



Ultraviolet Light for Water Treatment Disinfection and Oxidation

Water is necessary for life. The need for clean water continues to grow worldwide. And only a small fraction of fresh water can be supplied as drinking water. Today, almost half a billion people live in countries where water is scarce. And up till the year 2050 there will be a recurring everyday water shortage for at least a quarter of the world's population.

Contaminated water can be treated with high energy UV radiation without the addition of chemicals such as chlorine or ozone. Consequently, special UV lamps destroy not only micro-organisms such as bacteria, viruses, parasites or fungi but also break down any chemicals which are detrimental to health. Even chlorine-resistant pathogens, such as cryptosporidium can be inactivated with UV light.

Advantages of Heraeus UV-light

- No detrimental taste or smell
- No addition of chemicals
- No environmental impact
- Short radiation time
- Effective against chlorine-resistant pathogens
- Easy to use
- Low maintenance
- Very low operating costs

UV disinfection and oxidation are two proceedings to treat water.

UV Lamps for Industrial Water Treatment

- **Process water:** Industry requires clean, disinfected water for many purposes – such as rinsing and cleaning processes and production processes in the food and beverage industry and in the cosmetics-, chemistry- and automobile industries, where water is recycled and re-used.
- **Air cleaning:** Water is disinfected in air conditioning systems and humidifiers. No biocides are released into the air.
- **Aquaculture:** Water can be treated to allow the controlled farming of fish, mussels, crabs and plants in flowing or still water. This protects the farming of external environmental influences and also saves water.
- **Agriculture:** Farming uses a lot of water in greenhouses and growing frames. Pathogens can easily be formed in the irrigation water in such enclosed water circuits. If this water is re-used, the pathogens can be spread throughout the irrigation system, with detrimental effect on plant growth and on the health of personnel. Disinfection ensures a good harvest.
- **Ballast water:** As international shipping traffic expands, site-directed organisms are regularly taken in by ballast water and then introduced into different ecosystems. These organisms can be destroyed by on-board UV disinfection.



- **Injection water for oil extraction:** Water is treated and re-used on oil production platforms.

■ Activated oxidation (UV + H₂O₂; UV + O₃):

Various advanced oxidation processes can be combined with UV disinfection. For example, the chloramine loading of public swimming baths can be significantly reduced or high purity water can be produced for processes in the semiconductor industry and the optical industry.

- TOC (Total Organic Carbon) reduction
- COD (Chemical Oxygen Demand): destruction of organic contamination in water
- Direct water photolysis (such as NDMA)

Domestic Water Treatment Applications

- **Grey water:** Lightly loaded wastewater such as shower water can be re-treated in hotels and sports centres and used for lower value applications such as irrigation.
- **Drinking water systems for private households:** Decentralised drinking water treatment is gaining popularity in areas which are difficult to access. In these situations, UV disinfection can destroy Legionella in the private or public hot water supply, for example for swimming baths.
- **Other applications for domestic water treatment are:** aquaria, fish ponds, swimming pools.

UV Lamps for Municipal Water Treatment

- **Drinking water:** A hygienic and safe drinking water supply is an important factor in ensuring health and avoiding disease. Drinking water can be disinfected and treated with UV light without the addition of supplemental chemicals. There is no effect on the taste, smell or pH value of the water. And the special advantage: pathogens cannot build to resistance to UV light.
- **Wastewater:** Municipal wastewater must be treated and disinfected before it is re-introduced into the water cycle. This is necessary to protect rivers, lakes and coastal waters and hence to protect public health.