerfeed clarifier flow pattern, created by the waterfall effect and sludge wall creep, causes influent to flow directly to the effluent weir. This short-circuiting prevents complete use of the tank volume for the settling process.

The Spiraflo's spiraling flow pattern rolls around and under the skirt eliminating all possibility of short-circuiting and ensuring maximum use of the entire tank volume.

Spiraflo Hydraulic Theory & Results

Both full-scale and model testing at Iowa State University confirm that by dissipating the inflow current and controlling short-circuiting with the race and skirt, the Spiraflo provides superior solids removal.

Full-scale work consisted of dye studies of prototype Spiraflo and centerfeed units. Independent laboratory tests conducted on models confirmed that the peripheral feed clarifier performs two to four times better hydraulically than the centerfeed clarifier. Full-scale side-by-side testing of the Spiraflo Clarifier versus centerfeed designs has confirmed the modeling results.



Sludge Removal

Conventional Scrapers

Angled scrapers push the settled solids or sludge to the centrally located hopper for removal. The hydraulic flow in the main settling area moves in the same direction as the angled scrapers and actually helps move the sludge gently toward the center of the tank.



Conventional straight-blade angled scrapers.

Spiral Scrapers

Continuously tapered spiral-shaped scraper blades and faster operating tip speeds enable the plant operator to increase sludge transport capacity and improve return sludge concentrations.



Spiral-bladed scraper.

Spiravac Clarifier - Rapid Suction Removal

The Spiravac Clarifier uses rotating “V”-plows to direct settled solids to suction nozzles for sludge removal. Heavy, gritty material too large to be withdrawn passes through the “V” apex. Succeeding plows push this heavy material to the sludge sump located at the clarifier center for removal from the tank. The spiral flow pattern also helps direct the sludge to the central draw-off point. The Spiravac offers either controlled or direct removal of activated sludge.



Individual sludge removal pipes for Type CR design.



Common header pipe removes sludge in Type DR design.

Controlled Removal (Type CR)

The Type CR Spiravac allows the operator to vary the quality and quantity of flow from each sludge removal pipe. The smooth plastic sludge removal pipes and rotating valve construction help eliminate plugging problems and the hang-up of stringy material at the valve discharge. The controlled removal design allows removal of obstructions in the sludge piping without dewatering the tank.

Direct Removal (Type DR)

The Type DR Spiravac collects activated sludge from suction nozzles on a common header tube rotating on the clarifier floor. The sludge is suctioned off the floor and removed from the tank through a rotating manifold at the tank center.

Scum Removal and Surface Skimming

Race Skimmer

Grease, free oils and other floatable materials are separated from the flow as it slowly spirals around and down the raceway. The Spiraflo's deep skirt traps floatable material in the raceway and the depth of the skirt helps prevent floatable material from entering the main settling area.

The hydraulic energy of the influent flow then carries the floating material around the race for removal through the scum pipe. On tanks greater than 15 feet in diameter, a race skimmer is often installed to help collect scum and move it into the scum pipe. Mounted on the scraper arm, the race skimmer travels around the tank pushing scum to the removal point.



Hinged Blade Race Skimmer

Full-Surface Skimming

Although the peripheral-feed design significantly reduces floating material in the clarifier's main settling area, some processes with final settling tanks may require additional skimming.

Lakeside's Motorized Full-Surface Skimmer and Full-Surface Ducking Skimmer provide positive skimming by removing floating material over the entire surface of the main settling area.

Motorized Full-Surface Skimmer

The Motorized Full-Surface Skimmer extends the full width of the clarifier surface, from the central scum baffle to the outer race skirt. The motorized skimmer sweeps the surface of the clarifier with a hinged blade suspended from the skimmer arm. The blade maintains complete contact with the water surface while it pushes floating material to a rotating scum trough for removal.



Motorized Full-Surface Skimmer.



Full-Surface Ducking Skimmer.

Full-Surface Ducking Skimmer

In applications where skimming the clarifier surface is important but the Motorized Full-Surface Skimmer cannot be used, the non-motorized Full-Surface Ducking Skimmer is an economical alternative.

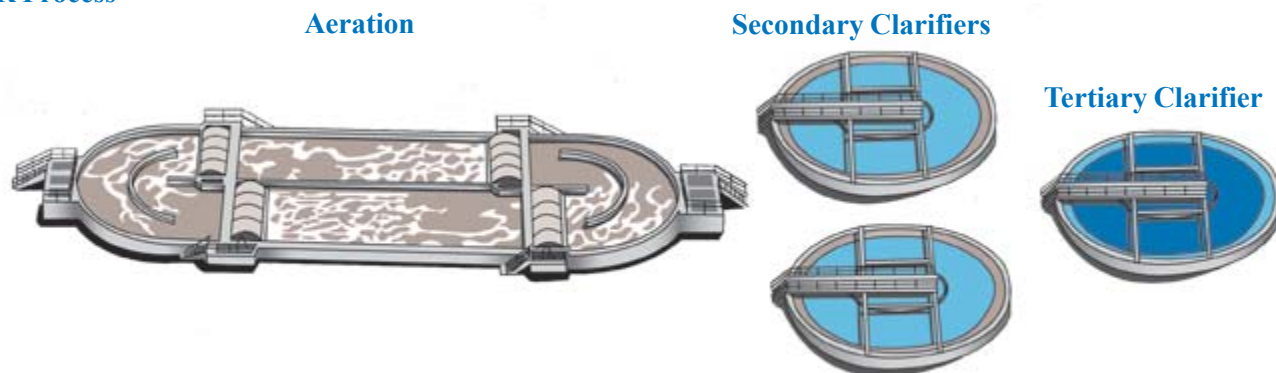
Unlike the Full-Surface Skimmer which passes over the rotating trough, the Full-Surface Ducking Skimmer pushes the floating material into the scum trough as the blade ducks under the trough.

Tertiary Treatment

Using Spiraflo Clarifiers in Series

Lakeside's established tertiary treatment process using Spiraflo Clarifiers operating in series has proven to be the simplest, most economical solution for improving the effluent quality of secondary treatment plants. Effluent qualities of 10 mg/l BOD and 10 mg/l TSS or less are being reliably achieved by adding a tertiary Spiraflo Clarifier downstream from the secondary Spiraflo Clarifier (*see process flow diagram*).

CLR Process



This diagram illustrates a typical series clarification operation.

Process Description

The Spiraflo Clarifier used for secondary treatment in the CLR Process has produced effluent qualities of 15 mg/l BOD and 15 mg/l TSS or less. However, some solids may be lost over the effluent weir because of problems such as high solids loading, sludge blanket disturbances and ashing.

To increase the solids removal capability of the plant, a tertiary Spiraflo Clarifier is added downstream. The tertiary Spiraflo Clarifier removes more solids and proportionately reduces the amount of BOD in the effluent. Using this additional Spiraflo Clarifier significantly improves the plant's effluent quality.

Tertiary treatment using Spiraflo Clarifiers in series can be added to virtually any secondary treatment process. This includes the CLR Process as well as trickling filter plants, rotating biological contactor plants, conventional activated sludge plants and extended aeration plants.

Optional Chlorination

The tertiary Spiraflo Clarifier can also function as a chlorine contact tank by simply adding chlorine to the influent. Chlorination improves solids settleability, improves effluent quality and eliminates the need for additional tanks.

The Spiraflo Clarifier makes a very effective chlorine contact tank with features such as flow direction, flow control and a race skirt to prevent short-circuiting and eliminate dead space. Independent studies have shown that one of the best shapes for chlorine contact tank design is the circular clarifier with an annular ring. The Spiraflo's race skirt forms this type of annular ring around the clarifier.

The Spiraflo Clarifier mechanically removes settled solids at a controlled rate to eliminate hydraulic shock loading, a common problem with other tertiary treatment processes using wash water. In order to remove settled solids from other types of chlorine contact tanks, plant personnel must drain the tank and shovel the solids out manually. The Spiraflo's mechanical removal of settled solids eliminates the need for this time-consuming, costly and labor-intensive step in the process.

Spiraflo vs Centerfeed Cost Comparison

Tank Excavation

Both centerfeed and Spiraflo tanks require excavation, but excavation is more expensive and time consuming for a centerfeed unit. Influent pipes for larger centerfeed clarifiers are installed under the tank floor requiring deeper excavation for gravel bedding or concrete encasement.

Excavation costs for a Spiraflo tank are *lower* because the tank is constructed without the below-grade influent pipe and peripheral effluent trough used for centerfeed clarifiers.

Tank Construction

The centerfeed's concrete peripheral effluent trough is a costly addition to tank construction. The cantilevered trough requires extra reinforcing steel to withstand design loads, special formwork to construct and extra concrete pours to complete the tank wall.

Spiraflo effluent troughs are part of the clarifier equipment provided by Lakeside. The effluent troughs are installed inside the tank and are not part of the poured concrete walls. Tank walls are straight and therefore make forming *less expensive*, steel reinforcing simpler and concrete pours easier. Less concrete is required and simple forms save time and money needed for tank construction.

Tank Bypassing

Construction for a centerfeed clarifier bypass normally requires additional valves, piping, valve boxes and fittings.

Materials for a Spiraflo bypass include *only* an influent and effluent box with a stop gate.

Additional Equipment

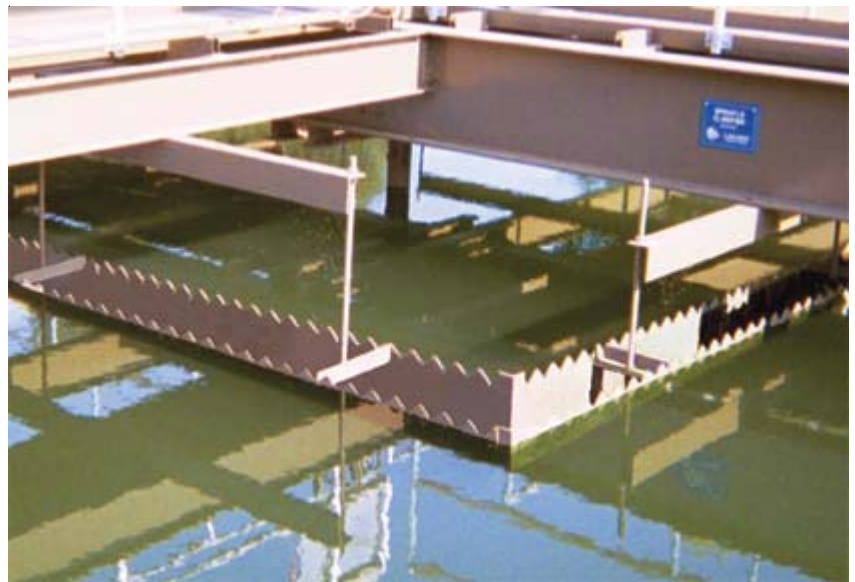
Stamford baffles, energy dissipation feedwells, flocculation wells and mid-radius baffles are often

used in an attempt to diminish the centerfeed clarifier's short-circuiting and waterfall effect.

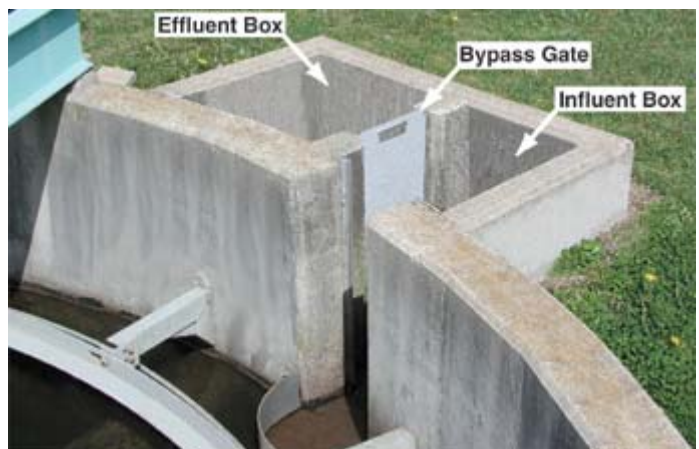
No such additional equipment is needed with the Spiraflo peripheral-feed design.



The Spiraflo's influent and effluent pipes are installed above the tank floor reducing the depth of excavation.



The effluent trough is suspended from adjustable supports eliminating the need for a concrete structure.



Influent and effluent boxes used for bypassing are conveniently located at the periphery of the tank.

Spiraflo Applications

Spiraflo Clarifiers can be used in water, wastewater and industrial applications to remove all types of settleable solids. The Spiraflo's proven spiral flow design provides superior removal for even the toughest applications.

Spiraflo Benefits

The peripheral-feed design incorporates advantages that provide *unequaled performance*.

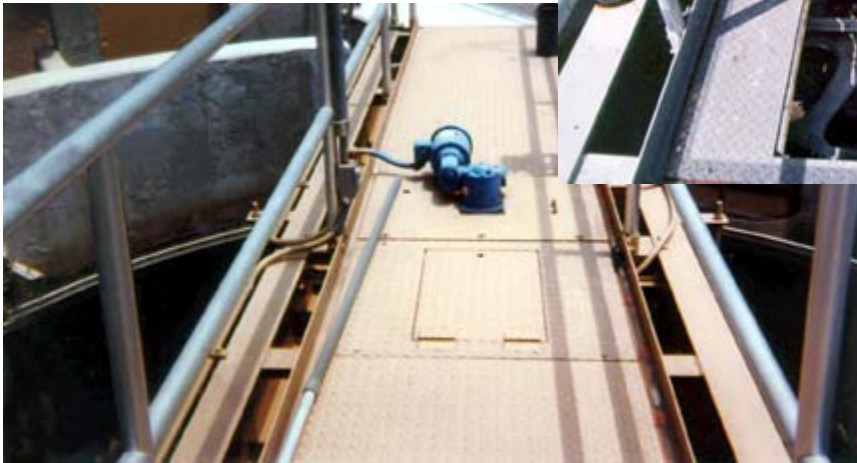
More than 2000 installations have proven that the Lakeside Spiraflo Clarifiers:

- produce the highest quality effluent
- improve sludge collection and removal
- promote full utilization of tank volume
- eliminate short-circuiting
- handle peak flows effectively
- retain suspended solids in the sludge blanket
- eliminate sludge wall creep that is created by the waterfall effect



Ten Year Clarifier Drive Warranty

When you specify a Lakeside Spiraflo or Spiravac Clarifier you'll not only get the superior performance of a peripheral-feed clarifier, you'll also get the most reliable drive available. Our dedication to quality and proven reliability allows Lakeside to stand behind our clarifier drive with a 10 year warranty.



1022 E. Devon, P.O. Box 8448
Bartlett, IL 60103
630/837-5640, FAX: 630/837-5647
E-mail: sales@lakeside-equipment.com