

Ultraviolet Technology

UV Disinfection in Ship Ballast Water Treatment

How does Ultraviolet Work?

Ultraviolet light causes permanent inactivation of micro-organisms by disrupting DNA so that they are no longer able to maintain metabolism or reproduce. It is effective against all marine micro-organisms. The maximum effectiveness occurs between 240 and 280nm with a peak at 265nm, and the Hanovia Medium Pressure Arc Tubes produces these wavelengths in abundance.

Why International Ship operators choose UV?

In consideration of imminent ballast water regulations, ship operators are looking to UV systems for the Ballast Water Treatment (BWT) prior to discharge.

All ocean-going vessels take on water to provide ballast and stability. It is usually taken on in coastal port areas and transported to the next port of call - sometimes on the other side of the world - where it may be discharged. Much of this water contains marine micro-organisms such as zooplankton, algae, bacteria and the eggs, cysts and larvae of various species. While many die in transit, some survive and invade the environment, out-competing native species and causing serious damage to native ecosystems. Environmental damage caused by ballast water is now regarded as one of the greatest threats to the world's oceans. Every day, more than 100,000 tonnes of ballast water are discharged into US waters alone; this has resulted in significant ecological damage such as the introduction of the zebra mussel in the Great Lakes of North America.



UV is an environmentally friendly way to eliminate all the unwanted marine organisms, without chemical biocides.

Hanovia
WORLD CLASS UV

Most efficient

- ▶ No micro-organisms survive UV treatment
- ▶ Treatment is effectively monitored
- ▶ UV is the most cost effective method of water disinfection

Superior to alternatives

- ▶ UV is the most environmentally friendly way to reduce the number of viable organisms, without causing pollution of local seawater ecology
- ▶ No biocide required
- ▶ UV is the most cost effective method of water disinfection
- ▶ UV requires minimal servicing: intelligent autowiper ensures no daily maintenance regime is necessary
- ▶ The use of Medium Pressure lamp technology allows small space requirement

Safety

- ▶ No hazardous chemicals are required
- ▶ No toxic by-products

Experience

Hanovia has over 80 years experience in UV and has designed and supplied UV systems worldwide



Arc Tubes

- ▶ Specially manufactured for disinfection and photolysis
- ▶ High output medium pressure lamps
- ▶ Over 15,000 lamps manufactured per annum
- ▶ Output optimised with over 20% germicidal output (200-300nm)

BWT process

- ▶ The Ballast Water Treatment process combines mechanical filtration and UV disinfection.
- ▶ During ballasting, the water is treated by multiple disc filtration modules configured in parallel, followed by UV disinfection.
- ▶ UV disinfected ballast water is used for backwashing the filter modules. Backwash water is discharged over board.
- ▶ One of the disc filtration modules is usually in backwash operation mode at any time. The backwash filtration module is constantly cycled during ballasting.
- ▶ The filtered ballast water is then disinfected by a single UV system before being pumped into ballast water tanks.
- ▶ During deballasting, the water is disinfected by the UV system and bi-passes the filtration modules. This ensures that any bacterial regrowth that may have occurred in the ballast tanks is fully disinfected before discharge.

- ▶ UV is sometimes used in conjunction with a biocide. This allows for reduced concentrations of biocide to be used during ballasting. The UV will also break down the biocide prior to deballasting.

Hanovia UV systems

Compact and easy to install

- ▶ Conveniently fit into existing pipework
- ▶ Small spatial footprint
- ▶ Minimum site preparation
- ▶ Pre-assembled units available pre-wired and skid mounted, requiring only connection to electrical supply
- ▶ Can interface with ship board PLC or computer control system

Inexpensive and Simple to Maintain

- ▶ Simple and safe operation easily understood by operators
- ▶ Designed for remote operation
- ▶ Replacement of Arc Tubes is quick and simple
- ▶ Distributors worldwide maintain full range of spares

Controls

- ▶ Local system operation is via membrane keypad
- ▶ System status is detailed on digital display screen
- ▶ Treatment is achieved by UV dose. This is computed from the UV intensity measured by the monitors, the water flow rate and the transmittance value.
- ▶ Power to the Arc Tube can be varied to ensure that the desired dose is obtained at all times, while keeping running costs to a minimum.
- ▶ An on-line microprocessor, providing continuous and precise management information so that the central control can operate the entire system.

Rigorous Quality Control (ISO 9001)

- ▶ All Hanovia stainless steel chambers and Arc Tubes built to the highest possible standards
- ▶ Every Arc Tube is individually checked and each completed system tested and run before despatch
- ▶ Test certificates always supplied

All Hanovia Systems Include:

- ▶ Disinfection Chamber
- ▶ Arc Tube
- ▶ Control unit / Power Supply Cabinet
- ▶ UV Monitor
- ▶ Automatic Cleaning Mechanism

Hanovia

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Hanovia Limited
145 Farnham Road
Slough SL1 4XB
England



i +44 (0)1753 515300
f +44 (0)1753 534277
e sales@hanovia.com
w www.hanovia.com

HALMA GROUP
COMPANY