



Standard Specification for Tool Steel, Carbon¹

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This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers the chemical, mechanical, and physical requirements for available wrought carbon tool steel products.

1.2 These products, which include hot- or cold-finished bar, plate, sheet, rod, wire, or forgings, are normally fabricated into tools, dies, or fixtures. The selection of a material for a particular application will depend upon design, service conditions, and desired properties.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

2. Referenced Documents

2.1 ASTM Standards:²

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A388/A388M Practice for Ultrasonic Examination of Steel Forgings

A561 Practice for Macroetch Testing of Tool Steel Bars

A700 Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment

E3 Guide for Preparation of Metallographic Specimens

E30 Test Methods for Chemical Analysis of Steel, Cast Iron, Open-Hearth Iron, and Wrought Iron (Withdrawn 1995)³

E45 Test Methods for Determining the Inclusion Content of Steel

E59 Practice for Sampling Steel and Iron for Determination of Chemical Composition (Withdrawn 1996)³

¹ This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.29 on Tool Steels.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

2.2 Military Standard:⁴

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

2.3 Federal Standards:⁴

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)

Fed. Std. No. 183 Continuous Identification Marking of Iron and Steel Products

3. Classification

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

3.1.1 *Carbon Tool Steels, Identification W*—Types W1, W2, and W5 are often referred to as water hardening tool steels since they require rapid quenching rates to attain the necessary hardness. Except in very small sizes they will harden with a hard case and a soft core.

3.1.1.1 Type W1 is an unalloyed carbon steel available in several carbon ranges.

3.1.1.2 Type W2 is characterized by a nominal vanadium content of 0.25 % and is also available in several carbon ranges.

3.1.1.3 Type W5 is characterized by a nominal chromium content of 0.50 %.

3.1.1.4 A suffix following the type designation is added to denote the minimum carbon content of the carbon range to be specified.

3.1.2 Types W1 and W2 are further classified by quality levels, namely, Grade A and Grade C.

3.1.2.1 Grade A is sometimes referred to as *Extra* or *Special*. It is controlled for hardenability; the chemical composition is held to closest limits; and it is subject to rigid tests to ensure uniformity. Grade A is available with three degrees of hardenability, namely, shallow hardening, regular hardening, and deep hardening.

3.1.2.2 Grade C is sometimes referred to as *Regular* or *Standard*. It is intended for applications that do not require controlled hardenability and where some latitude in uniformity is permissible.

⁴ Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.