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Designation: E 1447 – 09

Standard Test Method for Determination of Hydrogen in Titanium and Titanium Alloys by Inert Gas Fusion Thermal Conductivity/Infrared Detection Method¹

This standard is issued under the fixed designation E 1447; 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 applies to the determination of hydrogen in titanium and titanium alloys in concentrations from 0.0006% to 0.0250%.
- 1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.
- 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.* For specific hazards, see Section 9.

2. Referenced Documents

- 2.1 *ASTM Standards:*²
 - C 696 Test Methods for Chemical, Mass Spectrometric, and Spectrochemical Analysis of Nuclear-Grade Uranium Dioxide Powders and Pellets
 - E 50 Practices for Apparatus, Reagents, and Safety Considerations for Chemical Analysis of Metals, Ores, and Related Materials
 - E 135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials
 - E 1601 Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method
 - E 1914 Practice for Use of Terms Relating to the Development and Evaluation of Methods for Chemical Analysis

3. Terminology

- 3.1 *Definitions*—For definitions of terms used in this test method, see Terminology E 135 and E 1914.

¹This test method is under the jurisdiction of ASTM Committee E05 on Analytical Chemistry for Metals, Ores, and Related Materials, and is the direct responsibility of Subcommittee E05.09 on Ti, Zr, W, Mo, Ta, Nb, Hf, Ru.
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²For 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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Designation: E1316 – 16

Standard Terminology for Nondestructive Examinations¹

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INDEX OF TERMS

Section	
A	Common NDT Terms
B	Acoustic Emission (AE) Terms
C	Electromagnetic Testing (ET) Terms
D	Diamond and X-Radiologic Testing (RT) Terms
E	Leak Testing (LT) Terms
F	Liquid Penetrant Testing (PT) Terms
G	Magnetic Particle Testing (MT) Terms
H	Neutron Radiologic Testing (NRT) Terms
I	Ultrasonic Testing (UT) Terms
J	Infrared Testing (IRT) Terms
K	Holographic Testing (HT) Terms
L	Visual Testing (VT) Terms

1. Scope

- 1.1 This standard defines the terminology used in the standards prepared by the E07 Committee on Nondestructive Testing. These nondestructive testing (NDT) methods include: acoustic emission, electromagnetic testing, gamma- and X-radiology, leak testing, liquid penetrant testing, magnetic particle testing, neutron radiology and gauging, ultrasonic testing, and other technical methods.
- 1.2 Committee E07 recognizes that the terms examination, testing and inspection are commonly used as synonyms in nondestructive testing. For uniformity and consistency in E07 nondestructive testing standards, Committee E07 encourages the use of the term examination and its derivatives when describing the application of nondestructive test methods. There are, however, appropriate exceptions when the term test

¹This terminology is under the jurisdiction of Committee E07 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.02 on Editorial Review.
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and its derivatives may be used to describe the application of a nondestructive test, such as measurements which produce a numeric result (for example, when using the leak testing method to perform a leak test on a component, or an ultrasonic measurement of velocity). Additionally, the term test should be used when referring to the NDT method, that is, Radiologic Testing (RT), Ultrasonic Testing (UT), and so forth. (Example: Radiologic Testing (RT) is often used to examine material to detect internal discontinuities.)

1.3 Section A defines terms that are common to multiple NDT methods, whereas, the subsequent sections define terms pertaining to specific NDT methods.

1.4 As shown on the chart below, when nondestructive testing produces an indication, the indication is subject to interpretation as false, nonrelevant or relevant. If it has been interpreted as relevant, the necessary subsequent evaluation will result in the decision to accept or reject the material. With the exception of accept and reject, which retain the meaning found in most dictionaries, all the words used in the chart are defined in Section A.

FOR TRAINING PURPOSES ONLY



Designation: E 1351 – 01

Standard Practice for Production and Evaluation of Field Metallographic Replicas¹

This standard is issued under the fixed designation E 1351; 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

Replication is a nondestructive sampling procedure which records and preserves the topography of a metallographic specimen as a negative relief on a plastic film. The microstructural replica can be examined using a light microscope (LM) or scanning electron microscope (SEM) for subsequent analysis. Specimens examined in the SEM are vacuum coated with vaporized carbon or a suitable metal to provide contrast and conductivity. The convenience of the replication process makes it suitable for obtaining microstructures from field locations for subsequent examination and analysis in a laboratory. The proper preparation of the test surface and of the replica itself is of paramount importance and must receive careful attention. Because of the diversity of metallographic equipment available and the wide range of environments in which replication is conducted, the preparation of replicas of high quality should be viewed as a skilled process for which there exists a variety of techniques that achieve satisfactory results.

This practice presents some guidelines on the preparation of metallic surfaces and production of replicas and guidelines on evaluation of replica quality. It does not attempt to limit the variations in technique developed by skilled metallographers, each of which may produce acceptable replicas.

1. Scope

- 1.1 This practice covers recognized methods for the preparation and evaluation of cellulose acetate or plastic film replicas which have been obtained from metallographically prepared surfaces. It is designed for the evaluation of replicas to ensure that all significant features of a metallographically prepared surface have been duplicated and preserved on the replica with sufficient detail to permit both LM and SEM examination with optimum resolution and sensitivity.
- 1.2 This practice may be used as a controlling document in commercial situations.
- 1.3 The values stated in SI units are to be regarded as the standard. Inch-pound units given in parentheses are for information only.
- 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

- 2.1 *ASTM Standards:*²

¹This practice is under the jurisdiction of ASTM Committee E04 on Metallography and is the direct responsibility of Subcommittee E04.01 on Selection and Preparation of Samples.
Current edition approved Dec. 10, 2001. Published January 2002. Originally published as E 1351 – 90. Last previous edition E 1351 – 96.

- A 335/A 335M Specification for Seamless Ferritic Alloy-Steel Pipe for High-Temperature Service³
- E 3 Guide for Preparation of Metallographic Specimens³
- E 7 Terminology Relating to Metallography³
- E 407 Practice for Microetching Metals and Alloys³

3. Terminology

- 3.1 *Definitions*—For definitions of terms used in this practice, refer to Terminology E 7.

4. Significance and Use

4.1 Replication is a nondestructive sampling procedure that records and preserves the topography of a metallographically prepared surface as a negative relief on a plastic film (replica). The replica permits the examination and analysis of the metallographically prepared surface on the LM or SEM.

4.2 Enhancement procedures for improving replica contrast for microscopic examination are utilized and sometimes necessary (see 8.1).

Note 1—It is recommended that the purchaser of a field replication service specify that each replicator demonstrate proficiency by providing field prepared replica metallography and direct LM and SEM comparison to laboratory prepared samples of an identical material by grade and service exposure.

²Annual Book of ASTM Standards, Vol 03.01.

³Annual Book of ASTM Standards, Vol 03.01.

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