

Chapter 1-7CHEMICAL PROCESSES FOR PROTECTIVE SURFACE TREATMENTS

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Introduction

1 Chemical treatments may be applied by the electroless or displacement plating processes, together with the complex inorganic coatings based on chromates, oxides and phosphates.

Electroless plating

2 This process employs solutions from which a metal is deposited by chemical reduction and have two main uses in engineering, viz:

- 2.1 The production of conductive layers on plastics.
- 2.2 The plating of metallic components of complex shape.

3 Metals which can be deposited by this process include cobalt, gold, nickel, the platinum and silver.

4 Electroless nickel plating, to DTD900, has a deleterious effect on the fatigue properties of steels. Such deposits are far harder than electroplated nickel (suitably heat-treated), and may be considered as an alternative to hard chromium.

5 Steel parts to be plated are to be treated in accordance with DEF162 (Chap.1-5, para. 25).

Chromate coatings

6 These are used for the production of protective coatings on aluminium, brass, cadmium, copper and its alloys, silver, steel and zinc. They are also used as a pre-treatment of paints.

7 Chromate coatings may be heavy, providing a brown, green or yellow film; light coatings produce a light blue or near white film, which provide reasonable resistance to atmospheric corrosion.

8 For the painting of aluminium it is normal to use a chromate pre-treatment, the basic solution being one of sodium carbonate/sodium chromate used at 95 to 100°C.

9 Accelerated processes, enabling coatings to be obtained at higher speeds and lower temperatures are in general use.

10 Chromate treatment may be employed on zinc and cadmium coatings to protect against superficial corrosion and to provide improved adhesion of paints and lacquers. It may be also used on steel strip as an alternative to phosphating.

Oxide coatings

11 Used for the production of light corrosion-resistant and coloured finished on steels, typically the black oxide coating applied to small tools, etc; using a sodium hydroxide/sodium nitrate mixture in water, at 40°C.

Phosphate coatings

12 Phosphating is to be undertaken in accordance with the requirements of DEF29A, and to be of the accelerated, but copper-free type, in order to reduce hydrogen absorption.

13 The process generally uses proprietary formulations impregnated with grease, oils and waxes to provide a high resistance to corrosion; they may also be dyed or stained to give a coloured finish.

14 Where the articles to be plated will be subjected to mild corrosion in service, iron phosphate/iron oxide light films are used as a painting pre-treatment.

15 Where a high level of corrosion resistance is required, the crystalline zinc-phosphate coatings are used.

16 Heavy zinc, manganese and iron-phosphate processes are used for rust-proof coatings, being suitable for subsequent sealing and also for lubrication purposes.

17 Following phosphating, all parts are to be baked in accordance with the requirements of DEF162.

Surface filming-Allocrom 1200

18 For details of this process refer to AP 119A-0601-0 Chap. 5-5-3.