

Ultra-Blak™ 407-L

Black Oxide Finish for Stainless Steel

Ultra-Blak 407-L is a ready-to-use solution of **EPI's** oxidizing salt formulation. **Ultra-Blak 407-L** is recommended for black oxide installations where it is desired to automate the replenishment addition of the blackening salt solution through a pump and liquid level control system. It is also ideal for the initial charging of black oxide baths which will be replenished with **EPI's** conventional powdered **Ultra Blak 407** salts.

The **Ultra-Blak 407-L** solution is operated at a temperature of 250°F to blacken a wide range of stainless steels. The resulting finish complies with military specification MIL-DTL-13924E, Class 4. To blacken steel use **Ultra-Blak 400** or **Ultra-Blak 400-L**.

BATH MAKEUP

A new bath is started by filling the tank with **Ultra-Blak 407-L** solution, as received, to within six inches from the top. Heat is applied and the solution is brought to a gentle rolling boil at approximately 250°F to 255°F. Maintain the proper working level in the tank by the addition of **Ultra-Blak 407-L** solution, preferably by means of a metering pump directly from the shipping container. If **Ultra-Blak 407-L** solution is added manually, care should be taken to avoid too rapid an addition which could lead to spattering or an eruption on the surface. Allow the **Ultra-Blak 407-L** solution to slowly run down along a corner of the tank. If **Ultra-Blak 407-L** is added to the tank with a pump, it should be added above the surface against the tank wall through a pipe in a shielded corner. If the temperature of the solution climbs above 260°F, water must be added to replenish evaporated water and reduce the temperature. Extreme care must be taken when adding water at high temperatures to avoid spattering and eruptions. If water is added manually, allow the water to run through a pipe down a corner of the tank. The corner should be covered with a mild steel shield extending diagonally across the corner from one side to the other side with the water inlet pipe passing through the shield and ending above the solution level directed against the corner of the tank. **DO NOT INTRODUCE WATER BELOW THE SURFACE OF THE SOLUTION.**

It is recommended that an automatic indicating temperature controller and motor operated water inlet valve be used to safely control the additions of water. The automatic controller will replenish evaporated water as needed to maintain the correct boiling temperature and concentration. It will also protect against the undesirable and detrimental over-heating of the solution. Automating the water additions will relieve the operator of the responsibility for maintaining the temperature and ensures consistent, uniform, high-quality black finishes. **EPI** can supply the automated temperature controller and water inlet valve with the preferred drilled piping to introduce the water along the rear wall of the tank above the solution level. Consult us for advice prior to installing a water inlet to a tank.

FINISHING PROCEDURE

Pieces to be blackened may be processed in mild steel baskets, tumbling barrels, hung on racks or hooks, depending upon the shape and weight and production requirements.

1. Thoroughly clean and degrease pieces with **EPI's E-Kleen SR 196, E-Kleen SR 102** or **E-Kleen SR 102-E** liquid cleaners (130 - 200°F depending on the cleaner). A typical cleaning time is five to ten minutes.
2. Rinse in bottom-fed, overflowing cold water rinse.
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 2-5 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 surface 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 in bottom-fed, overflowing cold water rinse.
5. **BLACKEN:** Immerse parts in boiling (250° to 260°F) **Ultra-Blak 407-L** 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-L** solution.
6. **RINSE:** Using a bottom-fed, overflowing cold water rinse tank. Transfer time from the **Ultra-Blak 407-L** 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 a solution of **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 **Ultra-Blak 407-L** tank must be constructed of mild steel. The cleaning and rinse tanks may also be constructed of mild steel. Acid pickling tanks should be plastic or rubber-lined steel or rigid polypropylene.

Gas tanks are preferred and should be underfired and insulated. Immersion electric units should be constructed of mild steel and also be insulated. Racks, hooks and baskets must be constructed of mild steel. Non-ferrous metals such as galvanized iron, bronze, copper, tin or aluminum should not be used for racks or baskets as these materials will contaminate the **Ultra-Blak 407-L** solution.

Your **EPI** representative will be pleased to assist you in selecting and installing the proper controls as well as the complete tank system required for the process.

Hot alkaline cleaning, acid pickling and the **Ultra-Blak 407-L** solutions must be exhausted. The duct work may be of the same materials as recommended above for the tanks. Galvanized steel should not be used.

NOTICE Before using this material, the **SAFETY DATA SHEET** for **Ultra-Blak 407-L** furnished by **EPI** must be read and the specific instructions and precautions followed to assure correct use and personal safety.

CAUTION - THIS MATERIAL CONTAINS CAUSTIC SODA. CAUSES SEVERE BURNS.

Avoid contact with eyes, skin and clothing. Do not take internally. When handling the solution and working near the bath, wear goggles or face shield, rubber gloves and rubber apron. While preparing solutions and making additions, take care to avoid violent spattering.

In case of contact, immediately flush skin or eyes with plenty of water for at least fifteen minutes. For eyes, call a physician.

Avoid contact of **Ultra-Blak 407-L** solutions with acidic materials.

DO NOT MIX **Ultra-Blak 407-L** solutions with any other chemicals or solutions.

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 products.**

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