

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

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PART 8. MEDICAL EXTREMITY X-RAY INSTALLATIONS

R 333.5361 Purpose and scope.

Rule 361. (1) This part establishes requirements governing the use of x-radiation in a healing arts discipline for human extremity radiography only.

(2) This part applies to all registrants who use x-radiation for the intentional exposure of human extremities only.

(3) In addition to the requirements of this part, all registrants performing human extremity radiography are subject to all applicable provisions of these rules. Uses of x-radiation for intentional human exposure other than or in addition to extremity radiography are subject to R 333.5311 to R 333.5359.

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

FIXED RADIOGRAPHIC INSTALLATIONS

R 333.5362 X-ray equipment.

Rule 362. (1) All x-ray tube housings in fixed radiographic installations shall be of the diagnostic type.

(2) The aluminum equivalent of the total filtration in the useful beam shall not be less than that shown in table 362.

TABLE 362

Operating Potential	Minimum Total Filter (Inherent plus added)
Below 50 kVp	0.5 mm aluminum
50-70 kVp	1.5 mm aluminum
Above 70 kVp	2.5 mm aluminum

(3) If the filter in the machine is not accessible for examination and the total filtration is not known, subrule (2) of this rule may be assumed to have been met if the half-value layer is not less than any of the following:

- (a) 0.6 mm aluminum at 49 kVp.
- (b) 1.6 mm aluminum at 70 kVp.
- (c) 2.6 mm aluminum at 90 kVp.

(4) Under conditions of subrule (3) of this rule, for tube potentials above 90 kVp, subrule (2) of this rule may be assumed to have been met if the half-value layer is not less than that specified in table 325-2 in R 333.5325(5).

(5) Beam-limiting devices, such as diaphragms, cones, or adjustable collimators, capable of restricting the useful beam to the area radiographically recorded shall be provided to define the beam and shall provide the same degree of attenuation as that required of the tube housing.

(6) Beam-limiting devices shall be calibrated in terms of the size of the projected useful beam at specified source-

image receptor distances (SID). The calibration shall be clearly and permanently recorded on the beam-limiting device. Calibration of adjustable beam-limiting devices shall permit reproducible settings.

(7) X-ray systems designed for only 1 image receptor size at a fixed SID shall be provided with means to limit the field at the plane of the image receptor to dimensions no greater than those of the image receptor, and to align the center of the x-ray field with the center of the image receptor to within 2% of the SID.

(8) The size of the x-ray beam projected by fixed aperture beam-limiting devices, except those used for stereoradiography, shall not exceed the dimensions of the image receptor by more than 2% of the SID when the axis of the x-ray beam is perpendicular to the plane of the image receptor.

(9) The calibrated field size indicator on adjustable beam-limiting devices shall be accurate to within 2% of the SID. The light field shall be aligned with the x-ray field with the same degree of accuracy. The field size projected by automatic adjustable collimators shall provide the same precision.

(10) For radiographic procedures resulting in multiple views on a single image receptor, the beam-limiting device shall limit the x-ray field size to the recorded radiographic image size within 2% of the SID. Covering a portion of the image receptor with radio-opaque material is not a substitute for proper x-ray field limitation.

(11) A device shall be provided to terminate the exposure at a preset time interval or exposure limit. The operator shall be able to terminate the exposure at any time by discontinuing pressure upon the exposure switch.

(12) Unless protective shielding is provided for the operator, the length of the exposure control switch cord or remote control location shall be such that the operator shall be able to stand at least 1.8 meters (6 feet) away from the patient and the x-ray tube and out of the useful beam. When protective shielding is provided, the operator shall always be entirely behind the shield during the exposure.

(13) The control panel shall provide positive identification of the production of x-rays when the x-ray tube is energized. A milliammeter may meet the requirements of this subrule.

(14) The technique factors to be used during an exposure shall be indicated before the exposure begins. When automatic exposure controls are used, only those technique factors which are set before the exposure shall be indicated. On equipment having fixed technique factors, this requirement may be met by permanent markings. Indication of technique factors shall be visible from the operator's position.

(15) A signal audible to the operator shall indicate that the exposure has ended.

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

R 333.5365 Enclosures.

Rule 365. (1) The degree of protection required for an enclosure shall be determined by the workload, use and occupancy factors, and the tube potential, tube current, mechanical movement, and distance, and shall be subject to design approval by the department.

(2) In a radiographic room, wall and floor areas exposed to the useful beam plus an area extending at least 30 centimeters (1 foot) beyond shall be provided with a primary protective barrier where necessary as determined by workload, use and occupancy factors, and distance.

(3) Secondary protective barriers shall be provided in the radiographic room ceiling and in those walls not requiring primary barriers. Common building materials often fulfill this requirement.

(4) A fixed barrier of 1.6 millimeters (1/16 inch) lead equivalence, such as a shielded wall partition or immobilized portable shield, is recommended for operator protection. When this protection is provided, the operator shall be able to see and communicate with the patient from a shielded position.

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

R 333.5366 Conditions of operation.

Rule 366. (1) An operator shall properly utilize the beam-limiting devices provided to restrict the useful beam to the smallest area consistent with clinical requirements. Particular care shall be taken to align accurately the x-ray beam with the patient and film.

(2) The operator shall ensure the presence of adequate filtration before each radiographic procedure.

(3) Staff personnel routinely working with or around radiation sources shall not be required by the registrant to hold film or restrain patients during radiography. If the procedure is permitted, personnel exposure shall not exceed the limits in R 333.5057 to R 333.5059 or the procedure shall be prohibited.

(4) When a patient is held in position for radiography, mechanical supporting or restraining devices shall be available and shall be used unless contraindicated. If the patient is held by an individual, this individual shall wear protective gloves and a protective apron of 0.5 millimeter minimum lead equivalence and shall be positioned so that no part of his or her body can be struck by the useful beam and that his or her body is as far as possible from the edge of the useful beam.

(5) During each exposure, the operator shall stand at least 1.8 meters (6 feet) from the patient and the x-ray tube and outside the useful beam or behind a suitable barrier.

(6) Only individuals whose presence is necessary shall be permitted in the radiographic room during an exposure. An individual, except the patient, shall be protected by 0.5 millimeter minimum lead equivalent aprons unless protected by an approved primary barrier.

(7) Personnel monitoring shall be performed in controlled areas for each individual occupationally exposed to ionizing radiation from diagnostic x-ray equipment. Individual monitoring devices, such as film badge dosimeters or thermoluminescent dosimeters, shall be permanently assigned to each occupationally exposed individual. This monitoring shall be continuous during employment as a radiation worker.

(8) Personnel exposure records shall be kept on permanent available file at the facility where the exposure occurs.

(9) Monitoring devices used to estimate whole body exposure shall normally be worn on the chest or abdomen. Monitoring of all body parts shall comply with R 333.5065.

(10) Monitoring devices worn to estimate personnel occupational exposure shall not be worn by the individual when he or she is exposed as a patient for a medical or dental reason.

(11) The gonads of children and individuals who have not passed the reproductive age shall be protected from the useful beam either by the use of shielding (0.5 mm lead equivalent), collimation, or special gonad shields. Special gonadal aprons (0.25 mm lead equivalent) are recommended, but not required, for patient protection from secondary radiation.

(12) Intensifying screens shall be employed to reduce patient exposure except in cases where a noticeable decrease in image definition may reduce the clinical value of the examination. Film and screen speed combinations shall be carefully selected to produce the necessary clinical information with the least exposure to the patient consistent with current clinical judgment.

(13) Film processing materials and techniques shall be those recommended by the x-ray film and processing materials manufacturers unless otherwise tested to insure maximum information content of the developed film. Sight developing is not permitted except under extreme emergency conditions. Correct temperature control and development time shall be used.

(14) A radiographic x-ray system shall not be left unattended without locking the apparatus, room, or building in some manner which prevents use of the apparatus by unauthorized persons.

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

MOBILE OR PORTABLE RADIOGRAPHIC EQUIPMENT

R 333.5368 General provisions.

Rule 368. (1) Radiographic x-ray equipment shall meet the requirements of R 333.5362.

(2) Mobile or portable radiographic x-ray equipment used routinely in 1 location shall be considered a fixed installation and enclosures shall meet the requirements of R 333.5365.

(3) Operation shall comply with the requirements of R 333.5366.

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