

Ionizing Radiation, IAEA (International Atomic Energy Agency)

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					Reference Standard used in calibration		NMI Internal Service Identifier	Comments
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		
Absorbed dose rate to water	Therapy ionisation chamber	Calibration against a secondary standard in a water phantom	2.0E-03	2.0E-02	Gy s ⁻¹	Co-60	IAEA TRS-398	1.0	%	2	~95%	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-IAEA-1001	Approved on 24 February 2016
Air kerma rate	Therapy ionisation chamber	Calibration against a secondary standard free in air	2.0E-03	2.0E-02	Gy s ⁻¹	Co-60	IAEA TRS-277	0.8	%	2	~95%	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-IAEA-1002	Approved on 24 February 2016
Air kerma rate	Therapy ionisation chamber	Calibration against a secondary standard free in air	4.0E-04	4.0E-03	Gy s ⁻¹	X-ray, 10 kV to 50 kV	BIPM-CCRI, 10 kV to 50 kV	0.8	%	2	~95%	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-IAEA-1003	Approved on 24 February 2016
Air kerma rate	Therapy ionisation chamber	Calibration against a secondary standard free in air	2.0E-04	2.0E-03	Gy s ⁻¹	X-ray, 50 kV to 420 kV	BIPM-CCRI, 100 kV to 250 kV	0.8	%	2	~95%	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-IAEA-1004	Approved on 24 February 2016
Air kerma rate	Protection ionisation chamber	Calibration against a secondary standard free in air	6.0E-01	1.2E+01	mGy h ⁻¹	X-ray, 10 kV to 50 kV	ISO 4037, Narrow Series, 40 kV	1.2	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1006	Approved on 24 February 2016
Air kerma rate	Protection ionisation chamber	Calibration against a secondary standard free in air	6.0E-01	1.2E+01	mGy h ⁻¹	X-ray, 50 kV to 420 kV	ISO 4037, Narrow Series, 60 kV to 300 kV	1.2	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1007	Approved on 24 February 2016
Air kerma rate	Protection ionisation chamber	Calibration against a secondary standard free in air	3.6E-02	9.0E+00	mGy h ⁻¹	Cs-137	ISO 4037	3.2 to 0.8	%	2	~95%	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-IAEA-1008	Uncertainty varies linearly within the range. Approved on 24 February 2016
Air kerma rate	Protection ionisation chamber	Calibration against a secondary standard free in air	1.1E-01	3.0E+00	mGy h ⁻¹	Co-60	ISO 4037	0.8	%	2	~95%	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-IAEA-1009	Approved on 24 February 2016
Ambient dose equivalent rate	Protection ionisation chamber	Calibration against a secondary standard free in air	6.0E-01	1.2E+01	mSv h ⁻¹	X-ray, 10 kV to 50 kV	ISO 4037, Narrow Series, 40 kV	3.3	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1010	Approved on 24 February 2016
Ambient dose equivalent rate	Protection ionisation chamber	Calibration against a secondary standard free in air	6.0E-01	1.2E+01	mSv h ⁻¹	X-ray, 50 kV to 420 kV	ISO 4037, Narrow Series, 60 kV to 300 kV	3.3	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1011	Approved on 24 February 2016



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Ambient dose equivalent rate	Protection ionisation chamber	Calibration against a secondary standard free in air	3.6E-02	9.0E+00	mSv h ⁻¹	Cs-137	ISO 4037	3.5 to 1.2	%	2	~95%	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-IAEA-1012	Traceable to the H*(10) standard at the BIPM without conversion from air kerma, and uncertainty varies linearly within the range. Approved on 24 February 2016
Ambient dose equivalent rate	Protection ionisation chamber	Calibration against a secondary standard free in air	1.1E-01	3.0E+00	mSv h ⁻¹	Co-60	ISO 4037	0.8	%	2	~95%	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-IAEA-1013	Traceable to the H*(10) standard at the BIPM without conversion from air kerma. Approved on 24 February 2016
Personal dose equivalent penetrating (in 10 mm depth)	Protection ionisation chamber/Personal dosimeter	Calibration against a secondary standard on the surface of the slab phantom	2.0E-01	3.0E+01	mSv	X-ray, 10 kV to 50 kV	ISO 4037, Narrow Series, 40 kV	5.0	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1014	Approved on 24 February 2016
Personal dose equivalent penetrating (in 10 mm depth)	Protection ionisation chamber/Personal dosimeter	Calibration against a secondary standard on the surface of the slab phantom	2.0E-01	3.0E+01	mSv	X-ray, 50 kV to 420 kV	ISO 4037, Narrow Series, 60 kV to 300 kV	5.0	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1015	Approved on 24 February 2016
Personal dose equivalent penetrating (in 10 mm depth)	Protection ionisation chamber/Personal dosimeter	Calibration against a secondary standard on the surface of the slab phantom	5.0E-02	3.0E+01	mSv	Cs-137	ISO 4037	5.0	%	2	~95%	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-IAEA-1016	Approved on 24 February 2016
Personal dose equivalent penetrating (in 10 mm depth)	Protection ionisation chamber/Personal dosimeter	Calibration against a secondary standard on the surface of the slab phantom	5.0E-02	3.0E+01	mSv	Co-60	ISO 4037	5.0	%	2	~95%	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-IAEA-1017	Approved on 24 February 2016



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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		
Air kerma rate	Diagnostic ionisation chamber	Calibration against a secondary standard free in air	1.7E-05	1.0E-03	Gy s ⁻¹	X-ray, 10 kV to 50 kV	Mammography qualities (anode material + x mm of filter material): (i) Mo + 0.03 Mo, with and without additional 2 mm Al for 25 kV to 35 kV, IEC61627 RQR-M and RQA-M for 25 kV to 35 kV; (ii) Mo + 0.028 Rh, 25 kV to 35 kV; W + 0.048 Rh, 25 kV to 35 kV; W + 0.049 Ag, 25 kV to 35 kV	1.3	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1018	Approved on 09 January 2018
Air kerma rate	Diagnostic ionisation chamber	Calibration against a secondary standard free in air	1.7E-05	1.0E-03	Gy s ⁻¹	X-ray, 10 kV to 50 kV	Mammography qualities (anode material + x mm of filter material): (i) Mo + 0.03 Mo (IEC61267 RQR-M), 25 kV to 35 kV, and W + 0.066 Mo, 25 kV to 35 kV	1.0	%	2	~95%	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-IAEA-1019	Approved on 24 February 2016
Air kerma rate	Diagnostic ionisation chamber	Calibration against a secondary standard free in air	1.7E-05	1.4E-04	Gy s ⁻¹	X-ray, 10 kV to 50 kV	IEC 61267, RQA series, 40 kV to 50 kV	1.1	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1020	Approved on 24 February 2016
Air kerma rate	Diagnostic ionisation chamber	Calibration against a secondary standard free in air	1.7E-05	1.4E-04	Gy s ⁻¹	X-ray, 50 kV to 420 kV	IEC 61267, RQA series, 60 kV to 150 kV	1.1	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1021	Approved on 24 February 2016
Air kerma rate	Diagnostic ionisation chamber	Calibration against a secondary standard free in air	1.7E-04	1.2E-03	Gy s ⁻¹	X-ray, 10 kV to 50 kV	IEC 61267, RQR series, 40 kV to 50 kV	1.1	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1022	Approved on 24 February 2016



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Air kerma rate	Diagnostic ionisation chamber	Calibration against a secondary standard free in air	1.7E-04	1.2E-03	Gy s ⁻¹	X-ray, 50 kV to 420 kV	IEC 61267, RQR series, 60 kV to 150 kV	1.1	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1023	Approved on 24 February 2016
Air kerma rate	Diagnostic ionisation chamber	Calibration against a secondary standard free in air	1.7E-04	1.7E-03	Gy s ⁻¹	X-ray, 50 kV to 420 kV	IEC 61267, RQT beams, 100 kV to 150 kV	1.1	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1024	Approved on 24 February 2016
Air kerma length product	Diagnostic ionisation chamber	Calibration against a secondary standard free in air	1.5E-03	1.5E+00	Gy cm	X-ray, 50 kV to 420 kV	IEC 61267, RQT beams, 100 kV to 150 kV	1.2	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1025	According to the IAEA TRS 457. Approved on 24 February 2016
Air kerma area product	Air kerma area product meter	Calibration against a secondary standard free in air	5.5E-03	7.5E+00	Gy cm ²	X-ray, 10 kV to 50 kV	IEC 61267, RQR series, 40 kV to 50 kV	1.3	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1026	According to the IAEA TRS 457. Approved on 24 February 2016
Air kerma area product	Air kerma area product meter	Calibration against a secondary standard free in air	5.5E-03	7.5E+00	Gy cm ²	X-ray, 50 kV to 420 kV	IEC 61267, RQR series, 60 kV to 150 kV	1.3	%	2	~95%	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-IAEA-1027	According to the IAEA TRS 457. Approved on 24 February 2016