



PRODUCT INFORMATION

ZINC AND MANGANESE PHOSPHATES

WHAT ARE ZINC AND MANGANESE PHOSPHATES?

Zinc and manganese phosphate coatings are the treatment of iron or steel by immersion in a dilute solution of phosphoric acid and other additives. In the resulting chemical reaction, the surface of the metal is chemically converted to an integral protective layer of insoluble zinc and iron or manganese and iron phosphate crystals. Depending on the physical characteristics of the substrate and the pretreatment methods used, the translucent crystals appear black to light grey in color for zinc phosphates and black to dark grey in color for manganese phosphates.

WHY ARE ZINC AND MANGANESE PHOSPHATES USED?

For Lubrication During Cold Forming-

A phosphate-based lubricant soap system is superior to all other lubricants for severe extrusions because of the ability of the coating to flow with the metal as it is deformed, reducing metal to metal contact. This characteristic is the result of strong metal-to-phosphate bonds, which are formed during coating and the excellent extreme-pressure properties of the soap used as a supplementary treatment. Phosphate-soap coatings extend tool life, permit faster drawing speeds, allow for maintenance of closer dimensional tolerances, and produce a smooth, glossy surface on the finished part. Low iron, light zinc phosphate coatings are typically used in this application.

For Corrosion Resistance-

Alone or in combination with rust-inhibiting oils, waxes, or other organic coatings, zinc and manganese phosphates are a low-cost alternative to electroplating. Depending on the supplemental coating, it can withstand from 48-480 hours of neutral salt spray exposure per ASTM method B-117. Although heavy zinc phosphates are normally considered superior for this application, both types of phosphates extend the shelf life of aftermarket replacement parts in corrosive environments.

To Reduce Break-In Wear On Adjacent Moving Surfaces-

Nonmetallic, oil absorptive zinc and manganese phosphate coatings on bearing surfaces permit rapid break-in of moving parts without scuffing or welding by preventing metal to metal contact, as the friable coating is easily crushed when a load is applied. Additionally, the oil held by the crystals improves the lubrication of the treated surface and imparts corrosion resistance. After break-in, an even and fine distribution of oil "reservoirs" remains, assuring continued lubrication. Manganese phosphate is generally preferred for this application because of its higher wear resistance.

For Torque-Tension Requirements-

Zinc and manganese phosphated fasteners sealed with a lubricating oil guarantee repeatable torque-tension relationships in applications where automated assembly equipment cannot be continually adjusted to compensate for varying surface conditions. The excellent uniform lubrication provided by our special "TORQ-TECH", zinc, and manganese phosphate coatings eliminate stick-slip conditions and galling during assembly. Additionally, the parts are protected from oxidation during storage.

For Bonding Organic Coatings to Metals-

Reducing the electrochemical activity of the ferrous surface and forming strong physical and chemical bonds with organic coatings, zinc and manganese phosphates are widely used as a base under adhesives (in rubber to metal bonding), paints, and other organic coatings. The highly absorbent phosphate crystals allow paint to penetrate into tiny fissures and also increase the total surface area available for bonding. Acting as a dielectric film that insulates the active anode and cathode centers which exist over the surface of the base metal, phosphate coatings retard corrosion "creep", extending the life of the finished product. Light zinc phosphate coatings with small, uniform crystal sizes produce the best bond.





WHO USES ZINC AND MANGANESE PHOSPHATE COATINGS?

- Hydraulic system manufacturers
- Nuclear component fabricators
- Automotive fastener companies
- Marine equipment vendors
- Electrical connector manufacturers
- Military armament suppliers
- Cold-forming industries
- Aerospace industries
- Various stamping applications
- Heavy equipment manufacturers
- Rod-by-coil manufacturers
- Sports equipment manufacturers
- Motorcycle specialty groups
- Diesel engine manufacturers
- Gear & bearing manufacturers

HOW ARE ZINC AND MANGANESE PHOSPHATES APPLIED?

Material to be coated is cleaned by immersion in a hot alkaline solution that removes most oils and loose soil. If surface oxides are present, the parts are then stripped in an acid-cleaning step that undercuts the rust or scale, exposing the bare metal beneath. The work is then rinsed thoroughly and coated in a chemically balanced hot phosphoric acid solution via an autocatalytic reaction. The temperature, time, and chemical composition of this bath must be carefully controlled to produce consistent results. After coating is completed, excess acid is neutralized and a supplementary treatment is applied if required. Material to be zinc or manganese phosphated may either be racked or bulk-processed in barrels, depending on the specifications of the end user. Normally threaded parts, soft alloys, or parts which weigh in excess of 6 ounces are racked to avoid nicks, distortion, and coating damage which result from bulk handling practices.

ARE ALL ZINC AND MANGANESE PHOSPHATES THE SAME?

Depending on the intended purpose of the finish, the crystal size, shape, coating weight, and color can be modified to meet many industrial and military specifications. Because the hardness, composition, and surface condition of the raw material greatly influence the results of a given processing cycle, it is often necessary to use different cleaning cycles, refiners, and phosphate bath formulations to effect identical results on dissimilar substrates. We are currently using more than 70 different zinc and manganese phosphate cycles to accommodate our customers' needs. These processing programs must be selected with great care to match specification requirements with results.

HOW ARE ZINC AND MANGANESE PHOSPHATES TESTED FOR QUALITY?

The primary indicators of zinc and manganese phosphate quality are coating weight measurement and neutral salt spray resistance. Crystal size and form are important for some applications, but due to the expense of the electron microscopy necessary to make an accurate determination, this characteristic is not commonly checked on a production basis and is normally limited to first article (layout) inspection. Some specifications also include thickness requirements, but much controversy exists regarding the accuracy and methods of testing because the phosphate crystals are extremely friable and crush under even the slightest pressure. Diagnostic tests for coating integrity, torque-tension relationships and for the presence of zinc and manganese are also available. All tests performed on zinc and manganese phosphated material are destructive.

WHY ARE PARKER RUST-PROOF ZINC AND MANGANESE PHOSPHATES BETTER?

Phosphate coatings have been our primary business since 1918 and our dedication to customer service, quality and process development has given us competitive superiority not commonly found in our industry.

Parker Rust-Proof specializes in customer satisfaction. From assisting customers in writing process specifications, to creating customized cycles, to installing new tanks for specialty coating solutions, we offer a full range of support services including A2LA accredited laboratory facilities and certification options. Our customers know in advance that the coating on their pre-production samples will be approved because it has already been tested at Parker.

Parker Rust-Proof maintains a computer-driven inventory system that ensures lot integrity, fast turn around, and consistent reproducibility for both large and small orders. Our control procedures are so complete that we are authorized by many of our clients to ship directly to the end user. We statistically control all our processes by employing the highest level of technology available, and support this technology with a rigorous and thorough schedule of testing in our A2LA certified laboratory. Some of our processes operate consistently at a CpK of 5.0.

Parker Rust-Proof is highly committed to a continually increasing standard of excellence in all regards. Whatever your specific phosphating needs may be, you can be confident that the people at Parker Rust-Proof will finish your work with the best possible coatings.

