

Ultra-Blak™ 404-L

Black Oxide Finish for Cast Iron, Malleable Iron, and Metal Injection Molded (MIM) Alloys

Ultra-Blak 404-L is a ready-to-use solution of **EPI's** oxidizing liquid formulation. **Ultra-Blak 404-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 404** salts.

The alkaline solution is used at 250°F to 260°F to blacken cast and malleable iron as well as some mild low carbon steels; MIM alloys 230°F to 250°F- not boiling.

SOLUTION MAKE-UP AND MAINTENANCE

A new bath is started by filling the tank with **Ultra-Blak 404-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 404-L** solution, preferably by means of a metering pump directly from the shipping container. Allow the **Ultra-Blak 404-L** solution to slowly run down along a corner of the tank. If **Ultra-Blak 404-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.**

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 **Ultra-Blak 404-L** 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 **Ultra-Blak 404-L** 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** (emulsify) or **E-Kleen SR 102** (floats oil).
2. **Rinse:** Using a bottom-fed overflowing cold water rinse tank.
3. **Activate:** **Cast and Malleable Iron:** Immerse parts for 30 seconds to 1 minute in a room temperature, 50% by volume Muriatic Acid solution.
MIM Alloys: Immerse parts for 1 to 5 minutes in **E-Pik 215-L @ 50%** by volume.
4. **Rinse:** Using a bottom-fed overflowing cold water rinse tank.
5. **Blacken:** **Cast and Malleable Iron:** Immerse parts in boiling (250°F to 260°F) **Ultra-Blak 404-L** solution until a deep black color develops. Required immersion times may vary from 1 to 10 minutes depending upon the mass of parts and the type and condition of the metal surfaces. Most blackening problems can be traced back to improperly prepared surfaces or an incorrect boiling point for the **Ultra-Blak 404-L** solution.
MIM Alloys: Immerse parts in 230°F to 250°F **Ultra-Blak 404-L** solution. **Note:** Excessive immersion times in **Ultra-Blak 404-L** and/or acid can cause smutty finish.
6. **Rinse:** Using a bottom-fed overflowing cold water rinse tank. Transfer time from the **Ultra-Blak 404-L** solution to the rinse water should be as short as possible to avoid the development of an off-color on the surface. **Note:** Spraying parts right after applying **Ultra-Blak 404-L** can help with smut.
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, **E-Tec 505+** for a "soft film" high corrosion protection, or **E-Tec 520** for a hard, dry, clear finish.

EQUIPMENT

The tanks to contain the **Ultra-Blak 404-L**, **E-Kleen**, **E-Tec** and rinse waters should be constructed of mild steel. The acidic deoxidation/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 404-L** tank. Mild steel electric immersion heating elements may be used with the **E-Kleen** and **Ultra-Blak** solutions. Quartz electric immersion heaters are recommended for the acidic deoxidizing solutions. Non-ferrous metals such as galvanized steel, bronze, copper, tin and aluminum should not be used as racks or baskets because they will poison the **Ultra-Blak** solution. The hot alkaline cleaning, acidic deoxidizing, and the **Ultra-Blak** 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.

SOLUTION CONTROL

A. Dropping Bottle Method

1. Take a sample of **Ultra-Blak 404-L** working solution and cool down.
2. Transfer 1.0 ml of **Ultra-Blak 404-L** working solution to an Erlenmeyer flask and dilute with
50 ml of DI water.
3. Add 8 to 10 drops Phenolphthalein Indicator to the sample solution in the flask.
4. Using the 4 oz dropping bottle containing 6.0N Hydrochloric Acid, add drops to the sample
solution in the Erlenmeyer flask with constant swirling until the solution turns clear.

$$\text{Concentration of Ultra-Blak 404-L (\% by volume)} = (\text{Drops of 6.0N HCL}) \times 1.85$$

A. Burette Titration Method

1. Take a sample of the **Ultra Blak 404-L** solution and allow to cool to room temperature.
2. Pipet a 10 ml sample into a clean 100 ml volumetric flask. Fill to the level with DI water and mix.
3. Pipet a 10 ml sample of the diluted solution into a clean 125 ml Erlenmeyer flask.
4. Add 20 drops of Phenolphthalein Indicator.
5. Titrate with 1.0N Hydrochloric Acid until the pink color disappears.

$$\text{Concentration of Ultra-Blak 404-L (\% by volume)} = (\text{ml of Acid}) \times 10.5263 \times (\text{Normality of HCl})$$

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

Do not get **Ultra-Blak 404-L** in eyes, on skin or on clothing. 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 **Ultra-Blak 404-L** 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 404-L** with acidic materials or any other materials. **DO NOT** work with **Ultra-Blak 404-L**, the **E-Kleen**, **E-Tec** or other materials without first reading and understanding the **SAFETY DATA SHEET** for the material.

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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