



Ohio Administrative Code Rule 3701:1-68-03 Non-medical radiographic systems.

Effective: June 30, 2023

In addition to the applicable rules in this chapter and Chapter 3701:1-38 of the Administrative Code, handlers of radiographic systems will comply with the following:

(A) Radiographic systems will meet the following equipment standards:

(1) A lock designed to prevent unauthorized or accidental production of ionizing radiation will be provided.

(2) A readily visible warning light, labeled with the words "X-RAY ON" or words or symbols having a similar intent, will be located on or near the x-ray source and its controls and will be illuminated when the x-ray source is energized.

(3) All radiographic systems will be labeled with a readily discernible sign or signs bearing the radiation symbol and the words:

(a) "CAUTION - HIGH INTENSITY X-RAY BEAM," or appropriate words having a similar intent, on or near the x-ray source housing; and

(b) "CAUTION - THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED," or appropriate words having a similar intent, near any switch or control that directly energizes the unit.

(4) Permanent radiographic installations will be equipped with the following:

(a) Failsafe interlocks at each entrance used for personnel access to the high radiation area;

(b) A visible signal that is activated when radiation is produced; and

(c) An audible signal that is activated when an attempt is made to enter the high radiation area while



radiation is being produced.

(5) The exposure switch of hand-held radiographic systems will meet the following:

(a) The switch will be of the "dead-man" type;

(b) The operator will be able to terminate the exposure at any time during an exposure of greater than one-half second; and

(c) It will not be possible to make an exposure when the timer is set to "zero" or "off" position if either position is provided.

(B) Handlers of radiographic systems will comply with the following radiation safety obligations:

(1) Sufficient calibrated and operable radiation survey instruments will be maintained to make physical radiation surveys as obligated by this rule and rule 3701:1-38-14 of the Administrative Code. Radiation survey instruments obligated by this rule will have a range such that 0.2 millisievert (two millirem) per hour through 0.01 sievert (one rem) per hour can be measured.

(2) Radiation area surveys will be performed and the results recorded to confirm compliance with paragraph (A) of rule 3701:1-38-14 of the Administrative Code in accordance with the following:

(a) Upon installation;

(b) After any changes in shielding or the radiographic system that is part of permanent radiographic installation; and

(c) Each time the radiographic system has been moved to an area that has yet to be evaluated for radiation levels at temporary job sites.

(3) A physical radiation survey will be made after each radiographic exposure to verify that the radiation-generating equipment is not still producing radiation unless:



- (a) Personnel devices providing an audible signal when activated by radiation and proper operation of the audible detection device is checked and recorded daily;
 - (i) The audible device will be designed so as to clearly indicate entry into a 0.02 mSv (two mrem) per hour or greater radiation field; and
 - (ii) All personnel working with the radiation-generating equipment will be provided with such a device; or
- (b) Stationary area monitors providing an audible signal when activated by radiation will be acceptable and proper operation of the stationary detection device is checked and recorded daily;
 - (i) The stationary device will be designed so as to clearly indicate entry into a 0.02 mSv (two mrem) per hour or greater radiation field; and
 - (ii) Stationary area monitors will be evaluated annually to verify that the audible signal activates in a 0.02 mSv (two mrem) per hour radiation field.
- (4) A utilization log will be maintained between inspections showing the following information for each radiographic system used:
 - (a) Manufacturer, model number, and serial number;
 - (b) Locations and dates of use;
 - (c) Operating voltage, tube current, and exposure time for each radiographic exposure; and
 - (d) Identity of the operator.
- (5) Operating and emergency procedures will include instructions in at least the following:
 - (a) Inspection, maintenance and operability checks of radiographic systems and radiation survey instruments;



- (b) Minimizing additional exposure of individuals in the event of an accident;
- (c) Notifying proper personnel in the event of an accident; and
- (d) Identifying and reporting defects and noncompliance according to the obligations of rule 3701:1-38-23 of the Administrative Code, involving:
 - (i) The failure of any component, which is critical to safe operation of the device to properly perform its intended function;
 - (ii) The failure of an indicator on non-medical radiation-generating equipment to show that radiation is being produced;
 - (iii) The failure of an exposure switch to terminate production of radiation when turned to the off position; or
 - (iv) The failure of a safety interlock to terminate x-ray production.
- (6) At least two qualified individuals will be present at a temporary job site when a radiographic system is being used. At least one of the individuals will be the radiographer to whom the radiographic system is assigned and the other individual will be either a radiographer or a radiographer's assistant.
- (7) No individual other than a radiographer or a radiographer's assistant who is under the personal supervision of a radiographer will manipulate controls or operate equipment used in radiographic operations. The personal supervision will include:
 - (a) The radiographer's physical presence at the site where the radiographic system is being used;
 - (b) The availability of the radiographer to give immediate assistance if obligated; and
 - (c) The radiographer's direct observation of the radiographer's assistant's performance of the



operations referred to in this rule.

(8) The handler will not permit any individual to act as a radiographer or as a radiographer's assistant unless, at all times during radiographic operations, each such individual wears, on the trunk of the body, an appropriate direct reading dosimeter and a personnel dosimeter. Analog pocket dosimeters will be recharged at the start of each shift. Electronic dosimeters will be battery-tested at the beginning of each shift. Each personnel dosimeter will be assigned to and worn by only one individual and the handler will assure that:

(a) Direct reading dosimeters are read and exposures are recorded at the beginning and end of each shift.

(b) If an individual's pocket dosimeter is found to be off-scale, or the electronic personnel dosimeter reads greater than two millisieverts (two hundred mrem), the individual's personnel dosimeter will be sent for processing within twenty-four hours. In addition, the individual will not resume work associated with the use of x-ray sources until a determination of the individual's radiation exposure has been made. This determination will be made by the individual responsible for radiation protection (IRRP) or the IRRP's designee and the results of this determination will be recorded.

(9) The handler will not permit any individual to perform radiographic operations unless, at all times during radiographic operations, each such individual wears, on the trunk of the body, a personnel monitoring device that will be calibrated for the x-ray energies being utilized.

(a) Personnel dosimeters will be exchanged monthly unless the IRRP has performed an evaluation that indicates a longer frequency is adequate; in this instance the frequency will not exceed three months.

(b) If a personnel dosimeter is lost or damaged, the worker will cease work immediately until a replacement personnel dosimeter is provided and the exposure is calculated for the time period from issuance to loss or damage of the personnel dosimeter. This calculation will be made by the IRRP or the IRRP's designee. The results of the calculated exposure and the time period for which the personnel dosimeter was lost or damaged will be recorded.



(i) After replacement, each personnel dosimeter will be returned to the supplier for processing within fourteen calendar days of the end of the monitoring period; or

(ii) In circumstances that make it impossible to return each personnel dosimeter in fourteen calendar days, such circumstances will be recorded.

(10) During each radiographic operation, the radiographer, radiographer's assistant or operator will maintain surveillance of the operation to protect against unauthorized entry into a high radiation area, except:

(a) When the high radiation area is equipped with interlocks and signals as described in paragraph (A)(4) of this rule; or

(b) When the high radiation area is locked to protect against unauthorized or accidental entry.

(11) When performing radiographic operations at a location other than a permanent radiographic installation having the control devices specified in paragraph (B)(10) of this rule, the industrial radiographer will be responsible for:

(a) Posting signs bearing the radiation symbol and the words "CAUTION HIGH RADIATION AREA" at the perimeter of the calculated high radiation area;

(b) Restricting access by using appropriate barriers, such as rope or tape, and posting signs bearing the radiation symbol and the words "CAUTION RADIATION AREA" at the perimeter of the restricted area; and

(c) Maintaining constant visual surveillance of the restricted area boundary to prevent access by unauthorized personnel.

(C) In addition to the radiation protection obligations in rule 3701:1-68-02 of the Administrative Code, handlers of radiographic systems will comply with the following:

(1) Radiation survey instrumentation described in paragraph (B)(1) of this rule will be checked and



the results recorded at the beginning of each work shift using check sources or other appropriate means to ensure it is operating accurately. If any check conducted reveals the radiation survey instrumentation is not operating accurately, the instrument will not be used to meet the survey obligations of paragraph (B)(2) of this rule.

(2) Radiographic systems will be checked and the results recorded prior to each shift of use to ensure all necessary labeling is present and identify any obvious defects. If any check conducted reveals damage to components critical to radiation safety, the device will be locked out and tagged "DO NOT USE" until repairs have been made.

(3) Entrance interlocks and signals described in paragraph (A)(4) of this rule, will be tested and the results recorded at the beginning of each day of equipment use to ensure proper operation. If an entrance interlock or signal is operating improperly, it will be immediately labeled as defective and repaired or replaced within seven calendar days. The facility may continue operations during this seven-day period, provided the handler implements the continuous surveillance obligations of this rule.

(4) The following documents and records will be available for inspection at each temporary job site:

(a) Appropriate certificate of registration;

(b) Operating and emergency procedures;

(c) Applicable rules promulgated pursuant to Chapter 3748. of the Revised Code;

(d) Surveys obligated pursuant to this rule and rule 3701:1-38-14 of the Administrative Code for the period of operation at the site;

(e) Daily dosimetry for the period of operation at the site;

(f) The latest calibration records for the specific survey instruments and direct reading dosimeters in use at the site. Acceptable records include tags or labels which are affixed to the survey instrument or dosimeter; and



(g) Radiation survey instrumentation checks and radiographic system checks for devices in use at the site.

(D) Handlers of radiographic systems used for bomb detection purposes:

(1) Will be exempt from paragraphs (B)(1) to (B)(3), (B)(6) to (B)(11), (C)(1) to (C)(3) and (C)(4)(d) to (C)(4)(g) of this rule.

(2) May change the interval for calibrating radiation survey instruments as specified in paragraph (B)(1)(b) of rule 3701:1-68-02 of the Administrative Code to annual; and

(3) Will evaluate radiographic systems and record the results of the evaluations, at least annually, to assure proper functioning of components important to safety unless the radiation-generating equipment has been locked out and tagged "DO NOT USE" and is under the administrative control of the IRRP.

(E) Handlers of hand-held radiographic systems will:

(1) Be exempt from paragraphs (B)(1) to (B)(3), (B)(6) to (B)(11), (C)(1) to (C)(3) and (C)(4)(d) to (C)(4)(g) of this rule.

(2) Evaluate the radiographic systems and record the results of the evaluation, at least annually, to assure proper functioning of components important to safety unless the radiation-generating equipment has been locked out and tagged "DO NOT USE" and is under the administrative control of the IRRP.

(3) Obligate the IRRP to document and implement safe operating procedures to include, but not be limited to:

(a) Using specific administrative controls to prevent unauthorized access or use of the system;

(b) Requiring the backscatter shield to be in place during all radiographic exposures, if the



manufacturer of the hand-held radiation-generating equipment provides a backscatter shield; and

(c) Assuring that the system remains in direct control of the authorized operator and the operator will not aim the primary beam at him/herself or at any individual during exposure;

(d) Establishing and maintaining a restricted area of at least six feet opposite the side of the material being exposed;

(e) Banning individuals from holding material or the image receptor in their hand during exposure;

(f) Operating of software and trigger lock; and

(g) Requiring operators to wear assigned ring badges on the hand closest to the primary beam.