

Ultra-Blak™ 407

Black Oxide Finish for Stainless Steel

Ultra-Blak 407 oxidizing salts are dissolved in water at a concentration of 4.75 pounds per gallon. The alkaline solution will blacken a wide variety of stainless steels at 250°F. The resulting finish complies with military specification MIL-DTL-13924E, Class 4. The versatile **Ultra-Blak 407** solution may also be used to blacken malleable and cast irons as well as some mild low carbon steels.

SOLUTION MAKE-UP MAINTENANCE

Calculate the operating volume of the tank, leaving 6" of free board. Determine the total poundage of salts required using 4.75 pounds per gallon. Fill the tank half full with cold water. Do not apply heat. **A full-face shield, rubber gloves and rubber apron must be worn while mixing the solution.** Slowly add the salts to the water while thoroughly and continuously stirring the solution to avoid the formation of lumps. The salts should be added (sprinkled) over the entire surface of the water while stirring to avoid violent spattering on the surface. When the total amount of salts has been added, the tank should be filled with water to within 6 inches of the top while stirring continuously.

Once the tank is filled, heat is applied and the solution is stirred to ensure a uniform temperature throughout while the temperature rises to 250°F, at which time the solution should begin to boil. If the solution boils before reaching 250°F, additional **Ultra-Blak 407** salts should be added to raise the boiling point. If the solution does not boil at 260°F, then water should be slowly added until the solution just begins to boil (simmer). The super saturated solution should be held at operating temperatures below 250°F for at least one hour before adding additional salts to raise the boiling point. This will ensure that all salts previously added have been completely dissolved, and the true boiling point has been reached.

The chemical strength of the solution is maintained by controlling the boiling point between 250°F and 260°F by adding water when too high, and salts when too low. The boiling point will rise due to evaporation of water and an electronic temperature controller should be used to automatically and safely control the addition of water. Your **EPI** representative can assist in the selection of, and installation of an automatic water and temperature control system.

To ensure consistent and uniform finishes, detrimental over-heating must be avoided, and frequent small additions of replenishment salts should be made rather than large amounts added less frequently. The accuracy of the automatic temperature controller should be checked frequently.

The maximum load (including the weight of processing barrels, baskets and racks), should not exceed two (2) pounds of work per one (1) gallon of solution, with one (1) pound per gallon being optimum. The temperature of the solution should not be allowed to drop below the boiling point for more than a few minutes when work is introduced. Therefore, the heating system for the tank must be designed to ensure that sufficient heat capacity is available to handle the heaviest loads.

FINISHING PROCEDURE

Parts to be blackened may be processed in mild steel baskets, 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 (180°F) solution of **EPI's E-Kleen SR 102, E-Kleen SR 102-E and E-Kleen SR 196.**
2. **RINSE:** Using a bottom-fed overflowing cold water rinse tank.
3. **ACTIVATE:** All stainless-steel surfaces are passive by nature due to the chromium oxide present on the surface. This oxide must be removed prior to blackening by deoxidizing/activating the surface in one of the following solutions:
 - a. Use **EPI's E-Pik 211** at 16 to 32 wt. oz/gal. with immersion time of 2 to 5 minutes. Temperatures from ambient to 150° to 180°F should be evaluated.
 - b. 50% by volume Muriatic Acid used at room temperature for 5 minutes.
 - c. A five (5) minute immersion in a room temperature solution of 90% Muriatic Acid, 5% Sulfuric Acid and 5% water by volume. The solution is prepared by slowly adding the Sulfuric Acid to cold water, which is allowed to cool before adding the Muriatic Acid.
 - d. Very passive surfaces may require deoxidization with step 3-b, followed by a cold-water rinse, followed by activation in a warm (150° to 180°F) solution of **EPI's E-Pik 211** used at 1 to 2 pounds per gallon of water with 30 second to 3-minute immersions.
4. **RINSE:** Using a bottom-fed, overflowing cold water rinse tank.
5. **BLACKEN:** Immerse parts in boiling (250° to 260°F) **Ultra-Blak 407** solution until a deep black color develops. Required immersion times may vary from 2 to 15 minutes depending upon the mass of parts and the type and condition of the stainless steel. Excessive immersion times may lead to non-adherent finishes. Most blackening problems can be traced back to improperly prepared surfaces or an incorrect boiling point for the **Ultra-Blak 407** solution.
6. **RINSE:** Using a bottom-fed, overflowing cold water rinse tank. Transfer time from the **Ultra-Blak 407** solution to the rinse water should be as short as possible to avoid the development of an off color on the surface.
7. **SEAL:** The finish must be sealed and 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.

Equipment

The tanks to contain the **Ultra-Blak 407**, **E-Kleen**, **E-Tec** and rinse waters should be constructed of mild steel. The acidic 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 407** tank. Mild steel electric immersion heating elements may be used with the **E-Kleen** solution and quartz immersion heaters with the **E-Pik 211**.

The hot alkaline cleaning, acidic deoxidizing, and the **Ultra-Blak 407** 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.

SAFETY PRECAUTIONS

When salts are added to a cold or hot solution they should be added slowly by sprinkling them over the entire surface while stirring the solution. Large shovelfuls or buckets of salts should never be just dumped in mass into the solution as this could cause a violent eruption of the hot solution.

Although the temperature of the solution can be maintained by manually adding water, an automatic indicating temperature controller is recommended for the safe addition of water. The only reason for the boiling point to rise is due to the evaporation of water. The automatic temperature controller will replenish the water as needed on a continuous basis to maintain the correct boiling point and concentration. It will also guard against the undesirable and detrimental overheating of the solution.

Water should only be added automatically to the solution when it is boiling so that the fresh water is rapidly and thoroughly dispersed throughout the solution from the boiling action. If water is added to the solution when it is not boiling, the water will lie on the surface of the solution and can be suddenly drawn in mass below the surface upon the first boiling action and this could cause a violent eruption of the solution. Stirring the solution is satisfactory if water is added manually when the solution is not boiling.

Caution - This material contains caustic soda. Causes severe burns.

Do not get **Ultra-Blak 407** in eyes, on skin or clothing. Avoid breathing the dust when working with the powdered material, and avoid breathing the fumes while working with the hot solutions. **Do not take internally!** A full-face shield, rubber gloves and rubber apron must be worn when handling the powdered material and while preparing and working with the solution.

In case of contact with eyes or skin, flush thoroughly for at least 15 minutes. For eyes, call a physician. **Do not mix Ultra-Blak 407** or its solutions with acidic materials, or any other materials. **Do not** work with **Ultra-Blak 407**, the **E-Kleen** or **E-Tec** or other materials without first reading and understanding the **Safety Data Sheet** for the material.

Packaging

125 pound and 500 pound (net) non-returnable drums.

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 the use or the inability to use the product.**

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