



Standard Practice for Computed Tomographic (CT) Examination of Castings¹

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1. Scope

1.1 This practice covers a uniform procedure for the examination of castings by the computed tomography (CT) technique. The requirements expressed in this practice are intended to control the quality of the nondestructive examination by CT and are not intended for controlling the acceptability or quality of the castings. This practice implicitly suggests the use of penetrating radiation, specifically X rays and gamma rays.

1.2 This practice provides a uniform procedure for a CT examination of castings for one or more of the following purposes:

1.2.1 Inspecting for discontinuities, such as porosity, inclusions, cracks, and shrink;

1.2.2 Performing metrological measurements and determining dimensional conformance; and

1.2.3 Determining reverse engineering data, that is, creating computer-aided design (CAD) data files.

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 safety statements, see Section 7, *NBS Handbook 114*,² and 21 CFR 1020.40 and 29 CFR 1910.96.

2. Referenced Documents

2.1 ASTM Standards:

E 543 Practice for Evaluating Agencies that Perform Nondestructive Testing³

E 1316 Terminology for Nondestructive Examinations³

E 1441 Guide for Computed Tomography (CT) Imaging³

E 1570 Practice for Computed Tomographic (CT) Examination³

E 1672 Guide to Computed Tomography (CT) System Selection³

E 1695 Test Method for Measurement of Computed Tomography (CT) System Performance³

2.2 ASNT Standards:⁴

SNT-TC-1A Recommended Practice for Personnel Qualification and Certification in Nondestructive Testing
ANSI/ASNT CP-189 Personnel Qualification and Certification of Nondestructive Testing Personnel

2.3 Military Standard:

MIL-STD-410 Nondestructive Testing Personnel Qualification and Certification⁵

2.4 Code of Federal Regulations:⁵

21 CFR 1020.40 Safety Requirements of Cabinet X Ray Systems

29 CFR 1910.96 Ionizing Radiation

3. Terminology

3.1 *Definitions*—Definitions of terms applicable to this practice may be found in Terminology E 1316 and Guide E 1441.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *fixturing*—the mounting hardware used to place the test object in the CT system.

3.2.2 *representative quality indicator (RQI)*—a real part, or a fabrication of similar geometry in radiologically similar material to a real part, that has features of known characteristics that represent all of the features for which the test parts are being examined.

3.2.3 *scan plan*—scan locations and the system configuration parameters for a specific part examination.

3.2.4 *test object*—a part or specimen being subjected to CT examination.

4. Significance and Use

4.1 The CT may be performed on a test object when it is in the as-cast, intermediate, or final machined condition. A CT examination can be used as a design tool to improve wax forms and moldings, establish process parameters, randomly check process control, perform final quality control (QC) examination for the acceptance or rejection of parts, and analyze failures and extend component lifetimes.

4.2 The most common applications of CT for castings are for the following: locating and characterizing discontinuities, such as porosity, inclusions, cracks, and shrink; measuring

¹ This practice is under the jurisdiction of ASTM Committee E-7 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.01 on Radiology (X and Gamma) Method.

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² *NBS Handbook 114, General Safety Standard for Installations, Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies Up to 10 MeV*, National Institute of Standards and Technology (NIST), Gaithersburg, MD.

³ *Annual Book of ASTM Standards*, Vol 03.03.

⁴ Available from American Society for Nondestructive Testing, 1711 Arlinggate Plaza, P.O. Box 28518, Columbus, OH 43228-0518.

⁵ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.