QQ-T-570C
April 26, 1977
SUPERSEDING
QQ-T-570B
December 19, 1967

FEDERAL SPECIFICATION

TOOL STEEL, ALLOY

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal Agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers alloy tool steels as described in ASTM A 681 which are used for the manufacture of wrought steel products including hot or cold finished bar, plate, sheet, strip, rod, wire, or forgings which are normally fabricated into tools, dies, or fixtures.

1.2 Classification. Material in accordance with this specification is classified by chemical composition. Types correspond to respective AISI designations.

1.2.1 Hot work tool steels.

1.2.1.1 Types H10, H11, H12, H13, H14, and H19 are characterized by a controlled chromium content along with other alloying elements. The first four, containing molybdenum, offer excellent toughness and high hardenability and are frequently used in cold work applications requiring toughness at relative high hardness levels. These steels are widely used and many sizes are available from warehouse stocks.

1.2.1.2 Types H21 to H26 are characterized by a controlled tungsten content along with other alloying elements. These steels offer greater resistance to the softening effect of elevated service temperatures but exhibit a lower degree of toughness.

1.2.1.3 Types H41 to H43 are low-carbon modifications of molybdenum high speed tool steels and have characteristics similar to the tungsten types. They are generally available only on a mill delivery basis.

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1.2.2 Cold work tool steels.

1.2.2.1 Types A2 to A10 cover a wide range of carbon and alloy contents but all have high hardenability and may be hardened in air. The low carbon types A8 and A9 have less wear resistance but offer greater toughness than others in this group. Type A7, with high carbon and vanadium, offers exceptional wear resistance but at a very low level of toughness.

1.2.2.2 Types D2, D3, D4, D5, and D7 are characterized by high carbon and high chromium contents and exhibit high resistance to abrasion. The types containing molybdenum may be hardened in air and offer a high degree of dimensional stability in heat treatment.

1.2.2.3 Types O1, O2, O6, and O7 are low-alloy types that must be hardened by quenching in oil. Sizes over about 2 in. (50mm) in cross section usually exhibit lower interior hardness. These steels are widely used and are available in many sizes from warehouse stocks.

1.2.3 Shock-resisting steels.

1.2.3.1 Types S1, S2, S4, S5, S6 and S7 vary in alloy content but are intended for shock-resisting applications.

1.2.4 Special purpose tool steels.

1.2.4.1 Types L2, L3, and L6 are low alloy steels with a wide range of carbon content. The low-carbon types are generally used for structural applications requiring good levels of toughness, while the high-carbon types may be used for short-run tools.

1.2.5 Special purpose tool steels. Types F1 and F2 are high-carbon steels with varying tungsten content used primarily for relatively short-run fine edge cutting tools.

1.2.6 Mold steels.

1.2.6.1 Types P2 to P6 are very low-carbon steels and must be carburized after machining or hubbing.

1.2.6.2 Types P20 and P21 are usually supplied in the prehardened condition and can be placed in service directly after machining.

2. APPLICABLE DOCUMENTS

2.1 In addition to the applicable documents shown in ASTM A 681, Tool Steel, Alloy, the following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein. Unless otherwise specified in the contract or order, the latest revision of A 681 accepted by the Government shall apply.

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Federal standards:

Fed. Std. No. 123 - Marking for Shipment (Civil Agencies).
Fed. Std. No. 183 - Continuous Identification Marking of Iron and Steel Products.

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and Index of Federal Specifications and Standards from the established distribution points in their agencies.)

Military standards:

MIL-STD-129 - Marking for Shipment and Storage
MIL-STD-163 - Steel Mill Products, Preparation for Shipment and Storage

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

2.2 Other publications. The following document forms a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM)

A 700 - Recommended Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment.

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

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3. REQUIREMENTS

3.1 The requirements for chemical composition, hardness, macrostructure, and decarburization shall be as specified in A 681.

3.2 Dimensions and dimensional tolerances shall be in accordance with the requirements of A 681, section 10 and tables 4, 5, 6, 7, 9, 11, 13, 15, 16, 17, 18, 19, and 20 for the applicable product and form.

3.3 Workmanship. Alloy tool steels shall meet the workmanship requirements of section 11 of A 681.

3.4 When ultrasonic or cleanliness requirements and tests are specified in the contract or order, they shall be in accordance with the supplementary requirements of A 681.

3.5 Identification marking. The tool steel material shall be marked with the name or brand of manufacturer, number of this specification, heat number, grade or type, and where appropriate, the size, length, and weight. Unless otherwise specified in the contract or order, the method of marking is at the option of the manufacturer.

3.5.1 For Government procurement by the Defense Supply Agency, steel shall be continuously marked for identification in accordance with Fed. Std. No. 183.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Lot. Unless otherwise specified in the contract or order, a lot shall consist of all material submitted for inspection at the same time, of the same heat, type, finish, and size, and when heat treated, subjected to the same heat treatment.

4.3 Sampling.

4.3.1 For chemical analysis. At least one sample shall be selected from each heat to determine compliance with the requirements of table I of A 681.

4.3.2 For hardness test. Five samples or five percent (whichever is less) of the pieces in a lot shall be randomly selected for hardness tests.

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4.3.3 For macrostructure examination. One sample shall be selected from each lot as described in A 681.

4.3.4 For decarburization examination. One sample shall be selected from each lot as described in A 681.

4.3.5 Examination, inspection, and test procedures for the alloy tool steel material shall be conducted in accordance with A 681.

4.3.6 Rejection and retest shall be in accordance with sections 14 and 15 of A 681.

5. PREPARATION FOR DELIVERY

5.1 Packaging and loading.

5.1.1 Unless otherwise specified, shipments shall be packaged and loaded in accordance with Recommended Practices A 700.

5.1.2 When specified in the contract or order, and for direct procurement by or direct shipment to the Government, when Level A is specified, preservation, packaging, and loading shall be in accordance with the Level A requirements of MIL-STD-163.

5.2 Marking.

5.2.1 When specified in the contract or order, and for direct procurement by or direct shipment to the Government, marking for shipment, in addition to any requirements specified in the contract or order, shall be in accordance with MIL-STD-129 for Military agencies, and in accordance with Fed. Std. No. 123 for Civil agencies.

6. NOTES

6.1 Procurement documents should specify the following:

a. Title, number, and date of this specification.
b. Type of tool steel.
c. When a revision other than the latest revision of the document is to be used (see 2.1).
d. Ultrasonic or cleanliness requirements if required (see 3.4).
e. Form, dimensional requirements, finish, condition, and supplementary requirements shown in section 4 of A 681.

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