

In natural water conditions, aluminum corrodes 10 times slower than steel⁽¹⁾, and has twice the strength per lb of PVC with less thermal expansion.

POTENTIAL HAZARDS TO ALUMINUM IRRIGATION SYSTEMS

Aluminum is very corrosion resistant to natural water. Under certain conditions, noticeable corrosion can occur in a few months. The following conditions could rapidly degrade the aluminum product:

1. Intentional additives such as Sulfates, Nitrates, Chlorides, Iron, or Copper can all cause pitting type corrosion in aluminum.

2. Unintentional additives could include high copper content from upstream pipes, iron filings, or high microbiological content.

3. Ground condition changes across length of tube. If part of the tube is lying on aerated ground, and another part on un-aerated, the aluminum (or any metal) can corrode because of the difference in oxygen content between the two soils. Soil chemistry can also affect corrosion in any metal. Specifically, highly alkaline or acidic soil can promote corrosion.

WHY THIS BROCHURE?

In this brochure, you will find a brief guide to the use of aluminum in irrigation applications. Particular attention is given to conditions that can cause corrosion in aluminum. This provides a starting point for users and producers of irrigation systems to discuss methods of obtaining the best performance out of the aluminum product.

THE ALUMINUM ASSOCIATION

The Aluminum Association, Inc. is the trade association for producers of primary aluminum, recyclers and semi-fabricated aluminum products, as well as suppliers to the industry. Based in Washington, D.C., with offices in Detroit, Michigan, the Association provides leadership to the industry through its programs and services which aim to enhance aluminum's position in a world of proliferating materials, increase its use as the "material of choice," remove impediments to its fullest use, and assist in achieving the industry's environmental, societal, and economic objectives. Member companies operate about 200 plants in the U.S. and many conduct business worldwide.

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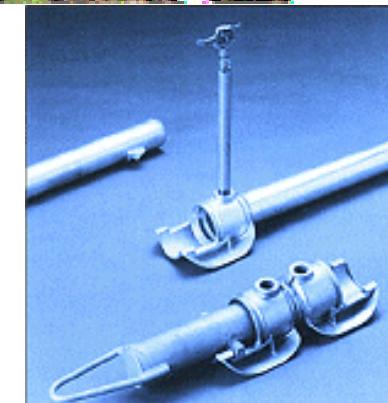
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(1) From "Aluminum and Aluminum Alloys", ASM 1996. Comparing carbon steel to aluminum in a seacoast environment. Galvanized steel has a corrosion rate equivalent to aluminum so long as the coating is intact.

ALUMINUM IN IRRIGATION SYSTEMS

Use and Care Guidelines



From:



The Aluminum Association, Inc.

Photos courtesy of Hastings Irrigation Pipe Co., Lake Irrigation, and Kroy Industries

ALUMINUM IN IRRIGATION

Aluminum has been used in the irrigation industry for over fifty years. Its low density, good strength, and corrosion resistance make it an excellent choice for a variety of tube and joint applications. Irrigation parts are typically made from either rolled & welded sheet or castings. Used appropriately, the aluminum components of an irrigation system can last many years of sustained service. Aluminum is also fully recyclable.

ALUMINUM AS PART OF THE IRRIGATION SYSTEM

Rarely is aluminum the sole material in an irrigation system. Valves, sprays, hoses, pumps, and motors are made of other materials. These materials can include steel (stainless and otherwise), copper, and plastic. In particular, steel and copper can produce a condition called Galvanic Corrosion.

Galvanic what? If two different metals are connected together and put in a moist environment, one of those metals will corrode. The corrosion rate will depend upon the metals and the liquid.

Plumbers know this type of corrosion, and try not to connect a copper pipe to a steel fitting. Another method of dealing with this type of corrosion is creating a physical, non-conductive separation between the two metals.

HOW WATER QUALITY EFFECTS ALUMINUM

Chemigation: Many fertilizers and fungicides contain chemicals that are very corrosive to metals, aluminum included. Examples include copper sulfates and nitrates. See your irrigation equipment supplier BEFORE applying anything other than water through your system.

Water Source: Different water sources have different chemistries. Reconstituted water can have a high bacteria content (used in treating the water prior to release). Potable water can contain significant amounts of chlorides. Chlorides can be corrosive to any metal if left stationary.

If you suspect issues with your water supply, some items to check for are:

- Copper
- Sodium
- Iron
- Lead
- Bacteria
- Sulfur
- Chlorides
- Boron

Pipes should be drained when not in use. Discuss any concerns you have with your supplier.

CONDUCTIVITY

Aluminum is an excellent conductor of electricity. Care should be used when handling any aluminum (or other metal) products to ensure they do not come in contact with power lines or other sources of electricity.

Additionally, tubes should not be placed under power lines, as the power line can induce a current into the aluminum tube. This induced current can promote or accelerate galvanic corrosion.

TYPICAL ALLOYS USED FOR IRRIGATION

Application	Alloy
Tube/Pipe	3004
Fittings	A356

RECYCLABILITY

At the end of there useful life, aluminum components are completely recyclable. Recycling aluminum saves ~95% of the energy and reduces the environmental impact on air and water by ~95% compared to producing primary aluminum.

FOR FURTHER INFORMATION

- The National Association of Corrosion Engineers
- “Corrosion of Aluminum and Aluminum Alloys”, ed. J.R. Davis, ASM, 1999
- “Aluminum Standards and Data”, Aluminum Association, 2003
- “Aluminum and Aluminum Alloys”, ed. J.R. Davis, ASM 1993
- ASTM B 313/B 313M - Specification for Al and Al-Alloy Round Welded Tubes
- ASTM B 547/B 547M - Specification for Al and Al-Alloy Formed and/or Arc-Welded Round Tube

DISCLAIMER:

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