Product Bulletin

Product Name: Black-Magic SS-C
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Black-Magic® SS-C

A free-flowing, dust-free granular composition for hot black oxidant stainless steel and cast- and malleable-iron.

Black Magic SS-C oxidizing salts are a free-flowing, dust-free granular composition used in water at a concentration of 4.75 pounds per gallon of solution. The alkaline solution is used at a low boiling temperature of 250°F to 260ºF, to blacken cast and malleable iron as well as steel.

Features & Benefits

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

Operating Conditions

Solution makeup
Rectangular Tank - Solution level 6" from top

$$\text{Black Magic SS-C} = \frac{\text{L" x W" x (D"-6") x 4-3/4 lbs. per gallon}}{\text{231 cubic inches per gallon}}$$

lb salt required for initial solution

Compute the amount of salts required by using the above equation. Fill the tank a little less than half full of **cold** water. Do not apply heat currently. Start adding the salts to the water with continuous stirring to avoid the formation of lumps. When the required amount of Black Magic SS-C salts has been added, continue to stir and fill the tank with water to within 6" from the top.

Heat is then applied to the solution, and as the temperature rises, it should be stirred frequently to ensure thorough mixing and a uniform temperature throughout. When the temperature reaches 250°F to 260°F, the solution should begin to boil. If it does not, keep stirring, water should be slowly added until it begins to simmer. If the solution boils before

reaching 250°F, additional Black Magic SS-C salts must be added and stirred into the solution. Black Magic SS-C is used as a super-saturated solution, and it should be allowed to boil for at least one hour before additional salt is added to ensure that the true boiling point has been reached with all the salts thoroughly dissolved.

When the Black Magic SS-C solution is boiling in the range of 250°F to 260ºF, it is ready for processing work. Although the temperature of the solution can be maintained by manually adding water, an automatic indicating temperature controller should be used. The only reason for the boiling point to rise is due to the evaporation of water. The automatic temperature controller will replenish this water as needed to maintain the correct boiling point and concentration set valve to add water slowly. It will also protect against the undesirable and detrimental overheating of the solution.

If the temperature of the solution climbs above 260ºF, 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 directs incoming water against the tank wall, allowing water 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 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

1. Thoroughly clean and degrease pieces with the appropriate Hubbard-Hall cleaner. A typical cleaning time is 5 to 10 minutes.

2. Rinse in bottom-fed, overflowing cold water rinse.

3. Activate parts in 50%v/v muriatic acid for 2 to 5 minutes at 75°F – 80ºF.

4. Rinse in bottom-fed, overflowing cold water rinse.

5. Immerse in Black Magic SS-C solution (boiling at 250°F to 260ºF) until a uniform, deep black color is developed. Immersion time usually will be from 2 to 10 minutes, depending upon the mass of parts and the type and condition of the Stainless Steel. 5 minutes is optimum.

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 to obtain the desired finish and / or corrosion protection.

Operating tips

Problems will rarely arise with a properly maintained and controlled Black Magic solution. Most problems can be traced to insufficient surface preparation of the work or an incorrect boiling temperature. Other tips would include:

1. A glass thermometer should be kept on hand to check the accuracy of the automatic temperature controller.

2. Frequent small additions of replenishment salts will produce more uniform results than large amounts 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 1 lb. of work per one gallon of solution. Optimum loads would be approximately 1 lb. of work to one gallon of solution, including the weight of barrels, baskets and racks.

4. Operating the bath at temperatures approaching 265ºF or over 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 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 Black Magic tank should be constructed of mild steel. The cleaning and rinse tanks may also be constructed of mild steel. Acid pickling tanks should be plastic, rubber-lined steel or rigid polypropylene.

Gas-heating units are preferred and should be under fired and insulated. Electric immersion 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 Black Magic solution.

Hot alkaline cleaning, acid pickling and the Black-Magic solutions should be exhausted. The duct work may be of the same materials as recommended above for the tanks. Galvanized steel should not be used.

Your Hubbard-Hall representative is readily available to assist you in selecting and installing the proper controls as well as the complete tank system required for the process.

Caution

THIS MATERIAL CONTAINS CAUSTIC SODA. CAUSES SEVERE BURNS.

Do not get in eyes, on skin or clothing. Avoid breathing dusts or mists. Do not take internally. When handling, wear goggles or face shield. **While making solutions, add slowly to surface of solution to avoid violent reaction and spattering.** In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. For eyes, call a physician.

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