CMC review protocol for calibration of fixed point cells (excluding the TPW) and for calibration of SPRTs at fixed points

Scope

To provide a method of reviewing thermometry CMCs in the sub-fields of fixed point cells for contact thermometry and standard platinum resistance thermometers for acceptance in Appendix C of the KCDB. Covers service category numbers 1.1.1, 1.2.1 and 1.3 of the "CMC Service Categories for Temperature and Humidity (October 2009)" in the KCDB.

This protocol for the review of contact thermometry fixed point cell and standard platinum resistance thermometer CMCs supersedes the version of 18 May 2008.

Participation in a CCT or RMO Key Comparison (KC), or in a bilateral comparison linking to such a Key Comparison, is mandatory for acceptance of fixed point CMCs.
If the KC is published without a KCRV, the Pilot Laboratory may be asked to provide a linkage mechanism to aid in the evaluation of CMCs with respect to the KC.

1.   No review is needed if

1.1 $$\frac{|T_{NMI} - KCRV|}{\sqrt{U_{CMC}^2(k=2) + U_{comparison}^2(k=2)}} < 1,$$

where T_{NMI} is the result of the NMI in the Key Comparison and $U_{comparison}$ is the combined uncertainty of the KCRV and any other components related to the comparison that are not included in the uncertainty of the KCRV or in the uncertainty quoted by the NMI in the KC (e.g., drift of the transfer artefact),

and

1.2 $U_{CMC}(k=2) \geq U_{NMI\_KC}(k=2)$,

where U_{NMI_KC} is the uncertainty quoted by the NMI in the KC,

and

1.3 $U_{CMC}(k=2) > \dfrac{U_{comparison}(k=2)}{3}$.

2.   Scrutiny by the RMO Thermometry WG is needed if

2.1   Condition 1.1 is <u>not</u> satisfied, but $\dfrac{|T_{NMI} - KCRV|}{\sqrt{U_{CMC}^2(k=3) + U_{comparison}^2(k=3)}} < 1$

and

2.2   conditions 1.2 and 1.3 are satisfied

and

2.3 $U_{CMC}(k=2) \geq Table\_1\_value$.

Table 1. Cut-off criteria for review of fixed point CMCs (excluding calibration of TPW cells). Values are estimated from the 25th percentile of results of CCT K2, K3 and K4.

Fixed point cells for capsule SPRT calibration

Fixed point cell	25th percentile $U(k=2)$, mK	Fixed point cell	25th percentile $U(k=2)$, mK	Fixed point cell	25th percentile $U(k=2)$, mK
e-H_2	0.33	Ne	0.32	Hg	0.16
17 K	0.26	O_2	0.20		
20.3 K	0.24	Ar	0.18	Ga	0.20

Fixed point cells for long-stem SPRT calibration

Fixed point cell	25th percentile $U(k=2)$, mK	Fixed point cell	25th percentile $U(k=2)$, mK	Fixed point cell	25th percentile $U(k=2)$, mK
Ar	0.38	Ga	0.20	Zn	0.90
Hg	0.23	In	0.70	Al	1.90
		Sn	0.60	Ag	3.00

3. *Scrutiny by the RMO Thermometry WG and CCT WG8 is needed*

in all cases not satisfying conditions 1.1 through 1.3 or 2.1 through 2.3, for example

$$U_{CMC}(k=2) < U_{NMI\_KC}(k=2)$$

or

condition 1.1 not satisfied and $U_{CMC}(k=2) < Table\_1\_value$.

References

[1]   G. F. Strouse et al, "CCT WG8 CMC review protocols: development and implementation", *Int J Thermophys*, 2008, 29, 1193-1203.
[2]   CCT-K2 final report
[3]   CCT-K3 final report
[4]   CCT-K4 final report