

**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.

MINISTRY OF TECHNOLOGY

D.T.D.5036

Amendment No. 1

June, 1969

Aerospace Material Specification

**LOW CARBON CHROMIUM-NICKEL CORROSION-RESISTING STEEL
WIRE RIVETS AND SPLIT PINS
(Weldable)**

Subclause 42.1. Delete this subclause and substitute the following:

4.2.1. Rivets shall be supplied in the softened and descaled condition.

4.2.2. Split pins shall be delivered as formed or in the softened and descaled condition at the option of the manufacturer.

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Aerospace Material Specification

**LOW CARBON CHROMIUM-NICKEL CORROSION-RESISTING STEEL
WIRE, RIVETS AND SPLIT PINS
(Weldable)**

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 they are to be regarded as the standard. Where equivalents are stated in British units the conversions are approximate. More accurate conversions should be based on B.S.350: "Conversion factors and tables".

SECTION ONE	— General requirements
SECTION TWO	— Rod for wire
SECTION THREE	— Wire
SECTION FOUR	— Rivets and split pins

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	—	0.030
Silicon	0.20	1.0
Manganese	0.50	2.0
Phosphorus	—	0.035
Sulphur	—	0.025
Chromium	17.5	19.0
Nickel	9.0	12.0

1.4 Surface dressing

1.4.1 The ingots, blooms or billets from which the rods are rolled shall be suitably dressed to remove all surface defects.

SECTION TWO**Rod for wire****2.1 Manufacture**

2.1.1 Rod for wire shall be made from billets complying with Section One of this specification.

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 on dimensions shall be stated on the drawing or order.

2.4 Freedom from defects

2.4.1 The rod shall be examined visually for surface imperfections and shall be free from harmful defects.

2.4.2 Deep etching 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 in each batch submitted for examination.
- 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 then be immersed in either :
- (i) a solution containing 10 per cent by volume of concentrated nitric acid (Sp.gr.1.53) and 3½ per cent volume of hydrofluoric acid (40% HF) in water at 60°C for not less than 10 minutes and not more than 15 minutes.
- or
- (ii) any alternative solution agreed by the Inspecting Authority.
- 2.4.2.4 *Examination.* The ends of the samples shall, after washing and drying, reveal no evidence of unsoundness and the surface shall be free from harmful defects.

2.5 Intercrystalline corrosion test

- 2.5.1 A bend test piece not larger than 10 mm (0.4 in) diameter shall be selected to represent each cast. The test piece, softened in accordance with Clause 3.4, shall be heated for 30 minutes at a temperature of 650°C and cooled in air. It shall then be immersed for 72 hours in a boiling solution having the following composition :
- 111 grammes copper sulphate crystals (CuSO₄.SH₂O)
 - 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.
- 2.5.2 Each test piece shall then be dropped on to a metal or stone surface and shall emit a clear metallic ring. The test piece shall then be bent cold through an angle of 90° over a radius of three times the diameter of the test piece and shall withstand this treatment without signs of fissuring, crazing or cracking.

2.6 Retests

- 2.6.1 *Freedom from defects.*
- 2.6.1.1 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.
- 2.6.1.2 If any sample from a straight length of rod fails to comply with the requirements of Clause 2.4.2 the inspector shall select a sample from all the remaining rods in the batch. These further samples shall comply with the requirements of Clause 2.4.2.
- 2.6.2 *Intercrystalline corrosion test.*
- 2.6.2.1 If the test piece fails to comply with the requirements of Clause 2.5.2. two further test samples shall be taken from the same cast, one from the rod or coil from which the original test sample was taken, unless that rod or coil has been withdrawn by the manufacturer. Test pieces from these further test samples prepared and tested in accordance with Clause 2.5.1 shall comply with the requirements of Clause 2.5.2.

2.7 Identification

- 2.7.1 All rods or coils 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

3.1 Manufacture

- 3.1.1 The wire shall be made from rod complying with the requirements of Section Two of this specification.
- 3.1.2 The wire at a convenient stage in manufacture shall be ground all over to remove surface defects. *NOTE.* Attention is drawn to the detrimental effect on fatigue properties of transverse grinding marks in the finished wire.
- 3.1.3 Any material may be rejected for faults revealed during wire manufacture, although it has passed previous tests in accordance with Sections One and Two of this specification.

3.2 Condition

- 3.2.1 The wire shall be supplied in the finally heat treated and descaled condition.
- 3.2.2 After heat treatment and descaling a light drawing operation may be carried out in order to comply with any straightness requirement of the purchaser.

3.3 Dimensions

3.3.1 Dimensions and tolerances on dimensions shall be stated on the drawing or order.

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 harmful defects. A standard of surface finish may be agreed between the purchaser and the manufacturer.

3.5.2 The inspector shall select a length of approximately 300 mm (12 in) from one end of each coil or from the product of each coil cut into straight lengths. The selected samples shall be prepared in accordance with Clause 2.4.2.2 and then subjected to the tests specified in Clause 2.4.2.3(i) or (ii). The sample shall show no evidence of any harmful defects.

3.6 Selection and preparation of test samples

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

3.7 Mechanical properties

3.7.1 *Tensile test.*

3.7.1.1 The properties obtained from test pieces selected and prepared from the test samples in accordance with Clause 3.6, and tested in accordance with the requirements of Clause 1.1 shall be:

0.2 per cent proof stress		Tensile strength				Elongation per cent
kgf/mm ²	tonf/in ²	kgf/mm ²		tonf/in ²		5.65 √ So
min.	min.	min.	max.	min.	max.	min.
21.5	13.5	50	70	32	44	45

3.7.2.1 The test piece, selected and prepared from the test sample in accordance with Clause 3.6, shall be bent cold through an angle of 180° and closed flat without showing signs of failure.

3.8 Intercrystalline corrosion test

3.8.1 The test piece, selected and prepared from the test sample in accordance with Clause 3.6 shall be heated for 30 minutes at a temperature of 650°C, cooled in air and then be immersed for 72 hours in a boiling solution having the following composition :

111 grammes copper sulphate crystals (CuSO₄.5H₂O)
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.

3.8.2 The test piece shall then be bent cold through an angle of 180° over a radius of twice the diameter of the test piece and shall withstand this treatment without signs of fissuring, crazing or cracking

3.9 Re- tests

3.9.1 *Freedom from defects.*

3.9.1.1 *Coil.* 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 *Straight lengths.* If the samples selected from the product of a coil in straight lengths fails 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.

3.9.2 *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 the relevant test specified in 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.

SECTION FOUR Rivets and split pins

4.1 Manufacture

- 4.1.1 Rivets and split pins shall be made from wire that complies with Section Three of this specification.

4.2 Condition

- 4.2.1 Rivets shall be supplied in the softened and descaled condition.

- 4.2.2. Split pins shall be delivered as formed or in the softened and descaled condition at the option of the manufacturer

4.3 Final heat treatment

- 4.3.1 Softening shall be carried out in accordance with Clause 3.4.

4.4 Freedom from defects

- 4.4.1 The rivets and split pins shall be free from harmful defects.

- 4.4.2 Rivets and split pins may be rejected for faults in, or revealed by, manufacture although they have been made from material that has passed previous tests in accordance with Sections One, Two and Three of this specification.

4.5 Dimensions

- 4.5.1 Rivets and split pins shall conform to the dimensions specified in the drawing.

4.6 Selection of hardness test samples

- 4.6.1 A batch shall consist of rivets or split pins of the same type and size made from wire from the same cast and heat treated together, or if heat treatment is carried out on a continuous basis, heat treated within the same period of continuous heat treatment not exceeding 8 hours.

- 4.6.2 The number and frequency of test samples selected for hardness test from each batch shall be agreed between the manufacturer and purchaser to the satisfaction of the Inspecting Authority.

4.7 Hardness

- 4.7.1 The hardness shall be not more than 180 HB.

- 4.7.2 Hardness tests shall be carried out in accordance with Clause 1.1.

4.8 Identification and marking

- 4.8.1 The marking of rivets and split pins shall be as specified in the relevant drawings.

- 4.8.2 Finished rivets and split pins of the same type and size, passed by the inspector, shall be packed into boxes each of which shall bear the mark of the inspector and such other marking as shall ensure full identification of the material.

Approved for issue,

E. W. RUSSELL,

Director of Materials Research and Development/Aviation.

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