

**MICHIGAN DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS
RADIATION SAFETY SECTION
IONIZING RADIATION RULES GOVERNING THE USE OF RADIATION
MACHINES**

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PART 6. INDUSTRIAL RADIOGRAPHIC OPERATIONS AND INSTALLATIONS

R 333.5281 Purpose and scope.

Rule 281. (1) This part establishes radiation safety requirements for persons utilizing radiation machines for industrial radiography and a classification system for industrial radiographic installations and use.

(2) This part applies to all registrants who use radiation machines for industrial radiography. Nothing in this part applies to the use of radiation machines by a health practitioner licensed under article 15 of the act, MCL 333.1101 to 333.25211.

(3) In addition to the requirements of this part, all registrants are subject to the applicable provisions of the other parts of these rules.

History: 2016 MR 10, Eff. May 25, 2016

R 333.5282 Definitions.

Rule 282. As used in this part:

- (a) "Industrial radiography" means the examination of the macroscopic structure of materials by nondestructive methods utilizing radiation machines.
- (b) "Installation" means a location, having boundaries specified by the registrant, where for a period of more than 30 days 1 or more radiation machines are used. A part of a building, an entire building, a plant, or plant site may be designated as an installation.
- (c) "Radiographer" means an individual who performs or who, in attendance at the site where radiation machines are being used, personally supervises class D radiographic operations and who is responsible to the registrant for assuring compliance with the requirements of these rules and all registration conditions.
- (d) "Radiographer's assistant" means an individual who, under the personal supervision of a radiographer, uses radiation machines or survey instruments in class D radiographic operations.

History: 2016 MR 10, Eff. May 25, 2016

CLASSIFICATION

R 333.5293 Class enumeration.

Rule 293. (1) For registration and approval purposes, industrial radiographic installations shall be classified as class AA, class A, class B, or class C.

(2) For the purpose of registering and approving industrial radiography and radiation machines intended for

limited use at temporary job site locations, this use shall be classified as a class D operation.

History: 2016 MR 10, Eff. May 25, 2016

R 333.5294 Class AA installations.

Rule 294. (1) In class AA installations the radiation machine and objects exposed thereto shall be contained within a permanent enclosure.

(2) The enclosure shall be constructed such that the radiation dose rate at a distance of 5 centimeters from any point on the external surface shall not exceed 0.02 millisievert per hour (2 mrem/h). The dose rate shall be measured with the source of radiation placed at the position of closest source-wall distance that is radiographically usable and under conditions of maximum radiation output permitted by the design or operating characteristics of the radiation machine.

(3) Mechanical or electrical limiters shall limit movement or alignment of the radiation machine within the enclosure if necessary to comply with subrule (2) of this rule.

(4) A personnel barrier posted pursuant to R 333.5067 to R 333.5072 restricting access to the roof of the enclosure shall meet the requirement of subrule (2) of this rule.

(5) Reliable interlocks shall be provided which will prevent anyone from opening the enclosure while the radiation machine is on or which will terminate machine operation should anyone open the enclosure.

(6) Enclosures of sufficient size to permit human occupancy shall be provided with visible signals or audible signals, or both, within the enclosure, which are activated a minimum of 5 seconds before radiation machine activation. Individuals shall at all times be able to escape from within the enclosure.

(7) Individuals shall not be permitted to remain within the enclosure while the radiation machine is in operation.

(8) Protective enclosures and equipment shall be kept in good repair.

(9) Industrial fluoroscopy shall meet the requirements of class AA installations.

(10) Notwithstanding the provisions of subrule (2) of this rule, the enclosure for industrial fluoroscopy shall be constructed such that the radiation dose rate at a distance of 5 centimeters from any accessible point on the external surface shall not exceed 0.005 millisievert per hour (0.5 mrem/h) under conditions of maximum radiation output permitted by the design or operating characteristics of the installation.

(11) Industrial cabinet radiography conducted in enclosures of insufficient size to permit human occupancy shall meet the requirements of class AA installations.

(12) Notwithstanding the provisions of subrule (2) of this rule, the enclosure for industrial cabinet radiography of insufficient size to permit human occupancy shall be constructed such that the radiation dose rate at a distance of 5 centimeters from any accessible point on the external surface shall not exceed 0.005 millisievert per hour (0.5 mrem/h) under conditions of maximum radiation output permitted by the design or operating characteristics of the installation.

(13) For class AA enclosures of sufficient size to permit human occupancy, a personnel radiation dosimeter shall be permanently assigned to each occupationally exposed individual. This monitoring shall be continuous during employment as a radiation worker.

(14) Personnel exposure records shall be kept on permanent available file at the facility where the exposure occurs for inspection by the department.

(15) Class AA approval permits unlimited use at maximum capacity.

History: 2016 MR 10, Eff. May 25, 2016

R 333.5296 Class A installations.

Rule 296. (1) Class A installations shall comply with all requirements of R 333.5294 except for a permissible dose rate of 0.07 millisievert per hour (7 mrem/h) at any accessible external point.

(2) A personnel radiation dosimeter shall be permanently assigned to each occupationally exposed individual. This monitoring shall be continuous during employment as a radiation worker.

(3) Personnel exposure records shall be kept on permanent available file at the facility where the exposure occurs for inspection by the department.

(4) Class A approval permits unlimited use at maximum capacity.

History: 2016 MR 10, Eff. May 25, 2016

R 333.5297 Class B installations.

Rule 297. (1) Class B installations shall comply with all requirements of R 333.5296.

(2) Radiation machine current and potential controls shall be mechanically or electrically limited so as not to exceed the normal operating conditions as specified by the registrant at the time of application for registration.

(3) Class B approval permits unlimited use under normal operating conditions as specified by subrule (2) of this rule.

History: 2016 MR 10, Eff. May 25, 2016

R 333.5298 Class C installations.

Rule 298. (1) Class C installations shall comply with all requirements of R 333.5296 except for a permissible dose rate of 0.5 millisievert (50 mrem) per hour at any accessible external point.

(2) The maximum weekly exposure time of radiation machines within the enclosure shall be established by the department under the conditions specified by the registrant at the time of application.

(3) Warning signs shall be posted in those areas outside the enclosure in which the radiation dose rate at any accessible external point exceeds 0.02 millisievert per hour (2 mrem/h). The dose rate shall be measured with the radiation machine tube placed at position of nearest source-wall distance that is radiographically usable under conditions of maximum radiation output permitted by the design or limited operating characteristics of the radiation machine.

History: 2016 MR 10, Eff. May 25, 2016

R 333.5299 Class D operations.

Rule 299. (1) Industrial radiography conducted under conditions not meeting the provisions and requirements of R 333.5294 to R 333.5298 shall be classified as class D operations and shall not be operated longer than 30 days unless written authorization is granted by the department.

(2) Written authorization may be granted by the department for class D operations longer than 30 days but not longer than 6 months when an undue and unnecessary hardship may result from the 30-day limitation. Written request by the registrant for this authorization is required and shall describe the hardship involved as well as provide written assurance of compliance with the requirements of these rules for class D operations.

(3) Notwithstanding subrules (1) and (2) of this rule, a registrant routinely engaged in providing industrial radiography services with mobile or portable radiation machines at temporary job site locations may conduct such class D operations without time limitation subject to all of the following conditions:

- (a) The registrant shall give written notice to the department at least 2 working days before starting radiographic work at a job site. The notice shall include the radiographer's name; the machine registration number; the nature, duration, and scope of use; and the exact location of each job site. If the 2 work-day period would impose an undue hardship on the registrant, upon application to the department, he or she may arrange for other notification to

- comply with the intent of this requirement.
- (b) These class D operations shall be limited to locations and circumstances which cannot meet the provisions and requirements of permanent installation classification without undue and unnecessary hardship.
- (c) A copy of written operating and emergency procedures shall be filed with and approved by the department.
- (d) Upon reasonable notice from the department, the registrant shall submit to the department or otherwise make available copies of specific records pertaining to radiographic operations and personnel conducting these operations within this state.

(4) A fence, rope, or other suitable barrier shall be erected along the 0.05 millisievert per hour (5 mrem/h) contour line during class D radiographic operations to exclude unauthorized individuals from the radiation area.

(5) Notwithstanding the requirements of R 333.5073, the radiation area and high radiation area shall be posted with caution signs as specified in R 333.5067 to R 333.5072.

(6) A registrant shall not permit an individual to act as a radiographer or as a radiographer's assistant unless, at all times during radiographic operation, the individual wears a long-term monitoring device such as a film badge or TLD and a short-term monitoring device such as a pocket dosimeter or pocket chamber. Pocket dosimeters and pocket chambers shall be capable of measuring doses from 0 to at least 2 millisieverts (200 mrem). A long-term monitoring device shall be assigned to and worn by only 1 individual.

(7) Pocket dosimeters and pocket chambers shall be read and doses recorded daily. A film badge or similar device shall be immediately processed if a pocket chamber or pocket dosimeter is discharged beyond its range. All personnel exposure reports and records of pocket dosimeter and pocket chamber readings shall be maintained for inspection by the department.

(8) Written operating and emergency procedures shall be available at each class D radiographic operation.

History: 2016 MR 10, Eff. May 25, 2016

REQUIREMENTS FOR CLASS D RADIOGRAPHIC OPERATIONS

R 333.5302 Operating and emergency procedures.

Rule 302. A registrant's written operating and emergency procedures for class D radiographic operations shall include instructions in at least the following:

- (a) The use of radiation machines to be employed such that an individual is not likely to be exposed to radiation doses in excess of the limits established in R 333.5057 to R 333.5061.

- (b) Methods and occasions for conducting radiation surveys.
- (c) Methods for controlling access to radiographic areas.
- (d) Personnel monitoring and the use of individual monitoring devices.
- (e) Transportation to field locations, including packing of radiation machines in the vehicles, posting of vehicles, and control of radiation machines during transportation.
- (f) Minimizing exposure of persons in the event of an accident.
- (g) Procedure for notifying proper persons in the event of an accident.
- (h) Maintenance of records.
- (i) Inspection and maintenance of radiation machines.

History: 2016 MR 10, Eff. May 25, 2016

R 333.5305 Security.

Rule 305. (1) During each class D radiographic operation, the radiographer or radiographer's assistant shall maintain a direct surveillance of the operation to protect against unauthorized entry into a high radiation area, except where the high radiation area is equipped with interlocks as described in R 333.5294 (5), or where the high radiation area is locked to protect against unauthorized or accidental entry.

(2) A radiographer or radiographer's assistant shall not perform or permit class D radiographic operation unless all individuals present in or entering the resulting radiation area are wearing individual monitoring devices.

History: 2016 MR 10, Eff. May 25, 2016

R 333.5306 Radiation surveys and survey records.

Rule 306. (1) A class D radiographic operation shall not be conducted unless calibrated and operable radiation survey instrumentation, as described in R 333.5307, is available and used at each site where radiographic exposures are made.

(2) For class D radiographic operations, a physical radiation survey shall be conducted to determine that the radiation machine is off before each entry into the radiographic exposure area.

History: 2016 MR 10, Eff. May 25, 2016

R 333.5307 Radiation survey instruments.

Rule 307. (1) A registrant shall maintain calibrated and operable radiation survey instruments to make physical radiation surveys as required by R 333.5306 and R 333.5063. A radiation survey instrument shall be calibrated at least annually and after each instrument servicing. A record of the calibration shall be maintained for examination by the department.

(2) Instrumentation required by this rule shall have a range such that 0.02 millisievert per hour (2 mrem/h) through 0.01 sievert per hour (1 rem/h) can be measured and shall be capable of measuring radiation of the energies and at the dose rates to be encountered.

(3) During repair or calibration of survey instruments required by this rule, spare operable and calibrated instruments shall be provided or class D radiographic operations shall be terminated pursuant to R 333.5306(1).

History: 2016 MR 10, Eff. May 25, 2016

R 333.5308 Utilization logs.

Rule 308. A registrant shall maintain for inspection by the department current logs, which contain all of the following information for each radiation machine:

- (a) The machine registration number.
- (b) The identity of the radiographer to whom the machine is assigned.
- (c) The locations where used and dates of use.
- (d) The signature or initials of the individual certifying each entry.

History: 2016 MR 10, Eff. May 25, 2016

R 333.5309 Limitations for radiographers and radiographer assistants.

Rule 309. (1) A registrant shall not permit an individual to act as a radiographer until all of the following have been met:

- (a) The individual was instructed in the subjects outlined in table 309 and has demonstrated understanding of these subjects.

Table 309
Instruction of radiographers

- I Fundamentals of Radiation Safety
 - A. Characteristics of x-radiation
 - B. Units of radiation dose
 - C. Hazards of excessive radiation exposure
 - D. Levels of radiation from radiation machines
 - E. Methods of controlling radiation dose
 - 1. Working time
 - 2. Working distances
 - 3. Shielding
- II Radiation Detection Instrumentation to be Used
 - A. Use of radiation survey instruments
 - 1. Operation
 - 2. Calibration
 - 3. Limitations
 - B. Survey techniques
 - C. Use of individual monitoring devices

- III. Radiographic Equipment to be Used
 - A. Operation and control of x-ray equipment
- IV. The Requirements of Pertinent State Regulations
- V. The Registrant's Written Operating and Emergency Procedures
- VI. Registration Conditions

- (b) The individual received copies of and instruction in the rules contained in this part and the applicable sections of R 333.5051 to R 333.5089, registration conditions, and the registrant's operating and emergency procedures, and has demonstrated an understanding of these subjects.
- (c) The individual demonstrated competence to use the radiation machine and survey instruments which will be employed in his or her assignment.

(2) A registrant shall not permit an individual to act as a radiographer's assistant until both of the following have been met:

- (a) The individual received copies of and instruction in the registrant's operating and emergency procedures, and has demonstrated an understanding of these procedures.
- (b) The individual demonstrated competence to use, under the personal supervision of the radiographer, the radiation machines and radiation survey instruments which will be employed in his or her assignment.

History: 2016 MR 10, Eff. May 25, 2016