



Standard Test Methods for Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys¹

This standard is issued under the fixed designation E 354; 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.

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

^{ε1} NOTE—Editorial changes were made in November 2000.

1. Scope

1.1 These test methods cover the chemical analysis of high-temperature, electrical, magnetic, and other similar iron, nickel, and cobalt alloys having chemical compositions within the following limits:

Element	Concentration Range, %
Aluminum	0.005 to 18.00
Beryllium	0.001 to 0.05
Boron	0.001 to 1.00
Calcium	0.002 to 0.05
Carbon	0.001 to 1.10
Chromium	0.10 to 33.00
Cobalt	0.10 to 75.00
Columbium (Niobium)	0.01 to 6.0
Copper	0.01 to 10.00
Iron	0.01 to 85.00
Magnesium	0.001 to 0.05
Manganese	0.01 to 3.0
Molybdenum	0.01 to 30.0
Nickel	0.10 to 84.0
Nitrogen	0.001 to 0.20
Phosphorus	0.002 to 0.08
Silicon	0.01 to 5.00
Sulfur	0.002 to 0.10
Tantalum	0.005 to 10.0
Titanium	0.01 to 5.00
Tungsten	0.01 to 18.00
Vanadium	0.01 to 3.25
Zirconium	0.01 to 2.50

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

	Sections
Aluminum, Total, by the 8-Quinolinol Gravimetric Method (0.20 to 7.00 %)	100

Carbon, Total, by the Combustion-Thermal Conductivity Method	1a
Carbon, Total, by the Combustion Gravimetric Method (0.05 to 1.10 %)	79
Chromium by the Atomic Absorption Method (0.006 to 1.00 %)	165
Chromium by the Peroxydisulfate Oxidation—Titration Method (0.10 to 33.00 %)	175
Chromium by the Peroxydisulfate-Oxidation Titrimetric Method	1b
Cobalt by the Ion-Exchange-Potentiometric Titration Method (2 to 75 %)	53
Cobalt by the Nitroso-R-Salt Photometric Method (0.10 to 5.0 %)	61
Copper by Neocuproine Photometric Method (0.01 to 10.00 %)	90
Copper by the Sulfide Precipitation-Electrodeposition Gravimetric Method (0.01 to 10.00 %)	71
Iron by the Silver Reduction Titrimetric Method (1.0 to 50.0 %)	192
Manganese by the Periodate Photometric Method (0.05 to 2.00 %)	8
Molybdenum by the Ion Exchange—8-Hydroxyquinoline Gravimetric Method (1.5 to 30 %)	184
Molybdenum by the Photometric Method (0.01 to 1.50 %)	153
Nickel by the Dimethylglyoxime Gravimetric Method (0.1 to 84.0 %)	135
Phosphorus by the Molybdenum Blue Photometric Method (0.002 to 0.08 %)	18
Silicon by the Gravimetric Method (0.05 to 5.00 %)	46
Sulfur by the Gravimetric Method	1c
Sulfur by the Combustion-Iodate Titration Method (0.005 to 0.1 %)	37
Sulfur by the Chromatographic Gravimetric Method	1b
Tin by the Solvent Extraction—Atomic Absorption Method (0.002 to 0.10 %)	143

1.3 Methods for the determination of several elements not included in this standard can be found in Test Methods E 30 and Test Methods E 1019.

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

1.5 The values stated in SI units are to be regarded as standard. In some cases, exceptions allowed in Practice E 380 are also used.

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

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

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^{1a} Discontinued April 25, 1986. Its replacement appears as part of ASTM Test Methods E 1019, found in *Annual Book of ASTM Standards*, Vol 03.06.

^{1b} Discontinued May 30, 1980.

^{1c} Discontinued April 29, 1988.