

4732.0380 SHIELDING REQUIREMENTS FOR ACCELERATORS.

Subpart 1. **Applicability.** This part applies to accelerators and is in addition to other applicable parts of this chapter.

Subp. 2. **Design requirements for accelerator facilities.** Accelerator facilities must have the following safety features:

A. be designed with primary and secondary barriers to ensure compliance with the dose limits in parts 4732.0400 to 4732.0430;

B. have protective barriers that are fixed except for entrance doors or beam interceptors;

C. have shielding for neutrons, as applicable, if the accelerator can operate above ten MeV;

D. accelerator room entrances must be provided with warning lights in readily observable positions near the outside of all access doors to indicate when the useful beam is in the "on" position;

E. interlocks or safety devices must be in place so all access into the room is blocked before irradiation is initiated or continued. If the useful radiation beam is interrupted by any door opening or tripping of the safety device, it must not be possible to restore the system to operation without closing the door or resetting the safety device and reinitiating irradiation by manual action at the control panel;

F. an emergency power cutoff switch must be located on either side of the primary beam and easily identifiable in all high radiation areas. The cutoff switch must include a manual reset so that the accelerator cannot be restarted from the accelerator control console without resetting the cutoff switch;

G. instrumentation, readouts, and controls on the accelerator control console must be clearly identified, easily discernible, and located outside the high radiation area;

H. each entrance into a target area or other high radiation area must be provided with two safety interlocks that shut down the machine when the barrier is breached;

I. each safety interlock must be on a circuit that allows it to operate independently of the accelerator; and

J. all safety interlocks must be designed so that any defect or component failure in the safety interlock system prevents operation of the accelerator.

Subp. 3. **Additional design requirements for medical use accelerators.**

A. Closed-circuit television, or an equivalent system, must be provided to permit continuous observation of the patient during irradiation and must be located so the operator may observe the patient from the control panel.

B. Two-way audio communication between the patient and the operator must be provided at the control panel. However, where excessive noise levels or treatment requirements make audio communication impractical, other methods of communication must be used.

Subp. 4. **Modification of an accelerator or room before use.** If radiation surveys indicate that an individual in an unrestricted area may be exposed to levels of radiation greater than those permitted by part 4732.0430 before use, the registrant must:

A. equip the unit with beam direction interlocks or add additional radiation shielding to ensure compliance with part 4732.0430;

B. perform a radiation survey; and

C. include the initial radiation survey, a description of the modification made, and the results of the subsequent survey; or

D. request and receive written authorization to operate the accelerator from the commissioner.

Subp. 5. **Radiation surveys.**

A. The registrant must ensure that radiation surveys are performed at intervals not to exceed 12 months. The radiation survey must be performed with the accelerator in a "BEAM-ON" condition, with the largest available field and with a scattering phantom in the useful beam of radiation, if applicable, to ensure that radiation levels in restricted areas are not likely to cause personnel exposures in excess of the limits specified in parts 4732.0400 to 4732.0430. A radiation survey must also be performed:

(1) prior to use;

(2) after making any change in the shielding;

(3) after installing or relocating the accelerator; and

(4) before using the accelerator in a manner that could result in increased radiation levels in areas outside shielded area.

B. The radiation survey record must also include:

(1) date of the measurements;

(2) the reason for the survey;

(3) the instruments used to measure radiation levels;

(4) a diagram or sketch of the areas surrounding the shielded areas that were surveyed;

(5) the measured dose rate at several points in each area expressed in millirems or microsieverts per hour;

(6) the calculated maximum level of radiation over a period of one year for each restricted and unrestricted area; and

(7) the signature or electronic signature of the individual responsible for conducting the survey.

Subp. 6. **Corrective actions.** If the results of the radiation surveys indicate any radiation levels in excess of the limits in parts 4732.0400 to 4732.0430 the registrant must lock the control in the "OFF" position and not use the unit except as follows:

A. if necessary to repair, replace, or test the accelerator or the shielding; or

B. until the registrant has submitted a corrective action plan and received authorization in writing from the commissioner.

Subp. 7. **Records retention.** Records must be maintained according to part 4732.0330.

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