OIL, GAS & PETROCHEMICAL UV SYSTEMS
EXPERTS IN WATER TREATMENT
Established in 1981, atg Evoqua have become the world market leader in the design and manufacture of UV disinfection systems and integrated water treatment packages for the oil and gas industry. As a specialist supplier to the oil and gas and petrochemical sectors, atg Evoqua are recognised worldwide for innovative engineering solutions, high quality manufacturing and for unsual collaborative research and development, including involvement in many industry projects (JIP) with leading oil and gas major operators.

Operating from a modern UK based manufacturing facility, atg Evoqua serves the global oil, gas and petrochemical sectors directly from our headquarters in Lancashire, North West England (UK) with a team of experienced Project Managers and Process, Mechanical, Electrical and Chemical engineering disciplines.

With over 35 years of expertise in water treatment and equipment designed especially for offshore and hazardous area environments, atg Evoqua have delivered hundreds of UV plants worldwide, including many of the world’s largest offshore potable drinking water plants treating over 100 m³/h and seawater injection plants (SWIR) treating over 4,000 m³/h each and every day.

As a global business, atg Evoqua have an established and experienced global distribution, service and after sales network who work closely with operators, EPC contractors and oil field service companies to provide innovative and cost effective solutions and award winning after sales support that includes offshore installation, commissioning and service visits.

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UV disinfection is the most cost-effective advanced treatment technology available when compared to alternative technologies on the market. An annualised cost analysis (graph above) illustrates how UV disinfection is used as part of an holistic approach, can assist operators to reduce their environmental impact factor (EIF) by 50% or more, whilst improving environmental performance and lowering the EIF at discharge.

As a chemical free, physical process, UV disinfection provides a range of operational advantages and process benefits when compared to traditional biocides. As regulations such as OSPAR, HOCNF and the EU Priority Substances Directive introduce more stringent operational and environmental parameters, the holistic link between chemical-use in up-stream processes and its impact on down-stream applications and Environmental Impact Factors (EIF) is becoming more understood.

Beyond the economic and environmental benefits to the oil and gas industry, as regulations around the world tighten, the holistic link between the selection of water treatment technologies such as electro-chlorination (ECL), which are typically 50% smaller in footprint and weight, UV Chambers use modern ‘in-line’ designs that see UV reactors installed direct into the pipe (similar to a valve or flow meter) making the technology suitable for retrofit into pipe galleries.

Developments in power supply technology and UV lamp design have significantly increased both UV system capacity (typically treating 1 m3/hr to over 6,000 m3/hr) and operational life, with certain UV designs being able to operate continuously for over 2 years before requiring any maintenance; making UV Systems suited to future developments such as unmanned platforms and subsea installations.

The UV dose (fluence rate) is typically expressed in mJ/cm2, with the term ‘fluence’ defined as the amount of UV energy delivered to the microorganism over a specific time (fluor time). Other parameters such as target microorganism species, inlet microorganism levels, UV Transmittance (UVT%) and sizing a UV disinfection system.

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While all known microorganisms are susceptible to UV light, different microorganisms have different UV dose response rates. Species such as SRB's have proved to be very sensitive to UV-C with a dose of 40 mJ/cm2 providing a >4 log (99.99%) reduction in a single pass (0.5 seconds exposure). Other species such as Adenovirus require a dose of around 120 mJ/cm2 to achieve a 4 log reduction (99.99%).

Unmanned platforms and subsea installations. Designs being able to operate continuously for over 2 years before requiring any maintenance; making UV Systems suited to future developments such as unmanned platforms and subsea installations.
UV SYSTEM DESIGN

OFFSHORE / OIL & GAS SPECIFICATION UV SYSTEMS

UV treatment is widely used throughout the oil and gas sector, however the design, engineering, quality and documentation requirements are far beyond that of standard UV equipment used in typical industrial applications. As specialist suppliers to the onshore and offshore oil, gas and petrochemical sectors, atg Evoqua have over 35 years’ experience in supplying UV systems and integrated water treatment packages that meet the high specifications and engineering requirements of oil, gas and petrochemical operators worldwide.

All UV Systems are manufactured to the highest standards and feature key upgrades such as material of construction, certification, advanced weld procedures, pressure vessel design and upgraded electrical designs to ensure the equipment is fit for purpose in some of the world’s most demanding environments. From high temperature desert locations (+55 Deg C) to the freezing outdoor decks of Norwegian North Sea platforms (-40 Deg C), atg Evoqua have the experience and engineering knowledge required to design and manufacture UV Systems and associated package designs to suit any specification or location, including -

- Offshore Platforms, FPSO, Drilling Rigs & Support Vessels
- Onshore Oil & Gas & Shell Work Pads
- Petrochemical & Refineries
- Unmanned Platforms & Subsea Environments
- High vibration environments (DNV)
- Desert Locations (+55 Deg C Ambient)
- Freezing Locations (-45 Deg C Ambient)
- Tropical Locations (+88 % Humidity)

UV System Design for Offshore / Oil & Gas Specifications

- 316L SS Local control panels
- LSZH cables (Low Smoke Zero Halogen)
- 316L SS cable glands
- Robust, vibration proof panel designs
- UV chamber ASME B31.3 calculations & nozzle loads
- RF Flange Upgrades for all nozzles
- PMI, NDT, X-Ray & 3.1 material certifications
- 316L SS instrumentation
- Full Project Documentation & Certifications

DESIGNED FOR OIL & GAS INSTALLATIONS

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Optional Design Upgrades

- NiPH certified (FHI Water Report 126)
- US EPA UVDGM validated
- NSF-55 certified (class 1 & 2)
- NORSOK, GOST, DOSH compliant designs
- ASME, PD5505 & EN13445 pressure vessels
- ATEX / IE CEX hazardous area - Zones 1 & 2
- Exotic materials, specialist ITP & material certifications
- Tropicalisation / winterization
- 230V / 400V / 440V / 480V / 690V designs

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ATEX & IEC EX

UV SYSTEMS FOR EXPLOSIVE HAZARDOUS AREAS

Atg Evoqua are one of only a few UV system equipment manufacturers in the world to specialise in the design and manufacture of ATEX (99/92/EC) and IEC EX certified UV disinfection systems and water treatment packages for operation in hazardous area Zones 1 and 2 for the global oil, gas and petrochemical sectors.

From drilling decks and accommodation platforms, to upstream refineries, many oil, gas and petrochemical installations now require equipment to be installed in hazardous areas and ATEX classified zones. Explosive atmospheres can be caused by any number of flammable gases, mists, vapours and combustible dusts. When a sufficient quantity of hazardous material is mixed with air, all that is needed to cause an explosion is a source of ignition such as a spark or even a high surface temperature.

Locations classified in to hazardous zones are required by law to be protected from sources of ignition. Whilst there are many UV systems available on the market, there are very few that can meet the strict requirements of the ATEX (99/92/EC) & IEC EX directives for installation into explosive atmospheres and classified hazardous zones.

Atg Evoqua are the worlds’ leading supplier of ATEX Zone 1 & 2 / IIA & IIB / T3 certified UV disinfection systems. In addition, atg Evoqua’s UK manufacturing facility is certified as an approved ATEX equipment manufacturing site under the Explosive Atmospheres Directive 2014/34/EU-Annex IV. Clients for ATEX approved UV systems include: Equinor (Statoil), Shell, Transocean, Petronas, Conoco Phillips, GDF Suez, ADMA, Maersk and Total.

ATEX & IEC EX DESIGNS

- Ex d & Ex e UV chamber designs
- Ex d Local control panels (<10.0 kW)
- Ex p Local control panels (>10.0 kW)
- Ex de Junction boxes & cable glands
- Ex ia & Ex d instrumentation
- Ex d Automatic wiper systems
- Ex d valves & actuators
- Ex d pumps
- ATEX Zone 1 & Zone 2, SIL rated safety circuits
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atg Evoqua package experience includes skid designs manufactured to meet client engineering specifications, footprint requirements and tie in points of individual projects and also, containerised UV plant designs, with all equipment installed into mobile 10ft, 20ft, 30ft or 40ft DNV certified containers. All ancillary items such as valves, actuators, manifolds, pipe work, junction boxes, distribution boards and electrical installation materials are included. In addition to UV disinfection systems, atg Evoqua specialise in providing integrated technology solutions onto one, turn-key package that includes all necessary equipment to treat the process, such as:

- Valves & actuators (isolation & flow control)
- Pumps
- Filters (Y-Type, basket & cartridge)
- Chemical dosing equipment
- Buffering capacity / storage tanks
- Project specific instrumentation
- RIO cabinets and supervisory control panels

Skid Packages Features
- Purpose built 316L SS skid frames
- Ultra compact, low weight designs
- Duty / standby & duty / assist / standby designs
- Single point lift
- Turn-key operation, easy to install
- 30 year design life
- Designed for installation in an offshore environment
- Safe area & ATEX Zones 1 & 2 hazardous area designs
- Standard off-the-shelf & bespoke designs available

Design Options
- Euro code 3 skid designs & stress analysis
- ASME B31.3 pipe stress analysis + nozzle loads
- ASME, PD5500 & EN13445 pressure vessel design
- Seismic, wind, snow, transport, lift & drop loads
- Safe area / ATEX / IECEx hazardous area installations
- Exotic materials and bespoke designs
- Outdoor installations (water treatment / tropicalization)
- NORSOK / DOSH / GOST compliant designs
- Range of ITP & NDE options

Standard Equipment
- Pumps
- Filters
- Chemical dosing units
- Buffering Capacity / Storage Tanks
- Pipe work, Manifolds & Tubing
- Valves & Actuators
- Flow Meters & Additional Instruments
- Wintertization (heat tracing & insulation)
- Lifting Equipment

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UV disinfection is a physical process that does not involve the use of chemicals and does not create any disinfection by-products. In some locations/regions, UV is used as the only disinfection barrier, providing the full inactivation of bacteria, protozoa and viruses. In other locations, UV is used as part of a multi-barrier approach, either installing the UV as a final treatment stage to protect against chlorine resistant pathogens or utilizing it as the primary disinfection stage, followed by the residual chlorine at low levels (0.2ppm - 0.5ppm) to protect the sterilized drinking water as it travels through the distribution/pipeline network.

No microorganism has developed immunity to UV disinfection, with a standard UV dose of 40 mJ/cm² achieving a 4 log reduction (99.99%) in a single pass of water. UV cannot be overdosed, no disinfection by-products or chemical residuals are produced, effective for both RO permeate and bunkered water. Automatic dose pacing adjusts power to match variable flow rates and water quality.
Inadequate disinfection and treatment of micro-organisms such as SRB (Sulphate Reducing Bacteria) and Slime Forming Bacteria in seawater used for well injection (enhanced oil recovery) has been proven to lead to a range of negative consequences, including:

- Microbiological Induced Corrosion (MIC)
- Well souring (H₂S)
- Reservoir plugging (H₂S + Fe = FeS)
- Formation of bio-films & Extracellular Polymeric Substances
- Damage of equipment & components (e.g., pumps)

With increasingly strict regulations on chemical use (OSPAR, HOCNF, PSD), there has been an increasing effort by operators to reduce or eliminate chemicals and biocides from the process and research new, environmentally friendly treatment solutions.

Working with ConocoPhillips in a Joint Industry Project (JIP), atg Evoqua carried out the original research (1993) into using UV treatment for seawater disinfection and SRB reduction. The high effectiveness of UV against SRB’s has led to UV being widely used offshore and onshore for well injection, with the largest plants operating in the Norwegian North Sea since 1999: ConocoPhillips’ Eldfisk Platform (4,365 m³/hr) and Ekofisk Platform (4,620 m³/hr).

By using UV disinfection for seawater treatment, operators can reduce the required volumes of biocides from the process typically by 90% to 100%. Alternatively, operators can use UV disinfection as an additional treatment step in conjunction with biocides or other chemicals such as chlorine to ensure maximum disinfection performance, significantly improving reservoir life.

- Eliminates the need to ship/store biocides offshore
- Improves Health & Safety (reduced chemical handling)
- Improved environmental profile (reduced EIF)
- Low maintenance technology
- Suitable for unmanned platforms
- Proven, cost saving technology
- Simple to operate, turn-key design
- Easy to install, modular design
- Flow rates from 10 m³/hr to 6,000 m³/hr per chamber

SEAWATER (WELL INJECTION)

CHEMICAL FREE, UV DISINFECTION FOR ENHANCED OIL RECOVERY (EOR)

Process Advantages
- Chemical free, environmentally friendly solution
- Reduces the use of HOCNF classified chemicals
- Leaves no residual chemicals or toxic compounds
- Creates no disinfection by-products
- Provides >4 Log Reduction (99.99%) of SRB’s
- Protects against MIC (Microbial Induced Corrosion)
- Protects against bio-films & EPS layers
- Protects against well souring & well plugging (H₂S)
- No microorganism immunity to UV disinfection

Benefits of UV Disinfection
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- Suitable for unmanned platforms
- Proven, cost saving technology
- Simple to operate, turn-key design
- Easy to install, modular design
- Flow rates from 10 m³/hr to 6,000 m³/hr per chamber

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- Improved environmental profile (reduced EIF)
- Low maintenance technology
- Suitable for unmanned platforms
- Proven, cost saving technology
- Simple to operate, turn-key design
- Easy to install, modular design
- Flow rates from 10 m³/hr to 6,000 m³/hr per chamber

SEAWATER (WELL INJECTION)

CHEMICAL FREE, UV DISINFECTION FOR ENHANCED OIL RECOVERY (EOR)

Process Advantages
- Chemical free, environmentally friendly solution
- Reduces the use of HOCNF classified chemicals
- Leaves no residual chemicals or toxic compounds
- Creates no disinfection by-products
- Provides >4 Log Reduction (99.99%) of SRB’s
- Protects against MIC (Microbial Induced Corrosion)
- Protects against bio-films & EPS layers
- Protects against well souring & well plugging (H₂S)
- No microorganism immunity to UV disinfection

Benefits of UV Disinfection
- Eliminates the need to ship/store biocides offshore
- Improves Health & Safety (reduced chemical handling)
- Improved environmental profile (reduced EIF)
- Low maintenance technology
- Suitable for unmanned platforms
- Proven, cost saving technology
- Simple to operate, turn-key design
- Easy to install, modular design
- Flow rates from 10 m³/hr to 6,000 m³/hr per chamber
PRODUCED WATER

CHEMICAL FREE DISINFECTION & SRB REDUCTION

BENEFITS OF UV DISINFECTION

Produced water re-injection (PWRI) is increasingly being used by operators to gain value from returning injection waters and avoid the need for environmental discharge or disposal wells. With total global volumes of re-injected produced water set to increase to over 340-bn barrels annually by 2020, operators are looking for advanced treatment solutions that can increase the quality of re-injected produced water, whilst reducing operation costs and simplifying operations.

Traditionally, large volumes of biocide such as Glutaraldehyde have been used to control bacterial growth before reinjection, however the rising costs of chemicals, handling, and offshore storage concerns plus an appetite by operators to reduce the number of chemicals added to the process has seen operators turn to UV treatment as an alternative solution.

Through extensive R&D with major oil and gas operators, atg Evoqua have developed and field tested a range of UV solutions specially designed to treat produced water and provide a minimum 99.99% reduction of microorganisms such as SRB's, acid producing bacteria and biofilm forming microorganisms, that if left untreated, pose a range of negative consequences including:-

- Microbiological Induced Corrosion (MIC)
- Well souring (H₂S)
- Reservoir plugging / equipment blinding (H₂S + Fe = FeS)
- Formation of bio-films & Extracellular Polymeric Substances

By using UV disinfection, operators can significantly reduce the required volumes of biocides from the process or alternatively use UV as a final polish solution to improve produced water quality.

Operational Benefits

- Eliminates the need to ship / store biocides offshore
- Improves Health & Safety (reduced chemical handling)
- Improved environmental profile
- Low maintenance technology
- Suitable for unmanned platforms
- Proven, cost saving technology
- Easy to install, modular design

Flow rates from 10 m³/hr to 2,000 m³/hr per chamber
The process of Hydraulic Fracturing requires large volumes of clean, sterile water to be injected into the shale formation to release the gas trapped between the rocks. Typically, 20% to 70% of the injected water, together with formation water and other contaminants returns from the well in the form of flowback or produced water.

Large scale removal of this water poses significant problems for operators due to the high number of truck movements required to remove the flowback to an off-site facility and then deliver replacement fresh water in its place. In addition, the high costs associated with off-site wastewater treatment and disposal are also of significant concern, with typical disposal costs ranging from £11.00 to £19.00 per m³ (in the UK).

As regulations, planning authorities and politics continue to drive sensitivity over the use of chemicals, truck movements and fresh water use, investment in on-site water treatment solutions that see flowback water recycled and reused for use on additional fracture stages have become a major priority for shale gas operators.

The use of UV disinfection as the primary sterilisation technique has allowed operators to eliminate the need for chemicals / biocides such as Glutaraldehyde and THPS from the process and have provided both the US and UK shale gas / shale oil industries with a highly effective ‘chemical-free’ treatment solution that targets a range of micro-organisms including SRB’s (Sulphate Reducing Bacteria), Acid Producing Bacteria and Slime Forming Bacteria.

### Operational Benefits
- Eliminates the need for biocides by 90% - 100%
- Significantly reduces truck movements
- Reduces / eliminates fresh water use
- Reduces CO₂ Carbon footprint
- Allows for local water extraction e.g. River / canal
- Improves environmental profile of operations
- Reduces operational costs
- Mobile design with small footprint (20ft container)
- On site, turn-key solution

### Process Advantages
- Highly effective, field proven technology
- Identified as a Best Available Technique (BAT)
- 100% chemical free (safe, drinking water technology)
- Provides >4 Log Reduction (99.99%) kill of SRB’s
- Leaves no residual chemicals or toxic compounds
- Creates no disinfection by-products
- Protects against MIC (Microbial Induced Corrosion)
- Protects against bio-films & EPS layers
- Prevents well souring (H₂S)
- Prevents well plugging (H₂S + Fe = FeS)

### BASED ON A WELL USING 30,000 M³ OF WATER, GENERATING 40% FLOWBACK, ON-SITE TREATMENT AND FLOWBACK WATER REUSE COULD ELIMINATE UP TO 1,556 ROAD TANKER TRIPS.

### MOBILE WATER TREATMENT PLANTS ALLOW OPERATORS TO SOURCE WATER FROM LOCAL RIVERS, CANALS, COAST LINES & EFFLUENT TREATMENT PLANTS

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ON SITE, CHEMICAL FREE DISINFECTION FOR WELL INJECTION WATER

HYDRAULIC FRACTURING

BENEFITS OF UV DISINFECTION
The water used for pipeline flooding and hydro-testing has for some time been known as a potential source of microbial contamination, containing natural concentrations of SRBs (Sulphate Reducing Bacteria), Acid Producing Bacteria and Planktonic Slime Forming Bacteria, that if left untreated, pose a range of negative consequences including:

- Microbiological Induced Corrosion (MIC)
- Production of hazardous hydrogen sulphide gas (H2S)
- Formation of bio-films & Extracellular Polymeric Substances
- Damage of equipment & components (e.g. Pumps)

Traditionally, chemical biocides such as Glutaraldehyde and THPS have been used to prevent bacterial growth, however strict limitations on discharges to the environment of wastewater following completion, together with the high cost of chemical biocides have seen operators look for alternative solutions. UV disinfection of fresh water, brackish water and seawater provides a highly effective, low cost alternative to chemical biocides for eliminating all known microorganisms, including SRB's. As a chemical-free technology, UV treatment has been successfully used in the field by leading operators on some of the world’s largest and most prestigious pipeline commissioning projects including the Nord Stream 1 & 2 (Baltic Sea) and Castor (Caspian Sea) pipelines.

When used with 50 micron pre-filtration, operators deploying UV packages have been able to fully eliminate the use of biocides from the process, significantly improving the environmental profile of the project and lowering operational costs.

- Eliminates the need for biocides
- Allows for free discharge of water into environment
- Simple to operate, turn-key design
- Improves environmental profile of operations
- Reduces operational costs (chemical cost saving)

Biochemical oxidation methods are not suitable for use on high salinity pipelines. However, UV disinfection can be used in conjunction with biological oxidation systems to ensure that all microbial contamination is eliminated from the water produced. When combined with 50 micron pre-filtration, biocides can be eliminated from the process, significantly improving the environmental profile of the project and lowering operational costs.

Pipe line HYDROTESTING

CHEMICAL FREE DISINFECTION & SRB REDUCTION OF PIPELINE FLOODING WATER

BENEFITS OF UV DISINFECTION

- Highly effective, field proven technology
- Used on major pipeline projects worldwide
- Identified as a Best Available Technique (BAT)
- 100% chemical free (drinking water technology)
- Leaves no residual chemicals or toxic compounds
- Creates no disinfection by-products
- Provides >4 Log Reduction (>99.99%) kill of SRB’s
- Protects against MIC (Microbial Induced Corrosion)
- Protects against bio-films & EPS layers
BLOWOUT PREVENTOR (B.O.P.) units used during drilling operations are critical safety devices that rely on high-quality, sterile and particle-free hydraulic fluid for reliable operation. As a leader in water treatment for the oil and gas industry, atg Evoqua developed the world’s first UV treatment solution to effectively maintain and protect B.O.P. operation fluids.

BLOWOUT PREVENTOR (B.O.P.) units used during drilling operations are critical safety devices that rely on high-quality, sterile and particle-free hydraulic fluid for reliable operation. As a leader in water treatment for the oil and gas industry, atg Evoqua developed the world’s first UV treatment solution to effectively maintain and protect B.O.P. operation fluids.

Blowout preventors are used to stop the uncontrolled flow of liquids and gases during operations. Typically, B.O.P’s are controlled and operated by hydraulic fluids comprised of: potable grade fresh water, glycol based antifreeze & soluble lubricants with corrosion inhibitors. If left untreated, the levels of bacteria present in the B.O.P controls fluid can quickly begin to rise. This growth is quickly accelerated by the sugars present in the glycol mixture. Bacterial growth is now a hot topic with operators, as even small amounts of biological activity can cause significant damage including; microbial induced corrosion (MIC) on the fluid lines, corrosion of the B.O.P and control unit components and seals and control system blockages caused by the formation of particles and solids in the fluid. These can lead to critical B.O.P failure and irreparable damage of the blow out Preventor itself.

Working with subsea BOP control specialists, atg Evoqua developed a unique treatment solution that combines specially designed UV disinfection reactors, pumps, instrumentation and filtration technology. The atg Evoqua solution has been field tested and proven to keep B.O.P hydraulic operation fluid in perfect condition.

**Process Advantages**
- Field proven process design
- Continuous, recirculation disinfection technology
- Effective against all known microorganisms
- Keeps B.O.P fluid in perfect, sterilise condition
- UV cannot be overdosed
- No disinfection by-products or chemical residuals
- Chemical free, environmentally friendly solution
- Installs directly to B.O.P Mix Tank (recirculating line)
- Monitors fluid integrity (pH & conductivity)

**Operational Benefits**
- Turn-key, skid design solution available
- No complex monitoring or measurements required
- Designed to recirculate B.O.P mix tank
- Low maintenance technology
- 100% duty/100% standby design
- 12,000 hour continuous operation
- Easy to install / retrofit into existing pipe galleries
- 20 year design life
- Safe area & ATEX Zone 1 & 2 solutions
MEMBRANE PROTECTION

Membrane and filtration technology such as Reverse Osmosis, Ultra Filtration and Nano Filtration are widely used in the oil and gas sector to remove organics, solid particles and sulphates from process water such as seawater, used for well injection and enhanced oil recovery (EOR) applications in order to protect the reservoir. However, microorganisms such as Sulphate-Reducing Bacteria, Vibrio Fischeri and Pseudoalteromonas Lipofera that are naturally present in the environment and feed water can significantly decrease the life of membranes, filters and other equipment through microbiological damage, including:

- Bio-film / EPS layer growth
- Microbial Induced Corrosion (MIC)
- Plugging / blinding (biological organic particles)
- Plugging / blinding (H2S + Fe = FeS)

Traditionally, disinfection with chlorine, followed by de-chlorination with sodium bisulfate or carbon filtration has been used to protect membranes, however due to unpredictable chlorine breakthrough, scaling issues and rising chemical costs, UV disinfection has been adopted as an effective alternative technology.

Installed before the RO membranes or UF plant, UV disinfection is proven to increase membrane life by protecting equipment from biological degradation. Unlike chlorine, UV disinfection effects the DNA of the microorganism and does not effect cell membrane integrity that if ruptured, can release polysaccharides (sticky glue like substance) that can quickly damage and blind membranes. As a chemical free technology, no residual chemical breakthrough can occur, further protecting downstream equipment.

BENEFITS OF UV TREATMENT

Process Advantages
- Chemical-free disinfection technology
- Significantly increases membrane & filter media life
- Eliminates risk of attack from residual chlorine
- Does not produce damaging, sticky, polysaccharides
- High disinfection efficiency >4 log reduction
- UV cannot be overdosed
- Leaves no residual chemicals or toxic compounds
- Creates no disinfection by-products
- Effective against all known microorganisms, including 17 chlorine resistant strains

Operational Benefits
- Eliminates the need to de-chlorinate feed water
- Improves health & safety (reduced chemical handling)
- Improved environmental profile
- Low maintenance technology
- Suitable for unmanned platforms
- Suitable for subsea installations
- Prowess, cost saving technology
- Simple to operate, turn-key design
- Easy to install, modular design
- Flow rates from 10 m³/hr to 6,000 m³/hr per system
Water sources such as seawater, fresh water and brackish water used for cooling loops and heat exchangers carry a major risk of microbial contamination. Operating at increased temperatures that provide the optimum environment for biological growth, operators are required to treat and disinfect source water to protect their systems and piping networks from Legionella, biofilms, EPS layers, Microbial Induced Corrosion (MIC) caused by acid producing bacteria such as SRB’s and mussel growth.

Traditionally, chemical dosing with biocides, chlorine dosing or electro chlorination have been used to protect the process, however strict limitations on discharges to the environment of wastewater, together with the high cost of transporting, storing and dosing chemicals has seen operators look for alternative, environmentally friendly water treatment solutions.

UV disinfection of fresh water, brackish water and seawater provides a highly effective, low-cost alternative to chemical biocides for eliminating all known microorganisms, including Legionella pneumophila, Legionnaires disease, acid producing bacteria such as Sulphate Reducing Bacteria (SRB’s), bio-film forming bacteria, including chlorine resistant strains such as Mycobacterium Avium and Mycobacterium Intracellular and mussel larvae.

When high doses of UV light at 254 nm is used as the primary disinfection technique for controlling bacterial growth, operators have been able to reduce the need for biocides and chemical use by 90% to 100%, significantly improving the environmental profile (reducing EIF) of installations, simplifying operations and significantly, lowering the operational costs of the plant.

**BENEFITS OF UV DISINFECTION**

- Eliminates the need to ship / store biocides
- Improves health & safety (reduced chemical handling)
- Improved environmental profile
- Low maintenance technology
- Suitable for unmanned / remote locations
- Proven, cost saving technology
- Simple to operate, turn-key design
- Easy to install, modular design
- Flow rates from 10 m3/hr to 20,000 m3/hr per system

**Process Advantages**

- Chemical free, environmentally friendly solution
- Reduces the use of regulated / classified chemicals
- Leaves no residual chemicals or toxic compounds
- Creates no disinfection by-products
- No microorganism immunity to UV disinfection
- Provides >4 Log Reduction (99.99%) kill of SRB’s
- Protects against MIC (Microbial Induced Corrosion)
- Protects against bio-films & EPS layers forming
- Eliminates mussel larvae
atg Evoqua believe that the relationship between the customer and supplier does not end once a UV system or water treatment package is delivered, and are committed to providing an excellent after sales and support service for the life of the UV System / package.

Starting the life of your UV system with an approved atg Evoqua commission ensures your new investment has been correctly installed, calibrated and is working at the optimum performance from day one. As a continuation of our partnership, atg Evoqua offer a range of onshore & offshore service contracts from 1 to 20 years. Regular service and maintenance of your UV system not only provides you with peace of mind, but will significantly extend the life of your investment, optimise process performance and ensure reliability of the system.

All atg Evoqua systems and water treatment packages are fully supported in the field with a range of sourced service plans and consumable spares options, with all major spare parts such as UV lamps, quartz sleeves / thimbles and instrumentation kept in stock for next day dispatch from our UK headquarters and also at selected, strategically placed locations around the world including Norway, China and the U.S.A.

In addition to commissioning and spare parts, atg Evoqua offer a range of after sales services such as our dedicated UK based technical help desk, certified operator training courses, site acceptance tests, bacterial performance sampling and reporting and the option for 24 hour technical support and rapid site mobilisation for offshore certified (Offshore Survival & Fire fighting qualified) engineers & service technicians.
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