



Product Bulletin

Product Name: Black-Magic™ ZX
Product Code: 2232008
Revision Date: May 30, 2025

Black-Magic™ ZX

Black-Magic™ ZX is a powdered concentrate for blackening zinc, producing decorative and durable black finishes on zinc, zinc plated and zinc die cast surfaces with excellent resistance to abrasion and organic solvents.

Features & Benefits

- 150F to 180F temperature (66 – 82 C)
- Blackens a wide range of zinc alloys
- Chrome free
- Abrasion resistant

Typical Applications

- Plated zinc
- Cast zinc: Zamac series
- Galvanized surfaces

Black-Magic™ ZX non-chromated chemical blackening salts are a dry, free-flowing, mildly acidic composition used at concentrations of 6 to 8 ounces per gallon of water. The solution is used at a low temperature of 150o to 180oF.



Other information

Rectangular Tank - solution level 6" from top.

$$\text{Lbs. Black-Magic™ ZX salt required for initial 8 oz./gal solution} = \frac{\text{L" x W x (D"- 6") x 1/2 lb. per gallon}}{231 \text{ cubic inches per gallon}}$$

Compute the amount of salts required by using the above equation. Fill the tank a little less than half full with cold water. Do not apply heat at this time. Start adding the salts to the water with continuous stirring to avoid the formation of lumps. When the required amount of Black-Magic™ 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 150-180oF., the Black-Magic™ ZX solution is ready for processing work. Small periodic additions of water and replenishment salts to compensate for evaporation, drag out and solution depletion are all that is required for continuous, trouble-free operation.

Finishing Procedure

Pieces to blacken may be processed in baskets, tumbling barrels, hung on racks or hooks, depending upon the shape and weight and production requirements.

Surface Preparation

In-line, freshly-plated zinc surfaces:

1. Rinse in bottom-fed, overflowing cold water rinse.
2. Immerse for 10 to 30 seconds in a 1/2% by volume nitric acid solution to neutralize residual alkaline plating solution, which could contaminate the Black-Magic™ ZX solution.
3. Rinse in bottom-fed, overflowing cold water rinse.

Passive zinc and zinc die cast surfaces:

1. Thoroughly clean and degrease pieces with HUBBARD-HALL's Mi-Clean™ 31, hot (180oF) alkaline soak cleaner or with HUBBARD-HALL's Mi-Clean™ 100, a heavy-duty, low temperature (65-160oF) alkaline soak cleaner. A typical cleaning time is 5 to 10 minutes. Zinc die cast surfaces may need longer immersions to remove oxides.
2. Rinse in bottom-fed, overflowing cold water rinse.
3. Immerse in a 2% to 5% by volume sulfuric acid solution at room temperature for 30 seconds to 2 minutes to activate the metal surface.



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

Blackening and sealing

1. Immerse pieces, while still wet from the preceding rinse, in Black-Magic™ solution (150-180oF) until a uniform, deep black color is developed. Immersion time usually will range from 5 to 10 minutes, depending upon the concentration and temperature of the Black-Magic™ solution, the mass of parts and the type and condition of the zinc surface.
2. Rinse in bottom-fed, overflowing water rinse.
3. Seal the finish by immersing for one minute in Hubbard-Hall's Metal Guard® 410 for a slightly oily finish; Metal Guard® 310 or Metal Guard® 450 for a soft, "dry-to-the touch" finish; or Metal Guard® 600 for a hard, dry finish.

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 operating temperature. Other tips would include:

1. A glass thermometer should be kept on hand to accurately check the temperature of the bath.
2. Frequent small additions of replenishment salts will produce more uniform and more consistent results than large amounts added less frequently. This is also true for water replenishment to compensate for evaporation loss.
3. Ideally, the temperature of the solution should not drop below the recommended operating range of 150 to 180F when work is introduced. Sufficient heat should be maintained to ensure that the solution does not drop below this temperature range for more than a few minutes, even with the heaviest loads.
4. Operating the bath at the maximum recommended concentration and temperature (8 oz/gallon at 180F) will promote a faster reaction, producing the black finish in a shorter time.
5. A thorough final rinse after blackening will minimize contamination of the sealant solutions.

Equipment

Steel, Stainless or Poly. The Black-Magic™ tank should be constructed of stainless steel, rigid polypropylene, lined steel or other acid-resistant material. Cleaning and rinse tanks may be constructed of mild steel, while acid pickling tanks should be plastic, rubber-lined or rigid polypropylene.

Gas heating units, under fired, may be used for heating solutions contained in stainless steel and mild steel tanks. These tanks should be insulated. Whenever lined steel, polypropylene and other acid-resistant tanks are used for the Black-Magic™ solution, quartz electric immersion heaters are recommended. 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 or deplete 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.

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

The Black-Magic™ salt and solution are mildly acidic. Avoid contact with eyes, skin and clothing. When handling, wear goggles or face shield, protective gloves and aprons. Do not take internally.

Dropping Bottle Control Procedure

EQUIPMENT REQUIRED:

- 1 10 ml Graduated Cylinder
- 1 150 ml Polypropylene Beaker
- 1 2 oz Dropping Bottle Bromthymol Blue Indicator
- 1 4 oz Dropping Bottle 1.0N Sodium Hydroxide



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1. Measure 10 ml of the Black-Magic™ ZX solution into the 150 ml beaker.
2. Add 5 ml water to the solution in the beaker.
3. Add 5 drops Bromthymol Blue Indicator to the solution.
4. Add the 1.0N Sodium Hydroxide from the dropping bottle-drop-by-drop-counting the drops while swirling the Black-Magic™ ZX solution.
5. The solution will start out yellow and go through a green transition. The end point is when the solution first turns a definite blue.
6. The number of drops of 1.0N Sodium Hydroxide used indicates the strength of the Black-Magic™ ZX solution.

Calculation:

$$\text{CONCENTRATION BLACK-MAGIC™ ZX (OZ/GAL)} = \# \text{ OF DROPS OF SODIUM HYDROXIDE} \\ \times 0.40$$

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Our People. Your Problem Solvers.

For more information on this process,
please call us at 203.756.5521 or email: techservice@hubbardhall.com

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