



Designation: A247 – 17

Standard Test Method for Evaluating the Microstructure of Graphite in Iron Castings¹

This standard is issued under the fixed designation A247; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This test method covers the classification of graphite in cast irons in terms of type, distribution, and size by visual comparison to reference photomicrographs. This test method is intended to be applicable for all iron-carbon alloys containing graphite particles, and may be applied to gray irons, malleable irons, compacted graphite irons, and the ductile (nodular) irons.

1.2 The reference photomicrographs included in this test method are in no way to be construed as specifications. In an appropriate specification for a specific material where graphite microstructure is an important consideration, this test method may be used as a reference to concisely define the graphite microstructure required.

1.3 These reference photomicrographs are offered primarily to permit accurate reporting of microstructures of cast irons and to facilitate the comparison of reports by different laboratories or investigators.

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

1.5 *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.*

1.6 *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.*

¹ This test method is under the jurisdiction of ASTM Committee A04 on Iron Castings and is the direct responsibility of Subcommittee A04.21 on Testing.

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2. Referenced Documents

2.1 *ASTM Standards*:²

E3 Guide for Preparation of Metallographic Specimens

2.2 *ASTM Adjuncts*:

Iron Casting Graphite Microstructure Rating Chart (Wall Chart)³

3. Summary of Test Method

3.1 The reference micrographs included in this standard form the basis for classification. Characteristic features of graphite particle shape and distribution are designated by numerals and letters. Type, distribution, and size of observed graphite are compared with the idealized microstructures in the standard charts and rated accordingly as closely as possible to the equal or similar microstructures in the charts.

4. Significance and Use

4.1 The comparison of observed graphite particles with the structures shown in the charts give only purely descriptive information on the type, distribution, and size of the graphite in the sample being evaluated. It does not indicate, except in a very broad way, the origin of the graphite or the suitability of the iron-carbon alloy for a particular service.

5. Test Specimens or Samples

5.1 The preferred sample is a section cut from an actual casting that is being evaluated at a location agreed upon between the manufacturer and purchaser. When this is impractical, a test lug or projection often can be appended to the casting and sawed or broken off to be used as the test sample. If neither of these methods is convenient, microstructural test coupons, such as those recommended by the Cast Iron

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.

³ Available from ASTM International Headquarters. Order Adjunct No. ADJA0247A. Original adjunct produced in 2010.