

Dev-Zinc 720

HEAVY ZINC PHOSPHATE FOR IMMERSION COATINGS

Dev-Zinc 720 is a heavy immersion zinc phosphate formulated to exceed the requirements of GM 4435M, Ford S-2, and Chrysler PS-18 specifications.

Dev-Zinc 720 provides excellent corrosion protection on ferrous metal parts by depositing in excess of 2,000 milligrams per square foot of crystalline zinc phosphate. When used with water emulsion oil and oil & wax products, **Dev-Zinc 720** can surpass 168 hours salt spray.

OPERATING CONDITIONS:

Dev-Zinc 720	2 to 6% by volume
Temperature	160 to 175 °F, normal
Immersion Time	10 to 30 minutes
Control ranges	Total Acid: 35 to 60 points Free Acid: 5 to 10 points Iron: 1 to 14 points
Conversion	1% by vol. Total Acid = 10 points 1% by weight Iron = 10 points
Coating Weight	2000 to 3500 mg/sq.ft.

MAKE-UP AND CONTROL:

1. Fill clean tank with water.
2. Heat to approximately 120°F.
3. Add 4% by volume of Dev-Zinc 720 and mix thoroughly.
4. Heat to operating temperature 160-175°F, and begin operation.

(Steelwork must be put through the tank immediately after initial heat of a new solution. The initial dissolved iron is needed to stabilize a new phosphating bath.)

The **Dev-Zinc 720** bath should be analyzed on a regular schedule for proper chemical concentration (i.e., once every 4 hours for heavy work loads to once every 8 hours for light work loads).

Dev-Zinc 720 concentrate is used to maintain the total acid level.

- > 1% by volume = 10 total acid points.

The operating concentration of **Dev-Zinc 720** is dependent upon the ferrous iron content. The following chart gives the recommended total acid level for a determined amount of ferrous iron.

OPERATING GUIDELINES:

Ferrous Iron Points	Recommended Total Acid Points
0 - 1	35 - 40
1 - 2	35 - 40
2 - 3	35 - 40
3 - 4	39 - 42
4 - 5	42 - 45
5 - 6	45 - 48
6 - 7	48 - 51
7 - 8	51 - 54
8 - 9	54 - 57
9 - 10	57 - 60
10 - 11	60 - 63
11 - 12	63 - 66

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The above guideline is recommended for operating Dev-Zinc 720 baths where the **Dev-Zinc 720** concentrate is metered in.

Iron points vs. TAP (Total Acid Points) relationship is calculated using the following formula:

$$3 \times \text{Iron points} + 35 = \text{optimum TAP relationship}$$

For example: If the iron points are found by analysis to be 5.0 iron points, then total acid should be at or adjusted up to 50 points. (3 x 5 + 35). If the acid points are higher than the control level, the phosphate coating will simply be put on faster.

When the iron reaches a level deleterious to the coating, a portion of the bath should be discarded. After discarding, the level is restored with water and the proper ration of total acid to iron points adjusted with **Dev-Zinc 720**.

ANALYSIS: Ordinarily, the bath is controlled by titrating for iron and total acid, as well as, checking the temperature. Always keep in mind that the rate of reaction is determined by the time, temperature, and concentration. The free acid titration need only be run occasionally. It is almost never necessary to make any adjustments for free acid.

Iron Analysis:

Reagents:

- > 0.2 N potassium permanganate
- > 50% sulfuric acid (1 to 1 by volume).

Procedure:

1. Pipette a 10 ml sample of the phosphate solution into the flask.
2. Add 10-15 drops of 50% sulfuric acid.
3. Titrate sample with 0.2 N Potassium Permanganate until a clear pink end-point.

Calculation: **mIs 0.2 N Potassium Permanganate = Iron points.**

Total Acid Analysis:

Reagents:

- > 0.1 N Sodium Hydroxide.
- > Phenolphthalein indicator solution.

Procedure:

1. Pipette a 10 ml sample of the phosphate solution into a flask.
2. Add 3-4 drops of phenolphthalein indicator solution.
3. Titrate the sample with 0.1 N Sodium Hydroxide to a pink end point.

Calculation: **mIs 0.1 N Sodium Hydroxide = Free acid points.**

TYPICAL PROCESSING CYCLE FOR PHOS AND OIL:

Stage Operation

- | | | |
|--|----------------|------------|
| 1. Hot alkaline soak clean, | 5-10 minutes, | 140-180°F. |
| 2. Rinse, overflowing water, | 30 seconds | room temp. |
| 3. Pickle, mineral acid | 5-10 minutes, | 65-115°F. |
| 4. Rinse, overflowing water, | 30 seconds, | room temp. |
| 5. Hot rinse, | 30 seconds, | 140-160°F. |
| 6. Dev-Zinc 720, | 10-20 minutes, | 165-185°F, |
| 7. Rinse, overflowing water, | 30 seconds, | room temp. |
| 8. Seal rinse, | 30-60 seconds, | 140°F. |
| 9. Oil, water emulsion oil, or oil & wax bath, | 30-60 seconds, | 135-140°F. |

NOTE: Consult your So Clean Solutions sales engineer for further process information or assistance.

EQUIPMENT: The process tank and piping for use with the Dev-Zinc 720 solution should preferably be of type 304, 316, or other 300 series stainless steel. Mild steel may also be used, but has a much shorter life and allows the build-up of zinc phosphate on the tank sides. The heat transfer surface should be of type 316 stainless steel, if steam heated or if gas-fired. The pump should be fabricated from any of the 300 series of stainless steel.

TROUBLE SHOOTING:

- It is important that there be good rinsing following any acid dip.
- For optimum performance, a bath should be titrated before each shift.
- This bath may be used for dip operations when parts are racked or are in baskets.
- The immersion time when work is dip-coated on hooks or racks is approximately one-third as long as when the work is tumbled to produce the same coating weights.
- Barrel operations require barrel rotation of 1-2 rpm in all stages of Zinc phosphating for best results and complete coatings.
- A coating having a white powdery appearance usually indicates a bath low in free acid, high in pH or that the temperature of the bath has exceeded 200°F.
- If the pH of the bath should drop below the 2.5 pH-operating limit, the bath may be brought back to the recommended pH by the addition of a neutralizer. An excessive amount of free acid may also be corrected by the addition of a neutralizer to the bath. This is rarely required. Consult So Clean Solutions for assistance.
- If the coating shows a "blush rust" appearance, it indicates insufficient phosphate coating. This could be due to a low bath temperature, a short immersion, high free acid or high iron in the solution.
- On hardened parts, the coating will appear darker and have a much finer grain than on cold-rolled and low-carbon parts. So Clean Solutions can provide special additives to produce darker phosphate deposits on all steel work. Consult So Clean Solutions for assistance if darker deposits are required.
- When the bath takes too long to heat up and isn't holding temperature, it indicates normally that the coils need cleaning.
- While sludge is not a problem, it is recommended to pump out the bath into a storage tank at least monthly to remove any iron parts and sludge that might have accumulated.
- If a fresh, new phosphate that is heated to the operating temperature and left idle, then the bath may become inoperative. To bring back the bath to operating condition, add 1.5 lbs. of urea per 100 gallons of solution to change the nitrites which formed in the unused bath back into nitrates. (Always use a fresh bath after the initial heat up, and avoid this possible start-up problem.)
- If oil accumulates in the processing tank (usually as a result of poor cleaning or rinsing), it can best be removed in the morning before turning on the heat. It may be either skimmed or blotted off.
- The average build-up on a surface treated with **Dev-Zinc 720** process is about 0.0002" to 0.0004" (0.2 - 0.4 mil). To obtain a dense, fine-grained coating on some articles where close tolerance is essential, it may be necessary to change the cleaning procedure to include a sand tumble or a hand wiping operation.
- To obtain the highest efficiency, production should be processing practically all the time. That is, when one load of production is taken from the tank, another should be ready to replace it.
- More crystalline coatings will be obtained when 20-40% by volume hydrochloric acid dip is used prior to phosphating. Sulfuric may be used; however, hydrochloric acid is preferred.

CAUTION:

Dev-Zinc 720 is an acidic material. Avoid contact with skin and clothing. Wear a face shield, apron, and rubber gloves when handling this material. In case of contact with skin or clothing, wash immediately with large amounts of water. For eyes, flush with clean water for at least 15 minutes and obtain medical attention.

Read the Material Safety Data Sheet before using this product.

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