

**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.

CORRECTION

MINISTRY OF TECHNOLOGY

D.T.D 5056

February 1968

Aerospace Material Specification

CHROMIUM - NICKEL CORROSION RESISTING

STEEL FOR COLD HEADED BOLTS AND SET SCREWS

(Suitable for cold forming)

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Clause 1.3 Chemical composition

Delete Carbon 80.0 max.

Insert Carbon 0.08 max.

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**Aerospace Material Specification**  
**CHROMIUM-NICKEL CORROSION RESISTING STEEL FOR**  
**COLD HEADED BOLTS AND SET SCREWS**  
**(Suitable for cold forming)**

*NOTE 1. This specification is one of a series issued by the Ministry of Technology to meet a requirement not covered by any existing British Standard for aerospace material.*

*NOTE 2. Where metric units are specified these are to be regarded as the standard. The conversions of metric units to British units are approximate and more accurate conversions should be based on B.S. 350: "Conversion factors and tables".*

*NOTE 3. Steel to this specification is not suitable for welding without subsequent heat treatment.*

- SECTION ONE — General requirements
- SECTION TWO — Rod for wire
- SECTION THREE — Wire for cold forming

**SECTION ONE**  
**General requirements**

**1.1 Inspection and testing procedure**

- 1.1.1 The steel shall comply with British Standard 3S.100, Section One, as applicable.
- 1.1.2 *Sulphur printing or deep etching tests.* Samples shall be selected in accordance with British Standard 3S.100, Section One, Clause 7.2.1.

**1.2 Process of manufacture**

- 1.2.1 The steel shall be manufactured by an electric process.

**1.3 Chemical composition**

- 1.3.1 The steel shall contain:

| Element                  | Per cent |       |
|--------------------------|----------|-------|
|                          | min.     | max.  |
| Carbon     ...     ...   | —        | 80.0  |
| Silicon     ...     ...  | 0.20     | 1.0   |
| Manganese   ...     ...  | 0.50     | 2.0   |
| Phosphorus   ...     ... | —        | 0.035 |
| Sulphur     ...     ...  | —        | 0.025 |
| Chromium    ...     ...  | 17.0     | 19.0  |
| Nickel     ...     ...   | 11.0     | 13.0  |

**1.4 Surface dressing**

- 1.4.1 The ingots, blooms or billets from which the steel is formed shall be overall dressed in accordance with British Standard 3S.100, Section One, Clause 5.1.

**SECTION TWO**  
**Rod for wire**

**2.1 Manufacture**

- 2.1.1 Rod for wire shall be made from billets complying with Section One.

**2.2 Condition**

- 2.2.1 The rods shall be supplied in the rolled or rolled and lightly drawn condition.

**2.3 Dimensions**

- 2.3.1 Dimensions and tolerances shall be stated in the order.

## 2.4 Freedom from defects

- 2.4.1 The steel shall be examined visually for signs of surface imperfections and shall be free from harmful defects.
- 2.4.2 *Deep etch test.*
- 2.4.2.1 *Sample selection.* The inspector shall select a length of approximately 300 mm (12 in) from each end of each coil or from one end of each of 10 per cent of the rods in straight lengths from each batch of rods of the same nominal size from the same cast.
- 2.4.2.2 *Sample preparation.* Both ends of each sample selected shall be machined smooth or ground square.
- 2.4.2.3 *Test procedure.* The samples shall be subjected to a deep etch test by immersion in either:  
(i) A solution, containing 10 per cent by volume of concentrated nitric acid (sp.gr.1.53) and 3½ per cent by volume of hydrofluoric acid (40% HF) in water, maintained at 60°C for not less than ten minutes and not more than fifteen minutes.  
or (ii) any alternative solution agreed by the Inspecting Authority.
- 2.4.2.4 *Examination.* The ends of the sample, after washing and drying, shall reveal no evidence of unsoundness and the surface shall be free from harmful defects.

## 2.5 Re-tests

- 2.5.1 *Freedom from defects.*
- 2.5.1.1 If a sample from a coil fails to comply with the requirements of Clause 2.4.2 the coil shall, unless it is withdrawn by the manufacturer, be cropped before re-submission for examination. The inspector shall select two further samples, one from each end of the coil. Both these samples shall comply with the requirements of Clause 2.4.2.
- 2.5.1.2 If any sample from a straight length of rod fails to comply with the requirements of Clause 2.4.2 it shall be rejected and the inspector shall select a sample for examination from all the remaining rods in the batch. All rods corresponding to samples that fail to comply with the requirements of Clause 2.4.2 shall be rejected.

## 2.6 Identification

- 2.6.1 All rods passed by the inspector shall be individually identified or, at the option of the manufacturer, shall be made into bundles each of which shall bear a durable label marked with the inspector's stamp and such other marking as shall ensure full identification of the material.

# SECTION THREE

## Wire for cold forming

### 3.1 Manufacture

- 3.1.1 The wire shall be made from rod that complies with the requirements of Section Two.
- 3.1.2 Any steel may be rejected for faults revealed during wire manufacture although it has passed previous tests in accordance with Sections One and Two.

### 3.2 Condition

- 3.2.1 The wire shall be supplied finally heat treated, descaled and lightly drawn.
- 3.2.2 The purchaser may order the material coated electrolytically with copper or other suitable material.

### 3.3 Dimensions

- 3.3.1 Dimensions and tolerances shall be stated in the order or drawing.

### 3.4 Final heat treatment

- 3.4.1 Soften by cooling freely in air, or quenching in oil or water, from a temperature between 1,000°C and 1,100°C.

### 3.5 Freedom from defects

- 3.5.1 The wire shall be examined visually for surface imperfections and shall be free from any defects likely to be detrimental to the end use. A standard of surface finish may be agreed between the purchaser and the manufacturer.
- 3.5.2 *Reverse torsion test.* Except as provided for in Clause 3.5.3, samples shall be selected and tested in accordance with British Standard 3S.100, Section Nine, Clauses 6.1 and 6.2.
- 3.5.3 *Deep etch test.* Alternatively to Clause 3.5.2, by agreement between the purchaser and the manufacturer, samples shall be selected, prepared and tested in accordance with Clause 2.4.2.
- 3.5.4 *Nicked fracture test.* The test shall be carried out in accordance with British Standard 3S.100 Sections One and Nine.

### 3.6 Selection and preparation of test samples

- 3.6.1 The inspector shall select from each coil, before straightening, or from the product of each coil that has been cut into straight lengths, one test sample of sufficient length to provide for the test pieces required for the tests specified in Clauses 3.7 and 3.8. The test pieces shall not be further mechanically worked before testing.

### 3.7 Mechanical properties

- 3.7.1 *Tensile test.* The properties obtained from test pieces selected in accordance with Clause 3.6 and prepared and tested in accordance with Clause 1.1 shall be :

| Tensile strength |      |                      |         | Elongation<br>on 5.65 $\sqrt{S_0}$ |
|------------------|------|----------------------|---------|------------------------------------|
| hbar             |      | lbf /in <sup>2</sup> |         | per cent                           |
| min.             | max. | min.                 | max.    | min.                               |
| 55               | 70   | 78,000               | 100,000 | 40                                 |

### 3.8 Intercrystalline corrosion test

- 3.8.1 A test piece shall be taken from each sample selected in accordance with Clause 3.6 and shall be immersed for 72 hours in a boiling solution having the following composition:  
 111 grammes copper sulphate crystals (CuSO<sub>4</sub>.5H<sub>2</sub>O)  
 98 grammes concentrated sulphuric acid (sp.gr.1.84) made up to 1 litre with distilled water.  
 Precautions shall be taken during boiling to prevent concentration due to evaporation.

*NOTE.* If the wire has been coated in accordance with Clause 3.2.2 the coating shall be removed from the test piece before testing.

- 3.8.2 The test piece shall then be dropped on a metal or stone surface and shall emit a clear metallic ring. The test piece shall be bent cold through an angle of 180° over a radius of 3 times the diameter of the test piece and shall withstand this treatment without exhibiting fissuring, crazing or cracking.

### 3.9 Re-tests

#### 3.9.1 Freedom from defects.

- 3.9.1.1 If the sample from a coil fails to meet the requirements of Clause 3.5.2 the coil, unless it is withdrawn by the manufacturer, shall be cropped before re-submission for examination. The inspector shall select two further samples, one from each end of the coil. Both these further samples shall comply with the requirements of Clause 3.5.2.
- 3.9.1.2 If the samples selected from the product of a coil in straight lengths fail to meet the requirements of Clause 3.5.2, the inspector shall select four more samples for test. All these further samples shall comply with the requirements of Clause 3.5.2.
- 3.9.1.3 If any sample fails to meet the requirements of Clause 3.5.3, the re-testing shall be carried out in accordance with Clause 2.5.1.
- 3.9.1.4 If the sample from a coil fails to meet the requirements of Clause 3.5.4 the coil, unless it is withdrawn by the manufacturer, shall be cropped before re-submission for examination. The inspector shall select two further samples, one from each end of the coil. Both these further samples shall comply with the requirements of Clause 3.5.4.
- 3.9.1.5 If the samples selected from the product of a coil in straight lengths fail to meet the requirements of Clause 3.5.4, the inspector shall select four more samples for test. All these further samples shall comply with the requirements of Clause 3.5.4.

#### 3.9.2 Mechanical tests.

- 3.9.2.1 If any test piece fails to meet the requirements of Clause 3.7, the inspector shall select two further test samples from each coil that failed. One sample shall be taken from each end of the coil, or, if the coil has been cut into straight lengths, from each of two individual wires. Test pieces prepared from both of these further test samples shall comply with the requirements of Clause 3.7.

#### 3.9.3 Intercrystalline corrosion.

- 3.9.3.1 If any test piece fails to comply with the requirements of Clause 3.8.2, two further samples shall be taken from each end of the coil, or from the product of the coil. Test pieces from these further samples, prepared and tested in accordance with Clause 3.8.1, shall comply with the requirements of Clause 3.8.2.

### 3.10 Identification

3.10.1 Each coil and each bundle of straight wires passed by the inspector shall bear a durable label marked with the inspector's stamp and such other marking as shall ensure full identification of the material.

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Approved for issue,

E. W. RUSSELL,

Director of Materials Research and Development/Aviation.

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