

Welcome

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Rotaguard
Technology

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Do you believe in...

Interior Corrosion Protection and
Insulating Potentials for Steel Tanks



Can you believe in...

Interior Corrosion Protection



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One thing to consider.....Ethanol fuel.

- Nylon is hygroscopic - absorbs & releases water.
- Ethanol is an alcohol – alcohol is a drying agent.
- Ethanol blended fuels separate – it is called phase separation.
- Ethanol is heavier than gasoline – during phase separation it will settle to the bottom.
- Fuel subjected to periods of storage will result in phase separation.

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The Negative Affects of Ethanol on Recreational Boat Fuel Systems

The National Marine Manufacturers Association (NMMA) opposes the use of marine fuels that contain greater than 10% ethanol content by volume. This position is based on safety and durability concerns and supported by many well documented studies.

According to state boating registrations, there are over 12 million recreational boats in the United States. Boat builders utilize five types of materials to fabricate fuel tanks. These are aluminum, steel, cross-link polyethylene, high density polyethylene and fiberglass. For a rough estimate of today's numbers, there are approximately four million boats that have aluminum fuel tanks; approximately seven million have steel or polyethylene tanks, and less than one million have fiberglass tanks.

The data clearly indicates that the increased use of ethanol in gasoline has raised safety and durability issues for aluminum and fiberglass fuel tanks.



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In the case of steel or aluminum tanks, both are conductive metals. Aluminum relies on an oxide layer for its corrosion protection properties. Steel relies on coatings for its corrosion protection. Low levels of ethanol, such as E10 (10%), are usually not a problem in aluminum tanks because the oxide layer provides a good measure of protection. What about steel? The problem occurs when the ethanol content is increased.

There are two mechanisms that occur with ethanol. Both mechanisms are a result of the hydroscopic property of ethanol, meaning it absorbs water. The more ethanol in the fuel, the more water there will be in the fuel tank. Water not only causes the tank to corrode, it also causes the corrosion particles to clog fuel filters, fuel systems, and damage engine components.



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The second mechanism that can occur with the increased use of ethanol based fuel in aluminum or steel tanks is galvanic corrosion. Gasoline fuel is not conductive, but the presence of ethanol or ethanol and water will conduct electricity. Boat builders are able to protect exterior aluminum boat equipment with sacrificial anodes known as zincs. Sacrificial anodes are not a feasible option for the interior of a fuel tank.

In the long term, corrosion can perforate aluminum or steel to produce leaks that would cause fuel to spill into the bilge and end up in the environment. In the worst case it could cause a fire and/or explosion hazard. Boat fuel tanks are often located under the deck next to the engine where the operator might not be aware of a leak until it was too late.

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High Strength-Low Alloy Steels.

High strength-low alloy steels show improved corrosion resistance over carbon steels in rural and mild industrial environments. In marine atmospheres and in immersion services, however, the difference in performance between carbon and low-alloy steels is minor (see Seawater Corrosion & Material Selection). The primary advantage of these materials is their higher strength. But remember that the same amount of material loss will usually have a greater impact on the load carrying capacity of a high strength material than on a low strength material. The high strength-low alloy steels should be protected when used in marine environments. They are somewhat more cathodic than carbon steels.

Alloy Steels.

Steels with an higher alloy content are more susceptible to pitting corrosion attack than steels with lower alloy content. Pitting is common in alloys with more than 5% total alloy content. Corrosion rates are similar to carbon and low alloy steels with pitting being only three to five times the corrosion rate calculated from weight loss. Alloy steels are selected for their higher strength but can be susceptible to hydrogen embrittlement or stress corrosion cracking at yield strengths in excess 100 ksi. The alloy steels are somewhat more cathodic than carbon steels.

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MIC SUMMARY - ETHANOL BLENDED FUELS (2/23/06)

Significant aspects of Minnesota Statute (S 4), enacted on 05/10/2005, to increase the minimum ethanol content for gasoline sold in the state.

On and after August 30, 2013 all gasoline sold or offered for sale in Minnesota must contain at least 20% denatured ethanol by volume. A blend of not less than 18.4% and not more than 20% as determined by an EPA or ASTM standard method of analysis of alcohol content, will be construed as in compliance. (Sec. 2. Subd. 1a.)

By December 31, 2015, the "Petroleum Replacement Goal" is that at least 20% of the "liquid fuel" sold in the state be derived from renewable sources. (Sec. 3. Subd. 1.)

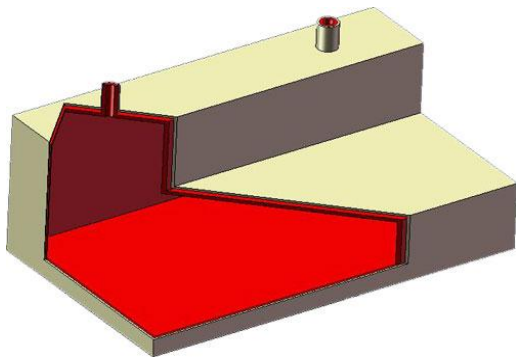


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Rotaguard Technology utilizes the versatile process of rotationally molding corrosion resistant plastic inside a fabricated aluminum fuel tank.

End result is a metal tank with a corrosion resistant inner wall that will never leak and is Permeation Free!



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The material LLDPE is compatible with hundreds of different chemicals. Linear Low Density Polyethylene is the most abundant and lowest cost resin available to rotational molders, and is the material choice for manufacturers and users of Intermediate Bulk Containers (IBC's) for hundreds of chemicals, Including gasoline, diesel, and ethanol.

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64 Gallon Aluminum Tank

50.2 lb Aluminum (0.125") @ 1.75 lb = \$87.85

64 Gallon Aluminum & Coated Tank

No Permeation or Internal Corrosion + Liquid Containment

36.2 lb Aluminum (0.090") @ 1.75 lb = \$63.35

17.4 lb LLDPE (0.125") @ 0.75 lb = \$13.05

\$76.40