A CRYSTAL CLEAR GUIDE TO ULTRA VIOLET WATER SYSTEMS

Introduction

Ultraviolet (UV) radiation technology has become an established method of disinfecting water. It's versatility enables UV to be used on a large scale ranging from municipal treatment plant to individual water applications as varied as food processing and cosmetic production. It is also used in the home where water is sourced from a private well or bore hole.

Since the introduction of the Private Water Supplies Regulations 19991, interest in UV has escalated, particularly as its major function is health related. UV offers a rapid and simple technique to rid water of bacteria, algae, mould, fungi and virus contamination including pathogenic organisms, without using heat or chemicals.

What is Ultraviolet Radiation?

One of the several categories of energy is electromagnetic or radiant energy. Solar radiant energy travels in the form of waves in straight lines in all directions from the sun. There are very long rays and very short X-rays. We are all aware of the visible part of the spectrum. The ultraviolet part includes wavelengths from 2000 to3900 Angstrom units (one unit is equivalent to one billionth of a metre). There are long waves, middle waves (best known for their sun tanning) and short waves. It is the latter which is so effective in destroying bacteria.

Short wave ultraviolet does not occur naturally as the atmosphere screens out the sunlight UV before it reaches the earths surface. To take advantage of the germ killing potential of shortwave UV the rays must be created artificially. This is achieved by using a mercury vapour lamp which converts electrical energy into UV radiant energy at around 2540 Angstroms.

UV equipment

A typical UV water treatment system provides high intensity UV light rays which irradiates the water as it passes through an illuminated chamber. The germicidal (mercury vapour) lamp creates an electric arc through an inert gas within a special glass tube. The heat created causes a vaporisation of a small amount of mercury which ionises in the electric arc and gives off UV radiation. Most UV units are designed as a cylindrical module in stainless steel or plastic. The water flows in at one end and passes through the annular space between the quartz tube (which contains the lamp) and the outer wall of the chamber before exiting at the other end of the module. There are various types, styles and sizes of UV depending on the volume of water needing treatment. The degree of disinfection relies on flow rate, quality of water, type of organism, concentration etc. The germicidal lamp is continuously illuminated. It has a life of between 6-12 months and is designed to produce a UV dosage rate of 20,000-40,000 microwatt-seconds per square metres. Most systems incorporate a pre-filter as cloudy water can impede the transmission of UV energy.

Advantages and disadvantages of UV

The main advantages of UV are:

Can quickly treat large and small volumes of water
No risks of overdosing
Quicker disinfection than with chlorine (½ to 1 sec, compared with 20 to 40 mins)
Unchanged pH, colour, taste, odour and temperature
No chemicals are involved
Water is ready for immediate use after treatment
Compact, easy to install and maintain
Provides continuous or intermittent disinfection automatically without special attention or measurement.
Environmentally friendly

There are a few disadvantages. There is no residual effect with UV and it will not work with cloudy water. For this the water would need pre-filtering. UV, like chlorine is ineffective on cryptosporidium or giardia. When not flowing the water surrounding the lamp becomes warm although in most situations this is of no consequence.

Conclusion

UV disinfection can be viewed as economical, cost effective and safe. It suits a wide variety of applications and can be easily installed. This makes it a particularly attractive choice for treating domestic drinking water. It must be remembered however that it is only a steriliser and must be used in conjunction with filtration equipment in order to provide a complete water treatment package. We at On Tap are always happy to advise you on all aspects of water treatment. Please contact us with your queries.

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