# APPLICATION OF ZINC PHOSPHATE COATING TO CARBON AND LOW ALLOY STEELS

## 1.0 SCOPE

1.1 This Specification covers the application and/or process to obtain a steel surface coating with reduced galling characteristics, improved adherence of petroleum-based lubricants (rust preventatives), a heat resistant chromate free conversion coating, and a substitute for iron oxide paint primer.

## 2.0 ACCEPTANCE CRITERIA

2.1 Coating Weight: Zinc phosphate coatings produced in accordance with this Specification shall be in the range of 400 to 1200 mg/ft$^2$. The thickness of the coating should be approximately .0001 to .0005 inches within this weight range. The weight and thickness of the applied coating will vary and will be dependent upon the alloy content of the steel.

2.2 Coating Surface Color: The zinc phosphate coating color characteristics shall range from medium gray to nearly black. Coating color results should be judged accordingly.

2.3 Surface Appearance: The phosphate coating shall be even and continuous over the entire surface of the part.

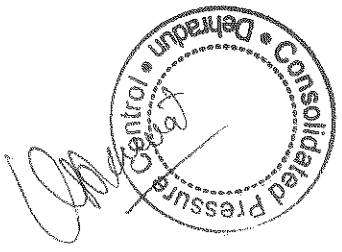
2.3.1 Unless otherwise specified on the drawing or router, the entire surface of the part shall be zinc phosphate coated. After phosphating, the part shall be examined by the coating personnel to verify that all surfaces are coated, including bolt holes and cavities.

2.3.2 Parts which incorporate non-ferrous inlays and/or overlays should not exhibit any evidence of chemical attack or degradation of the inlay/overlay surfaces.

2.3.3 The zinc phosphated surfaces will not normally appear as smooth as the original metal surfaces prior to the phosphating process.

2.3.4 Any phosphated surfaces which have rusty spots following completion of the process shall be reprocessed through the entire coating system.

2.3.5 Residue forming a roughened or crinkled surface shall be cause for reprocessing.



2.3.6 Smut, blotchiness, or loose coating on the surface shall be cause for reprocessing.

2.3.7 Parts that have been remachined, butted, or sanded shall be reprocessed.

## 3.0 COATING QUALIFICATION

3.1 The inspections listed below for coating qualification shall be performed by Quality Assurance every six months. Qualification records shall be maintained to support the quality of the coating.

3.1.1 Coating Weight: The weight of the applied coating shall be determined by using test specimens having a minimum surface area of four square inches and a maximum of fifty square inches. ASTM B-767 shall be used for the chemical strip.

3.1.1.1 The coating weight shall be determined using the following formula:

$$\text{Wt: } \frac{\text{mg}}{\text{ft}^2} = \frac{\text{Initial Phosphated Specimen Wt. (mg) - Final Stripped Specimen Wt. (mg)}}{\text{Total Specimen Area (ft}^2\text{)}}$$

3.1.1.2 The minimum acceptable weight shall be 400 mg per square foot.

3.1.2 Coating Thickness: The coating thickness shall be determined by using a specimen of known dimensions, measured prior to coating.

3.1.2.1 The thickness shall be determined by the following formula:

$$\text{Coating Thickness} = \frac{\text{(Final Measurement After Coating) - (Initial Measurement Prior to Coating)}}{2}$$

3.1.2.2 The minimum acceptable coating thickness shall be .0001 inches.

## 4.0 ZINC PHOSPHATE COATING APPLICATION PARAMETERS

4.1 The following procedure lists the basic processing parameters. Aerocoat #2 or Custom Chemicals #50964 Heavy Zinc Phosphate may be used.

4.1.1 Step 1:

The surface of part shall be sugar blasted. The blast media should produce an anchor pattern no larger than 0.25 mil. Protect machined surfaces that have a 63 finish or better prior to blasting.

**NOTE: All ring grooves shall be masked off prior to sugar blasting.**

4.1.2 Step 2:

Visually inspect parts to verify that all dirt, grease, oxide and scale is removed. If part is not properly cleaned, return to Step 1.

4.1.3 Step 3:

4.1.3.1 Zinc Phosphate Coating Tank using Aerocoat #2.

4.1.3.1.1 Product: Aerocoat #2.

4.1.3.1.2 Concentration: 5 to 10% by volume.

4.1.3.1.3 Temperature: 160° to 180°F.

4.1.3.1.4 Soak Time: 15 to 25 minutes, depending upon size of load, temperature, and strength of bath.

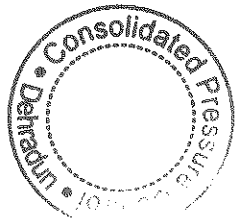
4.1.3.2 Zinc Phosphate Coating Tank using Custom Chemicals #50964 Heavy Zinc Phosphate.

4.1.3.2.1 Product: Custom Chemicals #50964 Heavy Zinc Phosphate.

4.1.3.2.2 Concentration: 3 to 5% by volume.

4.1.3.2.3 Temperature: 160° to 200°F.

4.1.3.2.4 Soak Time: 5 to 15 minutes, depending upon size of load, temperature, and strength of bath.



4.1.4 Step 4:

Cold water rinse the part(s) by spraying for 1 to 3 minutes. Be sure to rinse out any holes or cavities.

4.1.5 Step 5:

Rust preventative and lubricant shall be applied to all parts that will not be painted immediately.

4.1.5.1 Product: For long term storage (more than five (5) days), Aeroguard PR303 shall be used.
For short term storage (five (5) days or less), LPS-2 shall be used.

4.1.5.2 Concentration: Undiluted (100%).

4.1.5.3 Temperature: Ambient.

4.1.5.4 Coat surface until wetted.

## 5.0 NOTES

5.1 Application parameters as specified in Section 4.0 shall be construed as a basic guide. The manufacturer's specifications and recommended procedures shall also be followed.

5.2 The coating manufacturer shall provide procedures, instructions, and testing methods to be used with each product which constitutes the coating system.

5.3 The coating manufacturer shall provide operating limits of each product utilized in the coating system. This shall include, but is not limited to, concentrations, operating temperatures, soak time, etc.

5.4 The coating manufacturer shall recommend recording procedures or logs to be used to verify operation limits as specified in paragraph 5.3.

5.5 A zinc phosphate coating system operator's manual shall be provided by the manufacturer. The manual shall include, but is not limited to, operating procedures, testing methods, operating limits, logs, material disposal means, manufacturer's reference literature, and troubleshooting guide.

5.6 Zinc phosphate coating parameters, vendor products, etc., as specified per paragraph 4.0, shall not be changed without Engineering approval.