



Designation: E1648 – 95(Reapproved 2011)

Standard Reference Radiographs for Examination of Aluminum Fusion Welds¹

This standard is issued under the fixed designation E1648; 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 These reference radiographs illustrate various types and severity levels of discontinuities in aluminum fusion welds that may be revealed by radiographic examination. These reference radiographs do not specify the acceptable level of these discontinuities, rather they provide a visual reference for communicating the acceptable level.

NOTE 1—The reference radiographs consist of a set of eight plates (8½ by 11 in. (22 by 28 cm)), covering base material up to and including 0.75 in. (19 mm) in thickness.

1.2 These reference radiographs are based on two nominal weld thicknesses in wrought aluminum products and are applicable to the thickness ranges shown in Table 1. The welds were produced using base material plates of 6061 and 5083 alloys and 5356 and 4043 gas metal-arc (GMA) electrodes. These reference radiographs are intended for use in evaluating radiographs of welds in wrought aluminum products. They are not recommended for use with repair welds in cast materials; however, they are appropriate for use with assembly or fabrication welds. Reference radiographs for aluminum and magnesium castings are available in Reference Radiographs E155 and E505.

1.3 The adjunct contains illustrations of representative graded and ungraded discontinuities. Table 2 lists the discontinuity types and severities illustrated for each thickness of base material. Each of the graded discontinuity types has five severity levels, 1 through 5, in order of increasing severity. The ungraded discontinuities are included for informational purposes.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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 appro-*

priate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 *ASTM Standards:*²

E94 Guide for Radiographic Examination

E155 Reference Radiographs for Inspection of Aluminum and Magnesium Castings

E505 Reference Radiographs for Inspection of Aluminum and Magnesium Die Castings

E1032 Test Method for Radiographic Examination of Weldments

E1316 Terminology for Nondestructive Examinations

2.2 *ASTM Adjuncts:*

Reference Radiographs for Aluminum Fusion Welds:

Volume 1, Thicknesses Up to and Including 0.75 in. (19 mm)³

3. Terminology

3.1 *Definitions*—Definitions of terms relating to X-ray and gamma radiology, as used in these reference radiographs, may be found in Terminology E1316.

4. Significance and Use

4.1 Use of these reference radiographs requires agreement between the using parties as to the acceptable level of each discontinuity type. Illustrations are provided for welds in 0.125-in. (3.2-mm) thick material and 0.50-in. (12.7-mm) thick material. These illustrations are intended to be representative of base material thicknesses up to 0.75 in. (19 mm). Use of these reference radiographs is not intended to be restricted to the specific energy level or the absolute thickness limits that are illustrated. These reference radiographs may be used, where there is no other applicable document, for other energy levels or thicknesses, or both, for which agreement has been reached between the purchaser and the manufacturer. Standard reference radiographs should be used in accordance with contractual specifications.

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

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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 Headquarters. Order ADJE1648.