This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: E562 – 19

Standard Test Method for Determining Volume Fraction by Systematic Manual Point Count[1]

This standard is issued under the fixed designation E562; 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.

INTRODUCTION

This test method may be used to determine the volume fraction of constituents in an opaque specimen using a polished, planar cross section by the manual point count procedure. The same measurements can be achieved using image analysis per Practice E1245.

1. Scope

1.1 This test method describes a systematic manual point counting procedure for statistically estimating the volume fraction of an identifiable constituent or phase from sections through the microstructure by means of a point grid.

1.2 The use of automatic image analysis to determine the volume fraction of constituents is described in Practice E1245.

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

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E3 Guide for Preparation of Metallographic Specimens

E7 Terminology Relating to Metallography

E407 Practice for Microetching Metals and Alloys

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E1245 Practice for Determining the Inclusion or Second-Phase Constituent Content of Metals by Automatic Image Analysis

3. Terminology

3.1 *Definitions*—For definitions of terms used in this practice, see Terminology E7.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *point count*—the total number of points in a test grid that fall within the microstructural feature of interest, or on the feature boundary; for the latter, each test point on the boundary is one half a point.

3.2.2 *point fraction*—the ratio, usually expressed as a percentage, of the point count of the phase or constituent of interest on the two-dimensional image of an opaque specimen to the number of grid points, which is averaged over *n* fields to produce an unbiased estimate of the volume fraction of the phase or constituent.

3.2.3 *stereology*—the methods developed to obtain information about the three-dimensional characteristics of microstructures based upon measurements made on two-dimensional sections through a solid material or their projection on a surface.

3.2.4 *test grid*—a transparent sheet or eyepiece reticle with a regular pattern of lines or crosses that is superimposed over the microstructural image for counting microstructural features of interest.

3.2.5 *volume fraction*—the total volume of a phase or constituent per unit volume of specimen, generally expressed as a percentage.

3.3 *Symbols:*

[1] This test method is under the jurisdiction of ASTM Committee E04 on Metallography and is the direct responsibility of Subcommittee E04.14 on Quantitative Metallography.

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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.

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