

Coil Care:

A Necessity For Ammonia Refrigeration Systems



Ammonia refrigeration coils share the airstream with food products and personnel. As such, proper maintenance of coils, to prevent corrosion and leaks, is essential to prevent product loss and to ensure the safety of plant personnel.

This bulletin is intended to alert you to basic design considerations and maintenance practices you should be using in all your ammonia refrigeration evaporator installations.



ONE SIZE DOES NOT FIT ALL

Ammonia refrigeration evaporators are most frequently produced of aluminum or galvanized steel. Certain ammonia refrigeration applications require evaporators constructed of stainless steel. However, most evaporator manufacturers, due to their limited abilities to manufacture evaporators from a variety of materials, exhibit a defined preference for a single material of construction, regardless of application. This "preference" is inconsistent with good design practice.

Be advised that certain environments should dictate the evaporator material specified.

For example, in grape storage applications, with their highly SO_2 - laden atmosphere (used to deter mold growth), aluminum coils exhibit vastly superior corrosion resistance to their galvanized steel counterparts.



The addition of SO_2 to the grape storage environment visibly corrodes the galvanized fasteners on the fan hub, while leaving the aluminum blades intact.

Conversely, in applications requiring exposure to caustic soda (a component of certain cleaning solutions) superior coil life, though still reduced, can be obtained through the application of galvanized steel coils in lieu of aluminum coils.

As a manufacturer of aluminum, galvanized steel and stainless steel coils, we would prefer to discuss your application and operating environment with you, before coils are potentially mis-applied, to ensure a proper match of coil and environment. Just ask. Your local Frick/Frigid Coil/Imeco representative will be glad to offer you the benefits of our insight and experience.



FOOD PROCESSING AND DIRTY COILS DON'T MIX

A high percentage of coil corrosion problems we have encountered involved coils that were caked with dirt and debris. In addition to allowing the build-up of corrosive elements, dirty coils are unsanitary.

A typical refrigerated food processing facility sparkles with stainless steel food contact surfaces and clean work spaces. However, far too frequently, suspended overhead, in food storage and processing facilities are evaporators that suffer from far too little exposure to simple, gentle, wash and rinse procedures.

Dirty coils trap contaminants, trap corrosive elements and trap microbiological organisms that can contribute to corrosion via their metabolic processes.

Clean your coils!



USE CARE IN THE SELECTION OF CLEANSING SOLUTIONS

For all coils, chlorine-based cleansing solutions, acidic cleansing solutions and highly alkaline cleansing solutions are hazardous to the coil's health.

Use a mildly alkaline cleanser. Consult with your chemical supplier and read the Material Safety Data Sheet for your cleansing solution.



REMEMBER, AIR UNITS MOVE AIR (AND ALL AIRBORNE MATERIALS) ACROSS YOUR COIL

Instead of discovering that your salt-laden atmosphere has damaged your coil, it is better by far to consider your operating environment in the selection of your coil's material of construction and the frequency of your washdown and rinsing procedures.

We have included with this bulletin, chemical resistance tables (not all inclusive) for aluminum, zinc and steel. Please consider these in your coil selection process. But don't stop here.

Examine your environment. If structure, equipment or other elements of your facility show rust or corrosive effects, your coils are not likely to be impervious to the same effects of the environment. Consider this in coil selection and maintenance.

In dock applications, concern yourself with activities of your neighbors. Are they adding corrosives to the air entering your dock? Fortunately, most refrigeration environments are not corrosive. If yours is, don't deny, plan to protect your coils.



COILS CAN RUST FROM THE INSIDE OUT

Moisture inside of refrigeration systems is not desired and can be extremely detrimental to the life of your coils.

Be sure to use refrigerant grade ammonia, not agricultural grade ammonia (which allows a much higher moisture content).

Monitor moisture levels in your system. Excessive moisture can create sludge or acids in an ammonia system and attack your coil from the inside.



A REFRIGERATION COIL IS NOT INTENDED TO BE AN ICE MAKER

Do not allow ice buildup. If a coil remains partially frosted after a defrost, it is unlikely to ever completely clean itself in a subsequent defrost. If a coil is allowed to build ice into a solid block, the ice can cause stresses to develop which are capable of breaking coil tubes and piping.

Never take shortcuts to clear ice from a coil by applying an open flame to melt ice or frost.



WATER DEFROST, WATER WASH AND WATER QUALITY

The water you use to wash your coil should be analyzed prior to use to determine its suitability for this purpose. There should be no harmful dissolved chemicals or organisms. Water treatment may be required. It is your responsibility to make this determination. Any one of many specialists will be happy to help you with this. If it is determined that water treatment is required, it must be done following your water treatment specialist's recommendations on a regular basis. A schedule for regular testing should be established and followed.



The results of inadequate water treatment are displayed on the surfaces of this galvanized steel coil.



INSPECT YOUR COIL WHEN IT ARRIVES

If your unit shows damage from shipment, immediately notify and file a claim with the carrier.



OBSERVE SOUND CONSTRUCTION PRACTICES

All refrigeration coils must be evacuated to remove moisture prior to charging. Do not leave system or coils open and idle prior to start-up. Internal corrosive damage can result.

Make sure piping is properly supported. Evaporators are not designed to support external piping. Evaporator piping and distributor tubing is not to be used for support or stepped on by crews during the construction process.

The use of threading compounds at coil flanges with particles of metals (i.e. copper) embedded in the compounds can cause corrosion due to contact of dissimilar metals. Double check the compatibility of your construction materials with the coil material of construction.

Further, isolate aluminum coils from steel piping via gasketed flanges and sleeved bolts.

Sensing devices, which detect the presence of ammonia should be employed in your system.

Ensure your system's reliability and safety. Care for your coils!

ALUMINUM

Resistant to

Acetic acid;
ammonia;
ammonium nitrate;
calcium hydroxide;
chlorine (dry); citric
acid; hydrogen
peroxide; hydrogen
sulphide; magnesium
sulphate; nitric acid
(> 80 per cent);
sodium chloride;
sodium nitrate;
sulphur dioxide (dry);
sulfuric acid (dry)

Attacked by

Calcium chloride;
chlorine (wet);
chromic acid;
hydrochloric acid;
hydrofluoric acid;
magnesium chloride;
nitric acid (< 80
percent); phosphoric
acid; potassium
carbonate;
potassium hydroxide;
sodium hydroxide;
sulphur dioxide (wet);
sulfuric acid (wet);
zinc chloride; zinc
sulphate

STEEL

Resistant to

Ammonia; calcium
chloride (dry);
calcium hydroxide;
chlorine (dry);
chromic acid;
hydrofluoric acid
(> 70 percent);
hydrogen sulphide
(dry); magnesium
chloride (dry);
magnesium sulphate
(dry); potassium
carbonate;
potassium hydroxide
(not hot); sodium
chloride; sodium
hydroxide (dil);
sodium nitrate (dry);
sulphur dioxide (dry);
zinc chloride; zinc
sulphate (dry)

Attacked by

Acetic acid;
ammonium nitrate;
calcium chloride
(wet); chlorine (wet);
citric acid;
hydrochloric acid;
hydrofluoric acid
(< 70 per cent);
hydrogen peroxide;
hydrogen sulphide
(wet); magnesium
chloride (wet);
magnesium sulphate
(wet); nitric acid;
phosphoric acid;
potassium carbonate
(wet); potassium
hydroxide (hot);
sodium hydroxide
(conc); sodium
nitrate (wet); sulphur
dioxide (wet); sulfuric
acid; zinc sulphate
(wet)

ZINC

Resistant to

Calcium chloride;
calcium hydroxide
(pH < 12.5); chlorine
(dry); peroxide;
hydrogen sulphide;
sodium nitrate

Attacked by

Acetic acid;
ammonium; calcium
hydroxide
(pH 12.5); chlorine
(wet); citric acid;
hydrochloric acid;
hydrofluoric acid;
magnesium chloride;
nitric acid;
phosphoric acid;
potassium
carbonate;
potassium hydroxide;
sodium chloride;
sodium hydroxide;
sulphur dioxide;
sulfuric acid; zinc
sulphate

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