

Just Ask Engineering



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Question?

Will stainless steel pumps and valves corrode in a tough environment?

Steve Suche, Ft. Garry Fire Apparatus

Answer.

Understanding how corrosion takes place is the first step toward understanding how to prevent it. Bear in mind that few pure metals exist in nature – most metals exist as ore containing oxide or sulfide impurities. This is the natural state to which most metals tend to revert. With a few exceptions, all metals corrode when exposed to air and water, but at different rates, depending on the metal itself and other factors such as dissolved solids, chlorides, pH, etc. If we place all the metals in order from the ones that corrode the slowest (Noble metals), such as gold and platinum, to the ones that corrode the fastest (Active metals), like magnesium and zinc, we get what is known as the Galvanic Series. When two dissimilar metals are both in contact with water, they affect each other's rate of corrosion, with the more active metal corroding more quickly and the more noble metal corroding more slowly than each would corrode if it were by itself. This happens because the two metals essentially form a battery – the more active metal, as it corrodes, sends electrons to the other metal, protecting it and making it corrode more slowly.

The farther apart two metals are on the galvanic series, the greater this effect becomes. One may recall that years ago, most truck tanks were made of galvanized steel, providing a large volume of zinc to act as the sacrificial metal. Nowadays, virtually all tanks are made from plastic, removing the protective zinc coating from the pumping system. To make matters worse for the pump, many customers are changing from a fully-manifolded pump to pumps installed with fabricated stainless plumbing, decreasing the mass of cast iron to essentially just the pump body.

Water quality is another strong factor, and one that is often overlooked. Most people assume that if their water is safe to drink, it will not affect their truck, but this is untrue. Water's corrosivity is a factor of pH, dissolved chlorides and calcium, water temperature, dissolved oxygen, alkalinity, and a host of other factors. Most municipal water departments test for these factors regularly, and we suggest that each fire chief should contact their local water department

and ask for the

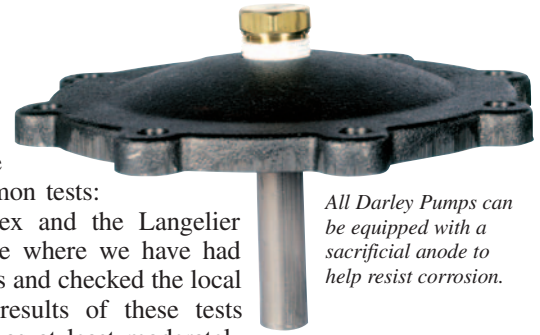
results of two common tests:

the Aggressive Index and the Langelier Index. In every case where we have had corrosion complaints and checked the local water supply, the results of these tests showed the water was at least moderately aggressive. A value below 12 on the Aggressive Index or a value below 0 on the Langelier Index would indicate the need for action. As fresh water supplies deteriorate worldwide, we expect to see more areas indicating the need for corrosion protection. If your locale does not have a water department, or if you use drafting sources regularly, you may want to contact a local water testing facility to have these tests performed.

Fortunately, there is an easy way to reduce corrosion on the pump. That is to add an anode to your pump or plumbing. Darley has an easy-to-install anode that installs into any 3/4" NPT port, along with 3/4" NPT flanges for our fully-manifolded pumps. These anodes are made from magnesium, not zinc, like other anodes on the marketplace. This is important for two reasons. First, magnesium is more active than zinc, so it provides greater protection. Second, magnesium loses material as it protects, whereas zinc just turns chalky. This makes it much easier to see when the anode should be replaced. Our anodes are suitable for any pump and any truck. Keep in mind, Darley offers an entire pump casing line in bronze.

One final topic is that of Microbiological Influenced Corrosion (MIC). In this type of corrosion, microorganisms typically present in water attach themselves to metal surfaces to form a biofilm. Those microorganisms extend to cover the pump and piping, with certain types of organisms producing metal dissolving metabolic byproducts. *These microbes can attach many kinds of metal, including stainless steel, and are very aggressive. Stainless steel, with its typically thinner walls, is probably more at risk than thicker castings, as this kind of corrosion can progress up to 0.1 inches per year. Keeping a dry pump should keep this type of corrosion at bay.*

In the end, your question is easy to answer. Test your water to see if your truck plumbing is at risk, and if it is, **Demand a Darley** supplied solution. 🚒



All Darley Pumps can be equipped with a sacrificial anode to help resist corrosion.

New Pump Developed for Boston Whaler

This unsinkable commercialized Boston Whaler 27' Guardian is equipped with a newly developed Mercury/Darley fire pump. A 200 HP Mercury Optimax Sportjet mated with an engine driven Darley pump to create a marine fire pump rated at approximately 1125 GPM @ 180 PSI. The system includes a 3" Stingray monitor and a 2 1/2" 3-way wye for hand lines.

All of the Mercury Optimax engine characteristics are passed on to the fire pump, including incredible power, fuel economy and reliable performance. The Optimax power head also enables fire departments to utilize one company to maintain propulsion units. 🚒

For more information, please contact:

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NEW

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