

McFarland WWTP UV module replacements

SPECIFICATIONS

GENERAL

Provide 14 replacement UV modules for an open channel, gravity flow, low pressure lamp, 120V single phase (not to exceed 6.3 amps) ultraviolet (UV) disinfection system located at the McFarland WWTP, 17630 Chagrin River Road, Chagrin Falls, Geauga County, Ohio, 44023.

The UV modules shall fit in the existing effluent channel which is 41 inches deep, 2 ¼ inches wide, and 76 ½ inches long. Each UV module shall have 8 UV lamps.



Figure 1. Label on current UV module device (McFarland WWTP, 2021).

DESIGN, CONSTRUCTION AND MATERIALS

A. General:

1. All metal components in contact with effluent will be stainless steel.
2. All wiring exposed to UV light will be Teflon™ coated.
3. All material exposed to UV light will be Type 316 stainless steel, Type 214 quartz, or Teflon™.
4. Wires connecting the lamps to the ballasts will be enclosed inside the frame of the UV Module and not exposed to the effluent, no exception.

B. Lamp Array Configuration:

1. The lamp array configuration will be uniform with all lamps parallel to each other and to the flow direction. The lamps will be evenly spaced in horizontal and vertical rows with centerline spacing equal in both directions.
2. The single array pattern will be continuous and symmetrical throughout the reactor.

3. The system will be designed for complete immersion of the UV lamps including both electrodes and the full length of the lamp tube in the effluent. Both lamp electrodes will operate at the same temperature and be cooled by the effluent.

C. UV Module:

1. Each UV module will consist of 8 UV lamps with an electronic ballast enclosure mounted on the Type 316 stainless steel frame.
2. Each lamp will be enclosed in its individual quartz sleeve, one end of which will be closed and the other end sealed by a lamp end seal and compressed O-ring. To be considered as an alternate, lamp quartz sleeves that are open at both ends will be supplied with twice the amount of specified spare seals and lamps.
3. The closed end of the quartz sleeve will be held in place by means of a retaining O-ring. The quartz sleeve will not come in contact with any steel in the frame.
4. The ends of the lamp sleeve will not protrude beyond the stainless steel frame of the UV Module.
5. Lamp wires will terminate in the electronic ballast enclosure located at the top of the UV Module.
6. The electronic ballast enclosure will contain the electronic ballasts and L.E.D. lamp status displays visible through a red Plexiglas viewing plate.
7. The ballast enclosure will be anodized aluminum.
8. All wires connecting the lamps to the ballasts will be enclosed inside the frame of the UV Module and not exposed to the effluent.
9. All lamp to ballast connections will be made by and tested by the UV Manufacturer.
10. At the point of exit from the UV Module frame the multi-conductor cable will pass through a waterproof strain relief.
11. Each UV Module will weigh no more than 60lbs and will be individually removable without using mechanical lifting devices.
12. Each UV Module will be connected to a receptacle on the Power Distribution Center by means of a multi-conductor cable with a molded 5 pin connector and a minimum length of 11 feet.
13. Each UV Module will have a UL rating of Type 6P.

D. UV Lamps:

1. Low pressure mercury slim line of the hot cathode instant start design. The coiled filamentary cathodes to be heated by the arc current.
2. The filament will be of the clamped design, significantly rugged to withstand shock and vibration.
3. Electrical connections at one end.
4. Each connection will have only two pins.
5. 90% of UV output will be within the wavelengths of 233.7 to 273.7 nm.
6. Rated to produce zero levels of ozone.
7. Lamp bases will be of a metal and ceramic construction resistant to UV and ozone.
8. The lamp base will incorporate a dielectric barrier or pin isolator. The pin isolator will consist of a non-conductive divider placed between the lamp pins to prevent direct arcing across the pins in moist conditions.

E. Lamp End Seal and Lamp Holder:

1. The open end of the lamp sleeve will be sealed by means of a sleeve nut, which threads onto a sleeve cup and compresses the sleeve O-ring.
2. The sleeve nut will have a rough surface that allows a hand grip for tightening. The sleeve nut will not require any tools for removal.

3. The lamp will be held in place by means of a molded lamp holder that will incorporate two seals. The lamp holder will seal against the inside of the quartz sleeve to act as a second seal in series with the external O-ring seal.
4. The second seal on the lamp holder will isolate and seal the lamp from the module frame and all other lamps in the module.
5. In the event of a quartz sleeve fracture the two seals of the lamp holder will prevent moisture from entering the lamp module frame and the electrical connections to the other lamps in the module.
6. The lamp holder will also incorporate a UV resistant plastic stop that will prevent the lamp sleeve from touching the steel sleeve cup.

F. UV Lamp Sleeves:

1. Type 214 clear fused quartz circular tubing.
2. Lamp sleeves will be domed at one end.
3. The nominal wall thickness will be 1.5 mm.

G. Electrical:

1. General:
 - a) Each UV module will be powered from the Power Distribution Center through a bus bar and will include a relay board and watertight connectors.
 - b) Each ballast will drive two lamps.
 - c) Maximum power consumption of each module will be no greater than 0.7 kW.

Note: Specifications are based on the Trojan UV units/modules currently in service at the McFarland WWTP.

Geauga County Department of Water Resources

McFarland WWTP UV module replacements

Bidder Information

Name: _____

Address: _____

Contact Person: _____

Phone Number: _____

Email Address: _____

BID

TOTAL AMOUNT BID \$

AMOUNT IN WORDS

Respectfully submitted:

Signature

Date