



Standard Specification for Tool Steels Alloy¹

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

1. Scope

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

1.2 These products, which include hot or cold finished bar, plate, sheet, strip, 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 the standard. The values given in parentheses are provided for information only.

2. Referenced Documents

2.1 ASTM Standards:

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products²

A 561 Practice for Macroetch Testing of Tool Steel Bars³

A 600 Specification for Tool Steel High Speed³

A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment³

E 3 Methods of Preparation of Metallographic Specimens⁴

E 30 Test Methods for Chemical Analysis of Steel, Cast Iron, Open-Hearth Iron, and Wrought Iron⁵

E 45 Test Methods for Determining the Inclusion Content of Steel⁴

E 59 Practice for Sampling Steel and Iron for Determination of Chemical Composition⁵

E 527 Practice for Numbering Metals and Alloys (UNS)⁶

2.2 Military Standard:

MIL-STD-163 Steel Mill Products, Preparation for Shipment and Storage⁷

2.3 Federal Standards:

Fed. Std. No. 123 Marking and Shipment (Civil Agencies)⁷

Fed. Std. No. 183 Continuous Identification Marking of Iron and Steel Products⁷

2.4 Other Standards:

SAE J1086 Recommended Practice for Numbering Metals and Alloys (UNS)⁸

3. Classification

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

3.1.1 Hot Work Tool Steels, Identification H:

3.1.1.1 Types H10 to 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 relatively high hardness levels.

3.1.1.2 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.

3.1.1.3 Types H41 to H43 are low-carbon modifications of molybdenum high speed tool steels (Note 1) and have characteristics similar to the tungsten types.

NOTE 1—High-speed tool steels are covered in Specification A 600.

3.1.2 Cold Work Tool Steels, Identification A—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.

3.1.3 Cold Work Tool Steels, Identification D—Types D2 to 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 This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.29 on Tool Steels.

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² Annual Book of ASTM Standards, Vol 01.03.

³ Annual Book of ASTM Standards, Vol 01.05.

⁴ Annual Book of ASTM Standards, Vol 03.01.

⁵ Annual Book of ASTM Standards, Vol 03.05.

⁶ Annual Book of ASTM Standards, Vol 01.01.

⁷ Available from the Standardization Documents, Order Desk, Bldg. 4, Section D 700 Robbins Ave. Philadelphia, PA 19111-5094 Attn: NPODS.

⁸ Available from the Society of Automotive Engineers, 400 Commonwealth drive, Warrendale, PA 15096.