



Designation: B 890 – 9802

Standard Test Method for Determination of Metallic Constituents of Tungsten Alloys and Tungsten Hardmetals by X-Ray Fluorescence Spectrometry¹

This standard is issued under the fixed designation B 890; 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 This test method is under the jurisdiction of ASTM Committee B-9 B09 on Metal Powders and Metal Powder Products and is the direct responsibility of Subcommittee B09.06 on Cemented Carbides.

Current edition approved Oct. 10, 1998; 2002. Published March 1999; November 2002. Originally published as B 890 – 98. Last previous edition B 890 – 98.

1. Scope

1.1 This test method describes a procedure for the determination of the concentration, generally reported as mass percent, of the metallic constituents of tungsten-based alloys and hardmetals utilizing wavelength dispersive X-ray fluorescence spectrometry (XRF). This test method incorporates the preparation of standards using reagent grade metallic oxides, lithium-borate compounds, and fusion techniques. This test method details techniques for preparing representative specimens of both powder and sintered tungsten-based material. This test method is accurate for a wide range of compositions, and can be used for acceptance of material to grade specifications.

1.2 This test method is applicable to mixtures of tungsten or tungsten carbide with additions of refractory metal carbides and binder metals. Table 1 lists the most common elemental constituents and their concentration range. Note that many of these occur as metallic carbides.

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.*

2. Referenced Documents

2.1 ASTM Standards:

E 135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials²

E 1361 Guide for Correction of Inter-element Effects in X-Ray Spectrometric Analysis³

2.2 ISO Standard:

ISO-4503(E) Hardmetal—Determination of contents of metallic elements by X-ray fluorescence - Fusion method⁴

2.3 *Handbook of Chemistry and Physics*,⁵ 67th ed

3. Terminology

3.1 For definitions of terms used in this test method, refer to Terminology E 135.

4. Summary of Test Method

4.1 A suite of standards which closely match the chemical content of the material to be analyzed are prepared using reagent grade metallic oxides. Test samples are oxidized in a high-temperature furnace open to air. Fused glass specimens are prepared for these standards and for the test samples to be analyzed. These specimens of oxidized tungsten or tungsten carbide alloys are irradiated with an energetic primary X-ray beam. The intensity of the resultant secondary X-rays, characteristic in energy, for each elemental constituent is measured by means of a suitable detector or combination of detectors after diffraction by a Bragg spectrometer. The concentration of each constituent element is calculated by comparison with standard samples which closely match the chemical content of the analyzed material. The calculation may be manual, incorporate a calibration curve, or be

² *Annual Book of ASTM Standards*, Vol 03.05.

³ *Annual Book of ASTM Standards*, Vol 03.06.

⁴ Available from American National Standards Institute, 11 West 42nd St., 13th Floor, New York, NY 10036.

⁵ CRC Press, Boca Raton, FL, 1987.