

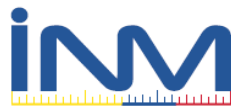
INM - National Metrology Institute of Colombia

Quantity: Temperature and Humidity

2017-10-05

Calibration and Measurement Capability (CMC) - INM Declarations NVLAP LAB CODE 200947-0

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					Reference Standard used in calibration	
Quantity/ 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?	Standard	Source of traceability
Temperature	Platinum Resistance Thermometer	Ice point bath	0	0	°C	Temperature	21 °C ± 2 °C	0.013	°C	2	95%	No	Ice point bath	INM
						Relative humidity	50% RH ± 15% RH							
Temperature	Platinum Resistance Thermometer	Comparison in stirred ethanol bath	-80	0	°C	Temperature	21 °C ± 2 °C	0.072	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Platinum Resistance Thermometer	Comparison in stirred water and oil baths	0	150	°C	Temperature	21 °C ± 2 °C	0.044	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Platinum Resistance Thermometer	Comparison in metal block furnace	50	100	°C	Temperature	21 °C ± 2 °C	0.120	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Platinum Resistance Thermometer	Comparison in metal block furnace	100	200	°C	Temperature	21 °C ± 2 °C	0.22	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Platinum Resistance Thermometer	Comparison in metal block furnace	200	300	°C	Temperature	21 °C ± 2 °C	0.32	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Platinum Resistance Thermometer	Comparison in metal block furnace	300	419.5	°C	Temperature	21 °C ± 2 °C	0.44	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Thermocouples: noble metal, (Types S, R and B)	Comparison ice point and metal tube & block furnace	0	400	°C	Temperature	21 °C ± 2 °C	0.12 to 1.2	°C	2	95%	No	Noble metal T/C	INM, PTB



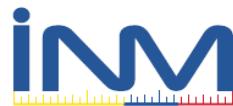
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						Relative humidity	50% RH ± 15% RH							
Temperature	Thermocouples: noble metal, (Types S, R and B)	Comparison metal tube & block furnace	400	800	°C	Temperature	21 °C ± 2 °C	1.2 to 2.4	°C	2	95%	No	Noble metal T/C	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Thermocouples: noble metal, (Types S, R and B)	Comparison metal tube & block furnace	800	1200	°C	Temperature	21 °C ± 2 °C	2.4 to 3.3	°C	2	95%	No	Noble metal T/C	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 0.05 °C graduation Total immersion, Mercury	Comparison in stirred liquid bath	-38	5	°C	Temperature	21 °C ± 2 °C	0.048	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 0.1 °C graduation Total immersion, Mercury	Comparison in stirred liquid bath	-38	5	°C	Temperature	21 °C ± 2 °C	0.049	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 0.2 °C graduation Total immersion, Mercury	Comparison in stirred liquid bath	-38	5	°C	Temperature	21 °C ± 2 °C	0.056	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 0.5 °C graduation Total immersion, Mercury	Comparison in stirred liquid bath	-38	5	°C	Temperature	21 °C ± 2 °C	0.092	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 1 °C graduation	Comparison in stirred liquid bath	-38	5	°C	Temperature	21 °C ± 2 °C	0,17	°C	2	95%	No	SPRTs	PTB



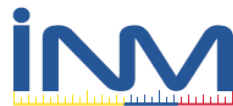
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Quantity/ Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?	Standard	Source of traceability
	Total immersion, Mercury					Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 0.05 °C graduation Total immersion, Mercury	Comparison in stirred liquid bath	5	80	°C	Temperature	21 °C ± 2 °C	0.037	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 0.1 °C graduation	Comparison in stirred liquid bath	5	80	°C	Temperature	21 °C ± 2 °C	0.039	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 0.2 °C graduation	Comparison in stirred liquid bath	5	80	°C	Temperature	21 °C ± 2 °C	0.048	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 0.5 °C graduation Total immersion, Mercury	Comparison in stirred liquid bath	5	80	°C	Temperature	21 °C ± 2 °C	0.089	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 1 °C graduation Total immersion, Mercury	Comparison in stirred liquid bath	5	80	°C	Temperature	21 °C ± 2 °C	0.17	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 0.05 °C graduation Total immersion, Mercury	Comparison in stirred liquid bath	80	150	°C	Temperature	21 °C ± 2 °C	0.053	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 0.1 °C graduation Total immersion, Mercury	Comparison in stirred liquid bath	80	150	°C	Temperature	21 °C ± 2 °C	0.054	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							



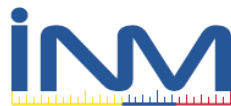
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Quantity/ Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?	Standard	Source of traceability
Temperature	Liquid-in-Glass thermometers: 0.2 °C graduation Total immersion, Mercury	Comparison in stirred liquid bath	80	150	°C	Temperature	21 °C ± 2 °C	0.061	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 0.5 °C graduation Total immersion, Mercury	Comparison in stirred liquid bath	80	150	°C	Temperature	21 °C ± 2 °C	0.096	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 1 °C graduation Total immersion, Mercury	Comparison in stirred liquid bath	80	150	°C	Temperature	21 °C ± 2 °C	0.17	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 0.02 °C graduation Total immersion, Mercury	Comparison in stirred liquid bath	16	24	°C	Temperature	21 °C ± 2 °C	0.013	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Liquid-in-Glass thermometers: 0.01 °C graduation Total immersion, Mercury	Comparison in stirred liquid bath	-1	1	°C	Temperature	21 °C ± 2 °C	0.013	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Digital System Thermometers (PRT Sensor)	Ice point bath	0	0	°C	Temperature	21 °C ± 2 °C	0.013	°C	2	95%	No	Ice point bath	INM
						Relative humidity	50% RH ± 15% RH							
Temperature	Digital System Thermometers (PRT Sensor)	Comparison in stirred ethanol bath	-80	0	°C	Temperature	21 °C ± 2 °C	0.072	°C	2	95%	No	SPRTs	PTB
							50% RH ± 15% RH							
Temperature	Digital System Thermometers (PRT Sensor)	Comparison in stirred water and oil baths	0.00	150	°C	Temperature	21 °C ± 2 °C	0.044	°C	2	95%	No	SPRTs	PTB



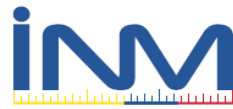
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							50% RH ± 15% RH							
Temperature	Digital System Thermometers (PRT Sensor)	Comparison in metal block furnace	50	100	°C	Temperature	21 °C ± 2 °C	0.12	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Digital System Thermometers (PRT Sensor)	Comparison in metal block furnace	100	200	°C	Temperature	21 °C ± 2 °C	0.22	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Digital System Thermometers (PRT Sensor)	Comparison in metal block furnace	200	300	°C	Temperature	21 °C ± 2 °C	0.32	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Digital System Thermometers (PRT Sensor)	Comparison in metal block furnace	300	419.5	°C	Temperature	21 °C ± 2 °C	0.44	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Temperature	Digital System Thermometers (Base metal thermocouple sensor)	Comparison in stirred liquid bath and metal block furnace	-80	250	°C	Temperature	21 °C ± 2 °C	0.80	°C	2	95%	No	SPRTs	PTB
						Relative humidity	50% RH ± 15% RH							
Humidity	Relative Humidity (capacitive hygrometers)	Chilled mirror hygrometer and two pressure humidity generator	12	85	%RH	Temperature	21 °C ± 2 °C	1.7 to 2.5	% RH	2	95%	No	Chilled mirror hygrometer and two pressure humidity generator	PTB, INM
		at 20 °C and Patm Bogota				Relative humidity	50% RH ± 15% RH							



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Temperature	Thermohygrometers: temperature measurement	Comparison in climatic chamber	0	70	°C	Temperature	21 °C ± 2 °C	0.2	°C	2	95%	No	Digital System Thermometers (PRT sensors)	INM
						Relative humidity	50% RH ± 15% RH							

https://kcdb.bipm.org/appendixC/T/CO/T_CO.pdf

<https://www-s.nist.gov/nisw/index.cfm?event=directory.detail&labId=678&programId=0&singleResult=true&csrfToken=0D8A958AA9589E3EF9CC0EF1D3F36082B4A6BF92>