



Standard Reference Radiographs for Heavy-Walled (2 to 4½-in. [51 to 114-mm]) Steel Castings¹

This standard is issued under the fixed designation E 186; 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 Department of Defense.

^{ε1} NOTE—Editorial changes made throughout in January 2004.

1. Scope

1.1 These reference radiographs² for heavy-walled steel castings are applicable to nominal section thicknesses of 2 to 4½ in. [51 to 114 mm] and consists of three separate sets as follows:

1.1.1 Volume 1: 1-MV X Rays and Iridium 192 (called “1 to 2-Mev X rays” in previous editions)-Set of 28 plates (5 by 8 in. [127 by 203 mm] in a 15 by 17 in. [381 by 432 mm] ring binder).

1.1.2 Volume 2: 2-MV X Rays and Cobalt-60 (called “gamma rays” in previous editions). This includes cobalt-60 or equivalent isotope radiation and from 2-MV up to 4-MV X rays- Set of 28 plates (5 by 8 in.) in a 15 by 17 in. ring binder.

1.1.3 Volume 3: 4-MV to 30-MV X rays (called “10 to 24 Mev X rays” in previous editions)- Set of 28 plates (5 by 8 in.) in a 15 by 17 in. ring binder.

1.1.4 Each set consists of three categories of graded discontinuities in increasing severity levels, and three categories of ungraded discontinuities furnished as examples only, as follows:

1.1.4.1 *Category A*—Gas porosity; severity levels 1 through 5.

1.1.4.2 *Category B*—Sand and slag inclusions; severity levels 1 through 5.

1.1.4.3 *Category C*—Shrinkage; three types:

(1) *Type 1*— Severity levels 1 through 5.

(2) *Type 2*— Severity levels 1 through 5.

(3) *Type 3*— Severity levels 1 through 5.

1.1.4.4 *Category D*—Crack; one illustration D3 in pre-1972 documents.

1.1.4.5 *Category E*—Hot tear; one illustration in pre-1972 documents.

1.1.4.6 *Category F*—Insert; one illustration EB3 in pre-1972 documents.

1.2 The values stated in inch-pound units are to be regarded as the 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.*

2. Referenced Documents

2.1 *ASTM Standards*:³

E 94 Guide for Radiographic Examination

E 1316 Terminology for Nondestructive Examinations

2.2 *ASTM Adjuncts*:⁴

Reference Radiographs for Heavy-Walled (2 to 4½-in. [51 to 114-mm]) Steel Castings:

Volume I, 1-MV X Rays and Iridium-192⁵

Volume II, 2-MV X Rays and Cobalt-60⁶

Volume III, 4-MV to 30-MV X Rays⁷

3. Terminology

3.1 *Definitions*—For definitions of terms used in this document, see Terminology E 1316, Section D.

4. Significance and Use

4.1 These reference radiographs are reproductions of original radiographs and are supplied as a means for establishing the categories and severity levels of discontinuities in steel castings that may be revealed by radiographic examination. They may be used in accordance with contractual specifications.

4.2 Radiographs for evaluation are to be compared with these reference radiographs for classification on the basis of the category and severity level of the discontinuity.

4.3 The use of this document is not intended to restricted to the specific energy level or to the absolute thickness limits that

¹ These reference radiographs are under the jurisdiction of ASTM Committee E07 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.02 on Reference Radiographs.

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² For ASME Boiler and Pressure Vessel Code applications see related Reference Radiographs SE 186 in Section V of that Code.

³ 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.

⁴ Available from ASTM Headquarters.

⁵ Order RRE018601.

⁶ Order RRE018602.

⁷ Order RRE018603.