CHEMICAL TREATMENT SYSTEM

ACLC

ANTI CLOG LAMELLA CLARIFIER

wetterson technology™

Inclined Plate Clarifier (IPC) a.k.a Lamella Plate Settlers perform the same function as conventional clarifier and can be installed in the same location is the process train. IPC is an equipment designed to increase the settling capacity of a clarifier by increasing the effective gravity settling area of the inclined plates.

Wastewater enters the plates through specially sized feed opening located in the lower sides of the plates. The solids (sludge) with higher density then settle on the surface of the plates and slide down to the sludge compartment; while supernatant is discharged from the top of the plates to overflow compartment through v-notch weirs to ensure even flow distribution.

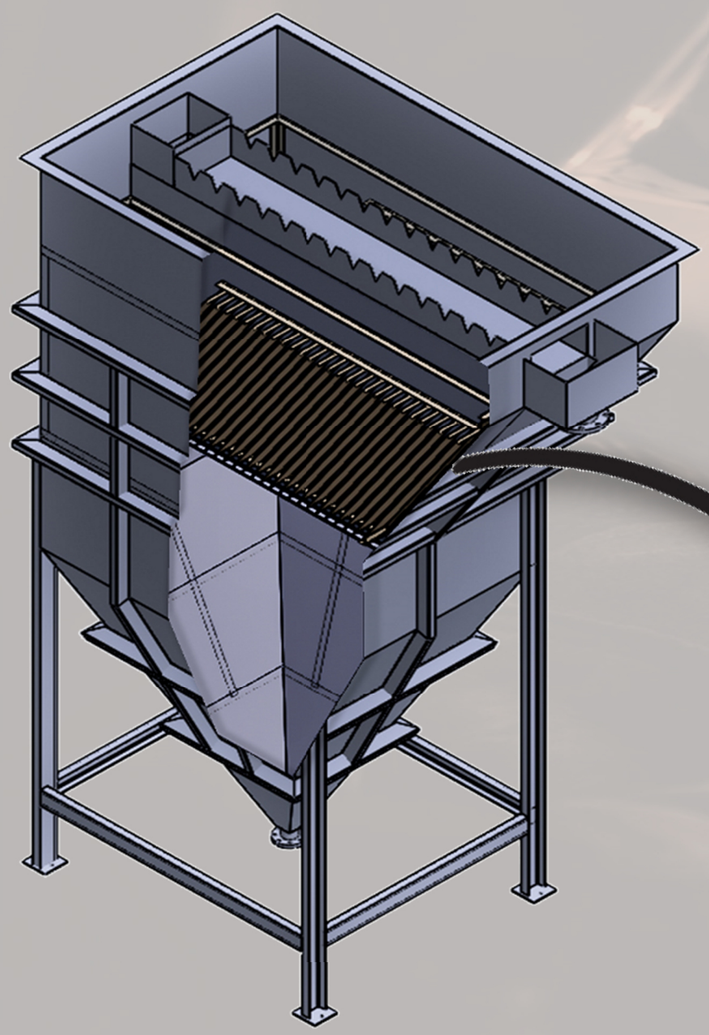
Lighter solids continue to accumulate on the plates until a critical mass is reached at which point gravity causes the solids to slide down into the sludge compartment. In some occasion for conventional IPC, this accumulated sludge would just stick on the plate surface and cause clogging problem to the inclined plates. When this phenomenon happened, operator would need to drain down the clarifier water to clean all the inclined plates by using high pressure water jet.

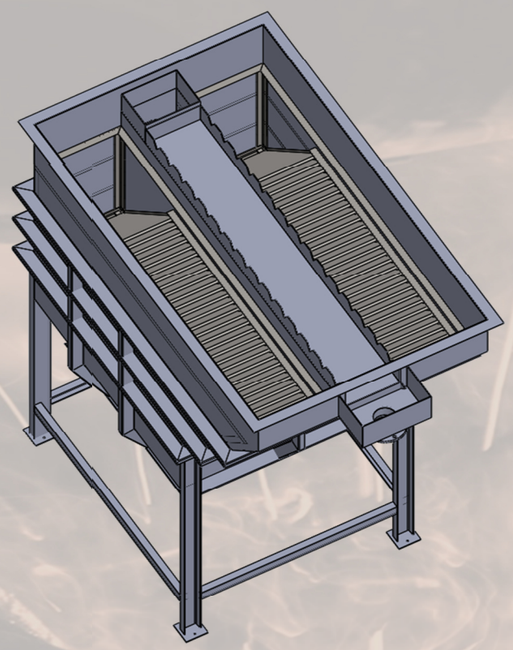
Therefore, Watterson have designed an Anti-Clog Lamella Clarifier or ACLC which overcome the above problems.

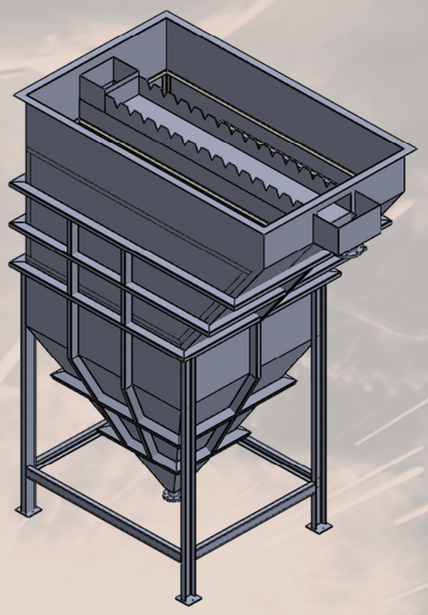
All inclined plates were made by SS304 plates which created a smooth surface to prevent sludge accumulation and ease the sludge to slide down.

Furthermore, the inclined plates frame was design and fixed with a mechanism to enable operator to adjust it to 90° position (from its normal operating condition of 55°) to aid the sludge drop to the bottom of tank (ease of cleaning). In the event if the operator would need to clean the ACLC, he would not need to drain the clarifier water; but by adjusting it to 90° position would be sufficient to aid the sludge to drop.

Sludge dropped to the bottom of tank, would be further thickened by the bottom pyramid shape of the ACLC before it is pump out for either re-circulation to Aeration Tank or de-sludge to Sludge Holding Tank.







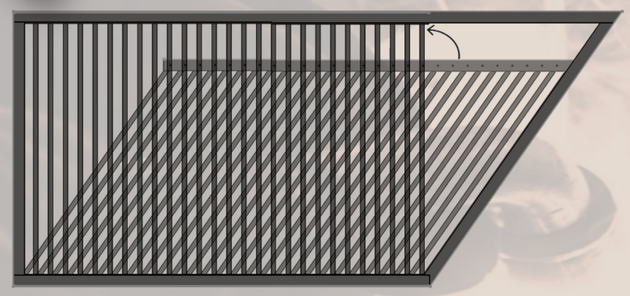
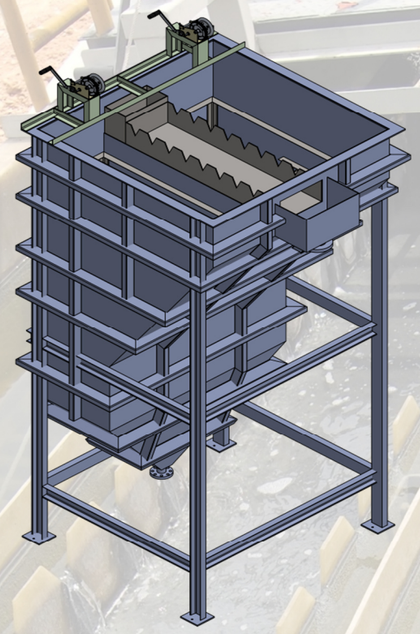
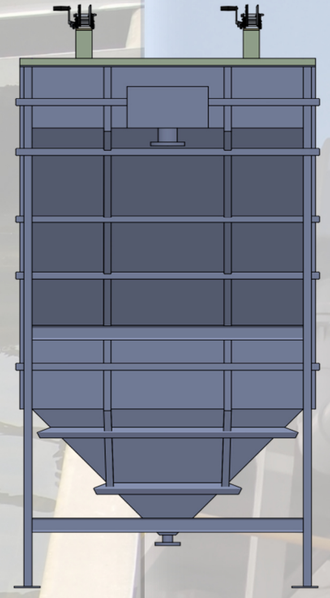
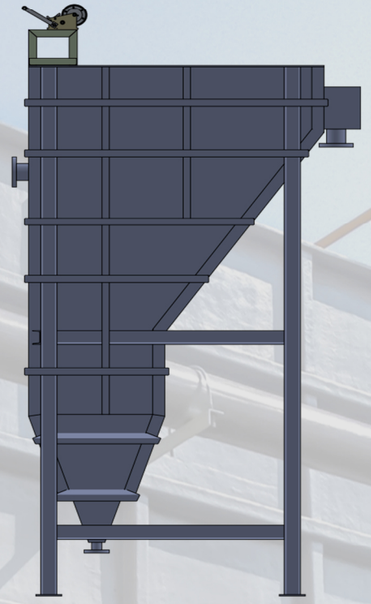


Illustration on the left shows how the Adjustable Inclined Plate Pack works during servicing period. The Plate Pack is tilted in a 90° angle to allow the trap sludge to slide downwards into the conical part of the clarifier. This eliminates any choking or clogging of sludge on the Inclined Plate Pack and thus ensuring the efficiency of the Clarifier is at optimum level.

The Plate Pack is tilted using a winching system which reduces the energy / effort needed compared to tilting the plate using manual force.







	WTS-ACLC-05	WTS-ACLC-10	WTS-ACLC-15	WTS-ACLC-20	WTS-ACLC-25	WTS-ACLC-30	WTS-ACLC-35	WTS-ACLC-40	WTS-ACLC-45	WTS-ACLC-50
Flowrate (m3/hr)	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0
INTERNAL TANK DIMENSION										
Length (mm)	1660	1660	1985	2310	2635	1990	2180	2310	2505	2640
Width (mm)	1030	1660	1660	1660	1660	3320	3320	3320	3320	3320
Height (mm)	3280	3730	3730	3730	3730	4330	4330	4330	4330	4330
OUTER DIMENSION										
Length (mm)	2040	2040	2365	2690	3015	2570	2760	2890	3085	3220
Width (mm)	1190	1820	1820	1820	1820	3480	3480	3480	3480	3480
Height (mm)	3280	3730	3730	3730	3730	4330	4330	4330	4330	4330
Plate Size	4ft(H) x 2ft(W)	4ft(H) x 2ft(W)	4ft(H) x 2ft(W)	4ft(H) x 2ft(W)	4ft(H) x 2ft(W)	4ft(H) x 2ft(W)	4ft(H) x 2ft(W)	4ft(H) x 2ft(W)	4ft(H) x 2ft(W)	4ft(H) x 2ft(W)
No. of Plate Row	1	2	2	2	2	4	4	4	4	4
No. of Plates Per Row (pcs)	10	10	15	20	25	15	18	20	23	25
Total No. of Plates (pcs)	10	20	30	40	50	60	72	80	92	100
PSA (m3/m2/min.)	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022
Upflow Velocity (m/h)	5.42	5.42	6.93	7.81	8.69	6.93	7.54	7.81	8.28	8.69
SLR (kg/m2.day) - Based on SS < 3,500 mg/L	107.05	107.05	107.05	107.05	107.05	107.05	104.08	107.05	104.73	107.05
Operating Weight (Tonne)	5.1	7.7	9.7	11.6	13.7	18.5	21.0	22.7	25.0	27.3
Empty Weight (Tonne)	3.0	3.5	4.1	4.7	5.4	7.3	8.0	8.5	9.1	9.6
Water Inlet (DN)	80	100	150	150	150	150	150	150	150	150
Water Outlet (DN)	80	100	150	150	150	200	200	200	200	200
Sludge Outlet (DN)	50	50	50	80	80	80	80	80	80	80

DAF

DISSOLVED AIR FLOATATION

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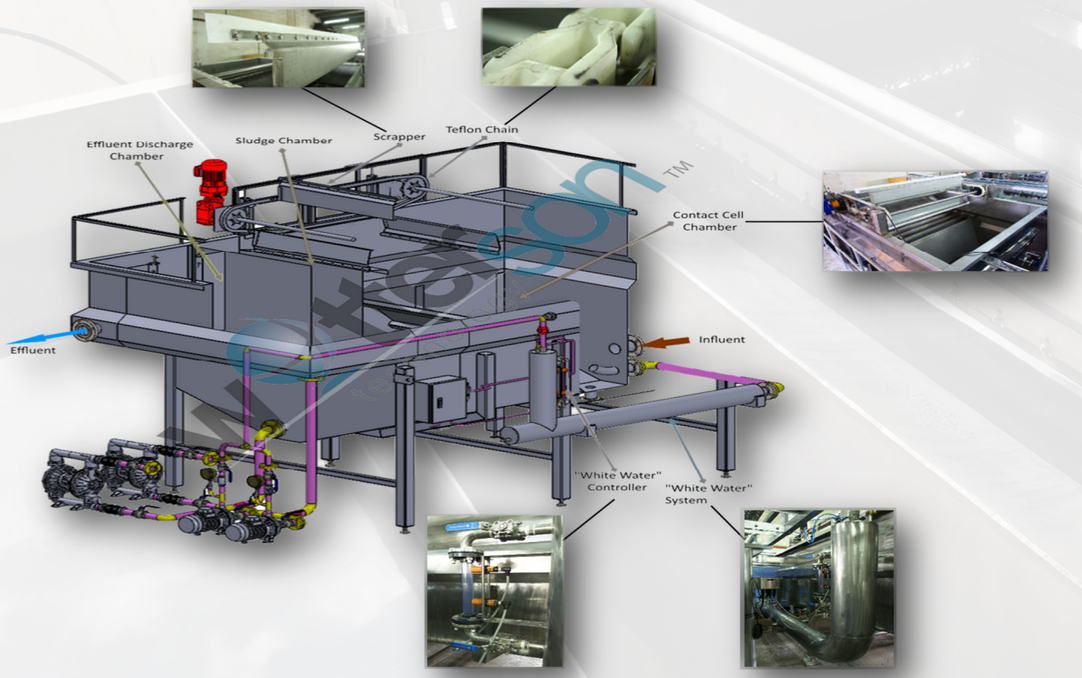
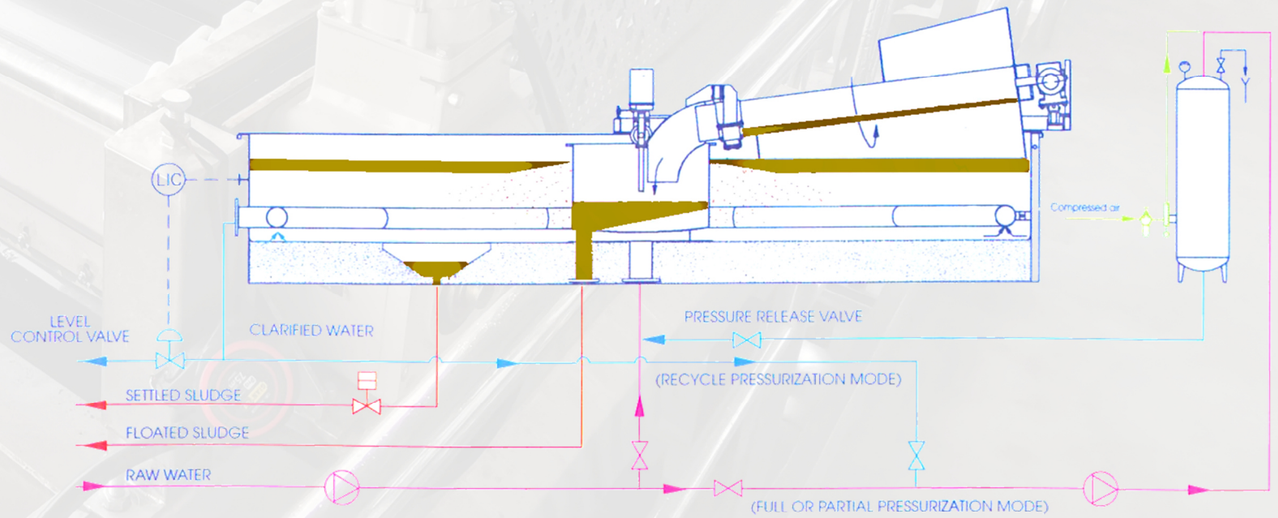
- DAF is the process of removing suspended solids, oils and other contaminates via the use of air bubbles flotation. Air is dissolved into water, mixed with the wastewater stream and released from solution while in intimate contact with the contaminants. Air bubbles form, attach to the solids, increase their buoyancy and float the solids to the water's surface where they are mechanically skimmed and removed from the tank.

- A percentage of the clean effluent wastewater is recycled into the saturation vessel, where it is mixed together with air. In the saturation vessel the mixture of air and recycled effluent is pressurized and after reaching a certain level, it is injected into the DAF separation chamber. Hereby, the dissolved air comes out of solution in the form of very fine bubbles that attach to the contaminants. The bubbles and the contaminants rise to the surface and form a floating bed of material that is removed by a surface skimmer into an internal hopper for further handling. This handling may include a belt filter press or a rotary vacuum drum with DE applied.

- Dissolved air flotation systems are designed to remove fats, oils and grease (FOG), suspended solids (TSS), biological oxygen demand (BOD), chemical oxygen demand (COD), food/animal production/ processing wastes, industrial wastes, hydrocarbon oils/emulsions and many other contaminants. Clarification rates as high as 97 % or more can be achieved using DAF systems combined with the right allocation of chemicals. The DAF system is manufactured fully in stainless steel materials, to ensure a long lasting performance

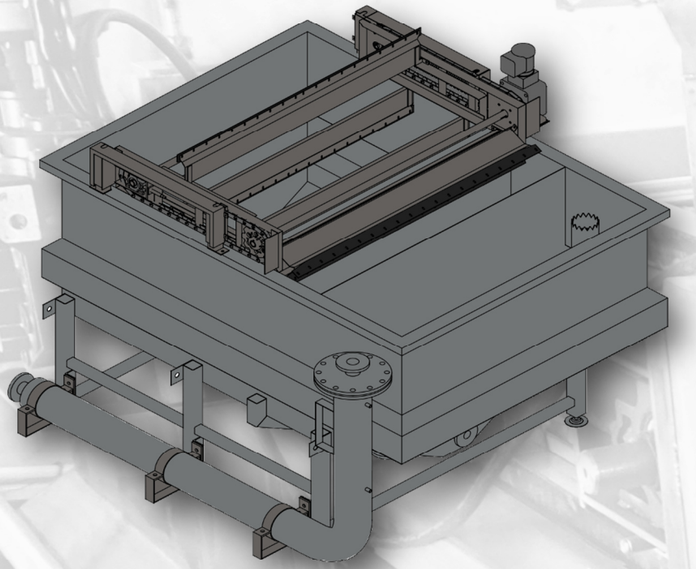


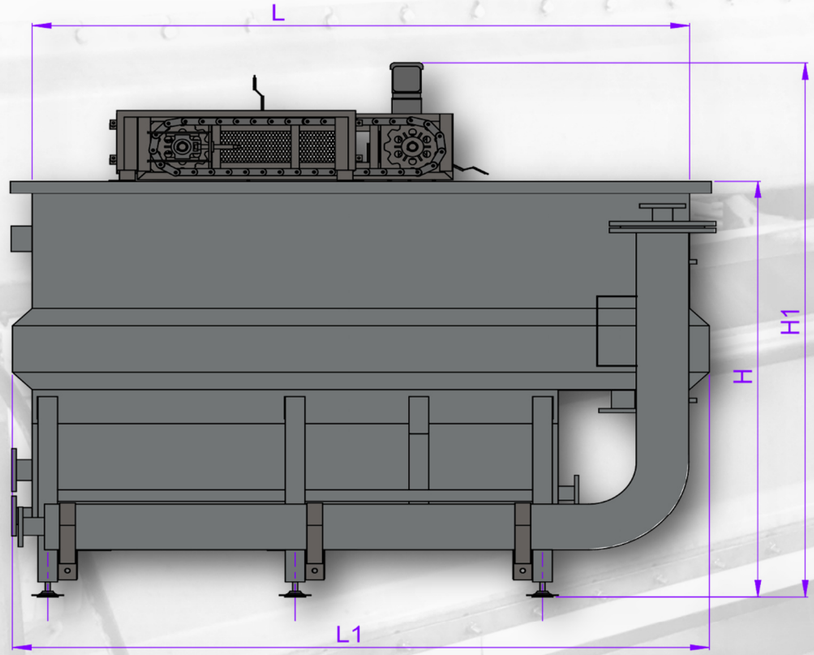
Rectangular DAF

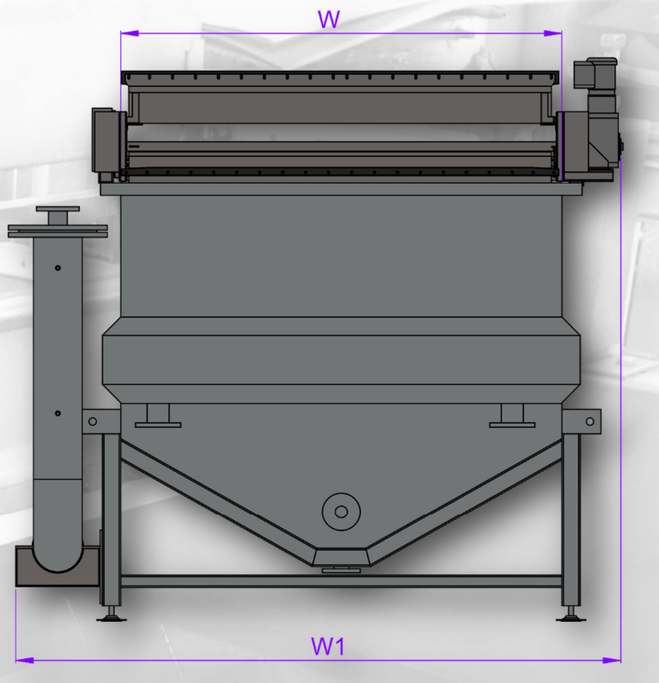


Round DAF

RECTANGULAR DAF





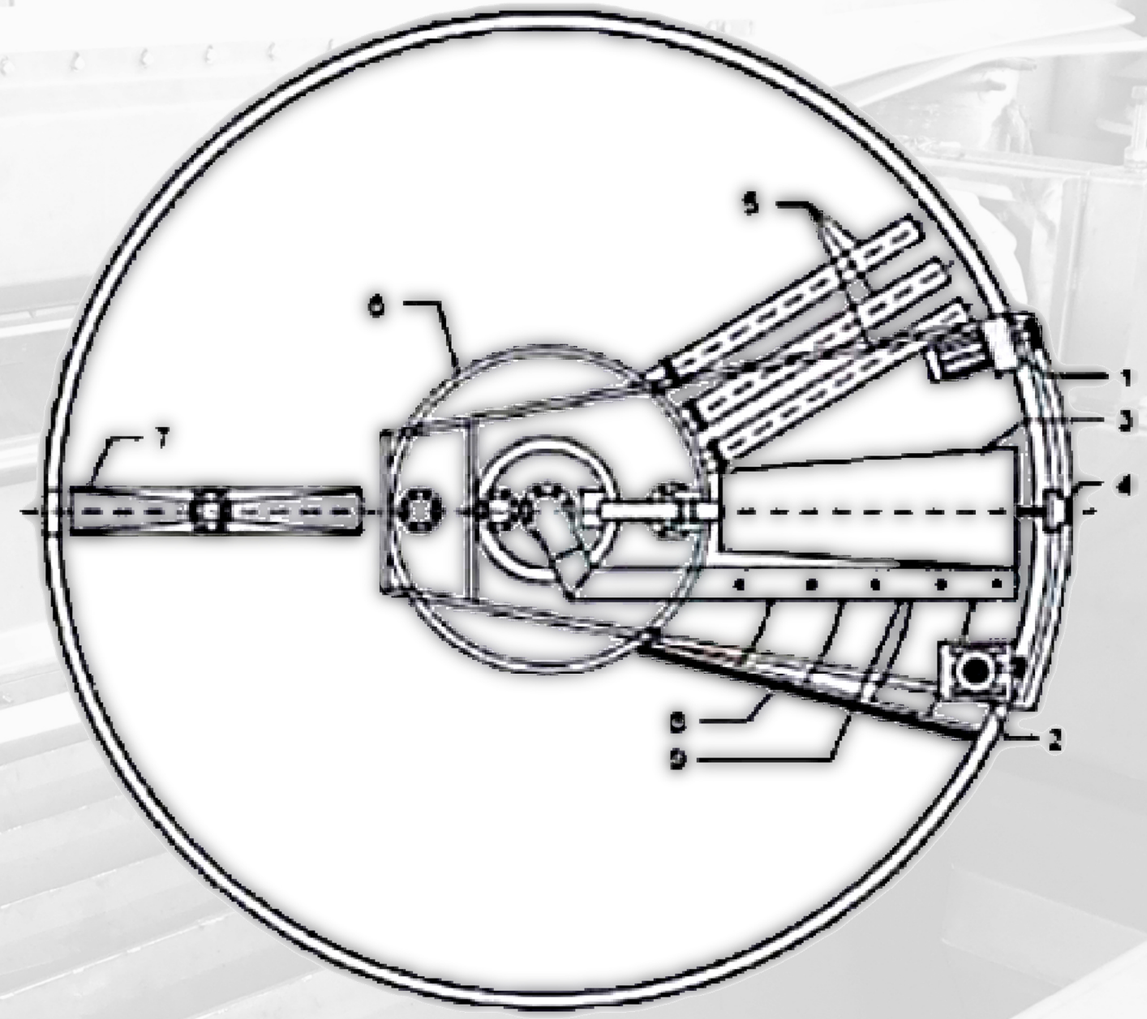


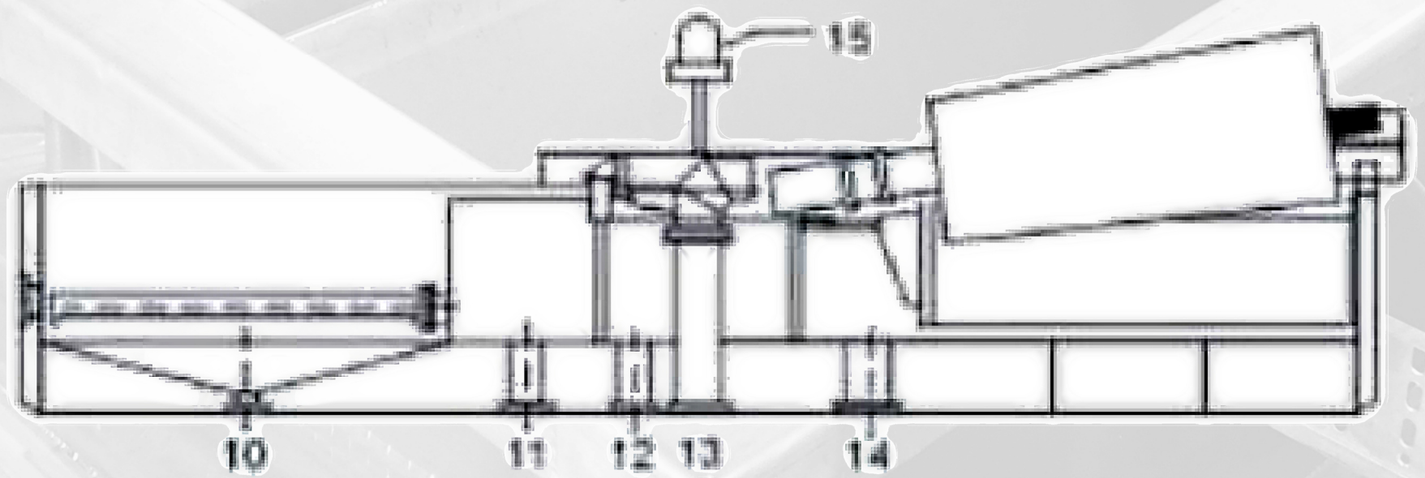
Model	WTS-DAF-05	WTS-DAF-10	WTS-DAF-15	WTS-DAF-20	WTS-DAF-25	WTS-DAF-30	WTS-DAF-35	WTS-DAF-40	WTS-DAF-45	WTS-DAF-50
Flowrate (m3/hr)	5	10	15	20	25	30	35	40	45	50
Influent Total Suspended Solid (TSS) Concentration (mg/L)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Hydraulic Loading Rate ($m^3/m^2/hr$)	5	5	5	5	5	5	5	5	5	5
Recirculation Pump Flowrate (m3/hr)	5	10	15.1	20.1	25.1	30.1	35.1	40.1	45.2	50.2
Recirculation Pump Pressure (Bar)	6	6	6	6	6	6	6	6	6	6
Air Flowrate (L/min)	0.81	1.61	2.42	3.23	4.04	4.84	5.65	6.46	7.27	8.07
Total Power (kW)	3.9	7.7	11.2	11.2	11.2	11.2	15.2	15.2	15.2	22.2
Material of Tank Body and Air Distillated Tank	SS304	SS304	SS304	SS304	SS304	SS304	SS304	SS304	SS304	SS304
Overall Dimension	2.65m(L) x 2.5m(W) x 2.35m(H)	3.15m(L) x 2.5m(W) x 2.35m(H)	3.65m(L) x 2.5m(W) x 2.35m(H)	4.15m(L) x 2.55m(W) x 2.35m(H)	4.15m(L) x 2.55m(W) x 2.35m(H)	4.65m(L) x 2.55m(W) x 2.35m(H)	5.15m(L) x 2.6m(W) x 2.35m(H)	5.15m(L) x 2.6m(W) x 2.35m(H)	5.65m(L) x 2.6m(W) x 2.35m(H)	5.65m(L) x 2.6m(W) x 2.35m(H)

ROUND DAF

1) Scoop Drive
2) Carriage Drive
3) Spiral Scoop
4) Support Wheel
5) Clarified Water Collector
6) Movable Centre Part
7) Sediment Pump
8) Distribution Rake
9) Distribution Tube
10) Sludge Outlet
11) Clarified Recycle Outlet
12) Floated Sludge Outlet
13) Process Water Inlet
14) Clarified Water Outlet
15) Electrical Slip Ring

Model	Dia. (mm)	Max. Capacity (m3/hr)	Motor Scoop (kW)	Motor Carriage (kW)
DAF-24	2400	27	0.37	0.37
DAF-32	3200	48	0.75	0.55
DAF-39	3900	72	0.75	0.55
DAF-45	4500	96	0.75	0.75
DAF-55	5500	144	1.1	0.75
DAF-61	6100	175	1.1	0.75
DAF-67	6700	210	1.5	1.1
DAF-72	7200	244	1.5	1.1
DAF-81	8100	308	1.5	1.5
DAF-90	9000	380	2.2	1.5
DAF-100	10000	470	2.2	2.2
DAF-110	11000	570	3.75	2.2





TPI

TILTED PLATE INTERCEPTOR

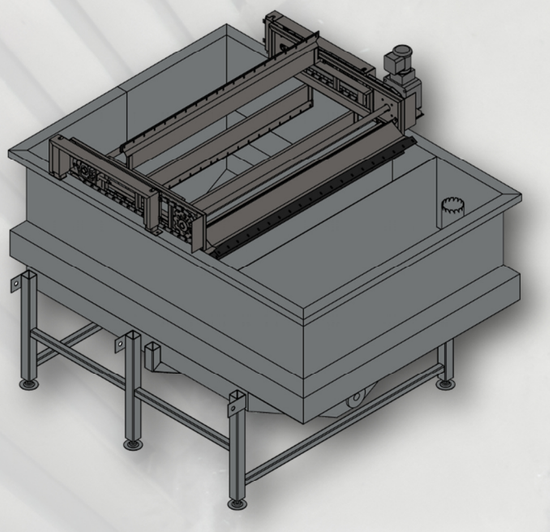
wetterson technology™

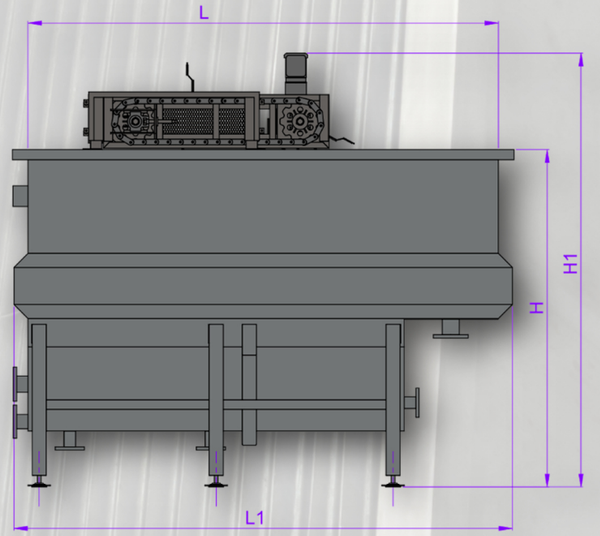
- High oil and grease content in a wastewater can reduce a wastewater / industrial effluent plant efficiency in treating such waste as it could lead to failure in biological treatment system due to the shortage of oxygen and upsetting the treatment itself. It could also affect the clarifier as high oil and grease wastewater tend to float up the sludge thus creating a carry-over sludge issue.

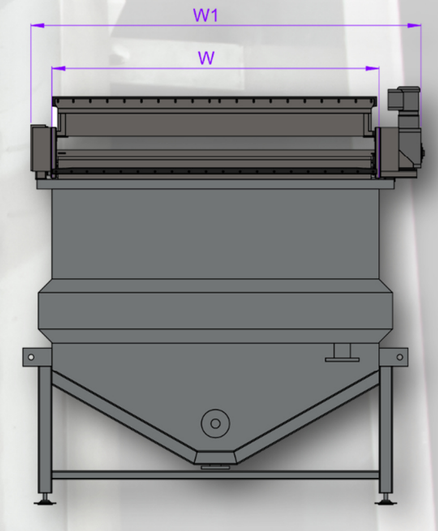
- Tilted Plate Interceptor or TPI is design to be a part of the process of removing Free Oil and Emulsified via the use of tilted plate pack. Tilted Plate Pack enhanced the surface area and the contact time where “Gravitation Separation” will have longer retention time to enable the separation of low density liquid (Free Oil) and high density liquid (Water). The low density liquid is then flow upward to the surface of the water where they are mechanically skimmed and removed from the tank.

- The clean effluent wastewater is then channelled to the chemical treatment system for further treatment before entering a biological or effluent polishing system. The main purpose of having a TPI System is to remove the free oil and emulsified oil where by it can reduce the effect in the Biological treatment, thus ensuring the efficiency of the wastewater treatment system.

- Tilted Plate Interceptor systems are designed to remove oils and grease (FOG), hydrocarbon oils/emulsions and many other contaminants. The TPI is design and build specifically using Stainless Steel material to ensure long lifespan of the tank should low pH is required to remove emulsified oil and high efficiency in separation of Free Oil from the wastewater.







Model	WTS-TPI-05	WTS-TPI-10	WTS-TPI-15	WTS-TPI-20	WTS-TPI-25	WTS-TPI-30	WTS-TPI-35	WTS-TPI-40	WTS-TPI-45	WTS-TPI-50
Flowrate (m3/hr)	5	10	15	20	25	30	35	40	45	50
Internal Dimension	2.55m(L) x 1m(W) x [1.5+0.2FB]mD	3.0m(L) x 1.2m(W) x [1.5+0.2FB]mD	3.6m(L) x 1.2m(W) x [1.5+0.2FB]mD	3.7m(L) x 1.5m(W) x [1.5+0.2FB]mD	4.2m(L) x 1.5m(W) x [1.5+0.2FB]mD	4.7m(L) x 1.5m(W) x [1.5+0.2FB]mD	4.7m(L) x 1.8m(W) x [1.5+0.2FB]mD	5m(L) x 1.8m(W) x [1.5+0.2FB]mD	5.5m(L) x 1.8m(W) x [1.5+0.2FB]mD	5.5m(L) x 2m(W) x [1.5+0.2FB]mD
Inclined Plates	4	6	8	10	10	12	12	12	15	15
Top Length Contact Zone (m)	0.85	1	1.1	1.1	1.2	1.3	1.3	1.3	1.4	1.5
*Channel Length(m) *Sludge Compartment Length(m) *Clean Water Length (m)	0.8 0.4 0.5	1.1 0.4 0.5	1.6 0.4 0.5	1.7 0.4 0.5	2.1 0.4 0.5	2.5 0.4 0.5	2.5 0.4 0.5	2.8 0.4 0.5	3.2 0.4 0.5	3.6 0.4 0.5
Empty Load (tonne)	0.80	1.00	1.15	1.40	1.45	1.55	1.75	1.80	2.00	2.10