

16 Shielding¹

16.1 Gamma Radiation

Shield material half-value layer, in inches:

Energy (Mev)	Lead	Iron	Concrete (150 lb/ft ³)	Water
0.5	0.2	0.4	1.3	3.0
1.0	0.3	0.6	1.8	3.9
1.5	0.5	0.7	2.3	4.8
2.0	0.6	0.8	2.6	5.5
2.5	0.6	0.9	3.0	6.2

To use half-value layers.

Shielded dose rate = unshielded dose rate $(1/2)^n$, where n is the number of half-value layers.

16.2 Beta Radiation

Thicknesses of low Z materials in inches, to absorb beta radiation:

Energy (Mev)	Plastic (Lucite)	Concrete	Aluminum
0.5	0.1	0.05	0.05
1.0	0.2	0.1	0.1
2.0	0.3	0.2	0.2
3.0	0.5	0.3	0.3

¹Pickering N.G.S., Radiation Protection Pocket Reference, courtesy of Ontario Hydro, 700 University Avenue, Toronto, Ontario, M5G 1X6, Canada.

16.3 Percentage of 1 MeV Beta Radiation Absorbed by Various Common Equipment

Equipment	% Absorbed
Cotton coveralls	20
Plastic hoods or goggles	30
Cotton or rubber gloves	30
Neoprene gloves	50
Paper (0.3 mm)	90
Safety glasses or Army respirator	90

Range of beta particles in air -- rule of thumb: Range is about 12 feet per MeV beta energy.