



TREELIUM

# T-WairO<sub>2</sub>



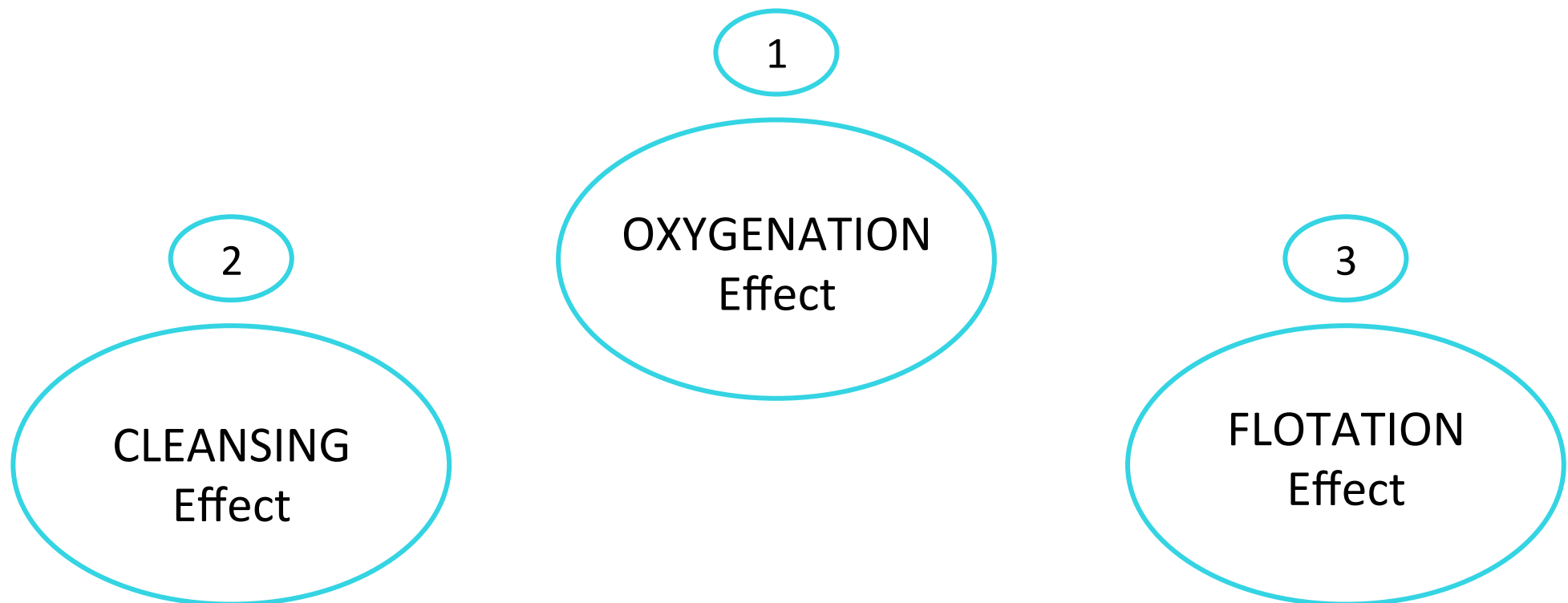


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**T-WairO<sub>2</sub>** is a generator of micro and nano bubbles which works on the principle of cavitation, suitable for civil and industrial applications, able to improve the oxygenation of water, increasing its cleansing and flotation capacity.

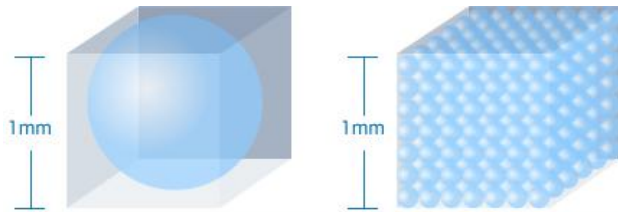




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## MICRO AND NANO BUBBLES WHAT ARE THEY?

Micro nano bubbles are air bubbles that have a size of less than 50  $\mu\text{m}$ . Their generation occurs with the physical principle of cavitation that allows the size reduction of normal air bubbles up to dimensions that modify the fluid's properties, giving it characteristics that are quite different compared to its original form.



The main characteristics that define the micro and nano bubbles are:

- Size from 50 to 0.1  $\mu\text{m}$ .
- Slow ascent in a liquid.
- High gas-liquid exchange surface.
- Negatively charged surface.

Thanks to the above mentioned characteristics the micro and nano air bubbles have a high stability in the liquid, allowing them a greater permanence time and a dissolution which completely takes place in the water and not on the liquid-air interface.

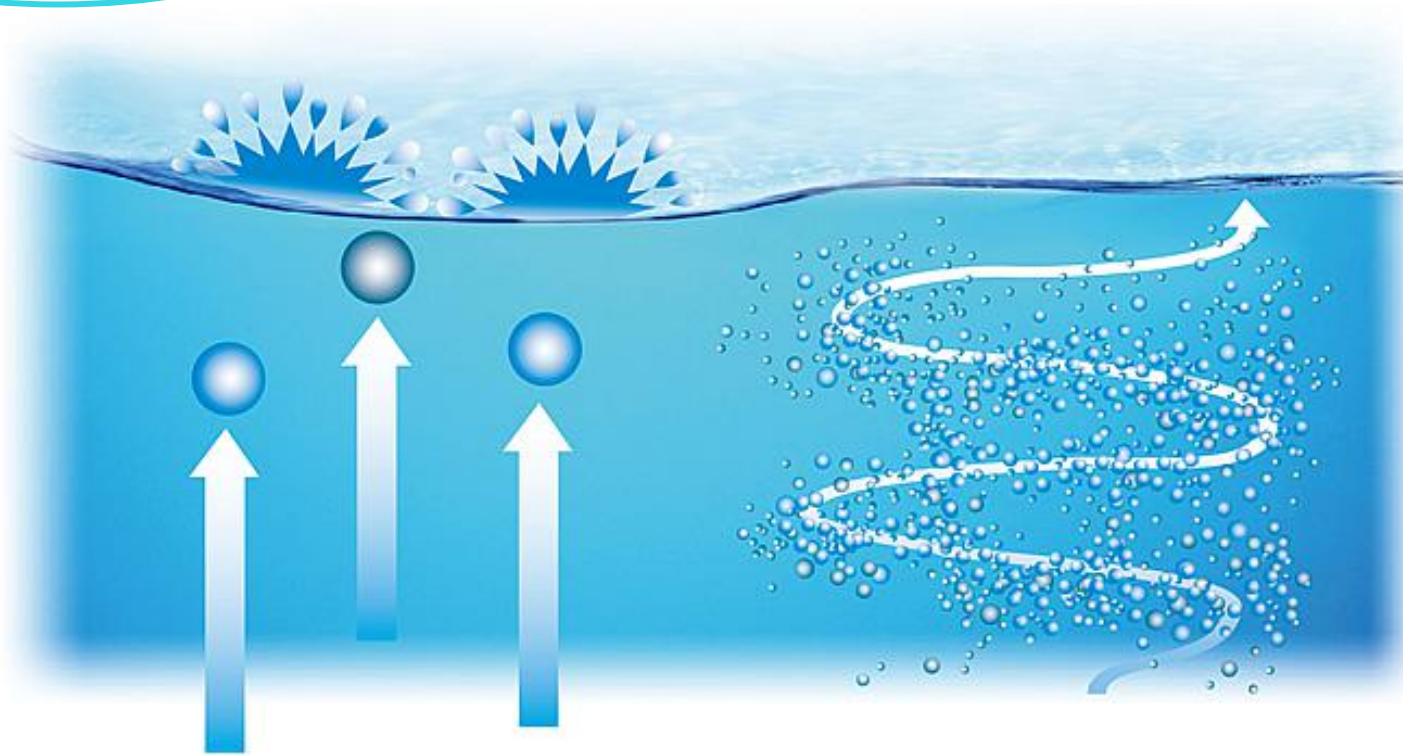
These properties have already been exploited for several years in Industrial, Agricultural, Fishing and Medical sectors. Scientific research has further progressed in recent times providing devices that guarantee great improvements in skin care and well-being of people with the use of micro nano bubbles.



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## MICRO AND NANO BUBBLES WHAT ARE THEY?

Micro and nano air bubbles, because of their size and negative surface charge, do not coalesce and they dissolve in water instead of degasifying of the liquid's surface.



Ascent rate: 25 cm / s

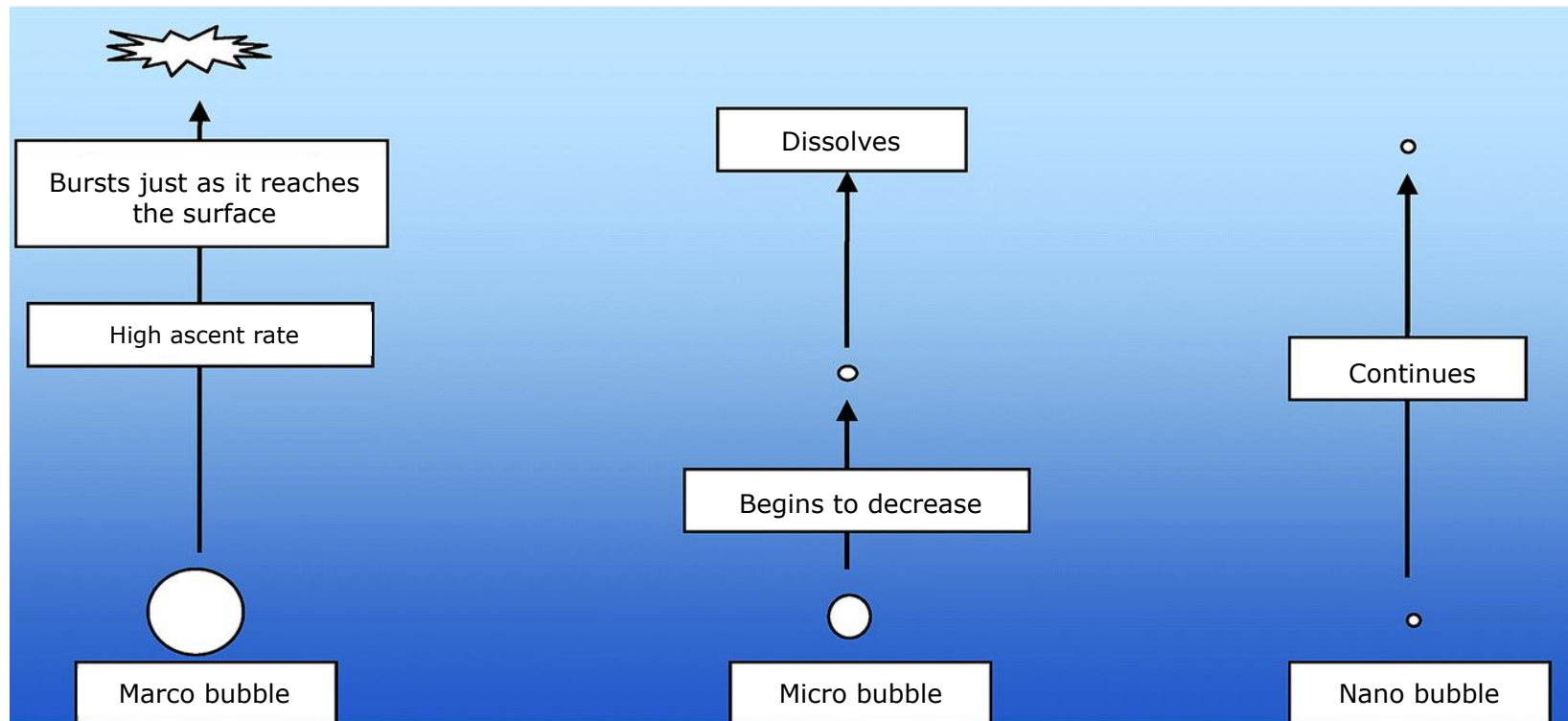
Ascent rate: 0.1 cm / s



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## MICRO AND NANO BUBBLES WHAT ARE THEY?

The image below defines the behavior of micro and nano bubbles in water compared to normal macro bubbles; the difference is linked to the fact that the macro bubbles burst once they reach the surface while the micro and nano bubbles remain present in the liquid, dissolving themselves in it. Nano bubbles do not reduce their size and may remain as such for a long time before dissolving.



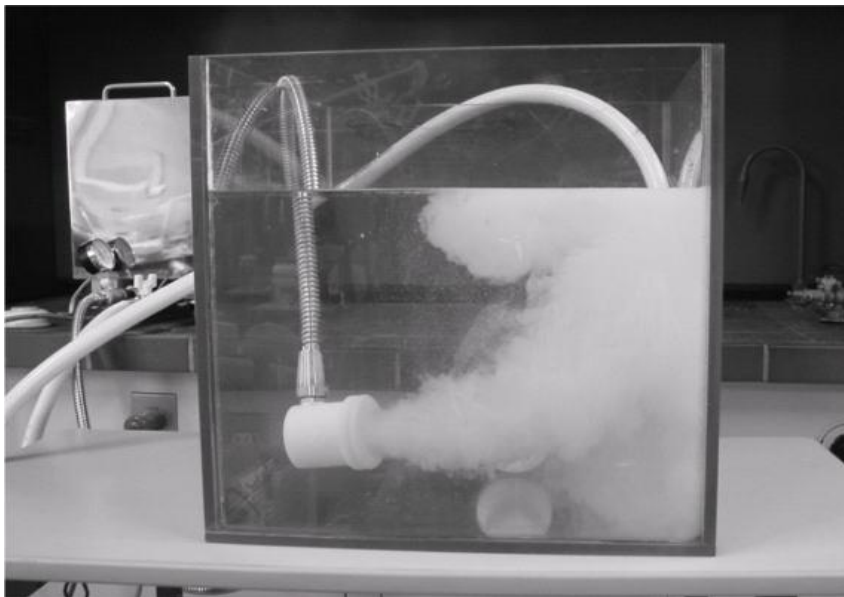


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## OXYGENATION Effect

### Oxygenation effect

The dissolution of the micro and nano bubbles takes place completely in the liquid and not on the surface, thus allowing a greater efficiency of the gas-liquid solution and above all maintaining an oxygen supply in the water for a long time.



The oxygenation efficiency (and in general the gas-liquid solubility) makes this technology particularly effective in all applications where a high oxygenation of water is necessary, like :

- Oxygenation of ponds
- Fish farming and aquariums
- Active mud tanks
- Oxygen and ozone treatments

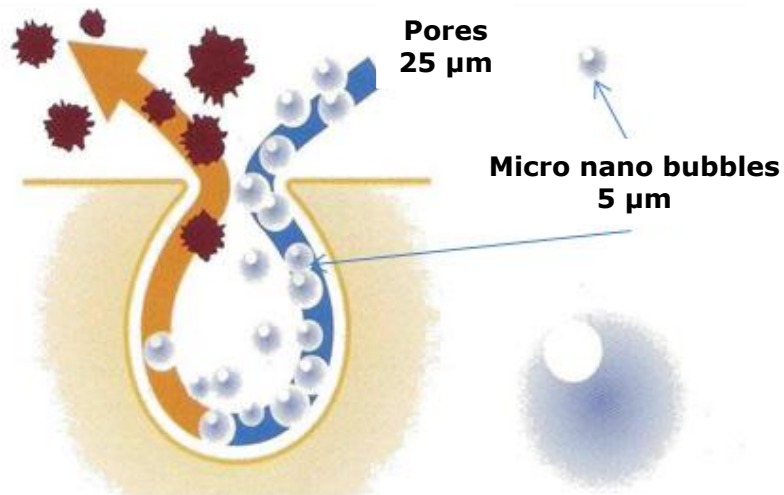


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## CLEANSING Effect

### Cleansing effect

The reduced size and negative surface charge of the bubbles allows them to penetrate the small pores and to bond with the greases; this phenomenon causes the micro and nano bubbles to have a cleansing effect that can, in some cases, completely eliminate the use of soaps



The cleansing effect makes the micro nano bubbles particularly suitable in all the civil and industrial cleaning operations but also in personal care and pet care.

**Removal of grease from the pores with the use of  
micro and nano bubbles**



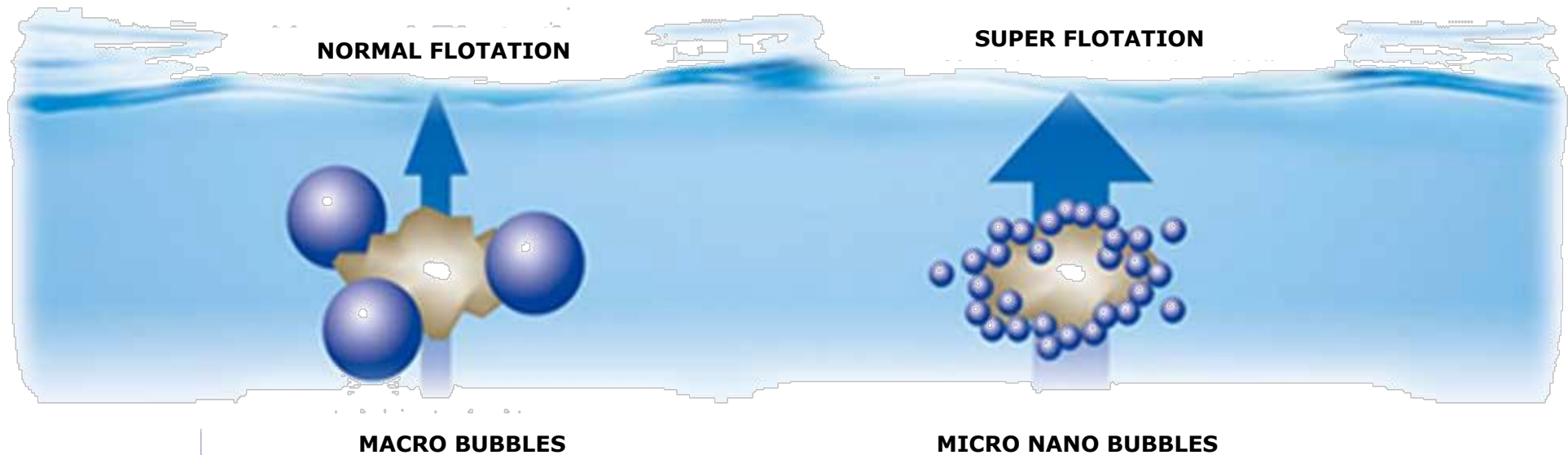


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## FLOTATION Effect

### Flotation effect

When the micro-nano bubbles coordinate with greases, thanks to their negative surface charge, they generate a light grease-air complex that tends to rise quickly to the surface. This makes the micro and nano bubbles particularly useful in all those cases where it is necessary to separate water from organic substances such as oils.





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## ANALYTICAL DATA

Two parameters were analyzed in a laboratory:

- Water oxygenation: evaluation of the amount of dissolved oxygen (expressed as % of saturation) in a comparison between mains water and water passed through the micro-nano bubble generator.
- Cleansing Effect: evaluation of the residual oil on a metal plate (on which a known amount of oil was placed ) after immersion in normal water and in water with micro and nano bubbles.

### Oxygenation

Sample	% O2 compared to saturation
Mains water	40.5 %
Water after T-WairO2	70.5 %

### Cleansing

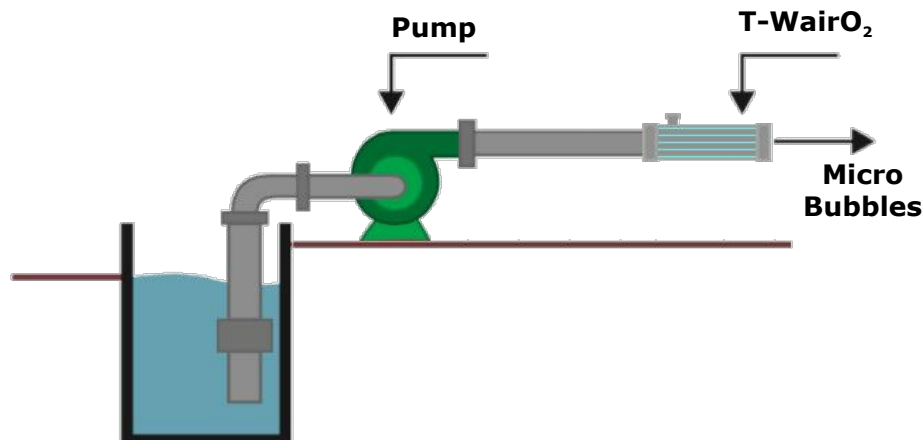
Sample	Amnt. of residual Oil
Mains water	81.14 mg/kg
Water after T-WairO2	69.78 mg/kg



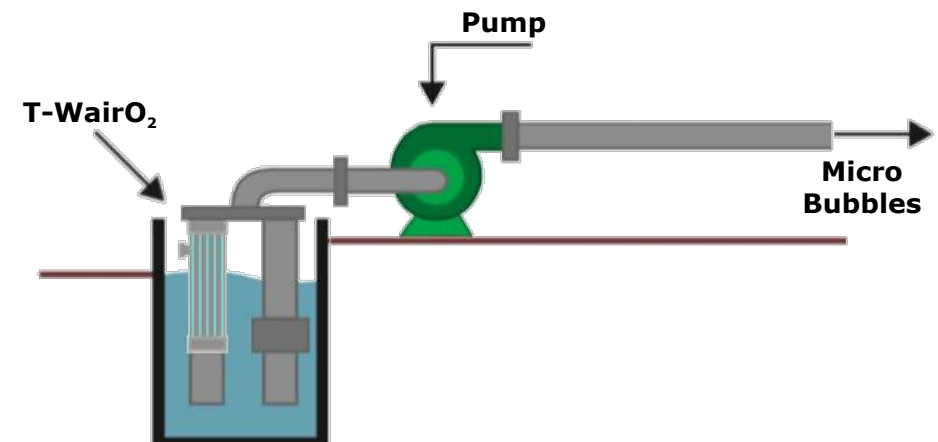
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## INSTALLATION AND MAINTENANCE

T-WairO<sub>2</sub> is generally inserted on the discharge side of the pump. In some cases it may be mounted on the intake side if inserted on a double dip-tube. the first with the microbubble generator and the second one free.



Mounting on the discharge side of the pump



Mounting on the intake side of the pump

It requires no regular maintenance nor replacement of parts.  
Before starting the system you need to adjust the amount of air drawn into the micro nano bubble generator.



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## T-WairO<sub>2</sub> DEVICES

Type	L (mm)	D (mm)	G (inches)	Water flow (l/min)	Max air flow (l/min)
<b>TW 1/2"</b>	150	30	1/2	40	12
<b>TW 1"</b>	270	52	1	80	28
<b>TW 1 1/2"</b>	400	62	1 1/2	180	50

All T-WairO<sub>2</sub> devices are made entirely of AISI 304 or 316 Stainless Steel



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## KEY BENEFITS T-WairO<sub>2</sub>

### OXYGENATION

- High permanence of bubbles and their complete dissolution in the liquid.
- High capacity in creating gas-liquid mixtures.
- Easily adaptable to all processes that require efficient oxygenation

### CLEANSING EFFECT

- High coordination capacity with non-polar substances.
- High capacity of penetrating micro pores ensuring high degreasing capacity.
- Possibility of washing without the use of detergents and soaps.

### FLOTATION

- Ability to create light complexes with greases.
- High speed water separation from organic substances.
- Easy adaptation to existing flotation systems.



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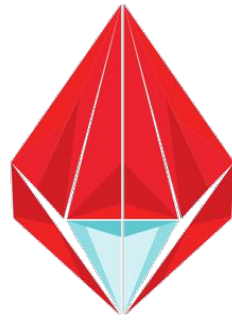
T-WairO<sub>2</sub> s a product patented by TREELIUM SA and certified by internationally accredited laboratories.



TREELIUM continues to invest in Research & Development both in terms of human and economic resources to find new areas of application for existing products and develop new ones for the future.

Our mission is to increase productivity by optimizing processes, reducing consumption and protecting the environment.

TREELIUM is on the market as an ideal partner for the supply of systems and applications in a global market where continuous technological innovation is the basis for sustainable economic development.



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"*Oxygen* ... an essential element for air and water ... when mixed creates life"

