

MIL-STD-753B

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SUPERSEDING

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MILITARY STANDARD

CORROSION-RESISTANT STEEL PARTS:

SAMPLING, INSPECTION AND TESTING

FOR SURFACE PASSIVATION



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MIL-STD-753B

DEPARTMENT OF DEFENSE
Washington, DC 20301

Corrosion Resistant Steel Parts: Sampling, Inspection and Testing for
Surface Passivation

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1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.
2. Recommended corrections, additions, or deletions should be addressed to the Commander, Naval Air Engineering Center, SESD (Systems Engineering and Standardization Department) (Code 93), Lakehurst, NJ 08733.

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SECTION 1

INTRODUCTION

1. SCOPE

1.1 This standard describes general and detailed Methods of sampling, inspecting, and testing for surface passivity of corrosion resistant steel parts; these tests may also determine a need for the passivation of surfaces of corrosion-resistant steel parts.

invitation for bids or request for proposal shall apply.

ASTM D 1748-Rust Protection by Metal Preservatives in the Humidity Cabinet

2. REFERENCED DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this standard to the extent specified herein.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race St. Philadelphia, PA 19103).

SPECIFICATIONS

FEDERAL

O-A-51 -Acetone, Technical.

STANDARDS

MILITARY

MIL-STD-105-Sampling Procedures and Tables for Inspection by Attributes

2.2 Other publications. The following document forms a part of this standard to the extent specified herein. Unless otherwise indicated, the issue in effect on date of

3. DEFINITIONS

3.1 Passivation. Passivation is the treatment of the surface of corrosion-resistant steels with certain agents which will remove surface contaminants and produce a surface condition which is resistant to corrosive action.

3.2 Corrosion Resistant Steel. The term "Corrosion Resistant Steel" as used herein refers to those alloyed steels containing chromium in excess of 10.5%.

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4. GENERAL REQUIREMENTS

SAMPLING AND INSPECTION

1. SCOPE

1.1 This section specifies the procedures for sampling and testing corrosion-resistant steel parts.

2. SAMPLING

2.1 *Sampling for tests.* Unless otherwise specified, sampling for tests shall be in accordance with Standard MIL-STD-105, Inspection Level L-7, Acceptable Quality Level (AQL) 1.0 percent defective.

3. INSPECTION

3.1 Surface condition. Parts shall be uni-

form in appearance, shall show no evidence of the presence of embedded particles of foreign materials, and shall be free of other defects which might affect their corrosion resistance. Unless a particular tests is specified, samples of parts submitted for acceptance shall meet the requirements of one of the test methods of this standard.

3.2 Any lots failing to comply with the requirements specified, shall be rejected. The lot may be resubmitted for inspection provided that the contractor has removed defective material or reworked the lot. Resubmitted lots shall be submitted to tightened inspection in accordance with MIL-STD-105.

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5. DETAILED REQUIREMENTS

Method 100

WATER IMMERSION TEST

1. SCOPE

1.1 This method is used for the detection of any anodic surface contaminant of corrosion resistant steel, including iron.

2. SPECIMEN

2.1 The specimen shall consist of samples of parts that are submitted or selected for acceptance inspection.

3. APPARATUS AND MATERIALS

3.1 A non-rusting tank.

3.2 Acetone conforming to Specification O-A-51.

3.3 Distilled water.

4. PROCEDURE

4.1 Parts shall be cleaned with acetone as follows: Immerse the specimens in the acetone, swab with clean gauze saturated with acetone, and dry in inert atmosphere or desiccated container prior to exposure specified in 4.2.

4.2 Parts shall be alternately immersed in distilled water for one hour and allowed to dry for one hour during a twenty-four hour period.

4.3 After completion of test, parts shall show no evidence of rust stains or other corrosion products.

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Method 101

HIGH HUMIDITY TEST

1. SCOPE

1.1 This method is used for the detection of any anodic surface contaminant of corrosion resistant steel, including iron.

2. SPECIMEN

2.1 The specimen shall consist of samples that have been submitted or selected for acceptance inspection.

3. APPARATUS AND MATERIAL.

3.1 A humidity cabinet designed and operated in accordance to ASTM D 1748.

3.2 Acetone conforming to O-A-51.

4. PROCEDURE.

4.1 Parts shall be cleaned with acetone as follows: Immerse the specimens in the acetone, swab with clean gauze saturated with acetone, and dry in inert atmosphere or desiccated container prior to exposure specified in 4.2.

4.2 Parts shall be subjected to a 100 percent humidity at 100°F in a humidity cabinet for 24 hours.

4.3 After completion of test, parts shall show no evidence of rust stains or corrosion products.

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Method 102

COPPER SULFATE TEST

1. SCOPE.

1.1 This method is recommended for the detection of metallic iron on the surface of austenitic chromium-nickel steels of the AISI Type 200 and 300 series. It is not recommended for the straight-chromium ferritic types of the AISI 400 series since the test will show a positive reaction on these materials. This test may work with some of the martensitic AISI 400 series in the heat treated condition. This test is hypersensitive and should be used and interpreted only by personnel familiar with its limitations.

WARNING

DO NOT USE THIS TEST ON
PARTS TO BE USED IN FOOD
PROCESSING.

2. SPECIMEN.

2.1 The specimen shall consist of samples that have been submitted or selected for acceptance inspection.

3. APPARATUS.

- 3.1 10 ml Graduate.
- 500 ml Graduate.
- 1000 ml Beaker.
- Swab.
- Cotton.
- Balance.,

4. MATERIAL.

- 4.1 Copper Sulfate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$).
- Distilled Water.
- Sulfuric Acid (sp gr 1.84).
- Acetone Conforming to O-A-51

5. PROCEDURE.

5.1 Parts shall be cleaned with acetone as follows:

Immerse the specimens in the acetone, swab with clean gauze saturated with acetone, and dry in inert atmosphere or desiccated container.

5.2 Prepare the test solution as follows:

Dissolve 8g. of copper sulfate in 500ml of distilled water to which 2 to 3 ml of sulfuric acid has been added.

5.3 Swab the surface to be inspected with test solution, applying additional solution if needed, to keep the surface wet for a period of 6 minutes.

5.4 At the end of this 6-minute period, wipe the surface dry and examine for areas of deposited copper. A copper deposit will indicate the presence of metallic iron.

5.5 Rinse with distilled water and wipe the surface thoroughly dry.

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Method 103

POTASSIUM FERRICYANIDE-NITRIC ACID SOLUTION TEST

1. SCOPE

1.1 This method is recommended for the detection of metallic iron on the surface of austenitic chromium-nickel steels of the AISI Type 200 and 300 series. It is not recommended for straight chromium ferritic or martensitic types of the AISI 400 series since the test will show a positive reaction on these materials. This test is hypersensitive and should be used and interpreted only by personnel familiar with its limitations.

WARNING

DO NOT USE THIS TEST ON
PARTS TO BE USED FOR FOOD
PROCESSING.

2. SPECIMEN

2.1 The specimen shall consist of samples that have been submitted or selected for acceptance inspection.

3. APPARATUS

- 3.1 50 ml Graduate.
- 500 ml Graduate.
- 1000 ml. Beaker.
- Swab.
- Stirring rod, flat ended.
- Balance.

4. MATERIAL.

- 4.1 Potassium ferricyanide C.P.
- Distilled water.
- Nitric acid (70 percent) C.P.
- Acetic acid (10 percent)
- Oxalic acid (8 percent)

5. PROCEDURE.

- 5.1 Prepare the test solution as follows:

Transfer 10g of chemically pure potassium ferricyanide to a 1000 ml beaker containing 500 ml distilled water, add 30 ml of (70 percent) nitric acid and agitate until all of the ferricyanide is in solution. Dilute to 1000 ml with distilled water.

NOTE: The test solution should be mixed fresh the day tests are made since it changes color on standing.

- 5.2 Swab the surface to be inspected with test solution. The formation of a dark blue color within 30 seconds denotes the presence of metallic iron.

WARNING

WHEN THE TEST IS NEGATIVE, THE SURFACE SHALL BE THOROUGHLY WASHED WITH WARM WATER TO REMOVE THE LAST TRACES OF TEST REAGENT. WHEN THE TEST IS POSITIVE, THE DARK BLUE STAIN SHALL BE REMOVED WITH A 10 PERCENT ACETIC ACID, 8 PERCENT OXALIC ACID SOLUTION, FOLLOWED BY A THOROUGH HOT WATER RINSE.

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