

Thermometry, China, MIM (National Institute of Metrology)



Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty					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?		
Temperature	Argon triple point cell	Comparison with reference cell(s)	83.8058	83.8058	K	Isothermal cryostat		0.40	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	Mercury triple point cell	Comparison with reference cell(s)	234.3156	234.3156	K	Temperature controlled bath		0.40	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	Water triple point cell	Comparison with reference cell(s)	273.16	273.16	K	Ethanol bath		0.16	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	Gallium melting point cell	Comparison with reference cell(s)	302.9146	302.9146	K	1-zone furnace		0.58	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	Indium freezing point cell	Comparison with reference cell(s)	429.7485	429.7485	K	3-zone furnace		1.5	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	Tin freezing point cell	Comparison with reference cell(s)	505.078	505.078	K	3-zone furnace		0.8	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	Zinc freezing point cell	Comparison with reference cell(s)	692.677	692.677	K	3-zone furnace		1.1	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	Aluminum freezing point cell	Comparison with reference cell(s)	933.473	933.473	K	3-zone furnace		1.9	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	Silver freezing point cell	Comparison with reference cell(s)	1234.93	1234.93	K	3-zone furnace		2.8	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	SPRT	Argon triple point cell	83.8058	83.8058	K	Isothermal cryostat		0.59	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	SPRT	Mercury triple point cell	234.3156	234.3156	K	Temperature controlled bath		0.59	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	SPRT	Water triple point cell	273.16	273.16	K	Ethanol bath		0.16	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	SPRT	Gallium melting point cell	302.9146	302.9146	K	1-zone furnace		0.63	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	SPRT	Indium freezing point cell	429.7485	429.7485	K	3-zone furnace		1.5	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	SPRT	Tin freezing point cell	505.078	505.078	K	3-zone furnace		1.1	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	SPRT	Zinc freezing point cell	692.677	692.677	K	3-zone furnace		1.4	mK	2	95%	No	2605	Approved on 10 November 2015

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Temperature	SPRT	Aluminum freezing point cell	933.473	933.473	K	3-zone furnace		2.4	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	SPRT	Silver freezing point cell	1234.93	1234.93	K	3-zone furnace		3.7	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	IPRT	Comparison in liquid bath	-60	5	°C	Alcohol bath		20	mK	2	95%	No	2605	Approved on 10 November 2015. Hysteresis included, points only
Temperature	IPRT	Comparison in liquid bath	5	95	°C	Water bath		18	mK	2	95%	No	2605	Approved on 10 November 2015. Hysteresis included, points only
Temperature	IPRT	Comparison in liquid bath	95	200	°C	Oil bath		22	mK	2	95%	No	2605	Approved on 10 November 2015. Hysteresis included, points only
Temperature	IPRT	Comparison in liquid bath	200	300	°C	Oil bath		24	mK	2	95%	No	2605	Approved on 10 November 2015. Hysteresis included, points only
Temperature	Liquid-in-glass thermometer	Comparison at liquid bath	-60	0	°C			30	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	Liquid-in-glass thermometer	Comparison at liquid bath	0	100	°C			20	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	Liquid-in-glass thermometer	Comparison at liquid bath	100	200	°C			30	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	Liquid-in-glass thermometer	Comparison at liquid bath	200	300	°C			40	mK	2	95%	No	2605	Approved on 10 November 2015
Temperature	Liquid-in-glass thermometer	Comparison in liquid bath	-60	5	°C	Alcohol bath		26	mK	2	95%	No	2605	Total immersion, 0.1 °C graduation. Approved on 10 November 2015

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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?		
Temperature	Liquid-in-glass thermometer	Comparison in liquid bath	5	95	°C	Water bath		26	mK	2	95%	No	2605	Total immersion, 0.05 °C graduation. Approved on 10 November 2015
Temperature	Liquid-in-glass thermometer	Comparison in liquid bath	95	200	°C	Oil bath		26	mK	2	95%	No	2605	Total immersion, 0.1 °C graduation. Approved on 10 November 2015
Temperature	Liquid-in-glass thermometer	Comparison in liquid bath	200	300	°C	Oil bath		30	mK	2	95%	No	2605	Total immersion, 0.1 °C graduation. Approved on 10 November 2015
Temperature	Thermocouple Type S and R	Fixed-point calibration	0	1100	°C			0.35	K	2	95%	No	2605	Approved on 10 November 2015
Temperature	Thermocouple Type S and R	Calibration at fixed point	1084.62	1084.62	°C	Cu fixed point		0.32	K	2	95%	No	2605	Inhomogeneity included. Approved on 10 November 2015
Temperature	Thermocouple Type S and R	Calibration at fixed point	961.78	961.78	°C	Ag fixed point		0.30	K	2	95%	No	2605	Inhomogeneity included. Approved on 10 November 2015
Temperature	Thermocouple Type S and R	Calibration at fixed point	660.323	660.323	°C	Al fixed point		0.23	K	2	95%	No	2605	Inhomogeneity included. Approved on 10 November 2015
Temperature	Thermocouple Type S and R	Calibration at fixed point	419.527	419.527	°C	Zn fixed point		0.14	K	2	95%	No	2605	Inhomogeneity included. Approved on 10 November 2015
Temperature	Fixed-point blackbody furnace (Ag)	Comparison using radiation thermometer	961.8	961.8	°C	Wavelength	0.66 μm	0.3	°C	2	95%	No	2605	Approved on 10 November 2015

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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?		
Temperature	Radiation thermometer	Direct scale realization by measurement of relative spectral responsivity	961.78	1700	°C	Wavelength	0.66 μm	0.13 to 0.30	°C	2	95%	No	2605	Approved on 10 November 2015
Temperature	Strip lamp (vacuum)	Comparison using radiation thermometer	961.8	1700	°C	Wavelength	0.66 μm	0.20 to 0.31	°C	2	95%	No	2605	Approved on 10 November 2015
Temperature	Strip lamp (gas filled)	Comparison using radiation thermometer	1700	1700	°C	Wavelength	0.66 μm	0.6	°C	2	95%	No	2605	Approved on 10 November 2015
Temperature	Radiation thermometer	Calibration by reference strip lamp	1000	1700	°C	Wavelength	0.66 μm	0.6 to 0.7	°C	2	95%	No	2605	Approved on 10 November 2015
Temperature	Strip lamp (vacuum)	Comparison using radiation thermometer	962	1400	°C	Wavelength	0.66 μm	1.3 to 1.4	°C	2	95%	No	2605	Approved on 10 November 2015
Temperature	Strip lamp (gas filled)	Comparison using radiation thermometer	1400	1700	°C	Wavelength	0.66 μm	1.8	°C	2	95%	No	2605	Approved on 10 November 2015
Temperature	SPRT	Water triple point cell, Argon triple point cell, Mercury triple point cell	83.8058	273.16	K	Cryostat, or temperature controlled bath		0.7	mK	2	95%	No	2605	Approved on 20 April 2017
Temperature	SPRT	Water and Mercury triple point cells, Gallium melting point cell	234.3156	302.9146	K	Temperature controlled bath, or 1-zone furnace		0.7	mK	2	95%	No	2605	Approved on 20 April 2017
Temperature	SPRT	Water triple point cell, Gallium melting point cell	273.16	302.9146	K	Ethanol bath, or 1-zone furnace		0.7	mK	2	95%	No	2605	Approved on 20 April 2017
Temperature	SPRT	Water triple point cell, Indium freezing point cell	273.16	429.7485	K	Ethanol bath, or 3-zone furnace		1.6	mK	2	95%	No	2605	Approved on 20 April 2017

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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?		
Temperature	SPRT	Water triple point cell, Indium and Tin freezing point cells	273.16	505.078	K	Ethanol bath, or 3-zone furnace		1.6	mK	2	95%	No	2605	Approved on 20 April 2017
Temperature	SPRT	Water triple point cell, Tin and Zinc freezing point cells	273.16	692.677	K	Ethanol bath, or 3-zone furnace		1.7	mK	2	95%	No	2605	Approved on 20 April 2017
Temperature	SPRT	Water triple point cell, Tin, Zinc and Aluminum freezing point cells	273.16	933.473	K	Ethanol bath, or 3-zone furnace		2.7	mK	2	95%	No	2605	Approved on 20 April 2017
Temperature	SPRT	Water triple point cell, Tin, Zinc, Aluminum and Silver freezing point cells	273.16	1234.93	K	Ethanol bath, or 3-zone furnace		4.1	mK	2	95%	No	2605	Approved on 20 April 2017