



Standard Test Methods for Chemical Analysis of Tool Steels and Other Similar Medium- and High-Alloy Steels¹

This standard is issued under the fixed designation E352; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 These test methods cover the chemical analysis of tool steels and other similar medium- and high-alloy steels having chemical compositions within the following limits:

Element	Composition Range, %
Aluminum	0.005 to 1.5
Boron	0.001 to 0.10
Carbon	0.03 to 2.50
Chromium	0.10 to 14.0
Cobalt	0.10 to 14.0
Copper	0.01 to 2.0
Lead	0.001 to 0.01
Manganese	0.10 to 15.00
Molybdenum	0.01 to 10.00
Nickel	0.02 to 4.00
Nitrogen	0.001 to 0.20
Phosphorus	0.002 to 0.05
Silicon	0.10 to 2.50
Sulfur	0.002 to 0.40
Tungsten	0.01 to 21.00
Vanadium	0.02 to 5.50

1.2 The test methods in this standard are contained in the sections indicated below:

	Sections
Carbon, Total, by the Combustion— Thermal Conductivity Method— <i>Discontinued 1986</i>	
Carbon, Total, by the Combustion Gravimetric Method— <i>Discontinued</i>	
Chromium by the Atomic Absorption Method	(0.006 % to 1.00 %) 174
Chromium by the Peroxydisulfate Oxidation—Titration Method	(0.10 % to 14.00 %) 184
Chromium by the Peroxydisulfate-Oxidation Titrimetric Method— <i>Discontinued 1980</i>	
Cobalt by the Ion-Exchange— Potentiometric Titration Method	(2 % to 14 %) 52
Cobalt by the Nitroso-R-Salt Spectrophotometric Method	(0.10 % to 5.0 %) 60
Copper by the Neocuproine Spectrophotometric Method	(0.01 % to 2.00 %) 89

¹ These test methods are under the jurisdiction of the ASTM Committee E01 on Analytical Chemistry for Metals, Ores, and Related Materials and are the direct responsibility of Subcommittee E01.01 on Iron, Steel, and Ferroalloys.

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	Sections
Copper by the Sulfide Precipitation- Electrodeposition Gravimetric Method	(0.01 % to 2.0 %) 70
Lead by the Ion-Exchange—Atomic Absorption Method	(0.001 % to 0.01 %) 99
Nickel by the Dimethylglyoxime Gravimetric Method	(0.1 % to 4.0 %) 144
Manganese by the Periodate Spectrophotometric Method	(0.10 % to 5.00 %) 8
Molybdenum by the Ion Exchange— 8-Hydroxyquinoline Gravimetric Method	203
Molybdenum by the Spectrophotometric Method	(0.01 % to 1.50 %) 162
Phosphorus by the Alkalimetric Method	(0.01 % to 0.05 %) 136
Phosphorus by the Molybdenum Blue Spectrophotometric Method	(0.002 % to 0.05 %) 18
Silicon by the Gravimetric Method	(0.10 % to 2.50 %) 45
Sulfur by the Gravimetric Method— <i>Discontinued 1988</i>	
Sulfur by the Combustion-Iodate Titration Method— <i>Discontinued</i>	
Sulfur by the Chromatographic Gravimetric Method— <i>Discontinued 1980</i>	
Tin by the Solvent Extraction— Atomic Absorption Method	(0.002 % to 0.10 %) 152
Vanadium by the Atomic Absorption Method	(0.006 % to 0.15 %) 193

1.3 Test methods for the determination of carbon and sulfur not included in this standard can be found in Test Methods E1019.

1.4 Some of the composition ranges given in 1.1 are too broad to be covered by a single test method and therefore this standard contains multiple test methods for some elements. The user must select the proper test method by matching the information given in the Scope and Interference sections of each test method with the composition of the alloy to be analyzed.

1.5 The values stated in SI units are to be regarded as standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* Specific hazards statements are given in Section 6 and in special “Warning” paragraphs throughout these test methods.