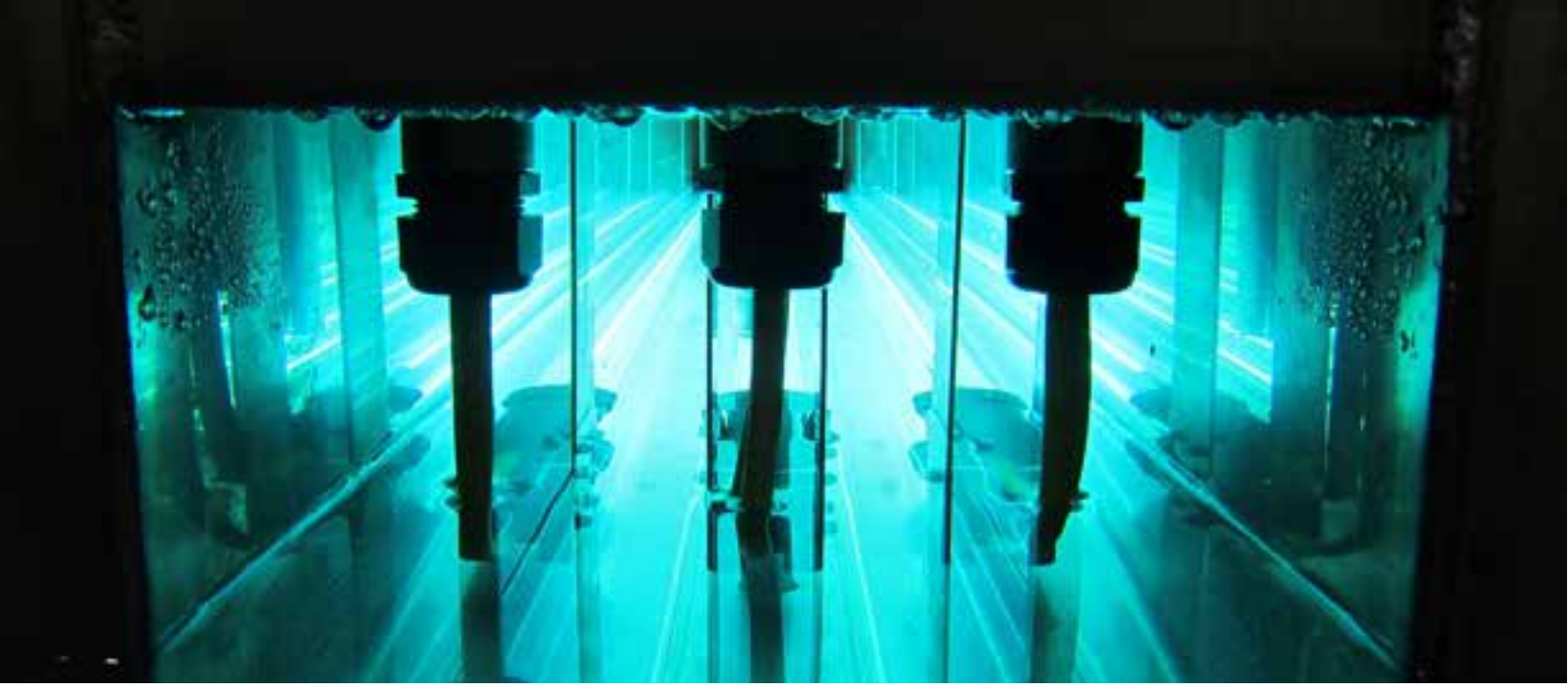
UV Wastewater

Horizontal Open Channel
Ultraviolet Disinfection

GLASCO UV



GLOW **HC** Series

Our Company

Glasco Ultraviolet has been manufacturing UV water and wastewater disinfection systems for over 50 years. We manufacture equipment for a variety of markets, industries and applications at our New Jersey (USA) facility.

From our early history as a New York City based process equipment manufacturer for the food industries, to our over fifty years of ultraviolet "UV" disinfection system fabrication, Glasco has been and will continue to be a high quality supplier for all of your UV disinfection needs.

In the 1940's, Glasco was committed to supporting manufacturers during the war effort. Even then, our mission was to "build and design any handling equipment made of metal that will enable you to process or fabricate more expeditiously or more efficiently".

Since the 1960's, Glasco has manufactured tens of thousands of systems that use UV light to disinfect water, air and surfaces. The UV business originally developed as a direct result of our ability to manufacture high-grade stainless steel material handling equipment and vessels that were food and beverage grade.

Today, Glasco manufactures a complete product range of UV disinfection systems for treating both clean and wastewater for the residential, commercial, industrial and various municipal marketplaces.

Our systems integrate mercury vapor ultraviolet lamps to provide environmentally friendly disinfection. UVC light, defined as UV light emitted at wavelengths between 200 and 300 (254 is peak) nanometers (nm), is used as a means of disinfection by inactivating microorganisms, including water borne pathogens. UV irradiation has been proven to be a fast, reliable, effective, economical, and environmentally friendly disinfection method and has been successfully applied worldwide for decades.

UVC lights targets the microorganisms' DNA. Exposure to UVC light prevents the microorganism from reproducing and cells that cannot reproduce cannot infect and are therefore harmless.

Glasco has integrated today's best tested technologies into our current offerings of horizontally oriented open channel wastewater treatment equipment. The GLOW **HC** Series.

1. UV Disinfection

When wastewater pathogens are exposed to UV light, their cells become damaged and this damage inhibits reproduction. The UV light, produced by a special UV lamp, damages the cell's DNA and RNA and once damaged, they are unable to replicate. This physical process renders them harmless.

2. The Kill

The amount of damage is a result of the lamp's UVC intensity multiplied by the residence time. The dosage is commonly referred to as micro-watts and is often expressed as mJ/cm2. Dosages of 30,000 uWs/cm2 (30 mJ) are common for meeting a 200/100 ml discharge permit.

3. Calculating Dose

There are a number of ways that the industry calculates dosage. The two primary methods are biological testing (bioassay) and mathematical calculations using light physics (Point Source Summation Method aka UVDIS) . Both offer end users with information that is important in system sizing. Each method takes into account flow rate, wastewater transmission, lamp type and number of lamps.

4. Why use UV?

UV disinfection is a well accepted method for treating wastewater. The main benefits of UV are that it is a green technology (no chemicals), that it does not require a long residence time and the technology has matured over the last 25 years. UV disinfection produces no by harmful by-products and will work on a wide range of effluent quality.

1 GLOW-300

GLOW 300 - for wastewater plants up to 150,000 GPD. Called packaged plants, the GLOW-300 comes with a stainless steel channel, transition boxes and built in level control. Electronics are remote in a NEMA 4x enclosure. Lamp: Low pressure high output 80 watts.

2 GLOW-5000

GLOW 5000 - for wastewater flows up to 5+ MGD. The GLOW-5000 is designed to operate in a stainless steel or pre poured concrete channel. Lamp technology: Low pressure high output 155 watts.

3 SUNLIGHT H-4XE-HO

SUNLIGHT H-4XE-HO - designed and validated by HydroQual to treat 800,000 GPD. The system can be installed in a stainless steel or concrete channel. Lamp technology: Low pressure high output 155 watts.

4 GLOW-6000

GLOW-6000 - designed to treat unlimited wastewater flows. Using state of the art UV lamp technology, the system has a 10 year track record. Lamp technology: Low pressure high intensity amalgam 320 watts.

Horizontal Operation

Horizontal UV disinfection systems have been the most widely installed type of UV system in the world.

While wastewater plants have many availabe options (vertically oriented open channel or chambered), Glasco UV has installed hundreds of horizontal systems ranging in flow from 1 gpm to 30 MGD.

Typical Set Up

- Stainless steel or pre poured concrete channels
- Horizontal modules
- Remote NEMA 4x stainless steel electrical enclosures
- Level control (weir, flap gate or downward gate)
- Optional automatic air driven quartz cleaning
- UV monitoring
- PLC control
- Select models bioassayed at UV Validation and Research Center of New York, Johnstown, NY
- Hydraulically tested and profiled
- Environmental Technology Verification (ETV) test performed for NSF International (NSF) and the United States Environmental Protection Agency (EPA)

Automatic Quartz Cleaning System

Modules can be provided with an automatic quartz cleaning system. The pneumatically driven piston uses a quick stroke approach to remove materials from the sleeves before they have the ability to build up and foul. System can use a standalone air compressor or have air supplied by the plant.

Ultraviolet Monitoring

Modules incorporate a UV light sensor and monitoring system . If automatically cleaned, the sensor is cleaned as part of the automatic wiping system. The sensor reads 360 degrees of UV light and provides an output from 0-100%. Information is displayed locally and remotely.

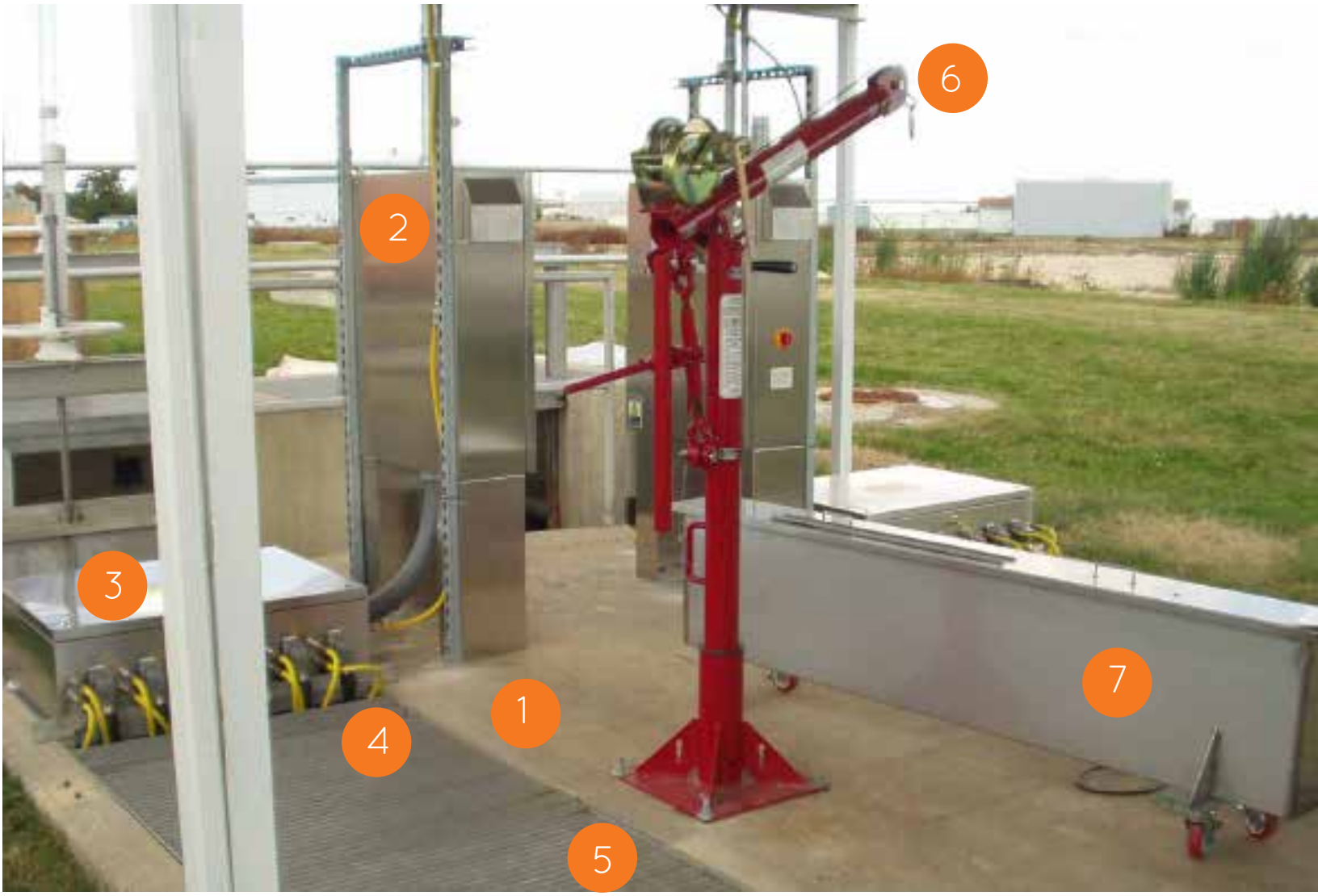
Lamp and System Maintenance

In order to perform preventive and yearly maintenance, the horizontal module needs to be removed from the channel. Once removed, operators need to undo the quartz o-ring seal, remove the quartz sleeve, remove and then replace the lamp and then re-quartz for return to operation.

Controls and Displays

At a minimum, each horizontal system will display lamp operating status, run time and UV output. PLCs can be integrated for remote monitoring on a lamp by lamp basis, lamp dimming, flow pacing based on a 4-20 mA signal from plant flow meter and automatic operation.

GLOW Horizontal Plant Overview



1. Concrete Channel
2. BCC / SCC
3. Junction Box
4. Modules
5. Level Control
6. Hoist
7. Dip Tank

About UV lamp technology

Not all lamps or UV systems are created equal. Various manufacturers will tout the benefits of their lamp type.

The primary type of UV lamps being used for horizontal open channel disinfection systems are low pressure (standard, high output and amalgam). The other type of UV lamp that is used for disinfection is called medium pressure.

The difference between low pressure and medium pressure is one of UV efficiency. Low pressure lamps produce 90%+ in 254 nm range. Medium pressure lamps only produce 15%, but are extremely powerful and allow for fewer lamps.

Standard output is 65 W, High Output is 155 W and Amalgam lamps come in various outputs ranging from 270 to 1000 Watts. Medium pressure range from 2,000 to 10,000 watts.

Horizontal Operation

Modules are lowered into their stainless steel support systems. Once in place, the module's utilities (power, data and air) are connected to the Ballast Control Center (BCC) and System Control Center (SCC) directly or through a junction box, which spans the channel.

As the wastewater enters the channel, banks of modules will turn on in relationship to a flow signal. To aid in lamp and energy savings, the system can be designed to dim the UV lamps based on a flow signal.

The quartz sleeves and UV sensor are automatically cleaned on a periodic basis. The protective sleeves are wiped to prevent build-up from adhering to the quartz.

Operators inspect the system to ensure that the lamps are functioning and that they are still producing actual UV light. Lamp Out and Low UV output indicators and alarms will direct operators to the service issue.

Modules are removed for service, cleaning or for seasonal storage.

Service

GLOW 300	
Flow rate range	up to 150,000 GPD
Channel	Stainless (optional concrete)
Level Control	Stainless weir with drain
Lamps	Low Pressure HO
Watts per lamp	85
Voltage	120-277 50/60 Hz
Electrical enclosures	Remote NEMA 4x Stainless
Ballasts	Electronic
UV Monitoring	0-100% (optional 4-20 mA)
Quartz sleeve cleaning	Optional Automatic

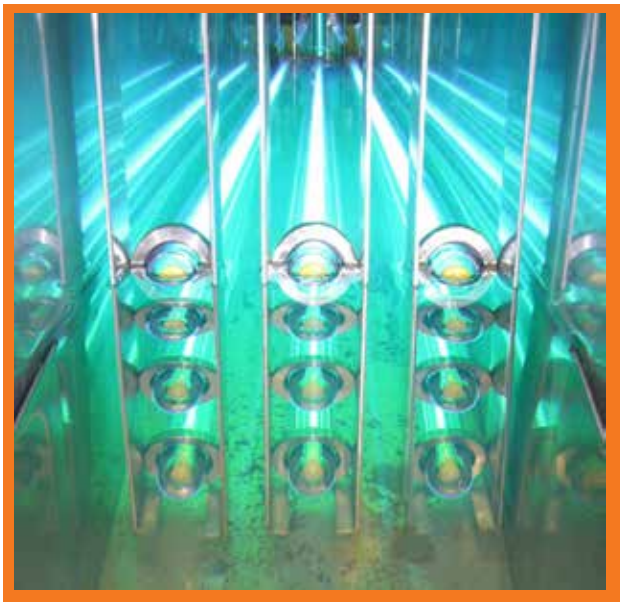
The **GLOW 300** is our offering for lower flow rates (<150,000 US GPD) and is designed to treat a 6" water level. The system has been designed for smaller packaged wastewater treatment plants.

Systems are good for smaller towns, industries, mobile home parks and new developments.

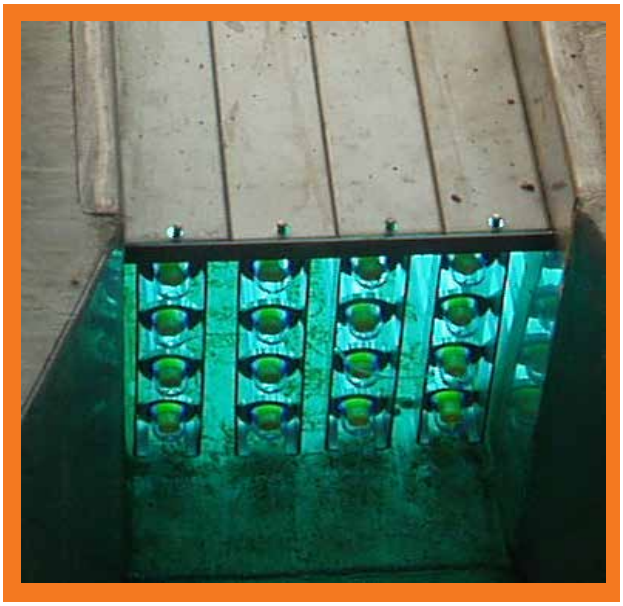
The **GLOW 5000** is our offering for plants exceeding 100,000 GPD. The system has 15 production years and hundreds of installations worldwide.

Systems are often provided with packaged stainless steel channel, but can also be installed in pre poured concrete channels.

GLOW 5000	
Flow rate range	up to 5 MGD
Channel	Stainless (optional concrete)
Level Control	Stainless weir with drain
Lamps	Low Pressure HO
Watts per lamp	155
Voltage	120-277 50/60 Hz
Electrical enclosures	Remote NEMA 4x Stainless
Ballasts	Electronic
UV Monitoring	0-100% (optional 4-20 mA)
Quartz sleeve cleaning	Optional Automatic



SUNLIGHT H-4XE-HO (typical 200/100 ml plant)	
Flow rate range	800,000 US GPD/Bank
Channel	Stainless steel or concrete
Level Control	Stainless weir with drain
Lamps	Low Pressure HO
Watts per lamp	155
Voltage	120-277 50/60 Hz
Electrical enclosures	Remote NEMA 4x Stainless
Ballasts	Electronic
UV Monitoring	0 - 100% with 4-20 mA
Quartz sleeve cleaning	Optional Automatic



The **SUNLIGHT H-4XE-HO** is a sixteen (16) lamp biologically validated low pressure high output UV disinfection channel system that treats up to 800,000 GPD (for a 200/100 ml) and is designed to treat a 12" water level .

The system has been validated in cooperation with the NSF and US EPA's Environmental Technology Verification Program (ETV). This program allows performance verification of innovative environmental technologies.

The **GLOW 6000** large flow horizontal amalgam UV disinfection system is designed for large horizontally oriented plants.

Using state of the art lamp, ballast and monitoring equipment sourced from German companies, the GLOW 6000 is a high tech UV disinfection system.

The system uses various plant parameters to dim the lamps in relationship to the flow. This allows for energy and lamp conservation.

GLOW 6000	
Flow rate range	unlimited
Channel	Concrete
Level Control	Weir, Flap Gates, Gate
Lamps	Low Pressure Amalgam
Watts per lamp	320
Voltage	230 V 50/60 Hz
Electrical enclosures	Remote NEMA 4x Stainless
Ballasts	Electronic
UV Monitoring	0 - 100% with 4-20 mA
Quartz sleeve cleaning	Automatic

Installations and Design

Experience

Today, Glasco supports hundreds of our wastewater plant installations around the world from our NJ USA based manufacturing facility.

We constantly strive to improve our technologies and have been at the forefront of the technology for the last 10 years.

We test and integrate the best components from around the world to manufacture our horizontal UV disinfection systems.

Many of our systems have been biologically validated to the most current standards by HydroQual at the Johnstown NY UV Validation Center.

- 1999 installed first low pressure high output system.
- 2001 installed first 320 watt horizontal amalgam
- 2004 installed 36 MGD amalgam system.
- 2007 installed first 450 watt horizontal amalgam.
- 2009 NSF - EPA - ETV Bioassays conducted.
- Worldwide installation base with horizontal systems installed in North and South America, Europe and Asia.

Environmental Considerations

UV systems, especially the UV lamp ballasts, are susceptible to both heat and freezing conditions. Some plants are only required to treat water seasonally.

Many operators have indicated that their jobs would be easier if a simple pole structure had been placed over the channel. These type of structures allow the operators to work in inclement weather and prevents them from dealing with issues like snow build-up or extreme heat conditions.

The other issue that needs to be carefully considered is the installation height of the level control system. The UV lamps need to be submerged regardless of the flow. This means that at both no flow and at peak flow, the lamp's electrodes need to be covered by the effluent. This not only ensures that the wastewater is being disinfected, but also provides needed cooling for the UV lamp.

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