Product Bulletin
Product Name: Mi-Phos Z-10
Product Code: 2202004
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Mi-Phos® Z-10

Mi-Phos Z-10 chemical is formulated to produce a non-metallic, fine-grained, calcium modified, crystalline zinc phosphate coating, regardless of the cleaning method used, on steel and iron surfaces by spray or immersion. It serves as a surface prep providing excellent adhesion to metal surfaces prior to painting.

When used alone, Mi-Phos Z-10 will produce a coating weight of 300 – 900 mg/ft^2.

When used with Mi-Phos Accelerator, Mi-Phos Z-10 will produce a coating weight of 300 – 500 mg/ft^2 in accordance to TT-C-490 for Type 1 coatings.

Features & Benefits

Calcium modified tight grain	Excellent paint adhesion
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 process tanks, heating coils, and pump (used to transfer the Mi-Phos Z-10 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. Mi-Phos Black Pre dip (if black coating is required)
4. Overflowing water rinse
5. Mi-Phos Z-10
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-10 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-10 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 brought into contact with the Mi-Phos Z-10 solution for 10 to 20 minutes at 180°F to 185°F. Agitation of parts processed in baskets is recommended when the Mi-Phos Z-10 is applied by immersion to prevent “nesting” and contact marks.

Mi-Phos Z-10 will meet Specification TT-C-490 only when all criteria listed in the most recent version of that specification are followed. That includes testing of rinse water, temperature, coating weights, salt spray requirements, submission of test specimens, sampling and testing frequency, embrittlement relief, post dips and coatings or any additional tests deemed necessary to comply with that specification and governing body.

A new Mi-Phos Z-10 solution is made up and operated as follows:

Parameter	Immersion	Spray
Concentration	4 – 6% (26 – 39 points)	2 – 4% (13 – 26 points)
Temperature	180°F – 185°F	170°F – 180°F
Processing Time	10 – 20 min	60 – 90 sec
Coating Weights	300 – 900 mg/ft^2	150 – 300 mg/ft2
Accelerator Value	0.5 – 3.0	

Mi-Phos Z-10 when used at 4% to 6% by volume will produce a coating offering excellent corrosion resistance when coated (sealed) with a Metal Guard rust preventative. It may also be used at this concentration over the black coating produced by Mi-Phos Black solution to yield a black phosphate coating that offers outstanding corrosion resistance when seal with the Metal Guards mentioned above.

It should be noted that new Mi-Phos Z-10 solutions will often produce a slightly courser grain structure than used (broken in) solutions. The solution will rapidly “break in” as work is processed.

To produce a coating weight of 300 to 500 mg/ft^2 Mi-Phos Accelerator should be added to bath at ratio of 2 fluid ounces per 100 gallons of solution. It is recommended that Mi-Phos Accelerator be diluted in water before addition to the bath.

Titration Method

The following methods are used to maintain the operating strength of the Mi-Phos Z-10 solution. The specific range for meeting TT-C-490 can vary with the alloy, abrasive blast and needs to be tested and adjusted for time and concentration to narrow the range to meet the specification. The following is the general starting point for that purpose.

Total Acid

1. Pipet a 10 mL sample of the Mi-Phos Z-10 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

Note: A solution made up as per specification normally results in a titration of 26 to 40 mL for immersion and 13 to 26 mL for spay applications.

To raise the concentration 1.0 mL, add 0.15 gallons of Mi-Phos Z-10 concentration per 100 gallons of solution.

Free Acid

1. Pipet a 10 mL sample of the Mi-Phos Z-10 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

Note: The normal amount of 0.1 N Sodium Hydroxide required to make the color change is 4.5 mL for immersion and 3 mL for spray applications.

The use of Free Acid control is to determine the operating ratio of total acid to free acid. The range should be between 6.0-8.0 to 1. In order to figure this radio, use the following formula:

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.

Accelerator

1. Pipet 25 mL sample of the Mi-Phos Z-10 solution into a 150 mL beaker.
2. Add 10 to 20 drops of 50% Sulfuric Acid.
3. Titrate using a 0.042 N Potassium Permanganate to a pick endpoint, for 30 secs.
4. Record mL used.

Calculation

Accelerator Points = mL 0.042N Permanganate
Maintain Accelerator between 0.5 – 3.0

To increase Accelerator concentration by 1.0, add 1.6 fluid ounces of Accelerator per 100 gallons of operating process bath.

Titration for Accelerator can only be performed in absence of iron. Solution should be checked for iron using Iron Test Paper prior to titration. Iron Test paper will turn pink in presence of iron. If iron is present add 2 fluid ounces of Accelerator per 100 gallons of

operating process bath. Continue to repeat test, and add additions if needed, until the Iron Test Paper no longer turns pink. The Accelerator titration can then be performed.

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-10 concentrate. If disposal become necessary, the solution should be treated with other metal bearing wastes or package for proper disposal.

The Mi-Phos Z-10 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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