



Standard Practice for Computed Tomographic (CT) Examination¹

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

1. Scope*

1.1 This practice is for computed tomography (CT), which may be used to nondestructively disclose physical features or anomalies within a test object by providing radiological density and geometric measurements. This practice implicitly assumes the use of penetrating radiation, specifically X-ray and γ -ray.

1.2 CT systems utilize a set of transmission measurements made along paths through the test object from many different directions. Each of the transmission measurements is digitized and stored in a computer, where they are subsequently reconstructed by one of a variety of techniques. A treatment of CT principles is given in Guide E1441.

1.3 CT is broadly applicable to any material or test object through which a beam of penetrating radiation passes. The principal advantage of CT is that it provides densitometric (that is, radiological density and geometry) images of thin cross sections through an object without the structural superposition in projection radiography.

1.4 This practice describes procedures for performing CT examinations. This practice is to address the general use of CT technology and thereby facilitate its use.

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.* For specific safety statements, see Section 8, NBS Handbook 114, and Federal Standards 21 CFR 1020.40 and 29 CFR 1910.96.

2. Referenced Documents

2.1 ASTM Standards:²

E1316 Terminology for Nondestructive Examinations

¹ This practice is under the jurisdiction of ASTM Committee E07 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.01 on Radiology (X and Gamma) Method.

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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.

E1441 Guide for Computed Tomography (CT) Imaging

E1695 Test Method for Measurement of Computed Tomography (CT) System Performance

2.2 NIST Standard:

ANSI N43.3 General Radiation Safety Installations Using Non-Medical X-Ray and Sealed Gamma Sources up to 10 MeV³

2.3 Federal Standards:⁴

21 CFR 1020.40 Safety Requirements of Cabinet X Ray Systems

29 CFR 1910.96 Ionizing Radiation

2.4 ASNT Documents:⁵

SNT-TC-1A Recommended Practice for Personnel Qualification and Certification in Nondestructive Testing

ANSI/ASNT-CP-189 Qualification and Certification of Non-destructive Testing Personnel

2.5 Military Standard:

MIL-STD-410 Nondestructive Testing Personnel Qualification and Certification⁴

2.6 AIA Standard:

NAS-410 Certification and Qualification of Nondestructive Testing Personnel⁶

3. Terminology

3.1 *Definitions*—For definitions of terms used in this guide, refer to Terminology E1316 and Annex A1 in Guide E1441.

4. Summary of Practice

4.1 Requirements in this practice are intended to control the reliability and quality of the CT images.

4.2 CT systems are made up of a number of subsystems; the function served by each subsystem is common in almost all CT scanners. Section 7 describes the following subsystems:

³ Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, <http://www.nist.gov>.

⁴ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://dodssp.daps.dla.mil>.

⁵ Available from American Society for Nondestructive Testing (ASNT), P.O. Box 28518, 1711 Arlington Ln., Columbus, OH 43228-0518, <http://www.asnt.org>.

⁶ Available from Aerospace Industries Association of America, Inc. (AIA), 1000 Wilson Blvd., Suite 1700, Arlington, VA 22209-3928, <http://www.aia-aerospace.org>.