

Ionizing Radiation, Spain, CIEMAT (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas)



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		

DOSIMETRY

Air kerma rate	Radiotherapy ionization chamber dosimeter	Calibration free in air	7.0E-03	7.0E-03	Gy s ⁻¹	Co-60	radiotherapy beam. Calibration at 1 m. Levels on January 1, 2003	0.8	%	2	not specified	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-CIEMAT(LMRI)-1001	Approved on 21 April 2008
Absorbed dose rate to water	Radiotherapy ionization chamber dosimeter	Calibration in a water phantom	7.0E-03	7.0E-03	Gy s ⁻¹	Co-60	radiotherapy beam. Calibration at 1 m. Levels on January 1, 2003	1.1	%	2	not specified	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-CIEMAT(LMRI)-1002	Approved on 21 April 2008
Air kerma rate	Radiotherapy ionization chamber dosimeter	Calibration free in air	9.E-04	9.E-04	Gy s ⁻¹	Cs-137	radiotherapy beam. Calibration at 1 m. Levels on January 1, 2003	1.1	%	2	not specified	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-CIEMAT(LMRI)-1003	Approved on 21 April 2008
Air kerma	Radiotherapy dosimeter	Calibration free in air	4.2E-01	8.4E+00	Gy	Co-60	radiotherapy beam. Calibration at 1 m. Levels on January 1, 2003. Integration times 60-1200 s.	0.8	%	2	not specified	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-CIEMAT(LMRI)-1004	Approved on 21 April 2008
Absorbed dose to water	Radiotherapy dosimeter	Calibration in a water phantom	4.2E-01	8.4E+00	Gy	Co-60	radiotherapy beam. Calibration at 1 m. Levels on January 1, 2003. Integration times 60-1200 s.	1.1	%	2	not specified	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-CIEMAT(LMRI)-1005	Approved on 21 April 2008

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DOSIMETRY

Air kerma	Radiotherapy dosimeter	Calibration free in air	5.4E-02	5.4E+01	Gy	Cs-137	radiotherapy beam. Calibration at 1 m. Levels on January 1, 2003. Integration times 60-1200 s.	1.1	%	2	not specified	Yes	Secondary standard ionization chamber	BIPM	EUR-RAD-CIEMAT(LMRI)-1006	Approved on 21 April 2008
Absorbed dose rate to tissue	Radiation protection dosimeter	Calibration free in air	4.4E-02	4.4E-02	Gy h ⁻¹	Beta radiation	Sr-90/Y-90 with ISO 6980 filter. Calibration at 30 cm. Levels on July 17, 2006.	2.8	%	2	not specified	Yes	Secondary standard beta source	PTB	EUR-RAD-CIEMAT(LMRI)-1007	Approved on 21 April 2008
Absorbed dose rate to tissue	Radiation protection dosimeter	Calibration free in air	2.4E-02	5.0E-01	Gy h ⁻¹	Beta radiation	Sr-90/Y-90 without ISO 6980 filter. Calibration at 11, 20, 30, 50 cm. Levels on July 17, 2006.	2.6	%	2	not specified	Yes	Secondary standard beta source	PTB	EUR-RAD-CIEMAT(LMRI)-1008	Approved on 21 April 2008
Absorbed dose rate to tissue	Radiation protection dosimeter	Calibration free in air	1.7E-01	1.7E-01	Gy h ⁻¹	Beta radiation	Kr-85 with ISO 6980 filter. Calibration at 30 cm. Levels on July 16, 2006.	2.7	%	2	not specified	Yes	Secondary standard beta source	PTB	EUR-RAD-CIEMAT(LMRI)-1009	Approved on 21 April 2008
Absorbed dose rate to tissue	Radiation protection dosimeter	Calibration free in air	8.2E-03	8.2E-03	Gy h ⁻¹	Beta radiation	Pm-147 with ISO 6980 filter. Calibration at 20 cm. Levels on July 07, 2006.	4.7	%	2	not specified	Yes	Secondary standard beta source	PTB	EUR-RAD-CIEMAT(LMRI)-1010	Approved on 21 April 2008

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DOSIMETRY

Personal dose equivalent, superficial	Dosimeter	Irradiation on a water slab or PMMA rod phantoms	1.5E-03	1.0E+00	Sv	Beta radiation	Sr-90/Y-90 with ISO 6980 filter. Calibration at 30 cm. Levels on July 17, 2006. Integration time 120 s - 23 h.	2.9	%	2	not specified	Yes	Secondary standard beta source	PTB	EUR-RAD-CIEMAT(LMRI)-1011	Approved on 21 April 2008
Personal dose equivalent, superficial	Dosimeter	Irradiation on a water slab or PMMA rod phantoms	5.8E-03	4.0E+00	Sv	Beta radiation	Kr-85 with ISO 6980 filter. Calibration at 30 cm. Levels on July 16, 2006. Integration time 120 s - 23 h.	2.8	%	2	not specified	Yes	Secondary standard beta source	PTB	EUR-RAD-CIEMAT(LMRI)-1012	Approved on 21 April 2008
Personal dose equivalent, superficial	Dosimeter	Irradiation on a water slab or PMMA rod phantoms	2.7E-04	1.9E-01	Sv	Beta radiation	Pm-147 with ISO 6980 filter. Calibration at 20 cm. Levels on July 07, 2006. Integration time 120 s - 23 h.	4.8	%	2	not specified	Yes	Secondary standard beta source	PTB	EUR-RAD-CIEMAT(LMRI)-1013	Approved on 21 April 2008
Air kerma rate	Reference dosimeter for radiation protection laboratory	Calibration free in air	2.5E-02	1.0E-01	Gy h ⁻¹	Cs-137	ISO 4037. Calibration at 1-1.5-1.75-2 m. Levels on January 1, 2003.	2.1	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1014	Approved on 21 April 2008
Air kerma rate	Reference dosimeter for radiation protection laboratory	Calibration free in air	5.0E-03	2.0E-02	Gy h ⁻¹	Co-60	ISO 4037. Calibration at 1-1.5-1.75-2 m. Levels on January 1, 2003.	1.3	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1015	Approved on 21 April 2008

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DOSIMETRY

Air kerma	Reference dosimeter for radiation protection laboratory	Calibration free in air	1.5E+00	6.0E+03	Gy	Cs-137	ISO 4037. Calibration at 1-1.5-1.75-2 m. Integration times 60-60000 s. Levels on January 1, 2003.	2.1	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1016	Approved on 21 April 2008
Air kerma	Reference dosimeter for radiation protection laboratory	Calibration free in air	3.0E-01	1.2E+03	Gy	Co-60	ISO 4037. Calibration at 1-1.5-1.75-2 m. Integration times 60-60000 s. Levels on January 1, 2003.	1.3	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1017	Approved on 21 April 2008
Ambient dose equivalent rate	Radiation protection dosimeter	Calibration free in air	1.0E-05	4.0E+00	Sv h ⁻¹	Cs-137	ISO 4037. Calibration using 3 different beams. Levels on January 1, 2003.	4.9	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1018	Approved on 21 April 2008
Ambient dose equivalent rate	Radiation protection dosimeter	Calibration free in air	2.0E-06	2.4E-02	Sv h ⁻¹	Co-60	ISO 4037. Calibration using 2 different beams. Levels on January 1, 2003.	4.7	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1019	Approved on 21 April 2008

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DOSIMETRY

Ambient dose equivalent	Radiation protection dosimeter	Calibration free in air	6.0E-04	2.4E+05	Sv	Cs-137	ISO 4037. Calibration using 3 different beams. Integration times 60-60000 s. Levels on January 1, 2003.	4.9	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1020	Approved on 21 April 2008
Ambient dose equivalent	Radiation protection dosimeter	Calibration free in air	1.2E-04	1.4E+03	Sv	Co-60	ISO 4037. Calibration using 2 different beams. Integration times 60-60000 s. Levels on January 1, 2003.	4.7	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1021	Approved on 21 April 2008
Personal dose equivalent rate, penetrating	Personal dosimeter	Irradiation or calibration on a ISO PMMA slab phantom	8.0E-03	2.5E-01	Sv h ⁻¹	Cs-137	ISO 4037. Irradiation or calibration at 4 m using 2 different beams. Levels on January 1, 2003.	5.5	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1022	Approved on 21 April 2008
Personal dose equivalent rate, penetrating	Personal dosimeter	Irradiation or calibration on a ISO PMMA slab phantom	1.5E-05	1.50E-03	Sv h ⁻¹	Co-60	ISO 4037. Irradiation or calibration at 4 m using 2 different beams. Levels on January 1, 2003.	5.4	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1023	Approved on 21 April 2008

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DOSIMETRY

Personal dose equivalent, penetrating	Personal dosimeter	Irradiation or calibration on a ISO PMMA slab phantom	5.00E-01	1.5E+04	Sv	Cs-137	ISO 4037. Irradiation or calibration at 4 m using 2 different beams. Integration times 60-60000 s. Levels on January 1, 2003.	5.5	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1024	Approved on 21 April 2008
Personal dose equivalent, penetrating	Personal dosimeter	Irradiation or calibration on a ISO PMMA slab phantom	9.0E-04	9.0E+01	Sv	Co-60	ISO 4037. Irradiation or calibration at 4 m using 2 different beams. Integration times 60-60000 s. Levels on January 1, 2003.	5.4	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1025	Approved on 21 April 2008
Air kerma rate	Ionization chamber	Calibration against secondary standard free in air	5.0E-08	1.0E-04	Gy s ⁻¹	X-ray, 10 kV to 50 kV	N10 to N40 ISO 4037-1 quality	1.4	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1026	Approved on 21 April 2008
Air kerma rate	Ionization chamber	Calibration against secondary standard free in air	3.0E-08	5.0E-05	Gy s ⁻¹	X-ray, 50 kV to 420 kV	N60 to N300 ISO 4037-1 quality	1.4	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1027	Approved on 21 April 2008
Air kerma rate	Ionization chamber	Calibration against secondary standard free in air	3.0E-07	5.0E-04	Gy s ⁻¹	X-ray, 50 kV to 420 kV	W60 to W300 ISO 4037-1 quality	1.2	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1028	Approved on 21 April 2008

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DOSIMETRY

Ambient dose equivalent rate	Radiation protection dosimeter	Calibration against secondary standard free in air	3.0E-04	3.0E-01	Sv h ⁻¹	X-ray, 10 kV to 50 kV	N25 to N40 ISO 4037-1 quality	4.2	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1029	Approved on 21 April 2008
Ambient dose equivalent rate	Radiation protection dosimeter	Calibration against secondary standard free in air	1.0E-04	1.0E-01	Sv h ⁻¹	X-ray, 50 kV to 420 kV	N60 to N300 ISO 4037-1 quality	4.2	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1030	Approved on 21 April 2008
Ambient dose equivalent rate	Radiation protection dosimeter	Calibration against secondary standard free in air	1.0E-03	2.0E+00	Sv h ⁻¹	X-ray, 50 kV to 420 kV	W60 to W300 ISO 4037-1 quality	4.2	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1031	Approved on 21 April 2008
Ambient dose equivalent	Radiation protection dosimeter	Calibration against secondary standard free in air	3.0E-06	6.0E-01	Sv	X-ray, 10 kV to 50 kV	N25 to N40 ISO 4037-1 quality. Integration times 60 s - 7200 s.	4.2	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1032	Approved on 21 April 2008
Ambient dose equivalent	Radiation protection dosimeter	Calibration against secondary standard free in air	1.0E-06	2.0E-01	Sv	X-ray, 50 kV to 420 kV	N60 to N300 ISO 4037-1 quality. Integration times 60 s - 7200 s.	4.2	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1033	Approved on 21 April 2008
Ambient dose equivalent	Radiation protection dosimeter	Calibration against secondary standard free in air	6.0E-05	4.0E+00	Sv	X-ray, 50 kV to 420 kV	W60 to W300 ISO 4037-1 quality. Integration times 60 s - 7200 s.	4.2	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1034	Approved on 21 April 2008
Directional dose equivalent rate	Radiation protection dosimeter	Calibration against secondary standard free in air	3.0E-04	6.0E-01	Sv h ⁻¹	X-ray, 10 kV to 50 kV	N10 to N40 ISO 4037-1 quality	4.2	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1035	Approved on 21 April 2008

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DOSIMETRY

Directional dose equivalent rate	Radiation protection dosimeter	Calibration against secondary standard free in air	1.0E-04	2.0E-01	Sv h ⁻¹	X-ray, 50 kV to 420 kV	N60 to N300 ISO 4037-1 quality	4.2	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1036	Approved on 21 April 2008
Directional dose equivalent rate	Radiation protection dosimeter	Calibration against secondary standard free in air	2.0E-03	2.0E+00	Sv h ⁻¹	X-ray, 50 kV to 420 kV	W60 to W300 ISO 4037-1 quality	4.2	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1037	Approved on 21 April 2008
Directional dose equivalent	Radiation protection dosimeter	Calibration against secondary standard free in air	6.0E-06	4.0E-01	Sv	X-ray, 10 kV to 50 kV	N10 to N40 ISO 4037-1 quality. Integration times 60 s - 7200 s.	4.2	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1038	Approved on 21 April 2008
Directional dose equivalent	Radiation protection dosimeter	Calibration against secondary standard free in air	2.0E-06	2.0E-01	Sv	X-ray, 50 kV to 420 kV	N60 to N300 ISO 4037-1 quality. Integration times 60 s - 7200 s.	4.2	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1039	Approved on 21 April 2008
Directional dose equivalent	Radiation protection dosimeter	Calibration against secondary standard free in air	4.0E-05	4.0E+00	Sv	X-ray, 50 kV to 420 kV	W60 to W300 ISO 4037-1 quality. Integration times 60 s - 7200 s.	4.2	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1040	Approved on 21 April 2008
Personal dose equivalent rate, penetrating	Radiation protection dosimeter	Calibration on ISO water slab phantom in known air kerma rate field	1.0E-03	6.0E-02	Sv h ⁻¹	X-ray, 10 kV to 50 kV	N15 to N40 ISO 4037-1 quality	4.6	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1041	Approved on 21 April 2008
Personal dose equivalent rate, penetrating	Radiation protection dosimeter	Calibration on ISO water slab phantom in known air kerma rate field	1.0E-03	2.0E-02	Sv h ⁻¹	X-ray, 50 kV to 420 kV	N60 to N300 ISO 4037-1 quality	4.6	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1042	Approved on 21 April 2008

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DOSIMETRY

Personal dose equivalent rate, penetrating	Radiation protection dosimeter	Calibration against secondary standard free in air	5.0E-03	5.0E-01	Sv h ⁻¹	X-ray, 50 kV to 420 kV	W60 to W300 ISO 4037-1 quality	4.6	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1043	Approved on 21 April 2008
Personal dose equivalent, penetrating	Dosimeter	Irradiation on ISO water slab phantom in known air kerma rate field	2.0E-05	1.0E-01	Sv	X-ray, 10 kV to 50 kV	N15 to N40 ISO 4037-1 quality. Integration times 60 s - 7200 s.	4.6	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1044	Approved on 21 April 2008
Personal dose equivalent, penetrating	Dosimeter	Irradiation on ISO water slab phantom in known air kerma rate field	2.0E-05	4.0E-01	Sv	X-ray, 50 kV to 420 kV	N60 to N300 ISO 4037-1 quality. Integration times 60 s - 7200 s.	4.6	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1045	Approved on 21 April 2008
Personal dose equivalent, penetrating	Dosimeter	Irradiation on ISO water slab phantom in known air kerma rate field	1.0E-04	1.0E+00	Sv	X-ray, 50 kV to 420 kV	W60 to W300 ISO 4037-1 quality. Integration times 60 s - 7200 s.	4.6	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1046	Approved on 21 April 2008
Personal dose equivalent rate, superficial	Radiation protection dosimeter	Calibration on ISO water slab phantom or PMMA rod phantom in known air kerma rate field	8.0E-04	1.0E-01	Sv h ⁻¹	X-ray, 10 kV to 50 kV	N10 to N40 ISO 4037-1 quality	4.6	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1047	Approved on 21 April 2008
Personal dose equivalent rate, superficial	Radiation protection dosimeter	Calibration on ISO water slab phantom or PMMA rod phantom in known air kerma rate field	4.0E-04	2.0E-02	Svh ⁻¹	X-ray, 50 kV to 420 kV	N60 to N300 ISO 4037-1 quality	4.6	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1048	Approved on 21 April 2008

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DOSIMETRY

Personal dose equivalent rate, superficial	Radiation protection dosimeter	Calibration on ISO water slab phantom or PMMA rod phantom in known air kerma rate field	2.0E-03	5.0E-01	Sv h ⁻¹	X-ray, 50 kV to 420 kV	W60 to W300 ISO 4037-1 quality	4.6	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1049	Approved on 21 April 2008
Personal dose equivalent, superficial	Dosimeter	Calibration on ISO water slab phantom or PMMA rod phantom in known air kerma rate field	2.0E-05	2.0E-01	Sv	X-ray, 10 kV to 50 kV	N10 to N40 ISO 4037-1 quality. Integration times 60 s - 7200 s.	4.6	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1050	Approved on 21 April 2008
Personal dose equivalent, superficial	Dosimeter	Calibration on ISO water slab phantom or PMMA rod phantom in known air kerma rate field	8.0E-06	4.0E-02	Sv	X-ray, 50 kV to 420 kV	N60 to N300 ISO 4037-1 quality. Integration times 60 s - 7200 s.	4.6	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1051	Approved on 21 April 2008
Personal dose equivalent, superficial	Dosimeter	Calibration on ISO water slab phantom or PMMA rod phantom in known air kerma rate field	4.0E-05	1.0E+00	Sv	X-ray, 50 kV to 420 kV	W60 to W300 ISO 4037-1 quality. Integration times 60 s - 7200 s.	4.6	%	2	not specified	Yes	Secondary standard ionization chamber	PTB	EUR-RAD-CIEMAT(LMRI)-1052	Approved on 21 April 2008

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RADIOACTIVITY

Activity	Single nuclide solution	High pressure well type ionization chamber	1.0E+06	1.0E+09	Bq	F-18	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	$4\pi\beta-\gamma$ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2001	Approved on 11 April 2016
Activity	Single nuclide solution	High pressure well type ionization chamber	1.0E+06	1.0E+09	Bq	Na-22	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	$4\pi\beta-\gamma$ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2002	Approved on 11 April 2016
Activity	Single nuclide solid source	Hp-Ge Gamma-ray spectrometer	1.0E+02	3.7E+05	Bq	Na-22	point source	1.6	%	2	95%	Yes	$4\pi\beta-\gamma$ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2003	Approved on 11 April 2016
Activity	Single nuclide solid source	Hp-Ge Gamma-ray spectrometer	1.0E+02	1.E+06	Bq	Mn-54	point source	3	%	2	95%	Yes	$4\pi(xe)-\gamma$ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2004	Approved on 11 April 2016
Activity	Single nuclide solid source	Hp-Ge Gamma-ray spectrometer	1.0E+02	3.7E+05	Bq	Co-57	point source	2	%	2	95%	Yes	$4\pi(xe)-\gamma$ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2005	Approved on 11 April 2016
Activity	Single nuclide solid source	Hp-Ge Gamma-ray spectrometer	1.0E+02	1.0E+06	Bq	Co-60	point source	1.6	%	2	95%	Yes	$4\pi\beta-\gamma$ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2006	Approved on 11 April 2016
Activity	Single nuclide solution	High pressure well type ionization chamber	1.0E+06	1.0E+09	Bq	Co-60	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	$4\pi\beta-\gamma$ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2007	Approved on 11 April 2016

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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		

RADIOACTIVITY

Activity	Single nuclide solid source	Hp-Ge Gamma-ray spectrometer	1.0E+03	3.7E+05	Bq	Ga-67	point source	2.5	%	2	95%	Yes	$4\pi(xe)-\gamma$ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2008	Approved on 11 April 2016
Activity	Single nuclide solution	High pressure well type ionization chamber	1.0E+06	1.0E+09	Bq	Ga-67	glass ampoule, 3.6 mL	2	%	2	95%	Yes	$4\pi(xe)-\gamma$ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2009	Approved on 11 April 2016
Activity	Single nuclide solid source	Hp-Ge Gamma-ray spectrometer	1.0E+02	5.0E+05	Bq	Sr-85	point source	2	%	2	95%	Yes	$4\pi(xe)-\gamma$ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2010	Approved on 11 April 2016
Activity	Single nuclide solid source	Hp-Ge Gamma-ray spectrometer	1.0E+02	1.0E+06	Bq	Nb-95	point source	2	%	2	95%	Yes	$4\pi\beta-\gamma$ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2011	Approved on 11 April 2016
Activity	Single nuclide solution	High pressure well type ionization chamber	1.0E+06	1.0E+09	Bq	Tc-99m	glass ampoule, 3.6 mL	3	%	2	95%	Yes	$4\pi(xe)-\gamma$ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2012	Approved on 11 April 2016
Activity	Single nuclide solid source	Hp-Ge Gamma-ray spectrometer	1.0E+02	1.0E+05	Bq	Ag-110m	point source	1.5	%	2	95%	Yes	$4\pi\gamma$ counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2013	Approved on 11 April 2016
Activity	Single nuclide solid source	Nal well spectrometer	1.0E+01	2.0E+03	Bq	I-125	point source	3	%	2	95%	Yes	$4\pi\gamma-x$ counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2014	Approved on 11 April 2016

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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		

RADIOACTIVITY

Activity	Single nuclide solid source	Hp-Ge Gamma-ray spectrometer	1.0E+02	3.7E+05	Bq	I-125	point source	3	%	2	95%	Yes	4 π γ-x counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2015	Approved on 11 April 2016
Activity	Single nuclide solid source	Hp-Ge Gamma-ray spectrometer	1.0E+02	3.7E+05	Bq	I-131	point source	2	%	2	95%	Yes	4πβ-γ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2016	Approved on 11 April 2016
Activity	Single nuclide solution	High pressure well type ionization chamber	1.0E+06	1.0E+09	Bq	I-131	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	4πβ-γ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2017	Approved on 11 April 2016
Activity	Single nuclide solid source	Hp-Ge Gamma-ray spectrometer	1.0E+02	3.7E+05	Bq	Cs-134	point source	3	%	2	95%	Yes	4πβ-γ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2018	Approved on 11 April 2016
Activity	Single nuclide solid source	Hp-Ge Gamma-ray spectrometer	1.0E+02	3.7E+05	Bq	Eu-152	point source	4.2	%	2	95%	Yes	4πγ counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2020	Approved on 11 April 2016
Activity	Single nuclide solution	High pressure well type ionization chamber	1.0E+06	1.0E+09	Bq	Eu-152	glass ampoule, 3.6 mL	4.2	%	2	95%	Yes	4πγ counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2021	Approved on 11 April 2016
Activity	Single nuclide solid source	Hp-Ge Gamma-ray spectrometer	1.0E+02	3.7E+05	Bq	Eu-154	point source	2	%	2	95%	Yes	4πγ counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2022	Approved on 11 April 2016

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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		

RADIOACTIVITY

Activity	Single nuclide solid source	Hp-Ge Gamma-ray spectrometer	1.0E+02	3.7E+05	Bq	Ir-192	point source	2	%	2	95%	Yes	4 $\pi\beta$ - γ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2023	Approved on 11 April 2016
Activity	Single nuclide solution	High pressure well type ionization chamber	1.0E+06	1.0E+09	Bq	Ir-192	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	4 $\pi\beta$ - γ coincidence counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2024	Approved on 11 April 2016
Activity	Single nuclide solid source	Alpha spectrometer (Si)	1.0E+01	1.0E+02	Bq	Ra-226	thin solid source	1.5	%	2	95%	Yes	2 $\pi\alpha$ absolute counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2025	Approved on 11 April 2016
Activity	Single nuclide solid source	Defined solid angle counter (alpha particles)	1.0E+02	1.0E+04	Bq	Ra-226	thin solid source	2	%	2	95%	Yes	Absolute counting by defined solid angle	LMRI	EUR-RAD-CIEMAT(LMRI)-2026	Approved on 11 April 2016
Activity	Single nuclide solid source	Alpha spectrometer (Si)	1.0E+01	2.0E+02	Bq	Th-229	thin solid source	1.5	%	2	95%	Yes	2 $\pi\alpha$ absolute counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2027	Approved on 11 April 2016
Activity	Single nuclide solid source	Defined solid angle counter (alpha particles)	2.0E+02	1.0E+04	Bq	Th-229	thin solid source	2	%	2	95%	Yes	Absolute counting by defined solid angle	LMRI	EUR-RAD-CIEMAT(LMRI)-2028	Approved on 11 April 2016
Activity	Single nuclide solid source	Alpha spectrometer (Si)	1.0E+01	1.0E+02	Bq	U-232	thin solid source	1.5	%	2	95%	Yes	2 $\pi\alpha$ absolute counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2029	Approved on 11 April 2016

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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		

RADIOACTIVITY

Activity	Single nuclide solid source	Defined solid angle counter (alpha particles)	1.0E+02	1.0E+04	Bq	U-232	thin solid source	2	%	2	95%	Yes	Absolute counting by defined solid angle	LMRI	EUR-RAD-CIEMAT(LMRI)-2030	Approved on 11 April 2016
Activity	Single nuclide solid source	2 π grid ionization chamber	1.0E+01	2.0E+02	Bq	U-233	thin solid source	1.5	%	2	95%	Yes	2 π absolute counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2031	Approved on 11 April 2016
Activity	Single nuclide solid source	Defined solid angle counter (alpha particles)	2.0E+02	2.0E+04	Bq	U-233	thin solid source	2	%	2	95%	Yes	Absolute counting by defined solid angle	LMRI	EUR-RAD-CIEMAT(LMRI)-2032	Approved on 11 April 2016
Activity	Natural uranium solid source	2 π grid ionization chamber	5.0E+00	2.0E+01	Bq	U-nat	thin solid source	1.5	%	2	95%	Yes	2 π absolute counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2033	Approved on 11 April 2016
Activity	Single nuclide solid source	2 π grid ionization chamber	1.0E+01	1.0E+02	Bq	Np-237	thin solid source	1.5	%	2	95%	Yes	2 π absolute counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2034	Approved on 11 April 2016
Activity	Single nuclide solid source	Defined solid angle counter (alpha particles)	1.0E+02	1.0E+04	Bq	Np-237	thin solid source	2	%	2	95%	Yes	Absolute counting by defined solid angle	LMRI	EUR-RAD-CIEMAT(LMRI)-2035	Approved on 11 April 2016
Activity	Single nuclide solid source	2 π grid ionization chamber	1.0E+01	3.0E+02	Bq	Pu-238	thin solid source	1.5	%	2	95%	Yes	2 π absolute counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2036	Approved on 11 April 2016

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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		

RADIOACTIVITY

Activity	Single nuclide solid source	Defined solid angle counter (alpha particles)	3.0E+02	1.0E+05	Bq	Pu-238	thin solid source	2	%	2	95%	Yes	Absolute counting by defined solid angle	LMRI	EUR-RAD-CIEMAT(LMRI)-2037	Approved on 11 April 2016
Activity	Mixed nuclide solid source	2π α grid ionization chamber	1.0E+01	3.0E+02	Bq	Pu-239+Pu-240	thin solid source	1.5	%	2	95%	Yes	2π α absolute counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2038	Approved on 11 April 2016
Activity	Mixed nuclide solid source	Defined solid angle counter (alpha particles)	3.0E+02	2.0E+04	Bq	Pu-239+Pu-240	thin solid source	2	%	2	95%	Yes	Absolute counting by defined solid angle	LMRI	EUR-RAD-CIEMAT(LMRI)-2039	Approved on 11 April 2016
Activity	Single nuclide solid source	2π α grid ionization chamber	10	300	Bq	Pu-242	thin solid source	1.5	%	2	95%	Yes	2π α (GIC) α counting	CIEMAT	EUR-RAD-CIEMAT(LMRI)-2036	Approved on 11 April 2016
Activity	Mixed nuclide solid source	2π α grid ionization chamber	1.0E+01	3.0E+02	Bq	Am-241	thin solid source	1.5	%	2	95%	Yes	2π α (GIC) α counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2040	Approved on 11 April 2016
Activity	Single nuclide solid source	Defined solid angle counter (alpha particles)	3.0E+02	1.0E+05	Bq	Am-241	thin solid source	2	%	2	95%	Yes	Absolute counting by defined solid angle	LMRI	EUR-RAD-CIEMAT(LMRI)-2041	Approved on 11 April 2016
Activity	Single nuclide solid source	2π α grid ionization chamber	1.0E+01	3.0E+02	Bq	Am-243	thin solid source	1.5	%	2	95%	Yes	2π α (GIC) α counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2042	Approved on 11 April 2016

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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		

RADIOACTIVITY

Activity	Single nuclide solid source	Defined solid angle counter (alpha particles)	3.0E+02	1.0E+05	Bq	Am-243	thin solid source	2	%	2	95%	Yes	Absolute counting by defined solid angle	LMRI	EUR-RAD-CIEMAT(LMRI)-2043	Approved on 11 April 2016
Activity	Single nuclide solid source	$2\pi\alpha$ grid ionization chamber	1.0E+01	3.0E+02	Bq	Cm-244	thin solid source	1.5	%	2	95%	Yes	$2\pi\alpha$ (GIC) α counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2044	Approved on 11 April 2016
Activity	Single nuclide solid source	Defined solid angle counter (alpha particles)	3.0E+02	1.0E+05	Bq	Cm-244	thin solid source	2	%	2	95%	Yes	Absolute counting by defined solid angle	LMRI	EUR-RAD-CIEMAT(LMRI)-2045	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E-01	1.0E+02	Bq g ⁻¹	C-14	glass ampoule, 3.6 mL	6	%	2	95%	Yes	Tritiated water, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2049	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+02	1.0E+06	Bq g ⁻¹	C-14	glass ampoule, 3.6 mL	2	%	2	95%	Yes	Tritiated water, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2050	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+02	1.0E+06	Bq g ⁻¹	F-18	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	$4\pi\beta-\gamma$ coincidence counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2051	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	High pressure well type ionization chamber, balance	1.0E+06	1.0E+09	Bq g ⁻¹	F-18	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	$4\pi\beta-\gamma$ coincidence counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2052	Approved on 11 April 2016

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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		

RADIOACTIVITY

Activity per unit mass	Single nuclide solution	Gamma spectrometer, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Na-22	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	4 π β - γ coincidence counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2053	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+02	1.0E+06	Bq g ⁻¹	P-32	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	Tritiated water, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2054	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+02	1.0E+06	Bq g ⁻¹	S-35	glass ampoule, 3.6 mL	2	%	2	95%	Yes	Tritiated water, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2055	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Cl-36	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	Tritiated water, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2056	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Ca-45	glass ampoule, 3.6 mL	2	%	2	95%	Yes	Tritiated water, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2057	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	Gamma spectrometer, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Mn-54	glass ampoule, 3.6 mL	2	%	2	95%	Yes	4 π (xe)- γ coincidence counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2058	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Fe-55	glass ampoule, 3.6 mL	2.5	%	2	95%	Yes	Tritiated water, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2059	Approved on 11 April 2016

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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		

RADIOACTIVITY

Activity per unit mass	Single nuclide solution	Gamma spectrometer, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Co-57	glass ampoule, 3.6 mL	2	%	2	95%	Yes	4 π (xe)- γ coincidence counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2060	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+03	1.0E+06	Bq g ⁻¹	Co-60	glass ampoule, 3.6 mL	1	%	2	95%	Yes	4 π β - γ coincidence counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2061	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Ni-63	glass ampoule, 3.6 mL	3	%	2	95%	Yes	CIEMAT/NIST liquid scintillation counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2062	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	Hp-Ge Gamma-ray spectrometer, balance	1.0E+03	1.0E+06	Bq g ⁻¹	Ga-67	glass ampoule, 3.6 mL	2	%	2	95%	Yes	4 π (xe)- γ coincidence counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2063	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	High pressure well type ionization chamber, balance	1.0E+06	1.0E+09	Bq g ⁻¹	Ga-67	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	4 π β - γ coincidence counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2064	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	Hp-Ge Gamma-ray spectrometer, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Sr-85	glass ampoule, 3.6 mL	2	%	2	95%	Yes	4 π (xe)- γ coincidence counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2065	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Sr-89	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	Tritiated water, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2066	Approved on 11 April 2016

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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		

RADIOACTIVITY

Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Sr-90	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	Tritiated water, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2067	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Y-90	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	Tritiated water, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2068	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	Gamma spectrometer, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Nb-95	glass ampoule, 3.6 mL	2	%	2	95%	Yes	4πβ-γ coincidence counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2069	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	Gamma spectrometer, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Tc-99m	glass ampoule, 3.6 mL	2	%	2	95%	Yes	4πβ-γ coincidence counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2070	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	NaI well spectrometer, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Ag-110m	glass ampoule, 3.6 mL	2	%	2	95%	Yes	4π NaI(Tl) sum peak counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2071	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	NaI well spectrometer, balance	1.0E+02	1.0E+06	Bq g ⁻¹	I-125	glass ampoule, 3.6 mL	2	%	2	95%	Yes	4π NaI(Tl) sum peak counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2072	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	NaI well spectrometer, balance	1.0E+02	1.0E+06	Bq g ⁻¹	I-131	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	4πβ-γ coincidence counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2073	Approved on 11 April 2016

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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		

RADIOACTIVITY

Activity per unit mass	Single nuclide solution	Nal well spectrometer, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Cs-134	glass ampoule, 3.6 mL	3	%	2	95%	Yes	CIEMAT/NIST liquid scintillation counting	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2074	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Cs-137	glass ampoule, 3.6 mL	3	%	2	95%	Yes	4 π β - γ coincidence counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2075	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Pm-147	glass ampoule, 3.6 mL	2	%	2	95%	Yes	Tritiated water, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2076	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	Nal well spectrometer, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Eu-152	glass ampoule, 3.6 mL	4.2	%	2	95%	Yes	4 π NaI(Tl) sum peak counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2077	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	Gamma spectrometer, balance	1.0E+02	1.0E+06	Bq g ⁻¹	Ir-192	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	4 π β - γ coincidence counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2078	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	CIEMAT/NIST liquid scintillation counting, balance	1.0E+03	1.0E+06	Bq g ⁻¹	Tl-204	glass ampoule, 3.6 mL	2	%	2	95%	Yes	Tritiated water, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2079	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	2 $\pi\alpha$ grid ionization chamber, balance	2.0E+01	1.0E+05	Bq g ⁻¹	Ra-226	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	2 $\pi\alpha$ (GIC) a counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2080	Approved on 11 April 2016

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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		

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Activity per unit mass	Single nuclide solution	2 $\pi\alpha$ grid ionization chamber, balance	2.0E+01	1.0E+05	Bq g ⁻¹	Th-229	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	2 $\pi\alpha$ (GIC) a counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2081	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	2 $\pi\alpha$ grid ionization chamber, balance	1.0E+01	1.0E+05	Bq g ⁻¹	U-232	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	2 $\pi\alpha$ (GIC) a counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2082	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	2 $\pi\alpha$ grid ionization chamber, balance	1.0E+01	1.0E+05	Bq g ⁻¹	U-233	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	2 $\pi\alpha$ (GIC) a counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2083	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	2 $\pi\alpha$ grid ionization chamber, balance	1.0E+01	1.0E+05	Bq g ⁻¹	U-236	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	2 $\pi\alpha$ (GIC) a counting, set of standard weights	CIEMAT, CEM	EUR-RAD-CIEMAT(LMRI)-2083	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	2 $\pi\alpha$ grid ionization chamber, balance	2.0E+01	1.0E+05	Bq g ⁻¹	Np-237	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	2 $\pi\alpha$ (GIC) a counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2084	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	2 $\pi\alpha$ grid ionization chamber, balance	2.0E+01	1.0E+05	Bq g ⁻¹	Pu-238	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	2 $\pi\alpha$ (GIC) a counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2085	Approved on 11 April 2016
Activity per unit mass	Multi nuclide solution	2 $\pi\alpha$ grid ionization chamber, balance	2.0E+01	1.0E+05	Bq g ⁻¹	Pu-239+Pu-240	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	2 $\pi\alpha$ (GIC) a counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2086	Approved on 11 April 2016

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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		

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Activity per unit mass	Single nuclide solution	2 $\pi\alpha$ grid ionization chamber, balance	2.0E+01	1.0E+05	Bq g ⁻¹	Pu-242	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	2pa (GIC) a counting, set of standard weights	CIEMAT, CEM	EUR-RAD-CIEMAT(LMRI)-2085	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	2 $\pi\alpha$ grid ionization chamber, balance	2.0E+01	1.0E+05	Bq g ⁻¹	Am-241	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	2 $\pi\alpha$ (GIC) a counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2087	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	2 $\pi\alpha$ grid ionization chamber, balance	2.0E+01	1.0E+05	Bq g ⁻¹	Am-243	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	2 $\pi\alpha$ (GIC) a counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2088	Approved on 11 April 2016
Activity per unit mass	Single nuclide solution	2 $\pi\alpha$ grid ionization chamber, balance	2.0E+01	1.0E+05	Bq g ⁻¹	Cm-244	glass ampoule, 3.6 mL	1.5	%	2	95%	Yes	2 $\pi\alpha$ (GIC) a counting, set of standard weights	LMRI, CEM	EUR-RAD-CIEMAT(LMRI)-2089	Approved on 11 April 2016
Efficiency of contamination monitors	Surface contamination monitor (radiation protection)	Extended area calibration source	1.0E-01	1.0E+00	s ⁻¹ Bq ⁻¹	Am-241	ISO 8769-1	5	%	2	95%	Yes	2 $\pi\alpha$ (GIC) a counting, set of standard weights	LMRI	EUR-RAD-CIEMAT(LMRI)-2090	Approved on 11 April 2016
Efficiency of contamination monitors	Surface contamination monitor (radiation protection)	Extended area calibration source	1.0E-01	1.0E+00	s ⁻¹ Bq ⁻¹	Pu-238	ISO 8769-1	5	%	2	95%	Yes	2 $\pi\alpha$ (GIC) a counting, set of standard weights	LMRI	EUR-RAD-CIEMAT(LMRI)-2091	Approved on 11 April 2016
Efficiency of contamination monitors	Surface contamination monitor (radiation protection)	Calibration source	5.0E-03	1.0E+00	s ⁻¹ Bq ⁻¹	C-14	UNE-EN 60325:2005	5	%	2	95%	Yes	CIEMAT/NIST liquid scintillation counting, balance	LMRI	EUR-RAD-CIEMAT(LMRI)-2092	Approved on 11 April 2016

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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		

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Efficiency of contamination monitors	Surface contamination monitor (radiation protection)	Calibration source	5.0E-03	1.0E+00	s ⁻¹ Bq ⁻¹	Tc-99	UNE-EN 60325:2005	5	%	2	95%	Yes	CIEMAT/NIST liquid scintillation counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2093	Approved on 11 April 2016
Efficiency of contamination monitors	Surface contamination monitor (radiation protection)	Calibration source	5.0E-03	1.0E+00	s ⁻¹ Bq ⁻¹	Sr-90	UNE-EN 60325:2005	5	%	2	95%	Yes	CIEMAT/NIST liquid scintillation counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2094	Approved on 11 April 2016
Efficiency of contamination monitors	Surface contamination monitor (radiation protection)	Calibration source	5.0E-03	1.0E+00	s ⁻¹ Bq ⁻¹	Cl-36	UNE-EN 60325:2005	5	%	2	95%	Yes	CIEMAT/NIST liquid scintillation counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2095	Approved on 11 April 2016
Efficiency of contamination monitors	Surface contamination monitor (radiation protection)	Calibration source	5.0E-03	1.0E+00	s ⁻¹ Bq ⁻¹	Co-60	UNE-EN 60325:2005	5	%	2	95%	Yes	CIEMAT/NIST liquid scintillation counting	LMRI	EUR-RAD-CIEMAT(LMRI)-2096	Approved on 11 April 2016
Efficiency of contamination monitors	Surface contamination monitor (radiation protection)	Calibration source	5.0E-03	1.0E+00	s ⁻¹ Bq ⁻¹	Cs-137	UNE-EN 60325:2005	5	%	2	95%	Yes	CIEMAT/NIST liquid scintillation counting	CIEMAT	EUR-RAD-CIEMAT(LMRI)-2097	Approved on 11 April 2016
Efficiency of contamination monitors	Surface contamination monitor (radiation protection)	Calibration source	5.0E-03	1.0E+00	s ⁻¹ Bq ⁻¹	Unat	UNE-EN 60325:2005	5	%	2	95%	Yes	2πα (GIC) α counting, set of standard weights	CIEMAT	EUR-RAD-CIEMAT(LMRI)-2098	Approved on 11 April 2016
Efficiency of contamination monitors	Surface contamination monitor (radiation protection)	Calibration source	5.0E-03	1.0E+00	s ⁻¹ Bq ⁻¹	Na-22	UNE-EN 60325:2005	5	%	2	95%	Yes	4πβ-γ coincidence counting	CIEMAT	EUR-RAD-CIEMAT(LMRI)-2099	Approved on 11 April 2016

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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		

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Efficiency of contamination monitors	Surface contamination monitor (radiation protection)	Calibration source	5.0E-03	1.0E+00	s-1 Bq-1	Co-57	UNE-EN 60325:2005	5	%	2	95%	Yes	4 π (xe)- γ coincidence counting, set of standard weights	CIEMAT, CEM	EUR-RAD-CIEMAT(LMRI)-2100	Approved on 11 April 2016
Efficiency of ionization chambers	ionization chamber	Calibration source	0.6	1.4	s-1 Bq-1	F-18	10 mL glass vial containing 0.3 to 4 mL of solution, small plastic syringe with 0.1 to 1 ml solution	5	%	2	95%	Yes	4 π (xe)- γ coincidence counting, set of standard weights	CIEMAT, CEM	EUR-RAD-CIEMAT(LMRI)-2101	Approved on 11 April 2016
Efficiency of ionization chambers	ionization chamber	Calibration source	0.6	1.4	s-1 Bq-1	Na-22	10 mL glass vial containing 0.3 to 4 mL of solution, small plastic syringe with 0.1 to 1 ml solution	5	%	2	95%	Yes	4 π (xe)- γ coincidence counting, set of standard weights	CIEMAT, CEM	EUR-RAD-CIEMAT(LMRI)-2102	Approved on 11 April 2016
Efficiency of ionization chambers	ionization chamber	Calibration source	0.6	1.4	s-1 Bq-1	I-125	10 mL glass vial containing 0.3 to 4 mL of solution, small plastic syringe with 0.1 to 1 ml solution	5	%	2	95%	Yes	4-x peak sum counting	CIEMAT, CEM	EUR-RAD-CIEMAT(LMRI)-2103	Approved on 11 April 2016
Efficiency of ionization chambers	ionization chamber	Calibration source	0.6	1.4	s-1 Bq-1	I-131	10 mL glass vial containing 0.3 to 4 mL of solution, small plastic syringe with 0.1 to 1 ml solution	5	%	2	95%	Yes	4 π β - γ coincidence counting	CIEMAT, CEM	EUR-RAD-CIEMAT(LMRI)-2104	Approved on 11 April 2016

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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		

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Efficiency of ionization chambers	ionization chamber	Calibration source	0.6	1.4	s-1 Bq-1	Ga-67	10 mL glass vial containing 0.3 to 4 mL of solution, small plastic syringe with 0.1 to 1 ml solution	5	%	2	95%	Yes	4 π NaI(Tl) integral gamma counting	CIEMAT, CEM	EUR-RAD-CIEMAT(LMRI)-2105	Approved on 11 April 2016
Efficiency of ionization chambers	ionization chamber	Calibration source	0.6	1.4	s-1 Bq-1	Tc-99m	10 mL glass vial containing 0.3 to 4 mL of solution, small plastic syringe with 0.1 to 1 ml solution	5	%	2	95%	Yes	4 π (xe)- γ coincidence counting, set of standard weights	CIEMAT, CEM	EUR-RAD-CIEMAT(LMRI)-2106	Approved on 11 April 2016