

## E-Phos 660

### Microcrystalline Zinc Phosphate

**E-Phos 660** is a calcium-modified formula which produces fine-grained crystalline coatings on iron and steel with a medium coating weight of 600 mg/ft<sup>2</sup>.

The zinc phosphate coating remains fine-grained regardless of the cleaning method used prior to application.

It can be applied by either immersion or spray.

**E-Phos 660** is an excellent paint base. The fine-grained, low porosity coating reduces paint consumption by reducing the amount of paint absorbed into the coating. The dense coating provides a very effective barrier between the paint and substrate, resulting in significantly better corrosion resistance than iron phosphates.

Parts will have some “bare” rust protection, so they do not have to be painted immediately.

Meets Mil-P 16232 and AMS 2480G.

#### Equipment Requirements

Type 316 stainless steel is preferred for the processing tank, pumps, piping, nozzles 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:	<b>E-Phos 660</b> liquid concentrate is used at 4 to 6% by volume in water for immersion application or 2 to 4% for spray application.	
Temperature:	Immersion:	130° to 185°F
	Spray:	170° to 180°F
Time:	Immersion:	3 to 15 minutes
	Spray:	60 to 90 seconds
Coating Weights:	Immersion:	300 to 900 mg/ft <sup>2</sup>
	Spray:	150 to 300 mg/ft <sup>2</sup>
Chemical Control:	Immersion:	4% = 26 points

Spray: 3% = 19.5 points

NOTE: When a new solution is made-up, the coating obtained at first will not be as fine grained as those obtained after the solution has been broken in by use.

### **Finishing Procedure**

1. Thoroughly clean and degrease parts with an immersion in a hot **EPI** alkaline soak cleaner such as **E-Kleen SR 102** or **E-Kleen SR 102-E**. **E-Kleen SR 149-L** is recommended for spray cleaning. Heavy duty cleaners and rust removers can be used without affecting the grain of the **E-Phos 660** coating.
2. Bottom-fed, overflowing cold water rinse or spray rinse.
3. Immerse parts in **E-Phos 660** solution for length for time required to produce the desired coating weight or impinge the spray on the surfaces for the required time. Agitation of parts will prevent contact marks with immersion applications.
4. Bottom-fed, overflowing cold water rinse or spray rinse.
5. Optional **E-Phos NCr Seal** to neutralize the zinc phosphate coating for maximum corrosion resistance.
6. Dry off with air.
7. Seal finish with the specified paint, coating or one of the **EPI E-Tec** corrosion inhibitors.

### **Solution Control**

Concentration of **E-Phos 660** (Total Acid)

1. Take a 10 ml sample of bath, add to 150 ml beaker and dilute with 25 ml of water.
2. Add 5 drops Phenolphthalein Indicator.
3. Titrate with 0.1N NaOH to a pink color end point.
4. The number of ml of 0.1N NaOH is the point count of the Total Acid.

Range:                      Immersion: 26 to 40 ml (points)  
                                    Spray: 13 to 26 ml (points)

To raise the concentration by 1.0 point (ml) in the working bath, add 0.15 gals.(568 ml) of **E-Phos 660** concentrate per 100 gallons of working solution.

Under normal operating conditions, only the total acid should be determined daily for replenishment and maintenance of the solution.

## Free Acid

1. Take a 10 ml sample of the working solution and add to a 150 ml beaker, dilute with 25 ml of water.
2. Add 3 drops Bromophenol Blue Indicator.
3. Titrate with 0.1N NaOH to a reddish-purple color. The number of ml of 0.1N NaOH is the point count of the Free Acid.

The working solution is maintained and operated on a Total Acid/Free Acid Ratio.

Ratio = Total Acid/Free Acid

Operating Range = 6.0/1 to 8.0/1

To lower the free acid, small additions of Soda Ash (Sodium Carbonate) should be used. The free acid measures the aggressiveness of the bath.

The RATIO indicates the chemical balances of ingredients.

## Iron Determination

1. Take a 10 ml sample of the working solution, dilute with water to 25 ml and add 2 ml of concentrated sulfuric acid.
2. Titrate with 0.2N Potassium Permanganate until the solution turns purple.
3. The number of ml of 0.2N Potassium Permanganate equals the grams of iron per liter of **E-Phos 660** solution.

If the iron concentration goes over 6 grams per liter it is recommended that some of the solution be removed from the tank and the volume be brought back to operating level with water. **E-Phos 660** concentrate is then added to adjust the solution to its optimum operating range.

## Solution Maintenance

As the bath is used, an insoluble by-product is formed which settles to the bottom of the tank which should be periodically removed. Allow sludge to settle, decant off and save the clean solution, remove sludge, return solution to tank and replenish to operating conditions.

Heating coils will become scaled and should be cleaned when the scale reduces heating efficiency.

At a minimum, a tank should contain one gallon of working solution per square foot of work processed at one time. It is preferable to have two gallons of solution per square foot of work.

## Caution

The **E-Phos 660** 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 solutions. Avoid contact of the **E-Phos**

**660** with alkaline materials. Do not mix **E-Phos 660** with any other chemicals or solutions. Do not work with **E-Phos 660** without first reading and understanding the **Material 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 **Material Safety Data Sheets** for each product.

### **Packaging**

185 pound net (15 gallons) or 680 pound net (55 gallons) 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 the use or the inability to use the product.**

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