**Section 360.60 Radiographic Systems Other Than Fluoroscopic, Dental, Veterinary or Computed Tomography Systems**

In addition to the provisions of Sections 360.10, 360.30, 360.40 and 360.41 of this Part, the requirements of this Section apply to x-ray equipment and associated facilities used in the healing arts of medicine, chiropractic and podiatry. It does not apply to fluoroscopic, dental, veterinary or computed tomography systems.

a) Beam Limitation. The useful beam shall be limited to the area of clinical interest.

1) Stationary General Purpose and Mobile/Portable X-Ray Systems

A) Variable X-Ray Field Limitation. An adjustable collimator shall be provided with means for independent stepless adjustment of the size of the x-ray field.

B) Visual Indication of Field Size. Means shall be provided for visually defining the perimeter of the x-ray field. The total misalignment of the edges of the visually defined field, with respect to the edges of the x-ray field, along either the length or the width of the visually defined field, shall not exceed two percent of the distance from the source to the center of the visually defined field when the surface upon which it appears is perpendicular to the axis of the x-ray beam.

 AGENCY NOTE: When a light localizer is used to define the x-ray field, it should provide an average illumination of not less than 100 lux (9 footcandles) at 100 centimeters or at the maximum SID, whichever is less.

2) Special Purpose X-Ray Systems

A) Means shall be provided to limit the x-ray field in the plane of the image receptor so that such field does not exceed each dimension of the image receptor by more than two percent of the SID when the axis of the x-ray beam is perpendicular to the plane of the image receptor.

B) The requirements of subsection (a)(2)(A) of this Section may be met:

i) With a system that meets the requirements specified in subsection (a)(1) of this Section; or

ii) With an assortment of removable, fixed-aperture, beam-limiting devices sufficient to meet the requirement for each combination of image receptor size and SID for which the unit is used, with each such device having permanent, clearly legible markings, in centimeters and/or inches, to indicate the image receptor size and SID for which it is designed; or

iii) With a beam-limiting device having multiple fixed apertures sufficient to meet the requirement for each combination of image receptor size and SID for which the unit is used. Permanent, clearly legible markings, in centimeters and/or inches, shall indicate the image receptor size and SID for which each aperture is designed and shall indicate which aperture is in position for use.

3) Radiation therapy simulation systems shall be exempt from the beam limitation requirements of this Section.

b) Radiation Exposure Control Devices

1) Timers. Means shall be provided to terminate the exposure at a preset time interval, preset product of current and time, preset number of pulses or preset radiation exposure to the image receptor. Also, it shall not be possible to make an exposure when the timer is set to a zero or off position if either position is provided.

2) X-Ray Control

A) An x-ray control shall be incorporated into each x-ray system such that an exposure can be terminated by the operator at any time except for:

i) Exposures of 0.5 second or less; or

ii) During serial radiography when means shall be provided to permit completion of any single exposure of the series in process.

B) The exposure switch shall be a dead-man switch.

3) Automatic Exposure Controls (AEC). Systems which are provided with automatic exposure control devices shall incorporate a back-up timer to terminate the radiation exposure in the event of AEC failure. In addition, they shall meet the following requirements:

A) Indication shall be made on the control panel when this mode of operation is selected; and

B) A visible signal shall indicate when an exposure has been terminated by the back-up timer, and manual resetting shall be required before further automatically timed exposures can be made.

c) Source-Skin Distance (SSD). All mobile or portable radiographic systems shall be provided with means to limit the SSD to 30 centimeters or greater.

d) Linearity. For equipment that is operated at more than one x-ray tube current or current-time product setting, the average ratios of exposure (microcoulombs per kilogram or milliroentgens) to the indicated milliampere-seconds (mAs) product obtained at any two tube current or current-time product settings utilized shall not differ by more than 0.10 times their sum. This requirement is mathematically represented by the following:

[]≤[]

where  and  are the average microC/kg/mAs or mR/mAs values obtained at any two tube current or current-time product settings utilized. Compliance shall be determined at any fixed x-ray tube potential within the rage of 40 percent to 100 percent of the maximum rated tube potential.

e) Medical Radiographic Entrance Exposure Limits. The in-air exposure determined for the technique used for the specified average adult patient for routine medical radiography shall not exceed the entrance exposure limits shown below: (See Section 360.Appendix A of this Part for measurement protocol and calculation of exposure at skin entrance.)

|  |  |  |  |
| --- | --- | --- | --- |
| Technique | Thickness (cm) | Exposure Limit (microC/kg) | (mR) |
| Chest (PA), Grid | 23 | 9 | 35 |
| Chest (PA), Non-Grid | 23 | 8 | 30 |
| Abdomen (KUB) | 23 | 155 | 600 |
| Lumbo-Sacral Spine (AP) | 23 | 206 | 800 |
| Cervical Spine (AP) | 13 | 52 | 200 |
| Skull (lateral) | 15 | 65 | 250 |
| Foot (D/P) | 8 | 26 | 100 |

AGENCY NOTE: These exposures are maximums. With careful selection of technique factors, adjustment of film processing systems, and choice of film and screen-film combinations, patient exposures can be further reduced.

f) SID Indication

1) Means shall be provided to indicate the SID.

2) SIDs shall be indicated in centimeters and/or inches and the measured SID shall correspond to the indicated value to within two percent.

g) X-Ray Field/Image Receptor Alignment. Means shall be provided to:

1) Indicate when the axis of the x-ray field is perpendicular to the plane of the image receptor; and

2) Align the center of the x-ray field with respect to the center of the image receptor to within two percent of the SID.

(Source: Amended at 23 Ill. Reg. 14516, effective January 1, 2000)