

Heat Affects on Aluminum/Copper Coils by Robert (Bob) Bloom

Field Operations & Training Supervisor at Bronz-Glow Technologies, Inc.

Corrosive environments have always had an adverse affect on HVAC equipment. Science has studied these and found four main characteristics needed to cause the break-down of all metallic surfaces. They are: 1. Moisture, 2. Oxygen, 3. Heat, and 4. Reactive elements in the environment. These factors vary in the corrosion rates of metals such as Cast Iron (corroding at a fast rate) to Gold (almost no corrosion rate at all). If a metal such as Aluminum is in a salt environment, the mixture of salt, humidity and oxygen will cause the molecular structure to break down reducing its ability to transfer heat. When heat is added to the equation, such as direct sun, re-heat operations, defrost modes or simple heat transfer operations, the rate of corrosion is doubled for every 10 degrees F (10° C). With these factors considered, adding a dissimilar alloy such as copper will then cause an electrolysis effect and increase the process of corrosion even more.

After long term observation of the above characteristics on air conditioning equipment, it has become very obvious that the rate of corrosion will vary in different components of a HVAC system. Typically, the exterior condenser coil is the most effected due to its direct contact with external elements, however, if there is a reheat coil in the system, the rate of corrosion is higher due to the extensive heat which is produced in that coil. The evaporator coil is always colder than any other coils or components but has a high rate of corrosion due to the constant moisture produced by this component.

There are many ways to decrease the rate of corrosion. Some are maintenance orientated and others are applied protection methods. If using preventive maintenance such as continuous cleaning, the chemicals used may also be corrosive thus increasing the break-down of the metal surface even faster. Many of the coil cleaners available have an acidic base and simply eat the surface layer away to expose a cleaner looking metal underneath the surface. This type of cleaning is only good for cosmetic reasons and will cause heat transfer to diminish, which makes the compressor work harder and in turn, uses more energy and shortens the life of the system. Using biodegradable citric cleaners will have less effect on the metal and extends the working life of the unit. Dirt, grease, and feathers will clog the coils and in turn, decrease the flow of air through the coil causing the system to work harder to expel the heat from the coil. Keeping the air flow at its maximum ability ensures the operational value of the unit in question.

The best way to protect your unit from corrosion is simple. Apply a good, flexible, protective barrier between the elements and the metals. Be sure to use a proven product that will have little effect on heat transfer. Powder coatings, paints and acrylic applications (heavy coatings) do not allow for metal expansion and will deter heat transfer. Flexible coatings, such as a polyelastomer product will expand and contract with the metals will allow heat to transfer off the coil. The thickness of these coatings is measured in mil's (one thousandth of an inch or .001). On the average, the millage on a coil fin should not exceed 3 mil's. and components and cabinetry should not exceed 6 mil's. Any more would be a waste of material and unnecessary for great protection. The best rule of thumb would be, the thicker coating is, the less heat will be transferred off.

At Bronz-Glow, we are proud to offer the most durable, longest lasting protective coatings on the market today. No other protective coatings company offers a comparable product, applied in our factory or in the field that can protect all HVAC systems. In addition, we cover the full pH range (1-14). Please check us out @ Bronz-Glow.com.