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Standard Practice for Determining Total Image Unsharpness in Radiology[1]

This standard is issued under the fixed designation E2002; 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 practice covers the design and basic use of a gauge used to determine the total image unsharpness of radiographs and radioscopic systems.

1.2 This practice is applicable to radiographic and radioscopic imaging systems utilizing X-ray and gamma ray radiation sources.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 The gauge described can be used effectively with radiation energies up to 400 kv. When using energies in the megavolt range the results may not be completely satisfactory.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E747 Practice for Design, Manufacture and Material Grouping Classification of Wire Image Quality Indicators (IQI) Used for Radiology

E1025 Practice for Design, Manufacture, and Material Grouping Classification of Hole-Type Image Quality Indicators (IQI) Used for Radiology

E1316 Terminology for Nondestructive Examinations

E1647 Practice for Determining Contrast Sensitivity in Radiology

2.2 *EN Standard:*

EN-462-5:1994 Nondestructive Testing—Image Quality of Radiographs—Part 5: Image Quality Indicators (Duplex Wire Type)—Determination of Total Image Unsharpness Value[3]

3. Terminology

3.1 *Definitions*—Definitions of terms applicable to this practice may be found in Terminology E1316.

4. Summary of Practice

4.1 When it is determined necessary to evaluate and measure the Total Image Unsharpness (Spatial Resolution) of an imaging system separately and apart from contrast sensitivity measurements, a tool or gauge as described in this practice can be used. Conventional IQIs described in Practices E747 and E1025 combine the contrast sensitivity and resolution measurements into an overall figure of merit. Such figures of merit may not be adequate to detect subtle changes in the imaging system's performance. For example, in a high-contrast image, spatial resolution can degrade with almost no noticeable effect upon the overall image quality. Similarly, in an application in which the imaging system provides a very sharp image, contrast can fade with little noticeable effect upon the overall image quality, as determined using conventional IQIs. These situations often develop and may go undetected until the system performance deteriorates below acceptable image quality limits.

5. Significance and Use

5.1 The gauge is intended to provide a means for measuring total image unsharpness as independently as practicable from the imaging system contrast sensitivity limitations. Further description and details of the gauge are provided in EN-462-5:1994.

5.2 The gauge can be used in conjunction with a contrast sensitivity measuring gauge, as described in Practice E1647.

6. Gauge Construction

6.1 The gauge shall be fabricated in accordance with Fig. 1, using the tolerances given in Table 1. This gauge is identical to the gauge described in EN-462-5:1994 and if necessary, EN-462-5:1994 should be reviewed for additional detailed information.

[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.

[3] Available from British Standards Institute (BSI), 389 Chiswick High Rd., London W4 4AL, U.K., http://www.bsi-global.com.