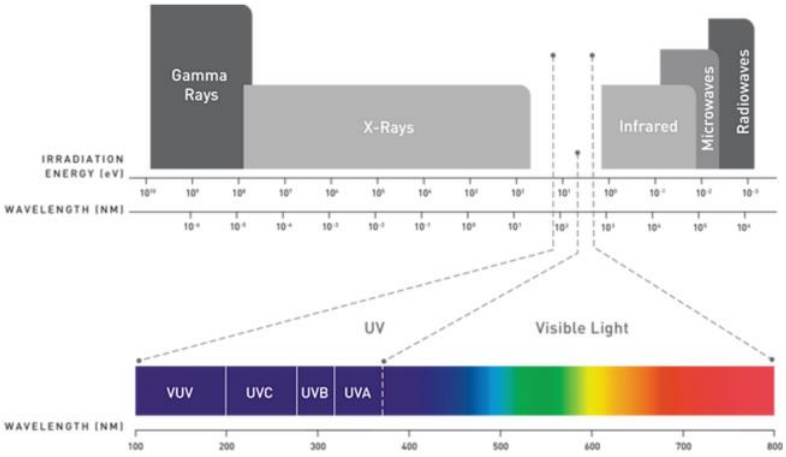
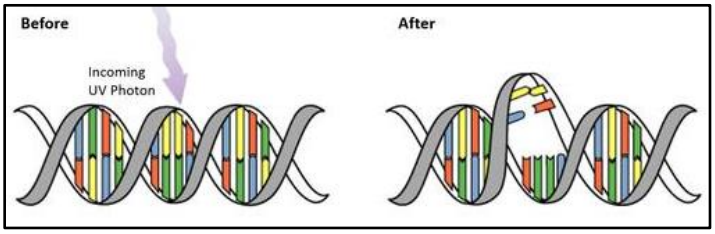
What is Ultraviolet (UV) Disinfection and Does it Work

UV light disinfection is a simple process that efficiently eliminates microorganisms. UV light represents wavelengths that fall between visible light and x-ray on the electromagnetic spectrum. The UV-C portion represents wavelengths between 200 nm and 280 nm.





UV-C photons travel through water to penetrate organic cells and damage their nucleic acid, rendering them microbiologically dead and incapable of reproduction.

UV disinfection technology has been the most rapidly growing disinfection technology globally for the past 20 years. It is generally considered more effective than filtration or chemical treatment methods and is the chosen technology for an increasing number of private and public drinking water sources.

Bacteria, viruses, and spores can all be inactivated with UV technology. The amount of UV-C light required to kill a pathogen is referred to as its UV Dose. UV Dose is a function of a microorganism's exposure time and the intensity of the UV light it is being exposed to and is expressed as follows:

UV Dose (mJ/cm^2) = UV Intensity (mW/cm^2) x Retention Time (secs)

Retention Time (secs) = Reactor Volume (cm^3) / Flow Rate (cm^2/sec)

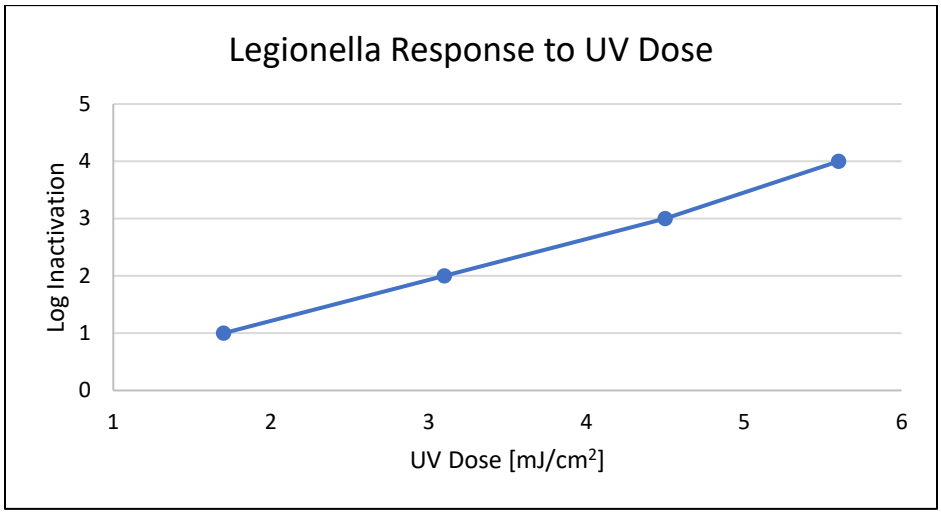
Every pathogen (bacteria, virus or spore) has a unique sensitivity to UV Intensity and, therefore, each has a specific UV Dose requirement. A UV Dose of $40mJ/cm^2$ will reduce the majority of microorganisms by 99.99% and is the standard Dose value specified in most food grade UV disinfection systems.

UV Dose generated by the system and expressed as a 'log reduction.' Each log reduction indicates a higher level of inactivation.

- 1 log reduction = 90%
- 2 log reduction = 99%
- 3 log reduction = 99.9%
- 4 log reduction = 99.99%

Target Pathogen UV Dose Determination

The table below shows the UV Dose required for up to a 4 log reduction of Legionella, based on existing research literature.



Source: Cervero-Arago et al. 2014