

Storage of Materion Copper-Based Strip Products

The copper alloy strip products that Materion manufactures are corrosion resistant in normal atmospheric conditions. Materion uses stain inhibitors that form a protective layer on the surface. When shipping overseas the material is also tightly wrapped with vapor corrosion inhibitors* (VCI) in the packaging. However, the material can be unwrapped and processed several times before it reaches the final customer. Slitting and stamping operations can remove the protective layer, leading to surface tarnish over time. This will not have an effect on the bulk properties but may negatively affect the ability to solder or plate without prior cleaning. Controlling the storage environment will help maintain good surface quality for an extended period of time. This can make surface cleaning prior to soldering or plating more effective or even unnecessary.

ATMOSPHERIC CORROSION BEHAVIOR OF MATERION'S COPPER-BASED PRODUCTS:

Materion's alloy products maintain surface quality best in rural areas and worst in humid marine areas. Even in the worst conditions, they may develop an extremely thin oxidation film that can be removable by well-established cleaning practices.

As can be seen in **Figure I**, the oxidation elements only penetrate the material to depth of about 400 angstroms.

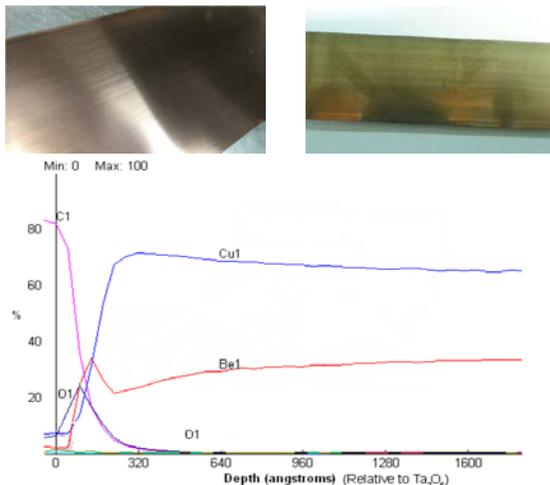


Figure I. Clean material (left) shown next to tarnished material. Below is an elemental profile of elements present in the tarnish versus depth in angstroms.

STORAGE ENVIRONMENT CONCERNS:

Several conditions are needed for surface tarnish to occur. Two significant factors are compounds that

react with the metal and the presence of moisture that acts as a vehicle for the reaction. Varying the levels of either will affect the time the metal can be stored without the formation of surface corrosion.

LIMITING CORRODING COMPOUNDS:

Compounds to avoid are chlorides, sulfides, amines, ammonia and fumes from acids commonly used in metal processing such as nitric or sulfuric. If any strong chemicals are being used in the vicinity, ensure that they are properly contained or vented.

Even if corrosive compounds are not being used, they can still be present in the air in the form of general pollution. These compounds are most likely to be attached to and concentrated on dust particles; so, limiting exposure to dust particles will also limit exposure to corroding compounds.

Materion recommends that the material be stored in a visibly clean environment to limit exposure to dust. Methods include wrapping the material in plastic, sealing the facility and filtering dust from the air with an air handling system.

MOISTURE AND RELATIVE HUMIDITY:

Since there is no way to remove 100% of the contaminants, it is important to prevent moisture in the air from condensing on the metal. This can happen even if the material is wrapped in plastic. The warmer the air, the more moisture it can hold. This is measured as relative humidity or the percentage of the total moisture in the air needed for condensation at a specific temperature.



Figure2. Coiled strip wrapped in plastic ready for international shipment.

It is recommended that material be kept at a constant temperature and the relative humidity be maintained below 60% to prevent condensation on the surface of the metal.

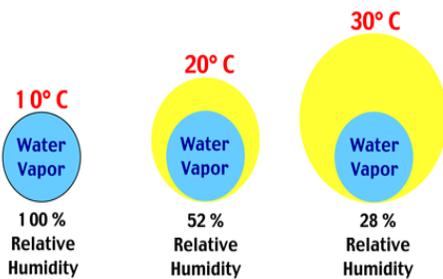


Figure3. Illustration showing the effect of water vapor and temperature on relative humidity.

* Daubert Cromwell® has been found to be effective in preventing corrosion during shipment and while the material is in its original packaging.

SAFE HANDLING OF COPPER BERYLLIUM

Handling copper beryllium in solid form poses no special health risk. Like many industrial materials, beryllium-containing materials may pose a health risk if recommended safe handling practices are not followed. Inhalation of airborne beryllium may cause a serious lung disorder in susceptible individuals. The Occupational Safety and Health Administration (OSHA) has set mandatory limits on occupational respiratory exposures. Read and follow the guidance in the Safety Data Sheet (SDS) before working with this material. For additional information on safe handling practices or technical data on copper beryllium, contact Materion Performance Alloys, Technical Service Department at 1-800-375-4205.

CONTROLLING HUMIDITY:

In cooler weather, when the temperature is below 70° F (20° C), simply heating the air will lower the relative humidity. The cooler it is, the more effective this will be.

In warmer months, it is not as simple. Air conditioners reduce the absolute humidity as moisture condenses on the refrigeration coils, but increase the relative humidity of the cooled air. Mixing the cooled air with ambient will result in air with higher relative humidity. Heat from windows and exterior walls and waste heat from lighting and appliances warm the air without adding moisture. This lowers the relative humidity. Air conditioning units that continually run to maintain the set point will better control both absolute and relative humidity than those that cool the air quickly and then shut off. Maintaining a lower absolute humidity during the day makes it easier to control the relative humidity when exterior temperatures drop at night.

Steps taken to make buildings more energy efficient create additional challenges in managing this. It may be necessary to consult with an HVAC engineer to design a system to control humidity along with temperature.

SUMMARY:

Despite being resistant to corrosion, the surface quality of Materion's strip products may degrade over time. However, keeping the material in a clean and dry environment by limiting the dust and maintaining relative humidity below 60% will extend the time the metal will maintain a good surface quality without the need for cleaning.