The Engineering Society
For Advancing Mobility
Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE STANDARD

AS7114/4

Issued 1997-07
Superseding AS 7110/1A

Submitted for recognition as an American National Standard

NADCAP
REQUIREMENTS FOR NONDESTRUCTIVE TESTING FACILITY
RADIOGRAPHY

1. **SCOPE**:

This Aerospace Standard (AS) is to be used to supplement AS7114. In addition to the requirements contained in AS7114, the requirements contained herein shall apply to suppliers seeking NADCAP accreditation for Radiography.

When customer requirements differ from those specified herein, the customer requirements shall take precedence.

2. **REFERENCES**:

2.1 SAE Publications

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15086-0001.

AS7003 National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Program Operation
AS7114 National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Nondestructive Testing

2.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM E 155 Reference Radiographs for Inspection of Aluminum and Magnesium Castings
ASTM E 186 Reference Radiographs for Heavy-Walled (2 - 4-1/2 in) (51 - 114 mm)) Steel Castings
ASTM E 192 Reference Radiographs of Investment Steel Castings for Aerospace Applications
ASTM E 446 Reference Radiographs of Steel Castings Up to 2 in (51 mm) in Thickness

2.3 Military Publications: Available from Naval Publications and Forms Center, Attn: NPODS, 5801 Tabor Avenue, Philadelphia, PA 19120-5099.

MIL-STD-453 Inspection, Radiographic
MIL-STD-45662 Calibration Systems Requirements

QUESTIONS REGARDING THIS DOCUMENT: (412) 772-8510 FAX (412) 776-0243
TO PLACE A DOCUMENT ORDER: (412) 776-4970 FAX (412) 776-0790

3. **PROCEDURES:**

3.1 If applicable, there shall be defined procedures for special material handling and processing of parts (e.g. for beryllium and titanium, etc.).

3.2 Procedures and/or technique cards shall be prepared for each part number that contain all the information required to X-ray the part or assembly. These procedures and/or technique cards shall include the following information as a minimum:

a. The procedure number, revision letter and date, applicable program and/or customer, and the date the procedure was approved
b. The part name, part number, material, class, grade, model designation (as applicable), sketch, state of fabrication, and dimensions significant to the part to be examined
c. Materials required (i.e., tape, fixtures, etc.)
d. Surface preparation (finishing and cleaning), if required
e. Applicable acceptance class and zone in accordance with engineering drawing specification (accept/reject criteria and source of criteria)
f. A statement to the effect that all personnel are qualified and certified to the applicable contract requirements
g. Disposition of reports, films, and inspection records; and methods of marking parts after inspection
h. A sketch or photograph(s) of the set-up detailing the following for each view:
   - Film location relative to the part and radiation beam
   - Thickness ranges to be radiographed
   - Location of IQI's/Penetrameters
i. Type and thickness of IQI's/penetrameters, shims, and blocks
j. Exposure parameters (kV, mA, and time)
k. Source-to-film distance (SFD)
l. Part-to-film distance (PFD)
m. Angle between the central beam and the part or film
n. Film brand, type, and size
o. Effective focal spot size of the X-ray equipment to be used (i.e., large, small, dimension)
p. Cassette/film holder type, if applicable
q. Type and thickness of screens, and film loading instructions, if needed
r. Blocking or masking materials and techniques, if used
s. Filter material, thickness, and location, if used
t. Film viewing and interpretation instructions
u. H & D film density range in the area of interest
v. Radiographic quality level
w. X-ray machine used, manufacturer, model number, and peak voltage rating
x. Film processing techniques, methods, and chemicals used
y. Identification of organization performing inspection
z. Other data as required, e.g., multi-film techniques, location of markers, etc.
aa. Prime contractor approval when required by purchase order or specification

3.2 Continued:

ab. Cognizant customer and/or supplier Level III approval signature
ac. Type and amount of backing material used, if required
ad. Additional information for special applications such as in-motion radiography, field operations, isotopes, high energy (above 1 MeV), etc.

4. **NDT PROCESS CONTROL**:

4.1 The facility shall maintain and use a system by which parts and radiographs are identified and correlated.

4.2 The lead letter “B” shall be on the back of the film cassette or placed on the lead covered table under and in direct contact with the film cassette with the lead letter “B” maintained in the area of interest, or per customer requirement.

4.3 Exposed film of step wedge or equivalent shall be processed at least weekly and the results shall be recorded.

4.3.1 Results shall be recorded to within ±15% film density required of original standard radiograph.

5. **FILM PROCESSING AREA**:

5.1 The facility shall be equipped with an adequate darkroom/film processing area for the loading of the film holders and development of film such that production of nonconforming radiographs is minimized.

5.2 The film processing equipment shall be adequate for performing production processing.

5.3 **Automatic Processors:**

5.3.1 Automatic processors shall be maintained within the processor and chemical manufacturer’s specified temperature, processing speed, replenishment rates, and concentrations.

5.3.2 Automatic processors shall be tested periodically, when solutions are changed, and/or when malfunction is suspected.

5.3.3 Automatic processors shall be cleaned and maintained in accordance with manufacturer’s recommendations.

5.3.4 A maintenance log shall be maintained for automatic processors.