Written Specifications for Lync UV-H Wastewater Disinfection System

SPECIFICATION SECTION XXX

PRODUCT: Lync UV-H System for Wastewater Disinfection

1. GENERAL

Furnish a UV disinfection system as specified here in this section and as called for in the equipment schedule for the disinfection of wastewater. The UV disinfection system shall be supplied with pre-installed quartz sleeves and lamps, entirely by one manufacturer. The system shall include all of the components required for proper operation. These components include a reactor chamber, (2) UV lamps, (1) quartz sleeve, (1) 316 stainless steel wiper for automatic quartz sleeve cleaning system, (1) system controller, (1) UV intensity sensor, and (1) purge valve. The system shall be a UV-H 500W or a UV-H 750W or a UV-H 1000W system.

* 1. Feedwater Requirements

The system shall be suitable for operation and capable of all flow and dosage claims when operated on a water supply with the following parameters:

|  |  |
| --- | --- |
| Maximum Hardness | 50 Grains per Gallon |
| Water Pressure | 5 – 100 psig |
| Water Temperature | 34 – 130 °F |
| Air Temperature | 34 – 104 °F |
| Relative Air Humidity | Max 70% |
| Maximum Iron | 3 ppm |
| Maximum Manganese | 0.5 ppm |
| Maximum Ambient Temperature/Humidity | 122°F(50°C) / 95% Relative Humidity (non-condensing) |
| UV Transmittance (UVT) | 95% |

* 1. Operational Requirements

|  |  |
| --- | --- |
| Maximum Flow Rate for 500W | 40 GPM |
| Maximum Flow Rate for 750W | 40 GPM |
| Maximum Flow Rate for 1000W | 100 GPM |
| Water Pressure | 5 – 100 psig |
| Maximum Pressure Drop (500W) | 12 psig |
| Maximum Pressure Drop (750W) | 13 psig |
| Maximum Pressure Drop (1000W) | 3 psig |
| Voltage | 120 VAC/60 Hz or 230 VAC/50 Hz |

1. COMPONENTS
   1. General

2.1.1 The UV equipment shall be installed indoors, in a dry location.

2.1.2 The UV equipment shall operate in an enclosed reactor and use high output low-pressure UV lamps.

2.1.3 Draining of the UV equipment shall not be required to change UV lamps or to perform calibration checks on the UV intensity sensors.

2.1.4 All wetted materials exposed to UV light shall be 316 stainless steel, quartz equivalent to GE Type 214, FKM, or other suitable UV-resistant material.

2.1.5 The electrical system shall be designed to provide maximum reliability of the UV equipment.

2.1.6 All heat-sensitive components shall be adequately cooled with forced dry air.

2.1.7 The UV equipment shall be equipped with safety devices to prevent over-temperature conditions should any cooling device fails.

2.1.8 The UV equipment shall be designed to allow operators to perform routine maintenance such as lamp replacement, without the use of special tools.

2.1.9 The UV equipment shall be equipped with a safety interlock to prevent accidental exposure to UV light in the event the system is not powered down during lamp replacement.

* 1. UV Lamps

2.2.1 The UV Lamp shall be rated for a minimum useful life of 9,000 hours for 500 and 750 models.

2.2.2 The UV Lamp shall be rated for a minimum useful life of 12,000 hours for 1000 models.

2.2.3 The UV Lamp shall be able to be cycled up to 12 times within a 24-hour period (for increased cycling, contact Lync)

2.2.4 The UV Lamp shall use high-purity quartz such as GE type 219 or equivalent with a coating to ensure constant UV output over the complete lamp lifetime.

2.2.5 The UV Lamp shall use bases of ceramic construction, resistant to UV light with an electrical connection at one end only.

2.2.6 The UV Lamp filament shall be rugged to withstand shock and vibration.

2.2.7 The UV Lamp shall have monochromatic spectral output with the emissions peaking at 253.7nm and shall be non-ozone producing.

2.2.8 The UV Lamps shall maintain a steady output over a water temperature range of 34-104oF.

2.2.9 The UV Lamps shall be removable with the quartz sleeve and automatic quartz cleaning device remaining in place.

2.2.10 The UV Lamps shall be able to start up and reach full power without water flow for up to 15 minutes.

* 1. UV Reactor

2.3.1 The 1” male NPT ports of the UV reactor shall be accessible on the side of the unit for 500 and 750 models.

2.3.2 The 2” male NPT ports of the UV reactor shall be accessible on the side of the unit for 1000 models.

2.3.3 The UV chamber within the UV reactor shall be easily accessible without tools to allow inspection of the quartz sleeve and automatic quartz cleaning device without draining of the reactor.

2.3.4 The UV lamps within the UV reactor shall be mounted in the air to minimize the effect of changes in water temperature.

2.3.5 The UV chamber within the UV reactor shall contain reflective panels to ensure 360° coverage of UV radiation to prevent shadowing.

2.3.6 The quartz sleeve shall be clear fused quartz GE Type 214 or equivalent with a minimum UV transmissibility of 88 percent.

* 1. Automatic Quartz Cleaning System

2.4.1 Each UV reactor shall be equipped with an electronically powered quartz cleaning system that will automatically function without operator intervention.

2.4.2 The automatic quartz cleaning system shall consist of 316 stainless steel wipers for mechanical cleaning.

2.4.3 The automatic quartz cleaning system shall not use any chemicals.

2.4.4 The wiping cycle shall occur on power up of the lamps and then once every 4 hours by default. The wiping cycle shall be adjustable and also be initiated at any time by an operator.

2.4.5 The wiped portion of the quartz sleeve shall consist of the entire length of the exposed quartz within the UV chamber.

2.4.6 The automatic quartz cleaning system shall contain a sensor to confirm operation and also return wipers to the correct park position.

* 1. UV Intensity Monitoring System

2.5.1 Each individual UV lamp shall be continuously monitored by its own UV intensity sensor.

2.5.2 Each UV intensity sensor shall be mounted in the air to prevent water fouling from affecting its performance.

2.5.3 The UV intensity sensor shall be removable from the UV reactor for reference checking with a factory-calibrated spare without interrupting the disinfection process or draining the UV reactor.

2.5.4 The UV intensity sensor shall measure the germicidal portion of the light emitted by the UV lamps at 253.7nm.

2.5.5 The UV intensity sensor shall be factory calibrated. Calibration shall be valid for a minimum of one (1) year from the beginning of service.

* 1. Automatic Purging System

2.6.1 Each UV reactor shall be equipped with a purge valve to regulate water temperature within the UV reactor during periods of no flow.

2.6.2 The setpoint for purge valve operation shall be adjustable.

2.6.3 The purge valve shall discharge water from the UV reactor if low UVT water is detected within the UV chamber.

* 1. Electrical Enclosure

2.7.1 The UV equipment shall be powered and controlled by one electrical enclosure.

2.7.2 The electrical enclosure shall be mounted to the UV reactor and contain the microcontroller, electronic ballasts, and power distribution devices.

2.7.3 A power supply of 120Vac, single phase, two wires plus a ground, 60Hz, shall be provided in a ground-fault circuit-interrupter (GFCI) receptacle by others in the vicinity of the UV equipment.

2.7.4 The electrical enclosure shall be powered by a detachable power cord.

* 1. Electronic Ballasts

2.8.1 For 500 and 750 models, each ballast shall drive two UV lamps.

2.8.2 For 1000 models, each ballast shall drive one UV lamp.

2.8.3 Ballasts shall incorporate an instant start circuit for immediate ignition. (For filament pre-heat circuit to allow for multiple on/off lamp cycles per day, contact Lync)

2.8.4 Ballasts shall be installed with polarized connectors for ease of maintenance.

2.8.5 Operating power factor for the ballasts shall be 0.98 or higher.

* 1. Instrumentation and Controls

2.9.1 The control system shall continuously monitor and control the UV equipment’s functions.

2.9.2 Complete control and monitoring of the UV equipment shall be accomplished through the operator interface.

2.9.3 The operator interface shall be a color touchscreen and display the following information: UV system status, UV Dose, UV Intensity, UVT prediction, UV lamp lifetime, maximum prescribed flow rate, the countdown for warm-up and power down, UV Lamp cycles, power cycles, the cycle time of automatic quartz cleaning device, unit temperatures including water, PCB, lamp and overall system.

2.9.4 The control system shall provide warnings and alarms for all critical devices and functions in both visual and audible formats.

2.9.5 The control system shall contain a real-time clock.

2.9.6 The control system shall maintain a log of the last 100 events and record the time of the event and all critical parameters.

2.9.7 The control system shall provide discrete outputs in the form of dry contacts for warning and alarm conditions for remote monitoring.

2.9.8 The control system shall allow remote operation of the UV lamps with the UV reactor on standby when not in use.

2.9.9 The control system shall be able to provide analog outputs for UV Dose, or UV Intensity, or predicted UVT, and Modbus connectivity.

2.9.10 The control system shall be able to provide continuous data logging every 30 seconds onto a USB drive.

2.9.11 The control system shall be able to connect to and control a solenoid valve for the automatic shutdown of untreated water.

2.10 Safety Warnings and Alarms

2.10.1 The control system shall provide the following warnings at a minimum:

i) End of lamp life approaching

ii) End of lamp life exceeded

iii) Lamps cycling too often

iv) Quartz Cleaning device not operating

v) Water temperature approaching the high limit

vi) System temperature approaching the high limit

vi) Temperature sensor failure

2.10.2 The control system shall provide the following alarms at a minimum:

i) Low UV Dose

ii) Low UV Intensity

iii) UV Lamp failure

iv) Lamps Not Starting

v) UV Door Open

vi) PCB temperature too high

vii) System temperature too high

viii) Water temperature too high

xi) UV sensor failure

x) Microprocessor failure

1. PERFORMANCE

The UV system shall be tested by a certified lab for the inactivation of Legionella bacteria as a general bacterial efficacy screening tool to verify the efficacy of the system. The UV system shall provide a minimum of 6-log reduction of Legionella bacteria.

1. SERVICES
   1. Warranty

UV lamps shall be warranted for a minimum of 9,000 hours of operating time for 500 and 750 models and 12,000 hours of operating time for 1000 models, under the conditions specified herein, and for a maximum of 12 on/off cycles per 24-hour period.

* 1. Start-up and Training

Start-up on the unit must be performed by a qualified contractor. The contractor shall perform a training for the owner upon completion of start-up.