



Standard Test Methods for Chemical Analysis of Refined Nickel¹

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1. Scope

1.1 These test methods² apply to the chemical analysis of refined nickel and other forms of metallic nickel having chemical compositions within the following limits:

Element	Weight %
Antimony, less than	0.005
Arsenic, less than	0.005
Bismuth, less than	0.01
Cadmium, less than	0.0025
Carbon, max	0.03
Cobalt, max	1.00
Copper, max	1.00
Hydrogen, max	0.003
Iron, max	0.15
Lead, less than	0.01
Manganese, less than	0.20
Nickel, min	98.0
Nitrogen, less than	0.50
Oxygen, less than	0.03
Phosphorus, less than	0.005
Selenium, less than	0.0010
Silicon, less than	0.005
Silver, less than	0.01
Sulfur, max	0.01
Tellurium, less than	0.0010
Thallium, less than	0.0010
Tin, less than	0.005
Zinc, less than	0.015

1.2 These test methods may be used to determine the following elements in the sections indicated below:

	Sections
Antimony, Arsenic, Bismuth, Cadmium, Lead, Selenium, Silver, Tellurium, Tin, and Thallium by the Electrothermal Atomic Absorption Method	20 to 30
Bismuth, Cadmium, Cobalt, Copper, Iron, Lead, Manganese, Silver, and Zinc by the Flame Atomic Absorption Method	8 to 19
Carbon, Total, by the Combustion-Instrumental Method ³	31 to 42
Nickel by the Dimethylglyoxime Gravimetric Method ⁴	91 to 99
Nitrogen by the Inert Gas Fusion Thermal Conductivity Method ³	66 to 77
Oxygen by the Inert Gas Fusion Method ³	78 to 90
Sulfur by the Infrared Absorption Method ³	43 to 54

¹ These test methods are under the jurisdiction of ASTM Committee E-1 on Analytical Chemistry for Metals, Ores, and Related Materials and are the direct responsibility of Subcommittee E01.08 on Ni and Co and High-Temperature Alloys. Current edition approved Jan. 15, 1994. Published March 1994.

² These methods represent revisions of, and replacements for, methods covered by Methods E 39 and E 107.

Sulfur by the Methylene Blue Spectrophotometric Method 55 to 65
After Generation of Hydrogen Sulfide

1.3 *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.* For specific precautions, see Section 5.

2. Referenced Documents

2.1 ASTM Standards:

- D 1193 Specification for Reagent Water⁵
- E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications⁶
- E 39 Methods for Chemical Analysis of Nickel⁷
- E 50 Practices for Apparatus, Reagents, and Safety Precautions for Chemical Analysis of Metals⁷
- E 60 Practice for Photometric and Spectrophotometric Methods for Chemical Analysis of Metals⁷
- E 107 Test Methods for Chemical Analysis of Electronic Nickel⁷
- E 173 Practice for Conducting Interlaboratory Studies of Methods for Chemical Analysis of Metals⁷
- E 354 Test Methods for Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys⁸
- E 882 Guide for Accountability and Quality Control in the Chemical Analysis Laboratory⁸
- E 1019 Test Methods for Determination of Carbon, Sulfur, Nitrogen, Oxygen, and Hydrogen in Steel and in Iron, Nickel, and Cobalt Alloys⁸
- E 1024 Guide for Chemical Analysis of Metals and Metal Bearing Ores by Flame Absorption Spectrophotometry⁸

2.2 ISO Standard:

- ISO 5725 Precision of Test Methods—Determination of

³ This method appears in Test Methods E 1019 – 88, in the 1992 *Annual Book of ASTM Standards*, Vol 03.05.

⁴ Supporting data are available from ASTM Headquarters. Request RR:E03-1051.

⁵ *Annual Book of ASTM Standards*, Vol 11.01.

⁶ *Annual Book of ASTM Standards*, Vol 14.02.

⁷ *Annual Book of ASTM Standards*, Vol 03.05.

⁸ *Annual Book of ASTM Standards*, Vol 03.06.