



## Designation: **F1428 – 92 (Reapproved 2011) F1428 – 92 (Reapproved 2017)**

# Standard Specification for Aluminum Particle-Filled Basecoat/Organic or Inorganic Topcoat, Corrosion Protective Coatings for Fasteners<sup>1</sup>

This standard is issued under the fixed designation F1428; 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 a corrosion-resistant coating consisting of an inorganic aluminum particle-filled basecoat and an organic or inorganic topcoat, depending on the specific requirements.

1.2 The coating may be specified with basecoat only, or with the top coated with compatible organic polymer or inorganic topcoats, depending on the specific requirements.

1.3 The basecoat is a water-dilutable slurry containing aluminum particles dispersed in a liquid binder of chromate/phosphate compounds.

1.4 The organic topcoats consist of polymer resins and dispersed pigments and are for service where temperatures do not exceed 230°C (450°F).

1.5 The inorganic topcoats consist of ceramic oxide pigments dispersed in a liquid binder of chromate/phosphate compounds and are for service where temperatures do not exceed 645°C (1200°F).

1.6 These coatings are applied by conventional dip/spin, dip/drain, or spray methods.

1.7 The coating process does not normally induce hydrogen embrittlement, provided that the parts to be coated have not been subjected to an acid cleaner or pretreatment (see [Note 1](#)).

**NOTE 1**—Although this coating material contains water, it has a relatively low susceptibility to inducing hydrogen embrittlement in steel parts of tensile strengths equal to or greater than 1000 MPa (approximately RC31). Normal precautions for preparing, descaling, and cleaning steels of these tensile strengths must be observed. An initial stress relief treatment should be considered prior to any chemical treatment or cleaning operation. Acids or other treatments that evolve hydrogen should be avoided. Mechanical cleaning methods may be considered. Some steels are more susceptible to hydrogen embrittlement than others and may also require hydrogen embrittlement relief baking after cleaning but before coating. Since no process can completely guarantee freedom from embrittlement, careful consideration must be given to the entire coating process and the specific steel alloy employed.

1.8 The coating systems defined by this specification can be applied to ferrous alloy steels, aluminum, and ferritic and austenitic stainless steels.

1.9 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.10 The following safety hazards caveat pertains only to the test methods portion, Section 6, of this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.11 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

[B117 Practice for Operating Salt Spray \(Fog\) Apparatus](#)

[B487 Test Method for Measurement of Metal and Oxide Coating Thickness by Microscopical Examination of Cross Section](#)

<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 Coatings on Fasteners. Current edition approved Nov. 1, 2011/Dec. 1, 2017. Published May 2012/December 2017. Originally approved in 1992. Last previous edition approved in 2005/2011 as F1428 – 92 (2005)–(2011). DOI: 10.1520/F1428-92R05.10.1520/F1428-92R17.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- B568 Test Method for Measurement of Coating Thickness by X-Ray Spectrometry
- D1186 Test Methods for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base (Withdrawn 2006)<sup>3</sup>
- D2247 Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity
- D3359 Test Methods for Rating Adhesion by Tape Test
- E122 Practice for Calculating Sample Size to Estimate, With Specified Precision, the Average for a Characteristic of a Lot or Process
- E376 Practice for Measuring Coating Thickness by Magnetic-Field or Eddy Current (Electromagnetic) Testing Methods

### 3. Classification

3.1 The inorganic aluminum particle-filled basecoat and the subsequent topcoats are classified into three groups, with subsequent subgroups formed according to the requirements given in **Table 1**. The coating bath requirements and cure temperatures recommended by the chemical manufacturer should be followed.

3.2 Regardless of the processes or materials used, the inorganic and organic coatings shall conform to all of the applicable requirements of this specification.

### 4. Ordering Information

- 4.1 Orders for material in accordance with this specification shall include the following information:
  - 4.1.1 Quantity of parts,
  - 4.1.2 Grade of coating (see **Table 1**),
  - 4.1.3 Color of coating,
  - 4.1.4 Any additions to specifications as agreed upon by the purchaser and the supplier, and
  - 4.1.5 Certification and test report requirements.

### 5. Requirements

5.1 *Appearance*—The coatings shall have a smooth, uniform appearance and shall be free of lacerations and other discontinuities that may affect the appearance or performance of the coatings. All topcoat colors shall be agreed upon by both the purchaser and the supplier.

**TABLE 1 Classification of Coatings**

NOTE 1—Grades 4A, 4B, and 2C require basecoat burnishing.

NOTE 2—The torque tension relationship of coated fasteners may be different from those of uncoated fasteners. A wax lubricant may be specified to improve the torque-tension characteristics of coated fasteners.

NOTE 3—When spray application methods are employed, the thickness requirements of the two individual coats may be achieved in one single spray application.

| Grade No.       | Coats of Basecoat | Coats of Topcoats | Average Thickness, $\mu\text{m}$ | Salt Spray Life Hours |
|-----------------|-------------------|-------------------|----------------------------------|-----------------------|
| 1A <sup>A</sup> | 1                 | 1                 | 10–15                            | 168                   |
| 2A              | 2                 | 1                 | 15–25                            | 240                   |
| 3A              | 2                 | 2                 | 20–30                            | 720                   |
| 4A              | 2                 | 2                 | 20–30                            | 1000                  |
| 1B <sup>B</sup> | 1                 | 1                 | 10–15                            | 168                   |
| 2B              | 2                 | 1                 | 15–25                            | 240                   |
| 3B              | 2                 | 2                 | 20–30                            | 500                   |
| 4B              | 2                 | 2                 | 20–30                            | 1000                  |
| 1C <sup>C</sup> | 2                 | 0                 | 10–20                            | 168                   |
| 2C              | 2                 | 0                 | 10–20                            | 400                   |

<sup>A</sup> Grades with Suffix A are organic topcoated for a maximum service temperature of 230°C (450°F).

<sup>B</sup> Grades with Suffix B are inorganic topcoated for a maximum service temperature of 645°C (1200°F).

<sup>C</sup> Grades with Suffix C are basecoated only for a maximum service temperature of 645°C (1200°F).

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).