Designation: B930 – 03(Reapproved 2008)

Standard Test Method for Rating Grain Size and Frequency of Abnormally Large Grains in Cemented Tungsten Carbides (Hardmetals)[1]

This standard is issued under the fixed designation B930; 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 describes a procedure for measuring abnormally large grains and the frequency of those grains in cemented tungsten carbides (hardmetals).

1.2 *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:*[2]

B243 Terminology of Powder Metallurgy

B406 Test Method for Transverse Rupture Strength of Cemented Carbides

B657 Guide for Metallographic Identification of Microstructure in Cemented Carbides

B665 Guide for Metallographic Sample Preparation of Cemented Tungsten Carbides

3. Terminology

3.1 *Definitions*—Definitions of powder metallurgy terms can be found in Terminology B243.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *E-Rating*—the number/cm^2 of grains larger than a specified size in a fully-etched specimen.

3.2.2 *L-Rating*—the size, in µm, of the largest grain observed in a fully-etched specimen.

4. Summary of Test Method

4.1 A polished and fully etched specimen/specimens having a minimum observable area of 0.5 cm^2 is examined using a metallograph. Abnormally large grains, compared to the finer-grained background material, are identified. These grains are categorized as: (*1*) The number of grains larger than a specified size, or (*2*) The largest grain observed, or both.

5. Significance and Use

5.1 The microstructure and grain growth of cemented tungsten carbides affect the material's mechanical and physical properties. The grain size and distribution will affect the material's wear resistance and fracture toughness. Abnormally large grains as compared to the background may introduce an area of weakness in a sintered part.

5.2 This test method may be used in acceptance testing of cemented tungsten carbide materials or the tungsten carbide powder used in their manufacture. The specified grain size used for the E-Rating is to be agreed upon between purchaser and supplier.

6. Apparatus

6.1 *Metallographic Microscope,* capable of magnifications of up to 1500×.

6.2 Ordinary metallurgical laboratory equipment.

6.3 Equipment for specimen preparation as outlined in Guide B665.

7. Test Specimens

7.1 *Specimen Size*—The recommended specimen shall be the standard transverse rupture specimen as specified in Test Method B406; that is, ground to the following dimensions: 5.00 ± 0.25 mm (0.200 ± 0.010 in) thick by 6.25 ± 0.25 mm (0.250 ± 0.010 in) wide by 19.0 mm (0.750 ± in) long. Alternatively, the specimen shall be a size to provide a minimum 0.5 cm^2 surface area of examination, or it may consist of several samples that provide this minimum area.

7.2 *Specimen Preparation:*

7.2.1 Polish the specimen/specimens according to the procedure described in Guide B665, or other suitable metallographic polishing procedure. If using the recommended specimen, polish the 6.25 by 19.0 mm side.

[1] This test method is under the jurisdiction of ASTM Committee B09 on Metal Powders and Metal Powder Productsand is the direct responsibility of Subcommittee B09.06 on Cemented Carbides.

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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.