

**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.

**Aircraft Material Specification**

**SOFT IRON FOR DYNAMO-ELECTRIC MACHINES**

**(Type B)**

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**Subclause 8.1.** Delete this subclause and substitute the following:

“8.1. After the heat treatment specified in Clause 4. test pieces shall be submitted to magnetic tests in accordance with one of the methods specified in B.S.2454, recording either B against H or vice versa. The results obtained shall comply with the requirements of Table 1 or Table 2 below. The tests shall be carried out by the manufacturer, unless the order states that they will be carried out by the purchaser after delivery.”

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**Aircraft Material Specification****SOFT IRON FOR DYNAMO-ELECTRIC MACHINES****(Type B)**

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*NOTE 1.—This specification is one of a series issued by the Ministry of Aviation, either to meet a limited requirement not covered by any existing British Standard for aircraft material or to serve as a basis for inspection of materials the properties and uses of which are not sufficiently developed to warrant submission to the British Standards Institution for standardisation.*

*NOTE 2.—The material is intended primarily for magnetic relays, the yokes of dynamo-electric machines and for other stationary parts of magnetic circuits carrying a direct flux. It is purified iron with high permeability at flux densities between 15,000 and 19,000 gauss (1.5 and 1.9 webers/m<sup>2</sup>).*

*NOTE 3.—This specification together with specification D.T.D. 5092 supersedes specification D.T.D. 330. D.T.D. 5102 differs from D.T.D. 5092 only in the requirement for magnetic characteristics.*

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*Sheet, strip, and plate  
Bars and billets for forging  
Forgings  
Bars for machining  
Tubes*

**1. Chemical composition**

- 1.1. The material shall consist of iron of a purity sufficient to give the magnetic characteristics required by Clause 8.

**2. Definitions**

- 2.1. *Cast.* The term “cast” shall be taken to mean the material derived from any one original furnace charge.
- 2.2. *Batch.* A “batch” shall consist of one cast or, at the discretion of the Inspecting Authority, an aggregate of casts up to a total of 10 tons from any one “furnace run” on the same material.

**3. Condition**

- 3.1. The material shall be supplied either in the “as manufactured” or heat-treated condition as stated on the order.

*NOTE.—Material supplied in the “as manufactured” condition will require heat treatment in accordance with Clause 4 in order to achieve the magnetic properties specified in Clause 8. Heat-treated material, after machining, may require further heat treatment under non-scaling conditions as given in Clause 4.3 in order to restore the original magnetic properties.*

**4. Heat treatment**

- 4.1. Material to be supplied in the heat-treated condition shall be heat treated together with its representative test pieces.
- 4.2. Except as provided in Clause 4.4 test pieces and material to be supplied in the heat-treated condition shall be heated at a temperature between 920°C and 940°C for not less than one hour, cooled at a rate not exceeding 50°C per hour to a temperature of 670°C or less, and cooled thereafter at the natural rate of cooling of the furnace.
- 4.3. In order to prevent the formation of scale, test pieces shall be heated either in suitable closed containers, or in a furnace atmosphere of hydrogen (preferably) or cracked ammonia containing not more than 0.5 per cent of residual ammonia. Contamination by sulphur, oxygen or carbon is to be avoided, and cast-iron containers shall not be used.
- 4.4. With the concurrence of the Inspecting Authority, an alternative heat treatment that will ensure compliance with the requirements of Clause 8 may be used.

**5 Freedom from defects**

- 5.1. The material shall be free from harmful defects.
- 5.2. Any material may be rejected for faults in manufacture although it may have passed the magnetic test specified in Clause 8 below.

**6. Margins of manufacture**

- 6.1. The tolerances on the thickness of sheets, strips and plates, the diameters of bars and the dimensions of forgings shall be agreed between manufacturer and purchaser and stated on the order.

6.2. The tolerances on the dimensions of tubes shall be as follows:—

*Outside diameter*

Up to and including 2" ... ..	± 2 %
Over 2", up to and including 3¾" ... ..	± 1½%
Over 3¾" ... ..	± 1%

*Thickness*

For all sizes ... ..	± 12½%
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### 7. Selection and preparation of samples for magnetic tests

7.1. The Inspector shall select an ingot from each batch from which three sections, including one from each end shall be cut to provide three test samples. One sample shall either

(a) (preferably) be pierced, forged without welding, and machined to a ring with the following dimensions:—

Outside diameter of ring ... ..	4 inches
Radial thickness ... ..	¼ inch
Axial length ... ..	½ inch

or (b) be forged to a bar for testing in a compensated yoke permeameter, in accordance with the provisions of B.S.2454.

7.2. Alternatively, where the material is supplied in the form of tubes, a sample shall be cut from the batch and shall be machined to a radial thickness of not more than  $\frac{1}{4}$  of the mean diameter, and to an axial length which shall ensure a radial cross sectional area of from 1 to 10 sq cm (0.16 to 1.6 sq in).

7.3. Test pieces shall be heat-treated in accordance with Clause 4.2 and shall not be mechanically worked before testing in accordance with Clause 8.

### 8. Magnetic tests

"8.1. After the heat treatment specified in Clause 4, test pieces shall be submitted to magnetic tests in accordance with one of the methods specified in B.S.2454, recording either B against H or vice versa. The results obtained shall comply with the requirements of Table 1 or Table 2 below. The tests shall be carried out by the manufacturer, unless the order states that they will be carried out by the purchaser after delivery."

#### B/H CHARACTERISTICS

**TABLE 1. (C.G.S. units)**

H (oersteds)	B (gauss) not less than	B (gauss)	H (oersteds) not more than
5	12,000	12,000	5.0
10	14,100	14,000	9.6
20	15,400	15,000	15.5
50	16,700	16,000	29.0
100	17,600	17,000	63.0
200	18,800	18,000	130
—	—	19,000	220

**TABLE 2. (M.K.S. units)**

H (amp/m)	B (webers / m <sup>2</sup> ) not less than	B (webers/m <sup>2</sup> )	H (amp/m) not more than
500	1.28	1.2	400
1,000	1.45	1.4	768
2,000	1.58	1.5	1,240
5,000	1.70	1.6	1,320
10,000	1.79	1.7	5,040
15,000	1.87	1.8	10,400
—	—	1.9	17,600

8.2. *Coercive force.* After a test piece has been subjected to a magnetising force sufficient to produce in it a flux density of 15,000 gauss (1.5 weber/m<sup>2</sup>) the coercive force shall be not more than 1.5 oersted (120 amp/m). The measurement of coercive force may be made by any suitable means, using the same specimen as for the B/H measurement.

**9. Re-tests**

- 9.1. *Ingots.* If any test piece fails to comply with the requirements of Clause 8 the remaining two samples of the set of three shall be prepared as described in Clauses 7.1 (*a*) or (*b*), and 7.3. Both test pieces shall comply with the requirements of Clause 8.
- 9.2. *Tubes.* If any test piece fails to comply with the requirements of Clause 8, the Inspector shall select for test from the batch two further samples, one of which shall be from the tube from which the original test sample was taken, unless that tube has been withdrawn by the manufacturer. The test pieces prepared from both these further samples in accordance with Clause 7.2 and 7.3 shall comply with the requirements of Clause 8.

**10. Final marking**

- 10.1. All material shall be stamped with the mark of the inspector, 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 and Structures Research and Development.

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