Weldphos Mn

Weldphos Mn is an immersion heavy manganese phosphate, which produces a non-metallic, dark matte-grey conversion on iron and steel. The rapid break-in properties of the coating reduce wear by preventing scoring and galling. As the sacrificial coating is worn in, surface dimples continue to trap oil for improved lubricity and protection of the part. Weldphos Mn is ideal for engine components, such as pistons, camshafts and engine blocks, as well as non-automotive gears, firearm components, and drill bits.

Features/Benefits

- Used when wear resistance and anti-galling is required.
- Coating retains oils, improving anti-friction and corrosion resistance of parts.
- Coating weights ranging from 1,500 to 5,000 mg/ft^2.
- Meets military and commercial specifications for manganese phosphates when correctly applied.

Operating Conditions

Concentration	10 % by volume Weldphos Mn
Temperature	80 to 100 ºC (180 to 210 ºF)
Immersion Time	10 to 30 minutes
Total Acid	25 to 60 points
Free Acid	5 to 10 points
Total Acid : Free Acid	5:1 to 6:1
Iron	0 to 10 points (optimal 1.5 to 3.5 g/L)

Operating Procedure

	Stage of Operation	**Immersion Time**	**Temperature**
1	Immersion Cleaner, Spotless™ LSS or MM	5 – 10 minutes	60 – 82°C (140 – 180°F)
2	Rinse, Overflowing water	30 seconds	Room Temperature
3	Hot Rinse, optional	30 seconds	60 – 70°C (140 – 160°F)
4	Phosphate, Weldphos Mn	10 – 30 minutes	80 – 100°C (180 – 210°F)
5	Rinse, overflowing water	30 Seconds	Room Temperature
6	Rust Preventative Oil; Guardcoat™ Oil	30 – 60 seconds	60 to 82 ºC (140 to 180 ºF)

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Equipment

Stainless Steel is preferred for the processing tank and piping. SS 304, 316 or other 300 series can be used. Mild steel may also be used, but will result in a much shorter life and build-up of Manganese Phosphate on the tank sides. Electric immersion heaters should be stainless steel, preferably 316 SS. Gas heated tanks and tubes should be mild steel to prevent cracking.

New Solution Make-Up

1. Fill clean tank with water.
2. Heat to approximately 48ºC (120ºF).
3. Add 10 % by volume of Weldphos Mn and mix thoroughly.
4. Add 2 lb. of clean steel wool or clean scrap steel per 100 gallons of solution.
5. Allow to stay in solution for 2 to 3 hours, then remove steel wool or scrap steel.
6. Add water to operating level and check solution parameters.
7. Heat to operating temperature 80 to 100°C (180 to 210°F), and begin operation.

Note: Steel must be put through tank immediately after initial heat of a new solution. The initial dissolved Iron is needed to stabilize a new phosphating bath and insure the formation of a complete coating on the work.

Operational Guidelines

The working solution can be applied by immersion with parts that are in barrels or racked. For barrel application, it requires barrel rotation of 1 to 2 rpm to minimize scratching of the smutty surface for best results and complete coatings. For rack application, the immersion time is approximately 33 % as compared to work tumbled in the barrel to produce the same coating weights.

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 can be either skimmed or blotted off. While sludge is not a problem, it is recommended to pump out the bath into a storage tank at least once a month to remove any iron parts and sludge that might have accumulated. If sludge builds up too high, it may settle on parts.

For optimum performance, the Weldphos Mn working solution should be titrated before each shift. The concentration is reflected by the Total Acid. That can be increased by the addition of Weldphos Mn.

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High Free Acid can be lowered by the addition of Manganese Carbonate. Approximately 30g/L of Manganese Carbonate will decrease the Free Acid by 1 point. High Free Acid will result in coatings that are etched, non-uniform and/or rough.

Increasing Iron content will lead to darker, coarse coatings' and may be controlled by occasionally decanting or the addition of an iron-reducing agent. *High Iron* will result in poor wear and corrosion resistance and an uneven coating that may flake off. The coating may be thin and as a result light grey. Iron can be precipitated out with 35% Hydrogen Peroxide. An addition of 0.6g/L 35% Hydrogen Peroxide will reduce Iron by 0.5g/L, do not add more than this at one time. This will cause Free Acid to rise and therefore Manganese Carbonate : Hydrogen Peroxide ratio of 2:1 by weight should be added.

Iron Precipitation

1. Add required 35% Hydrogen Peroxide at operating temperature.
2. Allow 15 minute reaction time.
3. Slowly add required Manganese Carbonate at operating temperature.
4. Allow 15 minute reaction time.
5. Analyze for Iron.
6. Allow sludge to settle before running parts.

If there is *Low Iron* in the solution it should be added as described in the new solution make section.

Analysis of Iron

Apparatus:	10 mL Volumetric Pipette, Type A 50 mL Burette, Class A 250 mL Erlenmeyer Flask
Reagents:	50% Sulfuric Acid 0.2N Potassium Permanganate
Procedure:	1. Pipette a 10mL sample of Weldphos Mn solution into a 250mL Erlenmeyer. 2. Add 2mL 50% Sulfuric Acid. 3. Titrate with 0.2N Potassium Permanganate to a pink end point. 4. Calculation: mL of Potassium Permanganate = g/L Iron

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Analysis of Total Acid

Apparatus: 5 mL Volumetric Pipette, Type A
50 mL Burette, Class A
250 mL Erlenmeyer Flask

Reagents: 1 % (w/v) Phenolphthalein Indicator Solution
0.1N Sodium Hydroxide (NaOH)

Procedure:
1. Pipette a 5mL sample of Weldphos Mn solution into a 250mL Erlenmeyer.
2. Add 3 - 4 drops of Phenolphthalein Indicator.
3. Titrate with 0.1N NaOH to a pink end point.
4. Calculation: mL of 0.1N NaOH titrated = Total Acid Points

Analysis of Free Acid

Apparatus: 10 mL Volumetric Pipette, Type A
50 mL Burette, Class A
250 mL Erlenmeyer Flask

Reagents: Bromocresol Green Indicator Solution
0.1N Sodium Hydroxide (NaOH)

Procedure:
1. Pipette a 10 mL sample of Weldphos Mn solution into a 250mL Erlenmeyer.
2. Add 3 drops of bromocresol green indicator
3. Titrate with 0.1N NaOH to the absence of yellow.
4. Calculation: mL of 0.1N NaOH titrated = Free Acid Points

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READ THE MSDS BEFORE USING THIS PRODUCT

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