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TECHNICAL DATA

E-Phos™ 630

Manganese Phosphate

E-Phos 630 produces a manganese phosphate coating of 1,500 + milligrams per square foot on steel and iron.

The sacrificial finish has excellent break-in properties and reduces wear on moving surfaces.

It prevents scoring and galling on moving parts to reduce wear during break-in of surfaces found on pistons, piston rings, camshafts, tappets, drill bits and similar bearing surfaces.

The absorptive coating retains oils and lubricants and increases the lubrication and corrosion resistance of the treated surfaces. Meets Mil-DTL-16232-G.

EQUIPMENT REQUIREMENTS

Type 316 stainless steel is preferred for the processing tank, pumps, piping and steam heat exchangers. Gas heated tanks and tubes should be mild steel because stainless steel can crack with direct gas heat.

SOLUTION MAKE-UP

Concentration: **E-Phos 630** liquid concentrate is used at 10% by volume in water.

Initial Temperature: 150°F to 160°F

Break in: Cleaned steel wool or scrap steel is added to the bath at a rate of 2 lbs. per 100 gallons. The solution is allowed to react for one to two hours until the reaction stops at which time the spent steel wool or scrap iron is removed. Water is added to bring solution to operating level. Check solution for total acid, free acid and iron content as outlined under Solution Control below. Make adjustments if necessary to put the solution within the operating ranges.

Operating Temperature: 200° to 210°F

Total Acid: 12 points

Free Acid: 2.0 to 2.2 points

Ratio Free Acid/Total Acid: 1:6 to 1:7.5

Iron: 1.5 to 3.5 grams per liter

FINISHING PROCEDURE

1. Thoroughly clean and degrease parts with an immersion in an **EPI** hot alkaline soak cleaner such as **E-Kleen SR 102** or **E-Kleen SR 102-E**.
2. Overflowing cold water rinse. Optional hot water rinse. It will pre-warm the surfaces which will result in a quicker start of the coating process in the **E-Phos 630** solution and hence reduce the pickling of the surface prior to the surfaces coming to bath temperature.
3. Immerse parts for up to 15 minutes in the **E-Phos 630** solution maintained at 200 to 210°F. Completion of the chemical reaction is evident by the cessation of gassing. If gassing does not stop within the 15 minutes, excessive etching will occur. Excessive free acid causes this and can be reduced by adding **Manganese Carbonate** - See Free Acid control.
4. Bottom-fed, overflowing cold water rinse or spray rinse.
5. Optional **E-Tec 555** when optimum corrosion resistance is required (please refer to the **E-Tec 555** technical data sheet).
   a) Dry parts without further rinsing by using warm moving air or comparable process that prevents staining;
   b) Go to Step 6 without any rinsing or drying.
6. Seal finish with an **EPI E-Tec** protective sealant as recommended by your **EPI** representative.

SOLUTION CONTROL

Total Acid

1. Pipet a 2 ml. sample of the **E-Phos 630** bath into a 150 ml. beaker and dilute with 10 to 15 ml of water.
2. Add 5 drops of Phenolphthalein Indicator.
3. Titrate with 0.1N Sodium Hydroxide solution to a pink color.
4. The number of ml of 0.1N NaOH used is the point count of the Total Acid. A properly prepared 10% solution will normally require 12.0 ml of 0.1N NaOH.

The addition of 1.0 lb of **E-Phos 630** concentrate per 100 gallons of working solution will increase the total acid by approximately 0.1 ml.

Free Acid

1. Pipet a 2 ml sample of the **E-Phos 630** solution into a 150 ml beaker.
2. Add 3 drops of Bromophenol Blue Indicator.
3. Titrate with 0.1N NaOH to an end point from a green color to a purple color. The number of ml of 0.1N NaOH is the point count of the Free Acid. A properly prepared 10% solution will require 2.0 to 2.2 ml to change the color.
4. Excessive free acid is caused by heating the solution without processing any work or by processing only a small amount of work through a large volume tank. Excessive free acid will etch the surfaces and cause a failure to produce a complete uniform coating with the normal processing time or it may produce a rough coating.

Neutralize excessive free acid with the addition of **Manganese Carbonate.** The addition of 4 oz. per 100 gallons of solution will lower the Free Acid by 1.0 count (ml of 0.1N NaOH).

Iron

1. Pipette a 10 ml. sample of the **E-Phos 630** solution into a 150 ml beaker.
2. Add 2 ml 50% Sulfuric Acid.
3. Titrate with 0.2N Potassium Permanganate to a permanent (20 seconds) pink color.
4. The number of ml of 0.2N Potassium Permanganate is the concentration of iron in grams per liter. The normal range is 1.5 to 3.5 grams per liter iron.

The iron concentration must be maintained between 1.5 to 3.5 grams per liter. If it drops below 1.5 grams per liter, then iron must be introduced to the bath as described above under Solution Break-In.

Normally, the iron concentration will get too high and must be reduced to produce acceptable coatings.

Hydrogen Peroxide is used to reduce the iron concentration. To reduce the iron by 0.5 grams per liter add 0.5 lbs. of 35% Hydrogen Peroxide per 100 gallons of working solution. Caution, add the Hydrogen Peroxide only in 0.5 lbs. per 100 gallon increments. Dilute the Hydrogen Peroxide with water prior to adding to the bath.

Additions of Hydrogen Peroxide will create excess Free Acid which must be reduced if acceptable coatings are to be obtained. Therefore, 2 lbs. of **Manganese Carbonate** must be added for every 1 lb. of Hydrogen Peroxide.

1. Add the required amount of 35% Hydrogen Peroxide diluted with water. Keep bath at 200 to 210°F.
2. Allow to react for 15 minutes.
3. Add required amount of **Manganese Carbonate** slowly. Keep bath at 200 to 210°F.
4. Allow to react for 15 minutes
5. Do an iron determination as outlined above.
6. Allow any sludge developed to settle prior to running any work through the bath.

A solution too high in iron will produce an incomplete coating, a non-adherent coating that will have poor wear resistance as well as poor corrosion resistance. High iron will also produce a thin coating which is light gray in color rather than the normal dark gray. High iron also results in an uneven etch of the surface.

Sludge

A sludge will be formed during the normal use of the **E-Phos 630** bath. Periodic removal of the sludge will be required by allowing the solution to settle. Decant off the solution. Remove the sludge from the tank and heaters. Replace the solution, add water and adjust the solution to proper operating concentration.

Sludge, if allowed to build up, will produce “dusty” coatings on the work.

CAUTION

The **E-Phos 630** concentrate and its working solutions are acidic. Avoid contact with eyes, skin and clothing. Wear eye protection (glasses, goggles and face shield), protective rubber gloves and rubber apron when mixing solutions and while working with the solutions. Avoid contact of the **E-Phos 630** with alkaline materials. Do not mix **E-Phos 630** with any other chemicals or solutions. Do not work with **E-Phos 630** without first reading and understanding the **SAFETY DATA SHEET** supplied by **EPI**. Additional information on the use of the **E-Kleen** and **E-Tec** products can be found in the individual technical data sheets and **SAFETY DATA SHEETS** for each product.

PACKAGING

5 gallon, 15 gallon or 55 gallon non-returnable containers.

IMPORTANT NOTICE! For Industrial Use Only

The following is made in lieu of all warranties, expressed or implied, including the implied warranties of merchantability and fitness for purpose: seller's and manufacturer's only obligation shall be to replace such quantity of the product as proved to be defective. Before using, user shall determine the suitability of the product for its intended use, and user assumes all risk and liability whatsoever in connection therewith. **Neither seller nor manufacturer shall be liable either in tort or in contract for any loss or damage, direct, incidental or consequential, arising out of the use or the inability to use the product.**

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