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Standard Guide for Defining and Rating the Microstructure of High Carbon Bearing Steels[1]

This standard is issued under the fixed designation A892; 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 guide covers the description of carbide structures in annealed high carbon bearing steels.

1.2 Included is a guide for rating steel specimens by a graded series of photomicrographs showing the incidence of certain conditions.

1.3 The reference photomicrographs are graded illustrations of annealed carbides categorized by size, network, and lamellar content (shape).

1.4 This guide is to facilitate communication and description of microstructure. It does not establish limits of acceptability. Such limits are a matter of agreement between user and producer.

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

1.6 *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.*

1.7 *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

E407 Practice for Microetching Metals and Alloys

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

2.2 *ASTM Adjuncts:*[3]

Photomicrographs for Defining and Rating the Microstructure of High Carbon Bearing Steels

3. Apparatus

3.1 In order to adequately compare the structure of a specimen with the photomicrographs, it will be necessary to view a properly prepared sample at 1000× magnification with good resolution.

4. Specimen Preparation

4.1 Samples that represent a portion of the cross section of the material shall be prepared using the practices described in Guide E3. The size of the sample shall be negotiated between the user and the producer. It may be a full cross section but should not be too large for practical handling in the polishing operation.

4.2 The properly polished specimens shall be etched in a suitable etchant which will clearly delineate the annealed carbide structure of the material being examined as described in Practice E407. Nital (2 %) will frequently be an adequate etchant for routine examination. When critical or detailed analysis of structures is required, the recommended etchant is Picral (saturated).

5. Description

5.1 The reference photomicrographs (available in ASTM Adjunct ADJA0892[3]) are arranged into three categories, as follows: carbide size (CS), carbide network (CN), and lamellar content (LC).

5.2 Six photomicrographs for each category are provided and are identified by category and number, for example, CS1-CS6, CN1-CN6, and LC1-LC6. Higher numbers indicate a larger number or greater degree of severity of the category being rated.

[1] This guide is under the jurisdiction of Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.28 on Bearing and Power Transmission Steels.

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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.

[3] Available from ASTM International Headquarters. Order Adjunct No. ADJA0892. Original adjunct produced in 2009.