ENRICH

CIRCULAR CLARIFICATION EQUIPMENT

For more than a decade, ENRICH™ has provided custom designed, circular sludge collector mechanisms for municipal and industrial water and wastewater treatment applications.

The quality of the engineered designs, the superior fabrication of the finished products and the consistency of experienced, after-installation services have contributed to ENRICH™'s reputation as a leading supplier of proven clarifier equipment.

The ENRICH™ Scrapers are designed as revolving (half bridge, extended half bridge, and full bridge) or reciprocating bridge scrapers for circular or rectangular basins, respectively. The material alternatives are epoxy coated, resin coated or galvanized carbon steel or stainless steel, depending on customer requirement and sites applications.

DESIGN CONCEPTS

Three basic design concepts are available. Each has a wide range of sizes and options to select from, allowing every circular clarifier to be tailored to meet specific application requirements.

The center drive bridge supported design (full bridge) consists of a bridge spanning the tank's diameter, with the sludge collector mechanism supported from the bridge. The center pier supported design (half bridge) consists of a mechanism supported on a center pier, with an access bridge leading to it from the tank's wall.

The peripheral bridge (rim bridge) design consists of a center bearing mechanism supported onto a center pier with a revoluting bridge and drive travelling on the tank wall

Both the center drive type design incorporate a minimum of two sludge scraper arms per mechanism while the peripheral rim drive type incorporate of three quarters sludge scraper blades per mechanism. Sludge removal mechanisms are designed for continuous operation over the life of the clarifier, and are based on the concept that solids within the water or wastewater will settle out in a quiescent tank.

DESIGN PARAMETERS

The basic operating parameter of a clarifier is to remove settled solids from the bottom of the clarifier tank as quickly as possible. This improves the efficiency of other treatment processes.

Inlet design, flocculation, scum removal and operator needs should be considered to match the needs of the installation.

The objective is to provide a hydraulically quiescent tank with the greatest detention time practical to improve the ability of solids to settle to the bottom of the tank.

Considerations involving inlet energy dissipation, solids settling characteristics, liquid flow patterns and effluent collection are part of this design parameter.

SETTING THE STANDARDS IN CIRCULAR COLLECTION

Envitrade engineers have furnished proven designs for virtually every type of application requiring clarification, floc-clarification, gravity thickening and skimming. With more than the ten year decade experience, Envitrade can point to its equipment operating in industries and municipalities throughout the country. From reliable drive design to factory fabrication, Envitrade sets the standards for how a circular collector should be built. With reliability. With longevity. And with integrity.

OTHER CLARIFICATION PROCESSES

The ENRICH™ clarifier rake provides economical, highly efficient secondary and tertiary clarification using a peripheral influent/peripheral effluent design or bottom up influent / peripheral effluent design.

It is designed for greater capacity and a higher overflow rate because of its inherent hydraulic efficiency. Increased efficiency means either a smaller tank or a tank with a conservative loading rate can be
designed.

The ENRICH™ sludge removal device is recommended to remove activated sludges. It offers rapid sludge pickup, minimum sludge agitation, maximum solids concentration, increased sludge removal concentrations and reduced floating sludge problems.

Center Drive

Half Bridge truss formed rake Center Drive Clarifier

Peripheral Drive Clarifier

SCRAPER TYPE	CENTER DRIVE	PHERIPHERAL RIM DRIVE
Description	The drive is mounted on the walkway or bridge. The rotating portion of the drive rotates a structural torque tube or shaft, which in turn rotates the sludge removal mechanism.	Rake arms are rotated by a revolving walkway and peripheral drive. The drive incorporates traction wheels which rotate on the outer wall of the clarifier. A center slip ring provides power to the unit.
Advantages	- Can develop high torques in compact units - Easy access to main gear, bearing and pinion - Most economical way to provide lifting device for rake arms under severe torque loads - Low regular maintenance requirements - Allows for stationary walkway	- Most cost effective drive - Easy access to parts requiring maintenance - Not affected by unbalanced loads on rakes or uneven settling of basins
Disadvantages	- Walkway or bridge must span the tank and support the weight and torque of the mechanism, therefore the bridge will be more expensive than for a center pier supported unit - More expensive than rim drives	- There is a practical limitation to torque capacities - The walkway rotates, which may be considered a safety hazard
Applications	Most economical when used in clarifiers 15 metre in diameter or less, or where center feed is not economical or feasible.	Any clarifier without high torque requirements

Circular Collector Components-General Benefits

- o Cast iron drive housings
- o Shop fabricated for bolted field assembly
- o Full surface adjustable skimmers
- o Reinforced influent well
- o Ample walkway and drive platform widths
- o Deep scraper blades and adjustable squeeges
- o No underwater bearings
- o Designed to exacting Specifications

Half Bridge Clarifier

COMMON FEATURES OF ENRICH CLARIFIERS

Beginning with tanks three metre in diameter and larger, ENRICH™ circular sludge collectors are available in either full or half bridge designs for center drive type and three fifth bridge design for peripheral drive type.

Every clarifier is equipped with a built drive designed to DIN standards, assuring proper torque ratings and longevity under continuous operation.

Surface skimmers, sludge scraper arms and other components are welded in the shop to reduce field installation time. Only bridge splices are field welded assuring quality fabrication and also available on boltings to a middle connection at site. All components are preassembled at the factory, an operation that reduces field fitup time and erection costs.

SELECTION PROVIDE

Drive type	Center Drive, Peripheral Rim Drive
Material of Construction	Carbon Steel, Stainless Steel
Coating	Epoxy, Resin, Galvanizing
Drive Unit	Helical Gear Motor, Helical Bevel Gear Motor, Worm Gear Motor
Walkway	Half bridge, Extended half bridge, Full bridge
Feed Type	Center, Peripheral, Side

OPTIONS

Each custom designed ENRICH™ circular sludge collector can be provided with features such as center drive platform, choice of walkway and handrail material and styles special service protective coatings, special material assembly bolts, etc. For details, contact our sales and technical teams.

FULL BRIDGE CENTER DRIVE CIRCULAR CLARIFIERS

ENRICH™ full bridge sludge collector mechanisms are available in sizes beginning at three meter in diameter. Generally, the economics of the design limit to 15 meter in diameter, although larger sizes can be built for special requirements.

In the full bridge design, a structural steel bridge spanning the tank's diameter supports the drive mechanism. A center torque tube bolted to the drive, supports and rotates the sludge collector mechanism.

INFLUENT FEED WELL

Influent enters the tank from the side of the basin and is fed into the center influent feed well. The feed well reduces the influent's energy while eliminating or reducing density currents. The feed well permits only a low velocity flow to enter the tank, assuring maintenance of quiescent conditions and the most efficient removal of solids.

For wastewater applications, the feed well is equipped with baffled scum ports that permit floating material to escape from the feed well while preventing short circuiting.

The feed well is supported from either the bridge or beams spanning the tank as dictated by the design.

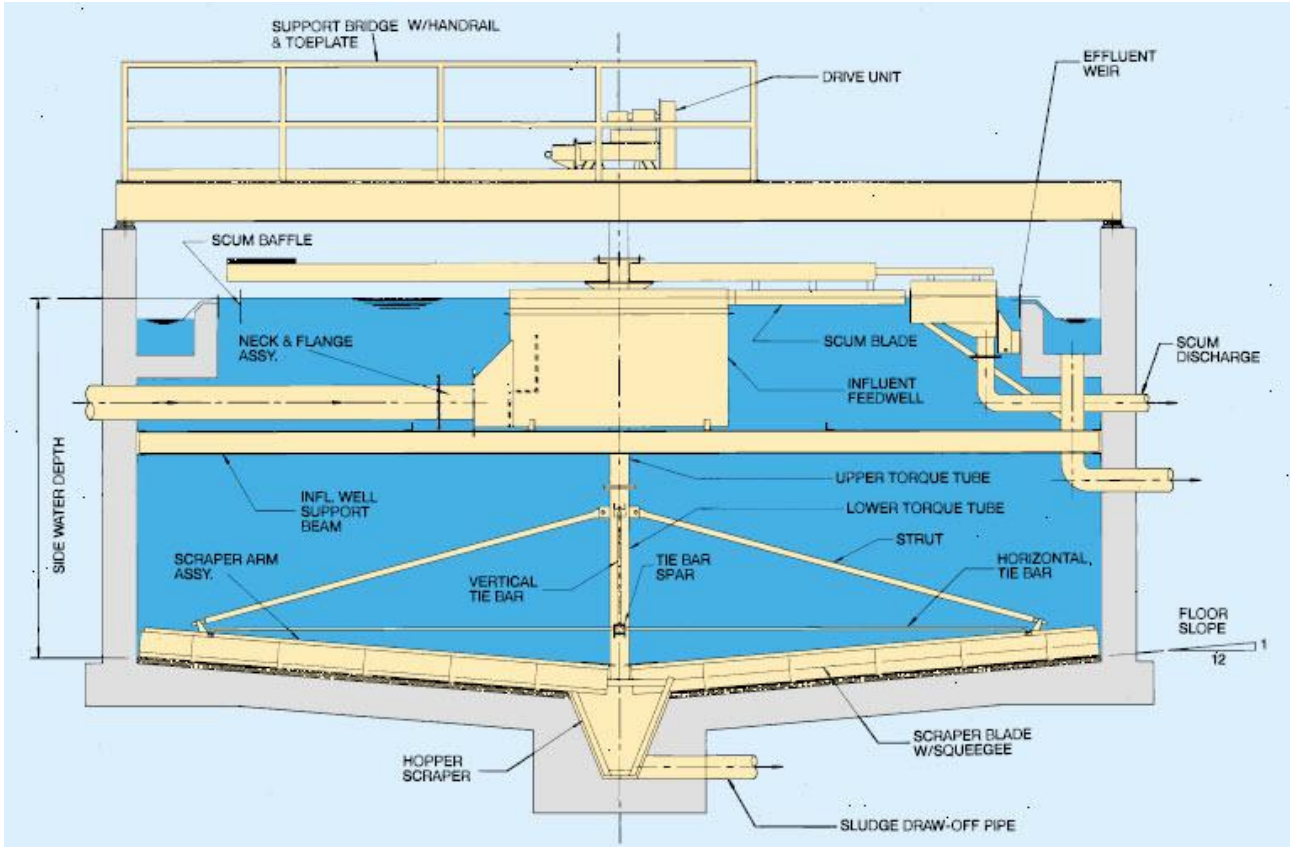
SCRAPER ARMS

Scraper arms are bolted to the torque tube and rotate with it. The scraper arms are engineered to complement the drive and anticipated sludge loads. Scraper arms extend from the torque tube to the periphery of the basin. A minimum of two scraper arms are provided, allowing the basin floor to be scraped at least twice in each removal. Each scraper arm is furnished with a number of scraper blades that are arranged to collect and direct the sludge to the center of the tank for hydraulic removal.

SUPPORT BRIDGE

The support bridge provides access to the drive mechanism. For operator convenience and safety, the bridge is provided with a minimum eighty centimeter wide walkway. All walkways have handrails and a four inch high toeplate along both sides.

FULL BRIDGE CENTER DRIVE CIRCULAR CLARIFIERS



Full Bridge Clarifier

SKIMMING / EFFLUENT WEIRS

Various skimming and effluent arrangements are available for water and wastewater treatment circular clarifiers. Generally, a full radius, surface scum blade directs floating material to the peripheral scum skimmer. The skimmer concentrates the floating material and deposits it in the scum trough.

Adjustable weirs are generally located on the periphery of the basin, although radial and other arrangements are employed.

HALF BRIDGE CIRCULAR CLARIFIERS

The ENRICH™ half bridge, pier supported circular sludge collector is available as small as 10 meter in diameter, although the economics of construction generally favor half bridge designs no less than 12 meter diameter.

There is no upper limit on the diameter of the collector other than process considerations. For clarifiers between 12 and 15 meter in diameter, operator preference will usually decide between the full bridge and half bridge designs.

MAIN COMPONENTS

The pier supported design consists of a support pier, influent feedwell, rotating cage and scraper arms, and access ridge spanning from the tank wall to the center column and drive unit. A wide range of scraping, skimming and process options are available with this design.

Half Bridge Drive

INFLUENT FEED WELL AND PIER

Flow enters the influent dispersion well through the center support pier or a side feed pipe. If a side feed is used, the pipe is supported from the bridge structure.

When used as an influent pipe, the support pier is provided with a large inlet area designed to reduce inlet turbulence.

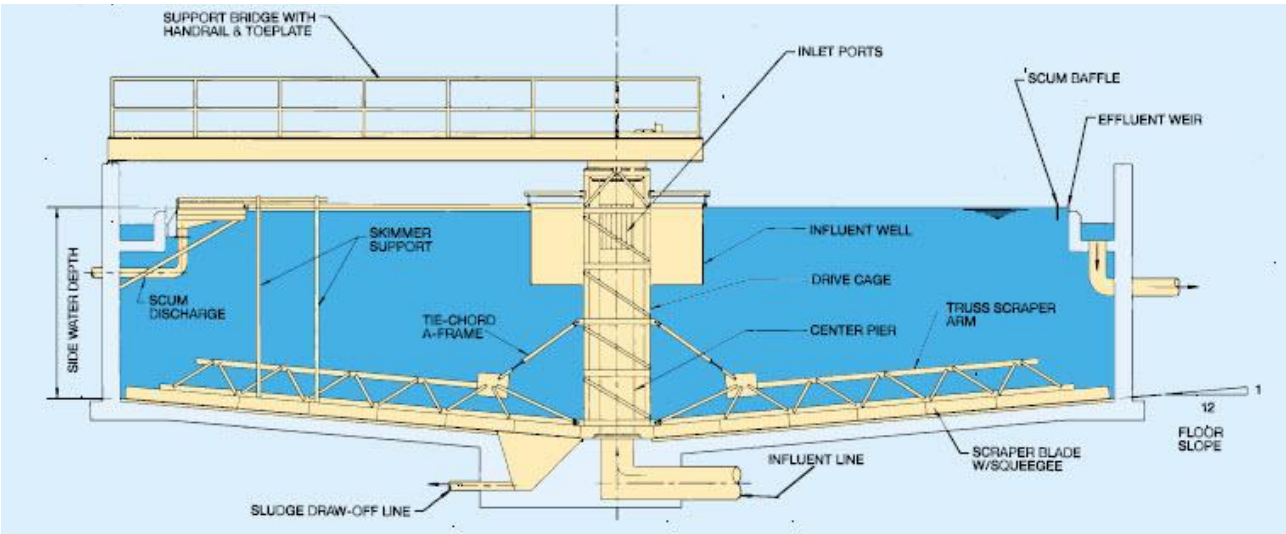
Depending on the process, the well can be a simple influent well with baffle arrangement or a flocculation well. In all instances, the well is designed to diffuse and disperse inlet water energy, based on process requirements.

The well can be supported from the sludge scraper arms, from the cage or from the access bridge, depending on design conditions.

For wastewater applications, the influent well is equipped with baffled scum ports that permit floating material to escape from the feedwell while preventing short circuiting.

Storm water clarifier installation with walk through truss bridge

HALF BRIDGE CIRCULAR CLARIFIERS



Half Bridge Clarifier

SCRAPER ARMS

A minimum of two scraper arms, each with individual scraper blades, move settled sludge toward the center sludge hopper for removal. Scraper blades are arranged to scrape the floor twice in each revolution.

Some applications require four scraper arms to achieve the required sludge removals. In all designs, sludge scrapers arms are supported and rotated by a center cage supported from the half bridge drive unit.

Scraper arms and the rotating cage are constructed of structural steel. All welding is done in the factory to assure quality fabrication and to minimize field erection requirements. All submerged structural material is a 3 mm. minimum thickness.

SKIMMING/EFFLUENT WEIRS

Various skimming effluent arrangements are available for water and wastewater treatment circular clarifiers. Generally, a full radius, surface scum blade directs floating material to the peripheral scum skimmer. The skimmer concentrates the floating material and deposits it in the scum trough.

Adjustable weirs are generally located on the periphery of the basin, although radial and other arrangements may be employed.

ACCESS BRIDGE

Depending on the size of tank, the access bridge to the drive mechanism will be of beam or truss design. Handrail and 100 mm. toeplate are provided for operator safety with the beam design. In the truss design, the truss acts as the handrail and toeplate. A platform is normally provided at the drive mechanism for safety and efficient maintenance.

3/5 BRIDGE PERIPHERAL DRIVE CIRCULAR CLARIFIERS

ENRICH™ three-fifth bridge sludge, peripheral sludge collector mechanisms are available in sizes beginning at eleven meter diameter. The economics of construction will generally more and more to larger size

In the three fifth rotating bridge peripheral drive design, a structural steel bridge spanning the tank's radius from one end of tank wall and extending from middle pier support to become a bridge length of 3/5 tank diameter.

HOW IT WORKS

The liquid will enter the tank from a bottom center influent column and will flow radically outward and over a v-notch weir around the periphery of the tank. The settled sludge will be conveyed by the scraper mechanism to a central sludge hopper and will be discharged out by mean of sludge draw off pipe. The evolute curve shape of scraper blades of three quarters tank diameter will be arranged to sweep the entire tank floor per revolution of the collector mechanism.

The skimmer device will also be skimmed off floating scum per each revolution of the collector mechanism.

The sludge scraper mechanism will rotating bridge walkway peripheral drive type suitable for circular sludge sedimentation tank. There is the slope towards to the center of tank.

The detention time and the tangential discharge in to the feed well promotes bio-solids flocculation, reducing effluent TSS, and increasing the settling rate.

CENTRAL BEARING ASSEMBLY

The central bearing assembly shall be designed to support the weight of bridge walkway and submerged structure suspended on it. The top of welded turn-table shall provide bearing coupling for both bridge rotation and allow for misalignment in the bridge cause by variation in coping of peripheral run track. The central pivot assembly shall consist of ball bearing and taper roller bearing mounted on bearing post and carried in welded steel turn-table.

This central bearing shall be designed for all applied and self-weight loads with minimum of 5 times base on yield strength. Set of bearings and slip rings included carbon brushes of power collector can be changed without moving of the bridge walkway from central column by using portable hydraulic jacking system at jacking points.

INFLUENT FEED WELL

The center column size and outlets are designed to control floc shear and provide a limited energy input into the energy dissipating inlet feed well.

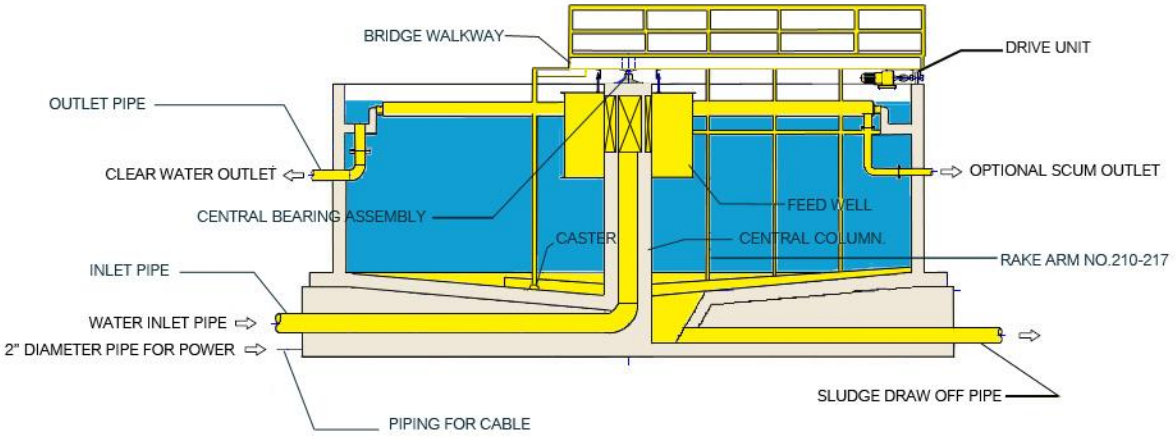
The higher density mixed liquor will plunge to the clarifier floor and then flow horizontally outward toward the wall. This density current can sustain its energy and flow up the wall and over the weirs. We design an influent baffle feed well for prevent the problem.

SCRAPER BLADES

The scraper arms overhang from bridge will be equipped a floor scraper blades to convey the settle sludge to the central hopper. The scraper clarifiers have traditionally used a series of overlap type shallow blades to gradually move sludge to a central withdrawal point.

The scraper clarifiers can also be an evolute curve type to cover three quarters of tank diameter with deep blades to totally move all settled sludge to a central withdrawal point per each revolution. The blades shall be equipped with adjustable squeegee of hard neoprene rubber sheet.

3/5 BRIDGE PERIPHERAL DRIVE CIRCULAR CLARIFIERS



Peripheral Drive Clarifier

EFFLUENT WEIR PLATE / SCUM BAFFLE PLATE

The peripheral effluent weir plate will be of 3 mm. thickness with 300 mm. deep stainless steel plate mounted on the concrete trough with site fixing anchor bolts. Weir will be a V-notch type of adequate size and number in capable to handle on the maximum wastewater flow.

Butt plate will be used at the joint. The whole weir plate will be fabricated to allow an adjustable on installation of plus and minus 25 mm.

A scum baffle with be made of 3 mm. thickness and 300 mm. deep stainless steel plate, supported by

SCUM REMOVAL EQUIPMENT

A scum skimming device and scum hopper will be furnished for the removal of floating scum.

The scum will be conveyed to the periphery of the tank where it will be automatically deposited in the scum hopper. The skimming device will consist of a skimmer blade at the water line hanging from the bridge starting from the influent feed well outward to the scum box.

A plow blade with replaceable neoprene strips rubber squeegees will be provided to ensure that the skimmer will maintain to contact with the scum board. It picks up the collected scum and conveys it over a partly submerged shelf plate into the hopper with each revolution of the mechanism. A can-operated hinged section is fitted to the outer end to activate the scum flushing tray, providing an efficient scum remove.

Technology

ENRICH™

Furnished By

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