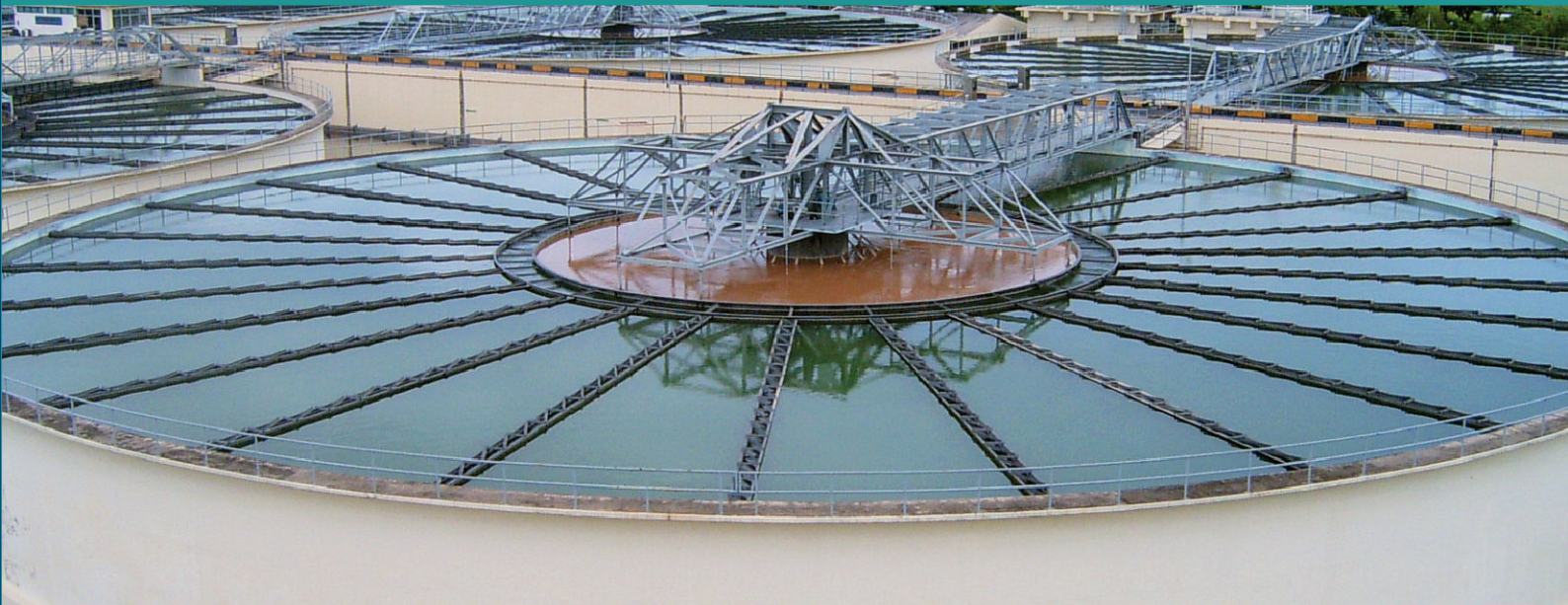


PurewaterGroup



CLARIFIERS

For Water & Wastewater Treatment Systems

CLARIFLOCCULATOR

COMBINED CLARIFIER & FLOCCULATION SYSTEM

GENERAL INFORMATION

The Purewater Systems Peripheral Rotating Half-Bridge Clariflocculator is a solids-contact Reactor-Clarifier unit that is designed and built to provide the most economical solution to suspended solids precipitation and clarification requirements. The basic mechanical system design provides for flocculation, solids recirculation, clarification, and positive sludge removal in one combined concentric structure, thus eliminating the need for multiple tanks and associated piping and pumping.

These units are essentially used for turbidity removal, taste and odor removal applications, and can also be adapted for water softening & conditioning processes as well.



Upward flow sludge blanket clarifier with central flocculation & outer settling zones

Note :

Purewater Systems also design & supply separate flocculation and clarification units for rectangular or radial shaped basins, the latter with or without lamella settling plates, or tube packs, to achieve smaller footprint, or for upgrading existing works.

Our units are backed by several decades of experience in engineering and manufacturing adapted to most process plant requirements.

RADIAL CLARIFLOCCULATORS

Type CLARTP2

The radial concentric reactor-clarifier unit combines slow speed vertical paddle-wheel mixer assemblies generating high volume internal circulation to promote mixing, flocculation and solids-contact, in the inner basin, and quiescent gravity settlement in the outer tank zone.

The compact, efficient and well proven design is best suited for the efficient treatment of raw waters abstracted from rivers, waterways, canals, lakes and other surface waters.

It has the advantage of relatively compact footprint, simple mechanical components that are very durable and easy to operate and maintain, and can meet the process requirements of fluctuating seasonal turbidity loads. The system is designed to promote particle

growth and improve the removal of suspended solids. Here, raw influent water immediately contacts a large volume of dense floc in the central flocculation zone and, after adequate retention, passes through the baffled wall to the large outer clarification-sedimentation zone. Heaviest particles settle to the floor where they are raked to the center for recirculation, or sludge discharge.

The Purewater standard CLARTP2 is a Peripheral Rotating Half-Bridge Clariflocculator (Sub-Type PRHBC /ST1) comprising of concentric circular RC tanks, with the inner radial basin housing the paddle flocculator(s), and an outer sedimentation basin traversed by a bridge-walkway supporting low fractional speed logarithmic floor scraper mechanism, that sweeps the settled sludge over a sloping floor to a discharge point at its base.

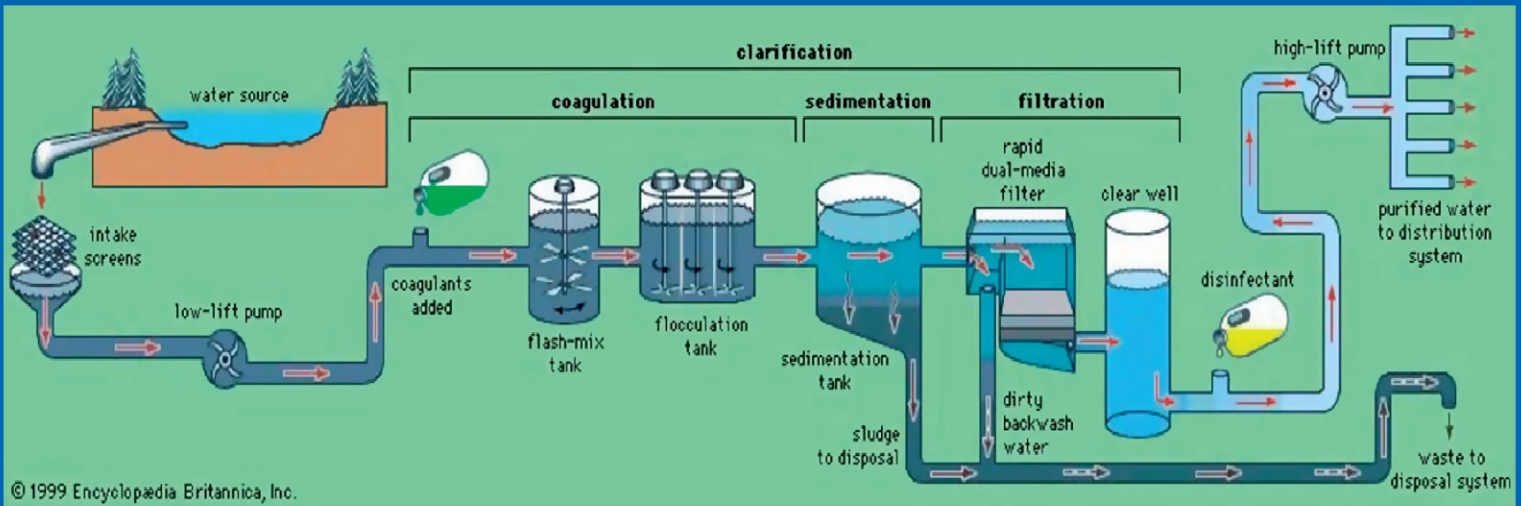


Scraper & skimming mechanism for Rectangular Clarifier basin



Clariflocculator with twin scraper arms & central driven torque tube

Typical Schematic of Surface Water Treatment Plant



Water-Abstraction > Chemical-Flocculation > Clarification > Filtration > Disinfection > Water-Distribution

OPERATIONAL FEATURES

- ▶ The pre-mixed or agitated raw water, which has been dosed with suitable coagulant (e.g. Alum) in the upstream flash mix chamber, is introduced via the central distribution column into the inner radial basin, and mixed at slow, regulated speed by two-or-more vertical rotating paddle flocculators, supported by the bridge walkway, to help enlarge & agglomerate the flocs in contact with suspended raw water sediments, thus enabling them to settle out in the outer sedimentation basin under quiescent conditions, where the bottom scraper system sweeps and evacuates the settled sludge via the discharge piping.
- ▶ The rate and quantity of discharge from the clarifier is normally regulated by means of a Telescopic Sludge Valve, placed within the sludge chamber downstream, the normal operation of which is by manual adjustment of sludge output, on continuous or on intermittent basis. This regulation may also be automated and motorized for remote operation, or on time basis, when requested.
- ▶ The oil-lubricated peripheral drive group, of first class West European manufacture, with combination worm-wheel geardrive and tropicalised electric motor, powers the polyurethane-clad heavy-duty wheels that rotate the horizontal bridge-walkway structure over the outer RC tank wall.
- ▶ The bridge-walkway structure, in turn, supports the bottom sludge scraper arms & blades, the surface scum skimmer system, as well as the vertical paddle wheel flocculators of the inner radial basin.
- ▶ A heavy-duty slewing ring bearing, having base-plate anchored to the RC central column, acts as central support and mechanical turntable for the rotating bridge.

- ▶ V-notch weir plates and scum baffles, anchored to the peripheral overflow launder or channel, will regulate the clarified water outlet and hold back potential surface scum.
- ▶ The latter is swept away by a skimmer arm to a scum collection box for discharge. (this feature being an option on the standard clariflocculator unit which is available to clients on request).
- ▶ A weatherproof emergency start/stop push-button mounted near the bridge drive assembly, and/or local electric starter-&-control panel mounted on the bridge walkway, are provided for operation and control of the mechanical drives.
- ▶ The mains power to these units is taken from a rotating central electric slip-ring device, with brush contacts, mounted on the central column of the RC tank, and wired to the respective drives via the control cabinet (panel).
- ▶ The mechanical turbine flash mixers for flocculant &/or polymer dosing are given elsewhere.

Note :

A modification of the standard Clariflocculator may include additional bottom scraper mechanisms within the inner flocculation zone, or basin, which corresponds to Type PRHBC /ST2 of Purewater series. Further modification, or option, may incorporate pumped sludge recirculation system (Type PRHBC /ST3-SR). Furthermore, a full-span rotating bridge scraper assembly spanning the inner & outer tank walls, with single or twin scraper assemblies, is available for use in very large diameter basins, or to comply with client requirements. This version corresponds to Type PRFBC /ST1 in its standard form.



Peripheral driven scraper bridge mechanism with walkway

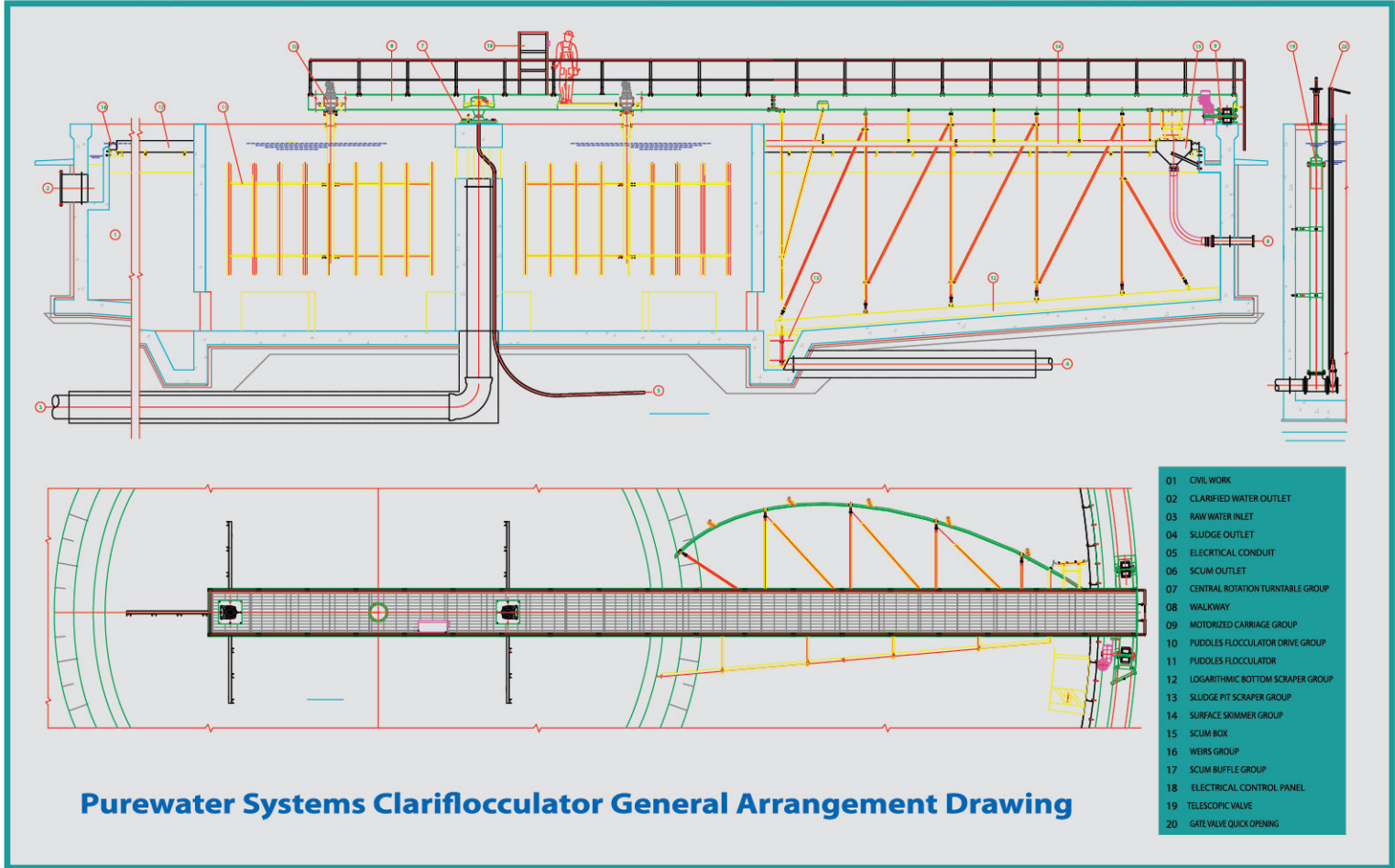


TABLE of Flow Capacities & Dimensions for Radial Clariflocculators

Nominal Flow Capacity cu.m.h	Settlement Tank outer basin I.D.	Flocculation Zone / inner I.D.	Effective Tank Height	Settling (*) Velocity m/h
200-300	20 m	7 m	4.0 m	1.10
400	24 m	9 m	4.0 m	1.03
500	26 m	10 m	4.0 m	1.10
600	30 m	10 m	4.0 m	0.97
700	32 m	11 m	4.0 m	1.00
750	34 m	12 m	4.0 m	0.95
900	36 m	13 m	4.0 m	1.02
1000	38 m	14 m	4.0 m	1.02
1100	40 m	15 m	4.0 m	1.00
1200	44 m	16 m	4.0 m	1.00
1400	46 m	17 m	4.0 m	1.00
1500	48 m	18 m	4.0 m	0.97
1600	50 m	19 m	4.0 m	0.96

(*): Note: settling rates may vary depending on type of flocculants used

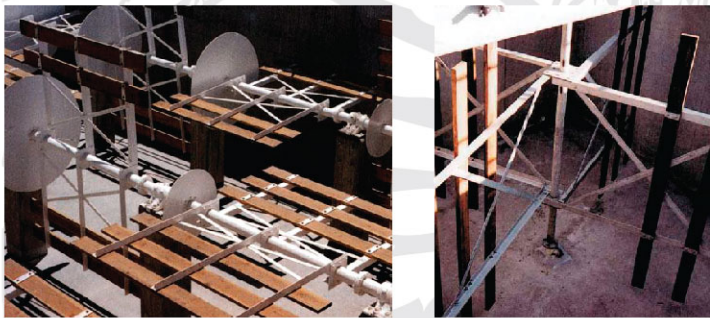
High Rate Solids Contact Clarifier

HRSCC is mostly used in applications wherein a large variation in the inlet conditions has to be tolerated by the system. The HRSCC enhances the flocculation process by ingeniously mixing a part of the existing sludge with incoming effluent to achieve a uniform and dense floc. This ensures a higher clarified water quality and greater tolerance to variations in inlet conditions.

Paddle-Wheel Flocculator

General : Purewater Systems design, manufacture & supply, in series or parallel operated, low speed vertical Paddle-Wheel Flocculators to be placed within the flocculation chambers / RC tanks, upstream of the combined lamella assisted RC Clarifier tank, or in combination with radial concentric basins.

The robust design of these high efficient yet simple units have been well established over the years in many water treatment facilities. These are well crafted flocculator systems, for both vertical & horizontal installations, engineered for long life and minimal maintenance.



Paddlewheel Flocculator highlights :

- ▶ Choice of Vertical or Horizontal flocculator design, based on site configuration and/or basin construction;
- ▶ Heavy-duty constant or variable speed drives;
- ▶ Standard coated carbon steel, or stainless steel construction;
- ▶ Shaft mounted drives, with chain and sprocket or belt drive options available;
- ▶ Heavy duty gear drives and electric motors of first class manufacture.

Note :

Purewater can provide slow-speed vertical turbine mixer-flocculators instead of paddle-type, upon request.

Telescopic Sludge Valve / TSV

The Purewater Systems Telescopic Valve is a standard desludging valve used with sedimentation /clarifier basins, or employed as liquid level control to regulate water levels in basins, or to decant surface fluids.

The unit basically comprises of two cylindrical tubes that slide vertically inside each other to create a differential in height to control the upper liquid level within the adjoining basin. The TSV is robust in construction and simple in operation, and is virtually maintenance-free.

The upper tube, which has a weir lip (or option with flared top for decanting scum) and is connected to a vertical threaded spindle and a gear assisted operator and hand-wheel, (or crank), telescopes in and out of the slightly larger diameter column, via a Neoprene, or UHMWPE guide seal; and by adjusting the height of the inner tube, the weir at the surface lets the overflow liquid to drain out downwards through the centre pipe, to the exterior pit.

Option for non-standard 304 / 316 stainless steel construction, as well as remote automation via electric or pneumatic actuators, should be specified or requested by client at the outset.



CLARIFIERS & SLUDGE THICKENERS

PRIMARY & SECONDARY SEDIMENTATION BASINS

Purewater Systems and its associates in Italy [Euromac Srl] & in Europe design and manufacture various configurations of settlement and sludge consolidation equipment, both for reinforced concrete basins and for steel tanks. The range covers M&E equipment for radial and rectangular basin configurations.

The standard wastewater sedimentation equipment for radial (circular) basins include the following types :

- ▶ Peripheral Drive Scraper Systems :
with rotating Half-Bridge, or Full-Bridge Drive Mechanism
- ▶ Rapid Sludge Removal Scraper System :
with either Peripheral, or Central Drive Mechanism
- ▶ Fixed-Bridge Scraper Mechanism, in concrete or steel :
with high-torque central drive
- ▶ Concentric tank Carifloculators (see above)



The settlement and sludge collection group for rotating bridge systems comprises of steel bridge with walkway fitted with gratings, toe-plate and hand-rails, to current European codes and norms, and trailing arms for bottom scraper blades with hard-rubber tips, in logarithmic or overlapping chevron profile. The drive group comprises of a trolley equipped with primary gearbox, with option for torque limiting device, urethane-clad heavy cast steel wheels, axles and bearings.

Central Drive cage is made of struss profile supporting rake arms & scraper blades, which are adjustable, and upper bearing block.

Basins are normally equipped with influent well for diffusion of incoming flow, suspended from the bridge, dimensioned in accordance with flow capacity. Alternative "stencil" type flow diffusers may be provided on request.

Surface Scum Skimmers are standard for wastewater plants, and may be provided for some water-treatment units as well, consisting of rotating skimming blade and scum-box in the tank periphery for automatic evacuation of accumulated scum.

V-Notch weirs, and scum baffles are provided in the outer periphery, or laterally, for collection of clarified effluent and for retention of scum.

All submerged structural materials are normally in epoxy-tar coated carbon steel, or hot-dipped-galvanized, but can be provided in stainless steel, or aluminium, upon specific request. Bridge structures and walkway are normally in galvanized or epoxy-coated steel.

SLUDGE THICKENER TANK



Sludge thickener is normally a cylindrical, or square basin, having mechanical picket fence structure and internal stilling well for gravity settling, degassing and thickening of wasted sludge, and subsequent removal by means of bottom scrapers. The picket and scraper mechanism may be supported by either rotating bridge drive, or by means of

centrally driven torque tube and arms. Materials of construction and sludge discharge are similar to clarifier-sedimentation systems. Clarified effluent is decanted from the surface periodically and returned to treatment stream.

Lamella Plate Settlers

Lamella plate settlers utilize a series of parallel plates which maintain a laminar flow in-between the plates to achieve settling. The plates are provided with a mirror finish to attract and settle the flocculated particles. The particles accumulate on the surface and slide down due to gravity. The sludge accumulates at the bottom cone.

The collected sludge is removed from the bottom at regular intervals. Lamella clarifiers are compact and ideal for high suspended solids and chemical based sludge.

They are employed to reduce plant footprint, or to upgrade clarifier flow capacity and efficiency.

Tube Settlers

Tube settlers utilize slanted tubular media to achieve laminar flow in the media. The media traps the floc particles which accumulate on the surface and slide down due to gravity. The sludge accumulates at the bottom cone. The collected sludge is removed from the bottom at regular intervals. Tube settlers also help reduce plant footprint and/or upgrade existing clarifier capacity and efficiency.



Inclined lamella tube-packs in settling zone of clarifier

TREATMENT PLANT ACCESSORY EQUIPMENT



Motor Control Center



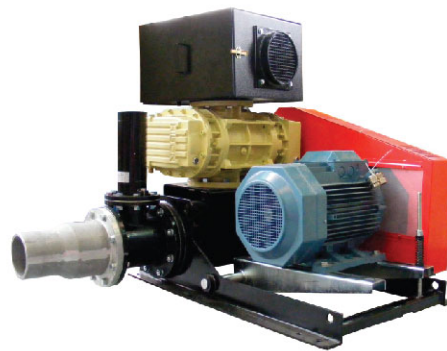
Chemical Dosing System



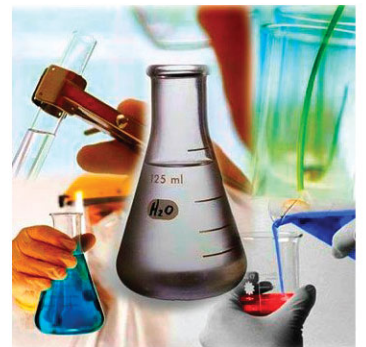
Chlorination System



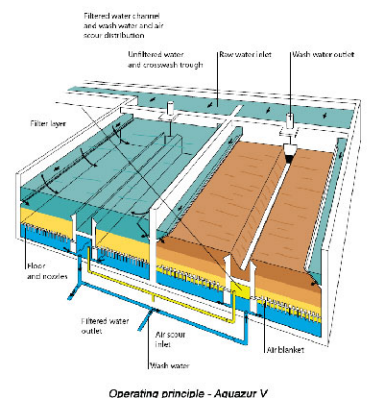
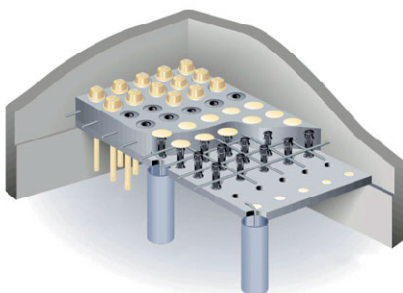
Mixer



Air Blower



Lab Equipment



Filtration Systems



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