Thermometry, Spain, CEM (Centro Español de Metrologia)

Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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?**	**Comments**	**NMI Service Identifier**	**NMI Service Provider**
Temperature	Argon point for SPRT	Comparison with a cell	-189.3442	-189.3442	ºC	Ambient temperature	(23 ± 1) ºC	1.3	mK	2	95%	No	Approved on 18 May 2004	1	CEM
Temperature	Indium point	Comparison with a cell	156.5985	156.5985	ºC	Ambient temperature	(23 ± 1) ºC	1.1	mK	2	95%	No	Approved on 18 May 2004	5	CEM
Temperature	Tin point	Comparison with a cell	231.928	231.928	ºC	Ambient temperature	(23 ± 1) ºC	0.9	mK	2	95%	No	Approved on 18 May 2004	6	CEM
Temperature	Aluminium point	Comparison with a cell	660.323	660.323	ºC	Ambient temperature	(23 ± 1) ºC	4.0	mK	2	95%	No	Approved on 18 May 2004	8	CEM
Temperature	Long stem SPRT	Calibration at the triple point of Mercury	-38.8344	-38.8344	ºC	Ambient temperature	(23 ± 1) ºC	0.5	mK	2	95%	No	Approved on 18 May 2004	11	CEM
Temperature	Long stem SPRT	Calibration at the freezing point of Zinc	419.527	419.527	ºC	Ambient temperature	(23 ± 1) ºC	2.0	mK	2	95%	No	Approved on 18 May 2004	16	CEM
Temperature	Long stem SPRT and HT SPRT	Calibration at the freezing point of Aluminium	660.323	660.323	ºC	Ambient temperature	(23 ± 1) ºC	9.0	mK	2	95%	No	Approved on 18 May 2004	17	CEM
Temperature	Long stem HT SPRT	Calibration at the freezing point of Silver	961.78	961.78	ºC	Ambient temperature	(23 ± 1) ºC	18	mK	2	95%	No	Approved on 18 May 2004	18	CEM
Temperature	Radiation thermometers	Calibration at the freezing point of Copper	961.78	2200	ºC	Wavelengh	650 nm and 950 nm	1 to 4	K	2	95%	No	Approved on 18 May 2004	26	CEM
						Ambient temperature	(23 ± 1) ºC								
						Humidity	< 60 %								

Thermometry, Spain, CEM (Centro Español de Metrologia)

Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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?	Comments	NMI Service Identifier	NMI Service Provider
Temperature	Platinum Resistance Thermometers	Comparison	-80	0	ºC	Liquid bath	alcohol bath	0.02	ºC	2	95%	No	Approved on 03 November 2009	28	CEM
Temperature	Platinum Resistance Thermometers	Comparison	0	90	ºC	Liquid bath	water bath	0.01	ºC	2	95%	No	Approved on 03 November 2009	29	CEM
Temperature	Platinum Resistance Thermometers	Comparison	90	250	ºC	Liquid bath	oil bath	0.02	ºC	2	95%	No	Approved on 03 November 2009	30	CEM
Temperature	Noble-metal thermocouples type S or R	Tin point	231.928	231.928	ºC	Ambient temperature	(23 ± 1) ºC	0.21	ºC	2	95%	No	Approved on 03 November 2009	31	CEM
Temperature	Noble-metal thermocouples type S or R	Zinc point	419.519	419.519	ºC	Ambient temperature	(23 ± 1) ºC	0.20	ºC	2	95%	No	Approved on 03 November 2009	32	CEM
Temperature	Noble-metal thermocouples type S or R	Aluminium point	660.323	660.323	ºC	Ambient temperature	(23 ± 1) ºC	0.22	ºC	2	95%	No	Approved on 03 November 2009	33	CEM
Temperature	Noble-metal thermocouples type S or R	Silver point	961.78	961.78	ºC	Ambient temperature	(23 ± 1) ºC	0.25	ºC	2	95%	No	Approved on 03 November 2009	34	CEM
Temperature	Noble-metal thermocouples type S or R	Copper point	1084.62	1084.62	ºC	Ambient temperature	(23 ± 1) ºC	0.34	ºC	2	95%	No	Approved on 03 November 2009	35	CEM

Thermometry, Spain, CEM (Centro Español de Metrologia)

Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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?	Comments	NMI Service Identifier	NMI Service Provider
Temperature	Noble-metal thermocouples type Pt/Pd	Tin point	231.928	231.928	ºC	Ambient temperature	(23 ± 1) ºC	0.28	ºC	2	95%	No	Approved on 03 November 2009	36	CEM
Temperature	Noble-metal thermocouples type Pt/Pd	Zinc point	419.519	419.519	ºC	Ambient temperature	(23 ± 1) ºC	0.21	ºC	2	95%	No	Approved on 03 November 2009	37	CEM
Temperature	Noble-metal thermocouples type Pt/Pd	Aluminium point	660.323	660.323	ºC	Ambient temperature	(23 ± 1) ºC	0.14	ºC	2	95%	No	Approved on 03 November 2009	38	CEM
Temperature	Noble-metal thermocouples type Pt/Pd	Silver point	961.78	961.78	ºC	Ambient temperature	(23 ± 1) ºC	0.10	ºC	2	95%	No	Approved on 03 November 2009	39	CEM
Temperature	Noble-metal thermocouples type Pt/Pd	Copper point	1084.62	1084.62	ºC	Ambient temperature	(23 ± 1) ºC	0.19	ºC	2	95%	No	Approved on 03 November 2009	40	CEM
Temperature	Noble-metal thermocouples type Au/Pt	Tin point	231.928	231.928	ºC	Ambient temperature	(23 ± 1) ºC	0.16	ºC	2	95%	No	Approved on 03 November 2009	36b	CEM
Temperature	Noble-metal thermocouples type Au/Pt	Zinc point	419.519	419.519	ºC	Ambient temperature	(23 ± 1) ºC	0.12	ºC	2	95%	No	Approved on 03 November 2009	37b	CEM
Temperature	Noble-metal thermocouples type Au/Pt	Aluminium point	660.323	660.323	ºC	Ambient temperature	(23 ± 1) ºC	0.10	ºC	2	95%	No	Approved on 03 November 2009	38b	CEM
Temperature	Noble-metal thermocouples type Au/Pt	Silver point	961.78	961.78	ºC	Ambient temperature	(23 ± 1) ºC	0.10	ºC	2	95%	No	Approved on 03 November 2009	39b	CEM
Temperature	Noble-metal thermocouples type S or R	Calibration at fixed points	0	961.78	ºC	Ambient temperature	(23 ± 1) ºC	0.40	ºC	2	95%	No	Approved on 03 November 2009	41	CEM
Temperature	Noble-metal thermocouples type S or R	Calibration at fixed points	961.78	1084.62	ºC	Ambient temperature	(23 ± 1) ºC	0.41	ºC	2	95%	No	Approved on 03 November 2009	42	CEM
Temperature	Noble-metal thermocouples type Pt/Pd or Au/Pt	Calibration at fixed points	0	961.78	ºC	Ambient temperature	(23 ± 1) ºC	0.21	ºC	2	95%	No	Approved on 03 November 2009	43	CEM
Temperature	Noble-metal thermocouples type Pt/Pd	Calibration at fixed points	961.78	1084.62	ºC	Ambient temperature	(23 ± 1) ºC	0.24	ºC	2	95%	No	Approved on 03 November 2009	44	CEM
Temperature	Noble-metal thermocouples type Au/Pt	Calibration at fixed points	0	961.78	ºC	Ambient temperature	(23 ± 1) ºC	0.16	ºC	2	95%	No	Approved on 03 November 2009	44b	CEM
Temperature	Liquid-in-glass thermometers	Comparison	-80	-60	ºC	Liquid bath	alcohol bath	0.06	ºC	2	95%	No	Approved on 03 November 2009	45	CEM

Thermometry, Spain, CEM (Centro Español de Metrologia), INTA (Instituto Nacional de Técnica Aeroespacial)

Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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?**	**Comments**	**NMI Service Identifier**	**NMI Service Provider**
Temperature	Liquid-in-glass thermometers	Comparison	-60	0	ºC	Liquid bath	alcohol bath	0.02	ºC	2	95%	No	Approved on 03 November 2009	46	CEM
Temperature	Liquid-in-glass thermometers	Comparison	0	90	ºC	Liquid bath	water bath	0.01	ºC	2	95%	No	Approved on 03 November 2009	47	CEM
Temperature	Liquid-in-glass thermometers	Comparison	90	200	ºC	Liquid bath	oil bath	0.02	ºC	2	95%	No	Approved on 03 November 2009	48	CEM
Temperature	Liquid-in-glass thermometers	Comparison	200	250	ºC	Liquid bath	oil bath	0.04	ºC	2	95%	No	Approved on 03 November 2009	49	CEM
Temperature	Temperature Sensors with Display Unit	Comparison	-80	0	ºC	Liquid bath	alcohol bath	0.02	ºC	2	95%	No	Approved on 03 November 2009	71	CEM
Temperature	Temperature Sensors with Display Unit	Comparison	0	90	ºC	Liquid bath	water bath	0.01	ºC	2	95%	No	Approved on 03 November 2009	72	CEM
Temperature	Temperature Sensors with Display Unit	Comparison	90	250	ºC	Liquid bath	oil bath	0.02	ºC	2	95%	No	Approved on 03 November 2009	73	CEM
Temperature	Water triple point cell	Direct comparison	0.01	0.01	ºC	Ambient temperature	(23 ± 1) ºC	0.12	mK	2	95%	No	Approved on 20 January 2010	3	CEM
Temperature	Long stem SPRT	Calibration at water triple point	0.01	0.01	ºC	Ambient temperature	(23 ± 1) ºC	0.5	mK	2	95%	No	Approved on 20 January 2010	12	CEM
Temperature	Long stem SPRT	Calibration at the triple point of Argon	-189.3442	-189.3442	ºC	Ambient temperature	(23 ± 1) ºC	1.5	mK	2	95%	No	Approved on 20 May 2010	10	CEM
Temperature	Long stem SPRT	Calibration at the melting point of Gallium	29.7646	29.7646	ºC	Ambient temperature	(23 ± 1) ºC	0.5	mK	2	95%	No	Approved on 20 May 2010	13	CEM
Temperature	Long stem SPRT	Calibration at the freezing point of Indium	156.5985	156.5985	ºC	Ambient temperature	(23 ± 1) ºC	1.3	mK	2	95%	No	Approved on 20 May 2010	14	CEM
Temperature	Long stem SPRT	Calibration at the freezing point of Tin	231.928	231.928	ºC	Ambient temperature	(23 ± 1) ºC	1.3	mK	2	95%	No	Approved on 20 May 2010	15	CEM

Amount of substance, Gases, Spain

CEM (Centro Español de Metrologia)

The expanded uncertainty range is expressed as the uncertainty of the smallest value of the quantity to the uncertainty of the largest value of the quantity.
The expanded uncertainties correspond to k = 2 (level of confidence 95%)

NMI Service Identifier	Measurement Service Sub-Category	Matrix	Measurand		Dissemination Range of Measurement Capability			Range of Expanded Uncertainties as Disseminated				Range of Certified Values in Reference Materials			Range of Expanded Uncertainties for Certified Value				Mechanism(s) for Measurement Service Delivery	Comments	Service provider
			Analyte or Component	Quantity	From	To	Unit	From	To	Unit	Is the expanded uncertainty a relative one?	From	To	Unit	From	To	Unit	Is the expanded uncertainty a relative one?			
6.6-05(a)	Environmental	nitrogen	nitrogen monoxide	Amount-of-substance fraction	25	500	µmol/mol	1.0	1.0	%	Yes								CRM, analyser calibration	Approved on 01 March 2005	CEM
6.6-06(a)	Environmental	nitrogen	methane	Amount-of-substance fraction	1	50	µmol/mol	1.6	1.6	%	Yes	1	5.3	µmol/mol	1.0	0.5	%	Yes	PRM supply, CRM, analyser calibration	Approved on 01 March 2005	CEM
6.6-02(a)	Environmental	nitrogen	carbon dioxide	Amount of substance fraction	0.2	200	mmol/mol	0.5	0.5	%	Yes	0.2	200	mmol/mol	0.3	0.3	%	Yes	Calibration, CRM, 6.6-02(a)		CEM
6.6-04(b)	Environmental	nitrogen	propane	Amount-of-substance fraction	600	4000	µmol/mol	0.9	0.9	%	Yes	600	4000	µmol/mol	0.9	0.9	%	Yes	PRM supply, CRM, analyser calibration	Approved on 01 March 2005	CEM
6.6-01(b)	Environmental	nitrogen	carbon monoxide	Amount of substance fraction	5	500	µmol/mol	1.6	1.4	%	Yes	10	500	µmol/mol	0.8	0.7	%	Yes	PRM supply, CRM, analyser calibration	Approved on 19 July 2010	CEM
6.6-01(a)	Environmental	nitrogen	carbon monoxide	Amount of substance fraction	500	2000	µmol/mol	1.4	0.6	%	Yes	500	2000	µmol/mol	0.7	0.3	%	Yes	PRM supply, CRM, analyser calibration	Approved on 19 July 2010	CEM
6.6-03(a)	Environmental	nitrogen	oxygen	Amount-of-substance fraction	2	210	mmol/mol	0.5	0.4	%	Yes	2	210	mmol/mol	0.2	0.2	%	Yes	PRM supply and analyser calibration	Approved on 31 March 2006	CEM
6.6-03(b)	Environmental	nitrogen	oxygen	Amount-of-substance fraction	2	210	mmol/mol	0.5	0.4	%	Yes	2	210	mmol/mol	0.8	0.6	%	Yes	CRM supply and analyser calibration	Approved on 31 March 2006	CEM
6.6-4A(b)	Environmental	nitrogen	carbon monoxide	Amount-of-substance fraction	5	100	mmol/mol	0.6	0.6	%	Yes	5	100	mmol/mol	0.9	0.9	%	Yes	CRM supply and analyser calibration	Approved on 31 March 2006	CEM
			carbon dioxide	Amount-of-substance fraction	10	200	mmol/mol	1.0	1.0	%	Yes	10	200	mmol/mol	1.2	1.2	%	Yes	CRM supply and analyser calibration		
			propane	Amount-of-substance fraction	600	4000	µmol/mol	0.9	0.9	%	Yes	600	4000	µmol/mol	1.2	1.2	%	Yes	CRM supply and analyser calibration		
6.6-7G (2)	Fuel	synthetic natural gas	methane	Amount-of-substance fraction	740	920	mmol/mol	0.3	0.5	%	Yes								Calibration	Approved on 02 July 2007	CEM
			ethane	Amount-of-substance fraction	28	95	mmol/mol	0.6	0.4	%	Yes										

Amount of substance, Gases, Spain

CEM (Centro Español de Metrologia)

The expanded uncertainty range is expressed as the uncertainty of the smallest value of the quantity to the uncertainty of the largest value of the quantity.
The expanded uncertainties correspond to k = 2 (level of confidence 95%)

NMI Service Identifier	Measurement Service Sub-Category	Matrix	Measurand		Dissemination Range of Measurement Capability			Range of Expanded Uncertainties as Disseminated				Range of Certified Values in Reference Materials			Range of Expanded Uncertainties for Certified Value				Mechanism(s) for Measurement Service Delivery	Comments	Service provider
			Analyte or Component	Quantity	From	To	Unit	From	To	Unit	Is the expanded uncertainty a relative one?	From	To	Unit	From	To	Unit	Is the expanded uncertainty a relative one?			
			propane	Amount-of-substance fraction	8	35	mmol/mol	1.0	0.3	%	Yes										
			i-butane	Amount-of-substance fraction	1.5	12	mmol/mol	1.4	0.5	%	Yes										
			n-butane	Amount-of-substance fraction	1.5	12	mmol/mol	1.4	0.4	%	Yes										
			carbon dioxide	Amount-of-substance fraction	8	32	mmol/mol	1.6	0.5	%	Yes										
			nitrogen	Amount-of-substance fraction	35	75	mmol/mol	1.3	0.5	%	Yes										
6.6-4A(a)	Environmental	nitrogen	carbon monoxide	Amount -of-substance fraction	1	100	mmol/mol	0.5	0.3	%	Yes	1	100	mmol/mol	0.3	0.2	%	Yes	Calibration, PRM (6.6-4A(PRM)) and CRM (6.6-4A(CRM))	Approved on 15 December 2008	CEM
			carbon dioxide	Amount -of-substance fraction	10	800	mmol/mol	0.3	0.1	%	Yes	10	800	mmol/mol	0.2	0.1	%				
			propane	Amount -of-substance fraction	0.02	3	mmol/mol	0.7	0.5	%	Yes	0.02	3	mmol/mol	0.5	0.3	%				
			oxygen	Amount -of-substance fraction	1	210	mmol/mol	1.0	0.7	%	Yes	1	210	mmol/mol	0.5	0.4	%				