



Product Bulletin

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BLACK MAGIC® RT-S20

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ROOM TEMPERATURE BLACKENING SOLUTION FOR IRON AND STEEL

BLACK MAGIC® RT-S20 liquid concentrate is diluted with water and used at room temperature for blackening iron and steel by immersion. **BLACK MAGIC® RT-S20** is recommended for blackening hardened and polished steels.

EQUIPMENT

Acid-resistant tanks, tumbling barrels, baskets, hooks and racks must be used with the **RT-S20** and **ACID BRITE** 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 and the number or cleaning steps and cleaning temperature. Lightly soiled parts can be cleaned in two to five minutes at room temperature with an 8 oz./gallon solution of **Mi-CLEAN 100**. Heavily soiled parts may require a longer immersion time and temperatures upwards of 180 F.

DEOXIDIZING

Surface rust, if present, should be removed with 5 to 20% solution of **ACID BRITE 40** at room temperature. Immersion times will normally range from one to five minutes.

ACTIVATION

RT Predip S 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 unmachined areas. **RT Predip S** 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 **RT-S20** and different immersion times to determine the conditions required to produce the desired depth of black. As a starting point a 10% 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 8% by volume and the immersion time re-evaluated.

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On occasion, the steel surface may be too reactive with the 10% by volume solution, resulting in a slight rub off of the black finish, if this happens the concentration should be raised to 15% by volume.

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-S20** 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 **BLACK MAGIC® RT-S20** 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 the **RT-S20** or the **RT-S20/25 REPLENISHER**. 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 10% to 15% 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 **Mi-Clean**, **METAL GUARD®**, and **Acid Brite** products, please see the individual instruction sheets.

DROPPING BOTTLE CHEMICAL CONTROL PROCEDURE

EQUIPMENT REQUIRED

125 ml Erlenmeyer Flask
10 ml Graduate Cylinder

CHEMICALS REQUIRED

6N (1:1) Hydrochloric Acid
Potassium Iodide - 15% Solution (by weight)
125 ml Dropping Bottle 0.5N Sodium Thiosulfate
0.2% Soluble Starch Solution

CONTROL PROCEDURE

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 D_1 .

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1. Transfer a 5 ml sample of the production bath into the 125 ml Erlenmeyer flask.
2. Dilute with water to the 50 ml mark.
3. Add 2 ml 6N (I:I) Hydrochloric Acid to the flask.
4. Add 4 ml of the 15% by weight Potassium Iodide solution.
5. Add 2 ml of starch solution. The solution will become a dark blue to almost black color.
6. Add the 0.5N Sodium Thiosulfate solution, from the dropping bottle - drop by drop - counting the drops 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. Calculate the amount of concentrate to be added as follows:

$$C_2 = \frac{D_1 - D_2}{D_1} (C_1)$$

C_2 = Concentration in gallons to be added to the bath.

D_1 = Number of drops of Sodium Thiosulfate used to titrate the new production bath.

D_2 = Number of drops of Sodium Thiosulfate used to titrate with used production bath.

C_1 = Volume of concentrate in gallons used to make up the original "new bath".

A 100 gallon bath made up at 10% by volume of concentrate (i.e. 10 gallons of concentrate in 90 gallons of water) is titrated and the additions to the bath calculated as follows:

$$D_1 = 27$$

$$D_2 = 24$$

$$C_1 = 10 \text{ gallons}$$

$$C_2 = \frac{27 - 24}{27} (10)$$

$$C_2 = \frac{3}{27} (10) \text{ or } \frac{30}{27}$$

C_2 = 1.1 gal of RT-S20 concentrate or RT-S20/25 Replenisher to be added to the production bath.

CAUTION: If using RT-S20/25 Replenisher XC, add only half as much product as calculated (.55 gal)

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

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CAUTION

The **RT-S20** 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.

WARRANTY

THE QUALITY OF THIS PRODUCT IS GUARANTEED ON SHIPMENT FROM OUR PLANT. IF THE USE RECOMMENDATIONS ARE FOLLOWED, DESIRED RESULTS WILL BE OBTAINED. SINCE THE USE OF OUR PRODUCTS IS BEYOND OUR CONTROL, NO GUARANTEE EXPRESSED OR IMPLIED IS MADE AS TO THE EFFECTS OF SUCH USE, OR THE RESULTS TO BE OBTAINED.

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