Wastewater Depot UV Disinfection

What is Ultraviolet Disinfection?

Ultraviolet (UV) light is invisible, electromagnetic energy with wavelengths between visible light and x-rays. UV light has long been acknowledged as a means of disinfection because of its ability to kill bacteria by penetrating their outer membrane and impairing proper DNA function.

Wastewater disinfection with ultraviolet light is a process that has proven to be superior to other disinfection methods. Many micro-organisms are not easily inactivated by chlorine or ozone whereas relatively low UV will provide the level of disinfection required. Operation and maintenance is less costly and less time consuming with UV systems, as compared to other disinfection methods. UV eliminates storage, handling and transportation hazards associated with chemicals and gasses. Through the use of UV disinfection, it is possible to eliminate chlorine, its byproducts, and the need for dechlorination.

When UV light is harnessed and properly transmitted, it provides a practical, safe and inexpensive means of water disinfection.

This is achieved through the use of low pressure mercury vapor lamps generate UV radiation in wavelengths of 2537A (Angstrom) capable of destroying virtually all known forms of microorganisms and viruses.

How Does It Work?

Ultraviolet is that band of light located in the spectrum between 2000-3000A wavelength. The most effective germicidal range is at 2537A for destroying microorganisms, molds, spores, protozoa, virus and yeast.

The intensity of ultraviolet is expressed in micro-watt seconds per square centimeter and is the product of the lamp output in watts, the length of time exposure and volume of water being treated microorganisms are destroyed with under 10,000 MW Sec./cm2.

Typical Example	
Bacillus Anthracis	8700
Cholera	6500
Dysentery	4000
Infectious Hepatitis	8000
Typhoid Fever	4100
E Coli	7000
Legionella	7000
Pseudomonas	10500
Streptococcus	10000

Tipton Environmental International, Inc.
4446 State Route 132 Batavia, OH 45103 USA
Voice: 513.735.2777 Fax: 513.735.1485
E-mail: info@tiptonenv.com
www.wastewaterdepot.com

Wastewater Depot UV Disinfection

Factors to be considered in water or liquid purification

Ultraviolet Radiation: Ultraviolet (UV) light is invisible radiation within a range of the solar spectrum. UV is similar to the wave-lengths that are produced by visible light, but much shorter. UV radiation is measured in millionths of a millimeter, i.e., Angstrom units (one Angstrom unit wavelength equals one hundred-millionths of a centimeter), and like visible light, it primarily has a surface effect. Within the UV radiation spectrum, there are three main groups.

Ultraviolet lamp radiation of 2537 Angstrom units (or 254 namometers) wavelength must hit the microorganism to inactivate it, and each microorganism must absorb a specific amount of energy to be destroyed.

Proteins and nucleic acid, which all microorganisms contain as their main constituents, absorb UV radiation energy. After absorption, the UV energy destroys or inactivates the DNA (deoxyribonucleic acid), thus preventing the microorganisms from reproducing.

Sterilization of water implies that all life, i.e. bacteria, mold virus, algae, and protozoa are destroyed. Table I gives the absolute amount of UV necessary to kill many of the common types. We can also supply an 1849A (185nm) UV lamp that produces ozone (03) disinfection residuals, and in most cases this lamp interchanges with our standard 2537A UV lamp. Complete sterilization is not necessary for the production of portable water. However, the water must conform with the drinking water standards of the Public Health Service or those of the agency governing your supply. Normally, the water must contain less than 2.2 coliforms per 100 ml to be considered safe to drink. The coliform group of microorganisms are generally associated with fecal matter and indicate that pathogenic (disease-causing) organisms, such as typhoid, may be present. As will be explained later, a different sizing formula must be used for purification if 100% sterilization is required.

Energy and Exposure: The germicidal spectrum of the ultraviolet wavelength is from 2000 to 3000 Angstroms, with the peak of 2537 Angstroms. The total UV energy emitted from all sides of the UV lamp is expressed in watts. The total exposure of the liquid is expressed in microwatt-seconds per square centimeter, which is a product of energy, time, and area. The same number of micro-watt seconds per square centimeter can be accomplished with a short exposure at a high intensity of UV or a long exposure at a low intensity of UV. Table II gives the UV energy data on the high intensity ultraviolet lamps used in purifiers.

Transmission: The amount of energy available to any microorganism from a given ultraviolet source is dependent on the UV transmission of the liquid. The transmission is dependent on the depth of the liquid and the absorption coefficient of the liquid. The absorption coefficient is dependent on the quantity and types of dissolved and suspended matter in the liquid. Generally, iron salts and organic matter have the greatest effect on absorption, while alkali salts (such as common salts) do not absorb these radiations. The physical requirements of less than 10 NTU of turbidity, 15 TCU of color, and 0.2 ppm of iron should be met before a water purifier is installed. Prefiltration of all suspended matter to at least 5 microns in size is recommended for all private water supplies, as the efficiency of the purifier is determined by the transmission of the water or liquid.

Table III illustrates the percent of transmission of the ultraviolet for water of various absorption coefficients. The absorption coefficient of the average tap water varies between 0.12 and 0.07 with highly polished DI or distilled water at 0.008 and cloudy water from a private source, such as a pond, well, or spring, at 0.50 or less. The absorption coefficient of the liquid to be purified must be known for proper sizing.

Tipton Environmental International, Inc.
4446 State Route 132 Batavia, OH 45103 USA
Voice: 513.735.2777 Fax: 513.735.1485
E-mail: info@tiptonenv.com
www.wastewaterdepot.com

Ultraviolet Disinfection Division

Wastewater Depot UV Disinfection

Other Factors Affecting Ultraviolet Purification: The ultraviolet output of the UV lamp is also dependent upon the primary voltage output and the lamp wall temperature. Table IV shows the effect of line voltage on UV output, and Table V shows the effect of temperature. It will be noted that at 56.6F (12 C) the lamp will be only 22% efficient in generating bactericidal radiation. We use only high intensity UV lamps inside a high-transmission clear fused quartz jacket so that an optimum temperature of 104 F (40 C) can be obtained for 100% UV output. The liquid does not come in contact with the lamp.

Another factor that must be considered is the useful life of the UV lamp. The performance of the various types of lamps is indicated in Table II. It is recommended that spare ultraviolet lamps be kept on hand at all times, and accurate records be kept of lamp use and replacement. The ultraviolet lamps output gradually decreases over the life of the lamp, and the lamp must be replaced as indicated by hours of use or by a UV monitor.
Sizing of Ultraviolet Liquid Purification Equipment: The various factors that must be considered were discussed above. Assuming a proper voltage source, the purifier can be sized properly if the following are known.
(a) Peak flow rate required in gpm, gph, gpd or m3/h.
(b) Transmission and physical makeup (absorption coefficient) of the liquid to be treated.
(c) Ultraviolet energy level required for microorganism destruction (see Table I).

The Public Health Service requires that UV disinfection equipment have a minimum UV dosage of 16,000 uW sec./cm sq. (microwatt-seconds per square centimeter). Our purifiers are manufactured in standard sizes from 1 to 2600 gpm to impart a dosage of 30,000 uW sec./cm sq. All significant waterborne pathogenic microorganisms are destroyed by under 10,000 uW sec./cm sq. Industrial high purity water may require higher radiation levels depending on the type of microorganism to be destroyed.

Suggested flow rates of the various models with different liquid transmission are indicated in figures 1 and 2. If 100% sterilization is required, the flow rate through the purifier can be computed, depending on the energy level required. For a particular problem or application, consult our technical staff.

Tipton Environmental International, Inc.
4446 State Route 132 Batavia, OH 45103 USA
Voice: 513.735.2777 Fax: 513.735.1485
E-mail: info@tiptonenv.com
www.wastewaterdepot.com

Wastewater Depot UV Disinfection

TABLE I	
Ultraviolet Energy Levels at 2537 Angstrom Units Wavelength required for 99.9% Destruction of Various Microorganisms	
UV Energy in Microwatt-seconds per Square Centimeter	
BACTERIA	
Agrobactrrium tumetaciens	8500
Bacillus anthracis	8700
Bacillus megaterium (vegetative)	2500
Bacillus megaterium (spores)	52000
Bacillus subtilis (vegetative)	11000
Bacillus subtilis (spores)	58000
Clostridium tetani	22000
Corynebacterium diphtheriae	6500
Escherichia coli	7000
Legionelia bozemanii	3500
Legionelia dumoffii	5500
Legionelia gormarii	4900
Legionelia micdadei	3100
Legionelia longbeachae	2900
Legionelia pneumophia	3800
Leptospira interrogans (infectious jaundice)	6000
Mycobacterium tuberculosis	10000
Neisseria catarrhalis	8500
Proteus vulgaris	6600
Pseudomonas aeruginosa (laboratory strain)	3900
Pseudomonas aeruginosa (envir. strain)	10500
Rhodospirillum rubrum.	6200
Salmonelia enteritidis	7600
Salmonelia paratyphi (enteric fever)	6100
Salmonelia typhimurium.	15200
Salmonelia typhosa (typhoid fever)	6000
Sarcina iutea	26400
SSerratia marcescens	6200
Shigelia dysenteriae (dysentery)	4200
Shigelia flexneri (dysentery)	3400
Shigelia sonnei	7000
Staphylococcus epidermidis	5800
Staphylococcus aureus	7000
Staphylococcus faecalis	10000
Streptococcus hemolyticus	5500
Streptococcus iactis	8800
Veridans streptococci	3800
Vibrio cholerae	6500

Tipton Environmental International, Inc.
4446 State Route 132 Batavia, OH 45103 USA
Voice: 513.735.2777 Fax: 513.735.1485
E-mail: info@tiptonenv.com
www.wastewaterdepot.com

Wastewater Depot UV Disinfection

MOLD SPORES	
Aspergillus flavus (yellowish green)	99000
Aspergillus glaucus (bluish green)	88000
Aspergillus niger (black)	330000
Mucor ramosissimus (white gray)	35200
Penicillum digitatum (olive)	88000
Penicillum expensum (olive)	22000
Penicillum roqueforti (green)	26400
Rhizopus nigricans (black)	220000
ALGAE	
Chlorelia vulgaris (algae)	22000
PROTOZOA	
Nematode eggs	92000
Paramecium	200000
VIRUSES	
Bacteriophage (E. coli)	6600
Hepatitis virus	8000
Influenza virus	6600
Pollo virus (Poliomyeiitis)	21000
Rota virus	24000
Tobacco masaic virus	440000
YEAST	
Baker's yeast	8800
Brewer's yeast	6600
Common yeast cake	13200
Saccharomyces var. ellipsoideus	13200
Saccharomyces sp	17600

TABLE III

Relative percent output of 2537A for water absorption coefficients*

Absorption	Transmission		Absorption	Transmission	
Coefficient	At 1"	At 3"	Coefficient	At 1"	At 3"
0.008	99%	95%	0.12	75%	40%
0.02	95%	87%	0.15	72%	34%
0.03	92%	80%	0.16	70%	29%
0.04	90%	74%	0.17	68%	28%
0.05	88%	68%	0.18	65%	25%
0.06	87%	64%	0.2	60%	23%
0.07	85%	59%	0.25	56%	16%
0.08	82%	55%	0.3	54%	11%
0.09	81%	50%	0.35	50%	8%
0.1	80%	46%	0.4	40%	5%
0.11	78%	44%	0.5	30%	2%

*As a measured percent of transmission with GL-100 monitor.
(Note:Monitor meets US Bureau of Standards Requirements.)

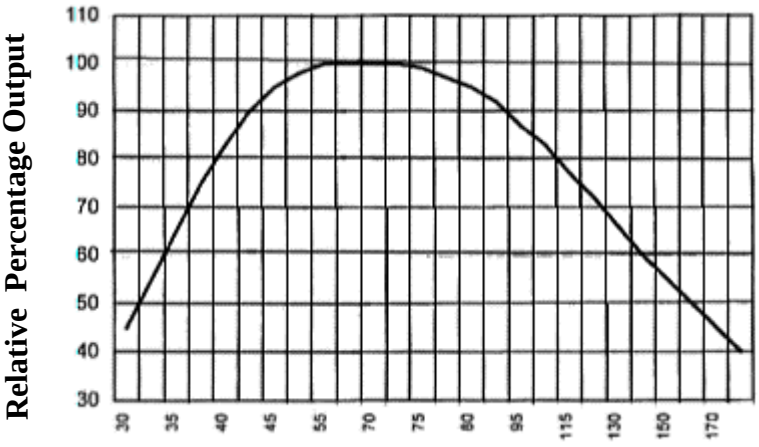
Tipton Environmental International, Inc.
4446 State Route 132 Batavia, OH 45103 USA
Voice: 513.735.2777 Fax: 513.735.1485
E-mail: info@tiptonenv.com
www.wastewaterdepot.com

Wastewater Depot UV Disinfection

TABLE IV	
Effect of line voltage on UV output, relative percent of 2537A*	
PRIMARY VOLTS	OUTPUT
90	68%
95	73%
100	78%
105	84%
110	90%
115	96%
120	102%
125	108%
*Optimum=118 VAC/60 HZ	

TABLE V					
Relative percent output of 2537A radiation temperature at various UV lamp					
Temperature			Temperature		
F°	C°	Output	F°	C°	Output
56.6	12	22%	104	40	100%
60.8	16	30%	111.2	44	98%
68	20	40%	118.4	48	93%
75.2	24	53%	125.6	52	85%
82.4	28	68%	132.8	56	75%
89.6	32	85%	140	60	66%
96.8	36	95%	147.2	64	58%

UV Lamp Output Relative to Reactor Water Temperature



Tipton Environmental International, Inc.
4446 State Route 132 Batavia, OH 45103 USA
Voice: 513.735.2777 Fax: 513.735.1485
E-mail: info@tiptonenv.com
www.wastewaterdepot.com

Wastewater Depot UV Disinfection

Uses and Applications of UV Purifiers	
Application	**Explanation**
Air conditioning and heating	10,15,16
Apple and fruit storage	5,16
Ampoules, bacteriological, biological enzyme laboratories	8,15,16
Bakeries, bread, cakes, pies, candy mfg.	1,2,8,15,16
Barber shops	16
Beverage plants (soft drinks), syrups, chocolate concentrates, flavoring extracts, coffee & tea	1,2,3,6,8,15,16
Blood banks & donor agencies	1,8,15,16
Bottle water plants	1,4,8,15,16
Breweries	1,3,8,15,16
Butter processing	1,3,5,8,15,16
Canning	1,3,5,8,15,16
Cheese processing & packaging plants	1,3,5,8,15,16
Chicken, turkey and game farms	13,16
Cosmetics	1,2,3,8,15,16
Dairy products, ice cream	1,2,3,8,15,16
Drug & pharmaceutical mfgrs., vitamin products, chemical plants	1,2,3,8,15,16
Eggs, canned, frozen, dried	1,3,8,15,16
Electroplating & mirror plants	8,9,15,16
Electronic Equipment Manufacturing Plants	8
Farms	1,5,13,14,16
Food products, fruit juices, fresh/frozen	1,2,3,8,15,16
Homes	12,13
Hospitals, sanitoria, institutions, nursing & convalescent homes	1,2,3,8,10,12,13,14,15,16
Hotels, motels and camps	12,13,16
Meat packing, fish and other food plants	1,3,5,11,13,16
Mines, lumber camps, oil refineries	8,10,13,14,15,16
Nylon & synthetic fiber manufacturers	1,6,8
Office and factory	13,16
Paper mills	1,8,10,15,16
Packaging	1,3,5,13,16
Photograph film and paper manufacturers	8,10,15,16
Potable water treatment plants	13,16

Tipton Environmental International, Inc.
4446 State Route 132 Batavia, OH 45103 USA
Voice: 513.735.2777 Fax: 513.735.1485
E-mail: info@tiptonenv.com
www.wastewaterdepot.com

Wastewater Depot UV Disinfection

EXPLANATIONS

(List of applications for water or liquid purifiers)

1. Purify final rinse water in holding and blending tanks, cans, bottles, pipe lines, heat exchanges and all other types of equipment and containers, floors, walls, tables and other working areas, to flush out foreign matter and disinfecting solutions without introducing water-borne bacteria which may re-contaminate the surface or product.
2. To provide uncontaminated water for making simple (sugar) syrup so as to avoid fermentation and costly spoilage. Also for making various other aqueous solutions in which bacteria contamination would cause spoilage.
3. To provide germ-free make-up water used to reconstitute powered milk; to add to syrups for carbonated or still beverages, or to add other ingredients where a percentage of water is present in the end product. Thus, by eliminating micro-organisms, the purity, freshness and flavor of the products are safeguarded and shelf life is extended.
4. To purify the bottle spring, well or other water prior to bottling, to destroy invisible algae and all types of microorganisms which would otherwise cause obnoxious odors, tasts, and cloudiness. This eliminates costly returns, loss of customers and sales, by safeguarding the purity, freshness and tastes.
5. Sterilize wash water for butter, cottage cheese and all other curd cheeses, smoked meats and other foods without introducing water-borne contaminants which later develop unsightly mold, foreign odors and taste, reduce butter-score and result in losses.
6. Special purifiers are available for treating susceptible liquids, including pharmaceuticals, liquid sugar, chemicals, various solutions and wines, to destroy budding yeast cells, bacteria, mold and algae so as to prevent fermentation and other spoilage. Any micro-watt seconds per square centimeter intensity can be delivered.
7. To use in the preparation of yeast culture, to prevent contamination of pedigreed yeast, to assure consistent, pedigreed quality, unaltered flavor and safeguarding of purity, freshness and keeping qualities; also in the preparation of any unprocessed products containing water.
8. Eliminate slime and fouling of mineral beds in all types of water treatment equipment. It prevents frequent shutdown for de-contamination procedures and provides the best, and most economical, method of obtaining bacteria-free, de-ionized water. The first chamber purifies the water before it enters the de-ionizer, this prevents bacteria, mold, yeast or algae settling on the resins. The second chamber irradiates the water after it leaves the de-ionizer to assure purified water in the event of internal contamination from the resins.
9. As a final, germ-free rinse for flushing electronic and other parts, without introducing contamination which may later cause fouling or product loss.
10. Purify cooling water for heat exchangers, etc., also spray-washing water and process water re-circulated for other purposes. To eliminate odors, contamination from water-borne bacteria, algae, slime, etc., & prevent algae build-up in pipe lines, cooling towers & clogged spray nozzles.
11. To provide germ-free water for making ice incorporated in frankfurters, bologna and other smoked meats, also in other foods and beverages.

Tipton Environmental International, Inc.
4446 State Route 132 Batavia, OH 45103 USA
Voice: 513.735.2777 Fax: 513.735.1485
E-mail: info@tiptonenv.com
www.wastewaterdepot.com

Ultraviolet Disinfection Division

Wastewater Depot
UV Disinfection

12. To provide germ-free water for recirculation in swimming pools with a reduction of up to 80% of chlorine and other chemical previously required. This means that the extremely small amount of chlorine recommended is at an unobjectionable level where it is also easy to maintain, and swimming is a pleasure. This small amount of chlorine acts as a bleach-booster to maintain the water crystal clear, while the ultra-violet purifier is constantly discharging germ-free water into the pool. An algaecide should be used periodically to prevent any microscopic spores from adhering to the sides and bottom of the pool, preventing them from entering the U.V. purifier, where they are destroyed.
13. To deliver purified, germ-free water by guaranteed 99% bacteria destruction in water distribution systems without the use of chlorine and without imparting any foreign taste, odor, corrosive or allergenic properties to the water. Cost of processing is the world's lowest - up to 30,000 GPH purified for only one kilowatt of current - costing only pennies a day!
14. To bacteriologically purify the final clear effluent, without the use of chlorine, from sewage treatment equipment or plants. At least 99% bacterial destruction is accomplished at high flow rates. The high cost of chlorinators, chemicals, supervision and constant testing are eliminated at a substantial savings.
15. To destroy at least 99% of all organisms in the water and sewage effluent from food, beverage, pharmaceutical plants, abattoirs, public conveyors, planes, ships, etc., after the water is rendered relatively free of turbidity, solids and excess color.
16.

A) Permanent or portable ultraviolet ozone fixtures for mold, bacteria and odor control.
B) Direct U.V. radiation with permanent handing hood or wall mounted fixtures or portable U.V. air purifiers for sterilization of air, surfaces or products. To prevent air-borne bacteria or mold contamination on foods, meats, vegetables, fruits, products, tables, walls, wrappers, packages, cans, bottles, coolers, caps, etc., shielding used for human and animal protection from direct U.V. radiation.
C) Indirect U.V. radiation with ceiling or wall fixtures to sterilize the room air and eliminate the spread of air-borne infections among humans and animals. Safe for humans and animal occupancy due to special construction. No protective clothing, face masks or shields required unless placed below eye level. Proven effective in hospital rooms, operating rooms, nurseries, offices, cafeterias, restaurants, schools, motels, hotels, hallways, coolers, holding rooms, stables, pens, incubators, hatcheries, brooder rooms, laying houses and veterinaries.
D) Direct and indirect radiation in special shielded cabinet for the sterilization of glasses, cans, utensils, instruments, caps, bottles, containers, conveyor belts, fillers and processing equipment. Special fixtures and cabinets for special applications.
E) High intensity germicidal radiation fixture for air conditioning and heating system ducts for 98% destruction of air-borne bacteria and communicable diseases. Special equipment for odor control. Prevents the dangers of drawing in bacteria and germs in a closed system...heating or cooling them and redistributing them to other rooms or areas. Proven effective in hospitals, nurseries, offices, restaurants, schools, etc.

Tipton Environmental International, Inc.
4446 State Route 132 Batavia, OH 45103 USA
Voice: 513.735.2777 Fax: 513.735.1485
E-mail: info@tiptonenv.com
www.wastewaterdepot.com

Wastewater Depot UV Disinfection

General Information on Ultraviolet Purification

1. The peak germicidal wavelength of the ultraviolet spectrum is 2537 angstrom and its intensity is expressed as micro-watts per square centimeter, a product of energy and area, or micro-watt seconds per square centimeters, a product of energy, time and area. Germicidal ultraviolet is invisible to the human eye.
2. Germicidal ultra-violet must contact the micro-organisms to kill them. Therefore, the water or liquid must be clear to be purified, and a prefilter is recommended if the water does not meet USPHS physical standards and chemical requirements.
3. Humans and animals must be protected from direct radiation of ultraviolet lamps, however, can safely congregate in areas or rooms treated with indirect radiation. Special shields are not required. Ultraviolet will not penetrate through glass or plastic and regular eye glasses are sufficient protection for looking at the bare ultra-violet lamp for a short period of time.
4. The 1849 angstrom wavelenth of the ultra-violet from our special ozone lamps produces activated oxygen in free air (03) and (H2O2) hydrogen peroxide in water. This is commonly referred to as OZONE and is an excellent odor oxidizer and bactericide. Ozone can be used to supplement the 2537 A. wavelength on hard to get places. Safe for humans and animal if used as directed.
5. All ultraviolet lamps have a useful operating life expressed in hours, and must be replaced as directed for effective results. Tipton Environmental Intl., Inc. manufactures UV Intensity Monitors for the measurement and metering of ultraviolet germicidal radiation output.

All known micro-organisms are destroyed with proper exposure to ultra-violet radiation in the 2,000 to 3,000 Angstrom Unit (1) range. Most water-borne pathogenic (disease-causing) Micro-organisms are destroyed with under 10,000 Microwatt seconds per square centimeter. Some typical examples are noted below:

Micro-Organism	Disease	MW Sec./CM2
Salmonella typhosa	Typhoid fever	4,100
Salmonella paratyphi	Enteric fever	6,100
Shigella disenteriae	Dysentery	4,200
Shigella flexneri	Dysentery	3,400
Vibro comma	Cholera	Approx. 6,500 (2)
Leptospira spp.	Infectious jaundice	6,000 (2)
Poliovirus	Poliomyelitis	Approx. 6,000 (3)
Virus of infectious hepatitis	Infectious hepatitis	Less than (8,000) (4)
Our purifiers provide in excess of 30,000 MW sec/cm2 of ultra-violet energy.		

General Notes

1. Angstrom unit: A unit of wavelength 1/1,000,000,000 of a centimeter.
2. This estimate is based on the similarity of these organisms to others and is probably of the same order of magnitude.
3. Based on American Journal of Hygiene (1951) Dic, G.W. 53:131
4. Since viruses in general are more susceptible to U.V. radiation than bacteria, this estimate is based upon work done with bacteriaophage.

Tipton Environmental International, Inc.
4446 State Route 132 Batavia, OH 45103 USA
Voice: 513.735.2777 Fax: 513.735.1485
E-mail: info@tiptonenv.com
www.wastewaterdepot.com

Wastewater Depot UV Disinfection

Ultraviolet Disinfection System Configurations:

- Horizontal Channel Type
- TEII UpFlow Packaged UV Unit
- Vertical Self Cleaning
- Chambered Units
    - Industrial
    - Light Industrial
    - Residential Clean Water

Features and Benefits

•Quick disconnect for ease of lamp replacement
•Designed for indoor and outdoor installations
•Narrow band Ultraviolet intensity monitor for continuous lamp monitoring
•Elapsed time running meter

Model Number Layout for Horizontal UV Units

			AMPS		NO. OF
UNIT	GPD	GPM	120V	220V	LAMPS
WWD-UV-1S2	5,000	3.4	0.8	0.8	2-24"
WWD-UV-1M2	25,000	17	1.3	1.1	2-36"
WWD-UV-2M2	50,000	34	2.1	1.1	4-36"
WWD-UV-3M2	75,000	51	3.2	1.7	6-36"
WWD-UV-4M2	100,000	68	4.2	2.1	8-36"
WWD-UV-5M2	125,000	85	5.3	2.6	10-36"
WWD-UV-6M2	150,000	102	6.3	3.4	12-36"
WWD-UV-2L2	50,000	34	2.1	1.1	2-64"
WWD-UV-2L4	100,000	68	3.2	1.7	4-64"
WWD-UV-2L6	150,000	102	4.8	2.5	6-64"
WWD-UV-8L2	200,000	136	6.4	3.2	8-64"
WWD-UV-10L2	250,000	170	7.5	4.1	10-64"
WWD-UV-3L4	300,000	204	9	4.5	12-64"
WWD-UV-4L4	400,000	272	12	6	16-64"
WWD-UV-5L4	500,000	340	15	7.5	20-64"
WWD-UV-6L4	600,000	408	18	9	24-64"
WWD-UV-8L4	750,000	544	24	12	32-64"
WWD-UV-10L4	1 MGD	680	30	15	40-64"

T I P T O N
E N V I R O N M E N T A L
I n t e r n a t i o n a l , I n c .

4446 State Route 132 Batavia, OH 45103 USA
Voice: 513.735.2777 Fax: 513.735.1485
E-mail: info@tiptonenv.com
www.wastewaterdepot.com