

Chapter 3-1RECTIFICATION PROCEDURES

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WARNINGS...

- (1) SPONTANEOUS COMBUSTION CAN OCCUR WHEN CHROMIC ACID AND BRUSH WASH ARE MIXED.
- (2) WHEN DILUTING CONCENTRATED ACID ALWAYS ADD ACID TO WATER VERY SLOWLY AND NOT WATER TO ACID. USE AN ACID RESISTANT CONTAINER OF SUITABLE SIZE ON A FIRM BASE. PROTECT EYES, SKIN, HANDS AND CLOTHES FROM ACID SPRAY.

Corrosion detection

- 1 Refer to Chapter 1-1 and 1-2.

Cleaning and degreasing

- 2 Preliminary washing of an aircraft removes most contaminants (see Chapter 2-3). A bristle brush assists in the removal of loose paint in the repair area.
- 3 Before paint stripping or pretreatment of the surface, degrease the repair area in accordance with AP 119A-0601-0 Chapter 5-3.
- 4 After paint stripping and feathering, the debris is to be washed off and the surface is again degreased.
- 5 Procedures for cleaning and preparing the surfaces of component parts before painting or electroplating are described in Def Stan 03-2. These procedures involve immersion in organic solvents, alkaline cleaners and pickling baths.

Paint stripping

6 Paints, dopes, varnishes and lacquers, are to be removed in accordance with AP 119A-0601-0, Chapter 5-2.

Mechanical removal of corrosion products

7 Approved mechanical methods of corrosion removal are:

- 7.1 Grinding, using abrasive wheels mounted in a power drill.
- 7.2 Manual abrasion with scrapers, metal wool and abrasive pads or papers.
- 7.3 Abrasive blasting using a Vacu-Blast, a compressed air powered, abrasive, blasting machine. It incorporates a vacuum system, which retains the abrasive within the blasting gun, and makes the operation dust free. Abrasive of the wrong type can damage aircraft structures. The equipment should only be used by trained personnel. Blasting with fine glass beads or aluminium oxide removes corrosion products and damaged material, leaving the sound metal surface ready for protective treatment. Further details are in Chapter 3-1-1.

Essential requirements

8 The essential requirements when removing corrosion are:

- 8.1 Remove all the corrosion, visible and hidden.
- 8.2 Leave the surface smooth, without stress raisers.
- 8.3 Leave the surface uncontaminated by the removal process.
- 8.4 Do not blend material into a crack.
- 8.5 Do not cause metallurgical or thermal damage to the surface.
- 8.6 Do not exceed any metal removal limits that may apply.

9 The requirements mentioned in para 8 are detailed as follows:

9.1 Hidden corrosion. Not all corrosion is visible at the surface of the part being examined: special measures may be needed to determine its extent. Intergranular corrosion, in its early stages, cannot always be detected beneath a paint film. The full extent of the damage may only be revealed by separating the joints and mating surfaces. To ensure that all corrosion damage has been removed, an appropriate NDT technique may be required at the end of the removal procedure.

9.2 Surface smoothness. Surface smoothness requirements will depend mainly on strength factors. Highly stressed, critical structural components usually require a high degree of smoothness. Depressions remaining after removal of pitting, exfoliation or cracks, should be saucer-shaped and without ridges.

9.3 Contamination. Contamination of the surface by the materials used to remove the corrosion can hasten further attack. This can be caused by contaminated abrasive in Vacu-Blast equipment, grinding wheels previously used on a different metal, and by the use of steel wire brushes or wool on light alloys, titanium and stainless steels (see Chapter 1).

9.4 Cracks. The indiscriminate use of grinding wheels and abrasives, can close a crack or, in certain materials, can blend-in delaminations. This can be avoided by abrasive blasting of the area (after grinding out visible corrosion), which sometimes causes hidden delaminations to peel. NDT techniques may also be used when this condition is suspected.

9.5 Damage. Surface heating during grinding operations, can cause thermal damage. Some grinding techniques can cause flow in the surface material to a depth of 5 microns (0.0002 in). Surface flow can conceal minute cracks which could accelerate stress corrosion cracking, and only laboratory techniques can reveal this condition. To overcome these effects, special grinding points and high speed grinders may be specified. These obviate an unacceptable temperature rise and leave a true surface in which the microstructure is undisturbed.

9.6 The maximum depth of corroded area may be determined by laying a flexible steel rule (or a thin piece of spring steel) across the depression and measuring the gap with feeler gauges. As a general guide, Table 1 shows the permissible depth of corroded areas for various thicknesses of material, nominally 10 per cent of the original thickness.

Note...

Permissible limits for specific aircraft will be found in the aircraft Topic 6: beyond these limits, Design Authority advice should be sought.

TABLE 1 PERMISSIBLE DEPTH OF CORRODED AREAS

S.W.G.	Thickness of material		Permissible depth	
	(mm)	(inches)	(mm)	(inches)
14	2.0	0.080	0.20	0.008
16	1.6	0.064	0.17	0.007
17	1.4	0.056	0.15	0.006
18	1.2	0.048	0.13	0.005
20	0.9	0.036	0.10	0.004

Detailed procedures

10 The mechanical methods of corrosion removal, for the most common aircraft materials, are listed in Chapter 3-1-1. Chapter 3-1-3 contains instructions for corrosion removal by Vacu-Blast equipment.

Chemical removal of corrosion products

11 Chemical methods of neutralizing corrosion are used mainly on aluminium and magnesium alloys. They are listed, for common aircraft materials, in Chapter 3-1-2.

12 Their advantages over mechanical methods are that large and complicated shapes can be treated more easily and quickly by less skilled operators.

13 Chemical methods are potentially dangerous where residues cannot be completely removed from crevices, laps, and enclosed areas. They may also be unsuitable if a highly reflective metallic surface finish is required. Penetration to the bottom of pits may not be attained in a single treatment.

Restoration of protective finish

Pre-Treatment

14 After the removal of corrosion products, the approved protective coating or system must be restored before the cleaned surface deteriorates again. Before the application of many paint systems, a metallic surface may need to be electroplated or given a surface-conversion coating which protects and in

addition, provides a suitable base for the adhesion of the primer (see Chapter 2-3). Pretreat before painting in accordance with the detailed instructions contained in AP 119A-0601-0, Chapter 5.

Application of paint

15 When repairing or restoring a damaged finish, proceed as instructed in AP 119A-0601-0, Chapter 4, which describes the procedure for complete finishing schemes. The type of paint used for the repair must conform with that on the surrounding structure.

16 In order to minimize the cost of stripping it is usually permissible to restore isolated scratches or minor imperfections with the scheme specified in DTD 5599, which comprises an epoxy primer and acrylic finish.

17 Finishing paint is occasionally applied in emergency, directly to an unprimed metal surface. This procedure may give protection for several weeks under favourable conditions, but a large area treated in this way should be stripped and re-treated, in accordance with the normal specification, at the first opportunity.

Anti corrosion kit

18 Portable anti-corrosion kits have been introduced in first line servicing units for first aid treatments of corroded or damaged protective finishes. The kits contain materials for surface treatment; jointing compounds, touch-up quantities of primers and finishes, and appropriate brushes and spray guns for the application of temporary protectives. The kits allow corrosion preventive maintenance with minimum interruption to aircraft operations or other maintenance. The Instructions for Use (AP 119A-0200-1E 2nd Edition) of the materials are included in the kits and are reproduced in Chapter 2-3 and Chapter 3-1.

Safety precautions

19 AP 119A-0601-0, Chapter 2 contains chapters on general health and safety precautions for paint spraying and paint shops, also fire precautions. (See AP 3409, Fire Prevention). Spray guns, lubricating guns and air nozzles must not be directed towards the body or hands (see AP 100B-01, Order No 1804).

20 Health and safety measures for ancillary processes, such as paint-stripping and the application of protective materials, are contained in Chapter 2-4 and AP 119A-0601-0, Chapter 5.

21 Health and safety measures applicable to the removal of cadmium corrosion products are contained in AP 100B-01 Order No 1703.

Bonding

22 On completion of repairs, any bonding strips removed during repairs must be refitted, ensuring that good electrical contact with bare metal is achieved. The points of contact must be protected by an approved paint scheme.