



Guideline for Determining the X-ray Shielding Requirements for a Radiographic and Fluoroscopic (Radioscopic) Facility

This guideline may be used to determine the shielding required for a new installation or when modifying an existing one, provided the following criteria apply to the installation. Before using the guideline, first read the Explanatory Notes provided. If the following Criteria do not apply, contact the Radiation Protection Services office for assistance. Note: the shielding specified in this guideline is to protect workers outside the x-ray room to the WorkSafeBC Action Level (1 mSv/year) rather than to the Exposure Limit (20 mSv/year). Owners wishing to shield to an exposure level greater than 1 mSv/year outside the room should not use this guideline and should be aware of the regulatory implication if the Action Level is or may be exceeded.

Criteria

- The current/future x-ray workload in the room does not exceed 50 fluoroscopic (radioscopic) procedures [average fluoroscopy (radioscopy) time is 5 minutes per patient] and 300 radiographic film in a 40 hour workweek schedule.
- The x-ray unit is normally operated in the range 70-100 kVp, and occasionally at up to 125 kVp. The maximum film (cassette) size is 35cm x 43cm (14" x 17") and maximum image intensifier size is 41cm (16"). An upright bucky is provided which receives up to 20 % of the radiographic workload (i.e. 60 radiographs/week). Up to 5% of the radiographic workload (i.e. is radiographs/week) can be taken cross-table (see over for locations).
- The room containing the unit has dimensions no smaller than 3m x 4.5m.
- Unexposed x-ray film is stored in a film bin, lined with at least 0.8mm (2 lb/ft²) lead.
- Shielding is required to provide protection outside the room, a) for workers, to meet the Action Level of 1mSv/year, as specified in the WSBC *Occupational Health and Safety Regulation* (see WSBC website: <http://www2.worksafebc.com/Publications/OHSRegulation/Home.asp>), and b) for the general public, to not exceed the recommended public dose limit of 1 mSv/year.
- For workers directly involved in the taking of x-rays, this guideline provides an option for shielding the control booth to either 20 mSv/year (the maximum permissible dose) or to 1 mSv/year (the Action Level referred to above). Note that the control booth shielding is based on providing protection against secondary radiation (i.e. leakage and scatter) only.
- Occupancy outside barriers: the shielding required (over) takes into account the amount of time (occupancy) spent by persons outside the barriers (i.e. walls/doors):
 - **Full occupancy** applies to areas occupied by workers or other persons for a total of more than 30 minutes per day, and applies to adjacent rooms and tenanted facilities.
 - **Partial occupancy** applies to areas occupied by workers and other persons for a total of no more than 30 minutes per day, and applies to areas such as adjacent stairwells, parkades and parking lots, lanes, gardens and infrequently used rooms (storage). Areas that can be converted from **Partial Occupancy** to **Full Occupancy** (e.g. from storage to office) should be considered as **Full Occupancy** for shielding requirements.
- If the facility has accessible areas (e.g. rooms) above and/or below the x-ray room, protection for these areas must be provided in the intervening floors (see over). For confirmation of construction material requirements for the intervening floor, above and/or below the x-ray room, please refer to the current BC Building Code.

If your facility design and use meets the above criteria, you can use the shielding information (over) to determine the thickness of materials required for the barriers. Complete the assessment and provide a copy to the responsible person carrying out the installation.

N.B. Building plans are NOT required to be submitted to the Radiation Protection Services.

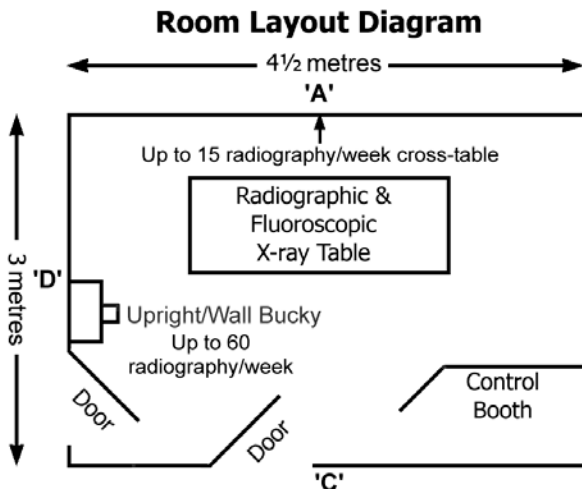
(over)



Shielding* for up to 50 Fluoroscopic (Radioscopic) Procedures and 300 Radiographs Per Week

Area (see Room Layout Diagram)	Shielding Required	Check <input checked="" type="checkbox"/> one per Area
Control Booth		
Full Occupancy (to 1 mSv/year) <i>or</i>	1.6 mm (4 lb/ft ²) lead and its equivalent for view window	<input type="checkbox"/>
Full Occupancy (to 20 mSv/year)	0.8 mm (2 lb/ft ²) lead and its equivalent for view window	<input type="checkbox"/>
Wall Labeled 'A' on diagram (up to 15 Radiographic/week cross-table) to Wall 'A')		
Full Occupancy (to 1 mSv/year) <i>or</i>	1.6 mm (4 lb/ft ²) lead	<input type="checkbox"/>
Partial Occupancy (to 1 mSv/year)	0.8 mm (2 lb/ft ²) lead	<input type="checkbox"/>
Wall labeled 'B' on diagram		
Full Occupancy (to 1 mSv/year) <i>or</i>	1.6 mm (4 lb/ft ²) lead	<input type="checkbox"/>
Partial Occupancy (to 1 mSv/year)	0.8 mm (2 lb/ft ²) lead	<input type="checkbox"/>
Wall labeled 'C' on diagram		
Full Occupancy (to 1 mSv/year) <i>or</i>	1.6 mm (4 lb/ft ²) lead	<input type="checkbox"/>
Partial Occupancy (to 1 mSv/year)	0.8 mm (2 lb/ft ²) lead	<input type="checkbox"/>
Wall labeled 'D' on diagram (up to 60 Radiographic/week directed to Wall 'D')		
Full Occupancy (to 1 mSv/year) <i>or</i>	1.6 mm (4 lb/ft ²) lead	<input type="checkbox"/>
Partial Occupancy (to 1 mSv/year)	0.8 mm (2 lb/ft ²) lead	<input type="checkbox"/>
Intervening Floor (above)		
	No occupancy space above x-ray room – no shielding required	<input type="checkbox"/>
Full Occupancy (to 1 mSv/year) <i>or</i>	10 cm (4") solid concrete	<input type="checkbox"/>
Partial Occupancy (to 1 mSv/year)	5 cm (2") solid concrete	<input type="checkbox"/>
Intervening Floor (below)		
	No occupancy space below x-ray room – no shielding required	<input type="checkbox"/>
Full Occupancy (to 1 mSv/year) <i>or</i>	10 cm (4") solid concrete	<input type="checkbox"/>
Partial Occupancy (to 1 mSv/year)	5 cm (2") solid concrete	<input type="checkbox"/>

* **Note:** For shielding installation requirements, see **Guideline & Checklist for Installation of Lead Shielding in a Diagnostic X-ray Facility**. Doors require the same shielding as their walls.



**Radiographic/Fluoroscopic (Radioscopic) Facility
Name & Address:**

Number of Exposures per Week: _____

Date: _____

Signed: _____

Name: _____

Keep a copy of this signed document on record for future reference/inspection. Attach a copy of room plan showing adjacent areas and their function with this document.