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## PRODUCT DATA SHEET

## Cleaning Copper and Copper Alloys Frequently Asked Questions

## Copper Alloys

Copper is valued for strength, malleability, ductility, and ability to conduct electricity and heat. It is also non-magnetic, resists wear, and in some atmospheres can form a green patina which is attractive and helps to make it resistant to further corrosion. Copper is used to coat the bottoms of steel pans to improve heat conduction, for decorative items, and in a few other cookware applications. It is also used for electrical wiring, plumbing pipes, and many uses in appliances.

Decorative items should be kept clean and dusted. Copper is sensitive to air, and oxidizes (tarnishes) faster in moist air. Coating with lacquer, if not being used for food purposes, helps preserve the finish.

Most pieces of decorative, modern copper are protected by a factory-applied, baked-on lacquer. Only dusting and an occasional washing with lukewarm, soapy water are needed to keep lacquered objects shiny. Never polish them. Lacquer must be removed from eating and cooking utensils before using. To remove lacquer, place the item in 2 gallons of boiling water to which 1 cup of washing soda has been added. The lacquer will peel off. An alternate method to remove lacquer is to rub with a cloth saturated with acetone or alcohol.

**Copper Pots:** To remove light tarnish from copper pots, rub with lemon halves dipped in salt.

**Copper Utensils:** with copper interiors should never be used for acidic foods, with pH of 6.0 or below, since toxic compounds can form if food is cooked, or stored, or served from such containers. Even if copper pans are lined with tin, they should not be used for acidic foods such as fruits, fruit juices, salad dressings, tomatoes, vinegar containing foods, etc. Copper bowls may be used for beating egg whites, or copper kettles for cooking high sugar foods like fudge, for these foods are alkaline. Utensils with copper on the bottom, or outside, and stainless steel, aluminum, or a porcelain enamel interior finish are safe to use and conduct heat well. Avoid high heat which discolours copper bottoms.

Ideally you should clean copper bottoms after each use, even though the tarnish does not affect cooking results or the pan's efficiency. Do not use an abrasive cleaner or steel wool to clean copper bottoms.

Wash tarnished copper utensils with soap and warm water and polish with a cleaner of equal parts of salt, vinegar and flour. After rubbing the item with this mixture or any polish, wash it carefully, rinse thoroughly and dry. Metal cleaners based on sulphamic acid, often labeled stainless steel cleaners, are readily available and can be used with copper.

### Removing Tarnish

There are several methods of removing tarnish from copper, which rely on dissolving the tarnish film from the surface of the copper. They may incorporate a mild abrasive which removes a tiny amount of copper from the surface, restoring the gloss.

**Vinegar and Salt.** If copper is heavily tarnished, boil the article in a pot of water with 1 tablespoon salt and 1 cup white vinegar for several hours. Wash with soap in hot water. Rinse and dry.

Salt, Vinegar, and Flour. Dissolve 1 teaspoon salt in 1 cup white vinegar. Add enough flour to make a paste. Apply the paste to copper and let sit for 15 minutes to 1 hour. Rinse with clean warm water, and polish dry.

Lemon and Salt or Baking Soda. Make a paste of lemon juice and salt, and rub with a soft cloth, rinse with water, and dry. Or use a slice of lemon sprinkled with baking soda. Rub copper with the lemon slice and rinse with water and dry.

Vinegar and Salt. Pour vinegar over the surface. Sprinkle salt over the acid and rub in the mixture. Rinse with warm water and polish dry.

Lemon Juice and Cream of Tartar. Make a paste of lemon juice and cream of tartar. Apply, leave on for 5 minutes, and then wash in warm water. Dry with a soft cloth.

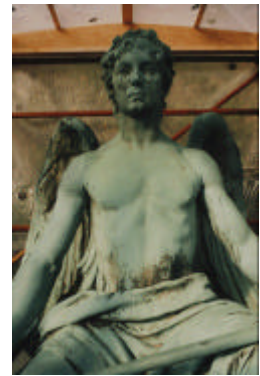
**Badly Tarnished Copper.** Polish with a commercial polish for copper following directions on the container. Polish can be made at home by moistening salt with vinegar or lemon juice to make a paste for a bright finish or a paste of rotten-stone and olive oil for a dull finish. After polishing decorative items, spray with lacquer to preserve color if desired.

## Bronze

Bronze is copper alloy. In modern times, bronze is an alloy of copper and any metal except zinc. It is generally more expensive than brass and more corrosion resistant. Bronze forms a green patina which is protective to the metal and is often seen on artwork. The green patina is called verdigris.

Solid bronze often is lacquered (at the factory) to protect the finish. Lacquered bronze only needs dusting and an occasional wiping with a damp cloth. Have the lacquer replaced if it cracks or peels.

Keep bronze pieces as clean as possible. Accumulations of dust and dirt can eat into the metal surface. Dust regularly with a soft cloth. Don't rub too vigorously, especially on protruding parts. If a bronze piece has been neglected for a long time and is covered with grime, thoroughly clean it with a soft brush.



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Remove all dust from crevices and notches and then lightly rub the entire surface with a soft flannel cloth. For more thorough cleaning, carefully wash with a solution of 1 tablespoon of salt and 3 litres of water. Rinse well. Polish with copper polish followed by a light wax.

If you want a high polish, dip a cloth into liquid wax and apply to the piece. When dry, buff lightly to a high gloss. This wax treatment also may be given to bronze pieces that are kept outdoors. Weathered bronze usually darkens; however, this is natural and does not harm the piece.

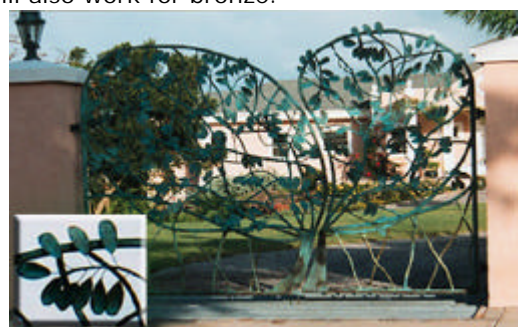
**"Bronze disease"** is one of the most serious hazards of bronze. This disease, caused when chlorides and oxygen combine in a damp environment, also attacks copper, brass and pewter. The disease takes the form of a sudden outbreak of small patches of corrosion and is distinguished by rough, light green spots. "Bronze disease" usually can be stopped by washing the piece in repeated changes of boiling hot, distilled water, which dissolves the chemical agents such as chlorides which are causing the corrosion. You may have to soak the object for a week or more in distilled water. If this treatment does not work, consult a museum expert about using a strong solution of sodium sesqui-carbonate or have your piece treated by a professional.

**Cleaning Bronze:** The cleaning methods described above will also work for bronze.



Bronze statue of Buddha on Lantau Island, Hong Kong

A patinated copper double gate



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## Austral Wright Metals additions:

When the surface staining is more severe, there are two problems to be rectified. First the corrosion product on the surface of the metal must be removed, then the surface must be restored to the desired appearance.

Corrosion products on copper and alloys may be oxides, usually black or deep red, or chlorides, sulphates and carbonates, which are various shades of blue and green.

Light corrosion products can be removed with mild acids, such as sulphamic acid (e.g. stainless steel cleaner), citric acid or acetic acid. Heavier corrosion products may require 20 – 30% nitric acid, applied as a wash to the surface. Use of a Scotchbrite pad to apply the acid may reduce the time taken by helping to dislodge the larger particles of corrosion product.

After removing the corrosion products, the surface may show shadow effects due to differences in surface texture where the corrosion products have been removed.

The surface may therefore need to be restored by polishing overall to match the rest of the job. This may be achieved by rubbing with a proprietary polish, such as Brasso, and again using a Scotchbrite pad may increase the cutting rate on the surface and make the finished surface a little less reflective, which may give a better match to an existing surface. The polish may be left on the surface for a while to assist in removing corrosion products. It should then be completely removed, and the surface thoroughly washed.

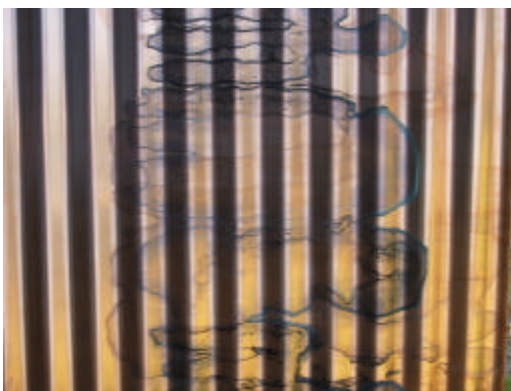
It may be necessary to give the surface a final rinse with methyl alcohol (methylated spirits, methanol) to prevent drying marks by promoting even drying and a uniform appearance. However, as long as the corrosion products have been removed and texture differences on the surface have been minimised, drying marks are likely to disappear as the surfaces tarnishes with age.

### **Safety:**

When working with mineral acids (nitric, sulphuric, hydrochloric) always wear a face mask and gloves, and work in the open air, where any fumes can dissipate.

Be careful to dilute or neutralise these acids before discharge to water courses.

Do not leave them in contact with copper and copper alloys when unattended, or for long periods, and always wash off completely with an excess of water.



Appearance of copper roofing sheet affected by water staining (left) and after cleaning with nitric acid and Brasso (right).