



# Standard Practice for Design, Manufacture and Material Grouping Classification of Wire Image Quality Indicators (IQI) Used for Radiology<sup>1</sup>

This standard is issued under the fixed designation E 747; 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<sup>2</sup> covers the design, material grouping classification, and manufacture of wire image quality indicators (IQI) used to indicate the quality of radiologic images.

1.2 This practice is applicable to X-ray and gamma-ray radiology.

1.3 This practice covers the use of wire penetrameters as the controlling image quality indicator for the material thickness range from 6.4 to 152 mm (0.25 to 6.0 in.).

1.4 The values stated in inch-pound units are to be regarded as 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 appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:

B 139 Specification for Phosphor Bronze Rod, Bar, and Shapes<sup>3</sup>

B 150 Specification for Aluminum Bronze Rod, Bar, and Shapes<sup>3</sup>

B 161 Specification for Nickel Seamless Pipe and Tube<sup>4</sup>

B 164 Specification for Nickel-Copper Alloy Rod, Bar, and Wire<sup>4</sup>

B 166 Specification for Nickel-Chromium-Iron Alloys (UNS N06600, N06601, and N06690) and Nickel-Chromium-Cobalt-Molybdenum Alloy (UNS N06617) Rod, Bar, and Wire<sup>4</sup>

E 1025 Practice for Design, Manufacture, and Material Grouping Classification of Hole-Type Image Quality Indicators (IQI) Used for Radiology<sup>5</sup>

E 1316 Terminology for Nondestructive Examinations<sup>5</sup>

## 3. Terminology

3.1 *Definitions*—The definitions of terms in Terminology E 1316, Section D, relating to gamma and x-radiology, shall apply to the terms used in this practice.

## 4. Wire IQI Requirements

4.1 The quality of all levels of examination shall be determined by a set of wires conforming to the following requirements:

4.1.1 Wires shall be fabricated from materials or alloys identified or listed in accordance with 7.2. Other materials may be used in accordance with 7.3.

TABLE 1 Wire IQI Sizes and Wire Identity Numbers

| SET A                      |               | SET B                     |               |
|----------------------------|---------------|---------------------------|---------------|
| Wire Diameter<br>in. (mm)  | Wire Identity | Wire Diameter<br>in. (mm) | Wire Identity |
| 0.0032 (0.08) <sup>A</sup> | 1             | 0.010 (0.25)              | 6             |
| 0.004 (0.1)                | 2             | 0.013 (0.33)              | 7             |
| 0.005 (0.13)               | 3             | 0.016 (0.4)               | 8             |
| 0.0063 (0.16)              | 4             | 0.020 (0.51)              | 9             |
| 0.008 (0.2)                | 5             | 0.025 (0.64)              | 10            |
| 0.010 (0.25)               | 6             | 0.032 (0.81)              | 11            |
| SET C                      |               | SET D                     |               |
| Wire Diameter<br>in. (mm)  | Wire Identity | Wire Diameter<br>in. (mm) | Wire Identity |
| 0.032 (0.81)               | 11            | 0.10 (2.5)                | 16            |
| 0.040 h(1.02)              | 12            | 0.126 (3.2)               | 17            |
| 0.050 (1.27)               | 13            | 0.160 (4.06)              | 18            |
| 0.063 (1.6)                | 14            | 0.20 (5.1)                | 19            |
| 0.080 (2.03)               | 15            | 0.25 (6.4)                | 20            |
| 0.100 (2.5)                | 16            | 0.32 (8)                  | 21            |

<sup>A</sup> The 0.0032 wire may be used to establish a special quality level as agreed upon between the purchaser and the supplier.

TABLE 2 Wire Diameter Tolerances, (mm)

| Wire Diameter ( <i>d</i> ), mm | Tolerance, mm |
|--------------------------------|---------------|
| 0.000 < <i>d</i> ≤ 0.125       | ±0.0025       |
| 0.125 < <i>d</i> ≤ 0.25        | ±0.005        |
| 0.25 < <i>d</i> ≤ 0.5          | ±0.01         |
| 0.50 < <i>d</i> ≤ 1.6          | ±0.02         |
| 1.6 < <i>d</i> ≤ 4             | ±0.03         |
| 4.0 < <i>d</i> ≤ 8             | ±0.05         |

4.1.2 The IQI consists of sets of wires arranged in order of increasing diameter. The diameter sizes specified in Table 1 are

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee E-7 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.01 on Radiographic Practice and Penetrameters.

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<sup>2</sup> For ASME Boiler and Pressure Vessel Code applications see related Practice SE-747 in Section II of that Code.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 02.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 02.04.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 03.03.