

AEROSPACE MATERIAL SPECIFICATION



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(R)

Conversion Coating of Titanium Alloys Fluoride-Phosphate Type

1. SCOPE:

1.1 Purpose:

This specification establishes the engineering requirements for producing chemical conversion coatings on titanium alloys and the properties of the coating.

1.2 Application:

This process has been used typically to provide a coating which is receptive to anti-galling and organic finishes, but usage is not limited to such applications.

1.3 Safety - Hazardous Materials:

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS:

None.

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3. TECHNICAL REQUIREMENTS:

3.1 Conversion Bath:

Shall consist of an aqueous solution of the following materials in the concentrations shown:

Trisodium Phosphate ($\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$) Technical 6.5 to 6.9 ounce per gallon (49 to 51.5 g/L)

Potassium Fluoride ($\text{KF} \cdot 2\text{H}_2\text{O}$), 2.3 to 3.2 ounces per gallon (17.5 to 24 g/L)

Hydrofluoric Acid (48 to 50% by weight HF) Technical 1.8 to 3.0 fluid ounces per gallon (14 to 24 mL/L)

3.2 Preparation:

3.2.1 Masking: Remove or mask dissimilar metal inserts and mask areas not to be coated.

3.2.2 Cleaning: Clean parts to remove oil, grease, dirt, mill markings, heat treatment scale, and other soils prior to immersion in the chemical conversion bath. The use of halogenated solvents is prohibited.

3.3 Procedure:

3.3.1 Coating: Parts shall be immersed in the conversion bath, maintained at $80\text{ }^\circ\text{F} \pm 10$ ($27\text{ }^\circ\text{C} \pm 6$), for 2 to 4 minutes.

3.3.2 Rinsing: Rinse coated parts in a circulating water bath, maintained at a temperature not higher than $185\text{ }^\circ\text{F}$ ($85\text{ }^\circ\text{C}$). Rinse time shall be not longer than 16 minutes when rinse water temperature is above $100\text{ }^\circ\text{F}$ ($38\text{ }^\circ\text{C}$).

3.3.2.1 Dissolved solids content of circulating rinse water shall be maintained below 200 parts per million.

3.3.3 Drying: Dry parts for not less than 30 minutes in air at 150 to $200\text{ }^\circ\text{F}$ (66 to $93\text{ }^\circ\text{C}$).

3.3.4 Handling: Dried parts shall be handled with clean, dry gloves.

3.4 Properties:

Coating shall conform to the following requirements:

3.4.1 Color: The coating shall be gray in color, but some variation in color intensity is acceptable.

3.4.2 Adhesion: Coating shall be adherent to basis metal when parts are wiped with a clean, cotton cloth. Heavy powdering or coating removal during wiping is not acceptable.

3.4.3 Water Spotting: Random staining, due to water spotting, which does not exceed 5% of the coated area is acceptable.

3.5 Quality:

Coating shall be uniform in quality and coverage, free from pits, and from imperfections detrimental to usage of the coating.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The processor of coated parts shall supply all samples for processor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that processing conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance and Preproduction Tests: All technical requirements of this specification are acceptance tests and preproduction tests and shall be performed prior to or on the initial shipment of processed parts to a purchaser, on each lot of processed parts, when a change in material, or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.2 Periodic Tests: Tests of cleaning and processing solutions to insure the coating will conform to this specification (see 8.5) are periodic tests and shall be performed at a frequency selected by the processor, unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing:

Shall be not less than the following; a lot shall be all parts made of the same part number, processed in a continuous operation, or within one 24-hour period, and presented for vendor's inspection at one time:

4.3.1 For Acceptance Tests: As shown in Table 1.

TABLE 1 - Sampling for Acceptance Tests

Number of Parts in Lot		Visual for Water Spotting, Color, and Quality	Adhesion
1 to	7	all	All
8 to	15	7	3
16 to	40	10	4
41 to	150	15	5
151 to	300	25	6
301 to	500	35	7
Over	500	50	8

4.3.2 For Periodic and Preproduction Tests: Sample quantity shall be at the discretion of the processor, unless otherwise specified by the purchaser.

4.4 Approval:

4.4.1 The process and control factors, a preproduction sample coated part, or both, whichever is specified, shall be approved by the cognizant engineering organization before production parts are supplied.

4.4.2 The processor shall make no significant change to materials, processes, or controls from those on which the approval was based, unless the change is approved by the cognizant engineering organization. A significant change is one which, in the judgment of the cognizant engineering organization, could affect the properties or performance of the part.

4.4.3 Control factors shall include, but not be limited to, the following:

- Control factors
- Method of cleaning
- Coating time
- Rinse temperature and time
- Control of dissolved solids in rinse bath
- Periodic test plan.