



ENGINEERING MATERIAL SPECIFICATION

FASTENER FINISH, ZINC PHOSPHATE AND OIL

WSS-M3P39-A1

1. SCOPE

The material defined by this specification is a microcrystalline zinc phosphate coating and lubricating oil over steel substrates intended to provide improved torque-tension performance and to prevent rust formation during shipment and short-term storage.

2. APPLICATION

This finish is intended for internal powertrain fasteners which require excellent torque-tension performance and resistance to galling during assembly. The finish is not suitable for use on fasteners exposed to the environment whether underhood, underbody, or inside the passenger compartment.

2.1. SERVICE APPLICATION

2.1.1 The following critical temperatures should be recognized when using these products.

- Torque tension performance degrades above 80 °C.
- Fastener removal may be difficult when joint temperature has exceeded 600°C

2.1.2 Fasteners coated to this specification are not suitable for electrical grounding applications.

3. REQUIREMENTS

3.1 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

3.1 The Approved Source List for this specification will list only the approved lubricating oils (including thread-rolling lubricants) and not the phosphate coatings. Any phosphate coating meeting the requirements below may be used on parts coated to this specification, but the chosen lubricant must appear on the Approved Source List. See approval requirements in Section 4.2.

3.2 COATING APPEARANCE

3.2.1 The finished coating will be light to dark gray.

3.2.2 The phosphate coating shall cover the metal surfaces evenly and shall not exhibit any white patches, corrosion products or bare spots.

3.2.3 The oil must not excessively pool in the bottom of packaging.

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3.3 COATING APPLICATION

- 3.3.1 Applicators shall follow material supplier procedures and recommendations for chemical usage, equipment, analysis, and processing. Applicators must have documentation to show that procedures and recommendations are being followed.
- 3.3.2 Prior to coating, the substrate shall be free of oil, dirt, oxide scale, and similar foreign materials.
- 3.3.3 When parts require cleaning prior to phosphate coating, the use of strong acids or alkalis for cleaning should be minimized and have no detrimental effect on the substrate. Approved cleaning methods are listed in the tables below.

Blanks Prior to Thread Rolling

Specified Hardness (Surface and/or Core)	Mechanical Cleaning	Alkaline Bath Cleaning	Inhibited Acid Bath Cleaning
< 390 HV (39 HRC)	Preferred	Acceptable	Acceptable
≥ 390 HV (39 HRC)	Preferred	Acceptable	Not Allowed

Threaded Parts

Specified Hardness (Surface and/or Core)	Mechanical Cleaning	Alkaline Bath Cleaning	Inhibited Acid Bath Cleaning
< 390 HV (39 HRC)	Acceptable	Preferred	Acceptable
≥ 390 HV (39 HRC)	Acceptable	Preferred	Not Allowed

- 3.3.4 The applicator shall follow the phosphate supplier's recommendations for maximum drying temperature.

3.4 EMBRITTLEMENT AVOIDANCE

Parts coated to this specification shall meet the requirements of WSS-M99A3-A to avoid the detrimental effects of hydrogen embrittlement or other factors which result in part brittleness. WSS-M99A3-A requires phosphated parts to be baked at a minimum of 110 °C for 1 hour within four hours of coating, or the parts shall not be used for 48 hours after coating.

3.5 COATING PROPERTIES

3.5.1 Zinc Phosphate Coating

- 3.5.1.1 Coating Weight
(ISO 3892, except repeat the strip/rinse/weigh process until weight stabilizes) 2-7 g/m²
- 3.5.1.2 Coating Thickness
(ISO 3497)
- Fastener under-head and shank regions 2- 6 μm