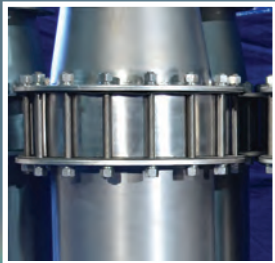


COLDHARBOUR



GLD™ Ballast Water Treatment System



YEARS

Marine Inert Gas & Water Treatment Experience



In-tank, in-voyage, inspired...

The Coldharbour Marine approach to BWT is absolutely unique

Who is it for?

Coldharbour GLD™ (Gas Lift Diffusion) Ballast Water Treatment System (BWTS) is specifically designed and optimised for large tankers, LNG/LPG carriers and large bulker/ore carriers. It is available for both new build and retrofit installations.

Approval status



The Coldharbour GLD™ BWTS has been awarded full Type Approval under IMO resolution MEPC 174 (58) by the UK Maritime and Coastguard Agency (UK MCA).



Coldharbour GLD™ BWTS has full Lloyds Register Type Approval.



USCG AMS has been awarded.

Full USCG Type Approval is in progress.

The system is certified and type approved for vessels with total ballast capacities from 20,000m³ up to 345,600m³

We listened - the thinking behind the technology came from you, the customer

MUST HAVE FEATURES FOR A BWT SYSTEM As expressed by tanker operators worldwide	Coldharbour GLD™ BWTS
No disruption to ship operations - especially ballasting and de-ballasting (Far and away the most important)	✓
No upgrades to ballast pumps or piping	✓
No upgrades to power generation capacity	✓
No filters so no risk of blockages	✓
Allow gravity ballasting and de-ballasting	✓
No specialist maintenance	✓
Simple to use (with IGG experience)	✓
Robust, reliable and suitable for use on a tanker	✓
Has a small footprint	✓
Low running costs	✓
No risk of damage to tank coatings, vessel structure and ballast systems	✓
Future proof against tightening regulations worldwide	✓
No chemicals or active substances - G8 approval preferred	✓
Safe for crew if misused	✓
Must eliminate the risk of regrowth in ballast tanks on long voyages	✓

Why should you fit it?

The Coldharbour GLD™ Ballast Water Treatment System is the only logical choice for large tankers, bulkers & LNG/LPG carriers.



GLD™ is the only BWTS guaranteed not to disrupt port operations



Ships arrive treated and ready to discharge with no risk of re-growth even on the longest voyages



Technology works regardless of temperature, salinity or suspended solids - for 100% reliability



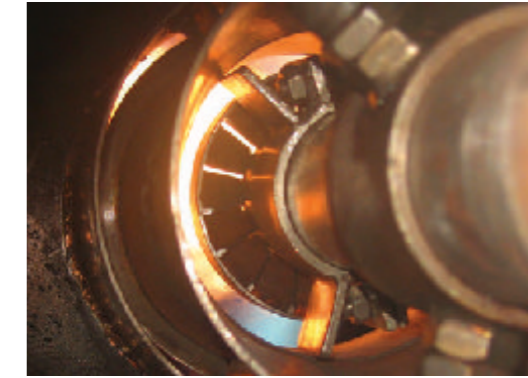
In-tank and in-voyage - how it works

The Coldharbour Marine GLD™ Ballast Water Treatment System is a unique in-tank system which uses the gas output from our Sea Guardian™ Inert Gas Generator (IGG) linked to specially designed gas lift diffusion (GLD) pipe assemblies inside the ship's ballast tanks.

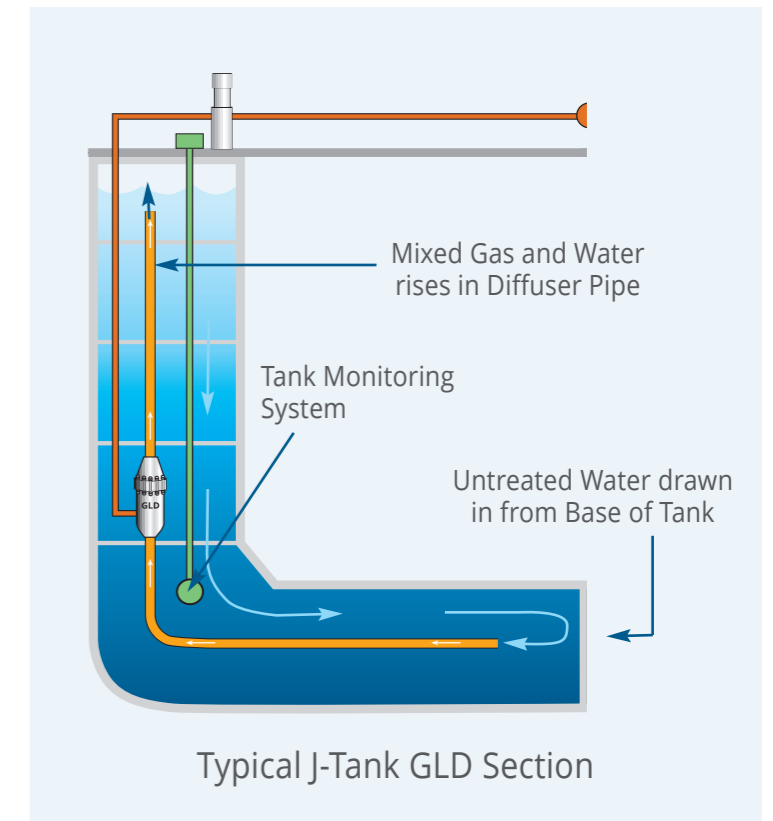
Sea Guardian™ is the first 3rd generation IGG in the world, and any experienced inert gas engineer would quickly feel comfortable operating it. It generates ultra clean, very low oxygen inert gas. It is compact, stable, reliable and largely maintenance free.



Gas Lift Diffusers



IGG Burner

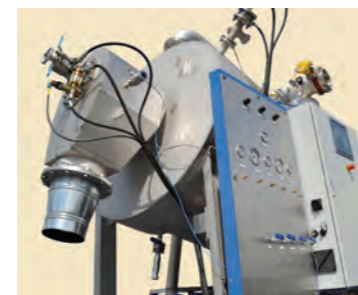


Robust with no moving parts or filters

During the voyage, the output from the IGG is pumped (by standard type marine compressors) to the GLD™ units in the ballast tanks where the full treatment takes place. The GLD™ technology has no moving parts and as such is 100% reliable. It uses natural fluid dynamics to both thoroughly stir the ballast tanks and diffuse the inert gas into the ballast water.

The Coldharbour system is capable of handling water with high levels of suspended solids. There are no mechanical filters to block or back flush, no additional seawater control valves, no complex electrical systems and no space consuming equipment to be incorporated into already crowded machinery spaces.

Because the Coldharbour GLD™ BWTS works in the ballast tanks and not during ballast uptake or discharge this means that **there is NO possibility of the system disrupting the ballast process.**



Sea Guardian™

Highly Effective Inert Gas-based Action

As the inert gas diffuses into the ballast water through the GLD™, oxygen is stripped from the water whilst the elevated level of CO₂ in the inert gas temporarily reduces the pH level of the water. This simultaneously induces hypoxia and a condition known as hypercapnia in marine life. These conditions are fatal to both aerobic and anaerobic marine organisms.



Deox + Lower pH + Gas Ultrasonics

The remaining organisms (E.Coli for example) are killed inside the GLD™ by a patented method of gas induced ultrasonic shockwaves which cause cellular destruction. The ultrasonic generators require no power and have no moving parts. They are designed for years of operation inside the harsh environment of the ballast tank.

Corrosion reduction reduces maintenance costs

The Coldharbour GLD™ BWTS also offers the ship owner significant savings in maintenance costs through a substantial reduction in ballast tank corrosion.

This is achieved because the percolated reduced oxygen gas sits in the ullage space within the tank thereby protecting the ballast tank and ensuring a longer life for ballast tank coatings, even if the coating has been cracked or compromised in some way.

Tests have shown that corrosion can be reduced by more than 80% in normal operation and this provides significant savings in dry dock maintenance time and repair costs, as well as offering an extension to the economic operating life of a vessel.

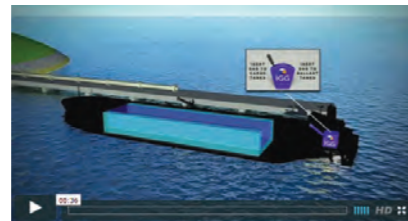
These savings are more than enough to pay for the system, its installation and maintenance, many times over during the lifetime of a typical vessel.

No disruption to port operations



The system does not disrupt any aspect of standard ship operation. Ballast water is pumped into the ballast tanks as normal, with no restriction to flow.

Because the water is treated whilst the vessel is underway there is no possibility of any disruption to the vessel's terminal operations. System performance is not affected by silt and solids levels within the ballast tanks or by changes in salinity.



Visit www.coldharbourmarine.com/#!ballast-water-treatment/c1c8a to see a video of how this works

No extra training required

The system is automatic in operation thereby ensuring optimal conditions are maintained within the ballast tanks regardless of loading. There are no additional specialist training or engineering support requirements for operators already accustomed to using inert gas generation systems.

***Coldharbour GLD™ BWTS
absolutely guarantees no disruption to port operations
as a result of BWT system failure or filter blockage.***

Environmentally Future-Proof

The Coldharbour GLD™ BWTS does not use active chemicals to achieve the required ballast water standards. It is a G8 type system as defined by the IMO and is only the second BWTS to be approved by the UK MCA.

No Active Chemicals

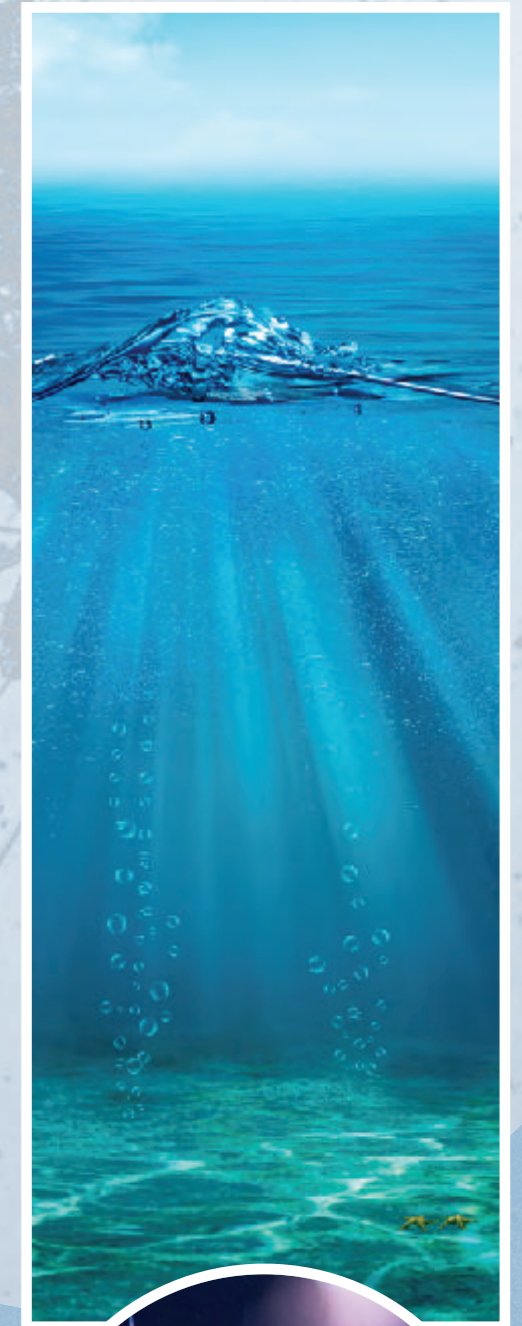
The treated ballast water poses no threat to the marine environment. The water is reoxygenated prior to discharge, making it ready once again to support life in the ocean. Tests have proven that the Coldharbour treatment process is robust in the face of an ever changing marine environment. By treating during the voyage, future treatment standards can be achieved without the need for expensive additional equipment – just what you would expect when you are making a long term investment in environmental technology

No regrowth problems

Coldharbour GLD™ BWTS eliminates the regrowth problem. Large ships typically have long ballast voyages - anything from 7 to 50 days. By treating the ballast water in the tanks, at a convenient point in the voyage, there can be no risk of the regrowth problem that can occur following in-line treatment during ballasting.

Be sure, be confident, be safe

Coldharbour recognises that the crew need to be confident that the ballast water is safe for discharge at the port of destination, and that is why, uniquely amongst BWTS suppliers, we equip every ballast tank with sensors which continuously monitor and record the condition of the water throughout the voyage. This data is available to the crew in real time, helping them to ensure a safe, environmentally friendly ballast water discharge.



***Ships arrive treated and ready for
discharge with no risk of re-growth
even on the longest voyages***

Retro Fit

Cost effective for new builds



We can save you space and money on the new build of your large tanker, LNG/LPG carriers and bulkers with our inert gas based BWT technology

The Coldharbour GLD™ BWTS is not connected to the ships ballast circuit in any way so there is no requirement to locate the equipment within the pump room.

The Coldharbour GLD™ BWTS can be fitted almost anywhere on-board and is immune to the usual space constraints.

The equipment can be located on any available space within the machinery casing and then enclosed within a new deck housing (as on the Alfa Glory VLCC retrofit).

The first BWT system to be successfully retrofitted to a VLCC



One IGG - two jobs

The Coldharbour Sea Guardian™ IGG is also available for cargo blanketing duties

- This is by far one of the most compelling arguments for the Coldharbour GLD™ BWTS, particularly for new build
- The Coldharbour GLD™ BWTS is driven by inert gas, supplied by the Coldharbour Sea Guardian™ Inert Gas Generator
- This means that the Coldharbour Sea Guardian™ IGG can carry out the dual role of providing inert gas for both cargo blanketing and ballast water treatment duties.
- Sea Guardian™ is also dual fuel compatible making it perfect for LNG type installations

The Coldharbour GLD™ BWTS can be retro-fitted to a VLCC in just ten days.

Installation takes place during normal dry docking, without interfering with any other work being carried out on board.

Visit www.coldharbourmarine.com/#!/ballast-water-treatment/c1c8a to see a video of the above installation on the Alfa Glory.

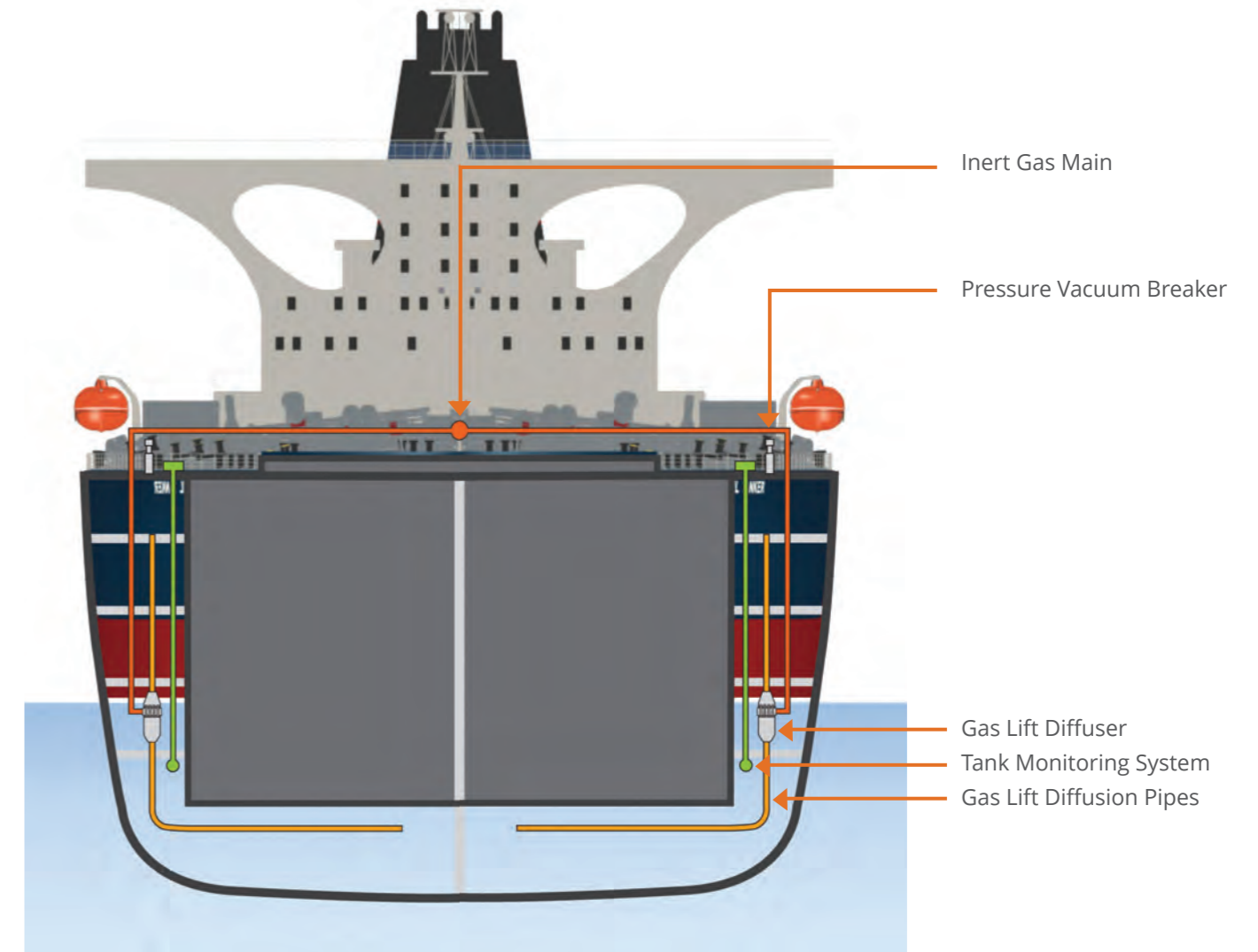


In just
10
days



Inert gas driven BWT combines two major ship components in one system, offering significant savings in both cost and space, particularly in new build applications

In-tank, in-voyage, inspired



Coldharbour GLD™ BWTS	
The only in-tank, in-voyage, BWT system for large ships	
No disruption to port operations	✓
Flow rate & pump size irrelevant	✓
Unaffected by salinity	✓
Unaffected by temperature	✓
Unaffected by turbidity/suspended solids	✓
No regrowth - always arrive treated	✓
Gravity ballasting & de-ballasting possible	✓
Simple inert gas based operation	✓
Minimal maintenance	✓
Future proof technology	✓

The Coldharbour GLD™ BWTS delivers all this and more in a package specifically designed and optimised for use on large tankers, LNG/LPG carriers and large bulkers/ore carriers.

The Coldharbour GLD™ BWTS is only the second system ever to have secured full UK Maritime and Coastguard Agency Type Approval





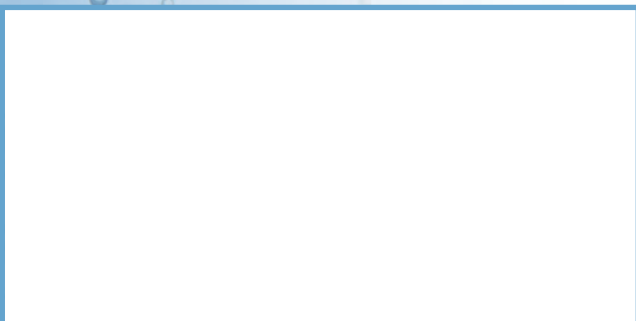
Coldharbour Marine Limited is based in the United Kingdom and has been supplying marine equipment for more than 35 years.

Our products and designs have been used extensively in both the marine and offshore sectors.

We make it our business to understand your requirements and to provide genuinely practical solutions to your technical problems.

We combine engineering excellence, intelligent application, efficient installation and years of experience in order to provide our customers with reliable, robust, advanced technologies for use in extreme environments.

Coldharbour Marine future proofs its technologies. We continually develop and enhance our products to satisfy and exceed both operational and legislative requirements.



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