



# Liquid Black-Magic<sup>®</sup> SS C

A unique blend of activators, rectifiers, catalysts, penetrants, and wetting agents for hot black oxide over stainless steel. This patented formulation is recommended for black oxide installations where it is desired to automate the replenishment additions 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 can then be replenished with our conventional, dust-free Black-Magic SS C salt.

## Features & Benefits

Meets Military Spec: MIL C 13924	Conforms to specifications for black finishes
Wear-in-Break-in function	Friction/Torque reduction
No dimensional change	High tolerance operations
ROHS, REACH and California Proposition 65 Compliant	Reduction of hazardous chemicals

## Operating Conditions

The Liquid Black-Magic SS C solution is operated at a boiling temperature of 250°F to 260°F, to blacken a wide range of stainless steel.

### Bath Makeup

A new bath is started by filling the tank with Liquid Black-Magic SS C solution, as received, to within six inches from the top. The solution should be heated to a gentle rolling boil at approximately 255°F to 260°F. Liquid Black-Magic SS C is used as a supersaturated solution and it should be allowed to boil for a while to evaporate some water and reach a boiling temperature of 255°F. Thereafter, the solution must be maintained at 250°F to 260°F for blackening steel. Maintain the proper working level in the tank by the addition of Liquid Black-Magic SS C preferably by means of a metering pump directly from the shipping container. If Liquid Black-Magic SS C solution is added manually, care should be taken to avoid too rapid an addition, which could lead to splattering or an eruption on the surface. Allow the Liquid Black-Magic SS C solution to slowly run down along a corner of the tank. 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 splattering and eruptions. In order to safely add water and control the boiling point of the solution, water should be introduced by a water



feed pipe, hung across the backside of the tank, near the top, with 1/8" or 3/16" holes, drilled 2" apart which will direct incoming water against the tank wall, allowing it to uniformly cascade down the tank wall into the black oxide solution.

**DO NOT INTRODUCE WATER BELOW THE SURFACE OF THE SOLUTION.** We recommend 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 salt concentration. It will also protect against the undesirable and detrimental overheating 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. Hubbard-Hall can recommend suppliers of automated temperature controllers and water inlet valves 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

Components may be processed in mild steel baskets, tumbling barrels, hung on racks or hooks—depending upon the shape, weight, and production requirements of the items.

1. Thoroughly clean and degrease pieces with the appropriate Hubbard-Hall cleaner. A typical cleaning time is five to ten minutes.
2. Rinse in bottom-fed, overflowing cold water rinse.
3. Activate parts in 50% by volume muriatic acid for 2 to 5 minutes at 75°F to 80°F.
4. Rinse in bottom-fed, overflowing cold water rinse.
5. Immerse in Liquid Black-Magic SS C solution (boiling at 250°F to 260°F) until a uniform, deep black color is developed. Immersion time will be from 2 to 10 minutes, depending upon the mass of parts and type of steel alloy and condition of the surface. Most parts run best at 5-minute immersion time.
6. Rinse in bottom-fed, overflowing cold water rinse.
7. Seal the finish by immersing for one minute in the appropriate Hubbard-Hall Metal Guard sealer to obtain the desired finish and / or corrosion protection.

#### Operating Tips

Problems will rarely arise with a properly maintained and controlled Liquid Black-Magic SS C solution. Its unique rectification eliminates the necessity for frequent sludge cleanout as is required with conventional formulations. Most problems can be traced to insufficient cleaning of the work or an incorrect boiling temperature. Other tips would include:

1. A glass mercury thermometer should be kept on hand to check the accuracy of the automatic temperature controller.
2. Frequent small additions of replenishment solution will produce more uniform results than large amounts that are added less frequently.



3. Ideally, the temperature of the solution should not drop below boiling when work is introduced. Enough heat should be maintained to ensure that the solution does not drop below the boiling point for more than a few minutes, even with the heaviest loads. Maximum loads should not exceed one pound 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.
4. Operating the bath at temperatures approaching 265°F or higher will kill the Black-Magic solution.
5. The bath should be periodically de-sludged to remove accumulation of sodium carbonate.
6. Transfer time from the Liquid Black-Magic SS C bath to the rinse water should be as short as possible to avoid the development of an off-color on the metal surface.
7. A thorough final rinse after blackening will minimize contamination of the sealant solution.

#### Equipment

The Liquid Black-Magic SS C 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-heated tanks are preferred and should be under fired and insulated. Immersion electric units should be constructed of mild steel and 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 Liquid Black-Magic SS C solution. Aluminum reacts violently with the hot solution.

Hubbard-Hall can recommend suppliers 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 Liquid Black-Magic SS C solutions must use an exhaust system. The duct work may be of the same materials as recommended above for the tanks. Galvanized steel should not be used.

## Caution

**THIS MATERIAL CONTAINS CAUSTIC SODA. CAUSES SEVERE BURNS.**

Before using this material, read and understand the Material Safety Data Sheet for this product and specific instructions and precautions should be followed to assure correct use and personal safety.



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## Our People. Your Problem Solvers.

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