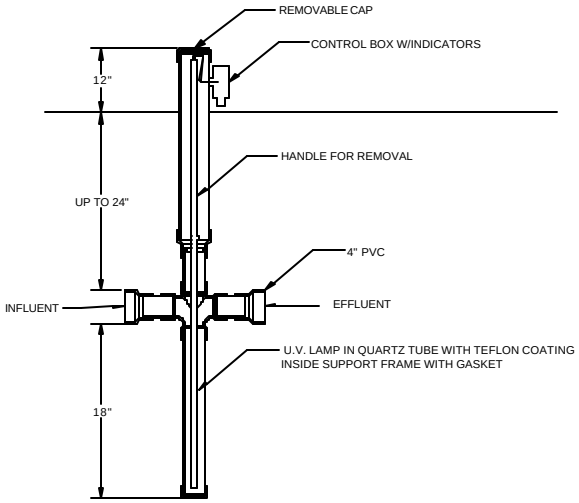
CONSOLIDATED
TREATMENT SYSTEMS, INC.

Ultraviolet Disinfection Unit

DESCRIPTION

The Consolidated Treatment Systems ultraviolet disinfection (CTS UV) lamp, patent pending, is specifically developed to disinfect the effluent from onsite wastewater treatment units. The CTS UV lamp reduces fecal coliform bacterial levels well below the most stringent US treatment standards, even if an upstream treatment unit is operating in a mild upset condition.



Onsite wastewater treatment systems are installed such that their discharge piping is below grade. The CTS UV lamp couples directly to the discharge pipe and is permanently installed below grade. Figure 1 shows the design details of the unit.

The ultraviolet light source for disinfection is mounted in a sub-assembly, which can be inserted or removed through the top of the riser pipe for periodic servicing. The light source is mounted in the center of an anodized aluminum frame that divides the disinfection chamber in half. A frame gasket seals against the inner surface of the disinfection chamber to prevent bypass.

The disinfection sub-assembly is water tight throughout its length, which extends approximately one foot above grade. Waterproofing protects the electrical connections against a backup, which could cause the wastewater effluent level to rise to the maximum height of the upstream treatment plant.

Two pins mounted near the top of the disinfection chamber properly orient the lamp when the sub-assembly is inserted. Wastewater entering one side of the unit flows vertically downward makes a 180-degree turn, and then flow vertically and out the other end of the unit. This flow path is results in an exposure time sufficient to complete the disinfection.

The ultraviolet lamp is surrounded by a clear, fused quartz tube to control lamp surface temperature. A clear Teflon film covers the quartz tube to minimize surface fouling. This design feature incorporates the beneficial attributes of both quartz and Teflon. When the disinfection chamber is filled with water, the ultraviolet light source can operate continuously, whether or not effluent is flowing. Continuous operation within a lamp surface temperature range of 105 -120 degrees Fahrenheit provides optimum ultraviolet light output and long lamp life.

The UV system operates on 12 Volt DC power and consumes less than 25 watts. A DC power converter is mounted inside junction box accepts standard 110 - 120 VAC. Two DC converter outlet wires are run from the home to the UV disinfection system through underground conduit to the electrical junction box on the above ground portion of the riser pipe. The power lead wires attach to a terminal strip inside the junction box.

A fiber optic probe conveys visible light from the ultraviolet light source to an electrical junction box mounted on the riser. Owners and maintainers can confirm operating status without having to remove the disinfection sub-assembly.

Two indicators, located on the outside of the electrical junction box, show the operating status of the ultraviolet disinfection system. One is a green LED, which indicates the availability of 12 VDC electrical power in the junction box. The other is a terminus of the fiber optic probe, which indicates that the ultraviolet light source is operating.

SPECIFICATIONS AND PERFORMANCE

Fecal coliform removal exceeds 3-logs—99.9 percent—when the following conditions are met:

- The maximum flow is 3 gpm or less
- Total Suspended Solids (TSS) is less than 30 mg/L
- Five-day Biological Oxygen Demand (BOD_5) is less than 30 mg/L

There are no adverse effects from over exposing the effluent to germicidal ultraviolet light, because ultraviolet disinfection does not form byproducts in contrast to chlorination and other chemical disinfection methods.

In studies conducted by the University of Wisconsin, Multi-Flo units produce effluents that average 530 cfu/100 mL. Nayadic units are expected to provide similar performance. Other products may produce effluent having fecal coliform counts that range from 800 to 20,000 cfu/100 mL. The CTS UV lamp is over designed to disinfect effluent from these products.

BENEFITS

CTS UV lamps are easily installed (usually in less then 30 minutes) and operate unattended. Because of the anti-fouling properties of Teflon, periodic cleaning is simple. Annual service is required for UV lamp replacement. Ultraviolet disinfection does not cause byproduct formation, in contrast to chlorination.

CLUSTER / MULTIPLE RESIDENCE POTENTIAL

Several UV lamps units may be connected in series and/or parallel to achieve a higher flow capacity. Salcor Inc. also manufactures larger wastewater disinfection units with capacities up to 16 million gallons per day.

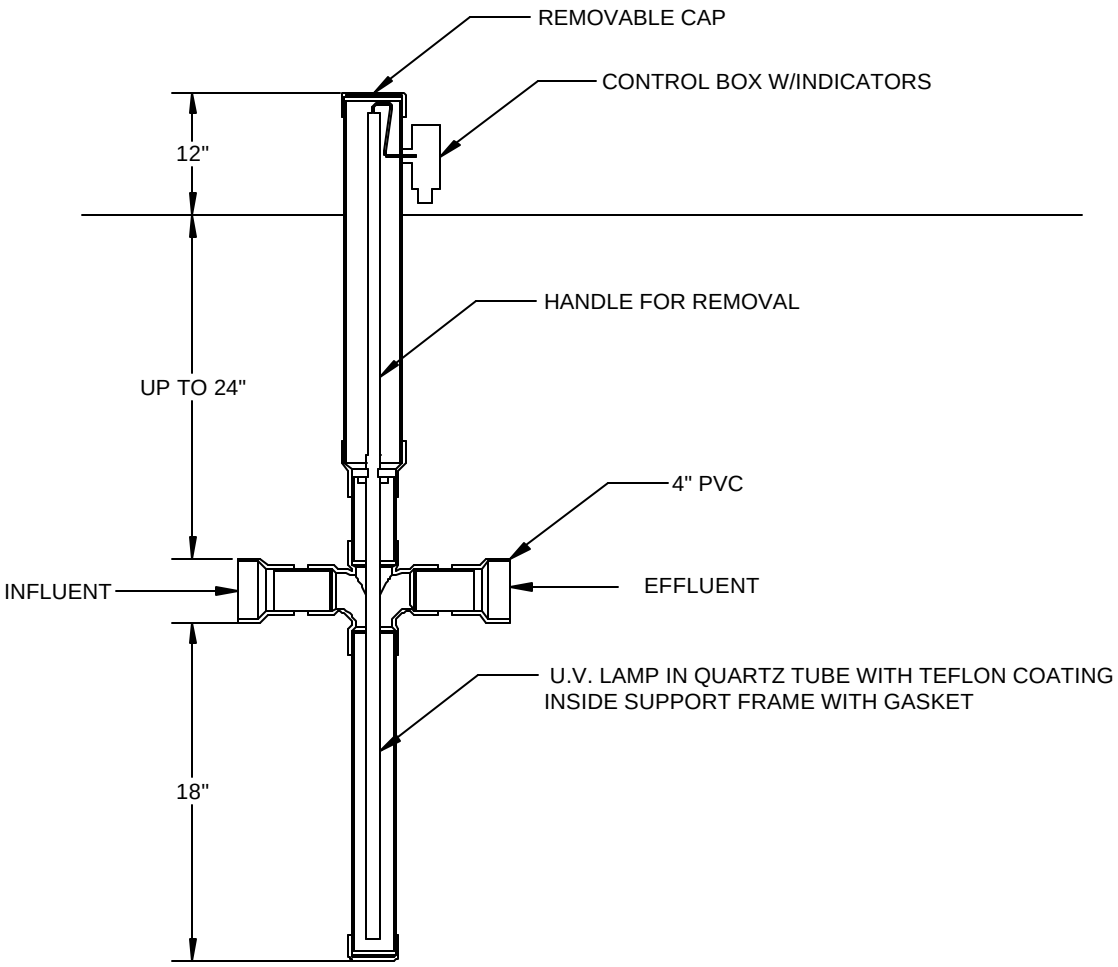


Figure 1—CTS UV Unit

BACKGROUND

Consolidated Treatment Systems, Inc., of Franklin, Ohio, manufactures the Multi-Flo and Nayadic series of onsite wastewater treatment units. Both units have been in continuous use for over 30 years. The company is expanding its scope to provide wastewater treatment components, systems, and solutions.

Dr. James E. Cruver, pioneered the use of Teflon in ultraviolet disinfection. Wastewater disinfection systems, ranging in size from 500 gal/day up to 16 million gal/day have been installed using this technology. The first unit was introduced in the spring of 1997. It has been a successful product and nearly 1000 units have been installed throughout the United States and Canada.