Process Bulletin

CURTISS-WRIGHT
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3002-A Inorganic Water Based Solid Film Lubricants

Recommended Application Procedure

Before beginning application, it is important to understand that solid film lubricants and other engineered coatings should be viewed as a system, taking into account the base material, surface pretreatment, method of application, and correct cure cycle. Eighty percent of all solid film lubricant failures are due to incorrect surface pretreatment and application. The rest are generally because the wrong coating was chosen.

1.0 PURPOSE

The purpose of this specification is to define the preparation and application of inorganic bonded solid film lubricants to various parts used in the temperature range of -365°F to +1200°F (-220° to 650°C). Design requirements should indicate if the parts can be coated all over or if certain areas need be masked or machined to compensate. If there is any conflict of information between this process bulletin and your required drawing or specification, then your drawing or specification takes precedence. However, failure to comply with the procedures listed in this process bulletin may lead to adhesion failure and/or a loss in coating performance

2.0 PRETREATMENT OF PARTS

Prior to the application of an inorganic bonded solid film lubricant, it is extremely important that the base substrate be properly prepared. Improper pretreatment may result in adhesion loss and reduced wear life.

2.1 The first step to proper pretreatment is degreasing to remove any oil, dirt, or other foreign matter from the part. It should be noted that chlorinated solvents should be avoided when cleaning titanium alloys.

2.1.1 Vapor degreasing using trichloroethylene is recommended, however other solvents such as methyl ethyl ketone or acetone may be substituted.

2.2 After degreasing, parts shall be subjected to grit blasting to remove scale, rust and other foreign matter.

2.2.1 220 mesh aluminum oxide at 30 psi (2.5 kg/cm$^{2)}$ pressure (using a siphon feed blast cabinet) should be used for grit blasting to achieve a 20 to 35 micro inches (Ra) (.5 to .9 microns (Ra)) unless otherwise specified. Blasting should be performed in such a manner as to achieve the desired finish with minimal dimensional change. Pressure feed blast systems usually require a much lower blast pressure to achieve the recommended surface finish.

2.2.2 Parts should once again be thoroughly cleaned to remove all residual blast media. This is accomplished by first blowing the parts with compressed air, then vapor degreasing as per section 2.1.

2.3 Additional Substrate Preparation

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2.3.1 After grit blasting and degreasing, stainless steel parts should be passivated per MIL-DTL-5002 or QQ-P-35B.

2.3.2 Steel parts may be coated after grit blasting and degreasing. If required, steel parts may be phosphated, however, phosphating is not recommended for parts which will be subjected to operating conditions above +800°F (427°C).

2.3.3 Titanium, Nickel, and Cobalt parts should be coated after grit blasting and degreasing.

2.3.4 Aluminum parts should be pretreated according to existing standards, anodize per MIL-A-8625 or chemical conversion coat MIL-C-5541. Grit blasting is not required prior to hard anodizing, but shall be performed prior to the application of all other anodize and conversion coating processes.

2.3.5 Nickel and Chrome plate may be coated after a light grit blast and degreasing.

3.0 PREPARATION AND APPLICATION OF INORGANIC BONDED SOLID FILM LUBRICANT

3.1 Preparation

3.1.1 To assure a homogeneous coating, inorganic bonded solid film lubricants must be thoroughly mixed. The recommended method is to use a low-shear mixing blade, such as a "Jiffy" type blade, with the use of an air mixer or equivalent. The coating should be mixed for a minimum of 10 minutes at low to moderate speed so a vortex is not created. Occasionally scrape the bottom of the container to ensure all the solids have been uniformly dispersed. Do not shake on a paint shaker as excessive foam may be introduced. There should not be a layer of foam on the surface of the coating when properly mixed.

3.1.2 Inorganic water-based bonded solid film lubricants should be sprayed "as received". If it is determined that additional thinning is required, this can be accomplished by additions of small amounts of deionized water.

3.2 Application

3.2.1 Coating should take place as soon as possible after the pretreatment. Should time exceed eight hours before coating, the parts should once again be degreased before coating application.

NOTE: To assure a clean surface before application, personnel should be extremely careful in handling pretreated parts. White cotton gloves are recommended when handling pretreated parts.

3.2.2 Coating can be accomplished by spray, brush or dip. Best results are achieved by applying the inorganic bonded solid film lubricant by spray. Spraying can be accomplished with the use of any conventional, air-atomized spray gun; however, Everlube Products recommends that the fluid nozzle have an orifice size of 0.04” to 0.07” (1.0mm to 1.8mm)

3.2.3. For spraying, an atomization pressure of 30 to 50 psi (2 to 3.5 kg/cm^2) is recommended. Inorganic bonded solid film lubricants should be applied in light even passes gradually building to the desired thickness. Pre-heating the parts at 150°F to 175°F (65°C to 79°C) greatly enhances the coating process.

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3.2.4 Control of the coating thickness is extremely important as the thickness is directly related to the wear life of the coated surface. A coating thickness of 0.0003" to 0.0005" (7.6 to 12.7 microns) is recommended; however, the actual coating thickness and degree of precision to be maintained should be specified on the applicable drawing.

4.0 CURING

4.1 Curing is accomplished after the vehicle has evaporated from the coating. The recommended cure cycle is 2 hours at 175°F (79°C) followed by 2 hours at 400°F (204°C). A slight reduction in temperature may be used for aluminum alloys. An air circulating oven capable of maintaining +/- 25°F (14°C) at cure temperature is recommended.

5.0 QUALITY

5.1 Finished surfaces should exhibit a smooth appearance, free of blisters, chips, peeling, runs and sags.

5.2 Parts should be inspected by visual means, and checked for thickness by use of a micrometer or electronic thickness tester.

5.3 An applicable job traveler should accompany each lot of parts signed by all authorized personnel.

6.0 Equipment List

Proper equipment is needed to ensure quality parts are processed with Perma-Slik R type coatings. Following is a list of recommended equipment for processing parts.

6.1.1 Spray Booth of appropriate size to handle required production. The booth should have a face velocity of 100 ft./min. to comply with OSHA requirements.

6.1.2 Spray Gun - Anest Iwata W-71 with a 0.040” to 0.070" nozzle set-up or equivalent. We recommend that the fluid nozzle and needle be made of stainless steel.

6.1.3 Air Mixer with “jiffy” style mixing blade or equivalent.

6.1.4 Vapor Degreaser (recommended) or suitable alternative degreasing station.

6.1.5 Grit Blast Cabinet with 200-300 mesh aluminum oxide.

6.1.6 Micrometer or Electronic Thickness Tester (recommended method).

6.1.7 TT-C-49 Microcrystalline Zinc Phosphate Line for less than 500°F applications on steel.

6.1.8 MIL-S-5002 or QQ-P-35B Passivation Tank for applications on stainless steel

6.1.9 Vented, air-circulating oven capable of maintaining ± 25°F (14°C) at cure temperature.