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## TECHNICAL DATA

### E-Phos 661

#### Low-Temp/No-Nickel Heavy Zinc Phosphate

**E-Phos 661** is a dark grey coating which produces fine-grained crystalline coatings on iron and steel with a heavy coating weight of 2000+ mg/ft<sup>2</sup>.

**E-Phos 661** operates as low as 140°F and up to ¾ less sludging (See Charts).

- Extended bath life 3-5 times
- Eliminates sludge buildup on heating coils
- Saves energy
- Less iron related challenges
- Does not contain EDTA
- Superior corrosion resistance up to 250 hours salt spray

Meets Mil-P 16232G Type Z.

**E-Phos 661** is listed in IMDS.

#### 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: **E-Phos 661** liquid concentrate is used at 5% by volume in water.

Temperature: Immersion: 140° to 180°F

Time: Immersion: 8 to 20 minutes

Coating Weights: Immersion:  
Heavy: 2000+ mg/ft<sup>2</sup>  
Medium: 1000 mg/ft<sup>2</sup>  
Light: 500 mg/ft<sup>2</sup>

Chemical Control: Immersion: 4-6% = 35 - 95 points total acid

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 108**.
2. Bottom-fed, overflowing cold water rinse.
3. Acid pickle 5-15% sulfuric acid 65-90°F, 5-10 minutes.
4. Bottom-fed, overflowing cold water rinse.
5. Bottom-fed, overflowing cold water rinse.
6. Immerse parts in **E-Phos 661** solution for length for time required to produce the desired coating weight. Agitation of parts will prevent contact marks.
7. Bottom-fed, overflowing cold water rinse.
8. Bottom-fed, overflowing cold water rinse.
9. 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 10 without any rinsing or drying.
10. Seal finish with an **EPI E-Tec** protective sealant as recommended by your **EPI** representative.
  - a). **E-Tec 515** water soluble oil: 5-15% by volume, 120-140°F, 1-3 minutes.
  - b). **E-Tec 503** water displacing oil, 100% by volume, ambient, 1-3 minutes.
  - c). **E-Tec 522** lubricating wax, 50-100% by volume, ambient, 1-3 minutes.
11. Dry off with moving air and/or heat/150-250°F if desired.

### **Solution Control**

Concentration of **E-Phos 661** (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.

1% = 9 ml

0.11% by volume = 1 ml

Range: 35 to 95 (points)

To raise the concentration by 1.0 point (ml) in the working bath, add 0.11 gals (416 ml) of **E-**

**Phos 661** 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 5-10 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 Ratio: **Total Acid ÷ Free Acid**

The operating range of this RATIO is 4.5 for a new bath to 9.0 for older baths with high iron.

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 balance 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 points of iron.

If the iron concentration goes over 13 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 661** concentrate is then added to adjust the solution to its optimum operating range.

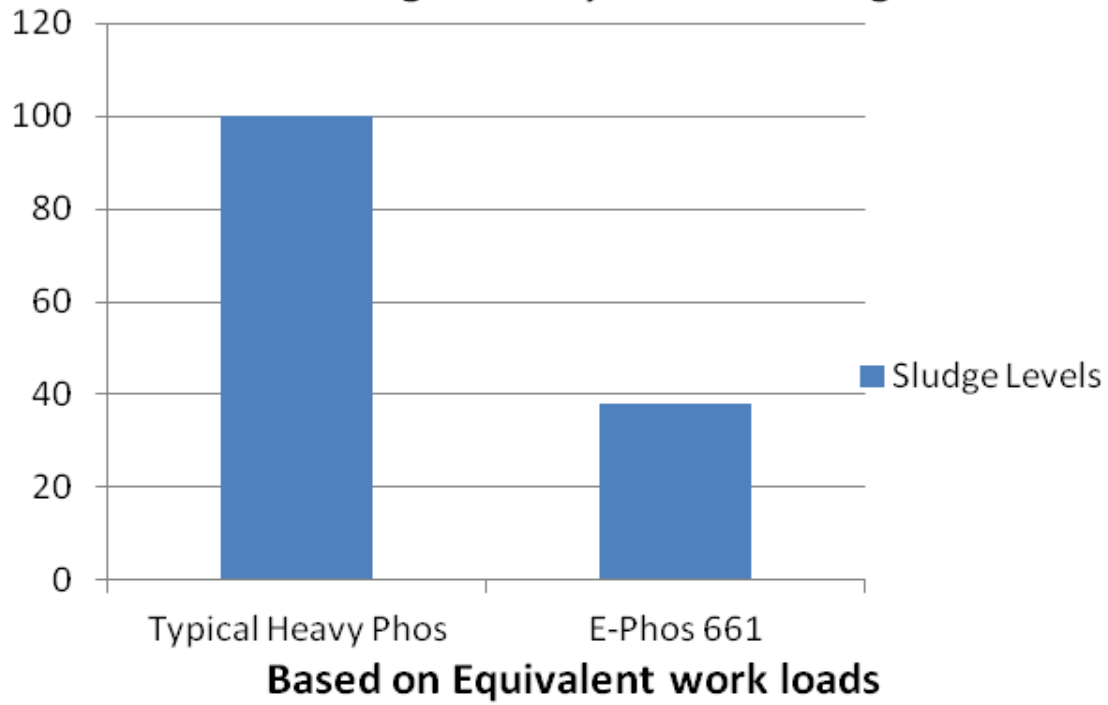
### **Solution Maintenance**

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.

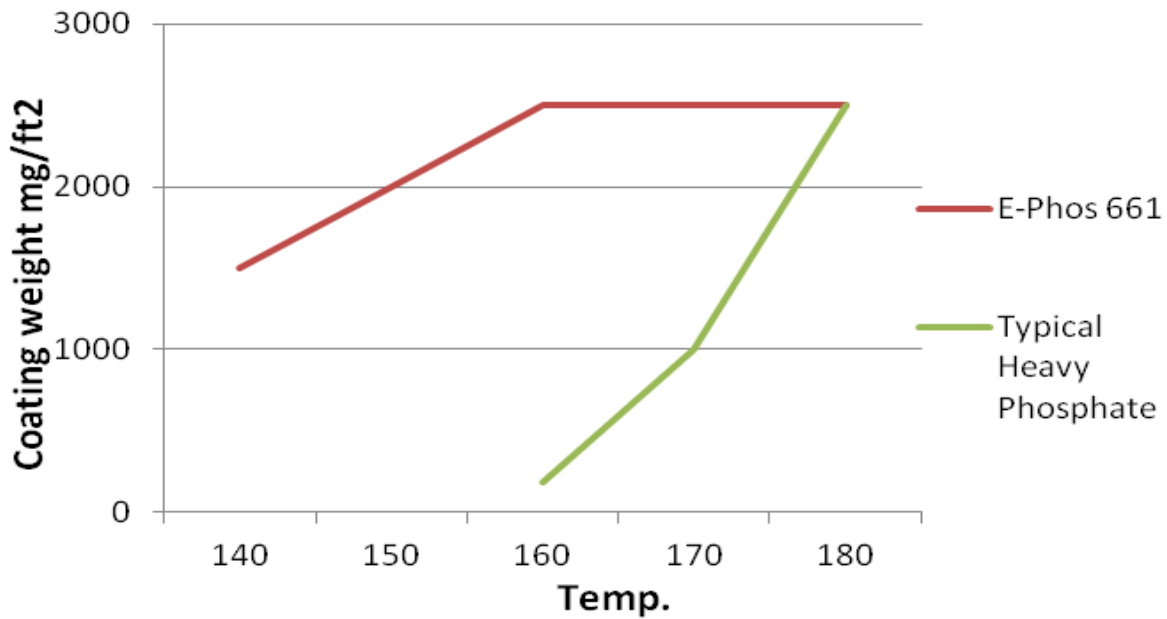
Heating coils will become scaled and should be cleaned when the scale reduces heating efficiency.

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.

### E-Phos 661 Significantly Reduces Sludge



### Coating Weight at Various Temperatures



## **Caution**

The **E-Phos 661** 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 661** with alkaline materials. Do not mix **E-Phos 661** with any other chemicals or solutions. Do not work with **E-Phos 661** 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**

67 pound net (5 gallons) or 734 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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