

Mass and Related Quantities, Spain, CEM (Centro Español de Metrologia)

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					Comments	Date of Approval	NMI Service Identifier
Class	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?			
Mass	Mass standards	Comparison in air	1	100	mg			0.4 to 0.5	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is well known.	Approved on 02 July 2008	
Mass	Mass standards	Comparison in air	0.1	1	g			0.5 to 1.6	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is well known.	Approved on 02 July 2008	
Mass	Mass standards	Comparison in air	1	10	g			1.6 to 4	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is well known.	Approved on 02 July 2008	
Mass	Mass standards	Comparison in air	10	100	g			4 to 6	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is well known.	Approved on 02 July 2008	
Mass	Mass standards	Comparison in air	0.1	1	kg			6 to 35	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is well known.	Approved on 02 July 2008	
Mass	Mass standards	Comparison in air	1	10	kg			35 to 600	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is well known.	Approved on 02 July 2008	

Mass and Related Quantities, Spain, CEM (Centro Español de Metrologia)

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					Comments	Date of Approval	NMI Service Identifier
Class	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?			
Mass	Mass standards	Comparison in air	10	50	kg	Temperature	(20 ± 1) °C	0.6 to 5	mg	2	95%	No		Approved on 27 April 2015	
						Humidity	(50 ± 10) %								
Mass	Mass standards	Comparison in air	50	100	kg	Temperature	(20 ± 1) °C	5 to 25	mg	2	95%	No		Approved on 27 April 2015	
						Humidity	(50 ± 10) %								
Mass	Mass standards	Comparison in air	100	500	kg	Temperature	(20 ± 1) °C	25 to 160	mg	2	95%	No		Approved on 27 April 2015	
						Humidity	(50 ± 10) %								
Mass	Mass standards	Comparison in air	500	1000	kg	Temperature	(20 ± 1) °C	0.16 to 1	g	2	95%	No		Approved on 27 April 2015	
						Humidity	(50 ± 10) %								
Volume of solid	Solid density standard, mass: 0.1 kg to 1 kg	Hydrostatic weighing	50	430	cm ³	Reference temperature	20 °C	1.5 to 0.5	mm ³	2	95%	No		Approved on 02 July 2008	
Volume of solid	Mass standard: 0.1 g to 1 g	Hydrostatic weighing	0.012	0.125	cm ³	Reference temperature	20 °C	0.2	mm ³	2	95%	No		Approved on 02 July 2008	
Volume of solid	Mass standard: 1 g to 10 g	Hydrostatic weighing	0.125	1.25	cm ³	Reference temperature	20 °C	0.2 to 0.3	mm ³	2	95%	No		Approved on 02 July 2008	
Volume of solid	Mass standard: 10 g to 0.1 kg	Hydrostatic weighing	1.25	12.5	cm ³	Reference temperature	20 °C	0.3 to 0.5	mm ³	2	95%	No		Approved on 02 July 2008	
Volume of solid	Mass standard: 0.1 kg to 1 kg	Hydrostatic weighing	12.5	125	cm ³	Reference temperature	20 °C	0.5 to 1.3	mm ³	2	95%	No		Approved on 02 July 2008	
Volume of solid	Mass standard: 1 kg to 10 kg	Hydrostatic weighing	125	1250	cm ³	Reference temperature	20 °C	1.3 to 40	mm ³	2	95%	No		Approved on 02 July 2008	
Volume of solid	Mass standard: 10 kg to 50 kg	Hydrostatic weighing	1250	6500	cm ³	Reference temperature	20 °C	40 to 1150	mm ³	2	95%	No		Approved on 02 July 2008	

Mass and Related Quantities, Spain, CEM (Centro Español de Metrologia)

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					Comments	Date of Approval	NMI Service Identifier
Class	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?			
Absolute pressure	Vacuum gauge		1.00E-04	5.00E-02	Pa			$(3.5E-02p + 9.1E-06)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 1.3E-05 Pa to 1.8E-03 Pa	Approved on 02 July 2008	
Absolute pressure	Vacuum gauge		5.00E-02	1.00E-01	Pa			$3.6E-02p$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 1.8E-03 Pa to 3.6E-03 Pa	Approved on 02 July 2008	
Absolute pressure	Vacuum gauge		1.00E-01	2.30E+01	Pa			$(8.2E-03p + 1.8E-03)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 2.6E-03 Pa to 1.9E-01 Pa	Approved on 02 July 2008	
Absolute pressure	Vacuum gauge		2.30E+01	1.00E+03	Pa			$(5.4E-03p + 7.0E-02)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 1.9E-01 Pa to 5.5 Pa	Approved on 02 July 2008	
Absolute pressure	Vacuum gauge		1.00E+03	3.50E+03	Pa			5.0	Pa	2	95%	No		Approved on 02 July 2008	
Absolute pressure	Pressure balance	Gas medium	3.50E+03	1.70E+05	Pa			$3.1E-05p$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 1.1E-01 Pa to 5.3 Pa	Approved on 02 July 2008	
Absolute pressure	Pressure balance	Gas medium	1.70E+05	7.00E+05	Pa			$2.7E-05p$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 4.6 Pa to 1.9E+01 Pa	Approved on 02 July 2008	
Absolute pressure	Pressure balance	Gas medium	7.00E+05	7.00E+06	Pa			$3.0E-05p$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 2.1E+01 Pa to 2.1E+02 Pa	Approved on 02 July 2008	
Absolute pressure	Pressure balance	Gas medium	7.00E+06	2.00E+07	Pa			$3.0E-05p$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 2.1E+02 Pa to 6.0E+02 Pa	Approved on 02 July 2008	
Absolute pressure	Pressure gauge	Oil medium	1.00E+05	5.00E+08	Pa			$(1.0E-04p + 10)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 20 Pa to 5.0E+04 Pa	Approved on 02 July 2008	
Negative gauge mode	Pressure gauge	Gas medium	3.50E+03	1.00E+05	Pa			$3.1E-05p$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 1.1E-01 Pa to 3.1 Pa	Approved on 02 July 2008	
Negative gauge mode	Pressure gauge	Gas medium	2.00E+01	3.50E+03	Pa			$(2.0E-04p + 9.0E-02)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 9.4E-02 Pa to 7.9E-01 Pa	Approved on 02 July 2008	

Mass and Related Quantities, Spain, CEM (Centro Español de Metrologia)

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					Comments	Date of Approval	NMI Service Identifier
Class	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?			
Gauge pressure	Pressure gauge	Gas medium	2.00E+01	3.50E+03	Pa			$(2.0E-04p + 9.0E-02)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 9.4E-02 Pa to 7.9E-01 Pa	Approved on 02 July 2008	
Gauge pressure	Pressure balance	Gas medium	3.50E+03	5.00E+04	Pa			$3.0E-05p$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 1.1E-01 Pa to 1.5 Pa	Approved on 02 July 2008	
Gauge pressure	Pressure balance	Gas medium	5.00E+04	2.00E+06	Pa			$1.6E-05p$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 8.0E-01 Pa to 3.2E+01 Pa	Approved on 02 July 2008	
Gauge pressure	Pressure balance	Gas medium	2.00E+06	2.00E+07	Pa			$2.4E-05p$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 4.8E+01 Pa to 4.8E+02 Pa	Approved on 02 July 2008	
Gauge pressure	Pressure balance	Gas medium	2.00E+07	5.00E+07	Pa			$4.0E-05p$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 8.0E+02 Pa to 2.0E+03 Pa	Approved on 02 July 2008	
Gauge pressure	Pressure balance	Gas medium	5.00E+07	7.00E+07	Pa			$5.0E-05p$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 2.5E+03 Pa to 3.5E+03 Pa	Approved on 02 July 2008	
Gauge pressure	Pressure balance	Oil medium	1.00E+05	5.00E+05	Pa			$(8.0E-05p + 10)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 18 Pa to 50 Pa	Approved on 02 July 2008	
Gauge pressure	Pressure balance	Oil medium	5.00E+05	2.00E+06	Pa			$(3.5E-05p + 10)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 27 Pa to 80 Pa	Approved on 02 July 2008	
Gauge pressure	Pressure balance	Oil medium	2.00E+06	1.00E+08	Pa			$3.5E-05p$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 7.0E+01 Pa to 3.5E+03 Pa	Approved on 02 July 2008	
Gauge pressure	Pressure balance	Oil medium	1.00E+08	2.00E+08	Pa			$4.0E-05p$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 4.0E+03 Pa to 8.0E+03 Pa	Approved on 02 July 2008	
Gauge pressure	Pressure balance	Oil medium	2.00E+08	5.00E+08	Pa			$9.5E-05p$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 1.9E+04 Pa to 4.8E+04 Pa	Approved on 02 July 2008	

Mass and Related Quantities, Spain, CEM (Centro Español de Metrología)

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					Comments	Date of Approval	NMI Service Identifier
Class	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?			
Gauge pressure	Pressure multiplier	Oil medium	5.00E+08	1.00E+09	Pa			2.3E-04p, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 1.2E+05 Pa to 2.3E+05 Pa	Approved on 02 July 2008	
Differential pressure	Pressure gauge	Gas medium	1.00E+02	5.00E+06	Pa	Differential mode	line pressure from 0 MPa to 20 MPa	(1 + 5.00E-05p), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 1.0 Pa to 2.5E+02 Pa	Approved on 02 July 2008	
Force: tension and compression	Force measuring device	Deadweight	10	1000	N			0.002	%	2	95%	Yes		Approved on 02 July 2008	
Force: tension and compression	Force measuring device	Deadweight	200	20000	N			0.002	%	2	95%	Yes		Approved on 02 July 2008	
Force: tension and compression	Force measuring device	Deadweight	5	500	kN			0.002	%	2	95%	Yes		Approved on 02 July 2008	
Force: compression	Force measuring device	Build-up system	100	1500	kN			0.02	%	2	95%	Yes		Approved on 02 July 2008	
Torque	Torque measuring device	EURAMET /cg-14	1	1000	N m	Mode	clockwise, anticlockwise	2.0E-05		2	95%	Yes		Approved on 22 October 2009	
Torque	Torque measuring device	EURAMET /cg-14	1000	5000	N m	Mode	clockwise, anticlockwise	2.0E-04		2	95%	Yes		Approved on 22 October 2009	
Torque	Reference torque wrench	Reference method	2	1000	N m	Mode	clockwise, anticlockwise	2.0E-04		2	95%	Yes		Approved on 23 September 2011	
Volume of liquid	Glassware, vessels, burettes, pipettes	Gravimetric	0.001	50	L	Liquid	water	0.02	%	2	95%	Yes		Approved on 10 November 2011	CEMVOL1
						Reference temperature	20 °C								



Mass and Related Quantities, Spain, CEM (Centro Español de Metrología)

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					Comments	Date of Approval	NMI Service Identifier
Class	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?			
Volume of liquid	Proving tanks, standard test measures	Gravimetric	50	500	L	Liquid	water	0.01	%	2	95%	Yes		Approved on 10 November 2011	CEMVOL2
						Reference temperature	20 °C								
Volume of liquid	Proving tanks	Volumetric	1	5000	L	Liquid	water	0.03 to 0.02	%	2	95%	Yes		Approved on 10 November 2011	CEMVOL3
						Reference temperature	20 °C								