

CONVERSION FACTORS FOR OPERATIONAL QUANTITIES REPORTED BY PACIFIC NORTHWEST
NATIONAL LABORATORY (PNNL)^(a)

For exposures conducted in accordance with N13.11-2001 and 2009

NIST Beam Code	Eye ^(c)	Deep Personal Dose Equivalent Conversion Factor (C _{k, d, α}), (C _{x, d, α}) and ARF						Shallow Personal Dose Equivalent Conversion Factor (C _{k, s, α}), (C _{x, s, α}) and ARF					
		α=0°		α=40°		α=60°		α=0°		α=40°		α=60°	
		C _k	C _x	C _k	ARF ^(d)	C _k	ARF ^(d)	C _k	ARF ^(d)	C _k	C _x	C _k	ARF ^(d)
L10 ^{(b)(e)}		0.00	0.0	0.00	0.0	0.00	0.0	0.89	0.78	0.86	0.9663	0.80	0.8989
L15 ^{(b)(e)}	0.16	0.02	0.02	0.01	0.5000	0.00	0.0	0.93	0.81	0.92	0.9892	0.88	0.9462
L20 ^{(b)(e)}	0.27	0.07	0.06	0.05	0.7143	0.02	0.2857	0.95	0.83	0.94	0.9895	0.92	0.9684
L30 ^(e)	0.51	0.28	0.25	0.22	0.7857	0.13	0.4643	0.99	0.87	0.98	0.9899	0.96	0.9697
L40	0.68	0.50	0.44	0.41	0.8200	0.28	0.5600	1.04	0.91	1.03	0.9904	1.01	0.9712
L50	0.83	0.70	0.61	0.60	0.8571	0.43	0.6143	1.10	0.96	1.09	0.9909	1.05	0.9545
L80	1.08	1.09	0.95	0.97	0.8899	0.76	0.6972	1.26	1.10	1.23	0.9762	1.18	0.9365
L100	1.16	1.23	1.08	1.11	0.9024	0.89	0.7236	1.34	1.17	1.31	0.9776	1.25	0.9328
M20 ^{(b)(e)}	0.39	0.14	0.12	0.09	0.6429	0.04	0.2857	0.97	0.85	0.96	0.9897	0.94	0.9691
M30	0.65	0.42	0.37	0.34	0.8095	0.22	0.5238	1.02	0.89	1.01	0.9902	0.99	0.9706
M40	0.79	0.63	0.55	0.53	0.8413	0.37	0.5873	1.07	0.94	1.06	0.9907	1.03	0.9626
M50	0.89	0.79	0.69	0.69	0.8734	0.51	0.6456	1.13	0.99	1.11	0.9823	1.08	0.9558
M60	1.02	1.00	0.88	0.89	0.8900	0.68	0.6800	1.21	1.06	1.19	0.9835	1.14	0.9421
M100	1.34	1.52	1.33	1.39	0.9145	1.14	0.7500	1.49	1.31	1.45	0.9732	1.37	0.9195
M150	1.51	1.78	1.56	1.65	0.9270	1.40	0.7865	1.64	1.44	1.60	0.9756	1.50	0.9146
M200	1.47	1.74	1.52	1.64	0.9425	1.41	0.8103	1.62	1.42	1.58	0.9753	1.50	0.9259
M250	1.38	1.62	1.42	1.54	0.9506	1.36	0.8395	1.53	1.34	1.51	0.9869	1.44	0.9412
M300	1.27	1.47	1.29	1.42	0.9660	1.28	0.8707	1.42	1.24	1.41	0.9930	1.37	0.9648
H10 ^{(b)(e)}	0.05	0.00	0.0	0.00	0.0	0.00	0.0	0.91	0.80	0.89	0.9780	0.85	0.9341
H15 ^{(b)(e)}	0.34	0.06	0.05	0.03	0.5000	0.01	0.1667	0.96	0.84	0.95	0.9896	0.94	0.9792
H20 ^{(b)(e)}	0.58	0.28	0.25	0.20	0.7143	0.10	0.3571	0.99	0.87	0.98	0.9899	0.97	0.9798
H30 ^(e)	0.89	0.79	0.69	0.68	0.8608	0.49	0.6203	1.10	0.96	1.08	0.9818	1.05	0.9545
H40 ^(e)	1.11	1.17	1.02	1.06	0.9060	0.83	0.7094	1.26	1.10	1.23	0.9762	1.18	0.9365
H50 ^(e)	1.25	1.40	1.23	1.28	0.9143	1.03	0.7357	1.40	1.23	1.36	0.9714	1.29	0.9214
H60 ^(e)	1.42	1.65	1.45	1.52	0.9212	1.25	0.7576	1.55	1.36	1.51	0.9742	1.42	0.9161
H100	1.57	1.87	1.64	1.74	0.9305	1.48	0.7914	1.71	1.50	1.66	0.9720	1.56	0.9123
H150	1.45	1.71	1.50	1.61	0.9415	1.4	0.8187	1.60	1.40	1.57	0.9813	1.48	0.9250
H200	1.35	1.57	1.38	1.50	0.9554	1.33	0.8471	1.49	1.31	1.47	0.9866	1.42	0.9530
H250	1.28	1.48	1.30	1.42	0.9595	1.29	0.8716	1.42	1.24	1.42	1.0000	1.38	0.9718
H300	1.23	1.42	1.24	1.38	0.9718	1.26	0.8873	1.37	1.20	1.38	1.0073	1.35	0.9854
S60	1.16	1.24	1.09	1.12	0.9032	0.89	0.7177	1.31	1.15	1.28	0.9771	1.22	0.9313
S75	1.08	1.09	0.95	0.98	0.8991	0.76	0.6972	1.26	1.10	1.23	.9762	1.18	0.9365
¹³⁷ Cs	1.07	1.21	1.06	1.2	0.9917	1.16	0.9587	1.21	1.06	1.23	1.0165	1.24	1.0248
⁶⁰ Co	1.04	1.17	1.03	1.16	0.9915	1.14	0.9744	1.18	1.04	1.18	1.0000	1.19	1.0085

^(a) C_k information taken from ANSI standard HPS N13.11-2001, *Personnel Dosimetry Performance – Criteria for Testing*, Table 3b and N13.11-2009 Table 2b. Multiplying kerma by the C_k conversion factor yields the personal dose equivalent. If kerma is in Gy, the personal dose equivalent will be in Sv. If kerma is in rad, the personal dose equivalent will be in rem.

^(b) Not used in Performance Testing under N13.11-2001.

^(c) Eye depth information provided based on C_x values determined and reported by Dr. C.G. Soares and P.R. Martin, A Comprehensive Set of Conversion Coefficients for Photons, reported in the Proceedings of the Harshaw User's Group Meeting, Las Vegas NV, March 13-17, 1995.

^(d) To attain shallow and deep dose equivalent at non-normal angles (i.e., 40°, 60°); multiply exposure by C_x and by ARF.

^(e) Not used in Performance Testing under N13.11-2009