

## Ultra-Blak™ 420

### Black Oxide Finish for Copper, Brass, Bronze and White Bronze

**Ultra-Blak 420** oxidizing liquid is mixed together with 50% Sodium Hydroxide and water. The alkaline solution is used at a temperature of 140-200°F (60-93°C) to blacken a wide range of copper, copper plated and copper alloyed surfaces. It must be used in conjunction with a brass activator step utilizing **Ultra Blak 420** to blacken high zinc (15% to 35%) copper alloyed surfaces. The **Ultra-Blak 420** finish meets military specification **MIL-F-495E**.

#### SOLUTION MAKE-UP

Calculate the operating volume of the tank, leaving 6 inches of free board. Determine the total gallons required of water, **Ultra-Blak 420** and 50% Sodium Hydroxide (see #6 in **FINISHING PROCEDURE**). Do not apply heat until additions of **Ultra-Blak 420**, 50% Sodium Hydroxide and water are added. A full face shield, rubber gloves and rubber apron must be worn while mixing the solution. **First add the required amount of water to the tank.** Slowly add the required amount of **Ultra-Blak 420** and 50% Sodium Hydroxide. When the total amount of **Ultra-Blak 420** and 50% Sodium Hydroxide has been added, water should be added to bring solution to the proper level if needed (**DO NOT OVERFILL** - remember to leave 6 inches of freeboard at the top.)

Once the tank is filled, heat is applied and the solution is stirred to ensure a uniform temperature throughout while the temperature rises to the operating temperature of 140°F to 200°F (60-93°C). Thereafter, all that is required for continuous, trouble-free operation are small periodic additions of water to compensate for evaporation and small periodic additions of **Ultra-Blak 420** oxidizer and 50% Sodium Hydroxide to make up for depletion and dragout (see note on page 3).

#### FINISHING PROCEDURE

Parts to be blackened may be processed in mild steel baskets or tumbling barrels or on mild steel hooks or racks.

- 1. CLEAN:** Parts must be thoroughly cleaned and degreased for 5 to 10 minutes in a hot (160°F; 70°C) solution of **EPI's E-Kleen 102** (alkaline soak cleaner at 5-10% by volume).
- 2. RINSE:** Using a bottom-fed, overflowing cold water rinse tank.
- 3. DEOXIDIZE:** Immerse parts for 30 seconds to one (1) minute in a room temperature, 25% to 50% by volume Muriatic Acid solution or in an 8 oz to 2 lb per gallon (60-240g/l) solution of **EPI's E-Pik 215** or in **E-Pik 217** at 1 to 2 pounds per gallon (120-240g/l) to remove surface oxidation.
- 4. RINSE:** Using a bottom-fed, overflowing cold water rinse tank.
- 5. BRASS ACTIVATOR:** Required only for high zinc (15% to 35%) copper alloys. This step is not used when blackening copper.

## Activator Solution Make Up

### 100 Gallons

1.2 gals of **Ultra-Blak 420**  
15 gals of 50% by wt Sodium Hydroxide  
83.8 gals of water  
Time – 1 to 3 minutes  
Temperature 220°F (105°C) (boiling)

### 100 Liters

1.2 liters of **Ultra-Blak 420**  
15 liters of 50% by wt NaOH\*\*  
83.8 liters of water  
\*\*or use 115 g/l of Sodium Hydroxide powder

- 6. BLACKEN:** Immerse parts in **Ultra Blak 420** solution maintained at 140° to 200°F (60-93°C) until a uniform, deep black color is developed. Immersion times will vary from 5 to 20 minutes depending upon type of surface and degree of alloying with zinc. Most blackening problems can be traced back to improperly prepared surfaces.

## Blackening Solution Make Up

### 100 Gallons

24 gals of **Ultra-Blak 420**  
16 gals of 50% by wt Sodium Hydroxide  
60 gals of water

### 100 Liters

24 liters of **Ultra-Blak 420**  
16 liters of 50% by wt NaOH\*\*  
60 liters of water  
\*\*or use 120 g/l of Sodium Hydroxide powder

- 7. RINSE:** Using a bottom-fed, overflowing cold water rinse tank.  
**8. SEAL:** The finish must be sealed and the depth of black enhanced by immersion in **EPI's E-Tec 501** for an oily finish, **E-Tec 510** or **E-Tec 504** for a "dry to the touch", non-tacky finish or **E-Tec 520** for a hard, dry, clear finish.

## OPERATION AND MAINTENANCE

The temperature of the solution should not drop below the recommended operating temperature of 200°F (93°C) when work is introduced. Sufficient heat should be maintained to ensure that the solution does not drop below this level for more than a few minutes, especially with heavier loads. Maximum loads should not exceed two pounds of work per gallon of solution. Optimum loads would be approximately one pound of work to one gallon of solution, including the weight of barrels, baskets and racks. The accuracy of automatic temperature controls should be checked periodically with a glass thermometer.

Frequent small additions of **Ultra-Blak 420** and 50% Sodium Hydroxide will produce more uniform results than large amounts added less frequently. This is also true for water replenishment to compensate for evaporation loss.

The strength of the solution and the amount of **Ultra-Blak 420** and 50% Sodium Hydroxide to be added is determined with the following titration procedures:

### Ultra Blak 420 Titration Method

1. Take a 50 ml sample of the **Ultra-Blak 420** working solution and cool to room temperature.
2. Measure out 5 ml of the cooled sample with a 5 ml pipette and transfer to a clean 100 ml volumetric flask. Dilute to the 100 ml mark with tap water and mix thoroughly.

3. Pipette a 10 ml portion of the solution from step 2 into a clean 250 ml Erlenmeyer flask. Add 25 ml of tap water.
4. Add 10 ml of 15% Potassium Iodide solution and 10 ml of 6N Hydrochloric Acid. The solution will turn to a reddish-brown color.
5. Titrate the solution with 0.1N Sodium Thiosulfate to a straw color and add 2 ml of 0.2% Starch Solution. The solution will turn to a dark blue color.
6. Continue titrating until the blue color disappears.
7. Record the burette reading in ml of 0.1N Sodium Thiosulfate.
8. **Calculation: Ultra-Blak 420** (% by volume) = ml of 0.1N Sodium Thiosulfate x 1.106

### **50% Liquid Caustic Titration Method**

1. Take a sample of the **Ultra-Blak 420** solution from the bath with a beaker and allow to cool to room temperature.
2. Pipette out 5 ml of the sample and transfer to a clean 125 ml Erlenmeyer flask. Add 25 ml of water.
3. Add five (5) drops of Phenolphthalein Indicator to produce a pink colored solution.
4. Titrate with 1.0N Hydrochloric Acid until the pink color suddenly disappears.
5. Calculation:  
 Concentration of 50% Liquid Caustic (% by volume) = (ml of 1.0N HCl) x 1.06

**NOTE:** It is recommended that for every addition of 1 gallon (3.785liters) of **Ultra-Blak 420**, 0.67 gallons (2.523 liters) of 50% Sodium Hydroxide should also be added to maintain the proper ratio between them.

### **EQUIPMENT**

The tanks to contain the **Ultra-Blak 420**, **E-Kleen**, **E-Tec** and rinse waters may be constructed of mild steel. The acidic **E-Pik 215**, **E-Pik 217** and Hydrochloric Acid deoxidization/activation solutions must be contained in polypropylene or rubber lined steel tanks.

Gas heating units evenly spaced beneath and across the bottom of the tank are preferred for uniform heating of the insulated **Ultra-Blak 420** tank. Mild steel electric immersion heating elements may be used with the **E-Kleen** and **Ultra-Blak** solutions.

Non-ferrous metals such as galvanized steel, bronze, copper, tin and aluminum should not be used as racks or baskets because they will contaminate or deplete the **Ultra-Blak 420** solution.

The hot alkaline cleaning, acidic deoxidizing and **Ultra-Blak 420** solutions must be exhausted. The duct work can be mild steel, stainless steel or plastic. Galvanized steel should not be used. Your **EPI** representative will assist you in designing and installing the proper controls, as well as the complete tank system, completely automated if desired.

## **CAUTION**

**MAJOR HEALTH HAZARDS: CORROSIVE.** Causes severe skin burns and serious eye damage. Toxic if inhaled. Harmful if swallowed. Ingestion may cause damage to blood system and kidney system. Inhalation may cause damage to the respiratory system. May cause damage to the blood and kidneys through prolonged or repeated exposures.

**POTENTIAL FIRE HAZARD!!** Avoid allowing **Ultra Blak 420** to evaporate to dryness. Dried material can ignite upon contact with combustibles. The dried material could represent an explosion hazard if it contacts acids, chlorine or organic materials.

**Do not** work with **Ultra-Blak 420, E-Kleen, E-Tec** or other materials without first reading the **SAFETY DATA SHEETS** for the materials and following the specific instructions and precautions to assure correct use and personal safety.

## **PACKAGING**

5 and 55 gallon non-returnable containers.

## **IMPORTANT NOTICE! For Industrial Use Only**

The following is made in lieu of all warranties, expressed or implied, including the implied warranties of merchantability and fitness for purpose: seller's and manufacturer's only obligation shall be to replace such quantity of the product as proved to be defective. Before using, user shall determine the suitability of the product for its intended use, and user assumes all risk and liability whatsoever in connection therewith. **Neither seller nor manufacturer shall be liable either in tort or in contract for any loss or damage, direct, incidental or consequential, arising out of the use or the inability to use the product.**

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