Designation: F 792 – 01$^{\epsilon 2}$

Standard Practice for Evaluating the Imaging Performance of Security X-Ray Systems[1]

This standard is issued under the fixed designation F 792; 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.

ϵ^1 NOTE—Note from Table 1 was deleted editorially in February 2002.
ϵ^2 NOTE—An adjunct reference was added editorially in June 2002.

1. Scope

1.1 This practice applies to all X-ray based screening systems, with tunnel apertures up to 1 m wide × 1 m high, whether it is a conventional X-ray system or an explosives detection system (EDS) that provides a projection or projection/scatter image for an operator to interpret.

1.2 This practice applies to X-ray systems used for the screening for prohibited items such as weapons, explosives, and explosive devices in baggage, packages, cargo, or mail.

1.3 This practice establishes quantitative and qualitative methods for evaluating the systems. This practice does not establish minimum performance requirements for any particular application.

1.4 The values as stated in SI units are to be regarded as the standard.

1.5 This practice relies upon the use of a standard test object (ASTM X-ray Test Object) to determine the applicable performance levels of the systems. The specific test object is subsequently described and referred to in this document as the "Test Object."

1.6 *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.* Examples are Title 21 Code of Federal Regulations, Section 1020.40 in the United States and Health & Safety Regulation No. 1333 in the United Kingdom.

1.7 *Film Safety*—If film safety, defined as $<2.58\times10^{-7}$ C/kg (<1 mR) per screening, is of importance, refer to Test Method F 1039.

2. Referenced Documents

2.1 *ASTM Standards:*

B 258 Specification for Standard Nominal Diameters and Cross-Sectional Areas of AWG Sizes of Solid Round Wires Used as Electrical Conductors[2]

E 1025 Practice for Design, Manufacture, and Material Grouping Classification of Hole-Type Image Quality Indicators (IQI) Used for Radiology[3]

E 1316 Terminology for Nondestructive Examinations[3]

E 1647 Practice for Determining Contrast Sensitivity in Radioscopy[3]

F 1039 Test Method for Measurement of Low Level X Radiation Used in X-ray Security Screening Systems[4]

2.2 *ASTM Adjuncts:*

30 Autocad Drawings[5]

2.3 *Other Documents:*

Part 21 Code of Federal Regulations, Section 1020.40, Cabinet X-ray Systems (United States)[6]

Health & Safety Regulation 1333 (United Kingdom)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *contrast sensitivity*—a measure of the minimum change in an object that produces a perceptible brightness change in the radiological image on a monitor.

3.1.2 *effective atomic number (Z eff)*—the effective atomic number of a chemical compound or mixture of compounds is the atomic number of a single hypothetical element which would exhibit essentially identical X-ray attenuation characteristics.

3.1.3 *explosive*—a material that can be detonated, that is, undergo a chemical reaction, expand suddenly, and create a shock wave.

3.1.4 *explosive device*—a device containing explosives, a detonator, a timer/switch and an energy source.

3.1.5 *image quality indicator (IQI)*—in industrial radiography, a device or combination of devices whose demonstrated

[1] This practice is under the jurisdiction of ASTM Committee F12 on Security Systems and Equipment and is the direct responsibility of Subcommittee F12.60 on Controlled Access Security, Search and Screening Equipment.

Current edition approved Oct. 10, 2001. Published November 2001. Originally published as F 792 – 82. Last previous edition F 792 – 88(93)$^{\epsilon 1}$.

[2] *Annual Book of ASTM Standards*, Vol 02.03

[3] *Annual Book of ASTM Standards*, Vol 03.03

[4] *Annual Book of ASTM Standards*, Vol 15.08

[5] Available from ASTM Headquarters. Request adjunct no. ADFF0792.

[6] Available from the United States Government Printing Office, 732 North Capitol St. NW, Washington, DC 20401.

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