



Designation: F 1137 – 00

# Standard Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners<sup>1</sup>

This standard is issued under the fixed designation F 1137; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers the basic requirements for seven grades of corrosion protection for fasteners. Grade 0A consists of a zinc phosphate coating with no additional sealer (dry), Grade 0B consists of a zinc phosphate coating with a dry organic sealer, Grade 0C, Grade 0D, and Grade I consist of a zinc phosphate coating with supplemental protective oil type compound, and Grades II and III consist of a zinc phosphate with a supplemental zinc-rich epoxy resin coating (Grade II includes a clear organic topcoat).

1.2 This specification is intended primarily for fasteners such as nuts, clips, washers, and other ferrous threaded and non-threaded fasteners that require corrosion protection.

1.3 These coatings may or may not have a decorative finish.

## 2. Referenced Documents

### 2.1 ASTM Standards:

- B 117 Practice for Operating Salt Spray (Fog) Apparatus<sup>2</sup>
- D 2247 Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity<sup>3</sup>
- D 3359 Test Methods for Measuring Adhesion by Tape Test<sup>3</sup>
- F 1470 Guide for Fastener Sampling for Specified Mechanical Properties and Performance Inspection<sup>4</sup>

## 3. Classification

3.1 The zinc phosphate treatment and subsequent protective coatings are classified into seven grades according to the requirements shown in Table 1. Phosphate bath concentrations, temperatures and immersion times recommended by the chemical manufacture should be followed.

## 4. Ordering Information

4.1 Orders for material under this specification shall include the following information:

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F16 on Fasteners and is the direct responsibility of Subcommittee F16.03 on Metal Coatings on Threaded Fasteners.

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<sup>2</sup> Annual Book of ASTM Standards, Vol 03.02.

<sup>3</sup> Annual Book of ASTM Standards, Vol 06.01.

<sup>4</sup> Annual Book of ASTM Standards, Vol 01.08.

TABLE 1 Classification and Performance Requirements of Protective Coatings

Grade No.	Zinc Phosphate, g/m <sup>2</sup>	Supplemental Coating	Coating Thickness, $\mu$ m	Salt Spray, h
Grade 0A	11, min	none	see 5.5	72 <sup>A</sup>
Grade 0B	11, min	sealer	see 5.5	72
Grade 0C	11, min	protective oil-type compound	see 5.5	24
Grade 0D	11, min	protective oil-type compound	see 5.5	72
Grade I	26–32	protective oil-type compound	see 5.5	168
Grade II	13–16	zinc-rich <sup>B</sup> resin flake	15–25	240
Grade III	13–16	zinc-rich resin powder <sup>C</sup>	10–20	400

<sup>A</sup> When testing Grade 0A finished parts, a protective oil coating shall be added before salt spray testing.

<sup>B</sup> Zinc-rich resin to contain 60 % minimum metallic zinc flake by volume with 14 to 16 % aluminum.

<sup>C</sup> Zinc-rich resin to contain 80 % minimum metallic zinc powder by volume with trace aluminum.

4.1.1 Quantity of parts,

4.1.2 Grade required (see Table 1), and

4.1.3 Any additions agreed upon between the purchaser and the supplier.

## 5. Requirements

5.1 *Appearance*—Unless otherwise agreed upon between the purchaser and the producer, the color of the protective coating shall be as-coated gray for Grades 0A, 0B, 0C, and 0D, black for Grade I, and metallic gray for Grades II and III. In addition, Grades II and III shall be free from tears, sags, and excess coating that may affect appearance or performance, or both.

5.2 *Adhesion*—The coating for Grades II and III shall show no evidence of blistering nor other appearance changes after exposure to humidity testing for 96-h minimum. It shall show no more than 3.0-mm peel-back from intersection of lines scribed and tape tested immediately after a 10-min recovery period following exposure, and no other peeling in area under the tape.

5.3 *Corrosion Resistance*—These coatings shall be capable of withstanding neutral salt spray for the minimum h specified in Table 1 with no base metal corrosion on significant surfaces. Significant surfaces on threaded fasteners are defined as the