

How to buy a UV Disinfection Systems

What should you know before deciding to use UV disinfection?

Ultraviolet (UV) light is a natural, cost-effective, environmentally safe way to disinfect drinking water. UV systems contain one or more lamps protected inside a quartz sleeve. Water is sent into a chamber containing the lamp/sleeve assembly. The lamp produces a powerful UV light at a 254 nm wave length. This light penetrates mirco-organisms present in the water. The UV light damages the DNA part of the bacteria and viruses in such a way that they are unable to replicate and are inactivated.

Properly designed UV systems are effective and user friendly. They do not require the mixing, injection or testing of chemicals. UV systems do not, however, provide for any residual disinfection in the distribution system. This lack of residual means that extra care must be taken in the installation process to make sure the distribution system is thoroughly disinfected. If the water distribution system could continue to introduce contamination from leaks in underground lines and(or) cross connections, provisions should be made to maintain residual disinfection. Cross connection are not uncommon in cottages on lakes where there may be a backup supply of water provided from a second source such as the lake.

The water being treated by the UV system must be relatively clear and colorless. This can be tested with a UVT (ultraviolet transmittance) meter. The meter measures the ability of UV light to pass through the water. The water should also be free of any materials that might build up on the surface of the quartz sleeve and decrease the output from the lamp. Tannins, iron, manganese and hardness are the most common materials that can cause build up on the quartz sleeve.

What level of safety do you require?

There are 3 different levels of safety that can be provided with UV systems. They are as follows:

1. UV systems with an inspection port that provides for a visual inspection to determine if the light is on (never look directly into these ports).
2. UV systems with an electronic detector that will automatically determine if the lamp is on. If the lamp is not on, an alarm will sound and(or) an optional solenoid valve will shut off the water supply.
3. UV systems with a UVT detector that measure the intensity of the UV light after it has passed through the water. If the light transmitted through

the water is not sufficient, the system will turn on an alarm and(or) an optional solenoid valve will shut off the water supply.

If the only disinfection is UV, a system like that described in 3 should be used. The combination of chlorination and UV system would be a good choice for any situation where residual is needed.

The National Sanitation Foundation (NSF) certification requires both a UVT detector and a lamp on detector.

What UV dose is required?

Dose is determined by multiplying the intensity of the light by the time:

$$IT = \text{Dose}$$

$$I (\text{uW/cm}^2) \times T (\text{sec}) = \text{Dose (uW sec/cm}^2)$$

The minimum generally accepted dose is 16,000 microwatt sec per square cm (uWs/cm²). Some viruses require a minimum of 38,000 uWs/cm². NSF certification requires that UV disinfection systems provide a dose of at least 40,000 uWs/cm².

What is the rated EOL?

EOL is the end-of-lamp life dose. As UV lamps age, their output decreases. You need to make sure the rated output is at the end-of-lamp life (EOL). The EOL is usually based on one year of usage (approx. 9000 hrs). You will need to replace the lamp at one year intervals to maintain the rated dose.

Is the unit flow controlled?

The rated dose will only be delivered at the rated flow. For example, a unit may provide a dose of 16,000uW s/cm² at 7 gpm. This same unit will only provide an 8,0000 uW/cm² dose at 14gpm. Make sure the unit is either sized for the maximum flow that your system can deliver or is flow controlled not to exceed its maximum rating. It is recommended (and is an NSF requirement) that a flow control be used on UV systems.

What size system should you choose?

The water stored in the pressure tank of the pumping system can easily be delivered at peak flows that greatly exceed the rated output of the well pump. DO NOT BASE THE SIZE OF THE SYSTEM ON THE RATED OUTPUT OF THE PUMP OR WELL. Most household needs will be satisfied with a flow of 5 –7 gallons per minute. To determine your needs, use the table "Fixture Flow Requirements" to calculate the peak flow you will require. Add together the flow rates of the fixtures you

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are likely to use at the same time to determine your maximum required flow.

Fixture Flow Requirements

Type	GPM
Sinks and Lavatories	2.5
Showers	2.5
Toilet	2.5
Washing machine	3.5
Dishwasher	1-2
Tubs	2.5-4
Whirlpools	3-7
Outside faucets	5-7

Does the unit have a UV transmittance monitor?

Not only should the unit have a UV transmittance monitor, there should be a way to tell when you are getting close to minimum dose so that you can take action before you lose the protection of the system. *Make sure this monitor measures only UV intensity and*

not visible light. UV light is the only type of light that provides the protection against biological contamination. Some systems provide LED displays that change color at different UV intensities. Other systems have additional displays with alarm codes that determine the potential problem. These user interfaces will help provide trouble shooting information that will allow the system to maintain an uninterrupted flow of treated water.

Is there a lamp monitor?

The lamp monitor determines whether or not the lamp is on. This is helpful in trouble shooting the system when the alarm is on. This monitor helps determine if the lamp needs changing or if the unit simply needs cleaning.

Does the unit have an auto-ranging power supply?

It is important to maintain the correct power to the UV lamp to insure proper UV output. With an auto ranging power supply, the unit detects the line voltage (90-265v) and adjusts its output. This means the unit can handle power fluctuation in the line and still provide protection.