

Ionizing Radiation, Canada, NRC (National Research Council)

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					Reference Standard used in calibration		Comments	NMI Internal Service Identifier
Quantity	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage factor	Level of Confidence	Is the expanded uncertainty a relative one?	Reference standard	Source of traceability		
NEUTRON MEASUREMENTS																
Ambient dose equivalent rate	Neutron dosimeter	Irradiation with calibrated neutron sources	8.0E-06	2.0E-04	Sv h ⁻¹	Neutron spectrum at distance 0.3 m to 1.5 m	Am-241/Be-9 ISO 8529-3	6	%	2	not specified	Yes	Calibrated neutron source	NRC	Approved on 21 October 2005	SIM-RAD-NRC-3001
DOSIMETRY																
Air kerma rate	Ionization chambers (other dose/rate instruments in special tests)	Calibration in air against national standard	7.0E-08	2.0E-02	Gy s ⁻¹	X-ray, 10 kV to 50 kV	HVL matched to client requirements	1.0	%	2	~95%	Yes	Free-air chambers	NRC	Approved on 06 March 2019	SIM-RAD-NRC-1001
Air kerma	Personal dosimeters	Irradiation in a calibrated field in air or on PMMA phantom	1.0E-04	1.0E-01	Gy	X-ray, 10 kV to 50 kV	HVL matched to client requirements	2.0	%	2	~95%	Yes	Free-air chambers	NRC	Approved on 06 March 2019	SIM-RAD-NRC-1002
Air kerma rate	Ionization chambers (other dose/rate instruments in special tests)	Calibration in air against national standard	7.0E-08	2.0E-02	Gy s ⁻¹	X-ray, 50 kV to 300 kV	HVL matched to client requirements	1.0	%	2	~95%	Yes	Free-air chambers	NRC	Approved on 06 March 2019	SIM-RAD-NRC-1003
Air kerma	Personal dosimeters	Irradiation in a calibrated field in air or on PMMA phantom	1.0E-04	1.0E-01	Gy	X-ray, 50 kV to 300 kV	HVL matched to client requirements	2.0	%	2	~95%	Yes	Free-air chambers	NRC	Approved on 06 March 2019	SIM-RAD-NRC-1004
Air kerma rate	Ionization chambers (other dose/rate instruments in special tests)	Irradiation in a calibrated field in air	1.0E-04	2.0E-02	Gy s ⁻¹	Co-60	collimated beam from a shuttered, shielded head	1.0	%	2	~95%	Yes	Graphite cavity chamber	NRC	Approved on 06 March 2019	SIM-RAD-NRC-1006
Air kerma rate	Ionization chambers (other dose/rate instruments in special tests)	Irradiation in a calibrated field in air	5.0E-06	5.0E-04	Gy s ⁻¹	Co-60	collimated beam from a shuttered, shielded head	1.0	%	2	~95%	Yes	Secondary standard ionization chamber	NRC	Approved on 06 March 2019	SIM-RAD-NRC-1007

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Air kerma	Personal dosimeters	Irradiation in a calibrated field in air or on PMMA phantom	1.0E-04	1.0E-01	Gy	Co-60	collimated beam from a shuttered, shielded head	2.0	%	2	~95%	Yes	Secondary standard ionization chamber	NRC	Approved on 06 March 2019	SIM-RAD-NRC-1009
Air kerma rate	Ionization chambers (other dose/rate instruments in special tests)	Irradiation in a calibrated field in air	3.0E-10	7.0E-05	Gy s ⁻¹	Cs-137	collimated beam from a shuttered, shielded head	2.0	%	2	~95%	Yes	Secondary standard ionization chamber	NRC	Approved on 06 March 2019	SIM-RAD-NRC-1011
Absorbed dose rate to water	Ionization chambers (other dose/rate instruments in special tests)	Irradiation in a calibrated field at 5 cm depth in water phantom	6.7E-03	1.6E-02	Gy s ⁻¹	Co-60	10 cm by 10 cm field at 1 m distance, 5 cm depth	1.0	%	2	~95%	Yes	Water calorimeter	NRC	Approved on 06 March 2019	SIM-RAD-NRC-1013
Absorbed dose rate to water	Ionization chambers (other dose/rate instruments in special tests)	Irradiation in a calibrated field at 5 cm or 10 cm depth in water phantom	1.7E-03	2.0E-01	Gy s ⁻¹	Photons, high energy	6 MV to 25 MV, 10 cm by 10 cm field at 1 m distance	1.0	%	2	~95%	Yes	Water calorimeter	NRC	Approved on 06 March 2019	SIM-RAD-NRC-1014
Reference air kerma rate	Well-type ionization chambers	Irradiation in a calibrated field in air	1.0E-02	6.0E-02	Gy h ⁻¹	Ir-192	calibrated source positioned at sweet spot of well chamber	1.2	%	2.0	~95%	Yes	Secondary standard ionization chamber	NRC	Approved on 06 March 2019	SIM-RAD-NRC-1015

RADIOACTIVITY

Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, standard set of weights	1.0E+02	1.0E+06	Bq g ⁻¹	C-14	glass ampoule	2.0	%	2	~95%	Yes	Liquid scintillation counting (CIEMAT/NIST method)	NRC (weights), NIST (tracer)	Approved 06 March 2019	SIM-RAD-NRC-2001
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, standard set of weights	1.0E+02	1.0E+06	Bq g ⁻¹	Sr-90	glass ampoule	2.0	%	2	~95%	Yes	Liquid scintillation counting (CIEMAT/NIST method)	NRC (weights), NIST (tracer)	Approved 06 March 2019	SIM-RAD-NRC-2002
Activity	Single nuclide solution	Secondary standard ionisation chamber	5.0E+04	8.0E+07	Bq	Co-60	glass ampoule	0.2	%	2	~95%	Yes	4π(PPC)-γ anticoincidence counting	NRC	Approved 06 March 2019	SIM-RAD-NRC-2003

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Activity	Single nuclide solution	Secondary standard ionisation chamber	2.0E+04	1.0E+09	Bq	Cs-137	glass ampoule	1.2	%	2	~95%	Yes	4 π (PPC)- γ anticoincidence counting	NRC	Approved 06 March 2019	SIM-RAD-NRC-2004
Activity	Single nuclide solution	Secondary standard ionisation chamber	5.4E+04	2.7E+09	Bq	Cs-134	glass ampoule	0.8	%	2	~95%	Yes	4 π (PPC)- γ anticoincidence counting	NRC	Approved 06 March 2019	SIM-RAD-NRC-2005
Activity	Single nuclide solution	Secondary standard ionisation chamber	2.0E+04	1.0E+09	Bq	Ba-133	glass ampoule	1.2	%	2	~95%	Yes	4 π (PPC)- γ anticoincidence counting	NRC	Approved 06 March 2019	SIM-RAD-NRC-2006