

**INFORMAL SECTION ROUGH DRAFT – APRIL 2005**

**MICHIGAN DEPARTMENT OF COMMUNITY HEALTH  
RADIATION SAFETY SECTION  
IONIZING RADIATION RULES**

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**PART 98. DENTAL X-RAY INSTALLATIONS**

**R325.5371. Purpose and scope.**

**Rule 371.-(1)** This part establishes requirements ~~governing the for~~ use of ~~x-radiation~~ x-ray equipment by or under the supervision of an individual authorized by and licensed pursuant to State statutes, to engage in dentistry. The provisions of the part are in addition to, and not in substitution for, other applicable provisions of these rules.

The change in wording is from the Suggested State Regulations for Control of Radiation (SSRCR) of the Conference of Radiation Control Program Directors.

~~(2) This part applies to all registrants who use x-radiation in dentistry for the intentional exposure of humans.~~

This rule has been incorporated in Rule 371.

~~(3) In addition to the requirements of this part all registrants are subject to parts 1, 4 and 5 and all applicable provisions of the other parts.~~

This rule has been incorporated in Rule 371.

~~(4) The dentist should be aware of the requirements of the Michigan department of labor with regard to the employment of persons under 18 in occupations involving x-ray equipment.~~

This is an advisement – not a rule.

**R325.XXX1. Definitions a to m.**

**Rule XXX1. (1)** As used in this part:

**(a)** "Barrier" (See "protective barrier").

**(b)** "Cephalometric device" means a device intended for the radiographic visualization and measurement of the dimensions of the human head.

**(c)** "Direct scattered radiation" means that scattered radiation which has been deviated in direction only by materials irradiated by the useful beam (See "scattered radiation").

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- 70 **(d)** "Equipment" (See "X-ray equipment").
- 71 **(e)** "Filter" means material placed in the useful beam to preferentially absorb selected radiations.
- 72 **(f)** "Focal spot (actual)" means the area projected on the anode of the x-ray tube bombarded by the
- 73 electrons accelerated from the cathode and from which the useful beam originates.
- 74 **(g)** "Image receptor" means any device, such as a fluorescent screen or radiographic film, which
- 75 transforms incident x-ray photons either into a visible image or into another form which can be made
- 76 into a visible image by further transformations.
- 77 **(h)** "mA" means milliampere.
- 78 **(i)** "mAs" means milliampere second.
- 79 **(j)** "Mobile x-ray equipment" (See "x-ray equipment").

80

81 **R325.XXX2. Definitions m to s.**

82

83 **Rule xxx. (1) As used in this part:**

84

- 85 **(a)** "Patient" means an individual or animal subjected to healing arts examination, diagnosis, or
- 86 treatment.
- 87 **(b)** "Phantom" means a volume of material behaving in a manner similar to tissue with respect to the
- 88 attenuation and scattering of radiation. This requires that both the atomic number (Z) and the density
- 89 of the material be similar to that of tissue.
- 90 **(c)** "Portable x-ray equipment" (See "x-ray equipment").
- 91 **(d)** "Primary protective barrier" (See "protective barrier").
- 92 **(e)** "Protective barrier" means a barrier of radiation absorbing material(s) used to reduce radiation
- 93 exposure. The types of protective barriers are as follows:
- 94 **(f)** "Primary protective barrier" means the material, excluding filters, placed in the useful beam;
- 95 **(g)** "Radiograph" means an image receptor on which the image is created directly or indirectly by an
- 96 x-ray pattern and results in a permanent record.

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97 (h) "Scattered radiation" means radiation that, during passage through matter, has been deviated in  
98 direction (See "direct scattered radiation").

99 (i) "Secondary protective barrier" (See "protective barrier").

100 (j) "Shutter" means a device attached to the tube housing assembly which can intercept the entire  
101 cross sectional area of the useful beam and which has a lead equivalency not less than that of the  
102 tube housing assembly.

103 (k) "SSD" means the distance between the source and the skin entrance plane of the patient.

104 (l) "Stationary x-ray equipment" (See "x-ray equipment").

105 (m) "Stray radiation" means the sum of leakage and scattered radiation.

106  
107 **R325.XXX3. Definitions t to z.**

108  
109 **Rule xxx. (1) As used in this part:**

110  
111 (a) "Tube" means an x-ray tube, unless otherwise specified.

112 (b) "Tube housing assembly" means the tube housing with tube installed. It includes high-voltage  
113 and/or filament transformers and other appropriate elements when such are contained within the tube  
114 housing.

115 (c) "Useful beam" means the radiation emanating from the tube housing port or the radiation head  
116 and passing through the aperture of the beam limiting device when the exposure controls are in a  
117 mode to cause the system to produce radiation.

118 (d) "X-ray equipment" means an x-ray system, subsystem, or component thereof. Types of x-ray  
119 equipment are as follows:

120 (e) "Mobile x-ray equipment" means x-ray equipment mounted on a permanent base with wheels  
121 and/or casters for moving while completely assembled.

122 (f) "Portable x-ray equipment" means x-ray equipment designed to be hand-carried.

123 (g) "Stationary x-ray equipment" means x-ray equipment which is installed in a fixed location.

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124 (h) "X-ray field" means that area of the intersection of the useful beam and any one of the set of  
125 planes parallel to and including the plane of the image receptor, whose perimeter is the locus of points  
126 at which the exposure rate is one-fourth of the maximum in the intersection.

127 (i) "X-ray high-voltage generator" means a device which transforms electrical energy from the  
128 potential supplied by the x-ray control to the tube operating potential. The device may also include  
129 means for transforming alternating current to direct current, filament transformers for the x-ray tube(s),  
130 high-voltage switches, electrical protective devices, and other appropriate elements.

131 (j) "X-ray system" means an assemblage of components for the controlled production of x-rays. It  
132 includes minimally an x-ray high-voltage generator, an x-ray control, a tube housing assembly, a  
133 beam-limiting device, and the necessary supporting structures. Additional components which function  
134 with the system are considered integral parts of the system.

135 (k) "X-ray tube" means any electron tube which is designed for the conversion of electrical energy  
136 into X-ray energy.

**CONVENTIONAL (SINGLE TUBE) INTRAORAL INSTALLATIONS**

**R325.5372. Scope.**

**Rule 372.** Rules 373 to 376 apply to installations consisting of a single x-ray source, its individual control unit, and protective enclosure used for the production of intra-oral radiographs.

**R325.5373. Intraoral X-ray equipment.**

General equipment requirements are now addressed in Part 6 – Healing Arts X-ray General Requirements and are struck out below.

~~**Rule 373. (1)** The tube housing shall be of the diagnostic type.~~

~~**(2)** The aluminum equivalent of the total filtration in the useful beam shall not be less than 2.0 millimeter aluminum for equipment capable of operating at potentials up to 70 kVp and shall not be less than 2.5 millimeter aluminum for equipment capable of operating at potentials greater than 70 kVp. The filter shall be located as near the window of the tube housing as possible.~~

~~**(3)** For diagnostic x-ray machines manufactured after the effective date of these rules the aluminum equivalent of the total filtration in the useful beam shall not be less than that shown in table 1.~~

**TABLE 1**

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

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166 Above 70 kVp \_\_\_\_\_ 2.5 mm aluminum  
 168

169 ~~(4) If the filter in the machine is not accessible for examination and the total filtration is not known~~  
 170 ~~subrule (3) may be assumed to have been met if the half-value layer is not less than~~  
 171 ~~\_\_\_\_\_ 0.6 mm aluminum at 49 kVp~~  
 172 ~~\_\_\_\_\_ 1.6 mm aluminum at 70 kVp~~  
 173 ~~\_\_\_\_\_ 2.6 mm aluminum at 90 kVp~~  
 174

175 ~~(5) Under conditions of subrule (4) for tube potentials above 90 kVp subrule (3) may be assumed to~~  
 176 ~~have been met if the half-value layer is not less than that specified in table 2.~~  
 177

178 ~~(6) The half-value layer (HVL) of the useful beam for a given x-ray tube potential shall not be less~~  
 179 ~~than the values shown in table 2.~~  
 180

Design operating range (Kilovolts peak)	Measured potential (Kilovolts peak)	Half-value layer (millimeters of aluminum)
Below 50 _____	30	0.3
	40	0.4
	49	0.5
50 to 70 _____	50	1.2
	60	1.3
	70	1.5
Above 70 _____	80	2.3
	90	2.5
	100	2.7
	110	3.0
	120	3.2
	130	3.5
	140	3.8
	150	4.1

181 ~~(7) If it is necessary to determine the half-value layer at an x-ray tube potential which is not listed in~~  
 182 ~~table 2, linear interpolation or extrapolation may be made. Positive means shall be provided to insure that~~  
 183 ~~at least the minimum filtration needed to achieve these beam quality requirements is in the useful beam~~  
 184 ~~during each exposure.~~  
 185

186 ~~(8) Diaphragms or cones shall be provided for collimating the useful beam to a size no larger than~~  
 187 ~~clinically necessary and shall provide the same degree of protection as required of the tube housing. The~~  
 188 ~~diameter of the useful beam at the cone tip shall not be greater than 3 inches.~~  
 189

190 ~~(9) Radiographic equipment manufactured after the effective date of these rules and designed for use~~  
 191 ~~with an intra-oral image receptor shall be provided with means to limit the x-ray beam so that:~~  
 192

193 ~~(a) If the minimum source-to-skin distance (SSD) is 18 centimeters or more, the x-ray field at the~~  
 194 ~~minimum SSD shall be containable in a circle having a diameter of not more than 7 centimeters.~~

195 ~~(b) If the minimum SSD is less than 18 centimeters, the x-ray field at the minimum SSD shall be~~  
 196 ~~containable in a circle having a diameter of not more than 6 centimeters.~~  
 197

198 ~~(10) For intra-oral film exposures, means (e.g. cones) shall be provided to limit the source-to-skin~~  
 199 ~~distance (SSD) to not less than 18 centimeters with apparatus operable above 50 kVp, and not less than~~  
 200 ~~10 centimeters with apparatus not operable above 50 kVp. Open-ended cones are recommended to~~  
 201 ~~reduce scattered radiation.~~  
 202

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203 | **Rule 373. (1)** X-ray systems designed for use with an intraoral image receptor shall be provided  
204 | with means to limit SSD, to not less than:

205 |       **(a)** 18 centimeters if operable above 50 kVp; or

206 |       **(b)** 10 centimeters if operable at 50 kVp only.

207 |

208 |       **(2)** Radiographic systems designed for use with an intraoral image receptor shall be provided with  
209 | means to limit the x-ray beam such that the beam at the minimum SSD shall be containable in a circle  
210 | having a diameter of no more than 7 centimeters.

211 |

SSRCR F.7a and F.7b above (new subrules 1 and 2) replace 373(8) through 373(10).

212 |

213 |       ~~**(11)** Mechanical support of the tube head and pointer cone shall maintain the exposure position~~  
214 | ~~without drift or vibration of sufficient magnitude to cause the need for manually restraining the tube or~~  
215 | ~~retaking the x-ray.~~

216 |

217 |       ~~**(12)** A device shall be provided which terminates the exposure at a preset time interval or exposure~~  
218 | ~~limit. The operator shall be able to terminate the exposure at any time by discontinuing pressure upon the~~  
219 | ~~exposure switch except that during serial radiography means may be provided to permit completion of any~~  
220 | ~~single exposure of the series in progress.~~

221 |

222 |       ~~**(13)** If a recycling timer is employed, it shall not be possible to make a repeat exposure without release~~  
223 | ~~of the exposure switch to reset the timer.~~

224 |

225 |       ~~**(14)**The exposure control switch shall have a circuit-closing contact which can be maintained only by~~  
226 | ~~continuous pressure on the switch by the operator.~~

227 |

228 |       **(15)(3)** Unless protective shielding is provided for the operator, the length of the exposure control  
229 | switch cord or remote control location shall be such that the operator shall be able to stand at least 4.8 2.7  
230 | meters (6.9 feet) away from the patient and the x-ray tube and out of the useful beam.

231 | Distance increased to 9 feet to be consistent with other SSRCR exposure cord rules.

232 |

Subrule 16 did not exist in the old rules.

233 |

234 |       ~~**(17)** The control panel shall provide positive visual identification of the production of x-rays whenever~~  
235 | ~~the x-ray tube is energized. A milliammeter may comply with this subrule.~~

236 |

237 |       ~~**(18)** On all diagnostic machines manufactured after the effective date of these rules a signal audible to~~  
238 | ~~the operator shall indicate that the exposure has ended.~~

239 |

240 |       ~~**(19)** The technique factors to be used during an exposure shall be indicated before the exposure~~  
241 | ~~begins, except when automatic exposure controls are used, in which case the technique factors which are~~  
242 | ~~set before the exposure shall be indicated. On equipment having fixed technique factors, this requirement~~  
243 | ~~may be met by permanent markings. Indication of technique factors shall be visible from the operator's~~  
244 | ~~position.~~

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Technique factor indication requirements are now addressed in the healing arts x-ray general requirements (Part 6).

~~(20) X-ray equipment installed after the effective date of these rules shall be installed and used in accord with the appropriate portions of the 1975 national electrical code (NFPA No. 70-1975) reproduced or referenced in rule 359. X-ray equipment installed before the effective date of these rules shall conform with the appropriate national electrical code in effect at the time of installation.~~

This rule does not address radiation safety and is regulated elsewhere.

**R325.5375.     Shielding for intraoral installations.**

**Rule 375. (1)**       Conventional building materials in ~~partitions, floors, walls, floor, and ceilings~~ ceiling may provide adequate radiation shielding for intraoral dental installations. When a conventional building structure does not provide adequate shielding, the shielding shall be increased by providing greater thickness of building materials or by adding lead, concrete, steel or other suitable materials to the walls, floor, and ceiling of an existing room. ~~Shielding shall be subject to approval by the department. The degree of protection required for an enclosure shall be subject to approval by the department. The amount of shielding shall ensure that the dose limits in Part 4 are met.~~

~~(2) An enclosure shall be a permanent part of the building or equipment. Portable shields shall not be used for permanent installations.~~

Addressed in Part 6.

**R325.5376.     Conditions of operation for intraoral installations.**

~~**Rule 376. (1)**       Deliberate exposure of an individual to the useful beam for training or demonstration purposes shall not be permitted unless there is a diagnostic need for the exposure and the exposure is prescribed by a dentist or physician.~~

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271 | ~~(2) The operator or the assistant shall not hold the film in place for the patient during the exposure.~~

272 | Subrule 1, 2, and 4 are addressed in the general healing arts x-ray requirements (Part 6).

273 | ~~(3) During the exposure, the operator shall stand BEHIND A SUITABLE BARRIER OR at least 1.8~~  
274 | ~~meters (6 feet) from the patient and the x ray tube and outside the useful beam or behind a suitable~~  
275 | ~~barrier.~~

Subrule (3) above is now addressed by new rules 373(3 and 4) above.

277 | ~~(4) Only persons whose presence is necessary to conduct the radiographic examination shall be~~  
278 | ~~permitted in the radiographic room during exposure.~~

280 | ~~(5)(1) The operator shall direct the x-ray tube such that the useful beam strikes a primary barrier or~~  
281 | ~~unoccupied area after emerging from the patient.~~

283 | ~~(6)(2) Neither the tube housing nor the cone shall be hand-held during the exposure.~~

285 | ~~(7) Fluoroscopy shall not be used in dental examinations.~~

287 | ~~(8)(3) The exposure to the patient shall be kept to the practical minimum consistent with clinical~~  
288 | ~~objectives.~~

289 | ~~(9)(4) X-ray film with a minimum sensitivity of 12.0 to 24.0 reciprocal roentgens as specified in american~~  
290 | ~~standards association speed group D (A.S.A. PH 6.1-1961) shall be used for routine dental radiography.~~

292 | ~~(10) The x-ray beam and the film shall be aligned very carefully with the area to be radiographed.~~

This subrule is addressed in Part 6.

294 | ~~(11) Film processing materials and techniques shall be those recommended by the x-ray film~~  
295 | ~~manufacturer unless otherwise tested to insure maximum information content of the developed film. Sight~~  
296 | ~~developing is not permitted except under extreme emergency conditions. Correct temperature control and~~  
297 | ~~development time are necessary to minimize radiation dose to the patient.~~

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Film processing is addressed in the general healing arts x-ray section.

~~(12) — A variable intensity light source should be used for viewing the finished radiograph.~~

Determined unnecessary. Really a non-rule due to the use of “should”.

~~(13) — A radiographic x-ray system shall not be left unattended without locking the apparatus, room or building in some manner which will prevent use of the apparatus by unauthorized persons.~~

Moved to the general healing arts x-ray section (Part 6).

**MULTIPLE TUBE INSTALLATIONS**

**R325.5378. — Scope.**

~~Rule 378. — Rules 379 to 381 apply to installations consisting of more than 1 x-ray source in the same room or of sources located in separate rooms. These installations may include 2 or more complete x-ray units (single tube units) or a combination of 2 or more tube heads operable from a single control panel (multiple tube units).~~

**R325.5379. — X-ray equipment.**

~~Rule 379. — (1) — X-ray equipment in multiple tube installations shall comply with the general requirements of rule 373 with regard to each tube housing assembly and each complete x-ray unit.~~

~~(2) — When 2 or more x-ray tube heads are operated from a single exposure switch (multiple tube units), there shall be indication at the control panel showing which tube is connected and ready to be energized, and means to prevent energizing more than 1 tube head at the same time.~~

~~(3) — For multiple tube units there shall be indication at the tube housing assembly when it is connected and ready to be energized.~~

Multiple tube rules are addressed in the general healing arts x-ray section (Part 6).

**R325.5380. — Shielding.**

See Rule 375(1).

~~Rule 380. — Conventional building materials in partitions, floors and ceilings may provide adequate radiation shielding for dental installations. When a conventional building structure does not provide adequate shielding, the shielding shall be increased by providing greater thickness of building materials or by adding lead, concrete, steel or other suitable materials to the walls, floor and ceiling of an existing room. In multiple tube installations the possibility of exposure from multiple sources shall be considered. Shielding shall be subject to approval by the department.~~

**R325.5381. — Conditions of operation.**

~~Rule 381. — Operation shall comply with the general requirements of rule 376.~~

**PANORAMIC INSTALLATIONS**

**R325.5383. — Scope.**

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**Rule 383.** Rules 384 to 386 apply to panoramic installations and protective enclosures.

**R325.5384. Panoramic x-ray equipment.**

**Rule 384 (1)** X-ray equipment in panoramic installations shall comply with the general requirements of ~~rule 373 excluding subrules (8) to (13), part 6 as applicable.~~

**(2)** For purposes of this rule, "image receptor" means that portion of the x-ray film instantaneously exposed by the x-ray beam subtended by a beam-limiting diaphragm immediately adjacent to the front of the radiographic film, if the panoramic technique requires such a diaphragm.

**(3)** The x-ray tube housing shall be provided with a beam-limiting diaphragm which shall limit the field at the plane of the image receptor to dimensions not exceeding the dimensions of the image receptor, ~~and shall align the~~. The center of the x-ray field shall be aligned with the center of the image receptor to within 2% of the SID beam-limiting diaphragm immediately adjacent to the front of the radiographic film, if the panoramic technique requires such a diaphragm.

**(4)** Mechanical support of the tube head and image receptor shall maintain beam alignment without drift or vibration of sufficient magnitude to cause the need for ~~manually restraining the tube or retaking the~~ x-ray.

~~**(5)** A device shall be provided which terminates 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.~~

Subrule (5) is addressed in Part 6.
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374 | **R325.5385.     Shielding for panoramic installations.**

375

376 |     **Rule 385. (1)**         Conventional building materials in walls, partitions, floors, and ceilings may  
377 | provide adequate radiation shielding for panoramic installations. When a conventional building structure  
378 | does not provide adequate shielding, the shielding shall be increased by providing greater thickness of  
379 | building materials or by adding lead, concrete, steel or other suitable materials to the walls, floor and  
380 | ceiling of an existing room. ~~Shielding~~ The degree of protection required for an enclosure shall be subject  
381 | to approval by the department. The amount of shielding shall ensure that the dose limits in part 4 are met.

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383 |     ~~(2) An enclosure shall be a permanent part of the building or equipment. Portable shields shall not~~  
384 | ~~be used for permanent installations.~~

385

Subrule (2) is addressed in Part 6.
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387 | **R325.5386.     Conditions of operation for panoramic installations.**

388

389 |     **Rule 386.**     Operation shall comply with the general requirements of ~~rule 376~~ part 6.

390

**CEPHALOMETRIC INSTALLATIONS**

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393 | **R325.5388.     **Scope.****

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395 |     **Rule 388.**     Rules 389 to 391 apply to installations consisting of an x-ray source used for the production of  
396 | radiographs of the skull or related extra-oral radiographs, its individual control unit, and protective enclosure.

397

398 | **R325.5389.     Cephalometric X-ray equipment.**

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400 | **Rule 389.**~~(1)~~ X-ray equipment in cephalometric installations shall comply with the general  
401 requirements of rule 373 excluding subrules (8), (9), (10), (11), and (15) part 6.

402  
403 | ~~(2)~~ Beam-limiting devices (diaphragms, cones, adjustable collimators), capable of restricting the useful  
404 beam to the area radiographically recorded shall be provided to define the beam and shall provide the same  
405 degree of attenuation as that required of the tube housing.

406  
407 | ~~(3)~~ Beam-limiting devices shall be calibrated in terms of the size of the projected useful beam at specified  
408 source-film distances. This calibration shall be clearly and permanently recorded on the beam-limiting device.  
409 Calibration of adjustable beam-limiting devices shall permit reproducible settings.

410  
411 | ~~(4)~~ X-ray systems designed for only 1 image-receptor size at a fixed SID shall be provided with means to  
412 limit the field at the plane of the image receptor to dimensions not exceeding those of the image receptor, and  
413 to align the center of the x-ray field with the center of the image receptor to within 2% of the SID.

414  
415 | ~~(5)~~ The size of the x-ray beam projected by fixed-aperture beam-limiting devices (except those used for  
416 stereoradiography) shall not exceed the dimensions of the image receptor by more than 2% of the SID when  
417 the axis of the x-ray beam is perpendicular to the plane of the image receptor.

418  
419 | ~~(6)~~ The calibrated field size indicator on adjustable beam-limiting devices shall be accurate to within 2% of  
420 the SID. The light field shall be aligned with the x-ray field with the same degree of accuracy. The field size  
421 projected by automatic adjustable beam-limiting devices shall provide the same precision.

422  
423 | ~~(7)~~ For radiographic procedures resulting in multiple views on a single x-ray film the beam-limiting device  
424 shall limit the x-ray field size to the recorded radiographic image within 2% of the SID. Covering a portion of  
425 the radiographic film with radio-opaque material is not a substitute for proper x-ray field limitation.

Subrules (2) through (7) above are addressed in Part 6.

427  
428 | **R325.5390.    Shielding for cephalometric installations.**

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430 | **Rule 390. (1)**            The degree of protection required shall be determined by the workload, use and  
431 occupancy factors and the kilovoltage, milliamperage, mechanical movement, and distance factor, and shall  
432 be subject to design approval by the department.

433  
434 | **(2)** Radiographic-room wall and floor areas exposed to the useful beam plus an area extending at least 30  
435 centimeters (1 foot) beyond shall be provided with a primary protective barrier where necessary as determined  
436 by workload, use, occupancy and distance factors. All vertical primary protective barriers specified in this rule  
437 shall extend continuously from the floor to a minimum height of 2.1 meters (7 feet).

438



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470        (2) Dental tomographic systems designed to operate above 15 milliamperes shall meet the general  
471 requirements of Part 6 and the Equipment, enclosure, and monitoring requirements for general purpose  
472 radiography systems in Part 7.

**MULTIPLE PURPOSE INSTALLATIONS**

**R325.5395. General provisions.**

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478        ~~Rule 395. (1) This rule applies to installations consisting of an x-ray source or sources used for~~  
479 ~~2 or more purposes described and provided for in rules 372 to 391.~~

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481        ~~(2) X-ray equipment in multiple purpose installations shall comply with the applicable requirements of~~  
482 ~~rules 373, 379, 384 and 389 for each mode of operation permitted by the design of the equipment.~~

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484        ~~(3) Shielding in multiple purpose installations shall comply with the applicable requirements of rules~~  
485 ~~375, 380, 385 and 390 for each mode of operation permitted by the design of the equipment.~~

486  
487        ~~(4) Operation in multiple purpose installations shall comply with the applicable requirements of rules~~  
488 ~~376, 381, 386 and 391 for each mode of operation permitted by the design of the equipment.~~

**EDUCATIONAL DENTAL FACILITIES**

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This statement pertains to programs and facilities providing formal instruction of high school, vocational, continuing education, or college students in activities involving the use of x-ray equipment. In particular, this Position Statement addresses radiation safety expectations pertaining to dental radiology teaching or training of students. It updates an earlier statement dated July, 1975.

NCRP Report #32, Radiation Protection in Educational Institutions, specifies that students under 18 years of age exposed to radiation during educational activities should not receive whole body radiation doses exceeding 100 millirem per year due to their educational activities. To provide an additional safety factor, the NCRP also recommends that each experiment or training session be so planned that no individual receives more than 10 millirem while carrying it out. We endorse the philosophy of the NCRP, not just for students under 18 but for all students. This is due, in part, to recognition of genetic concerns over unnecessary radiation dose to persons who are not beyond reproductive age. With this recognition and in conformance with the accepted radiation safety concept of maintaining radiation doses as low as reasonably achievable (ALARA), we recommend that no dental radiology student, regardless of age, receive radiation doses exceeding 100 millirem per year due to educational activities. Furthermore, no individual should receive more than 10 millirem per training session.

We are aware of the sensitivity limitations and some other limitations of existing means of personal dosimetry. Therefore, it is necessary to also subscribe to very stringent physical protection criteria rather than relying solely on procedural controls to ensure the desired radiation safety results.

Listed below are the criteria of the Radiation Safety Section for the approval of dental radiology teaching or training facilities and programs under Michigan's *Ionizing Radiation Rules*. The criteria established in this Position Statement are intended to meet the intent as well as the letter of the rules and to maintain radiation doses as low as reasonably achievable.

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493        **R325.5396. General provisions for educational installations.**

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494 Rule 396. (1) Potential radiation exposure of students less than 18 in a dental radiology teaching or  
495 training program shall be limited to x-ray installations that are within the teaching or training facility and that are  
496 under the immediate supervision of the individual designated in charge of radiation safety for the program.  
497 This precludes assignment of students less than 18 to private dental offices for radiological experience  
498 training.

499  
500 (2) An x-ray installation used by a dental radiology teaching or training program shall be designed and  
501 shielded in such a manner that the x-ray machine cannot be operated from an unshielded position and that  
502 observers during classroom demonstrations or laboratory sessions will not be exposed to unattenuated  
503 primary or secondary radiation.

504  
505 (3) An x-ray installation in a professional school for the practice of dentistry, even one that is used only for  
506 clinical purposes by that school, should meet the same design and shielding expectations as outlined in 2  
507 above. However, on a case-by-case basis, alternate shielding and design expectations for such clinical  
508 installations may be individually evaluated.

509  
510 (4) Approval of x-ray room shielding and design by the Radiation Safety Section is necessary prior to use  
511 of x-ray equipment by students. Shielding and design evaluations prior to x-ray room construction and  
512 installation of x-ray equipment are available upon request by submission of plans and specifications to the  
513 Radiation Safety Section.

514  
515 (5) A brief statement of a teaching or training program's procedures for radiation safety is required with  
516 submission of an application for x-ray equipment registration. Registration of x-ray equipment with the Section  
517 is required prior to use of such equipment.

518  
519 (6) Students participating in a dental radiology teaching or training program shall be assigned individual  
520 radiation dosimeters provided by a dosimetry supplier that is accredited by the National Institute of Standards  
521 and Technology through the National Voluntary Laboratory Accreditation Program. The program shall require

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522 and ensure that students wear their individual dosimeters during the course of x-ray machine operation within  
523 the program. Student dosimetry records shall be maintained on permanent available file at the facility.

524  
525 (7) X-ray exposures or films taken for demonstration or training purposes during classroom or laboratory  
526 sessions shall be made with phantoms or other inanimate objects in the beam. No student shall be permitted  
527 within an x-ray room during such exposures.

528  
529 (8) Intentional x-ray exposure of students or others at a teaching or training facility shall be limited to  
530 exposures specifically prescribed by and taken under the supervision of a licensed dentist. Such prescribed  
531 exposures shall be for legitimate diagnostic purposes, and if diagnostic exposures are prescribed, this practice  
532 shall be clearly described in the program's procedures for radiation safety addressed in item 5 above.

533

534

### OTHER TYPES OF INSTALLATIONS

535

536 **R325.5397. General provisions for other types of dental installations.**

537

538 **Rule 397. (1)** This rule applies to dental x-ray producing equipment and devices not specifically  
539 covered elsewhere by this part.

540

541 **(2)** Types of dental x-ray sources and uses not specifically covered by this part and not exempted under  
542 rule 182 shall comply with parts 1, ~~4~~ and ~~5~~ through 4.

543

544 **(3)** Dental fluoroscopy without image intensification shall not be used.