

Chapter 3-1-2CHEMICAL METHODS OF CORROSION REMOVAL

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ALUMINIUM BASED ALLOYSIntroduction

1 The chemical treatment for corroded aluminium alloys comprises the removal of corrosion products by phosphoric acid, pretreatment of the surface by Alocrom 1200 and reapplication of the protective materials. The procedure is given in para 4.

Tools and equipment

2 The tools and equipment required are as follows:

- 2.1 Tools and equipment as listed in Chapter 3-1-1, para 2.
- 2.2 Paint remover, Def Stan 18-16 or Def Spec 1443.
- 2.3 Deoxidine 624 (liquid).

- 2.4 Deoxidine 202 (paste).
- 2.5 Alocrom 1200.
- 2.6 Ardrex 1074 (RN use).

Safety precautions

3 The following safety precautions must be observed:

- 3.1 Operators must wear appropriate protective clothing particularly when using paint remover or mixing solutions. PVC or rubber gloves, denims, aprons, eye shields or goggles and rubber boots are to be worn.
- 3.2 Barrier cream must be rubbed on the hands before starting work. If the skin becomes contaminated, particularly with paint remover, Alocrom 1200 Part A or a mixed solution, immediate cleansing action is to be taken. If the eyes are affected, rinse immediately with copious supplies of water and seek urgent medical attention.
- 3.3 In poorly ventilated areas a face mask is to be worn.
- 3.4 The containers used in solution preparation must be of stainless steel, plastic, rubber or other acid proof material. Note that the mixed solution must not be stored in excess of 24 hours.
- 3.5 Swabs used for applying or removing Alocrom solution constitute a fire risk if allowed to dry without rinsing. Brushes must be thoroughly washed in water before being stored. Dispose of waste rags contaminated with Alocrom solution in accordance with instructions of the Superintendent, Property Services Agency (PSA).

Procedures

4 Carry out the following procedures:

- 4.1 Remove grease or oil in the corroded area by wiping with solvent.
- 4.2 Remove paint in the corroded area.
- 4.3 Remove as much of the corrosion products as possible by mechanical methods (See Chapter 3-1-1). Feather the edges of surrounding paint.
- 4.4 Apply a coat of Deoxidine 624 (liquid) or Ardrex 1074 by brush to the corroded area, taking care to avoid ingress to crevices or joints. Avoid contact with ultra-high tensile steels by masking as necessary. Fresh solution must be used for each application.

Note...

Where Deoxidine 624 (liquid) cannot be applied, or is likely to enter crevices or joints, Deoxidine 202 (paste) is to be used. This may be removed by wiping with a dry cloth.

- 4.5 Allow 5 to 20 minutes for the solution to act; agitate with a stiff bristle brush where heavy corrosion is present; wipe off, and wash the area with clean water.
- 4.6 If necessary, repeat procedures 4.4 and 4.5.
- 4.7 Dry all surfaces thoroughly.
- 4.8 Apply Alocrom 1200 treatment (See para 5 and 6) allow to dry for a minimum of two hours, then apply a primer and paint finish scheme within 48 hours.

Alocrom 1200

5 Alocrom 1200 produces a chromate film which increases the corrosion resistance of the alloy to which it is applied and provides a key for subsequent painting. Unsuitable for use under etch primer, it is an excellent pre-treatment under epoxide primers. Supplied in two part form, Alocrom 1200 solution is prepared as specified in AP 119A-0601-0, Chapter 5-5-3. Touch-up quantities are prepared as follows:

5.1 Mix equal volumes of Part A and Part B in a suitable container (see para 3.4).

5.2 The prepared solution is to be used within 24 hours. If any mixed solution remains after this time it is to be disposed of.

6 The procedure for the application of Alocrom 1200 is as follows:

6.1 Clean surface to remove grease, oil and dirt.

6.2 Apply Alocrom 1200 solution by brush or swab, avoiding entry into crevices and seams.

6.3 Allow solution to act until a yellow or golden-yellow film is formed. Failure to achieve the correct coating will impair subsequent paint adhesion.

6.4 Wash surface with clean water, and dry thoroughly.

6.5 Apply appropriate primer to DTD 5567A and paint finish.

MAGNESIUM BASED ALLOYS

Introduction

7 Magnesium alloys are prone to corrosion when exposed, with inadequate protection, to corrosive environments. The rate of attack, particularly at dissimilar metal contacts, can be extremely rapid. Corrosion rectification and repair of damaged protective films must be done with minimum delay. After removal of the paint finish, magnesium alloy components can be identified by their dark brown or black chromate surface film. The procedure for treating corroded magnesium alloys is in para 10. For deep pitting, or where extensive intergranular corrosion is present, mechanical methods are to be employed.

WARNING...

DO NOT USE DEOXIDINE 202, 624, OR ARDROX 1074 ON MAGNESIUM ALLOYS.

Tools and equipment

8 The tools and equipment required are as follows:

8.1 Tools and equipment as listed in Chapter 3-1-1, para 10.

8.2 Paint remover.

8.3 Chromic acid crystals.

8.4 Alocrom 1200.

8.5 Commercial sulphuric acid SG1.84.

Safety precautions

9 The following safety precautions must be observed:

9.1 Only the quantity of solutions immediately required should be mixed;

any surplus is to be disposed of as soon as possible.

9.2 Operators must wear appropriate protective clothing, particularly when using paint remover or mixing solutions. PVC or rubber gloves, denims, aprons, eye shields or goggles, and rubber boots are normally to be worn.

9.3 Rub barrier cream on the hands before work starts. If the skin is contaminated, particularly with paint remover or acid, clean it immediately. If the eyes are affected, rinse immediately with copious supplies of water and seek medical attention.

9.4 In poorly ventilated areas wear a face mask.

9.5 The container in which solution is prepared must be of stainless steel, plastic, rubber or other acid proof material.

9.6 Swabs used for applying or removing Alocrom or chromic-acid solution constitute a fire risk if allowed to dry without rinsing. Dispose of waste rags contaminated with Alocrom or chromic acid in accordance with instructions of the Superintendent, Property Services Agency (PSA). Brushes must be thoroughly washed in water before being stored.

Procedures

10 Carry out the procedures as follows:

10.1 Remove grease or oil in the corroded area by wiping with solvent.

10.2 Remove paint from the corroded area and feather the edges. Avoid damaging the chromate film by heavy scraping. Paint should be well softened before scraping using a non-metallic scraper.

10.3 Remove as much as possible of the corrosion products by mechanical methods (refer to Chapter 3-1-1). Do not use steel wool, wire brushes or metallic abrasives.

10.4 Swab the affected area to dissolve the corrosion products and give chromate inhibition with a solution of 50 g of chromic acid crystals in 500 ml of clean water (preferably distilled or deionised) to which has been added 8 drops (approximately 0.5 ml) of concentrated sulphuric acid (sg 1.84).

WARNING...

WHEN DILUTING CONCENTRATED ACID, SLOWLY ADD THE ACID TO WATER, NOT WATER TO ACID. PROTECT EYES, SKIN, HANDS AND CLOTHES FROM ACID.

10.5 Wash thoroughly with clean water to remove acid, and dry the area thoroughly.

10.6 If necessary repeat procedure 10.4 and 10.5.

10.7 Apply Alocrom 1200 treatment as described in para 5 and 6.

10.8 Apply primer DTD 5567A, followed by paint finish.

FERROUS METALS

Introduction

11 The most effective and preferred method of removing corrosion products from ferrous surfaces is by mechanical means (refer to Chapter 3-1-1). On all components, especially highly stressed parts, ensure that corrosion damage is within acceptable limits. Where mechanical methods are impracticable, a phosphoric-acid derusting agent may be used on low and medium strength steels

only, providing that tolerances are not critical and that applied chemicals are neutralized before reprotection. The general procedure for the chemical derusting of low and medium strength steels below 1000 N/mm² (65 ton/in²), is as described in para 14. Acids must not be used on high strength steels because of the possibility of hydrogen embrittlement.

Steels of low or medium strength

Tools and equipment

12 The tools and equipment required are as follows:

- 12.1 Tools and equipment as listed in Chapter 3-1-1, para 19.
- 12.2 Paint remover.
- 12.3 Jenolite rust removing jelly (acidic).

Safety precautions

13 The following safety precautions must be observed:

- 13.1 Operators must wear appropriate protective clothing, particularly when using paint remover. PVC or rubber gloves, eye shields or goggles, denims, aprons and rubber boots are normally to be worn.
- 13.2 Rub barrier cream on the hands before work starts. If the skin is contaminated, particularly with paint remover or acid, clean it immediately. If the eyes are affected, rinse immediately with copious supplies of water and seek medical attention.

Procedures

14 Carry out the procedures as follows:

- 14.1 Remove paint finish in the corroded area, feathering the edges.
- 14.2 Remove as much as possible of the corrosion products by mechanical means (refer to Chapter 3-1-1).
- 14.3 Degrease the metal.
- 14.4 On ferrous parts and structural steels of ultimate tensile strength known to be under 1000 N/mm² (65 ton/in²) apply acid rust removing jelly. Allow at least half an hour for the remover to act.
- 14.5 Remove all traces of the rust remover by rinsing thoroughly with fresh water.
- 14.6 Apply a second coat as necessary and repeat para 14.5
- 14.7 Thoroughly clean and dry.
- 14.8 Apply protective scheme.

Notes...

- (1) Rust removing solutions are described in AP 119A-0511-1.
- (2) Alkali derusting agent dips may be used for small items. Def Stan 03-2 method K1 refers.

Steels of high strength

Procedure

15 Carry out the procedure as follows:

15.1 Remove corrosion by mechanical means only (refer to Chapter 3-1-1).

STAINLESS STEELS

Introduction

16 There are no approved chemical methods of corrosion removal for these materials but passivation, after removal of corrosion by mechanical methods, will increase the resistance to further attack. Passivation is achieved by use of the following materials:

16.1 Solution of 20% nitric acid and 2½% sodium dichromate by volume.

16.2 Solution of 5% sodium dichromate by volume.

Safety precautions

17 Safety precautions governing the use of acids are laid down in AP 119A-0203-1, Section 1, Chapter 6.

Procedure

18 After removal of corrosion by mechanical method, proceed as follows:

18.1 Immerse affected part in an aqueous solution of 20% nitric acid and 2½% sodium dichromate, by volume, at 50°C (122°F) for 30 minutes.

18.2 Rinse with hot water.

18.3 Immerse in a hot (65°C (149°F)) aqueous solution of 5% sodium dichromate.

18.4 Rinse thoroughly in cold water and dry.

TITANIUM, TITANIUM BASED AND NICKEL BASED ALLOYS

Introduction

19 Corrosion removal on titanium and titanium based alloy components, is preferably achieved by mechanical means (refer to Chapter 3-1-1) since the susceptibility of these metals to hydrogen embrittlement precludes the use of many chemical processes. Oxidation of such components is normally confined to turbine engines with detailed rectification techniques specified in overhaul manuals. An acid pickle suitable for general purpose use on such alloys is formulated from the following materials:

19.1 Cleaning agent, white spirit or 50% white spirit and 50% solvent naphthas. There are restrictions on the use of hot chlorinated hydrocarbons, such as trichlorethylene and perchlorethylene (DEF STAN 03-2).

19.2 Solution of 20% nitric acid and 5% hydrofluoric acid by volume.

Safety precautions

20 Safety precautions governing the use of acids are laid down in AP 119A-0203-1, Section 1, Chapter 6.

Procedures

21 Carry out the procedures as follows:

21.1 Clean the surface using a suitable cleaning agent.

21.2 Immerse in an aqueous solution containing 20% nitric acid and 5%

hydrofluoric acid, by volume, not exceeding 65°C (149°F), avoiding contact with the hands.

21.3 Rinse thoroughly in clean water and dry.

COPPER AND COPPER BASED ALLOYS

Introduction

22 The procedures detailed in para 24 are for parts which can be removed from the aircraft for treatment. Since this process is very rapid it must not be used to clean thin section components. The materials required are as follows:

22.1 Cleaning agent, white spirit or 50% white spirit and 50% solvent naphthas.

22.2 Solution of 5%-10% sulphuric acid, by volume.

22.3 Mixture of 2 parts sulphuric acid, one part nitric acid and one part water, all by volume.

Safety precautions

23 Safety precautions governing the use of acids are laid down in AP 119A-0203-1, Section 1, Chapter 6.

Procedures

24 Carry out the procedures as follows:

24.1 Remove oil and grease from the component using a suitable cleaning agent. Immerse in an aqueous solution containing 5%-10% sulphuric acid, by volume, at a temperature of between 25°C (77°F) and 50°C (122°F), until corrosion and scale are removed.

24.2 Clean by immersion in a mixture of 2 parts sulphuric acid, one part nitric acid and one part water, all by volume, at room temperature. The cleaning reaction proceeds extremely rapidly.

24.3 Rinse thoroughly in clean water and dry.