Kansas Administrative Regulations

Department of Health and Environment

Article 35.—Radiation

28-35-247a. Intraoral dental radiographic systems.

In addition to K.A.R. 28-35-242a and 28-35-242b, this regulation shall apply to all X-ray equipment and the associated facilities used for dental radiography. The requirements for extraoral dental radiographic systems shall be those requirements specified in K.A.R. 28-35-244a. Each registrant shall use only systems meeting the requirements of this regulation.

(a) Source-to-skin distance (SSD). X-ray systems designed for use with an intraoral image receptor shall be provided with a means to limit the SSD to not less than either of the following:

(1) 18 centimeters if operable above 50 kVp; or

(2) 10 centimeters if operable at 50 kVp only.

(b) kVp limitations. Dental X-ray machines with a nominal fixed kVp of less than 50 kVp shall not be used to make diagnostic dental radiographs of humans.

(c) Beam limitation. Each radiographic system designed for use with an intraoral image receptor shall be provided with a means to limit the X-ray beam so that the beam at the minimum SSD is containable in a circle with a diameter of no more than seven centimeters.

(d) Radiation exposure control.

(1) Exposure initiation.

(A) A means shall be provided to initiate the radiation exposure by a deliberate action on the part of the operator, including the depression of a switch. Radiation exposure shall not be initiated without such an action.

(B) When the timer is set to a "zero" or "off" position, if either position is provided, an exposure shall not be possible.

(2) Exposure indication. A means shall be provided for a visual indication observable at or from the operator's protected position whenever X-rays are produced. In addition, a signal audible to the operator shall indicate that the exposure has terminated.

(3) Exposure termination.

(A) A means shall be provided to terminate each exposure at a preset time interval, a preset product of current and time, a preset number of pulses, or a preset radiation exposure to the image receptor.

(B) An X-ray exposure control shall be incorporated into each X-ray system so that each exposure can be terminated by the operator at any time, except for exposures of one-half second or less.

(C) Each termination of an exposure shall cause the automatic resetting of the timer to its initial setting or to "zero."

(4) Exposure duration or timer linearity. For each system that provides for the independent selection of exposure time settings, the average ratios (X_1) of exposure to the indicated timer setting, in units of C kg^{-1} s^{-1} (mR/s), obtained at any two clinically used time settings shall not differ by more than 0.10 times their sum. The linearity is calculated using the following equation:

$$(X_1 - X_2) \leq 0.10\,(X_1 + X_2)$$

where X_1 and X_2 are the average ratios of exposure to the indicated timer setting.

(5) Exposure control location and operator protection.

(A) Each stationary X-ray system shall be required to have the X-ray exposure control permanently mounted in a protected area so that the operator is required to remain in that protected area during the entire exposure.

(B) Each mobile or portable X-ray system used for one week or longer in the same location, including a room or suite, shall meet the requirements of this regulation.

(C) Each mobile or portable X-ray system used for less than one week in the same location shall be provided either with a protective barrier that is at least two meters (6.5 feet) high for operator protection or with the means to allow the operator to be at least 2.7 meters (9 feet) from the tube housing assembly while making exposures.

(e) Reproducibility. When the equipment is operated with an adequate power supply as specified by the manufacturer, the estimated coefficient of variation of radiation exposures shall be no greater than 0.05 for any specific combination of selected technique factors.

(f) mA and mAs linearity. The requirements specified in this subsection shall apply when the equipment is operated with a power supply as specified by the manufacturer for any fixed X-ray tube potential within the range of 40 percent to 100 percent of the maximum rated mA or mAs.

(1) Equipment that provides for the independent selection of X-ray tube current (mA). The average ratios (X_1) of exposure to the indicated milliampere-seconds product, in units of C kg^{-1} mAs^{-1} (or mR/mAs), obtained at any two consecutive tube current settings shall not differ by more than 0.10 times their sum. The linearity is calculated using the following equation:

$$X_1 X_2 \leq 0.10 (X_1 + X_2)$$

where X_1 and X_2 are the average values obtained at each of two consecutive tube current settings, or at two settings differing by no more than a factor of two if the tube current selection is continuous.

(2) Equipment that has a combined X-ray tube current-exposure time project (mAs) selector but not a separate tube current (mA) selector. The average ratios (X_1) of exposure to the indicated milliampere-seconds product, in units of C kg^{-1} mAs^{-1} (or mR/mAs), obtained at any two consecutive mAs selector settings shall not differ by more than 0.10 times their sum. The linearity is calculated using the following equation:

$$X_1 X_2 \leq 0.10 (X_1 + X_2)$$

where X_1 and X_2 are the average values obtained at any two mAs selector settings, or at two settings differing by no more than a factor of two if the mAs selector provides continuous selection.

(3) Measuring compliance. Determination of compliance shall be based on 10 exposures taken within one hour, at each of two settings. These two settings may include any two focal spot sizes, unless one is equal to or less than 0.45 millimeters and the other is greater than 0.45 millimeters. For purposes of this regulation, "focal spot size" shall mean the nominal focal spot size specified by the X-ray tube manufacturer.

(g) Accuracy. The deviation of technique factors from the indicated values for kVp and exposure time, if time is independently selectable, shall not exceed the limits specified for that system by its manufacturer. In the absence of manufacturer's specifications, the deviation shall not exceed 10 percent of the indicated value for kVp and 20 percent for time.

(h) Administrative controls.

(1) Patient-holding and film-holding devices shall be used when the techniques permit.

(2) The tube housing and the position indication device (PID) shall not be handheld during an exposure.

(3) Each X-ray system shall be operated so that the useful beam at the patient's skin does not exceed the requirements of this regulation.

(4) Dental fluoroscopy without image intensification shall not be used.

(Authorized by and implementing K.S.A. 48-1607; effective Dec. 30, 2005.)