Sara Sae

Engineering Standards/Specifications

Procedure No.
SES 26-714

Title

SURFACE TREATMENT SPECIFICATION, PASSIVATING STAINLESS STEEL

V.P. of Manufacturing	V.P. of Engineering	V.P. of QA/QC	V.P. of Sales/ Marketing	Revision Description	Release Date	Rev. Ltr

Written By	Revised By	

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1.0 Scope:

1.1 This specification describes a process for removing foreign metals from the surface of 200, 300 and 400 series stainless steels and promoting the natural tendency for the surface to oxidize.

2.0 Purpose:

2.1 The passivation treatment described in this specification is intended to improve corrosion resistance of stainless steels.

2.2 Stainless steels, when processed, may have iron particles imbedded or in contact with the surfaces. If these particles are not removed they will begin to corrode and cause damage to the corrosion resistant base material.

3.0 Applicable Requirements and Specifications:

3.1 Federal Specification QQ-P-35B.

4.0 Treatment Procedure:

4.1 Alkaline Cleaning

4.1.1 Prior to passivating, preclean part in an alkaline bath to remove soils that do not react readily with the passivating solution, i.e. grease, oil, soaps, lubricants, etc. Composition of the cleaner shall contain builder's (phosphates, silicates, carbonates and borates), additives (chelates) and surfactants.

4.1.1.1 A recommended composition of the alkaline cleaner contains 20% sodium hydroxide, 30% organic chelating agents, 45% complex phosphates, and 5% surface activating agents. Alternatively, the alkaline cleaning formula from ASM may be used. The alkaline bath will contain 4 ounces of the alkaline cleaner per gallon of water (30g/L).

4.2 Passivation Treatment

4.2.1 The stainless steel parts shall be passivated by immersion in one of the following solutions at the temperature and time period specified.

4.2.1.1 Solution A: For Series 200 and 300 and chromium grades containing 17% Cr or more: 70% (1.42 sp. gr.) nitric acid, HNO_3 at a concentration of 6 to 15% by volume in clean, fresh

water. Immersion time should be 10 to 30 minutes at a temperature of 70-90°F.

4.2.1.2 Solution B: For free-machining grades, polished surfaces, and series 400 containing less than 17% Cr: 70% (1.42 sp. gr.) nitric acid, HNO_3 at a concentration of 18 to 25% by volume with 2% by weight of sodium dichromate ($Na_2Cr_2O_7 \cdot 2H_2O$), the remainder clean fresh water. Immersion time should be approximately 12 minutes at a temperature of 90-100°F and 8 minutes at a temperature of 100-120°F.

4.2.1.3 Solution C: For series 300 stainless steels, citric acid, $C_6H_6O_7$, at a concentration of 4 to 10% by weight, the remainder clean fresh water. Immersion time should be approximately 20 min at a temperature of 70 -120°F

4.3 Water Rinse

4.3.1 Immediately after removal from the passivating solution the parts shall be thoroughly rinsed, either by-immersion or continuous flooding, with clean, fresh water (not salt water) at a temperature of 70°F to 200°F.

4.4 No other coating is required or desirable.

5.0 Workmanship:

5.1 After passivation the parts shall exhibit a clean surface and shall show no frosting, etching, or pitting.

5.2 Parts shall be free of iron contamination and other foreign materials that could adversely effect corrosion resistance of the stainless steel.

5.3 Parts should be able to pass a copper sulfate test in accordance with Method 2 of MIL-STD-753 or Practice D of ASTM A967. This test is not to be performed unless parts are rejected by Quality Assurance for non-conformance with 5.1 and 5.2 of this specification.

6.0 Exceptions:

6.1 At Engineerings discretion the immersion requirement of 4.2 may be replaced with "swabbing of solution". This exception must be received in writing to be in effect.

6.2 No other deviations are allowed unless specifically agreed to in writing by Engineering prior to treatment.

7.0 References:

7.1 ASM Handbook "Alkaline Cleaning" and "Surface Engineering of Irons and Steels; Passivation".

7.2 ASTM A380 and A967. ASTM Appendix XI.