

DISSOLVED AIR FLOTATION


anaconda®


WASTEWATER EQUIPMENT INDUSTRIES®

MIXED CELL,
LAMELLAR AND
OPEN CELL FLOATS



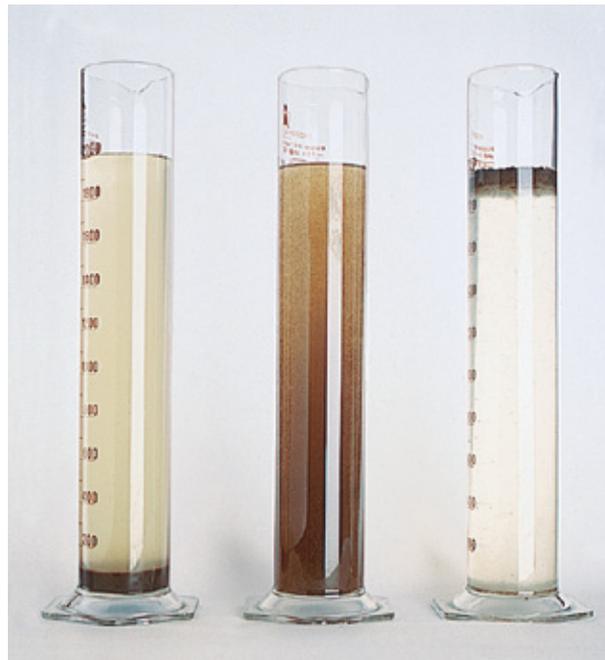
Process Description

Dissolved air flotation is a process which separates solid particles from liquids by means of advanced FADAR® (high performance dissolved air flotation) flotation technology.

Thanks to the advanced FADAR® technology, our equipment produces a stream of micro air bubbles that adhere to the floccules, raising them to the surface where a system of scrapers drags the sludge bed generated to the hopper that collects the sludge, reducing the total suspended solids by up to 90%, reducing the COD and obtaining a sludge dryness of around 6%.

FADAR® TECHNOLOGY

Dissolved air floats separate solids using FADAR® technology, developed by Toro Equipment, which enhances flotation by injecting micro air bubbles into the floc. This causes the floc density to reduce, creating what we call sponge flocs, which increases the separation rate. Stokes' theorem.



**REDUCTION OF
TSS UP
TO 90%**





STAGES OF THE PROCESS DISSOLVED AIR FLOTATION

- Dissolved air bubble formation.
- Adhesion of bubbles to particles to form air/solid particles.
- Formation of air/solid particle conglomerate and flotation of the formed conglomerate.
- Separation of the sludge formed.

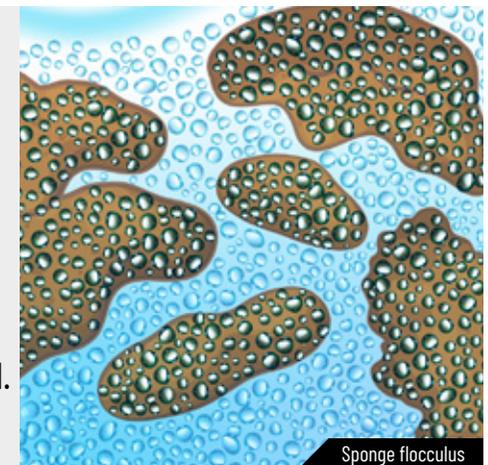
THE GREAT ADVANTAGE EXCLUSIVE AIR INJECTION SYSTEM

System integrated in the flocculation tube. Improves the performance of dissolved air flotation by injecting micro bubbles of air into the floc.

Innovation developed by Toro Equipment that allows a higher bubble density to be achieved than with conventional systems, thus increasing the separation speed.

What do we want the air bubble to look like?

- Numerous.
- Small in size.
- Simultaneously formed.
- Well distributed over the surface to be treated.



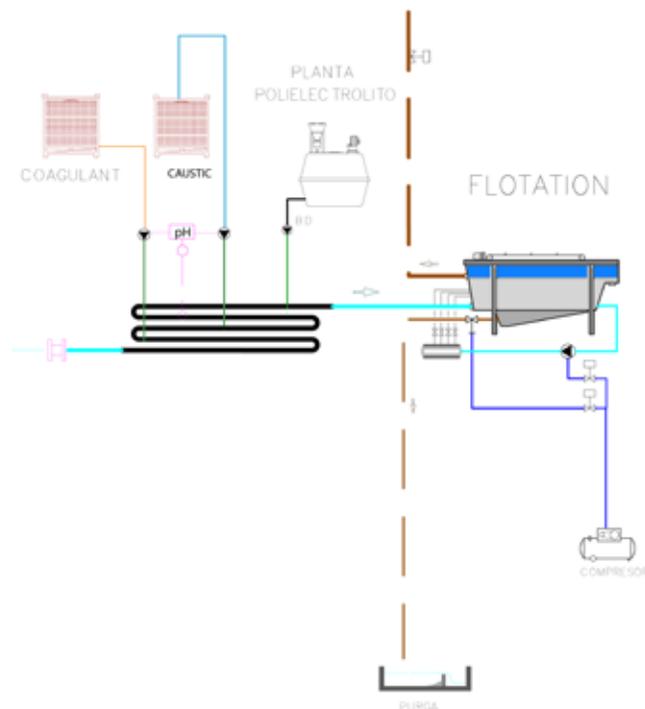
Sponge flocculus

Operation

Certain chemical compounds are usually added to facilitate the flotation process. For the most part, these chemical reagents work in a way that creates a surface or structure that allows air bubbles to be easily absorbed or trapped. Inorganic chemical reagents, such as iron or aluminium salts and activated silica, are used to aggregate the solid particles so as to create a structure that facilitates the absorption of air bubbles.

Various organic polymers can also be used to modify the nature of the air-liquid or solid-liquid interfaces, or both. In general, these compounds act at the interface to produce the desired changes.

The degree of clarification obtained when reagents are added to the wastewater depends on the amount of reagents used, and the care with which the processes are controlled and operated. By chemical precipitation it is possible to remove 80 to 90 per cent of suspended solids, 70 to 80 per cent of BOD5 and 80 to 90 per cent of bacteria. Comparable removal values for properly designed and operated primary sedimentation tanks without addition of reagents are between 50 and 70 per cent for suspended solids, 25 to 40 per cent for BOD5 and 25 to 75 per cent for bacteria.



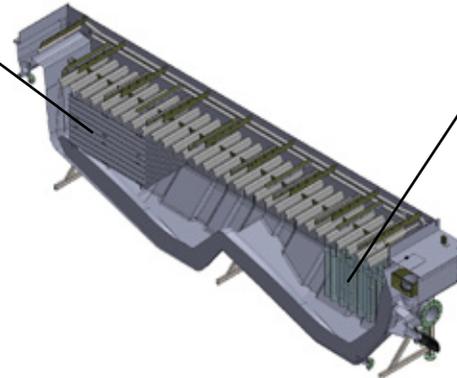
Types of floats

- From 2 m³/h up to 600 m³/h with recirculation.
- Linear scraping system.

MIXED CELL

PART OF THE OPEN AREA

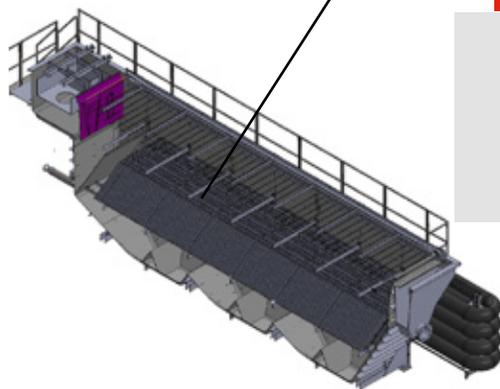
- Removal of 40% to 60% of solids, those of bigger size.



PART OF THE LAMELLAR AREA

- Produces polishing effect, high outlet water quality.
- Protected against outlet overloads.
- Solid, high-strength infused GRP lamella construction, does not collapse. Easy to clean.

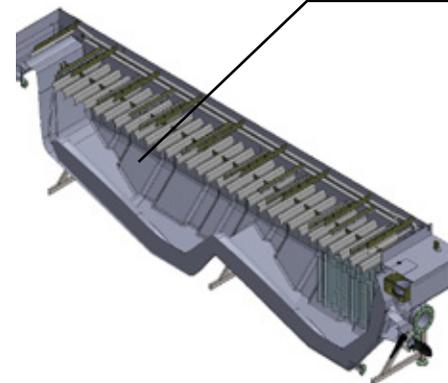
LAMELLAR CELL



DESIGNED TO

- High flow rates.
- Low suspended solids load.
- Countercurrent flow.

CELDA ABIERTA



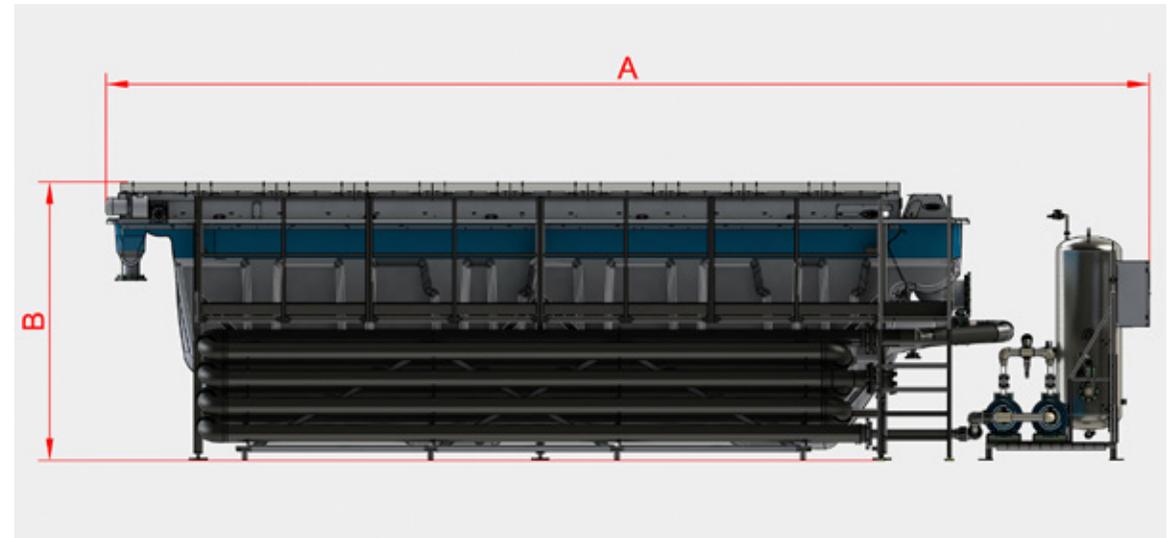
DESIGNED TO

- High solids load.
- Avoid clogging.

FRC | Technical Specifications

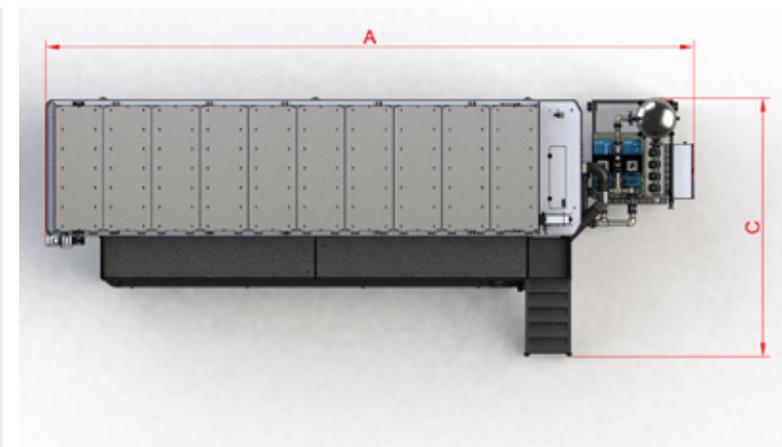
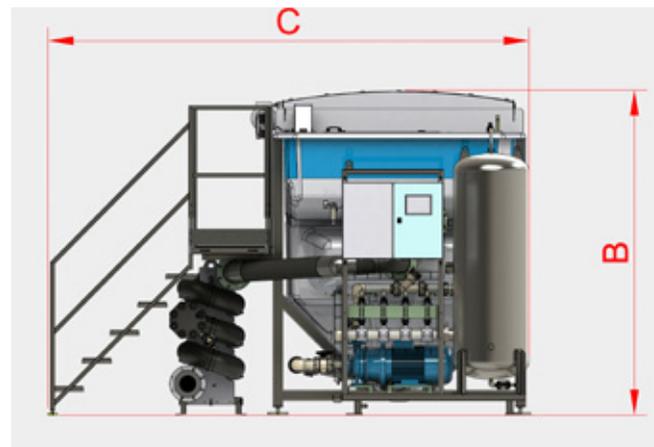
MODEL	FLOW	LENGTH	MAXIMUM HEIGHT	WIDE
		A (mm)	B (mm)	C (mm)
FRC-2	2 m ³ /h	3.222	1.736 + 100	937
FRC-5	5 m ³ /h	3.971	1.725 + 100	923
FRC-10	10 m ³ /h	4.463	2.185 + 100	2.832
FRC-20	20 m ³ /h	6.202	2.270 + 100	2.531
FRC-30	30 m ³ /h	6.632	2.420 + 100	3.799
FRC-60	60 m ³ /h	9.637	2.448 + 100	3.799
FRC-90	90 m ³ /h	12.778	2.448 + 100	3.799

*Dimensions may vary depending on the mounting position of the skid.
 Compressed air pressure will be between 6 and 8 bar for all models.
 The flow rate will depend on temperature, salinity and solids loading.
 The design temperature for the flow rates given in the table is 15-25oC.
 Design salinity up to 5,000 µS.
 Maximum solids loading will depend on float/skid configuration.



ADVANTAGES

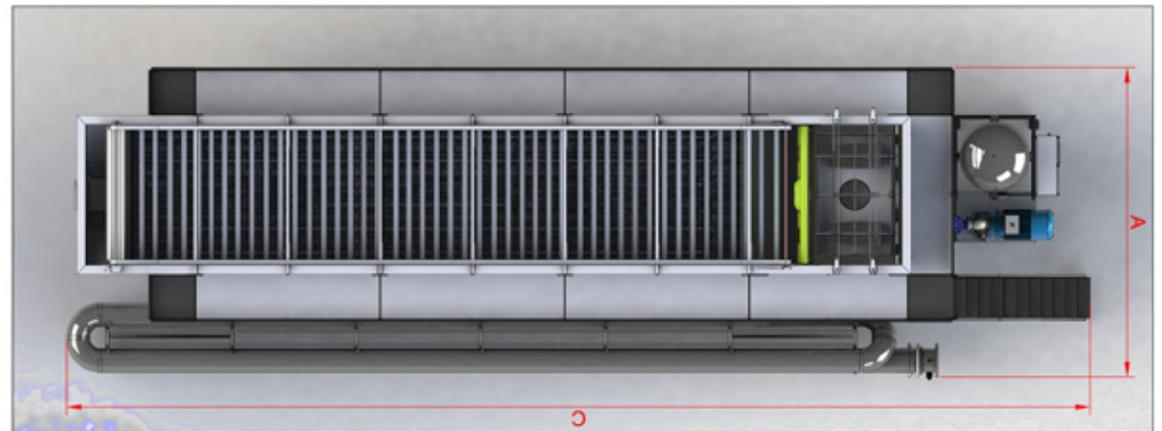
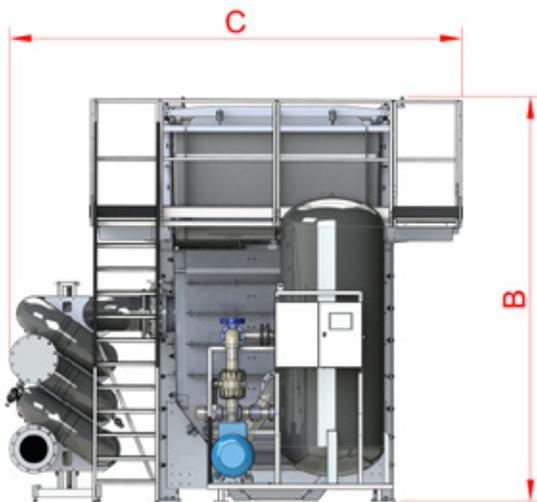
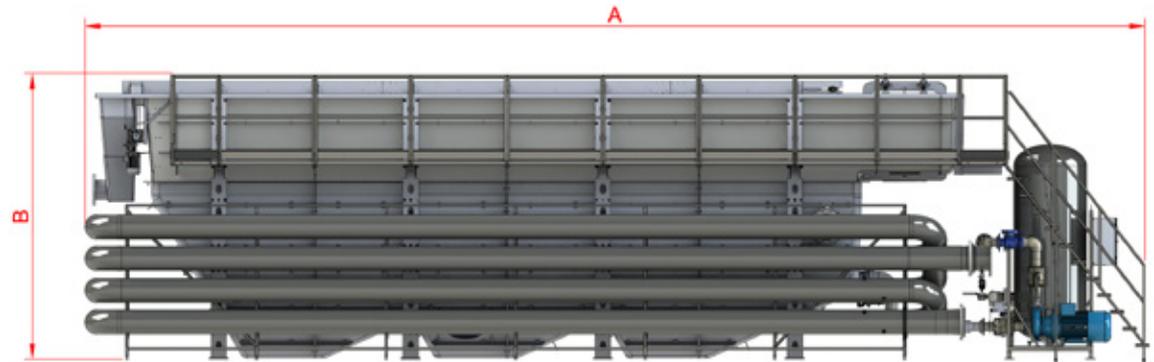
- Good results with large volumes of solids resistant to decantation.
- High floc ascension speed.
- 100% resistant to the corrosive effluents generated.
- Safety system.
- Different installation options depending on the available space.
- Sludge dryness obtained around 6%.



Technical Specifications | FRL

MODEL	FLOW	LENGTH	MAXIMUM HEIGHT	WIDE
		A (mm)	B (mm)	C (mm)
FRL-200	200 m ³ /h	8.827	3.669	4.410
FRL-400	400 m ³ /h	11.365	3.669	4.410
FRL-600	600 m ³ /h	13.930	3.669	4.410

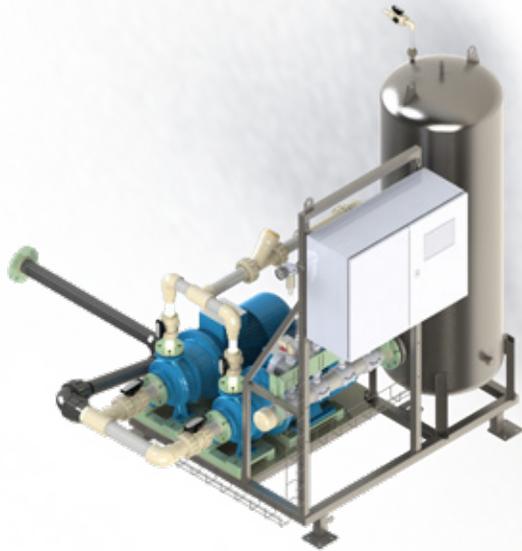
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 Design salinity up to 5.000 µS.
 Maximum solids loading will depend on float/skid configuration.



Customisation

In our factory in Villavaquerín we manufacture different models of floats which, together with the different sizes of flocculators and pressurisation skid, allow us to adapt to the needs of the client depending on the flow and load of solids to be treated.

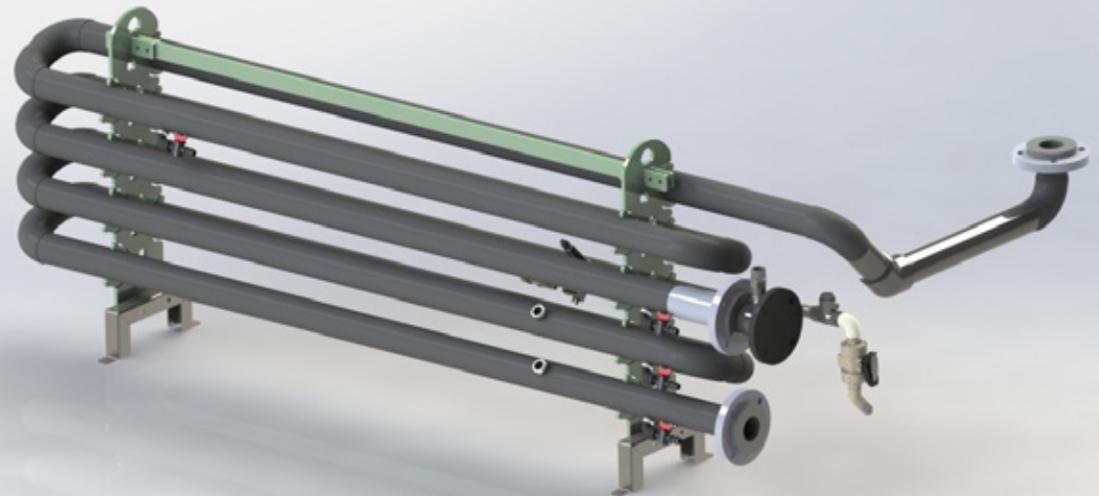
PRESSURIZATION SKID



Formed by pressure vessel, pumps, valves, supports and base in GRP, and structure in AISI 316.

This means that depending on the solids in the water, pressurization can be applied, achieving an optimization of the flotation process.

FLOCCULATOR PIPE



Allows in-line dosing of chemicals into the water. It is composed of PVC, polypropylene, polyethylene or stainless steel tubes, depending on the application.

Toro Equipment offers three sizes of flocculators designed for different float models: FLH standard model, FLH top model and FLH FRL model.

They include: Reagent injection socket, sampling taps to control the amount of chemical injected, GRP and AISI 316 steel support.

EQUIPMENT

● Standard equipment ● Optimal equipment

STRUCTURE

Material AISI-304	●
Material AISI-316	●
Steel in contact with water AISI-316	●
Steel in contact with water Duplex	●
Structure elevation 1m	●

PRESSURIZATION SYSTEMS

Double centrifugal pump (1 in reserve)	●
Compressor	●
Pumpen 316 NO	●

VAT

Cover	●
Cover flanges	●
GRP material	●
Sludge tank	●
Automatic bottom drain	●
Sludge thickening slats	●
Weir lifting system	●

CONTROL PANEL

Pneumatic panel	●
Electric panel	●

SAFETY AND SIGNALLING

Emergency stop	●
Emergency alarm	●

FLOCCULATION TUBE

Injection point reagents, 2 units	●
Polyelectrolyte injection point	●
Sampling taps, 3 units	●
Manufacture in AISI 316 + GRP	●
pH point, pH cleaning kit	●
Cleaning point	●
Foot regulators	●

NOTES:

- Optional equipment is subject to surcharge. Please ask for information and offer.
- Dimensioning for seismic zone, snow load and wind load: please consult the Technical Department.
- Technical development may modify some specifications, see toreequipment.com.

● Cover



● Sludge thickening lamellas



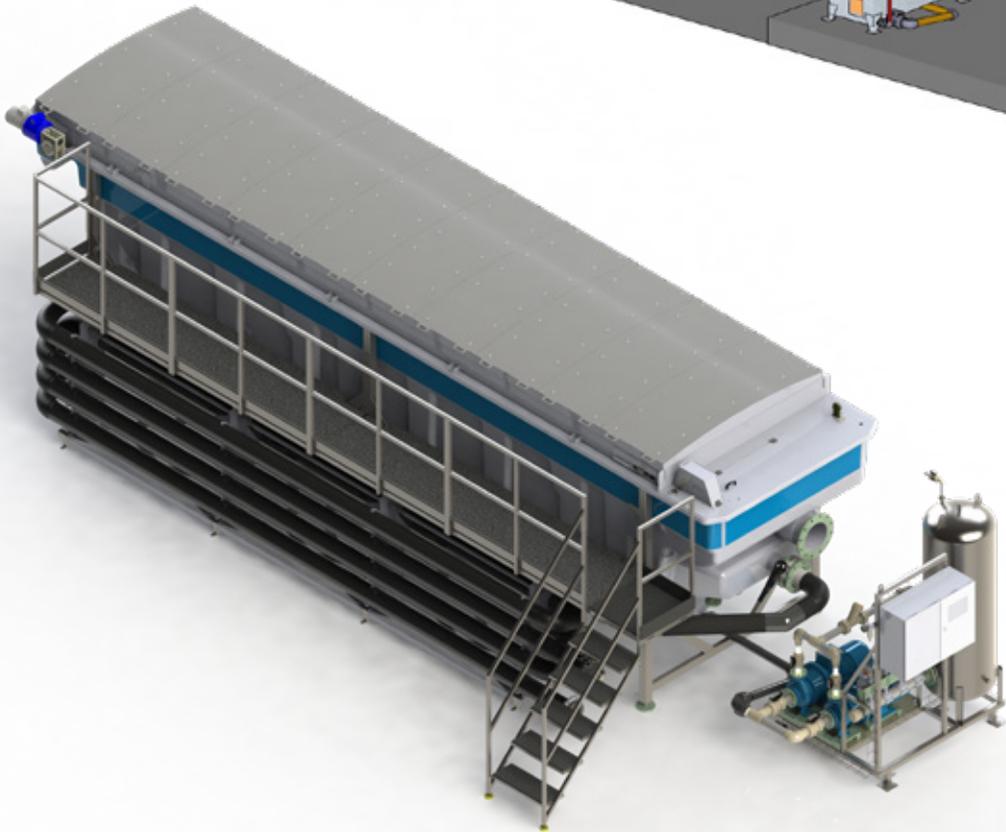
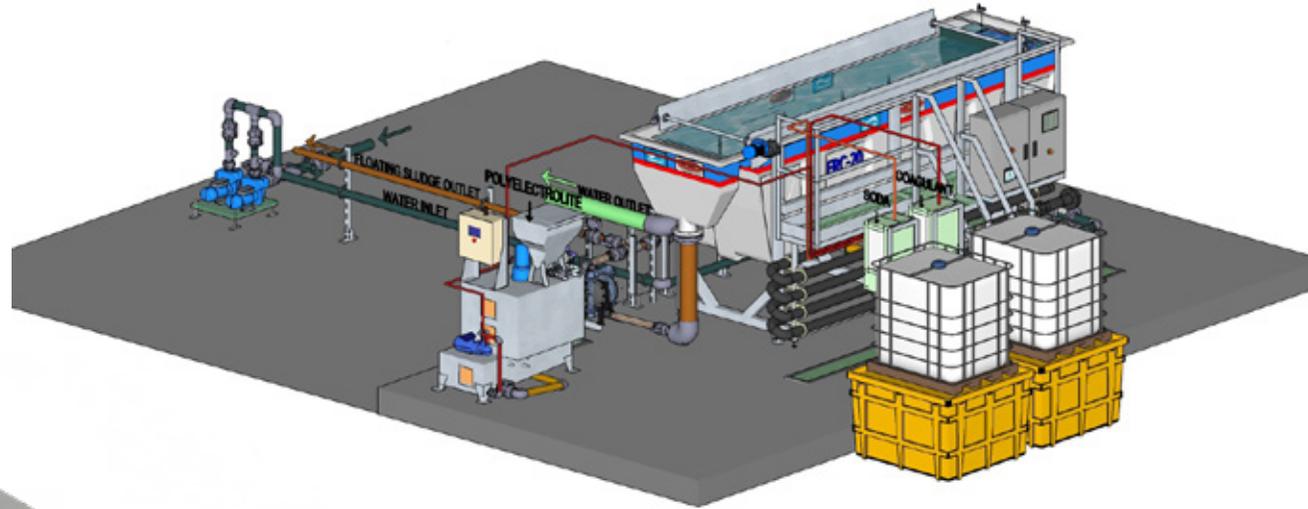
● Weir lifting system



● Emergency stop



Configuration Examples



Select your Dissolved Air Float

FLOATS ADAPTED TO YOUR NEEDS WHAT WE NEED TO KNOW

- Flow rate.
- Application.
- Solids loading.
- Working temperature.
- Working hours.
- Inlet pH.
- Water conductivity.
- Installation of options. E.g.: lid or compressor.





Factory Villavaquerín - Valladolid

WORLD REFERENCES

- Algeria
- Argentina
- Australia
- Austria
- Belgium
- Brazil
- Bulgaria
- Canada
- Chile
- China
- Colombia
- Costa Rica
- Croatia
- Dominican Republic
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