

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

## **OBSOLESCENCE NOTICE**

All DTD specifications were declared obsolescent from 1<sup>st</sup> 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.

**Process Specification**  
**SURFACE COATING OF PARTS BY USE OF**  
**DETONATION, FLAME AND PLASMA SPRAYING PROCESSES**

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**1. Scope**

- 1.1 This specification covers the application of heat resisting coatings other than aluminium to aerospace parts by a controlled detonation gun, flame or plasma arc torch.
- 1.2 The choice and thickness of coating to be applied will be determined by design requirements in respect of resistance to oxidation, wear, abrasion or erosion, fretting, chemical attack, electrical conductivity, and resistance to mechanical or thermal shock. The specific coating required including any bond coating is to be selected by the Design Authority and stated on the drawing or order.
- 1.3 Depending on the process and the material of the coating, it is possible to coat parts having a basis metal hardness of up to 60 Rockwell C (740 VPN).
- 1.4 The edges of surfaces to be coated should have sharp corners removed. Unless otherwise required by the purchaser\* heat-treatable materials shall be in the finally heat-treated condition prior to coating.
- 1.5 The surface temperature of parts being coated will not normally exceed 300°C. If design requirements dictate the maintenance of a lower temperature, this temperature is to be stated on the drawing or order.

**2. Preparation of work**

- 2.1 Coatings are normally applied to machined surfaces. All surfaces to be coated are to be free from scale, inclusions, grease, paint, or any other contamination. Surfaces shall be cleaned by appropriate methods described in D.T.D 901.
- 2.2 Unless otherwise agreed by the purchaser\*, all surfaces to be coated shall be grit blasted before processing. Areas not to be coated are to be suitably masked against grit blasting.
- 2.3 After blasting, residual grit shall be removed from the surface, e.g. by a jet of clean dry air, free from dust or oil.
- 2.4 Precautions shall be taken to maintain the parts in a clean condition prior to coating. The areas to be coated shall not be handled after grit blasting unless clean cotton gloves are worn, and all contamination with dust, oil, grease and water shall be avoided.
- 2.5 The prepared surfaces are in a very active state, and can be readily contaminated in moist atmospheres. Thus, the surface coating shall be applied as soon as possible after grit blasting. Even under good workshop conditions an interval of four hours shall not be exceeded, unless special precautions agreed by the Inspection Authority are taken to ensure a suitably controlled storage atmosphere.

**3. Coating media**

- 3.1 The material used for coating shall be to a specification approved by D.Mat.Av. as suitable for the application. The chemical composition, the mesh analysis (powder) or gauge (wire) of each cast/lot of material shall be determined and recorded by the manufacturer to the satisfaction of the Inspection Authority. The manufacturer shall supply the purchaser with a certificate that the material complies with the requirements of the specification.
- 3.2 Powders shall be supplied dry and shall be kept in sealed containers until immediately before use, or they may be supplied in plastic tubes ready for use.

**4. Coating application**

- 4.1 Precautions shall be taken in spraying to avoid local overheating of the part or coating.
- 4.2 For each different design or part to be coated a technique governing the operating cycle shall be developed and proved by sectioning a coated part and examining the section micrographically for conformity with the drawing/order requirements in respect of coating quality, including hardness, porosity, thickness of coating, structure and freedom from surface separation, cracks and interface inclusions to the minimum standard agreed by the purchaser. \*
- 4.3 Having been proved in accordance with 4.2, the technique shall be recorded to the satisfaction of the Inspection Authority.

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\*The purchaser is responsible for securing the concurrence of the parent design firm.

#### 4.4 The recorded technique shall include:

- (a) The method of surface preparation, i.e. the type and size of grit, the pressure and distance between nozzle and part being treated, the "dwell" time (area covered/time) and masking details (where applicable);
- (b) The specification for the material and the thickness of the coating to be applied, the powder particle size and whether the application is by the detonation, flame or plasma spray process;
- (c) Details of any preheating requirements;
- (d) (i) For the detonation process: The machine settings;  
(ii) For the flame and plasma spray processes: Equipment Model, Nozzle type, Electrode type, the gas and flow-rate; plasma current and voltage; powder conveying gas and flow rate; and powder or wire feed rate: all as appropriate to the method;
- (e) The distance of the part from the detonation gun barrel or torch, and the impingement angle of the coating stream;
- (f) Other factors which control the thickness and uniformity of the coatings, e.g. traversing speeds, feeds, number of passes etc. ;
- (g) Particulars of any method of cooling to be applied to the part during the coating cycle.

### 5. Inspection and testing

#### 5.1 Inspection is to verify that:

- (a) the process and grade of coating employed are in accordance with drawing/order requirements;
- (b) before coating, the dimensions of surfaces to be coated are correct, and the parts are in the finally heat treated condition, suitable for coating applications;
- (c) the surfaces to be coated are prepared in accordance with clause 2 and the approved technique for the part, and uncoated areas have been suitably protected;
- (d) the coating application and method of cooling have been performed in accordance with the approved technique for the part;
- (e) after coating, the dimensions of the as-deposited coated surfaces are correct and the required coating thickness has been applied;
- (f) all coated parts are visually examined for freedom from surface defects.

#### 5.2 Control testing shall be carried out as under.

- 5.2.1 At each change of cast or melt of material, or change of equipment, a test sample shall be coated according to the technique requirements. The sample shall consist preferably of an actual part or a sample of the same basis material, or, if these are not available, a mild steel specimen may be used. The coated sample shall be sectioned micrographically and examined as in para. 4.2.

### 6. Salvage or reclamation of previously coated parts

- 6.1 Unless otherwise agreed by the purchaser\* parts which have been previously coated by electro-deposition, hard-facing, or other techniques, shall have all traces of the previous coating removed prior to the re-coating treatment. Removal of previous coatings may involve anodic pickling and/or molten salt treatment at a temperature in excess of 450°C. Such treatment may have a deleterious effect on some basis materials and are not to be applied to design classified aerospace parts without the prior agreement of the Design Authority for the parts concerned.

### 7. Retests

- 7.1 In the event of failure to satisfy any of the tests required by clause 5.2 the manufacturer shall carry out such further tests in accordance with clause 5.2 as may be required by the Inspection Authority.

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Approved for issue,

E. W. RUSSELL,

Director of Materials Research & Development/Aviation.

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