



Standard Test Method for Analysis of Ni-Base Alloys by Wavelength Dispersive X-Ray Fluorescence Spectrometry¹

This standard is issued under the fixed designation E2465; 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 test method covers the analysis of Ni-base alloys by wavelength dispersive X-ray Fluorescence Spectrometry for the determination of the following elements:

Element	Composition Range
Manganese	0.06 % to 1.6 %
Phosphorus	0.008 % to 0.015 %
Silicon	0.08 % to 0.6 %
Chromium	1.6 % to 22 %
Nickel	23 % to 77 %
Aluminum	0.20 % to 1.3 %
Molybdenum	0.03 % to 10 %
Copper	0.007 % to 2.5 %
Titanium	0.11 % to 3.0 %
Niobium	0.55 % to 5.3 %
Iron	0.17 % to 46 %
Tungsten	0.06 % to 0.50 %
Cobalt	0.04 % to 0.35 %

NOTE 1—Unless exceptions are noted, concentration ranges can be extended by the use of suitable reference materials. Once these element ranges are extended they must be verified by some experimental means. This could include but not limited to Gage Repeatability and Reproducibility studies and/or Inter-laboratory Round Robin studies. Once these studies are completed, they will satisfy the ISO 17025 requirements for capability.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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 to determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

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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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.

E135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials

E305 Practice for Establishing and Controlling Atomic Emission Spectrochemical Analytical Curves

E1361 Guide for Correction of Interelement Effects in X-Ray Spectrometric Analysis

E1601 Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method

E1622 Practice for Correction of Spectral Line Overlap in Wavelength-Dispersive X-Ray Spectrometry (Withdrawn 2006)³

2.2 Other Documents:

ISO 17025 General requirements for the competence of testing and calibration laboratories

2.3 U.S. Government Standards:⁴

10 CFR Part 19 Notices, Instructions and Reports to Workers: Inspection and Investigations

10 CFR Part 20 Standards for Protection Against Radiation

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology E135.

4. Summary of Test Method

4.1 The test specimen is finished to a clean, uniform surface, then irradiated with an X-ray beam of high energy. The secondary X-rays produced are dispersed by means of crystals and the intensities are measured by suitable detectors at selected wavelengths. The outputs of the detectors in voltage pulses are counted. Radiation measurements are made based on the time required to reach a fixed number of counts, or on the total counts obtained for a fixed time (generally expressed in counts or kilocounts per unit time).

4.2 Concentrations of the elements are determined by relating the measured radiation of unknown specimens to analytical curves prepared with suitable reference materials. Either a fixed-channel (simultaneous) spectrometer or a sequential

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from the U.S. Nuclear Regulatory Commission, Public Document Room, One White Flint North, 11555 Rockville Pike, Rockville, MD 20852-2738, <http://www.nrc.gov>.