CBX™ 11

The **CBX™ 11** gives the metal finisher a wide range of choices for color development in the oxidizing of copper and its alloys. The liquid concentrate is diluted with water and by varying the concentration and immersion time, a range of colors will be developed. The **CBX™ 11** is an economical oxidizer that can produce statuary bronzes, brown and black-brown colors.

Operating Conditions

Concentration:	15% to 20% b.v.	Black to Black-Brown US 10B
	5% to 10% b.v.	Flemish and statuary bronzes
Immerstion Time:	1 - 5 min.	
Temperature:	Ambient to 40.56ºC	

Desirable underlying red tones revealed upon highlighting the brown tones. To decrease the process times the solution can be heated (32.2° to 40.56°C). Some experimentation should be done with properly prepared sample parts using various dilutions and immersion times prior to charging a production tank. Once the optimum conditions are determined they can be consistently reproduced in production.

The natural color of the alloy and the mechanical finish on the surface will affect the final color of highlighted or burnished finishes. The ultimate color will also be enhanced when top-coated with a lacquer or wax. Therefore, the topcoat should be applied prior to judging the color or before comparing with other antiqued finishes.

The easy to relieve finish increases productivity by reducing the time required for buffing or burnishing and the consumption of buffing wheels, compounds and burnishing media is reduced.

Equipment

Acid resistant tanks, tumbling barrels, baskets, hooks and racks must be used. Plastic, plastic lined, rubber lined, glass or stainless steel are suitable. Mild steel may be used for the cleaning, rinsing and sealant tanks.

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Finishing Procedure

1. Surfaces must be free of oxides and residual plating solutions.

a) Plated surfaces should be thoroughly rinsed with cold water followed by another short rinse in a 5% Sulfuric Acid solution or acid salts to neutralize residual alkaline plating solutions.

b) Wrought alloys and sheet stock can be mechanically cleaned and deoxidized by burnishing, belt sanding, glass bead or sand blasting. Chemical cleaning and deoxidizing can be accomplished with **Spotless™ ESS** soak and electrocleaner, and acid pickling. A cold water rinse is used following cleaning and deoxidizing to remove residual solutions or blasting dust.

2. **Oxidizing Brass, Bronze and Copper**
   Immerse pieces, while still wet from the preceding rinse in the **CBX™ 11** solution for the length of time necessary to produce the desired color. Rotating perforated plastic barrels are recommended for processing small parts. When using dip baskets, the parts should be agitated when immersed in the solution to break air bubbles and to assure solution contact with all surfaces.

3. Rinse thoroughly in bottom fed, overflowing cold water rinse. A stagnant hot water rinse can be used to speed drying, but it should be preceded by a short cold water rinse to minimize staining. Hot rinses should be maintained at 71 to 82°C and dumped periodically or overflowed very slowly. A rinse aid may be helpful in eliminating water spots.

4. Force drying in heated spin dryers, ovens or cob meal will minimize streaking and staining. Large architectural panels should be wiped dry or blown dry. Small parts do not require drying if they will be barrel or vibratory burnished immediately after rinsing.

5. "Highlighted" or relieved antique finishes are produced by buffing, scratch brushing, barrel or vibratory burnishing.

6. Sealing the finish with a protective topcoat will enhance the color and impart corrosion and abrasion resistance. A clear lacquer topcoat such as **GuardCoat™ TCP** produces a hard, dry finish.

SOLUTION MAINTENANCE

The **CBX™ 11** solutions are gradually depleted through use but may be replenished indefinitely with periodic additions of **CBX™ 11** concentrate. The strength of the solution and the amount of concentrate to be added can be determined by titrating the solution per burette titration control by using a simple dropping bottle method outlined below. The strength of the solution can also be

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fairly accurately maintained by the immersion time required to produce the desired color. As the time increases, add sufficient concentrate to reduce the time to your established standard. A sample of a freshly prepared bath should always be retained as a control.

The frequency of additions will depend upon the volume of work processed through the solution and the color developed. Producing the darker black and brown colors will consume more than the lighter colors. Coverage will be on the order of 9.82 m^2 per liter of concentrate added to the bath for blacks and 19.636 m^2 per liter for the light browns.

For optimum results, the strength of the solution should be maintained at 85% of its original strength or greater at all times and frequent small additions are recommended. With automatic lines a bath history should be established while running the first several (15 to 25) racks or barrels and by titrating the strength after each 5 loads to determine the point at which the solution is depleted approximately 10 to 15% and replenishment is necessary. Timed metering pumps, triggered by the load, are recommended for replenishing the solution and maintaining a consistent strength. If the ambient temperature in the plant varies considerably, electric heaters may be used to maintain a consistent solution temperature.

The life of the solution and coverage will be increased by continuous circulation and filtration through a 50 micron filter. An alternative with smaller baths is to allow the solid by-products of the reaction to settle to the bottom of the tank and transfer the solution to a plastic holding drum to be retained for recharging the tank after the solids have been removed.

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Analytical Procedure

A sample of a freshly prepared production bath should always be taken as a control solution prior to running any parts through the bath. If a sample was not taken, a laboratory prepared solution at the same concentration may be used as the control solution. Titration of this "new" solution will provide the figure for **D_1**.

1. Transfer a 5 ml sample of the production bath into a 250 ml Erlenmeyer flask.
2. Dilute with water to the 50 ml mark.
3. Add 2 ml 6N (1:1) Hydrochloric Acid to the flask.
4. Add 4 ml of the 15% by weight Potassium Iodide solution.
5. Add 2 ml of starch solution. The solution will become a dark blue to almost black color.
6. Add the 0.5N Sodium Thiosulfate solution from the dropping bottle - drop by drop - counting the drops while swirling the flask.
7. The end point is marked by a sudden change in color from dark black to light brown.

NOTE: Upon standing, the light brown color will turn dark again, but additional Sodium Thiosulfate solution should not be added. The first end point is correct.

Calculate the amount of concentrate to be added as follows:

$$\mathbf{C_2} = \frac{D_1 - D_2}{D_1}(C_1)$$

C_2 = Concentration in liters to be added to the bath.
D_1 = Number of drops of Sodium Thiosulfate used to titrate the new production bath.
D_2 = Number of drops of Sodium Thiosulfate used to titrate the used production bath.
C_1 = Volume of concentrate in liters used to make up the original "new" bath.

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