Mi-Phos™ Z-2

Mi-Phos Z-2 is a non-metallic, oil absorptive heavy zinc phosphate with an average coating weight of 1400 to1600 mg/ft^2, formulated for steel and iron surfaces. This coating is an excellent base for the retention of a rust preventative, which will increase the corrosion resistance of the final finished part.

Features & Benefits

Heavy zinc phosphate	Excellent anti-corrosion properties
ROHS AND REACH compliant	Reduction of hazardous chemicals
Meets military Spec: MIL DTL 16232	Can be used in military applications
Liquid concentrate	Easy to make up solution and regulate

Typical Applications

- Pre-Paint and Powder Coat
- Automotive
- Military DOD
- Hand Tools
- Sporting Arms

Operating Conditions

Equipment

The processing tank, heating coils and pump (used to transfer the Mi-Phos Z-2 solution) should be constructed of 300 series stainless steel. If mild steel is used, then the life of the equipment will be shorter than that of the stainless steel. If direct gas is used to heat the solution, mild steel tanks should be used.

Processing sequence

The following system is to be used as a guide for the operation of this process.

1. Thoroughly clean with the alkaline cleaner recommended by your Hubbard-Hall representative.
2. Overflowing water rinse

3. Mi-Phos Black Pre dip (if black coating is required)
4. Overflowing water rinse
5. Mi-Phos Z-2
6. Overflowing water rinse
7. If a military specification is to be met, then the use of a chrome or non-chrome sealer might be required, contact your Hubbard-Hall representative for a recommendation. (required only for corrosion-resistant finishes).
8. Metal Guard rust preventive oil recommended by your Hubbard-Hall representative.

Cleaning
All metals to be treated in Mi-Phos Z-2 solution must be chemically cleaned and free from dirt, oil grease, etc. The proper Hubbard-Hall cleaner will be determined when the soil conditions are known.

Water Rinsing
All water rinses must be kept free from contaminates from prior solutions by overflowing them when in use. Best type of water additions is by a bottom feed line while the overflow should be in the back of the solution away from the water input.

Rust Removal
If rust is present on work, it should be removed by either an acid or alkaline product.

Black Pre Dip
If a black zinc phosphate coating is required, then Mi-Phos Black Pre dip is used. Please refer to the Product Bulletin for this product.

Zinc Phosphate
Mi-Phos Z-2 is used as stated in the following paragraphs and will produce a quality coating that will enhance the corrosion resistance of the final finish.

Sealer
Use of Mi-Phos Sealer is required in some cases to meet military specifications. Refer to Product Bulletin for these products.

Rust Preventive
Various rust preventives are available from Hubbard-Hall and are called Metal Guard. The selection of this material will depend on the individual requirement.

Operation
The properly cleaned articles are immersed into the Mi-Phos Z-2 solution made up at 3% to 4% v/v for 15 to 30 minutes at 190°F to 200°F. Agitation of parts processed in baskets is recommended when the Mi-Phos Z-2 is applied by immersion to prevent “nesting” and contact marks.

A new Mi-Phos Z-2 solution is made up by adding 3 1/2 gallons of Mi-Phos Z-2 concentrate to 97 gallons of water. Heat solution to 150°F, then add 2 pounds of steel wool or clean scrap iron per 100 gallons of solution. Leave in solution for 2 to 3 hours, then remove steel wool from bath, add water to operating level, check bath for proper strength, heat to operating temperature, then begin to process work.

The addition of steel wool is to age the bath as well as introduce iron so the coating will be complete and fine grained.

Control Method

A solution made up at 3% by volume of Mi-Phos Z-2 will result in a bath having a strength of 33 points. To check out the strength, use the following method:

Total Acid
1. Pipet a 10 mL sample of the Mi-Phos Z-2 solution into a 150 mL beaker.
2. Add 5 drops of Phenolphthalein indicator and mix well.
3. Then titrate using 0.1 N Sodium Hydroxide to a pink color.
4. Record mL used.

Note: A solution made up as per specification normally results in a titration of 33.0 ± 2.0 mL of 0.1N Sodium Hydroxide solution.

To raise concentration 1.0 mL, add 0.1 gallon of Mi-Phos Z-2 concentrate per 100 gallons of solution.

Free Acid
1. Pipet a 10 mL sample of the Mi-Phos Z-2 solution into a 150 mL beaker.
2. Add 3 to 5 drops of Bromophenol Blue indicator and mix well.
3. Then titrate using a 0.1 N Sodium Hydroxide from a green color to a purple color.
4. Record mL used.

Note: The normal amount of 0.1 N sodium hydroxide required to make the color change is 5.0 to 5.5 mL.

The use of Free Acid control is to determine the operating ratio of total acid to free acid. The range should be between 6.0 to 7.5 to 1. In order to figure this radio, use the following formula:

RATIO = Total Acid / Free Acid

Excessive Free Acid in this bath can be caused by heating the solution without processing any work or by only processing a small amount of work in a large volume tank. The Free Acid will normally not get too low.

Excessive Free Acid is likely to etch the metal surface excessively, fail to produce a complete coating within the normal processing time or produce a smudgy and non-adherent coating, which can be wiped off or give a rough coating.

Iron Control

Prior to running a concentration check for iron, make sure iron is present in the bath by dipping a strip of ITP into the operating bath. It should change color to pink or red. If it does not change, then iron must be added to the bath prior to the processing of any production. If it changes to red, proceed to the following concentration check.

1. Pipet a 10 mL sample of Mi-Phos Z-2 solution into a 150 mL beaker.
2. Add 2 mL of 50% Sulfuric Acid and mix well.
3. Then titrate using 0.2 N Potassium Permanganate to a permanent pink color (20 seconds).
4. Record mL used.

Note: The number of mL of 0.2 N Potassium Permanganate is ten times the percent of iron in the bath.

Example: A 2 mL titration indicates the presence of 0.2% iron in the bath. The normal range is 1.0 to 6.0 mL of 0.2 N KMn04 (0.1% - 0.6% iron).

Normally iron will not be lost from an operating solution, but rather build up to a point that it will interfere with the coatings being obtained. Reduction of the iron is performed by discarding a portion of the operating solution, adding water, then raising concentration to proper operating range by Mi-Phos Z-2 concentrate.

Maintenance

When the product is used, an insoluble residue is formed as a by-product of the reaction and will settle to the bottom of the tank and should be removed periodically. This can be done by letting the sludge settle to the bottom of the tank, pump the clear solution to a holding tank, remove the sludge, then return the solution to the tank. Add water and bring solution up to strength.

Heating coils will become scaled with the reaction material and should be removed and cleaned so they will not interfere with the heating of the solution.

Waste Disposal

Normally zinc phosphating solutions are maintained in the operating ranges by the control methods stated in this operating sheet. However, if the bath must be discarded, reference should be made to Waste Treatment Procedure for disposal of acidic phosphate solutions.

The Mi-Phos Z-2 is an acidic solution. Adjust the pH from 8.5 to 9.0 using caustic soda or lime to precipitate out all the metals. Discharge the liquid according to local regulations. The sludge is considered a hazardous waste and should be accumulated and hauled off by a reputable waste hauler.

Caution

DANGER. ACID CAN CAUSE BURNS.

Avoid contact with skin, eyes and clothing. Wear a face shield, rubber gloves and apron when handling Mi-Phos Z-2 concentrate. In case of contact with skin, FLUSH with large quantity of water. For eyes, FLUSH with large quantities of water for at least 15 minutes and obtain medical attention at once.

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