

Black-Magic[®] RT S30 XC

Room temperature blackening solution for iron and steel. Recommended for blackening powdered metal, cast and malleable irons, and forged steels. It is designed for low smut rather than jet black.

Features & Benefits

Maintains black over time with high Silicon alloys	Blacken difficult alloys
ROHS and REACH Compliant	Product is good for use in Europe

Operating Conditions

Instructions

The Black-Magic RT S30 XC liquid concentrate is diluted with water. The black developed and the reaction rate with various metal surfaces is controlled by varying the concentration and the length of immersion. Prior to charging a production tank, some experimentation should be done with properly prepared sample parts to determine the conditions required to produce the desired finish.

Equipment

Acid-resistant tanks, tumbling barrels, baskets, hooks and racks must be used with the Black-Magic RT S30 and Black-Magic Pre-dip P solutions. PVC, plastic lined or rubber lined tanks and plastic-coated hooks and racks are suitable. Mild steel may be used for the cleaning, rinsing and sealant tanks.

Surface Preparation

Items to be blackened must be thoroughly cleaned and deoxidized. Some experimentation should be done with sample parts to determine the degree of cleaning and activation required to produce a uniform black finish. Parts to be blackened should be protected from rust during fabrication and in-plant storage prior to blackening to minimize surface preparation.

Cleaning

The type and degree of surface soil will determine the length of time required for cleaning, the number or cleaning steps, and the cleaning temperature. Lightly soiled parts can be cleaned in the appropriate Hubbard-Hall's cleaner. Heavily soiled parts may require a longer immersion times and temperatures upwards of 180°F.

Deoxidizing

Surface rust, if present, should be removed with 5 to 20% solution of Acid Brite 40 for cast iron at room temperature. Immersion times will normally range from one to five minutes. Muriatic acid should not be used to remove rust from cast iron. Use Acid Brite 40 only.

Activation

Black-Magic RT Pre-dip P is used as an activator for difficult-to-blacken passive steel surfaces or as a conditioner to enhance the evenness of color between machined and un-machined areas. Black-Magic RT Pre-dip P is normally used at 10% by volume at room temperature. Immersion times will normally range from two to five minutes.

Blackening

Prior to charging a production tank, some experimentation should be performed with properly prepared sample parts, using various dilutions of the Black-Magic RT S30 XC and different immersion times to determine the conditions required to produce the desired depth of black. As a starting point a 6% by volume solution should be tried. Determine by test, the shortest immersion time necessary to produce the desired depth of black, usually two to three minutes, depending upon the alloy and surface hardness. If the required immersion time exceeds five minutes, the concentration should be lowered to 5% by volume and the immersion time re-evaluated.

Finishing Procedure

1. Clean and prepare surface as determined above.
2. Rinse for a minimum of 30 seconds in overflowing cold water to remove residual cleaner.
3. Immerse parts in the Black-Magic RT S30 XC solution for the length of time necessary to produce the desired depth of black.
4. Rinse for minimum of 30 seconds in overflowing cold rinse.
5. To displace the rinse water, seal the finish, enhance the depth of black and impart corrosion resistance: immerse parts for one to two minutes in Hubbard-Hall's Metal Guard sealants. The ultimate depth of black will not develop until the sealant is completely absorbed into the surface and this may take several hours. A sealant must be applied before judging the depth of black.

Note: Rotating perforated plastic barrels are recommended for processing large volumes of small parts. If dip baskets or racks are used, the parts should be agitated when first introduced into each solution and water rinse to break air bubbles and to assure uniform solution contact with all surfaces.

Solution Replenishment and Maintenance

The blackening solution is gradually depleted through use but, may be replenished indefinitely with periodic additions of Black-Magic RT S30 XC. The strength of the solution and the amount of concentrate to be added can be determined by titrating with sodium thiosulfate as outlined in the Chemical Control Procedure.

The frequency of additions will depend upon the volume of work processed. For optimum results, the solution should be maintained at 85% of its original strength or better with frequent small additions.

With automatic lines, a bath history should be established immediately after charging the tank by keeping a record of the processed verses the titrated strength to determine the point at which the bath is depleted approximately 6% to 7% and replenishment is necessary. Timed metering pumps triggered by the load are recommended for maintaining a consistent strength. The life and the coverage of the solution will be increased by continuous circulation and filtration.

For more complete operation instructions for the appropriate Hubbard-Hall's cleaner, Metal Guard and Acid Brite products, please see the individual instruction sheets.

Test Kit Method

Equipment Required

4 oz mixing bottle
 2 syringes (5 mL)
 2 syringes (3 mL)
 pH meter

Chemicals Required

4 oz 6 N Hydrochloric Acid
 8 oz 15%w/w Potassium Iodide
 0.1 N Sodium Thiosulfate
 0.2% Soluble Starch
 0.1 N Sodium Hydroxide

A sample of a freshly prepared production bath should always be taken as a control solution prior to running any parts through the bath. If a sample was not taken, a laboratory prepared solution at the same concentration may be used as the control solution. Titration of this "new" solution will provide the figure for D₁.

1. Transfer a 15 mL sample of the production bath into the 225 mL Erlenmeyer flask.
2. Dilute with water to the 50 mL mark.
3. Add 10 mL 6N (1:1) Hydrochloric Acid to the flask.
4. Add 10 mL of the 15% by weight Potassium Iodide solution.
5. Add 15 mL of starch solution. The solution will become a dark blue to almost black color.
6. Titrate using the 0.1 N Sodium Thiosulfate solution, from the burette while swirling the flask.
7. The end point is marked by a sudden change in color from dark black to light brown.

Note: Upon standing, the light brown color will turn dark again, but additional Sodium Thiosulfate solution should not be added. The first end point is correct.

8. Record mL used.

Calculation

$$\text{Concentration} = \text{mL } 0.1 \text{ N Na}_2\text{S}_2\text{O}_3 \times 0.30$$

A 100 gallon bath made up at 6% by volume of concentrate (i.e. 6 gallons of concentrate in 94 gallons of water) is titrated and the additions to the bath calculated according to the acid and metals titrations.

Note: The volumes used in the above equation may be metric or English (i.e. liters, quarts, gallons).

Acid Titration

1. Transfer a 30 mL sample of the production bath into the 225 mL Erlenmeyer flask.
2. Dilute with water to the 50 mL mark.
3. Use a pH meter and titrate to pH 7.0.
4. Titrate using 0.1 N Sodium Hydroxide solution.

NOTE: Upon standing, the light brown color will turn dark again, but additional Sodium Thiosulfate solution should not be added. The first end point is correct.

5. Record mL used.

Calculation

$$\text{Concentration} = \text{mL } 0.1 \text{ N Na}_2\text{S}_2\text{O}_3 \times 0.30$$

Caution

The RT S30 XC solution is mildly acidic. Avoid contact with eyes, skin, and clothing. Wear eye shields, protective gloves, and apron. The solutions are toxic if taken internally.

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