Mi-Phos® Z-1500

Mi-Phos Z-1500 chemical is formulated to produce a non-metallic, medium to heavy crystalline zinc phosphate coating, regardless of the cleaning method used, on steel and iron surfaces by immersion. It serves as a surface prep providing excellent bonding and corrosion resistance properties.

Mi-Phos Z-1500 will produce a coating weight of 1000 - 2500 mg/ft^2.

Features & Benefits

Nickel Free	Low sludge formation
Improved Bonding & Corrosion Resistance	Higher quality and longer lasting coatings
Liquid Concentrate	Buying less water to reduce shipping costs

Typical Applications

- Automotive
- Fasteners
- Military DOD
- Hand Tools
- Sporting Arms

Operating Conditions

Equipment

The process tanks, heating coils, and pump (used to transfer the Mi-Phos Z-1500 solution) should be constructed of 300-type stainless steel. If mild steel is used, the life of the equipment will normally be shorter than that of stainless steel. If direct gas-fired heating is used, then mild steel should be used.

Process Sequence

1. Thoroughly clean with the alkaline cleaner recommended by your Hubbard-Hall representative.
2. Overflowing water rinse.
3. Acid Pickle when rust, scale or oxides are present.
4. Overflowing water rinse.
5. Mi-Phos Z-1500

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.

Acid Pickling
When needed to remove rust, scales, or other oxides, an acid pickle utilizing either inhibited hydrochloric or sulfuric acids is recommended.

Cleaning
All metals to be treated in Mi-Phos Z-1500 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.

Zinc Phosphate
Mi-Phos Z-1500 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
Sealer may be required in some cases to meet specifications. Contact Hubbard-Hall representative for options.

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

Operation
The properly cleaned articles are brought into contact with the Mi-Phos Z-1500 solution for 10 to 20 minutes at 150°F to 185°F. Agitation of parts processed in baskets is recommended when the Mi-Phos Z-1500 is applied by immersion to prevent “nesting” and contact marks. Sampling and testing frequency, embrittlement relief, post dips and coatings or any additional tests deemed necessary to comply with that specification and governing body.

Initial Make-Up

A new Mi-Phos Z-1500 solution is made up and operated as follows:

Parameter	Immersion
Concentration	3% – 5% (18 – 30 points)
Total Acid Factor	18 - 25
Free Acid Factor	4.0 – 7.5
Ratio	4:1 – 9:1
Temperature	150°F – 185°F
Iron Concentration	0.02% – 0.6%
Processing Time	10 – 20 min
Coating Weights	1500 – 2500 mg/ft^2

Mi-Phos Z-1500 when used at 3% to 5% by volume will produce a coating offering excellent corrosion resistance when coated (sealed) with a Metal Guard rust preventative.

A new Mi-Phos Z-1500 solution is made up by adding 4 gallons of Mi-Phos Z-1500 concentrate to 96 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.

Titration Method

The following methods are used to maintain the operating strength of the Mi-Phos Z-1500 solution. The following is the general starting point for that purpose.

Total Acid

1. Pipet a 10 mL sample of the Mi-Phos Z-1500 solution into a 150 mL beaker.
2. Add 5 drops of Phenolphthalein indicator and mix well.
3. Titrate using 0.1 N Sodium Hydroxide to a pink color.
4. Record mL used.

Calculation

Total Acid Factor = mL 0.1N NaOH

1 gallon of Mi-Phos Z-1500 per 100 gallons of working bath will raise Total Acid Factor 6.0

Free Acid
1. Pipet a 10 mL sample of the Mi-Phos Z-1500 solution into a 150 mL beaker.
2. Add 3 to 5 drops of Bromophenol Blue indicator and mix well.
3. Titrate using a 0.1 N Sodium Hydroxide from a green color to a purple color.
4. Record mL used.

Calculation

Free Acid Factor = mL 0.1N NaOH

Acid Ratio

RATIO = Total Acid / Free Acid

To lower the free acid, small additions of soda ash should be used. However, normal operation of this solution will keep the bath within specifications.

Iron
1. Pipet 10 mL of Mi-Phos Z-1500 into a 150 mL beaker.
2. Add 10 to 20 drops of 50% Sulfuric Acid.
3. Titrate to a pink endpoint using 0.18 N Potassium Permanganate for 20 secs
4. Record mL used

Calculation

% Iron = mL 0.18N Permanganate x 0.1

If iron content is greater than 0.6% it is recommended that the bath be decanted and made up with fresh product

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 phosphate solutions are not disposed of but maintained within proper operating conditions by additions of Mi-Phos Z-1500 concentrate. If disposal become necessary, the solution should be treated with other metal bearing wastes or package for proper disposal.

The Mi-Phos Z-1500 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-10 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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please call us at 203.756.5521 or email: techservice@hubbardhall.com

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