

**Ministry of Defence
Defence Procurement Agency, ADRP2
Abbey Wood
Bristol
BS34 8JH**

OBSOLESCENCE NOTICE

All DTD specifications were declared obsolescent from 1st April 1999. All DTD 900 series approvals also lapsed at that time. The standards will no longer be updated but will be retained as obsolescent documents to provide for the servicing of existing equipment.

Further Guidance

The aim in declaring the specifications obsolescent is to recognise that the documents are not being updated and thus should be used with care by both purchaser and supplier. For example, a specification could contain valid technical information but may also contain type approval clauses that contradict procurement policy and/or use materials that do not comply with environmental legislation. The obsolescent specification can still be used as a basis for a purchase provided that the supplier and purchaser agree suitable changes to the specification within the purchase order/contract.

For the DTD 900 system, each specification has provided an MoD approved material and process. For these items, the declaration of obsolescence will constitute the termination of both the extant MoD approval and the continuing MoD assessment that had underpinned those approvals. Again, the technical content of the document remains valid and can be used by both purchaser and supplier as a basis for a contract but an acceptable (to the parties) approval/assessment procedure would be required.

July, 1974

Process Specification
ELECTRODEPOSITED COBALT/CHROMIUM CARBIDE
COMPOSITE COATINGS

1. SCOPE

This specification covers the requirements for the coating of aerospace parts made from carbon and low alloy steels, and non-ferrous-base materials, with electrodeposited cobalt having co-deposited inclusions of chromium carbide, for the purpose of improving resistance to wear and corrosion at room and elevated temperatures.

2. HEAT TREATMENT PRIOR TO PLATING

- 2.1 Unless otherwise specified by the Design Authority, heat-treatable materials shall be in the finally heat-treated condition prior to plating.
- 2.2 Parts made from steels of minimum specified tensile strength 1000 MPa and greater, which have been machined prior to coating, shall be stress-relieved as required by DEF STAN 03-2 or DEF STAN 03-4 as appropriate.

3. PREPARATION

- 3.1 Where practicable and as agreed with the Design Authority, all areas to be coated shall have sharp edges removed by radiusing or chamferring, as outlined in BS 4479 clause 2.2.3.
- 3.2 Areas not to be plated shall be stopped-off prior to plating using a suitable resist, care being taken to avoid contamination of the areas which are to be plated.
- 3.3 Immediately prior to plating the parts shall be cleaned and prepared in accordance with the requirements of DEF STAN 03-2, with special reference to the instructions regarding the cleaning and preparation of steels of tensile strength greater than 1400 MPa in DEF STAN 03-4.

4. PLATING

- 4.1 The process is proprietary and patented.*
- 4.2 Plating is carried out in an electrolyte in which chromium carbide particles are maintained in suspension.
- 4.3 The composition of the electrolyte, the anode material, the chromium carbide particles and the means of maintaining them in suspension, and the operating conditions for the bath shall all be to specifications based on the patents* and approved by DR/Mat 2.

5. WASHING AFTER PLATING

The plated parts shall be washed thoroughly in cold running water followed by a rinse in clean hot water and drying. Any stopping-off coating shall then be removed.

6. POST-PLATING HEAT TREATMENT

- 6.1 After being coated, all parts shall, unless otherwise specified, be heat-treated as detailed below. The heat-treatment constitutes an adhesion test (Clause 9.3) and, in the case of steels covered by Clause 6.2, is also for relief from hydrogen embrittlement.
- 6.2 *High strength steel parts and surface-hardened steel parts*
 - 6.2.1 Plated steel parts, other than those surface-hardened, of minimum specified tensile strength 1000 MPa and greater shall be heated at a temperature between 190° and 230°C for the following times: —
 - (a) Not less than 6 hours for steels with a minimum specified tensile strength between 1000 and 1800 MPa
 - (b) Not less than 18 hours steels with a minimum specified tensile strength exceeding 1800 MPa.
 - 6.2.2 Plated steel parts having surface hardened areas shall be heated at a temperature between 130°C and 150°C for not less than 6 hours, or at a higher temperature when specified by the Design Authority.

*British Patents 1218179 and 1236954

- 6.3 *Other steel parts.* These shall be heated at the temperature at which the part is designed to operate or at 200°C, whichever is the greater, for not less than 3 hours.
- 6.4 *Aluminium and aluminium alloy parts.* These shall be heated at a temperature within the range 120—140°C for not less than 1 hour.
- 6.5 *Copper and copper alloy parts.* These shall be heated at a temperature within the range 120 — 140°C for not less than 1 hour.
- 6.6 *Nickel and nickel alloy parts.* These shall be heated at the temperature at which the part is designed to operate or at 350°C, whichever is the greater, for not less than 6 hours.

7. PROCESS CONTROL

- 7.1 For each different design of part the suitability of the process to be used shall be confirmed by processing a part or representative sample and inspecting in accordance with clause 9 and any other special inspection requirements arising from design peculiarities.
- 7.2 The processing procedure proved in accordance with 7.1 and agreed between the processer and the Design Authority, together with any special inspection requirements shall be recorded as a Control Schedule to the satisfaction of the Quality Assurance Authority.

8. PARTS TO BE MACHINED AFTER PLATING

Where a part is to be subsequently machined to specified dimensions and/or surface finish the minimum thickness of coating to be applied before machining shall be agreed between the processer and the Design Authority and stated together with the relevant dimensions prior to plating on the drawing or order.

9. INSPECTION

- 9.1 *Visual examination.* All parts shall be visually examined and shall be free from blistering, cracks, pits and exfoliation. The stopped-off areas shall be free from plated deposit and shall be uncorroded.
- 9.2 *Thickness.* The thickness of the coating shall comply with the requirement of the drawing or order. Thickness testing shall preferably be on the part itself by direct measurement or by any other non-destructive test acceptable to the Quality Assurance Authority. Alternatively, by agreement with the Quality Assurance Authority the thickness may be determined on a representative sample processed together with the part, by microsectioning or any other agreed method.
- 9.3 *Adhesion.* The absence of visible defects such as blistering, cracking or exfoliation after heat-treatment as detailed in Clause 6 shall be accepted as evidence of satisfactory adhesion. Alternatively any other test agreed by the Quality Assurance Authority and acceptable to the Design Authority may be used.
- 9.4 *Chromium carbide particle content and distribution.* A test sample plated from the bath not less than once each week or at any other frequency agreed by the Quality Assurance Authority shall exhibit uniform random distribution of the chromium carbide particles when a cross-section is examined microscopically, and a particle content of not less than 15% by volume when analysed.

Approved for issue,

N. J. WADSWORTH

Director of Research Materials 2.

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