



Standard Test Method for Analysis of Nickel Alloys by Spark Atomic Emission Spectrometry¹

This standard is issued under the fixed designation E3047; 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 This method describes the spark atomic emission spectrometric (Spark-AES) analysis of nickel alloys, such as those specified by committee B02, having chemical compositions within the following limits:

Element	Application Range (Mass Fraction, %)
Aluminum	0.005-6.00
Boron	0.001-0.10
Carbon	0.005-0.15
Chromium	0.01-33.00
Copper	0.01-35.00
Cobalt	0.01-25.00
Iron	0.05-55.00
Magnesium	0.001-0.020
Manganese	0.01-1.00
Molybdenum	0.01-35.00
Niobium	0.01-6.0
Nickel	25.00-100.0
Phosphorous	0.001-0.025
Silicon	0.01-1.50
Sulfur	0.0001-0.01
Titanium	0.0001-6.0
Tantalum	0.01-0.15
Tin	0.001-0.020
Tungsten	0.01-5.0
Vanadium	0.0005-1.0
Zirconium	0.01-0.10

1.2 The following elements may be determined using this method.

Element	Quantification Range (Mass Fraction, %)
Aluminum	0.010-1.50
Boron	0.004-0.025
Carbon	0.014-0.15
Chromium	0.09-20.0
Cobalt	0.05-14.00
Copper	0.03-0.6
Iron	0.17-20
Magnesium	0.001-0.03
Manganese	0.04-0.6
Molybdenum	0.07-5.0
Niobium	0.02-5.5

¹ This test method is under the jurisdiction of ASTM Committee E01 on Analytical Chemistry for Metals, Ores, and Related Materials and is the direct responsibility of Subcommittee E01.08 on Ni and Co and High Temperature Alloys.

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Element	Quantification Range (Mass Fraction, %)
Phosphorous	0.005-0.020
Silicon	0.07-0.6
Sulfur	0.002-0.005
Tantalum	0.025-0.15
Tin	0.001-0.02
Titanium	0.025-3.2
Tungsten	0.02-0.10
Vanadium	0.005-0.25
Zirconium	0.01-0.05

1.3 This method has been interlaboratory tested for the elements and quantification ranges specified in section 1.2. The ranges in section 1.2 indicate intervals within which results have been demonstrated to be quantitative. It may be possible to extend this method to other elements or different composition ranges provided that a method validation study as described in Guide E2857 is performed and that the results of this study show that the method extension is meeting laboratory data quality objectives. Supplemental data on other elements not included in the scope are found in the supplemental data tables of the Precision and Bias section.

1.4 *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 safety hazard statements are given in Section 9.*

2. Referenced Documents

2.1 ASTM Standards:²

- E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- E135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials
- E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods
- E305 Practice for Establishing and Controlling Atomic Emission Spectrochemical Analytical Curves

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.