

METRIC

DOD-F-24669/4

7 July 1986

SUPERSEDING

MIL-S-17758(SHIPS)

23 August 1956

MILITARY SPECIFICATION

FORGINGS AND FORGING STOCK, STEEL BARS
AND BILLETS, NICKEL AND NICKEL-MOLYBDENUM
MODIFIED HADFIELD; LOW MAGNETIC PERMEABILITY (METRIC)

This specification is approved for use by all Departments and Agencies of the Department of the Defense.

1. SCOPE

1.1 Scope. This specification covers bars, billets and forgings made of two modified Hadfield steels having low magnetic permeability.

1.2 Classification. The material covered by this specification shall be of the following alloys, as specified (see 6.2).

Alloy 1 - Nickel modified Hadfield steel

Alloy 2 - Nickel-molybdenum modified Hadfield steel

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specification and standard. The following specification and standard forms a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

MILITARY

DOD-F-24669 - Forgings and Forging Stock, Steel Bars, Billets and Blooms, General Specification For. (Metric)

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

AREA FORG

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STANDARD

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection By
Attributes.

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following document forms a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A 342 - Standard Test Methods for Permeability of Feebly
Magnetic Materials.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 General. The material furnished under this specification shall be in accordance with the requirements of DOD-F-24669.

3.2 Bars and forgings. Unless otherwise specified (see 6.2) bars and forgings shall be furnished with scale not removed.

3.3 Heat treatment. Unless otherwise specified (see 6.2) bars, billets and forgings shall be in the as-formed condition.

3.4 Chemical composition. Bars, billets and forgings shall comply with the composition requirements shown in table I.

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TABLE I. Chemical composition.

Alloy	Carbon	Manganese	Silicon	Nickel	Phos-phorus (max)	Sulphur (max)	Chro-mium (max)	Molyb-deum
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
1	0.70-0.90	13-15	0.50-1.00	3.0-3.5	0.07	0.05	0.50	—
2	0.70-0.90	13-15	0.50-1.00	1.75-2.25	0.07	0.05	0.50	0.35-0.55

3.5 Mechanical properties. Bars and forgings shall comply with the mechanical property requirements shown in table II.

TABLE II. Mechanical properties.

Alloy	Tensile strength (min)	Yield strength (0.2 percent offset) (min)	Elongation in 2 inches or 4D (min)	Elongation reduction in area (min)
	MPa lb/in ²	MPa lb/in ²	Percent	Percent
1 and 2	690 100,000	345 50,000	18	56

3.6 Magnetic permeability. The magnetic permeability shall not exceed 1.2. An increase in permeability up to and including 2.0 resulting from the cold shearing of stock to size will not be cause for rejection.

4. QUALITY ASSURANCE PROVISIONS

4.1 The quality assurance provisions shall be in accordance with DOD-F-24669 and as specified herein.

4.2 Sampling.

4.2.1 Sampling for mechanical tests. One longitudinal specimen from each lot (see DOD-F-24669) of bars, billets, or forgings shall be selected.

4.2.2 Magnetic permeability. Sampling shall be in accordance with MIL-STD-105, general inspection level I, acceptance quality level 1.5.

4.2.3 Dimensional examination. Sampling shall be in accordance with MIL-STD-105, general inspection level I, acceptance quality level 1.5.

4.3 Examination and test procedures.

4.3.1 Magnetic permeability. Each of the items selected in accordance with 4.2.2 shall be tested in accordance with ASTM A 342.

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5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition.)

5.1 Preservation, packing, packaging, and marking shall be in accordance with DOD-F-24669.

6. NOTES

6.1 Intended use. This material is intended to be used where an abrasion resistant alloy of low-magnetic permeability is required.

6.2 Ordering data. In addition to the ordering data of DOD-F-24669, acquisition documents should specify the following:

- (a) Alloy number (see 1.2).
- (b) If bars and forgings are to be furnished with scale removed (see 3.2).
- (c) Heat treatment, if condition other than as-formed (see 3.3).
- (d) Size, shape and quantity of bars, billets and forgings required.
- (e) The applicable drawing, piece number and location of marking for forgings only.
- (f) For bars, billets and forgings in excess of 645 square centimeters (100 square inches), the acceptance criteria for macrostructure examination (see DOD-F-24669).

Custodians:

Army - MR
Navy - SH
Air Force - 99

Preparing activity:

Navy - SH
(Project FORG-0128-04)

Review activities:

Army - AR, MI, GL
Navy - AS, OS
Air Force - 84

User activity:

Navy - MC

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