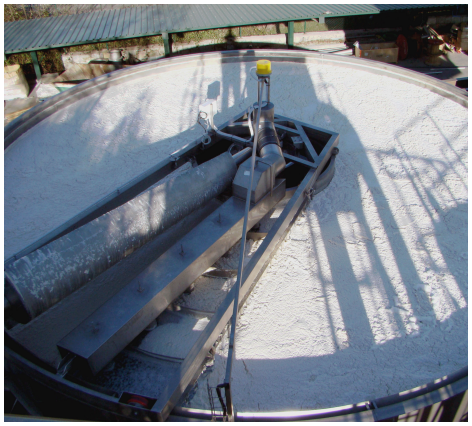
AIR FLOTATORS RAF

Dissolved Air Flotation System

MACHINE DESCRIPTION

R.E.M. produce a wide range of flotators which consists of a compartment for expansion and flocculation, set up for receiving simultaneously the wastes to be treated as well as the water enriched with dissolved air coming in from a pressurization system. The unit is about sludge treatment which comes from waste waters; the range refers to: **DISSOLVED AIR FLOTATOR - MODEL RAF**.
The series of flotators are of the circular type with low hydraulic head with peripheral traction rotary bridge. The most important feature of the flotator is the supply and distribution system. It consists of a compartment for expansion and flocculation, set up for receiving simultaneously the wastes to be treated as well as the water enriched with dissolved air coming in from the pressurization system. It also includes a flow distribution system capable of compensating the speed of the incoming waste and providing the ideal hydraulic conditions according to the **STOKES law - low speed of wastes, laminar motion - Uniform distribution**.
Before explaining all the points regarding the working of this series of flotators in detail, the theoretical considerations concerning the description of the flotator and flotation are given below.



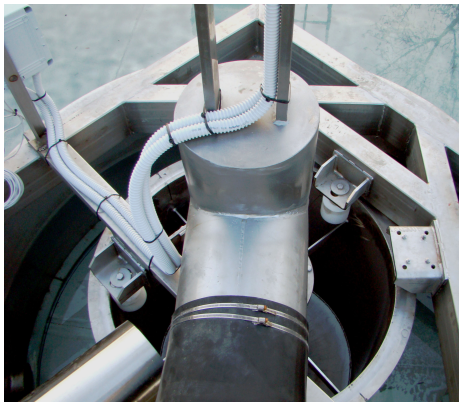
WORKING LOGIC FOR DISSOLVED AIR FLOTATION SYSTEM RAF

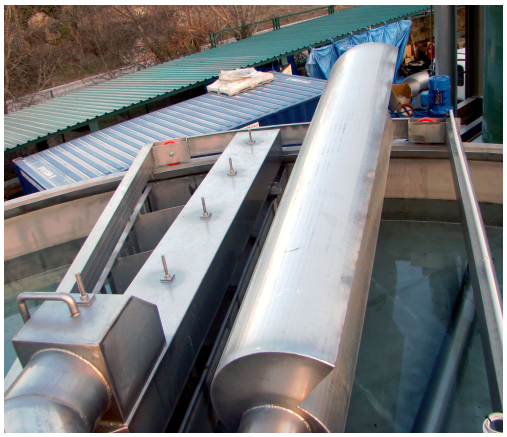
Flotation is the process which allows separation of solid impurities from the water by transferring these to the surface. Suspended particles are removed from the liquid phase (which is usually water) by introducing a gaseous phase (usually air) in the suspension. Because of the different physical/chemical characteristics of their surfaces, the solid particles bind together with the gaseous bubbles surrounding themselves.
The particles that tend to remain in the air and thereby not get wetted by water are referred to as aerophylic or lyophobic; those that tend to get wetted with water are hydrophylic or lyophylic. While the process of hydraulic classification is essentially based on the difference in specific weight of the solids treated, this difference is not a determining factor in flotation.

Separation takes place because of the forces acting (adsorption and surface tension) to overcome gravity. Simultaneously with air a surfactant substance can be introduced into the liquid, so that increasing the surface tension of the liquid will allow the air bubbles to become persistent and form foam.

The aerophylic solid thus adheres to the bubbles and floats on the suspension while the hydrophylic solid sinks to the bottom. Separation is obtained by removing the foam from the surface and the sludge from the bottom. To understand the theoretical basis of the flotation process, let us consider the state of a solid particle (or granule) resting on the free surface of a liquid.
Both force of gravity and surface tension of the supporting liquid act on this granule. Because of the effect of the force of gravity, the particle will tend to get immersed in the liquid while the surface tension makes the free liquid surface behave like a stretched membrane preventing the phenomenon of immersion. In this situation two events are possible:
1. the gravity is in agreement.
2. in disagreement with the surface tension, respectively.

In the first case, the granule of treated material will not get wet and will cause the liquid to assume a concave shape at the relative point of contact. In the second case the granule will get wet and the liquid will assume a convex shape at the point of contact with the particle.
Depending on which of the two events takes place, the materials can be differentiated as described earlier:
- AEROPHYLIC, THOSE THAT TEND TO STAY IN THE AIR AND NOT BE WETTED BY WATER.
- HYDROPHYLIC, THOSE THAT GET WETTED BY WATER.





PRINCIPLE OF THE AIR DISSOLUTION SYSTEM RAF

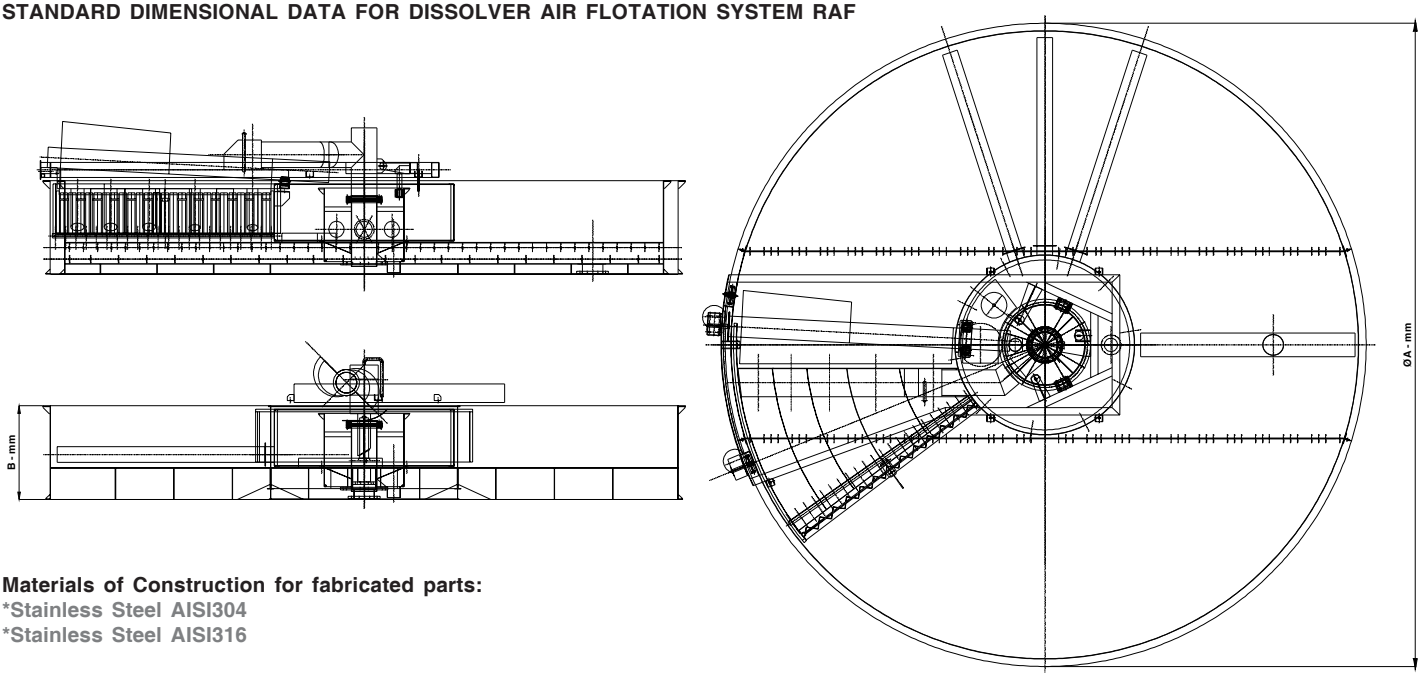
Flotation system removes the solid impurities contained in the water by transferring these to the surface, thanks to the tiny air bubbles which anchor themselves to the particles (or floc) dragging them to the surface. The air bubbles are formed by the following mechanism:

1. **THE AIR COMING FROM THE PRESSURE REDUCER AT 4.5 BAR IS ADDED TO WATER, IN A CONTROLLED QUANTITY IN THE PRESSURIZATION CELL.**
2. **THE WATER IS PRESSURIZED AT A PRESSURE OF 4 BAR BY MEANS OF THE PRESSURIZATION PUMP.**
3. **THE WATER REMAINS PRESSURIZED FOR ABOUT 20 SECONDS IN THE PRESSURIZATION CELL SO THAT THE AIR AT THAT PRESSURE IS DISPERSED IN THE WATER.**
4. **AFTER THIS TREATMENT, THE WATER CONTAINING DISPERSED AIR, IS MADE TO PASS THROUGH AN ACTIVATE FLOW VALVE OPERATED IN SUCH A MANNER AS TO RELEASE THE PRESSURE: AT THIS POINT THE WATER CAN NO LONGER RETAIN THE EXCESS AIR THAT WAS ABSORBED, AND THUS RELEASES TINY AIR BUBBLES WHICH IMMEDIATELY SPREAD THROUGH THE LIQUID.**

The main advantages are:
1. **Very high suspended and dissolved solids removal efficiency.**
2. **Easy maintenance and cleaning.**
3. **Elimination of short-circuiting flow.**
4. **Reduced polymer consumption**

RAF Dissolved air flotators are mostly used for:
1. **Dairies.**
2. **Slaughterhouses**
3. **Petroleum applications**
4. **Waste streams with high grease concentration.**

STANDARD DIMENSIONAL DATA FOR DISSOLVER AIR FLOTATION SYSTEM RAF



Materials of Construction for fabricated parts:
*Stainless Steel AISI304
*Stainless Steel AISI316

RAF MODELS	RAF20	RAF25	RAF30	RAF40	RAF50	RAF67	RAF80	RAF100
ØA DIAMETER - m	2.0	2.5	3.0	4.0	5.0	6.7	8	10
B TANK HEIGHT - m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
FLOWRATE - m^3/h	18	28	42	75	120	210	300	470

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