

Aquaculture UV System

The Solutions to Pathogen Control and Marine Biology Safety

PROVEN TECHNOLOGY

DESMI

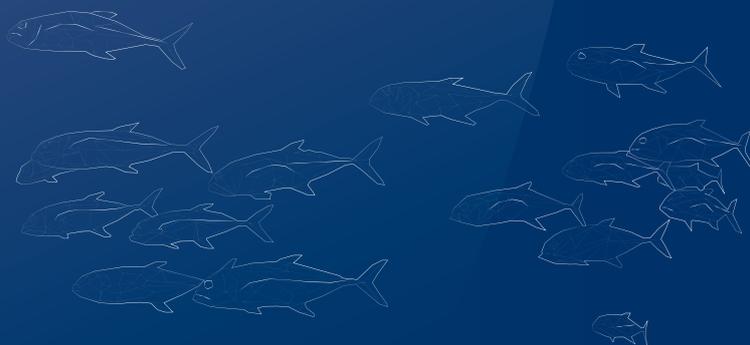
UV SYSTEMS

The constant concerns regarding virus and bacteria outbreaks and fish loss can be effectively reduced through the use of DESMI's Aquaculture UV systems.

This global technology has been proven to enhance fish production while simultaneously reducing pathogens and mortality rates.

The implementation of the AquaShield or AquaDose UV systems will not only safeguard valuable stocks, but also eliminate the worries about quarantine and trade restrictions.
Creating a safe environment for your fish.

With an AquaShield or AquaDose UV system in your facility, you can look forward to a profitable and low-stress aquaculture operation.



The Challenges Fish Farmers Are Facing

Aquaculture industry professionals understand the challenges of protecting valuable fish stocks and maintaining a healthy environment for their fish. The Aquaculture UV system from DESMI is designed to address these challenges by delivering extremely high and documented UV doses for unrivaled safety.

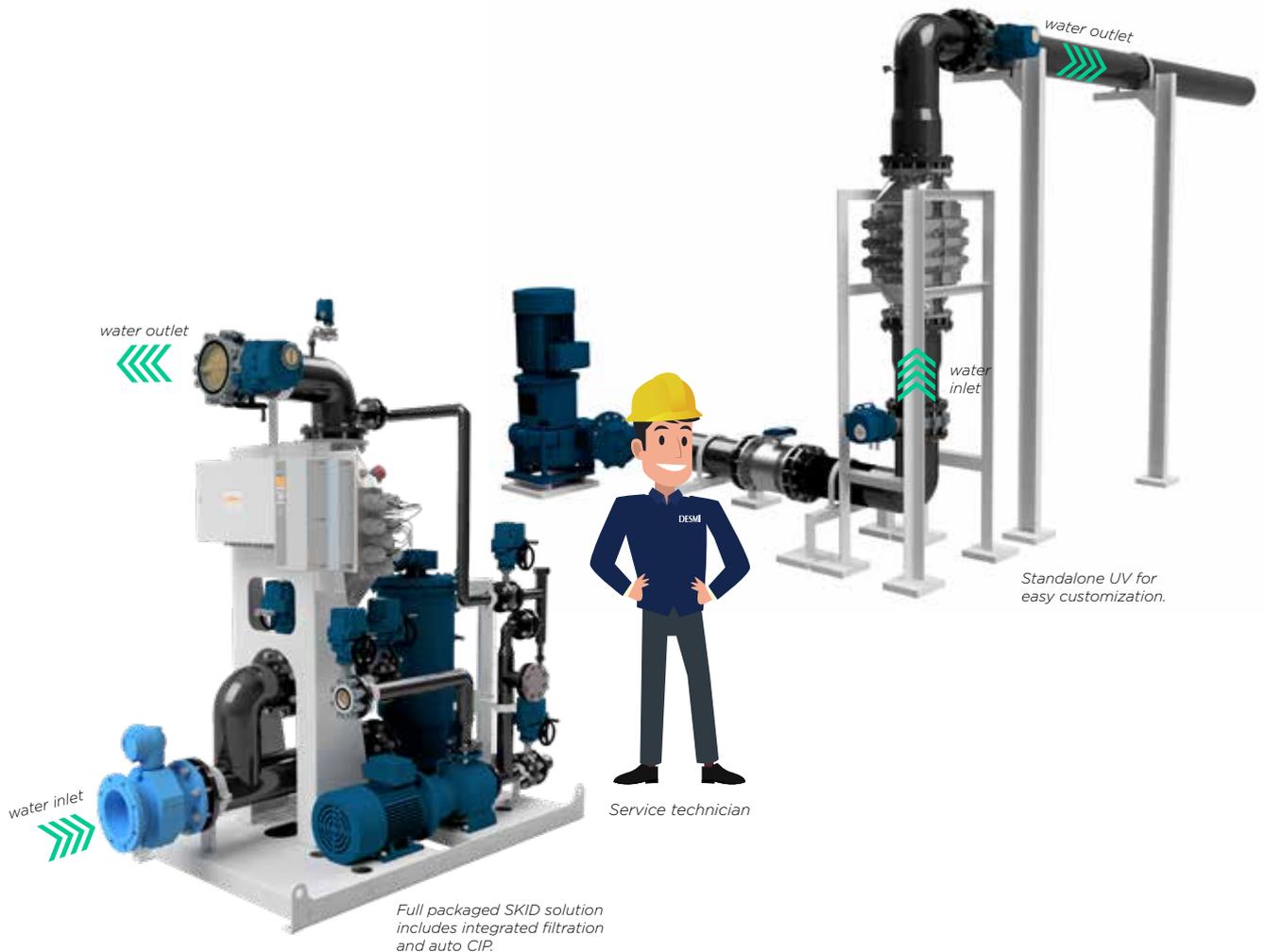
Our high-quality industrial UV systems for intake and recirculation water not only enhance fish production but are also chemical-free, making them a risk-free solution for fish livestock. DESMI UV systems effectively eradicate pathogens and reduce mortality rates while ensuring safety and peace of mind of aquaculture professionals.

Investing in advanced technology and biosecurity measures is not only crucial but also imperative for the prosperity and safety of a fish farming operation. Utilizing a UV

system, such as the AquaShield or AquaDose UV system, can guarantee a sanitary and beneficial environment for the fish.

The peace of mind and safety provided by Aquaculture UV systems is immeasurable. The AquaShield UV system is specifically engineered for intake water, focusing on the water source where most pathogens and microorganisms are likely to enter the system, providing an additional layer of protection for the fish. We often refer to this as “The Firewall.” Aquadose is an essential UV treatment system for recirculating water in fish farms. It effectively controls and eliminates harmful pathogens, bacteria, and viruses that may exist in the water. The peace of mind and safety provided by our Aquaculture UV systems, chemical-free solution, is immeasurable.

Increase fish production, protect valuable stocks, and create a safer environment for your fish



AQUASHIELD

The Key to Inactivating Pathogens and Keeping Intake Water Safe for Fish

DESMI UV has no salinity or temperature limitations. Model selection ensures flow ranges down to 35 m³/h and up to 3,500 m³/h with a single unit. The different UV models are optimized for both high and record-breaking low UV transmission values!

Key benefits:

- Simple installation, operation, and maintenance
- Acts as a firewall for viruses in intake water
- Can be delivered skid mounted for super easy installation
- Can be bundled with Auto-filter and Auto-Cleaning
- No chemicals, only UV light
- Automatic dose control ensuring optimal safety and cost efficiency.
- Specialized plant engineering team available
- +10 years of UV experience
- More than 2,000 systems in operation around the world
- Wide range in flowrates from a single unit*
- Full IoT integration for remote performance monitoring and alarm notifications (SMS, email, etc..)

*Depending on UV-T and Target UV Dose.



UV unit AS30186



UV unit AS5064



Veterinærinstituttet
Norwegian Veterinary Institute

AquaShield	V10024	V15044	V15064	V20066	V20086	V25126	V30186	V35246	V40366
UV lamps [pcs]	2	4	6	6	8	12	18	24	36
Lamp type [kW]	4	4	4	6	6	6	6	6	6
Total lamp power [kW]	8	16	24	36	48	72	108	144	216
Flange size Dimensions [mm]	DN65	DN100	DN150	DN200	DN200	DN250	DN300	DN350	DN400
Height	525	570	772	776	900	850	984	1030	1101
Width	661	661	661	828	828	828	838	838	844
Depth	300	405	406	438	446	516	541	628	722

AquaDose: The Key To Controlling Recirculation

Investing in a compact and solid UV system, such as The AquaDose, is essential for fish farmers who want to ensure optimal recirculating water conditions for their fish. By using the AquaDose system, farmers can eliminate the risk of potential pathogens outbreaks that could lead to the loss of valuable fish.

The AquaDose effectively controls harmful pathogens, creating a clean and safe recirculating environment for the fish to grow. This ensures that the fish are not only protected but also healthier and happier, resulting in increased profits for the farm.

By providing a comprehensive pathogen control solution, the AquaDose ensures that the fish remain healthy and thrive. The peace of mind that comes with knowing that the fish are protected in optimal water conditions is priceless, making investing in a high-quality UV system like the AquaDose an obvious choice for any serious fish farm.



AquaDose	AD20014	AD20024	AD25044	AD35064	AD45066	AD50086	AD50106	AD60126	AD60186
UV lamps [pcs]	1	2	4	6	6	8	10	12	18
Lamp type [kW]	4	4	4	4	6	6	6	6	6
Total lamp power [kW]	4	8	16	24	36	48	60	72	108
Flange size Flange size	DN200	DN200	DN250	DN350	DN450	DN500	DN500	DN600	DN600
Dry Weight [kg]	40	60	75	85	103	135	165	185	250

Cleaning In Place

Keep your UV at its best...
CIP will do the trick



At DESMI we recommend Cleaning in Place (CIP) to ensure top performance of the UV system every day.

DESMI has its own brand of citric acid, which can be added to recirculate through the UV unit, when needed.

Citric acid is generally recognized as safe (GRAS) by the FDA and is widely used in food and beverage industries as a preservative, acidulant, and flavoring agent. Citric acid poses no harm to human health or aquatic life.

UV Dimming Saves Energy While Maintaining The Set Minimum Dose

The implementation of smart UV lamp dimming represents a significant advancement in energy management for water disinfection systems. By adjusting the intensity of UV lamps based on the required dosage, energy consumption is reduced without compromising the effectiveness of the disinfection process. This not only promotes conservation of resources and cost savings, but also ensures the continuation of safe and clean water supply.

For instance, considering a UV unit with a size of 48 kW, utilizing smart UV dimming technology for a 20% power reduction could save up to 84,096 kWh annually. Adopting this technology serves as a responsible and efficient means of achieving a sustainable water disinfection system. The benefits of smart UV lamp dimming extend beyond cost savings and environmental considerations.

UV Systems That Can Survive High Humidity Environments

Aquaculture requires a dependable UV system to ensure the health and safety of the fish. Our UV systems are constructed from ultradurable Super Duplex material or Nickel-Alu-Bronze to withstand the challenging corrosive conditions. These materials are specifically designed to

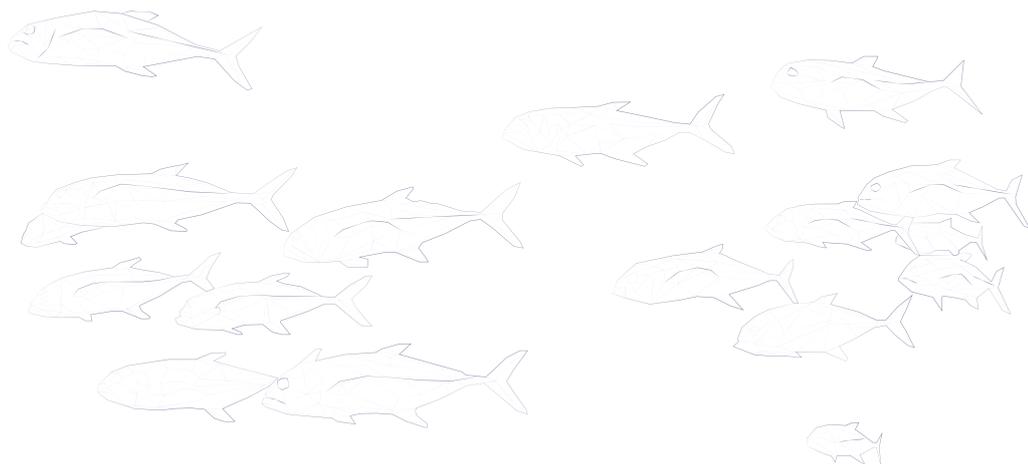
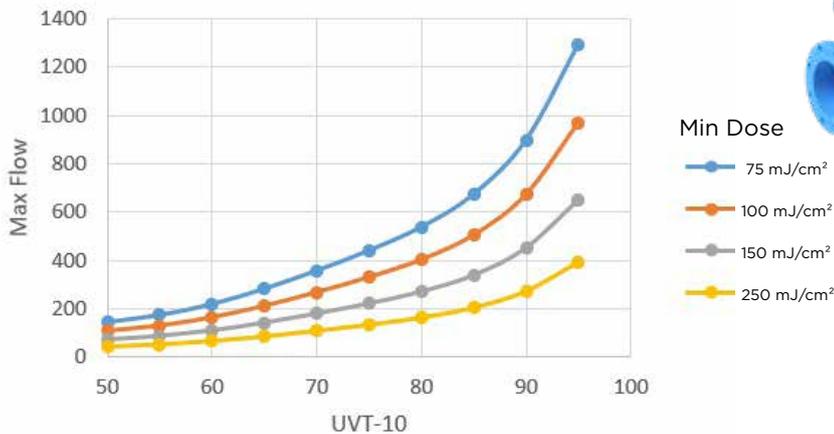
endure even the most extreme conditions and effectively disinfect the water.

DESMI's UV units are an invaluable resource to have when facing unpredictable climates and ensuring that your fish are kept safe from hazardous pathogens.

With a successful history of more than 2,000 installations and being type-approved for the harshest conditions, including vibration, humidity, temperature, and saltwater exposure, you can trust that this cutting-edge system will always effectively safeguard your fish and provide a secure environment



Max flow curves
V20086 - Minimum Dose



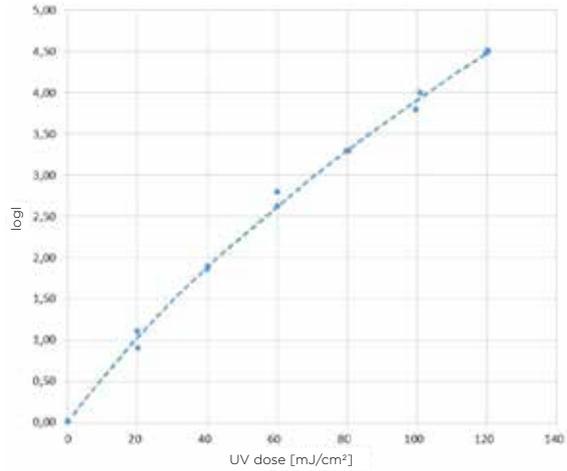
Enhanced Efficiency with CFD Optimized UV Systems

Our UV systems are optimized using biosimetry validated CFD (Computational Fluid Dynamics) technology.

DESMI UV system has been extensively tested and optimized to ensure maximum performance in aquaculture environments. The system has undergone rigorous biosimetry testing, with test results indicating high levels of efficiency and effectiveness.



Table 6 shows one of the comparisons between the measured data and CFD simulation results of the system.



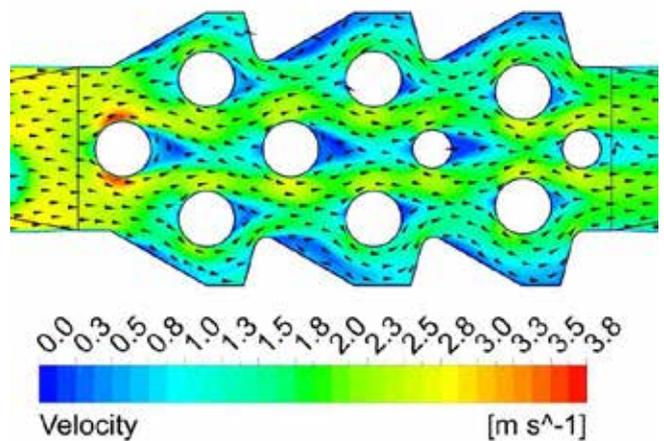
FDA 1000 badge Plot of simulated log inactivation vs. UV-dose for MS2 microbe with exponential approximation (dotted line) and actual dosemetry data points.

Table 6: Comparison of measured data and CFD simulation.

	ID	UVT [%]	Flow [m ³ /h]	Logi [-]	RED [J/m ²]
Test Results	MS2-1	64.7	340	4.15	1080
	MS2-2	59.8	288	4.14	1078
	MS2-3	55.3	216	4.25	1118
	MS2-4	44.4	122	4.51	1210
	MS2-5	40.6	91	4.71	1284
CFD Results	MS2-1	64.7	340	4.15	1083
	MS2-5	40.6	91	4.99	1392

MS2-1 results

At test point MS2-1, there was a near-perfect match between the measured and simulated results, with a RED (dose of UV radiation) of 1080 and 1083 J/m², respectively. Test point MS2-5 showed a slight deviation between the two results, but overall, the CFD results were well within the confidence level. The UVT, flow, and log data for each test point also show the system's ability to perform in a variety of conditions. With DESMI UV system, you can trust that your aquaculture disinfection needs will be met with the highest levels of performance and reliability.



Section plot from CFD simulation

Minimum vs. RED UV Dosage. What is the difference?

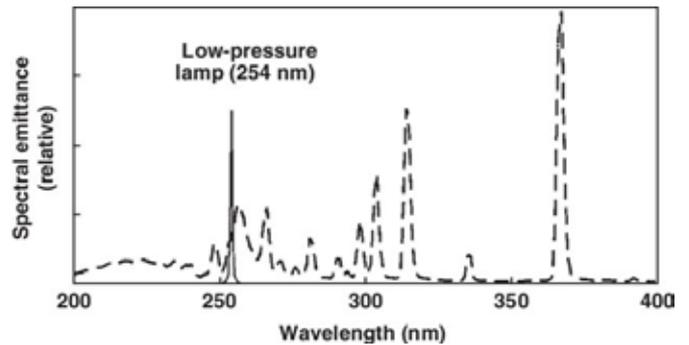
Minimum dose, average dose, and reduction equivalent dose (RED), are essential for evaluating UV-system performance and predicting log reduction.

Minimum dose represents the least amount of UV light energy received by the microorganisms as they pass through the UV system. This is a crucial parameter because the system's overall effectiveness depends on the lowest dose received by the most shielded organisms. The minimum dose is typically used to ensure that all microorganisms receive a sufficient dose of UV light to achieve the desired level of inactivation or kill rate.

Average dose is the mean UV energy received, accounting for variations in intensity, flow, and exposure time. While the average dose can provide a general understanding of the system's performance, it may not fully represent the actual inactivation level, as some microorganisms may receive lower or higher doses than the average.

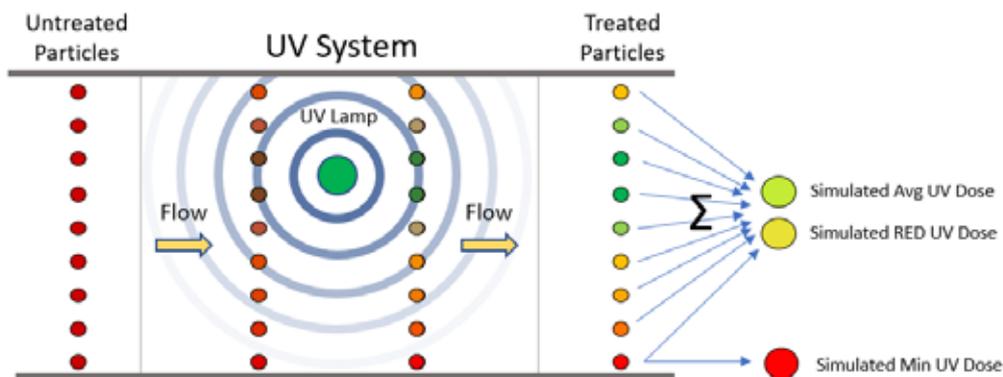
RED considers the target microorganism's UV sensitivity, expressing the UV dose needed for a specific log reduction. It's useful for comparing UV systems or treatment conditions. The RED is especially useful for comparing the effectiveness of different UV disinfection systems or treatment conditions, as it provides a common benchmark for evaluating performance based on the specific target organism's sensitivity.

Please note that real-life bio-dosimetry tests and obtaining the RED values are crucial for accurate UV system simulations. These tests offer empirical data on system performance, considering water quality, flow rate, and UV intensity variations. The RED value accounts for the target microorganism's UV sensitivity, ensuring simulations accurately represent inactivation effectiveness. Without bio-dosimetry tests and RED values, simulations may depend on theoretical assumptions, potentially resulting in inaccuracies in predicting system performance and pathogen reduction.

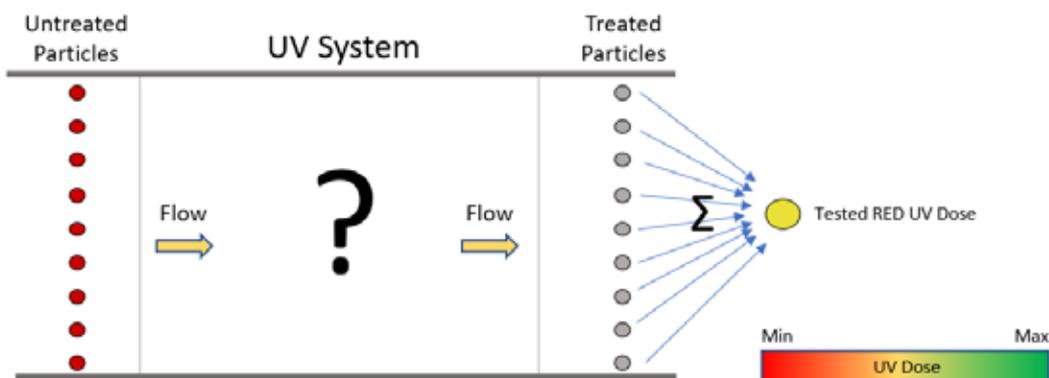


As a result of the broader spectrum of light, compared to lowpressure UV-systems, the reduction of specific organisms will respond positively to the treatment delivered by DESMI's mediumpressure UV light. Comparing medium and low-pressure UV systems by only assessing the 254nm UV-Dose is therefore not sufficient.

Simulated



Bio Dosimetry Testing



Danish Salmon

...says YES to the DESMI AquaShield

The implementation of the AquaShield UV system in Danish Salmon's RAS operations serves as a prime example of the efficacy of this technology in intake water treatment. They have reported that the system works smoothly and is easy to operate and maintain. Danish Salmon is currently expanding the fish farm significantly and due to that - the new AquaShield system is installed at a temporary location. This is easily accommodated with the SKID-based solution where the system is prefabricated at DESMI's factory. When Danish Salmon is ready for the permanent placement - this is done in less than a day. Finally, Danish Salmon reports that the extensive IoT monitoring platform gives great insight into the performance of the system.

The system installed at Danish Salmon is the AquaShield V20086 SS - capable of giving a minimum dose of $250\text{mJ}/\text{cm}^2$ (RED dose of $365\text{mJ}/\text{cm}^2$) when treating $400\text{m}^3/\text{h}$ of water at approx. 95% UVT.



Easy Handling and Maintenance

DESMI's UV systems provide an unparalleled level of convenience and efficiency in daily handling and maintenance. Any arising issues can be quickly addressed due to the regular upkeep, preventing any loss of productivity. Investing in a reliable system that maintains its performance over time is an asset for any business looking to establish trust with its equipment partner.

DESMI's World-Wide Service Network Delivers Spare Parts On Time! - DESMI DeServe

DESMI's global service network makes the impossible possible. Customers can be certain that their spare parts will arrive when expected, regardless of their location. The guarantee of a reliable and dependable partner is invaluable - this allows our customers to focus on the most important aspects of their operations. With the timely delivery of spare parts, businesses can remain productive and free from interruption, creating peace of mind and enabling them to excel to ensure their longevity in an environment of a high salt content.



Overhaul
Videos



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