

METRIC
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DOD-F-24669/2

7 July 1986

SUPERSEDING

MIL-S-18410(SHIPS)

28 February 1955

MIL-S-872A(SHIPS)

9 March 1955

## MILITARY SPECIFICATION

FORGINGS AND FORGING STOCK, STEEL BARS  
AND BILLETS - CHROMIUM-MOLYBDENUM ALLOY (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 wrought chromium-molybdenum alloy steel bars and forgings for use at temperatures not over 565 degrees Celsius (°C) (1050 degrees Fahrenheit (°F)). Bars and billets for reforging may also be acquired to this specification.

1.2 Classification. Wrought chromium-molybdenum alloy steel shall be furnished in the following compositions and conditions, as specified (see 6.2).

Composition F-11

Composition F-22

Condition AR - As hot rolled bars and billets for reforging.

Condition A - Annealed (reforging stock only).

Condition HT - Heat treated (bars and forgings).

## 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.

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.
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AREA FORG

DOD-F-24669/2

## SPECIFICATION

## MILITARY

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

## 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 documents form 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 29 - Standard Specification for Steel Bars, Carbon and Alloy, Hot-Wrought and Cold-Finished, General Requirements for. (DoD adopted)
- E 10 - Standard Test Method for Brinell Hardness of Metallic Materials. (DoD adopted)
- E 18 - Standard Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials. (DoD adopted)
- E 110 - Standard Test Method for Indentation Hardness of Metallic Materials by Portable Hardness Testers.

(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.

DOD-F-24669/2

3.2 Chemical requirements. The bars, billets and forgings shall be in accordance with table I and be within the check analysis tolerances of ASTM A 29.

TABLE I. Chemical requirements.

Com- posi- tion	Carbon	Manganese	Phos- phorous (max)	Sulphur (max)	Silicon	Molybdenum	Chromium
	Percent	Percent	Percent	Percent	Percent	Percent	Percent
F-11	0.15 max	0.30 - 0.60	0.040	0.040	0.50 max	0.90 - 1.10	2.00 - 2.50
F-22	0.10 - 0.20	0.30 - 0.80	0.040	0.040	0.50 - 1.00	0.45 - 0.65	1.00 - 1.50

3.3 Mechanical properties. The bars and forgings shall conform to table II. (No mechanical properties are required for condition AR bars and billets for reforging.)

TABLE II. Mechanical properties.

Conditions	Tensile strength (min)		Yield point <sup>1/</sup> (min)		Elonga- tion in 2 inches (min)	Reduction of area (min)	Hardness (max)	
	MPa	Klb/in <sup>2</sup>	MPa	Klb/in <sup>2</sup>	Percent	Percent	Brinell	Rockwell
A HT	--- 485	-- 70	--- 275	-- 40	--- 20	--- 40	180 ---	B 89 ---

<sup>1/</sup> Where a definite yield point is not exhibited, the yield strength corresponding to a limiting offset of 0.2 percent of the gauge length of the specimen shall be used.

3.4 Heat treatment. Bars and forgings to condition HT may be annealed, or normalized and tempered. The final tempering temperature shall be 620°C (1150°F) minimum. When approved by the Command or agency concerned, liquid quenching followed by tempering shall be permitted. When a stress relief is employed, the temperature shall not exceed 55°C (100°F) below the final tempering temperature and shall be held for a minimum of 1/2 hour per centimeter (1 hour per inch) of thickness.

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

## DOD-F-24669/2

4.2.2 Sampling for mechanical tests. For bars and forgings furnished in condition HT, one tension test shall be performed on each lot (see DOD-F-24669).

4.2.3 Sampling for hardness tests. For bars and forgings furnished in condition A, hardness tests shall be performed on a sample selected in accordance with MIL-STD-105, general inspection level I, acceptance quality level 1.5.

4.2.4 Dimensional examination. The samples selected in accordance with 4.2.1 shall be examined for the dimensional requirements of the applicable drawing or as specified (see 6.2).

4.3 Hardness test procedures. Hardness tests shall be performed in accordance with ASTM E 18 for Rockwell, ASTM E 10 for Brinell tests or ASTM E 110 for portable testers.

## 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. Steel covered by this specification is intended for use at temperatures not over 565°C (1050°F), such as in superheated steam, high pressure saturated steam lines or feed discharge lines, and for steam turbine applications, such as, turbine diaphragms, nozzle blocks and rings.

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

- (a) Composition and condition required (see 1.2).
- (b) Size, shape and quantity of bars, billets or forgings required.
- (c) The applicable drawing, piece number and location of marking (for forgings only).
- (d) For bars, billets, or forgings in excess of 645 square centimeters (100 square inches) the acceptance criteria for macrostructure examination (see DOD-F-24669).
- (e) If dimensional requirements are other than to the applicable drawing (see 4.2.4).

6.3 Supersession data. The alloy of MIL-S-872 is no longer required and where specified shall be replaced by composition F-11 of this specification.

DOD-F-24669/2

**Custodians:**

Army - MR  
Navy - SH  
Air Force - 99

**Preparing activity:**

Navy - SH  
(Project FORG-0128-02)

**Review activities:**

Army - AR, MI, GL  
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Air Force - 84

**User activity:**

Navy - MC

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