

# Press release

April 8, 2009

## New Patent to Prevent Galvanic Corrosion in Marine Piping Systems

**Columbus, OH USA:** DNV was recently awarded its second patent for a device to prevent galvanic corrosion in shipboard piping systems. DNV's Galvanic Corrosion Inhibiting Coupling (GCIC) can mitigate galvanic corrosion while avoiding the potentially harmful limitations found with other methods, such as cathodic protection or electrical isolation.

Galvanic corrosion can occur when pipes made of different metals are joined together and exposed in aqueous environments, such as seawater. It can be mitigated by electrically isolating one of the dissimilar metals; however, this approach is typically difficult in a complicated shipboard system where piping is grounded to the hull or other metallic structures through grounding straps. Galvanic corrosion can also be mitigated by cathodic protection (CP). Some of the problems caused by CP include hydriding of susceptible metals, such as titanium, and the build up of calcareous deposits on the piping, which is a serious problem in seawater. For CP systems that use a sacrificial (anode) spool piece, corrosion products can be produced that can plug downstream components, such as heat exchangers. In addition, the spool piece requires periodic replacement, typically necessitating dry-docking of the ship.

The difference between the GCIC and cathodic protection, which both use electrical currents to prevent corrosion, is the coupling system does not deliver current onto the internal surface of the piping system; rather the current is contained within the coupling. "The coupling does not cause hydriding of susceptible metals or the build up of calcareous scale in the piping that usually results from the application of cathodic protection," explained Brett Tossey, senior engineer and DNV's shared patent holder.

John Beavers, Ph.D. director of failure analysis and DNV's patent holder, first conceived the idea for the device in 1995 from a combination of observations made while conducting research for the Nuclear Regulatory Commission on pitting corrosion of carbon steel canisters and a discussion of galvanic corrosion on marine piping systems at the Sea Horse Institute. These observations led Beavers to research and develop the GCIC. In 1998, Beavers received DNV's patent for the device. At that time, the GCIC did not have a control system.

The U.S. Navy discovered the patent and ran a series of tests in flow seawater and compared the GCIC or bi-electrode device (BED) as they call it, against other technologies. They discovered that it worked well, but required daily manual control. The Navy approached DNV with this issue and funded research to develop an automatic control system and spool piece that both met military specifications for installation in shipboard piping systems.

The automatic control system is now complete, has been patented, and has withstood a series of rigorous lab and field tests by DNV and the U.S. Navy. "This is the only device available for active

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control of galvanic corrosion in piping systems that doesn't rely on barrier coatings, cathodic protection, or electrical isolation," explained Tossey. The hope is to continue testing and design modifications that will lead to the development of a field worthy device.

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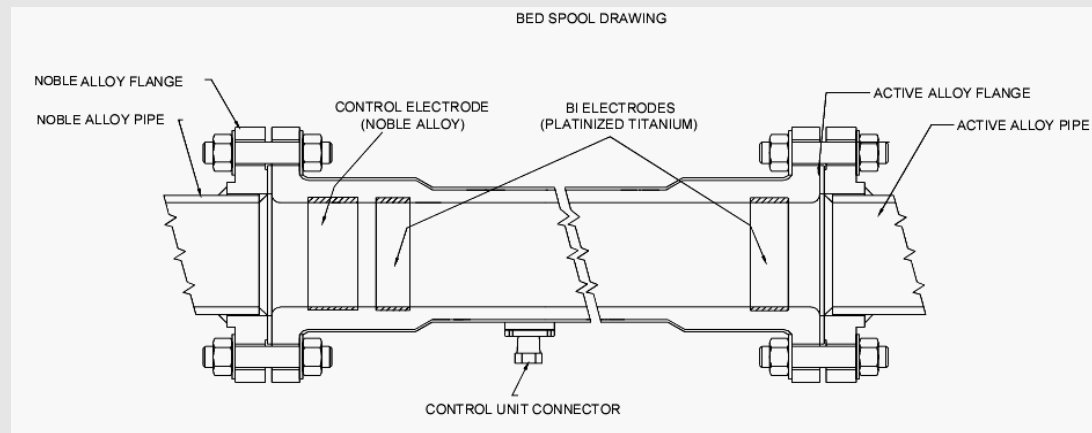
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## Links:

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GCIC or BED

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