

Ultra Polylok UV Micro-Organism Destruction Levels

Ultraviolet energy at 253.7 nm wavelength required for 99.9% destruction of various micro-organisms (measured in mJ/cm²). For equivalent figures in μWS/cm² [microwatt seconds/cm²], multiply by 1000.

UV Dosages for 99.9% Inactivation			
(corroborated by a number of different sources – see end of table for references).			
Bacteria	UV Dose	Bacteria	UV Dose
<i>Agrobacterium lumentorum</i> 5	8.5	<i>Pseudomonas aeruginosa</i> (Environ. Strain) 1,2,3,4,5,9	10.5
<i>Bacillus anthracis</i> 1,4,5,7,9 (anthrax veg.)	8.7	<i>Pseudomonas aeruginosa</i> (Lab. Strain) 5,7	3.9
<i>Bacillus anthracis</i> Spores (anthrax spores)	46.2	<i>Pseudomonas fluorescens</i> 4,9	6.6
<i>Bacillus megatherium</i> Sp. (veg) 4,5,9	2.5	<i>Rhodospirillum rubrum</i> 5	6.2
<i>Bacillus megatherium</i> Sp. (spores) 4,9	5.2	<i>Salmonella enteritidis</i> 3,4,5,9	7.6
<i>Bacillus paratyphosus</i> 4,9	6.1	<i>Salmonella paratyphi</i> (Enteric Fever) 5,7	6.1
<i>Bacillus subtilis</i> 3,4,5,6,9	11.0	<i>Salmonella</i> Species 4,7,9	15.2
<i>Bacillus subtilis</i> Spores 2,3,4,6,9	22.0	<i>Salmonella typhimurium</i> 4,5,9	15.2
<i>Clostridium tetani</i>	23.1	<i>Salmonella typhi</i> (Typhoid Fever) 7	7.0
<i>Clostridium botulinum</i>	11.2	<i>Salmonella</i>	10.5
<i>Corynebacterium diphtheriae</i> 1,4,5,7,8,9	6.5	<i>Sarcina lutea</i> 1,4,5,6,9	26.4
<i>Dysentery bacilli</i> 3,4,7,9	4.2	<i>Serratia marcescens</i> 1,4,6,9	6.16
<i>Eberthella typhosa</i> 1,4,9	4.1	<i>Shigella dysenteriae</i> - Dysentery 1,5,7,9	4.2
<i>Escherichia coli</i> 1,2,3,4,9	6.6	<i>Shigella flexneri</i> - Dysentery 5,7	3.4
<i>Legionella bozemanii</i> 5	3.5	<i>Shigella paradysenteriae</i> 4,9	3.4
<i>Legionella gormanii</i> 5	4.9	<i>Spirillum rubrum</i> 1,4,6,9	6.16
<i>Legionella micdadei</i> 5	3.1	<i>Staphylococcus albus</i> 1,6,9	5.72
<i>Legionella longbeachae</i> 5	2.9	<i>Staphylococcus aureus</i> 3,4,6,9	6.6
<i>Legionella pneumophila</i> (Legionnaire's Disease)	12.3	<i>Staphylococcus epidermidis</i> 5,7	5.8
<i>Leptospira canicola</i> -Infectious Jaundice 1,9	6.0	<i>Streptococcus faecalis</i> 5,7,8	10.0
<i>Leptospira interrogans</i> 1,5,9	6.0	<i>Streptococcus hemolyticus</i> 1,3,4,5,6,9	5.5
<i>Listeria monocytogenes</i>	12.0	<i>Streptococcus lactis</i> 1,3,4,5,6	8.8
<i>Micrococcus candidus</i> 4,9	12.3	<i>Streptococcus pyogenes</i>	4.2
<i>Micrococcus sphaeroides</i> 1,4,6,9	15.4	<i>Streptococcus salivarius</i>	4.2
<i>Mycobacterium tuberculosis</i> 1,3,4,5,7,8,9	10.0	<i>Streptococcus viridans</i> 3,4,5,9	3.8
<i>Neisseria catarrhalis</i> 1,4,5,9	8.5	<i>Vibrio comma</i> (Cholera) 3,7	6.5
<i>Phytomonas tumefaciens</i> 1,4,9	8.5	<i>Vibrio cholerae</i> 1,5,8,9	6.5
<i>Proteus vulgaris</i> 1,4,5,9	6.6		

Moulds	UV Dose	Moulds	UV Dose
<i>Aspergillus amstelodami</i>	77.0	<i>Oospora lactis</i> 1,3,4,6,9	11.0
<i>Aspergillus flavus</i> 1,4,5,6,9	99.0	<i>Penicillium chrysogenum</i>	56.0
<i>Aspergillus glaucus</i> 4,5,6,9	88.0	<i>Penicillium digitatum</i> 4,5,6,9	88.0
<i>Aspergillus niger</i> (bread mould) 2,3,4,5,6,9	330.0	<i>Penicillium expansum</i> 1,4,5,6,9	22.0
<i>Mucor mucedo</i>	77.0	<i>Penicillium roqueforti</i> 1,2,3,4,5,6	26.4
<i>Mucor racemosus</i> (A & B) 1,3,4,6,9	35.2	<i>Rhizopus nigricans</i> (cheese mould) 3,4,5,6,9	220.0
Protozoa			
Protozoa	UV Dose	Protozoa	UV Dose
<i>Cryptosporidium parvum</i>	< 10.0	<i>Giardia lamblia</i>	< 20.0
<i>Chlorella vulgaris</i> (algae) 1,2,3,4,5,9	22.0	Nematode Eggs 6	40.0
Blue-green Algae	420.0	<i>Paramecium</i> 1,2,3,4,5,6,9	200.0
<i>E. hystolytica</i>	84.0		
Virus			
Virus	UV Dose	Virus	UV Dose
Adeno Virus Type III 3	4.5	Influenza 1,2,3,4,5,7,9	6.6
Bacteriophage 1,3,4,5,6,9	6.6	Rotavirus 5	24.0
Coxsackie	6.3	Tobacco Mosaic 2,4,5,6,9	440.0
Infectious Hepatitis 1,5,7,9	8.0		
Yeasts			
Yeasts	UV Dose	Yeasts	UV Dose
Baker's Yeast 1,3,4,5,6,7,9	8.8	<i>Saccharomyces cerevisiae</i> 4,6,9	13.2
Brewer's Yeast 1,2,3,4,5,6,9	6.6	<i>Saccharomyces ellipsoideus</i> 4,5,6,9	13.2
Common Yeast Cake 1,4,5,6,9	13.2	<i>Saccharomyces sp.</i> 2,3,4,5,6,9	17.6
References			
<ol style="list-style-type: none"> "The Use of Ultraviolet Light for Microbial Control", Ultrapure Water, April 1989. William V. Collentro, "Treatment of Water with Ultraviolet Light - Part I", Ultrapure Water, July/August 1986. James E. Cruver, Ph.D., "Spotlight on Ultraviolet Disinfection", Water Technology, June 1984. Dr. Robert W. Legan, "Alternative Disinfection Methods-A Comparison of UV and Ozone", Industrial Water Engineering, Mar/Apr 1982. Unknown Rudolph Nagy, Research Report BL-R-6-1059-3023-1, Westinghouse Electric Corporation. Myron Lupal, "UV Offers Reliable Disinfection", Water Conditioning & Purification, November 1993. John Treij, "Ultraviolet Technology", Water Conditioning & Purification, December 1995. Bak Srikanth, "The Basic Benefits of Ultraviolet Technology", Water Conditioning & Purification, December 1995 			

UV Dosage and Dosage:Kill Relationship

Doubling the dose required for 90% destruction will produce 99% destruction of the target organism. Tripling the dose will produce a 99.9% destruction of the target organism and so on.

On the right is an example of the Dosage:Kill relationship for a typical micro-organism (E.Coli).

Applied UV Dose mJ/cm ²	Reduction in number of live micro-organisms
2.2	90.0%
4.4	99.0%
6.6	99.9%
8.8	99.99%
11.0	99.999%

